Developing Municipal Spatial Data Infrastructure (MSDI) for Dodhara Chandani Municipality

Capacity Assessment, Recommendations, and Roadmap

EXECUTIVE SUMMARY

The establishment of a Municipal Spatial Data Infrastructure (MSDI) in Dodhara Chandani Municipality is a strategic administrative requirement necessitated by the constitutional mandates for devolved governance and evidence-based urban management. This report serves as a technical blueprint for transitioning the local government from a fragmented, manual record-keeping environment toward a modern, integrated geospatial ecosystem. The proposed framework is designed to address the specific geographical vulnerabilities of the municipality, including its high exposure to Mahakali River flooding, while preparing the administrative infrastructure for the economic expansion associated with the upcoming Dodhara Chandani Dry Port and Integrated Check Post. By institutionalising the discovery, sharing, and application of spatial information, the municipality intends to transform geographic data into a fundamental utility for sustainable development.

The research approach utilized for this report followed a six-phase methodology anchored in international best practices and Nepal's National Spatial Data Infrastructure (NSDI) guidelines. This included a comprehensive literature review of global frameworks such as INSPIRE and the UN-IGIF, followed by a local contextual analysis and high-level stakeholder consultations with municipal leadership. The methodology ensured that the final recommendations are technically robust, locally applicable, and aligned with the Local Government Operation Act (2017).

A rigorous capacity assessment of the municipality revealed a current operational status classified as Pre-GIS. While the municipality possesses high-value technical assets, including enterprise-grade Dell PowerEdge servers and fibre-optic connectivity, these remain as ghost infrastructure that is currently dormant or underutilised. The technical audit identified that spatial data remains sequestered within departmental digital islands, with critical infrastructure files stored in isolated astandardised metadata, and a dedicated geospatial unit results in the rapid degradation of information and the redundant duplication of data collection efforts across departments.

The strategic solution proposed in this report is structured around the Institutional, People, Data, and Systems (IPDS) framework to facilitate a holistic institutional transition. The findings of the framework can be summarized as:

- Institutional arrangements focus on the enactment of a formal MSDI Policy and the establishment of a dual-tier governance structure comprising a Steering Committee for policy oversight and an Execution Committee for technical management.
- Human capital recommendations prioritise the formal recruitment of a permanent Geomatics Engineer and the implementation of continuous capacity-building programmes to bridge the identified skills gap in spatial database management and geoprocessing.
- Data protocols establish rigorous standards for the formalisation of framework data themes and the development of a comprehensive geospatial data inventory to ensure all municipal assets are findable, accessible, interoperable, and reusable.
- Systems recommendations involve the operationalisation of a centralised Municipal Geoportal and the configuration of existing server infrastructure to serve as a single source of truth for municipal discovery and visualization services.

The implementation roadmap is structured across a ten-quarter timeline to ensure systematic institutional absorption. This roadmap begins with the establishment of the legal and institutional foundation, followed by the concurrent development of data standards and technical systems. The final phase focuses on operational scaling and the integration of the MSDI into routine municipal workflows such as property taxation, land-use zoning, and disaster risk reduction. By following this phased approach, Dodhara Chandani Municipality will secure the technical and administrative resilience required to function as a data-driven logistics and trade hub in the far-western region of Nepal.

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API	Application Programming Interface
CAD	Computer-Aided Design
CAO	Chief Administrative Officer
CPL	City Planning Labs
CSW	Catalog Service for the Web
DHM	Department of Hydrology and Meteorology
DPRP	Disaster Preparedness and Response Plan
DPS	Data Product Specifications
DRR	Disaster Risk Reduction
FAIR	Findable, Accessible, Interoperable, and Reusable
FGDC	Federal Geographic Data Committee
GIID	Geographic Information Infrastructure Division
GIS	Geographic Information System
GML	Geography Markup Language
HDI	Human Development Index
HMIS	Health Management Information System
ICP	Integrated Check Post
INGO	International Non-Governmental Organization
INSPIRE	Infrastructure for Spatial Information in the European Community
IPDS	Institutional Arrangements, People, Data, and Systems
ISO	International Organization for Standardization
IT	Information Technology
JD	Job Description
KII	Key Informant Interview
LMTC	Land Management Training Center
MIS	Management Information System
MoU	Memorandum of Understanding
MSDI	Municipal Spatial Data Infrastructure
MUTM	Modified Universal Transverse Mercator
NAS	Network Attached Storage
NGII	National Geographic Information Infrastructure
NGO	Non-Governmental Organization
NSDI	National Spatial Data Infrastructure
O&M	Organization and Management
ODK	Open Data Kit
OGC	Open Geospatial Consortium
PoC	Proof of Concept
RBAC	Role-Based Access Controls

SDI	Spatial Data Infrastructure
SMC	Surat Municipal Corporation
SOP	Standard Operating Procedure
UN-IGIF	United Nations Integrated Geospatial Information Framework
VDC	Village Development Committee
WFS	Web Feature Service
WMS	Web Map Service
XML	Extensible Markup Language

CHAPTER 1
INTRODUCTION

01

1.1 Background

The transition of Nepal into a federal state has fundamentally redefined the country's governance landscape and the role of local authorities. The promulgation of the Constitution of Nepal in 2015, followed by the subsequent restructuring of the country, marked a significant shift from a centralized, unitary system to a federal structure comprising three tiers of government. As a result, Nepal is now divided into one federal government, seven provinces, and 753 local levels, which include 6 Metropolitan Cities, 11 Sub-metropolitan Cities, 276 municipalities, and 460 rural municipalities. This restructuring extends beyond the mere reorganization of administrative boundaries; it represents a profound empowerment of local units through political, administrative, and fiscal devolution. Under the Constitution and the Local Government Operation Act (2017), local governments are vested with a robust set of exclusive and concurrent powers, granting them the autonomy to enact legislation, formulate budgets, and manage the entire development lifecycle. To effectively fulfill these mandates, a data-driven approach is essential, as it replaces guesswork with evidence and ensures that municipal activities are conducted with precision and efficiency.

Despite this clear constitutional mandate, a significant gap remains between the devolved authority of local governments and the technical infrastructure required to exercise it. While the devolution of power has successfully transferred authorities to the local level, the institutional and technical framework necessary to support data governance remains largely absent. This lack of a structured environment has constrained the effective use of data for municipal functions, resulting in "information silos" where data is in many cases, absent, or when it does exist fragmented, inaccessible, or non-interoperable. Without mechanisms to ensure data availability, standardization, and integration, local governments remain unable to fully translate their legal authority into optimized service delivery.

The implications of this data-governance gap are particularly evident in the context of Dodhara Chandani Municipality. Located in the western plains of Kanchanpur District, the municipality is transitioning from a primarily agrarian economy into a growing trade hub, driven by the development of the Dodhara–Chandani Dry Port. However, this growth remains largely uncoordinated due to the absence of a data-driven planning and decision-support system. Three interrelated challenges contribute to this situation: the fragmentation of data generated by various NGO/INGO projects and government agencies, the institutional redundancy arising from departments collecting inconsistent datasets, and the isolation of more than two dozen digital systems that lack interoperability. These conditions prevent decision-makers from obtaining a comprehensive understanding of the municipality's overall socio-economic and spatial dynamics, leading to inefficient resource allocation and suboptimal planning outcomes.

To address these localized challenges and to advance the broader national vision of federalism, the establishment of a robust spatial ecosystem is required. Closing the information gap necessitates the development of a Municipal Spatial Data Infrastructure (SDI) that enables access to, and effective utilization of, granular-scale data tailored to local needs. By institutionalizing data standards and interoperability, the municipality can reduce redundancy and minimize the wastage of limited resources. Such a spatial ecosystem serves as foundational infrastructure for the entire data-driven governance lifecycle, bridging the gap between raw data and actionable intelligence, and thereby enabling more effective urban planning and municipal management.

1.2 Rationale

The Constitution of Nepal and the Local Government Operation Act (2017) grant local levels extensive mandates to develop policies, manage resources, and deliver essential services. To fulfill these responsibilities effectively, municipalities must transition from subjective decision-making to data-driven governance. Without a structured approach to spatial information collection and management, municipal planning often relies on anecdotal evidence rather than empirical facts. Establishing a Municipal Spatial Data Infrastructure (MSDI) provides the technical and institutional foundation required to convert raw data into actionable insights, as demonstrated by the following use cases:

Use Case 1 - Estimation of Property and Land Tax: Efficient planning and realistic budgeting require accurate revenue forecasting. Property Tax (Ghar-Jagga Kar) and Land Revenue (Bhumi Kar) are primary "own-source" revenues collected and retained by local levels. However, determining the collectible tax base remains a challenge because the necessary data parcel counts, areas, building details, and proximity to infrastructure,exists in fragmented formats across departments. These datasets often use varying coordinate systems and lack standardized documentation. A functional MSDI standardizes data specifications and coordinate systems, allowing the municipality to create a unified digital tax map. This ensures that every taxable asset is accounted for, reducing revenue leakage and enhancing fiscal autonomy.

Use Case 2 - Avoiding Resource on Data Duplicacy: Many municipal projects collect specific spatial data to fulfill their individual objectives. However, without unified protocols and standards, this data is often lost over time or rendered unusable for other departments. This lack of interoperability forces the municipality to repeatedly fund the collection of identical spatial datasets, a wastage of valuable resources that could be utilized for other developmental activities. The municipality can institutionalize data-sharing protocols by establishing an MSDI, ensuring that data collected for one project is readily available and useful for others. These are only two use cases. All sectors within the local government mandate, including urban planning, disaster risk management, infrastructure development, environmental conservation, public health, and education, benefit highly from Findable, Accessible, Interoperable, and Reusable (FAIR) spatial data. This cross-sectoral utility justifies the development of a functional MSDI to replace opinion-based planning with fact-based insights.

The aforementioned are only two representative examples, a geospatially enabled municipality would find applications in areas, such as, urban planning, disaster management, agriculture, land use planning, infrastructure development, etc.

1.3 Objectives

The core purpose of this study is to formulate a comprehensive MSDI Framework for Dodhara Chandani Municipality, focusing on its implementation and long-term sustainability. To achieve this overarching goal, the following specific objectives have been defined:

1. **Conduct a Baseline Capacity and Data Status Assessment:** Evaluate the existing municipal landscape, focusing on current administrative structures, technical infrastructure, human resource capabilities regarding the collection , management , sharing and dissemination of datasets to identify critical gaps and opportunities.
2. **Recommend MSDI Framework:** Design a model framework for data governance, staffing, and data standards in such a way that municipal spatial data is easy to share, regularly updated, and integrated across all departments.
3. **Formulate a Detailed Implementation Roadmap:** Prepare a phased action plan that outlines the timeline, resource requirements, and strategic milestones for transitioning from fragmented data management to an integrated municipal data ecosystem.

1.4 Scope

This study develops a MSDI Framework and Roadmap to operationalize spatial data management within the constitutional and legal mandates granted to Nepal's local governments. It specifically addresses the local context of Dodhara Chandani Municipality, ensuring that the proposed MSDI solves unique municipal issues and enhances local governance.

Since no single, universally agreed-upon framework exists for MSDI in a low income developing country like Nepal, this study synthesizes global best practices and adapts them to the specific requirements of Dodhara Chandani. Consequently, the research evaluates national-level SDI components and examines international MSDI implementations that share a similar context with Nepal to ensure the proposed model is both innovative and locally applicable.

1.5 Limitation of this Study

The scope of this study is subject to several limitations, primarily stemming from the constrained operating environment. The data collection phase was constrained by a limited survey size, involving in-depth interviews with only nine key stakeholders. Furthermore, the capacity assessment and framework development were mostly based on secondary research, adapting international and national models to the local context rather than relying on extensive primary data collection across all departments. This approach, while necessary, means the proposed framework's design is informed by a representative sample of municipal officials and existing documentation, and further validation through broader primary data collection will be required during the initial implementation phase.

CHAPTER 2
MUNICIPAL BASELINE: DODHARA CHANDANI

02

The formulation of a context-specific Municipal Spatial Data Infrastructure (MSDI) is predicated upon a comprehensive evaluation of the geographical, administrative, and socio-economic pillars of the project site. The assessment of local infrastruacture, disaster risk profiles, and service delivery mechanisms identifies critical opportunity areas where data-driven interventions can enhance municipal performance. These variables provide the foundational data necessary to justify the technical design and implementation roadmap discussed in subsequent chapters.

2.1 Geographical Context

Dodhara Chandani Municipality occupies a unique geopolitical and geographical position in the far-western Terai plains of Nepal. Located within the Kanchanpur District of Sudurpashchim Province, it serves as a frontier municipality, bordered by India on its northern, western, and southern flanks. To the east, it is bounded by the Mahakali River, which separates it from Bhimdutt Municipality and the Shuklaphanta National Park.

The municipality covers an area of approximately 57 square kilometers, situated between latitudes 28°49′ to 28°59′ N and longitudes 80°04′ to 80°06′30′ E. Geographically, the territory is characterized by a distinct elongated rectangular shape; its longitudinal (north-south) axis extends roughly 17 kilometers, while its latitudinal (east-west) width is relatively narrow at approximately 4 kilometers.The landscape is defined by its hydrological boundaries: the massive Mahakali River traverses the eastern border, while the Jogbudha River runs along the western periphery. The land situated between these two water bodies consists of flat, fertile alluvial plains, providing a highly favorable environment for intensive agricultural activities.

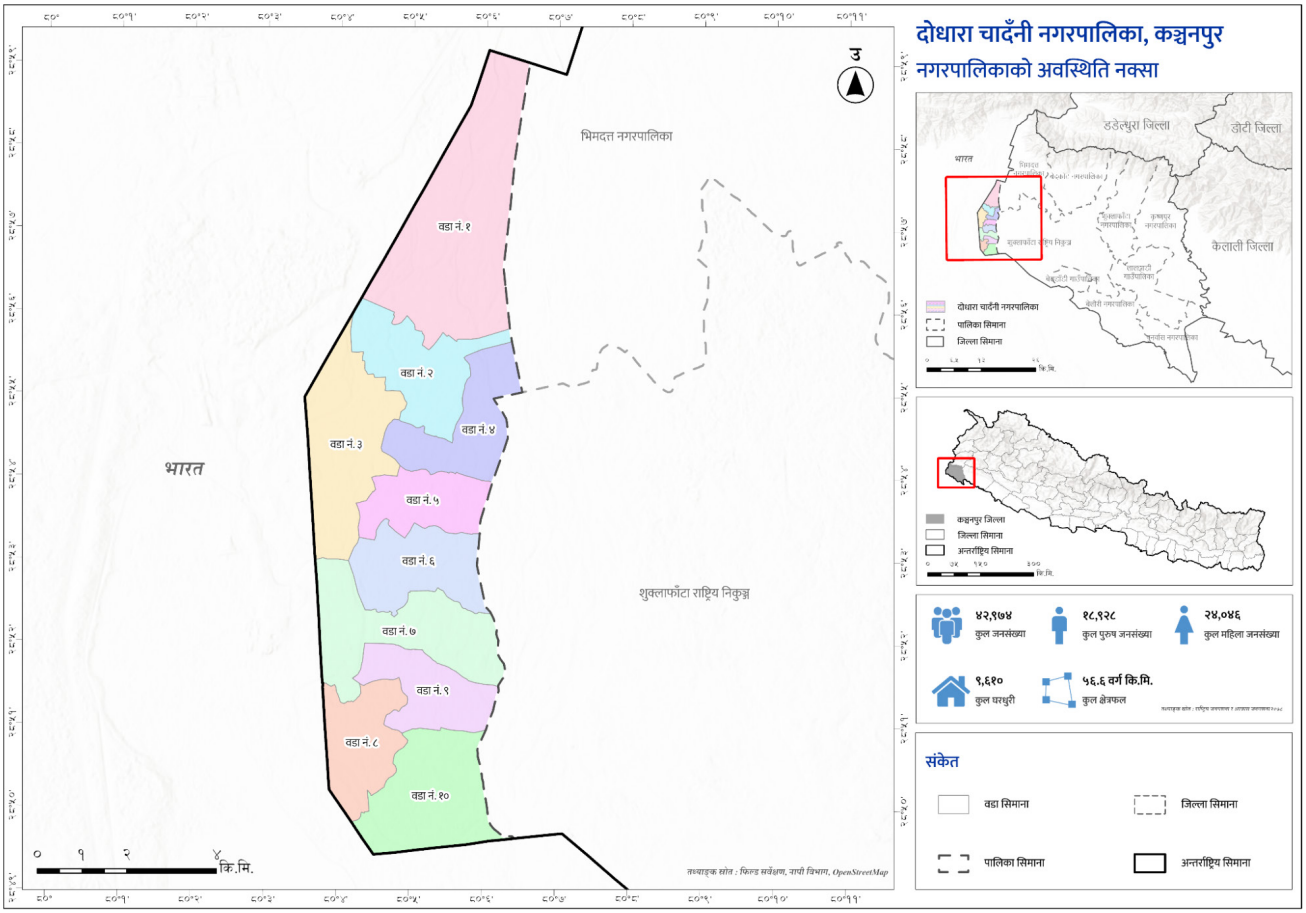

Figure 1: *Location map of Dodhara Chandani Municipality*

2.2 Administrative Context

Dodhara Chandani Municipality was established through the merger of the former Dodhara and Chandani Village Development Committees (VDCs) as part of Nepal's federal restructuring. The municipality is organized into ten administrative wards, which serve as the primary units for grassroots governance and public service delivery. Under the authority devolved by the Constitution of Nepal (2015) and the Local Government Operation Act (2074 B.S.), the municipality operates as an autonomous local government with defined legislative, executive, and quasi-judicial responsibilities. The Municipal Assembly serves as the legislative wing, responsible for enacting local laws and approving the annual budget in alignment with federal and provincial frameworks. This assembly consists of the Mayor and Deputy Mayor, 10 Ward Chairpersons, 40 Ward Members, and 8 additional members elected from Dalit or minority groups, bringing the total assembly strength to 60 members.

The executive power of the municipality is held by the Municipal Executive, which is headed by the Mayor and functions as the primary implementation body. This 20-member committee includes the Mayor, the Deputy Mayor, 10 Ward Chairpersons, 5 women members elected by the assembly, and 3 members representing Dalit or minority communities. To handle local dispute resolution, a three-member Judicial Committee of a quasi-judicial nature is also active, chaired by the Deputy Mayor and comprising two other members elected from the Municipal Assembly.

For the execution of these responsibilities, administrative operations are managed by the Chief Administrative Officer, who supervises a specialized municipal administration organized into 18 thematic sections. These include the **Planning, Administration, Financial Administration, Education, Technical, and Health sections, alongside units for Women Development, Agriculture Development, Livestock Development, and Employment**. The structure is further supported by sections for Information Technology, Disaster Management, Land Management, Store, Revenue, Small Cottage Industry, Social Security, and Ayurvedic Health. At the grassroots level, ward-level administration is led by the respective Ward Chairpersons and supported administratively by Ward Secretaries through the ten ward offices.

2.3 Land cover and Land use

The land use and land cover of Dodhara Chandani Municipality are predominantly defined by its fertile geography, with agricultural land occupying approximately 75.22% of the total area. This vast expanse of flat, arable terrain serves as the economic backbone of the region, supporting half of the local households. Forest and greenery cover roughly 11.17% of the municipality, encompassing community forests such as Baidhanand and Chahana, as well as portions of the Shuklaphanta National Park buffer zone.However, the spatial distribution of settlements remains largely unorganized and scattered, accounting for a significant portion of the remaining landscape. These residential areas have historically expanded without a formal land-use policy, often encroaching on productive agricultural zones. Additionally, the municipality's proximity to the Mahakali River introduces a volatile land cover element; frequent riverbank erosion and flooding annually convert fertile fields into barren riverbeds (bagar).

To combat these issues, the municipality's current five-year plan focuses on implementing a strict Land Use Policy to demarcate specific zones for residential, industrial, and agricultural use, while promoting integrated settlements to protect the remaining forest and fertile land from further encroachment.

2.4 Socio-Economic Context

The socio-economic landscape of Dodhara Chandani is defined by its transition from a traditional agrarian society to a strategic border-side economic hub. Current demographic data from the 2021 Nepal National Census records a population of 42,974 with a density of 756 people per square kilometer and a literacy rate of 79.24%. Notably, the 2022–2024 Municipal Household Survey reports a higher resident count of 48,939 across 9,011 households.

The social fabric of the municipality is deeply influenced by a history of migration from hill districts such as Dadeldhura, Baitadi, Bajhang, Bajura, and Doti. According to the 2011 Census, the major ethnic and caste groups include Chhetri (34.8%), Kami (22.9%), Hill Brahmin (10.1%), Magar (8.9%), and Thakuri (7.2%), with recent surveys confirming Brahmin/Chhetri and Pahadi Dalit communities as the predominant household heads. This cultural diversity is reflected in the linguistic landscape, where Nepali, Doteli, and Tharu are the primary dialects spoken.

Economically, the municipality remains largely dependent on agriculture and labor migration. Farming supports approximately 4,500 households (roughly 50%) and utilizes 3,600 hectares of arable land, while foreign employment serves as the second-largest livelihood pillar with over 1,500 households reliant on remittances. Despite a relatively high literacy rate, financial inclusion remains critically low; internal municipal surveys reveal that 91% of households lack a bank account and 93% do not have life insurance. These financial gaps contribute to a high vulnerability index, with 97% of households currently classified as high vulnerability.

The Human Development Index (HDI) for Sudurpashchim Province is 0.601 (2024), reflecting medium human development. The municipal educational infrastructure includes 40 schools (22 public and 18 private), while health services are delivered through a primary health center and two sub-health posts, with additional ward clinics under construction. Future economic prospects are anchored to the municipality's strategic border location. The planned Integrated Check Post (ICP) and the Dodhara Chandani Dry Port project are expected to transform the region into a major trade corridor, attracting investment and creating local employment opportunities. For the development of an integrated National Spatial Data Infrastructure (NSDI), mapping these socio-economic layers—specifically the intersection of financial exclusion and physical vulnerability—is essential for targeted development and equitable service delivery.

2.5 Connectivity

Dodhara Chandani Municipality's connectivity is defined by a comprehensive road network reaching all ten wards, though it remains primarily in an earthen or graveled state, leading to significant accessibility challenges such as mud and waterlogging during the monsoon season. A central feature of this infrastructure is the iconic 1.45-kilometer suspension bridge over the Mahakali River, which has been fundamentally transformed by the successfully completed four-lane motorable bridge. This modern infrastructure provides a direct, high-capacity vehicular link to the rest of Nepal, eliminating the previous necessity of transiting through Banbasa, India, and serving as a vital catalyst for the municipality's strategic vision to become a national logistics hub through the planned Dodhara Chandani Dry Port. In terms of digital connectivity, approximately 73.20% of households utilize mobile phone services, and the municipality is actively working to bridge the technological divide by expanding optical fiber networks and geolocating major physical assets to enhance maintenance and ensure equitable service delivery across all wards.

2.6 Amenities and Services

Dodhara Chandani Municipality's social and economic services are characterized by a growing network of educational and health facilities centered around emerging market hubs. The educational sector comprises 40 schools, including 22 public and 18 private institutions, alongside 35 pre-schools and 12 secondary schools, several of which offer higher secondary programs to support a literacy rate of 79.24%. Health services are delivered through a primary health center, a health post, an urban health clinic, and several village and vaccination clinics, supported by a network of 83 female community health volunteers, though the system still faces challenges regarding advanced diagnostic equipment like X-rays and laboratories.

The local economy is anchored by small to medium market centers, with the primary market areas serving as vital nodes for agricultural trade and the distribution of daily essentials. These markets are poised for significant expansion due to the municipality's strategic border location, where the development of the Dodhara Chandani Dry Port and Integrated Check Post is expected to transform local trade into a large-scale commercial gateway.

2.7 Disaster Risk, Climate, and Environmental Context

Dodhara Chandani is particularly vulnerable to floods, riverbank erosion, and seasonal climate extremes, as it is situated in the low-lying Terai region. The Disaster Preparedness and Response Plan (DPRP - 2082) identifies flood as the municipality's primary hazard, followed by Earthquake, Pandemic, Windstorm, and Wildlife Conflict. The Mahakali River, while vital for agriculture and livelihoods, frequently overflows during heavy monsoon rainfall, affecting settlements and farmland. This vulnerability was starkly demonstrated during the historic cloud burst event of July 2024 (Ashadh 2081), where the local station recorded 624 mm of rainfall within 24 hours,the highest ever in the region, triggering widespread inundation. Consequently, household-level assessments revealed an acute fragility: 97% of households are classified as having High Vulnerability, while composite risk analysis places 83% of households in the "Medium Risk" category and 11% in "High Risk." Studies on disaster vulnerability in the area further indicated that these climate impacts are often gender-differentiated, with women and marginalized groups facing disproportionate hardships during such events.

Climate observations from Nepal's Department of Hydrology and Meteorology (DHM) show that the Sudurpashchim region has experienced above-average rainfall and rising mean temperatures over the past decade. Such shifts are altering cropping cycles and increasing disease vectors. Additionally, ongoing deforestation and infrastructure expansion, especially near the Mayapuri Forest and Shuklaphanta National Park buffer zone,pose risks of habitat fragmentation and biodiversity loss.

The construction of the dry port and its supporting roads may further stress the ecosystem unless accompanied by robust environmental safeguards. Despite the high physical risk, a critical gap in preparedness persists: survey data reveal that 66% of respondents are not aware of weather forecast information, while only 34% possess such awareness. Municipal authorities, in partnership with national and international organizations, have begun implementing early-warning systems and community-based disaster preparedness programs, but closing this information gap remains a priority.

For municipal planning, integrating hazard maps (specifically flood inundation zones from the 2024 cloud burst), climate-vulnerability indices, and land-use change layers into the spatial data infrastructure is essential. Doing so will allow data-driven disaster risk reduction, ensure resilience in urban expansion, and support sustainable management of cross-border environmental resources.data-driven disaster risk reduction, ensure resilience in urban expansion, and support sustainable management of cross-border environmental resources.

2.8 Developmental Outlook

Dodhara Chandani Municipality stands at a definitive developmental crossroads, transitioning from a remote agrarian frontier into a strategic node of international commerce. This shift is anchored by the successful completion of the four-lane motorable bridge over the Mahakali River, which has ended the area's historical isolation and created a direct connection to the national highway network. This infrastructure serves as the foundation for the upcoming dry port and integrated check post, projects expected to move the local economy away from a heavy reliance on subsistence farming and toward a modern service sector focused on logistics and cross-border trade.

Despite this high-level growth, the community faces significant internal gaps that threaten equitable development. High levels of economic vulnerability persist, characterized by limited access to formal banking and insurance, which hinders local residents from investing in the new trade opportunities. Additionally, while mobile connectivity is high, the digital divide in rural wards and a lack of reliable energy infrastructure remain hurdles for industrialization. Environmental risks further complicate this transition, as seasonal flooding and riverbank erosion from the Mahakali and Jogbudha rivers frequently damage fertile land and unorganized settlements.

To ensure this transformation benefits all residents, the current planning cycle focuses on a more organized approach to land use and disaster resilience. The municipality is prioritizing integrated settlement development to move households out of flood-prone zones and into areas with planned utilities and earthquake-resistant housing. By establishing a digital spatial data system to track these infrastructure gaps and environmental risks, the local government aims to balance the

requirements of a massive international trade gateway with the essential need for clean water, stable energy, and secure livelihoods for its people.

2.9 The Value Proposition: Benefits of MSDI Adoption

The establishment of an MSDI provides Dodhara Chandani Municipality with measurable advantages across strategic and technical levels of operation. These benefits provide the institutional justification for sustained investment in the municipal geospatial ecosystem and serve as the core value proposition for departmental participation.

2.9.1 Strategic and Application-Level Benefits

- The MSDI serves as a primary mechanism for improved governance and informed decision-making through several strategic applications that enhance municipal service delivery:
- Integrated land-use planning and infrastructure development are facilitated by providing a clear spatial understanding of municipal growth patterns and service gaps.
- Scientific evidence replaces anecdotal planning, ensuring that new developments do not encroach upon high-value agricultural land or environmentally sensitive zones.
- Disaster resilience in flood-prone contexts is enhanced by mapping risk zones precisely to enable proactive mitigation and more effective emergency response coordination.
- Spatial insights allow for the identification of vulnerable households during extreme weather events, facilitating the rapid deployment of resources and medical aid.
- Resource allocation is optimised by ensuring the equitable distribution of services based on geographic priorities and documented socio-economic indicators.
- Fiscal budgets are directed towards areas with the highest documented deficit in infrastructure, ensuring that development is both inclusive and efficient.
- Authority and accountability are enhanced through public-facing geoportals that allow the municipality to share authoritative data with citizens to foster trust.
- Transparency in data access reduces the administrative burden on municipal staff by allowing the public to retrieve basic spatial information independently.
- Civic participation in local governance is encouraged as stakeholders gain access to transparent spatial information regarding proposed development projects and municipal investments.

2.9.2 Technical and Operational-Level Benefits

- The efficiency and long-term sustainability of municipal digital assets are ensured through several technical protocols that streamline daily operations:
- Technical standards for system interoperability allow disparate departmental software and databases to exchange information without the formation of restrictive data silos.
- Seamless data flow between the revenue and engineering sections, for example, ensures that property tax records are automatically updated when new building permits are issued.
- The centralised repository serves as a single source of truth that eliminates data redundancy and prevents the utilisation of conflicting or outdated datasets across municipal units.

- Version control and authoritative timestamps ensure that all departments are making decisions based on the same verified spatial information.
- Metadata documentation and search tools enable municipal staff to locate and utilise existing datasets rapidly to reduce administrative delays.
- Time-consuming manual searches for historical maps or paper records are replaced by digital discovery services, significantly improving staff productivity.
- Standardised data management protocols simplify the collection, storage, and maintenance of spatial information to ensure it remains accurate, secure, and reusable.
- Data quality is maintained through consistent geometric and attribute validation rules that are applied uniformly across the municipality.
- Technical debt is reduced through the implementation of unified data lifecycles that prevent the recurring costs associated with uncoordinated and repetitive data capture.

Public funds are conserved by ensuring that information collected for one project remains useful for future municipal functions across multiple sectors.

CHAPTER 3: MUNICIPAL SPATIAL DATA INFRASTRUCTURE (MSDI)

03

The establishment of a clear context for a Municipal Spatial Data Infrastructure (MSDI) necessitates an examination of the broader SDI framework, including its underlying motivations and fundamental architecture. While a National Spatial Data Infrastructure (NSDI) provides the overarching governance, standards, and technical arrangements for nationwide data sharing, an MSDI represents the operational realisation of these principles tailored specifically to municipal functions. MSDI frameworks mirror the core architecture of an NSDI but are differentiated by their application at the local scale, where data granularity and service delivery are paramount. Global benchmarks and localised implementations are evaluated in this chapter to derive the strategic lessons necessary for a robust municipal spatial ecosystem.

3.1 SDI Frameworks and Initiatives

The formulation of an effective MSDI requires an analysis of established international and national SDI initiatives. The identification of structural arrangements and policy motivations that govern geospatial data management across different jurisdictions is possible through the examination of these foundational frameworks. These global benchmarks provide the theoretical and technical scaffolding required to funnel broad spatial principles into the localised municipal context, ensuring that the development in Dodhara Chandani is aligned with international best practices for interoperability and data stewardship.

3.1.1 National Spatial Data Infrastructure (NSDI), United States

The modern implementation of Spatial Data Infrastructure can be attributed to Executive Order 12906, promulgated on 11 April 1994. Titled "Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure," this order catalysed SDI development globally by providing the first comprehensive legal and technical blueprint for national-level geospatial coordination.

Strategic Objectives for NSDI Development

The development of the National Spatial Data Infrastructure in the United States was driven by the following strategic objectives:

- Geographic information is recognised as a critical national asset essential for promoting sustainable economic development, improving the scientific management of natural resources, and ensuring long-term environmental protection.
- The necessity of developing a robust infrastructure through active collaboration between federal, state, local, and tribal governments is prioritised to ensure vertical and horizontal data alignment.
- Geospatial data application is facilitated across diverse sectors, including transportation planning, community development, precision agriculture, emergency response coordination, and environmental impact management.
- Wasteful duplication of effort in data collection is eliminated through coordinated acquisition strategies to improve the overall utilisation and return on investment of geospatial assets.
- Both the public and private sectors are provided with access to high-quality, authoritative data to support evidence-based policy formulation and strategic investment decisions.
- Data standardisation is institutionalised to ensure that geographic information from different sources can be integrated seamlessly for multi-jurisdictional analysis.
- Public accessibility to geospatial information is mandated to enhance transparency in governance and stimulate innovation within the digital economy.
- The development of a National Geospatial Data Clearinghouse ensures that data is findable and accessible through standardised metadata documentation.

Key Provisions for Institutionalizing NSDI

The Executive Order established several foundational provisions that have since become standard components of MSDI frameworks worldwide:

- Authority to operationalise and coordinate the NSDI was assigned to the Federal Geographic Data Committee (FGDC), which serves as the primary interagency body responsible for setting policy and technical standards.
- Active cooperation between all levels of government, academia, the private sector, and professional societies was mandated to foster a unified approach that transcends administrative boundaries and promotes the sharing of technical expertise.
- A central electronic repository, the National Geospatial Data Clearinghouse, was established to provide a digital gateway for the distributed search, discovery, and access of geographic information through an interconnected network of data servers.
- Mandates were developed for the comprehensive documentation of both new and legacy geospatial data using standardised metadata protocols, ensuring that users can evaluate data quality, lineage, and applicability before utilisation.
- Geospatial information is formally categorised as a public asset, with provisions ensuring that data remains accessible to all stakeholders to enhance civic engagement and drive cross-sectoral economic innovation.
- A check-before-collect mechanism was institutionalised to require public agencies to verify the availability of existing datasets within the national inventory before allocating fiscal resources for primary data capture, thereby ensuring financial efficiency.
- Specific federal agencies were designated as thematic leads for core data categories, granting them the responsibility to coordinate standards and facilitate the continuous update of thematic datasets in alignment with FGDC guidelines.
- Critical core layers, classified as Framework Data, include essential geographic themes such as geodetic control, orthoimagery, elevation, and administrative boundaries, which are identified as the fundamental base for all other spatial applications.
- Strategic partnerships with non-federal entities and private sector institutions were leveraged to distribute the costs of data acquisition, improve the frequency of updates, and ensure that the infrastructure reflects current technological capabilities.
- The integration of geographic data into formal decision-support systems was prioritised to ensure that location-based insights are utilized in the formulation of national security, public health, and urban development policies.

3.1.2 Infrastructure for Spatial Information in the European Community (INSPIRE)

Directive 2007/2/EC, establishing the Infrastructure for Spatial Information in the European Community (INSPIRE), was enacted by the European Parliament and the Council of the European Union on 14 March 2007. This landmark legislation was born from the realisation that effective governance of the modern environment requires a seamless, cross-border flow of geographic information to support environmental and sustainable development policies. The directive represents a legal and technical framework designed to ensure that spatial data infrastructures across the European Union are compatible and usable in a trans-boundary context.

Strategic Policy Objectives

The directive was enacted to address systemic failures in data exploitation and to provide a high-level coordination mechanism for environmental management through several strategic realisations:

- Spatial information is fundamental for formulating, implementing, and monitoring environmental policies at all levels of government, requiring structured and sustained coordination between data providers and end-users.

- Obstacles regarding the availability, quality, and accessibility of spatial data that are common across all levels of public authority must be addressed to ensure that information is not restricted by administrative or political boundaries.
- Harmonised standards, such as ISO 19131 for data specifications and ISO 19115 for metadata, are required to overcome the historical diversity of data formats and structures, thereby preventing the loss of institutional knowledge and resources.
- Network services are essential for public authorities to share, view, and process spatial data without administrative or technical delays, facilitating more rapid responses to environmental challenges.
- The infrastructure must allow third-party contributors, including NGOs, academia, and the private sector, to enrich the geospatial ecosystem while providing core discovery and view services free of charge to maximise public benefit.
- A formal mechanism for monitoring and reporting ensures that the infrastructure evolves alongside technological advances and that member states remain compliant with established interoperability targets.

Key Provisions of the INSPIRE Directive

To achieve a fully functional and interoperable SDI, the INSPIRE Directive established a set of technical rules and implementing acts that define how data should be managed:

- Spatial data pertaining to 34 specific data themes, ranging from foundational reference data such as coordinate systems and administrative units to thematic layers such as hydrography, transport networks, and land use, are prioritised for harmonisation.
- Standardised documentation for all spatial datasets and services is mandated through metadata protocols, enabling users to efficiently discover, evaluate, and utilise geospatial resources across different organisations and jurisdictions.
- Harmonised data models and technical specifications for the prioritised themes are established to ensure that datasets from disparate sources can be combined seamlessly without the need for manual conversion or schema alignment.
- The establishment of online gateways, or geoportals, is required to provide services for discovery (search), view (visualisation), download (access), and transformation (coordinate or schema conversion) of geospatial data.
- Policies and data-sharing agreements are defined to remove legal and administrative barriers, ensuring that public authorities can exchange spatial data freely and reliably to support governance and environmental decision-making.
- A formal compliance mechanism is implemented where member states must regularly report on the availability, accessibility, and degree of harmonisation of their spatial data infrastructure to ensure transparency in the implementation process.

INSPIRE Guiding Principles

The framework is founded on five core principles that dictate the lifecycle of spatial information within a modern governance structure:

1. Data should be collected only once and kept where it can be maintained most effectively, such as at the local ward level for community assets or the engineering section for infrastructure networks, ensuring that the primary data owner remains responsible for quality.
2. It must be possible to combine seamless spatial information from different sources across the municipality and share it between many users and applications, enabling a multi-disciplinary approach to urban planning.
3. Information collected at one level of government should be available to be shared with all other levels, ensuring that local ward surveys contribute to municipal planning and national federal monitoring programmes.
4. Geographic information needed for good governance and sustainable development should be readily available under conditions that do not restrict its extensive use by public and private stakeholders.

5. It should be easy to find available geographic information, evaluate its suitability for a specific requirement, and clearly understand the conditions under which it can be acquired and utilised for professional or public use.

3.1.3 United Nations Integrated Geospatial Information Framework (UN-IGIF)

The United Nations Integrated Geospatial Information Framework (UN-IGIF) serves as the globally recognized blueprint for bridging the "geospatial digital divide." Adopted in 2018, it provides the strategic leadership and practical guidance necessary to transform spatial data into a driver for socio-economic growth. Developed through a collaboration between the United Nations and the World Bank, the UN-IGIF assists nations in strengthening their national and sub-national geospatial arrangements to ensure that "no one is left behind" in the transition to a digital, location-enabled economy.

Rationale of UN-IGIF

The framework was developed as a strategic response to systemic challenges that prevent the effective leveraging of location-based data:

- The lack of understanding among decision-makers regarding the strategic value of geospatial information and the enabling architectures required to harness it is addressed.
- Critical shortages of formal data management policies, governance practices, and technical capacities that hinder evidence-based decision-making are overcome.
- The fragmentation caused by collecting data in isolation is resolved, as this leads to duplication and conflicting standards that make integration problematic.
- Resource efficiency is maximised by ensuring spatial information is collected once and used many times across multiple policy themes.

The 9 Strategic Pathways the UN-IGIF

The framework is operationalized through nine strategic pathways, categorized into three areas of influence- Governance, Technology, and People:

1. **Governance and Institutions**: Focuses on leadership, value propositions, and institutional arrangements.
2. **Policy and Legal**: Addresses legislation, data protection, licensing, and accountability.
3. **Financial**: Covers business models, investment, and benefits realization.
4. **Data**: Focuses on data themes, custodianship, and supply chains.
5. **Innovation**: Leverages technological advances to bridge the geospatial digital divide.
6. **Standards**: Ensures technology and data interoperability through compliance and communities of practice.
7. **Partnerships**: Encourages cross-sector, private sector, academic, and international collaboration.
8. **Capacity and Education**: Promotes awareness, formal education, and professional training.
9. **Communication and Engagement**: Focuses on stakeholder messaging, monitoring, and evaluation.

3.1.4 National Spatial Data Infrastructure, Nepal

Led by the Geographic Information Infrastructure Division (GIID) of the Survey Department, the Government of Nepal oversees the implementation of the National Spatial Data Infrastructure (NSDI). The initiative began as the Census Mapping Project (2055/56 B.S.) before evolving into the National Geographical Information Infrastructure Project; it was formally institutionalized as a permanent division in 2073 B.S.

A key milestone in this framework is the "Directive for Distribution, Use, and Regulation of Digital Data, 2069 B.S." To facilitate data accessibility, the division operates the National Geoportal, serving as the country's central hub for discovering

and sharing geospatial information.

The development of Nepal's NSDI was driven by the critical need to address systematic resource waste and technical data silos arising from uncoordinated duplication and a lack of interoperability across government agencies. The NSDI focuses on several foundational components to achieve a unified, location-enabled ecosystem:

- Uniform technical rules and data standards are established to ensure that geographic information produced by disparate agencies remains compatible and integratable.
- A set of authoritative base layers, classified as foundation data, includes administrative boundaries, topography, and geodetic control to serve as the geometric constraint for all thematic mapping.
- The National Geoportal serves as the primary digital interface and single-door platform for the discovery, visualisation, and distribution of geospatial information to both public and private stakeholders.
- An integrated storage system and a comprehensive inventory of national geospatial assets are maintained to preserve historical datasets and reduce redundant capture.
- Governance is managed through a multi-tiered structure, comprising the NSDI Steering Committee for policy formulation and the NSDI Implementation Committee for technical execution and monitoring.

3.2 MSDI Frameworks and Initiatives

Municipal Spatial Data Infrastructure (MSDI) focuses on the granular operational requirements of local government, whereas NSDI provides the strategic national baseline. This section evaluates specific municipal-scale frameworks and international implementations that provide the evidence base for the Dodhara Chandani MSDI.

3.2.1 MSDI-IPDS Framework by World Bank City Planning Labs (CPL)

The World Bank City Planning Labs (CPL) initiative was established to empower municipal governments by leveraging geospatial data to effectively plan, prioritize, and invest in infrastructure. The framework is designed to help cities navigate the pressures of rapid urbanization by transforming spatial information into a strategic tool for sustainable growth. The World Bank's MSDI-IPDS framework is a proven methodology, refined through over two years of intensive implementation and refinement in Indonesian cities.

Structure of MSDI-IPDS Framework

The CPL MSDI Framework is organized across four foundational pillars; Institutions, People, Data, and Systems (IPDS), providing a holistic approach to the municipal spatial data infrastructure.

1. **Institutional Arrangements (I)**: This pillar focuses on the city's capacity to sustain formal policy and regulatory structures. It involves establishing legal bases for data sharing and defining governance roles. Since an MSDI is fundamentally a social construct, effective governance is the primary enabler for cross-departmental collaboration.
2. **People (P)**: This pillar addresses human capital and skill development. It involves creating a geospatial workforce plan and providing technical training to ensure that city staff can maintain and operationalize the infrastructure over the long term.
3. **Data (D)**: This pillar focuses on core geospatial and non-spatial datasets, standards, and metadata. It emphasizes maintenance, verification, and semantics to ensure data is discoverable and reliable. By treating data as a "strategic asset" (similar to a physical road),
4. **Systems (S)**: This pillar covers the technological environment, including hardware, software, and integrated platforms like Geoportals. A Geoportal serves as the central "nerve center" for searching, discovering , analyzing and disseminating location-based information.

The development and adoption of the CPL framework are driven by several strategic objectives:

- Recognizing that geographic information is not merely a technical output but a primary driver of urban growth and transformation.
- Treating spatial data as a key resource for social and economic development, allowing cities to identify opportunities for investment and poverty reduction.
- Enabling decision-makers to harness location-based insights to move away from anecdotal planning toward objective, data-supported strategies.
- Addressing the complexity of adopting data-driven planning, which requires navigating both technical challenges and the necessary shifts in organizational mindset and culture.

3.2.2 National MSDI Implementation - Saint Lucia

Saint Lucia manages a complex, high-risk landscape characterised by volcanic topography and extreme climate vulnerability. This country has become a regional leader in leveraging geospatial initiatives to mitigate environmental risks, primarily driven by the urgent need for Disaster Risk Reduction (DRR) and climate-resilient planning.

Implementation Features and Challenges

- The technical and institutional arrangements in Saint Lucia demonstrate the effectiveness of using high-stakes scenarios as a catalyst for infrastructure development (World Bank, 2023):
- Disaster management served as the primary entry point for securing political buy-in and humanitarian funding through the Disaster Vulnerability Reduction Project (DVRP).
- High-resolution aerial imagery and LiDAR data were procured to create high-precision digital terrain models (DTM), which are essential for the accurate placement of climate-resilient public works.
- A draft NSDI Policy was established to provide the legal roadmap for geospatial integration, ensuring that information collected for disaster response is accessible for land use and development control.
- Significant challenges remain, including technical gaps in metadata consistency and a chronic shortage of trained GIS professionals to ensure the system survives beyond project-specific funding.

3.2.3 eThekwini Metropolitan Municipality (Durban), South Africa

eThekwini Metropolitan Municipality, centered around the city of Durban, covers approximately 2,555 km2. It is globally recognized as a gold standard for Enterprise GIS (EGIS) in a developing nation. Unlike fragmented systems, eThekwini's MSDI serves as a "Corporate GIS," providing a unified spatial backbone for over 40 municipal departments and a population of nearly 4 million.

Strategic Integration

The eThekwini model emphasises the democratisation of data and its integration into formal municipal performance monitoring:

- GIS is legally and operationally embedded into the city's Integrated Development Plan (IDP), ensuring that spatial data directly informs municipal budgeting and infrastructure planning.
- The Corporate GIS unit maintains a formal Service Catalogue, treating spatial data as an essential public utility similar to water or electricity provision.
- Web Map Viewers allow a wide range of stakeholders, from emergency responders to urban planners, to access tailored spatial insights through a central portal, reducing inter-departmental conflict over data accuracy.

3.2.4 Surat Municipal Corporation (SMC), India

Surat is a prominent leader in Smart City initiatives within India, utilising its MSDI for comprehensive and efficient digital city management. The city's rapid industrial growth and historical exposure to severe flooding necessitated a scientific, data-driven approach to urban resilience.

Operational Applications

- The technical implementation in Surat focuses on high-resolution utility mapping and real-time monitoring to enhance public safety and municipal revenue:
- The municipality has mapped nearly 100% of its underground utilities, including gas, water, and drainage lines, to support rapid maintenance and prevent accidental damage during construction.
- A GIS-based property tax system utilises high-resolution satellite imagery to identify unassessed or under-assessed properties, significantly increasing the municipal tax base.
- Supervisory Control and Data Acquisition (SCADA) systems are integrated with GIS to monitor river levels in real-time, allowing for automated responses to flood threats.

3.3 Lessons from SDI and MSDI frameworks and Their implementations

Based on the review of global and national Spatial Data Infrastructure (SDI) and Municipal Spatial Data Infrastructure (MSDI) initiatives, the following lessons are identified as critical for the successful implementation of MSDI in Dodhara Chandani Municipality:

- **Recognition of MSDI as a Socio-Technical System**: MSDI is not merely a technical solution; its success depends on robust institutional and legal arrangements. Technical tools must be supported by formal policies and administrative mandates to ensure long-term viability and legitimacy.
- **Importance of Structured Capacity Assessments**: Formal assessments are essential for evaluating institutional readiness, data availability, and technical infrastructure before implementation. As seen in Saint Lucia, utilizing tools like the MSDI Manual helps municipalities identify realistic priorities, avoid overly complex system designs, and sequence investments to match local resource constraints.
- **Disaster Risk Reduction (DRR) as a Strategic Catalyst**: In flood-prone and hazard-exposed contexts, DRR and climate resilience initiatives serve as effective entry points for MSDI development. The Saint Lucia case demonstrates that immediate disaster-related needs create strong institutional demand for spatial data, secure political support, and help embed MSDI systems into routine municipal planning.
- **Human Capital as a Sustainability Driver**: The availability of technology alone does not guarantee effective MSDI utilization. Reviewed cases consistently show that a lack of trained GIS professionals remains a primary constraint. Sustained capacity-building, knowledge transfer, and staff retention strategies are vital for maintaining and operationalizing MSDI systems over time.
- **Framework Data as the Basis of Integration**: Framework data provides the foundation for integrating all other spatial datasets. Prioritizing the acquisition of framework data—as evidenced by Saint Lucia's procurement of high-resolution aerial imagery and LiDAR data is essential for ensuring the accuracy and reliability of the infrastructure.
- **Integration into Everyday Municipal Workflows**: MSDI systems deliver maximum value when integrated into routine municipal workflows rather than functioning as standalone platforms. Evidence from eThekwini Metropolitan Municipality (South Africa) and Surat Municipal Corporation (India) indicates that spatial data must directly support daily functions—such as asset management, utility management, property taxation, public health, and flood

management—to remain institutionally relevant.

- **Standardization and Data-Sharing Protocols**: The NSDI implementation in the United States highlights the importance of establishing rigorous data standards and sharing protocols. Creating common data formats and metadata standards is essential for enabling cross-departmental collaboration and reducing the duplication of effort.
- **Geoportal as the "Single Source of Truth"**: The development of a centralized geoportal is a key feature of modern MSDI. A geoportal ensures that all municipal departments and stakeholders access the same authoritative, up-to-date information, eliminating conflicting data versions.
- **Phased and Context-Appropriate Implementation:** An incremental, needs-driven approach is more sustainable than technology-heavy strategies, particularly for resource-constrained municipalities. Phased development—starting with priority datasets and specific use cases allows municipalities to build institutional confidence and technical capacity before scaling system functionality.

CHAPTER 4: APPROACH AND METHODOLOGY

04

The development of the Municipal Spatial Data Infrastructure (MSDI) framework necessitates a structured transition from fragmented data collection to an integrated geospatial ecosystem. This chapter details the strategic approach and the six-phase methodology employed to ensure that the resulting framework is technically robust, locally applicable, and aligned with the constitutional mandates of Nepal. The methodology focuses on bridging the gap between national standards and municipal operational realities through a combination of secondary research and targeted stakeholder consultations.

4.1 Approach

The approach of this study is rooted in evidence-based strategic planning, ensuring that the proposed MSDI is both technically sound and locally relevant. The study moves beyond a purely technical design by adopting a "Multi-Level Alignment" strategy, which integrates three distinct dimensions of research and consultation:

1. **Global and National Benchmarking**: The study establishes a technical foundation by reviewing international SDI best practices, existing MSDI frameworks, and roadmap development manuals. This ensures that the framework for Dodhara Chandani adheres to global standards for interoperability and data governance. Simultaneously, it aligns with Nepal's National Spatial Data Infrastructure (NSDI) and the constitutional mandates governing local authorities.

2. **Contextual Integration**: To ensure the MSDI is "fit-for-purpose," the approach incorporates a deep dive into the local realities of Dodhara Chandani. This involved an analysis of the municipal profile and the Five-Year Periodic Plan to align the MSDI development with the municipality's long-term development goals.

3. **Stakeholder-Centric Validation**: Recognizing that data, technology, people, and policy are the critical components of any SDI, the approach utilized high-level consultations. Key informant interviews were conducted with the Mayor, Deputy Mayor, and Departmental Heads (DRR, Engineering, Health,planning, agriculture etc). These interactions focused on identifying existing data silos, assessing the current status of the municipality's data assets and technical readiness, and capturing leadership vision for improved data-driven decision-making.

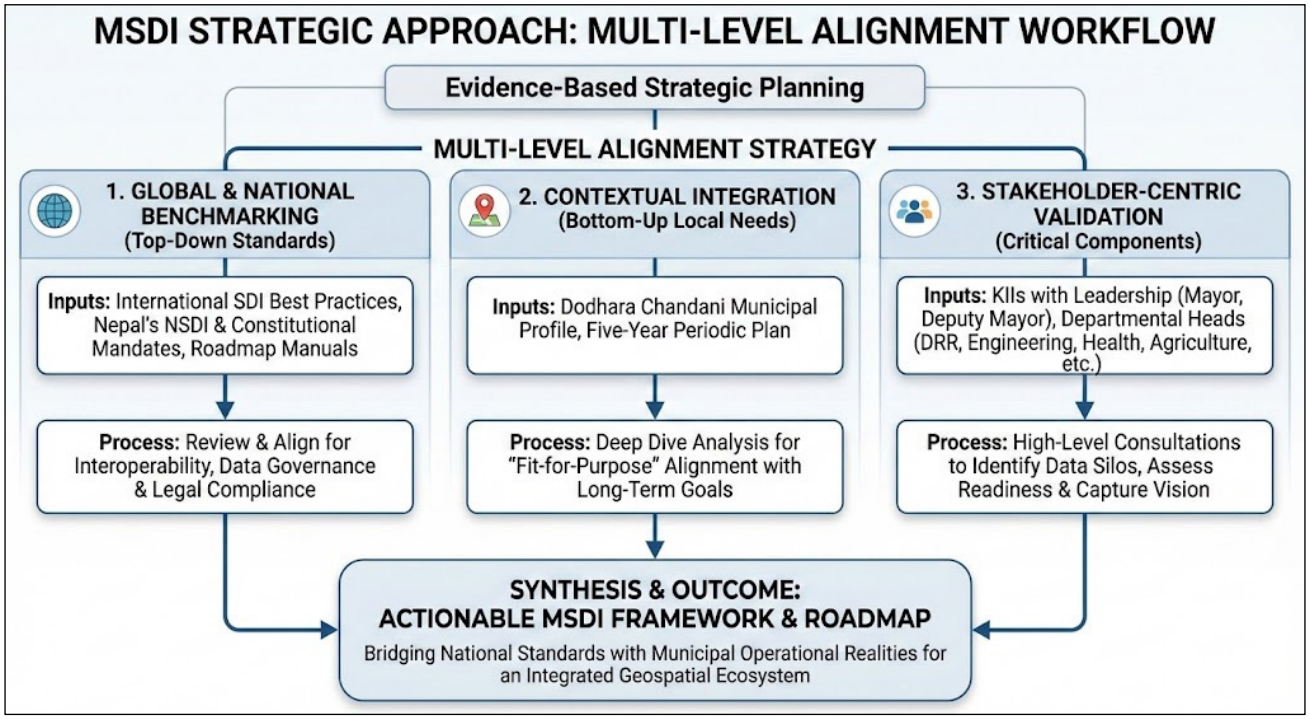

Figure 2: *A Multi-level Strategic Approach for formulating the MSDI Framework*

The resulting MSDI framework and roadmap serve as an actionable blueprint for the municipality by synthesizing these top-down national standards with bottom-up local needs.

4.2 Methodology

The study followed a six-phase methodology to ensure a comprehensive and structured development of the MSDI framework for Dodhara Chandani.

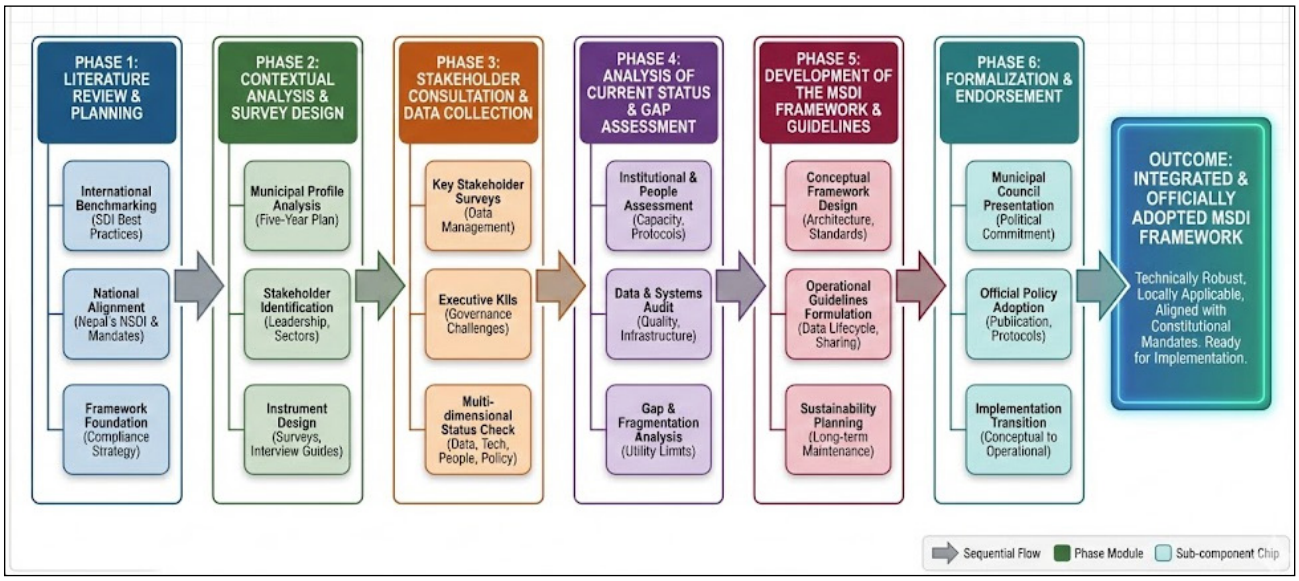

Figure 3: *Methodological diagram for development of MSDI framework for Dodhara Chandani*

Phase 1 - Literature Review and Planning: A comprehensive review was conducted to examine existing international MSDI frameworks, geospatial data standards, and roadmap manuals. This phase also involved a critical review of Nepal's NSDI along with the constitutional and legal mandates for local governments. These reviews provided the foundation for a customized framework that remains compliant with national legislation and global best practices.

Phase 2 - Contextual Analysis and Survey Design: The study incorporated a deep dive into the local context of Dodhara Chandani Municipality, including its profile and Five-Year Periodic Plan. Based on this context, key stakeholders were identified—including local government leadership, sectoral departments, and development partners. A survey and interview guide were designed to assess current data collection practices, challenges in data sharing, and the governance of data across departments.

Phase 3 - Stakeholder Consultation and Data Collection: The survey was administered to nine key stakeholders involved in data management and decision-making. Simultaneously, Key Informant Interviews (KIIs) were conducted with the Mayor, Deputy Mayor, and Departmental Heads to capture detailed perspectives on the municipality's data governance challenges. This phase focused on evaluating the current status of data, technology, people, and policy within the municipality.

Phase 4 - Analysis of Current Status and Gap Assessment: The collected data was analyzed to evaluate the current state of spatial data management across four critical dimensions. This included an assessment of institutional arrangements to identify existing policy frameworks and formal data-sharing protocols. It also evaluated the people component by reviewing technical capacity, GIS literacy, and defined roles among staff. Furthermore, the study audited existing data for quality, coordinate system alignment, and critical gaps, while reviewing technical systems and hardware infrastructure. This comprehensive assessment highlighted how the fragmented nature of these components limits the utility of data for planning and revenue generation.

Phase 5 - Development of the MSDI Framework and Guidelines: Building on the identified gaps, a conceptual framework for the MSDI was developed to define the technical architecture, data standards, and governance structures required for integration. Detailed guidelines were formulated for data collection, sharing, and periodic updates to ensure the long-term sustainability of the system and to delineate roles across various departments. These guidelines serve as the operational manual for maintaining the MSDI as a dynamic municipal asset.

Phase 6 - Formalization and Endorsement: The final MSDI framework and roadmap will be presented to the Municipal Council for formal endorsement to ensure the municipality's political commitment. Upon endorsement, the framework will be finalized as an official publication, including the implementation roadmap and management protocols. This will mark the completion of the development process, transitioning the project from a conceptual design to an officially adopted municipal policy.

CHAPTER 5:
CAPACITY ASSESSMENT OF MSDI AND GEOSPATIAL READINESS IN DODHARA CHANDANI MUNICIPALITY

05

The transition from the research methodology defined in Chapter 4 to the operational design of a Municipal Spatial Data Infrastructure (MSDI) requires a rigorous audit of existing capacities. This assessment evaluates the technical and institutional readiness of Dodhara Chandani Municipality through the IPDS model, which categorises infrastructure into Institutional Arrangements, People, Data, and Systems. The findings derived from departmental surveys and executive interviews delineate the current status of the local government as a Pre-GIS environment. This diagnostic identifies specific bottlenecks in governance, technical expertise, and hardware utilisation that must be addressed to facilitate a modern, digitally enabled geospatial ecosystem.

5.1 Institutional Arrangements

Institutional arrangements encompass the governance structures, legislative frameworks, and collaborative partnerships that define the operational boundaries of geospatial activities. The strength of these arrangements determines the sustainability of data sharing and the legal confidence with which municipal officials manage spatial information.

5.1.1 Governance and Coordination Mechanisms

Governance refers to the leadership structures, organizational bodies, and reporting lines that manage geospatial activities. Effective coordination ensures that data flows seamlessly between departments rather than getting trapped in administrative bottlenecks.

The assessment revealed that Dodhara Chandani Municipality currently operates without a formalized governance structure for Spatial Data Infrastructure. There is no designated "Geospatial Section," naapi sakha , GIS Unit, or steering committee within the municipal organogram to oversee data management related activities (strategy design Instead, geospatial responsibilities are decentralized and managed on an ad-hoc basis. Technical tasks typically fall upon the Information Technology (IT) Officer or are assigned loosely to the head of different departments (health, education, agriculture, etc.) who already have other substantial administrative duties. Coordination mechanisms between departments are described as informal and reactive; data exchange occurs primarily through physical paper transfers, phone calls, or the manual sharing of files via flash drives rather than through a structured institutional protocol. This lack of a central coordinating mandate has resulted in a fragmented environment where departments operate in isolation ("silos"), often unaware of the complementary data assets held by their peers, leading to redundant data collection efforts.

5.1.2 Policy and Legal Frameworks

This section evaluates the "rules of the game",the policies, laws, and directives that govern how data is collected, shared, and protected. A robust policy framework provides the legal confidence necessary for officials to share data both internally and with the public.

A significant institutional void identified during the assessment is the absence of a foundational policy framework for data governance. Responses from high-level administrative and planning officials unanimously confirmed the non-existence of an Open Data Policy, a Data Sharing Policy, or Standard Operating Procedures (SOPs) for information management. Consequently, there are no legal provisions defining data ownership, copyright, privacy standards, or the conditions under which municipal data can be shared with the public or other agencies. This regulatory vacuum creates a culture of hesitation among staff regarding data transparency; without clear guidelines on what is permissible to share, the default tendency is to withhold data to avoid liability. Furthermore, the lack of a legal mandate for data collection standards means there is no enforceability regarding the quality or format of data submitted by contractors or internal departments.

5.1.3 Partnerships and Collaboration

This component assesses the strength and nature of relationships between the municipality and external entities (private sector, academia, NGOs). Sustainable partnerships should focus on capacity transfer rather than just product delivery.

Due to the constraints in internal technical capacity, the municipality has developed dependency on external partnerships for geospatial execution. The assessment highlighted strong, active collaboration with humanitarian and technical organizations for activities such as disaster risk profiling, humanitarian mapping, and external survey execution. While these partnerships provide essential short-term outputs, the collaboration model is largely project-based rather than institutional. A critical weakness identified is the lack of formal Memorandums of Understanding (MoUs) specifically designed to ensure that the raw geospatial data generated by these partners is transferred to the municipality in a standardized, editable format. This results in a "Black Box" scenario where the municipality receives final PDF maps or reports but fails to acquire the underlying digital layers (shapefiles/geodatabases) necessary to update or maintain that data independently after the partner projects conclude.

5.2 People

The "People" dimension evaluates the workforce's ability to operate and maintain the MSDI. It looks beyond just headcount to examine the specific technical competencies and qualifications of the staff.

5.2.1 Human Resource Capacity and Skills

The human resource assessment identified a critical deficit in the specialized technical expertise required to sustain an MSDI. The municipality currently employs zero permanent GIS Specialists or dedicated Data Curators. The responsibility for data management is largely shouldered by generalist IT officers and MIS operators, whose primary training and daily workload focus on general IT support and administrative troubleshooting rather than spatial sciences. The prevailing GIS skill level across key operational departments, including Engineering, Health, and Agriculture, is self-rated as "Basic" to "None." While the workforce is proficient in traditional administrative tools like Microsoft Excel and Computer-Aided Design (AutoCAD), they lack the specific competency to manage spatial databases (PostGIS), perform geoprocessing, or maintain a server-based repository. This skills gap is the single largest bottleneck preventing the transition from static record-keeping to dynamic spatial planning.

5.2.2 Training and Awareness Levels

This section analyzes the gap between current skills and future needs, as well as the organizational culture regarding the value of geospatial technology.

Despite the technical skill gap, there is a moderate-to-high level of political and administrative awareness regarding the strategic value of geospatial data. Leadership within the DRR and Planning sections explicitly recognizes the necessity of GIS for evidence-based decision-making and disaster resilience. However, this awareness has not yet been matched with technical empowerment. Survey respondents across all departments have explicitly identified urgent and specific training needs. The most requested competencies include training in professional GIS software (specifically QGIS), Mobile Data Collection technologies (such as KoboToolbox or ODK), and Spatial Database Management. The current reliance on irregular, informal self-learning is insufficient to bridge the gap between the staff's desire to use modern tools and their actual operational capability.

5.2.3 Roles and Responsibilities Across Departments

Current roles regarding data stewardship are ill-defined and rooted in traditional workflows. The Agriculture Department views its role as the keeper of administrative farmer records rather than the curator of agricultural spatial layers. Similarly, the Health Department collects household-level health data but lacks the mandate or tools to geocode this information for spatial disease tracking and analysis. The Engineering Department focuses almost exclusively on CAD-based drafting for specific construction projects, without a defined responsibility to convert these drawings into municipal-wide GIS layers. Because job descriptions do not include "spatial data management" or "metadata maintenance" as Key Performance Indicators (KPIs), data hygiene tasks, such as backing up files, standardizing naming conventions, or updating datasets, are viewed as no one's responsibility, leading to the rapid degradation ("data rot") of municipal information assets.

5.3 Data

This section inventories the current stock of data to understand what data assets the municipality already possesses. It distinguishes between data that is truly spatial (maps/coordinates) and data that is merely tabular but has spatial potential.

5.3.1 Existing Geospatial Datasets , its Sources and Departments

The municipality possesses high-value data assets that remain locked in non-spatial or incompatible formats. These assets represent significant potential for integration into a unified system.

- The Agriculture Department maintains production data and farmer records primarily in tabular Excel spreadsheets.
- Community health profiles and household data are stored in Health Management Information System (HMIS) formats.
- Detailed infrastructure drawings and road network designs exist almost entirely as isolated AutoCAD (.dwg) files within the Engineering Department.
- Hazard maps and risk profiles are accessible to the DRR section, although these are often provided as static images or hard-copy reports.
- High-quality satellite imagery is accessible via digital platforms, but the resulting data is frequently split into formats that lack interoperability.

5.3.2 Data Quality, Standards, and Accessibility

Data quality within the municipality is significantly compromised by the absence of standardization. There is no adherence to the National Geographic Information Infrastructure (NGII) standards or any internal metadata schema. Because data is stored in "silos" on personal computers, laptops, and flash drives, version control is a major issue; multiple departments often hold conflicting versions of the same dataset, with no way to determine which is the "system of record." Accessibility is severely restricted by the physical storage medium. A planner needing health data cannot access it via a network but must physically request the file from the Health Department. This manual retrieval process creates unnecessary delays, increases administrative friction, and effectively discourages cross-departmental data usage.

5.3.3 Data Gaps and Integration Challenges

The assessment identifies critical data gaps that hinder effective master planning. The Planning Department has highlighted the urgent need for comprehensive Land Use Maps, updated Topography/Topology Maps, and digitized Infrastructure Footprints (specifically water, sewer, and power networks) which are currently missing or incomplete. The primary integration challenge is the technical incompatibility of existing formats. Merging the Health Department's tabular Excel data with the Engineering Department's vector-based AutoCAD drawings and the DRR section's raster maps is technically unfeasible in the current environment without significant conversion efforts. This lack of interoperability prevents the creation of a composite, multi-layered view of municipal development, forcing decision-makers to rely on fragmented, sectoral perspectives.

5.4 Systems

The technical environment of the municipality is characterised by a paradox of owning high-value hardware that remains operationally dormant. This ghost infrastructure provides a significant baseline for future centralisation.

5.4.1 Existing Technical Infrastructure and Tools

The municipality's technical environment can be best described as utilizing "Ghost Infrastructure" powerful assets that exist but remain dormant. The dominant tools currently in use are non-GIS applications: AutoCAD for engineering drawings and Microsoft Excel for attribute management. There is zero current utilization of enterprise GIS platforms or robust open-

source alternatives like QGIS in daily operational workflows. Furthermore, there is no centralized Geoportal, intranet dashboard, or map server. This absence means that data discovery is non-existent; staff cannot search for or visualize municipal data digitally, and there is no platform to serve data to the public or external stakeholders. What about different online toles built by different projects lets mention them

5.4.2 Software, Hardware, and Network Readiness

Municipal technical operations rely predominantly on non-GIS applications for engineering and attribute management. There is no current utilisation of enterprise GIS platforms or map servers in daily workflows.

- AutoCAD and Microsoft Excel are the dominant tools for managing municipal assets.
- Zero utilisation of open-source GIS platforms such as QGIS is observed in daily operational tasks.
- There is no centralised geoportal, intranet dashboard, or map server to facilitate data discovery.
- Staff cannot digitally search for or visualise municipal data, preventing the serving of information to the public or external stakeholders.

5.4.3 Interoperability and System Integration

System integration is currently non-existent within the municipality. The absence of a central server or Network Attached Storage (NAS) means there is no physical or virtual space where different departmental systems can interact. The financial systems (revenue/taxation), technical engineering files, and administrative records exist on completely separate “digital islands.” There are no Application Programming Interfaces (APIs) or automated data pipelines connecting these functions. For example, the tax revenue system cannot automatically pull building footprint data from the engineering repository to verify property tax assessments. This necessitates manual data re-entry across departments, drastically increasing the workload and the risk of human error.

5.4.4 Data Security and Maintenance Practices

Data security practices are alarmingly weak and reactive. With no central repository or automated backup system, the municipality’s data security relies entirely on the health of individual personal computers. There are no formal protocols for regular data backup, user access control, or disaster recovery. A single hard drive failure, theft of a laptop, or a ransomware attack could result in the catastrophic and permanent loss of years of municipal data. The lack of active server management means there are no audit logs to track who accesses or modifies data. Maintenance is currently performed on a “break-fix” basis rather than through a scheduled lifecycle management strategy, leaving the municipality’s digital memory highly vulnerable.

CHAPTER 6: RECOMMENDATION FOR MSDI AND IMPLEMENTATION ROADMAP

06

The transition from the diagnostic capacity assessment to a proactive strategic framework is essential for the institutionalisation of geospatial data within Dodhara Chandani. This chapter proposes the foundational architecture for the Municipal Spatial Data Infrastructure (MSDI) and delineates the recommended roadmap for its operationalisation. By addressing the identified deficiencies in governance, technical proficiency, and system interoperability, the proposed framework establishes a structured pathway toward a digitally resilient municipal ecosystem. The recommendations provided are designed to be locally applicable while remaining compliant with the National Spatial Data Infrastructure (NSDI) standards of Nepal.

6.1 Overview of the proposed MSDI Framework

The Municipal Spatial Data Infrastructure (MSDI) for Dodhara Chandani is envisioned as a comprehensive enabling platform designed to facilitate the seamless discovery, exchange, and application of geospatial information. The MSDI serves as a catalyst for institutional transformation by fostering a robust culture of data sharing and cross-departmental collaboration. Rather than functioning as a standalone software application, the MSDI is a holistic ecosystem built upon four foundational pillars. Each pillar integrates specific enablers, including policies, standards, and technical tools, to ensure the infrastructure remains operational, scalable, and sustainable. The proposed MSDI framework is structured around the following four pillars:

- **(I) - Institutional Arrangements**: The bedrock of the system, encompassing governance structures, formal data-sharing policies, and the legal mandates required to institutionalize GIS operations.
- **(P) - People**: Focuses on human capital, including specialized technical training, continuous capacity building, and the clear definition of roles and responsibilities across municipal tiers.
- **(D) - Data**: Defines the core content, establishing rigorous standards for metadata, accuracy, and quality protocols to ensure all spatial layers are "FAIR" (Findable, Accessible, Interoperable, and Reusable).
- **(S) - Systems**: The technological backbone, comprising ICT infrastructure, specialized software, and the web services (geoportals) necessary for data visualization and dissemination.

6.2 Strategic Recommendations for Operationalization of Dodhara Chadani MSDI

Drawing upon the comprehensive capacity assessment of Dodhara Chadani Municipality and an extensive review of international SDI and MSDI best practices, the following strategic recommendations have been developed. These actions are organized according to the IPDS Framework (Institutional arrangements, People, Data, and Systems) to ensure a holistic approach to the implementation and long-term sustainability of the municipality's spatial infrastructure.

A summary of the primary recommendations is presented below. Comprehensive justifications and specific implementation guidelines for each action are provided in the subsequent sections of this report.

A. INSTITUTIONAL ARRAGMENTS PILLAR

#	RECOMMENDATIONS
a.	Enact MSDI Policy

#	RECOMMENDATIONS
b.	Establish MSDI Steering Committee
c.	Establish MSDI Execution Committee
d.	Enactment of MDSI Governance Directives and Operational Procedures

B. PEOPLE PILLAR

#	RECOMMENDATIONS
a.	MSDI Sensitization and Awareness Program
b.	Appointment of Lead Geospatial Officer / Expert
c.	Enhance Municipal Geospatial Capacity
d.	Definition and Formalization of Institutional and Personnel Roles and Responsibilities

C. DATA PILLAR

#	RECOMMENDATIONS
a.	Identification and Formalization of Framework Data Themes
b.	Development of a Comprehensive Geospatial Data Inventory
c.	Acquisition of Framework Data
d.	Development of Data Product Specifications and Format Standards
e.	Develop Metadata Standards and Compliance
f.	Development of Data Quality Standards and Assurance Mechanisms

D. SYSTEM PILLAR

#	RECOMMENDATIONS
a.	Development and Optimal Utilization of Geoportal
b.	Levering Existing Server for Geospatial Data Processing and Archiving

6.2.1 (I) - Institutional Arrangements

The **Institutional Arrangements** pillar establishes the governance structure and legal authority necessary to sustain a spatial data ecosystem. The following recommendations provide the strategic foundation for operationalizing the Dodhara Chadani MSDI. Each recommendation is supported by a clear justification and structured implementation guidelines to ensure institutional buy-in and long-term viability.

a. Enact MSDI Policy

Recommendation:
Draft and enact a formal MSDI Policy to serve as the legal and regulatory foundation for all geospatial activities within the municipality.

Justification:
A formal policy is the primary prerequisite for MSDI sustainability. It provides the legal mandate required to:

- **Establish Governance:** Authorize the creation of formal Institutional Arrangements, including the MSDI Steering Committee and MSDI Execution Committee.
- **Mandate for operationalizing MSDI:** Provide the legal authority to develop and enact essential Procedures (for data collection, sharing, and security) and Technical Standards (including data product specifications and metadata standards).

Implementation:
The municipality should develop MSDI policy supported by technical experts including representatives from Survey Department particularly Geographic Information Infrastructure, the nodal agency for Nepal's National Spatial Data Infrastructure.

b. Establish MSDI Steering Committee

Recommendation:
Establish an MSDI Steering Committee to provide the strategic direction and legal framework necessary for the sustainable operation of the municipal spatial data infrastructure.

Justification:
The implementation of an MSDI requires robust legal backing to formalize data-sharing protocols and departmental mandates. The MSDI Steering Committee will serve as the highest governing body, steering all geospatial activities and providing direct oversight to the MSDI Executive Committee to ensure alignment with municipal priorities. The MSDI Steering Committee provides the legislative mandate and inter-agency coordination at the policy level

Implementation:
To ensure maximum political commitment and administrative authority:

- **Governance:** The **Municipal Executive** shall function as the MSDI Committee .
- **Member Secretary:** The **Chief Administrative Officer (CAO)** will serve as the Member Secretary to bridge the gap between policy and administration.
- **External Advisory:** The Committee may invite representatives from relevant external institutions to provide expert technical and strategic recommendations.

c. Establish MSDI Steering Committee

Recommendation:
Formally establish the MSDI Executive Committee to serve as the operational and technical arm of the MSDI, responsible for the execution of the geospatial roadmap.

Justification:
While the Steering Committee provides strategic direction, a dedicated technical body is required to handle the daily complexities of spatial data management. MSDI Execution Committee ensures that these policies are translated into technical standards and shared digital services.The Executive Committee ensures:

- **Technical Operationalization:** Translates high-level policy into functional technical workflows and manages the municipal geospatial database.
- **Data Interoperability:** Collaborates across government levels to ensure that municipal data remains compatible with provincial and national standards.
- **Cross-Sectoral Integration:** Facilitates direct communication between departments to ensure that data from Planning, Public Works, and Finance are integrated into a single, reliable system.

Implementation:
The committee shall be structured to balance administrative authority with technical expertise:

- **Leadership:** Chaired by the Chief Administrative Officer (CAO) to ensure administrative alignment and resource allocation.
- **Composition:** Includes representatives from every municipal department to represent diverse sectoral data needs.
- **Technical Secretariat:** The Head of the Land Management, Data, or IT Section shall serve as the Member Secretary and technical lead

d. Enactment of MSDI Governance Directives and Operational Procedures

Recommendation:
Formally enact a comprehensive suite of directives and procedures to mandate framework data themes, content, and standards; define clear institutional roles for Data Stewardship and Custodianship; and establish formal frameworks for data collection, inter-agency sharing, and strategic partnerships.

Justification:
The formal enactment of these directives provides the legal validity and administrative authority necessary to ensure long-term MSDI sustainability. By codifying these procedures, the Municipality ensures:

- **Institutional Accountability:** Formalizing roles for Data Stewardship (responsible for content accuracy and business rules) and Data Custodianship (responsible for technical infrastructure and security) eliminates ambiguity and ensures clear lines of responsibility for data maintenance.
- **Structural Interoperability:** Mandating fundamental data themes and technical standards (such as metadata and coordinate systems) ensures wthat geospatial information remains consistent, searchable, and integrable across all municipal departments.
- **Streamlined Collaboration:** Pre-defined protocols for data collection and sharing reduce administrative friction, minimize data duplication, and provide a secure, transparent environment for multi-departmental and public-private partnerships.

Implementation:
The MSDI Execution Committee shall be responsible for drafting the technical directives and procedural manuals. These must be submitted to the MSDI Steering Committee for final ratification. Upon enactment, these directives will serve as the binding regulatory framework for all municipal geospatial data management.

Scope of Directives (Administrative & Policy Framework) Directives shall be established to provide the administrative mandate for the following:

- **Fundamental Data Themes:** Designation of authoritative "Framework Data" to serve as the city's geographic foundation.
- **Mandatory Data Inventory & Maintenance:** Requirement for all departments to register their geospatial assets in a centralized inventory. This directive mandates that the inventory is actively maintained, ensuring all new spatial data is recorded and existing entries are updated regularly.
- **Mandated Metadata Development:** A directive requiring that all spatial data must be accompanied by metadata developed according to the established metadata standard. Data shall not be published to the Geoportal or shared officially without a completed metadata record.
- **Resource Optimization:** Implementation of protocols to prevent duplication in data collection and digitizing efforts across departments.
- **Data Sharing Provisions:** Legal and administrative rules governing the exchange of datasets between municipal agencies.
- **Interoperability Mandates:** Policies ensuring that departmental workflows align with the centralized MSDI architecture.
- **Strategic Partnerships:** Frameworks for collaborative data acquisition with the private sector, utilities, and academic institutions.
- **Scope of Standards (Technical Specifications):** Technical standards shall be developed to ensure the seamless integration of data:
- **Geodetic Reference System:** Definition of a unified coordinate reference system (e.g., WGS84 or local datum) to ensure spatial alignment.
- **Metadata Standards:** Adoption of international metadata schemas (e.g., ISO 19115) to document data quality, lineage, and ownership.
- **Data Product Specifications (DPS):** Clear technical requirements for each dataset, including accuracy levels, attribute tables, and file formats

6.2.2 (P) - People

a. MSDI Sensitization and Awareness Program

Recommendation:
Conduct MSDI sensitization for municipal leadership, department heads, and administrative/technical staff, as well as external stakeholders essential to the MSDI ecosystem.

Justification:
Geospatial data is foundational to municipal operations but often remains an unrecognized asset. Formal sensitization highlights the critical role of spatial data in service delivery, demonstrating the collective value of a shared data environment. This awareness is essential to encourage data sharing and dismantle the departmental silos that currently hinder municipal efficiency.onment for multi-departmental and public-private partnerships.

Implementation:
The committee shall be structured to balance administrative authority with technical expertise: Sensitization should be integrated into the municipality's existing administrative cycle. This includes executive briefings during leadership meetings and technical awareness modules within regular departmental workshops to ensure continuous engagement without additional overhead.

b. Appointment of a Lead Geospatial Officer / Expert

Recommendation:
Formalize the recruitment of a Lead Geospatial Expert (Geomatics Engineer) to coordinate municipal-wide spatial data activities and manage the technical operations of the MSDI.

Justification:
Efficient municipal governance requires seamless, high-frequency spatial data integration across Planning, Public Works, Utilities, and Finance. A dedicated expert is essential to:

- **Centralize Coordination:** Synchronize workflows to eliminate data duplication and departmental silos.
- **Operational Oversight:** Manage the municipal Geoportal to ensure system security, availability, and performance.
- **Technical Excellence:** Standardize data quality and guide the integration of spatial analytics into executive decision-making.

Implementation:
The primary objective is to appoint a Geomatics Engineer on a permanent basis to ensure institutional continuity and long-term MSDI sustainability. If permanent recruitment is not immediately feasible, a temporary expert should be engaged to maintain technical momentum.

c. Enhance Municipal Geospatial Capacity

Recommendation:
Strengthen the geospatial capabilities of municipal personnel through targeted technical training and professional development.

Justification:
While various municipal departments interact with spatial data daily, effective operationalization of an MSDI requires specialized technical skills. Developing internal geospatial expertise is essential to ensure that departments can independently manage, analyze, and utilize spatial services for improved urban planning and service delivery.

Implementation:
The Municipality should enhance staff capacity through a flexible training strategy:

- **Institutional Collaboration:** Partner with the Land Management Training Center (LMTC) in Dhulikhel for certified geospatial programs or customized on-site workshops.
- **Personnel Encouragement:** Actively encourage and incentivize municipal staff to participate in LMTC's regular training programs to build long-term internal expertise.
- **External Training:** Utilize private sector agencies or specialized external programs to address specific technical gaps as they arise.

d. Definition and Formalization of Institutional and Personnel Roles and Responsibilities

Recommendation:
Define and formalize organizational, departmental, and individual roles and responsibilities to establish a clear governance hierarchy for the operationalization of the MSDI.

Justification:
Successful MSDI implementation depends on moving away from "ad-hoc" data management to a structured Institutional Framework. Clearly defined roles ensure:

- **Operational Continuity:** Prevents the loss of institutional knowledge when staff change.
- **Clear Accountability:** Assigns specific "owners" to datasets, ensuring that data quality and updates are not neglected.
- **Efficient Workflow:** Minimizes duplication of effort by defining which department is the "Authoritative Source" for specific data themes (e.g., Engineering for utilities, Planning for zoning).

Implementation:
To embed these roles into the municipal structure, the following actions shall be taken:

1. **Departmental Data Steward Designation:** Each municipal department shall formally designate at least one Data Steward. These subject-matter experts will be responsible for data content, ensuring the accuracy of attributes, and developing metadata for their respective departments.
2. **Technical Data Custodian Designation:** The central ICT or GIS unit shall formally designate Data Custodians responsible for the technical lifecycle of the data, including database security, server maintenance, and system backups.
3. **Nodal Officer Appointment:** A Nodal Officer shall be appointed within the MSDI lead agency to act as the primary liaison for developing and managing strategic partnerships for data acquisition and inter-agency sharing.
4. **Formalization of Mandates:** These roles shall be formalized through official appointment letters and integrated into the individuals' Job Descriptions (JDs) to ensure that MSDI tasks are recognized as core professional responsibilities.

6.2.3 (D) - Data

a. Identification and Formalization of Framework Data Themes

Recommendation:
Identify and formalize a definitive list of Framework Geospatial Data Themes that will serve as the municipality's foundational digital layers.

Justification:
Framework data (often called "Base Maps") provides the common geographic reference for all municipal activities. By standardizing layers such as administrative boundaries, road networks, and topography, the municipality ensures:

- **Geographic Alignment:** Every department's thematic data (e.g., utility pipes or tax parcels) will overlay perfectly without spatial gaps or overlaps.
- **Efficiency:** Individual departments no longer need to independently digitize base maps, significantly reducing operational costs and time.
- **Interoperability:** These layers act as the "common language" that allows different software systems across the municipality to communicate.

Implementation:
The formalization of these themes shall follow a structured administrative process:

1. **Identification (Executive Level):** The MSDI Execution Committee shall identify and define the specific framework themes required for the municipality (e.g., geodetic control, orthoimagery, transport, and water bodies).
2. **Formal Ratification (Steering Level):** The proposed list shall be submitted to the MSDI Steering Committee for formal recognition as the "Official Municipal Base Data."
3. **Standardized Development:** Upon recognition, the municipality shall develop or update these layers strictly according to the established Data Product Specifications (ISO 19131) and the Geodetic Reference System.
4. **Authoritative Designation:** A directive shall be issued declaring these datasets as the sole "Authoritative Source," mandating their use by all departments and external contractors to ensure consistency across the municipal GIS ecosystem.

b. Acquisition of Framework Data

Recommendation:
Collect or capture identified framework data.

Justification:
Framework data serves as the essential bedrock for positional interoperability, ensuring that data from various departments (e.g., engineering, planning, and revenue) aligns geographically without error. Because these datasets are designed for repeatability and multi-purpose utility, the initial acquisition is a strategic long-term investment rather than a one-time project cost. A robust framework prevents the costly duplication of efforts and ensures that municipal decisions are based on accurate, authoritative spatial contexts.

Implementation:
To optimize resources, the municipality should adopt a tiered approach to data acquisition:

- **Utilization of Open-Access National Data:** Leverage existing free geospatial resources from federal authorities.
  Example: Land-use zoning and soil data are available through the Topographical Survey and Land Use Management Division of the Survey Department, Government of Nepal.
- **Procurement of High-Resolution Proprietary Data:** Access high-precision datasets already captured by national agencies to avoid the expense of new surveys.
  Example: Orthophotos and LiDAR data (essential for flood modeling and infrastructure planning) should be formally procured from the Geographic Information Infrastructure Division (GIID) of the Survey Department.
- **Gap Analysis & Primary Capture:** For layers not available at the federal level (such as house numbering or ward-level utility maps), the municipality should commission localized data capture using standardized protocols to ensure compatibility with national systems.

c. Development and maintenance of Geospatial Data Inventory

Recommendation:
Establish an actively maintained inventory of all existing and future municipal geospatial datasets to eliminate data silos and ensure discoverability.

Justification:
Currently, geospatial data is scattered across various departments and individual projects. This "siloed" approach undermines the efficiency of the municipality through:

- **Data Redundancy:** Multiple departments inadvertently purchasing or digitizing the same geographic information.
- **Discovery Barriers:** Critical datasets remain "hidden" on local drives or departmental servers, making them unavailable for integrated city-wide planning.
- **Asset Loss:** Data created through donor-funded or private projects is often lost upon project completion.

A centralized inventory provides a single authoritative source for identifying available data, ensuring that municipal investments in information are preserved and accessible.

Implementation:
The inventory shall be developed and managed through a phased approach:

1. **Governance Structure:** A dedicated Sub-Committee of Data Stewards shall be formed to conduct the initial data audit. The Data Custodian (from the central IT/GIS unit) shall serve as the Nodal Officer, responsible for the technical operation and maintenance of the registry.
2. **Initial Categorization & Feature Catalogue:** Before a full Geoportal is operational, the committee shall develop a classified digital collection of data. This "Pre-Geoportal Inventory" will include a Feature Catalogue—a formal document defining the types of features, their specific attributes, and their relationships.
3. **Mandatory Registration Directive:** A directive shall be enacted requiring that all new geospatial data—whether generated internally or by external contractors—be registered in the inventory. This registration shall be a mandatory prerequisite for project closure and final payment.

d. Development and maintenance of Geospatial Data Catalog

Recommendation:
Establish an actively maintained catalog with standardized metadata of all existing and future municipal geospatial datasets to eliminate data silos and ensure discoverability.

Justification:
While the Geospatial Data Inventory servers as a simple register for recording of geospatial data, the Geospatial Data Catalog provides information with the metadata and hence provides detail on not just discovery of the data but also assess the appropriateness of use of the data and provide proper understanding of the data.

Implementation:
The inventory shall be developed and managed through a phased approach:

1. **Governance Structure:** The MSDI Implementation Committee will be responsible for making necessary arrangements to develop and maintain Geospatial Data Catalog.
2. **Migration to Metadata Catalog Service (CSW):** Once the Geoportal is launched, the inventory will be migrated into the portal's Metadata Catalog Service (CSW). At this stage, the Geoportal transitions into the live, authoritative data inventory for the entire municipality, allowing for automated search and discovery.

e. Development of Data Product Specifications and Format Standards

Recommendation:
Develop and adopt standardized Data Product Specifications (DPS) and exchange formats, prioritizing Framework Data Themes followed by thematic departmental data.

Justification:
Standardized specifications and formats are the primary technical pillars of interoperability. Without them, data from different departments cannot be integrated or analyzed together. Establishing these standards ensures:

- **Structural Consistency:** Every dataset for a specific theme (e.g., roads) contains the same mandatory attributes and geometry types regardless of which department created it.
- **Seamless Exchange:** Data can be moved between different software platforms (GIS, CAD, Web) without loss of information or coordinate shifts.
- **Procurement Quality:** Clearly defined specifications provide a technical benchmark for outsourced data collection, ensuring the municipality receives high-quality, usable assets.

Implementation:
The development of geospatial specifications shall be guided by international best practices and national mandates:

1. Alignment with ISO Standards: Technical specifications for each framework theme shall be developed based on the ISO 19131 (Geographic Information - Data Product Specification) standard. This includes defining the scope, coordinate reference system, and data quality requirements.
2. Adoption of OGC Formats: To ensure open access and prevent vendor lock-in, the municipality shall mandate the use of Open Geospatial Consortium (OGC) standards for data exchange, such as GeoPackage, GML, or GeoJSON for vector data, and GeoTIFF for raster data.
3. National Standard Integration: All specifications must incorporate Nepal's National Geographic Information Infrastructure (NGII) standards and the National Geodetic Reference System to ensure vertical integration with provincial and federal data.

4. Phased Rollout: The MSDI Execution Committee shall first draft specifications for the Framework Themes before expanding the mandate to specialized thematic layers.

f. Develop Metadata Standards

Recommendation:
Develop and formalize a municipal metadata standard for **Dodhara Chandani** by aligning with **Nepal's NSDI guidelines** and the **ISO 19115** family.

Justification:
Metadata serves as the "identity card" for every geospatial layer. Without standardized metadata, data remains a "black box," making it impossible for users to judge its reliability. Formalizing these standards ensures:

- **Enhanced Discoverability:** Enables the Geoportal's Catalog Service to index data so users can search by keywords, date, or location.
- **Trust and Credibility:** Provides the "pedigree" of the data, documenting who created it, what methods were used, and any usage constraints (e.g., copyright or sensitivity).

Implementation:
The establishment of metadata standards shall be executed through a rigorous compliance framework:

1. **Adoption of the Nepal Municipal Metadata Profile:** The **MSDI Execution Committee** shall adopt a specific profile based on the **ISO 19115-1:2014** standard, incorporating the **9 mandatory elements** defined in Nepal's NSDI guidelines:
    a. **Identification:** Title, Abstract, Purpose, and Keywords.
    b. **Contact:** Originator and Point of Contact.
    c. **Dates:** Creation, Publication, and Revision dates.
    d. **Extents:** Geographic Bounding Box (coordinates) and Time Period.
    e. **Constraints:** Legal and security access constraints.
2. **Metadata Preparation (Legacy Data):** The Data Stewards shall be tasked with "retro-fitting" metadata for all existing priority datasets. This backlog must be cleared before these layers are published on the Geoportal.
3. **The "No Metadata, No Integration" Policy:** Implement a formal protocol requiring that all new geospatial data—whether generated internally or by external partners—must be accompanied by ISO-compliant metadata (typically in .xml format) as a prerequisite for being accepted into the municipal system.
4. **Automated Validation:** Utilize open-source tools (such as the GeoNetwork Metadata Editor) to provide Data Stewards with templates that automatically validate metadata against the ISO 19139 (XML implementation) schema.

g. Development of Data Quality Standards and Assurance Mechanisms

Recommendation:
Establish formal data quality standards and rigorous validation mechanisms to ensure all geospatial assets are accurate, complete, and fit for their intended municipal use.

Justification:
The success of the MSDI depends entirely on user trust. If decisions regarding urban planning, disaster management, or infrastructure are based on inaccurate or outdated data, the system's credibility is compromised. Standardizing data quality ensures:

- **Decision Integrity:** Reliable spatial analysis results in more effective resource allocation and policy-making.
- **Reduced Risk:** Minimized errors in critical layers (e.g., underground utility locations) prevent costly mistakes during construction or emergency response.
- **System Reliability:** Uniform quality across departments allows for the seamless aggregation of data from different sources.

Implementation:
The municipality shall develop a quality framework aligned with international benchmarks:

1. **Alignment with ISO 19157:** Develop a "Municipal Data Quality Profile" based on the ISO 19157 (Geographic Information - Data Quality) standard. This profile shall define the six key elements of quality:
    a. **Completeness:** Presence and absence of features and their attributes.
    b. **Logical Consistency:** Degree of adherence to logical rules (e.g., roads must connect at intersections).
    c. **Positional Accuracy:** Accuracy of the coordinates relative to the earth's surface.
    d. **Temporal Quality:** Validity of data in respect to time (e.g., how recently was the building footprint updated?).
    e. **Thematic Accuracy:** Correctness of non-spatial attributes (e.g., correct pipe diameters or zoning codes).
    f. **Usability:** General fitness for the intended application.
2. **Establishment of Validation Mechanisms:** The **Data Custodian** shall implement automated and manual validation procedures. Data must pass these "Quality Gates" before being accepted into the central MSDI database or published on the Geoportal.

6.2.4 (S) - Systems

a. Development and Optimal Utilization of Geoportal

Recommendation:
Develop, maintain, and promote the utilization of a centralized Municipal Geoportal as the primary technical gateway for geospatial data discovery, access, and inter-departmental collaboration.

Justification:
The Geoportal serves as the **technical engine** of the MSDI, transforming siloed data into a shared municipal asset. A robust Geoportal provides:

- **Centralized Discovery:** Acts as a "search engine" for the city's spatial assets, allowing users to find data through the maintained inventory and metadata registry.
- **Fitness-for-Use Evaluation:** Enables users to evaluate the appropriateness of a dataset (accuracy, date, and source) before downloading or integrating it into their workflows.
- **Streamlined Access for Public Authorities:** Provides a secure platform where public authorities and departments can access authoritative data directly, reducing the need for manual data requests and physical transfers.

Implementation:
The development and operation of the Geoportal is a major strategic initiative that shall be executed through the following structured stages:

1. **Appointment of Leadership:** Designate a Nodal Officer responsible for overseeing the development, launch, and subsequent day-to-day operationalization of the Geoportal. This officer will act as the bridge between technical developers and departmental users.
2. **Comprehensive Requirement Analysis:** The MSDI Execution Committee shall conduct a thorough assessment of user needs across all departments. This will define critical functional requirements, including spatial viewing, attribute querying, data downloading, and API integration for third-party software.
3. **System Architecture & Pilot Phase:** Establish a robust hosting environment (Cloud-based or On-Premise) and deploy a "Beta" pilot version. This pilot must feature the Fundamental Data Themes to demonstrate immediate value to municipal stakeholders.
4. **Access Control & Security Framework:** Implement a tiered security model. This ensures that public authorities are granted specific permissions to view or download sensitive infrastructure data, while non-sensitive layers are curated for wider public or inter-departmental use.
5. **Promotion & Capacity Building:** To ensure optimal utilization, the Nodal Officer shall launch an awareness program and technical training series. This will focus on integrating Geoportal tools into standard departmental workflows to ensure the platform becomes a daily decision-making asset.

b. Levering Existing Server for Geospatial Data Processing and Archiving

Recommendation:
Leverage the municipality's existing server infrastructure to centralize the processing and archiving of geospatial data.

Justification:
GIS workflows demand high-performance computing and scalable storage that standard workstations cannot provide. Utilizing the currently under-utilized municipal server allows for high-speed spatial analysis and secure, long-term data retention without the need for additional hardware investment.

Implementation:
The server will act as a centralized hub with secure, partitioned access for each department. Departments will perform data processing and staging within their designated environments. Upon final validation, datasets will be integrated into the central Geoportal for public or internal consumption.

6.3 MSDI Implementation Roadmap

The following roadmap outlines the strategic timeline for the operationalization of the Municipal Spatial Data Infrastructure (MSDI) in Dodhara Chandani Municipality. This sequence ensures that the foundational legal, policy, and human resource requirements are established as a prerequisite for technical system deployment.

6.3.1 Phase I: Establishment of Legal and Institutional Foundation

Objective: To establish the formal mandate, governance structure, and organizational buy-in necessary for the long-term sustainability of the MSDI.

a. Strategic Sensitization and Advocacy

Action Title	Key Activities	Results & Strategic Impact
Stakeholder Engagement & Workshops	Conduct high-level briefings for the Mayor, Deputy Mayor, CAO, and Ward Chairs and practical demonstrations for department heads (Planning, Infrastructure, Revenue, and Health).	**Unified Vision:** A shared understanding of MSDI as the "Digital Backbone," ensuring a formal commitment to use spatial data for shared decision-making across all departments.

b. MSDI Policy Enactment

Action Title	Key Activities	Results & Strategic Impact
MSDI Policy Formulation and Enactment	1. **Directive:** Issuance of an official directive by the Municipal Executive to initiate policy drafting. 2. **Drafting:** Development of the policy draft led by the Chief Administrative Officer (CAO), ensuring a cross-departmental approach with input from external MSDI experts. 3. **Endorsement:** Formal presentation to and approval by the Municipal Assembly to grant the policy legal authority. 4. **Implementation:** Dissemination and operationalization of the policy across all municipal functions.	**Establishment of a Legal Framework:** Provides the necessary legal "backup" to institutionalize MSDI operations. **Operational Sustainability:** Ensures that data integration and sharing become a mandatory, standardized function of the municipality rather than an ad-hoc activity.

c. Establish MSDI Governance Bodies

Action Title	Key Activities	Results & Strategic Impact
Formalization of MSDI Steering Committee and Executive Committee	**Executive Decision:** Table the proposal for a formal minute decision by the Municipal Executive to authorize the bodies.	**Institutionalized Governance:** Transitions MSDI from a technical project to a permanent municipal function with clear accountability.

Action Title	Key Activities	Results & Strategic Impact
		Strategic Alignment: Ensures high-level political buy-in (Steering Committee) while maintaining technical agility (Executive Committee) to eliminate data silos across departments.

d. Strategic Staffing: Geospatial Officer/Expert

Action Title	Key Activities	Results & Strategic Impact
Institutionalization of Geospatial Expertise	1. Execute an **Organization & Management (O&M) Survey** to formally justify and establish a permanent Geospatial Officer position. 2. Implement **interim staffing solutions**, such as temporary contracts or inter-agency technical secondments, to meet immediate needs.	**Operational Leadership:** Established internal technical authority to spearhead data-driven governance. **MSDI Integration:** Appointment of a dedicated **Nodal Officer** to oversee the operationalization and maintenance of the Municipal Spatial Data Infrastructure (MSDI).

6.3.2 Phase II: Development of Framework Data & Standards

a. Capacity Building & Technical Empowerment

Action Title	Key Activities	Results & Strategic Impact
Technical Capacity Development Program	**Collaborative Technical Workshops:** Execute the first phase of hands-on training in partnership with the **Land Management Training Center (LMTC)** for the Executive Committee and departmental personnel.	**Institutional Competence:** Institutional Competence: Builds a standardized technical language and professional GIS proficiency across departments, ensuring long-term MSDI sustainability and alignment with national land standards.

b. Identification and Ratification of Fundamental Geospatial Data: Execution Committee identifies and MSDI Steering Committee ratifies the Fundamental Geospatial Data.

Action Title	Key Activities	Results & Strategic Impact
Municipal Base Data Framework	**1. Identify Framework Themes:** MSDI Execution Committee selects core layers (Cadastral, Transportation, Utilities, etc.) to serve as the foundation of the MSDI. **2. MSDI Steering Committee Ratification:** Formally present the selected themes to the Municipal MSDI Steering Committee for legislative approval as "Official Base Data."secondments, to meet immediate needs.	**Standardization:** Establishes a uniform set of data layers that all municipal departments must use, eliminating duplication. **Legal Weight:** MSDI Steering Committee ratification provides the mandate required for enforcement and inter-departmental data sharing.

c. Development of Geospatial Data Inventory: The MSDI Implementation Committee will develop and maintain Geospatial Data Inventory.

Action Title	Key Activities	Results & Strategic Impact
Develop an inventory list of all geospatial data available with the municipality and create a maintenance mechanism	**1. Team Formation:** Establish a specialized team tasked with identifying and verifying all geospatial data assets across municipal departments. **2. Formal Registration:** Systematically record all identified data into the Geospatial Data Inventory Book. **3. Sustainment Framework:** Define and implement a mechanism for the continuous registration of any new geospatial data relevant to the municipality.	**Visibility:** Creates a foundational document that informs stakeholders of all existing data assets at a glance. **Governance:** Establishes a formal trail of data existence, format, and department-level responsibility. **Sustainability:** Ensures the inventory remains a "living document" through a structured update cycle.

d. Development of Metadata Standards

Action Title	Key Activities	Results & Strategic Impact
Development of Metadata Standard	**1. Framework Standardization:** Draft and enact metadata protocols for "Official Municipal Base Data" through the MSDI Executive Committee. **2. Tiered Implementation:** Gradually extend these standards to departmental "data of interest" to ensure municipality-wide consistency.	**Enhanced Discoverability:** Established a searchable data catalog that allows users to quickly identify the source, accuracy, and lineage of information. **Data Interoperability:** Ensures that datasets are used correctly and can be integrated seamlessly across different municipal departments.

e. Develop Data Sharing Protocol

Action Title	Key Activities	Results & Strategic Impact
Establishment of Data Sharing Protocols	**1. Draft Governance Framework:** Formulate a comprehensive protocol through the MSDI Executive Committee defining data ownership, access tiers, and security standards. **2. Formal Ratification:** Enact the protocol as a municipal mandate to ensure mandatory compliance across all departments.	**Inter-departmental Synergy:** Eliminates data silos by creating a "Single Source of Truth," allowing departments to access real-time, authoritative data without administrative delays. **Data Security:** Protects sensitive municipal information through defined user permissions and ethical usage guidelines.

f. Develop Data Product Specifications (DPS)

Action Title	Key Activities	Results & Strategic Impact
Development of Data Product Specifications (DPS)	**1. ISO 19131 Alignment:** Draft comprehensive Data Product Specifications for "Official Base Data" following ISO 19131 standards. **2. Iterative Adoption:** Systematically expand these specifications to thematic datasets (Utilities, Revenue, Environment) to ensure enterprise-wide quality.	**Technical Excellence:** Ensures all municipal data meets international standards for quality, consistency, and technical documentation. **Procurement Readiness:** Provides a clear technical benchmark for outsourcing data collection, ensuring contractors deliver data that is "ready-to-use" in the MSDI.

6.3.3 Phase III: Technical Implementation

a. Development of Intra-Municipal Geoportal

Action Title	Key Activities	Results & Strategic Impact
Development of Intra-Municipal Geoportal	**1. Technical Audit & User Mapping:** Execute a technical audit to define specific departmental workflows and establish Role-Based Access Controls (RBAC) to ensure internal data security. **2. Internal Platform Deployment:** Build a secure, OGC-compliant web GIS environment hosted on a private server/cloud for internal data discovery and visualization. **3. Thematic Pilot Integration:** Migrate core administrative boundaries and critical infrastructure layers as a **Proof of Concept (PoC)** to showcase cross-departmental data overlay and coordination. **4. Capacity Building & Handover:** Conduct specialized technical training for Nodal Officers and Data Stewards on database administration and internal data-update protocols. administration and maintenance.	**Administrative Efficiency:** Establishes a "Single Window" for all municipal spatial assets, reducing data redundancy and the time spent on manual cross-departmental data requests. **System of Record:** Creates a centralized "Single Source of Truth," eliminating fragmented digital files and ensuring all departments work from the same validated map base.

b. Document to Habit - Operationalization of Geospatial Standards and Protocols

Action Title	Key Activities	Results & Strategic Impact
Implementation of geospatial data standards as well as protocols such as data sharing, updating data to geoportal, etc.	Enforce compliance to geospatial data standards and protocols.	All geospatial data would be standards which would make them findable, accessible, interoperable and reusable.

c. Acquisition of Framework Data

Action Title	Key Activities	Results & Strategic Impact
Comprehensive Acquisition of Foundational Framework Data	**1. Data Discovery:** Identify authoritative sources for open-access (e.g., Land Use Management Division) and proprietary datasets (e.g., GIID LiDAR/Orthophotos). **2. Formal Procurement:** Execute data-sharing agreements or purchase orders with the Survey Department and other federal agencies. **3. Primary Data Capture:** Conduct field surveys or drone mapping for missing local layers (e.g., building footprints, street addresses). **4. Harmonization:** Standardize all layers to a common coordinate system (e.g., MUTM) to ensure seamless alignment.	**Establishing the "Geospatial Bedrock":** The municipality secures a reliable "Single Source of Truth," eliminating data duplication across departments. **Positional Interoperability:** All municipal projects—from drainage design to property tax assessment—align perfectly on the map, reducing costly engineering errors and planning overlaps.

6.3.4 Phase IV: Operationalization & Scaling

a. Full Geoportal Deployment: Open the Geoportal to all public authorities and continue to develop decision-support integration.

Action Title	Key Activities	Results & Strategic Impact
Full Geoportal Deployment & Operationalization	**1. System Launch:** Deploy the Geoportal on a secure production server; configure the Internal Portal (role-based access for departments) and the Public Portal (open access).A centralized, high-availability platform that serves as the "Single Source of Truth" for all municipal spatial data.	A centralized, high-availability platform that serves as the "Single Source of Truth" for all municipal spatial data. Transition from "data storage" to "data-driven governance," reducing time for permit approvals and urban planning by at least 30%.

Action Title	Key Activities	Results & Strategic Impact
	2. Decision-Support Integration: Implement GIS tools for spatial analysis (e.g., zoning buffers, land-use queries, and infrastructure heatmaps) to automate routine planning tasks. Transition from "data storage" to "data-driven governance," reducing time for permit approvals and urban planning by at least 30%. **3. Public Engagement & Feedback:** Launch an incident reporting module for citizens to report local issues (e.g., potholes, waste) directly via the map.	Increased transparency and civic participation, fostering trust between the municipality and its citizens.

6.3.5 Timeline

The operationalisation of the Municipal Spatial Data Infrastructure is structured across a temporal framework of two and a half years to facilitate systematic institutional absorption and technical stability. This roadmap ensures a phased transition from legal preparation to full operational scaling, allowing the municipality to build capacity incrementally. Phases II and III are scheduled concurrently to exploit the technical synergies between data standardisation and system implementation, thereby optimising resource utilisation. The following timeline delineates the strategic milestones across ten quarters, commencing in the third quarter of Year 1.

Year	Y1	Y1	Y2	Y2	Y2	Y2	Y4	Y4	Y4	Y4	Remarks
Quarter	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Phase I: Establishment of Legal and Institutional Foundation	x	x									
Phase II: Development of Framework Data and Standards			x	x	x	x					
Phase III: Technical Implementation			x	x	x	x					
Phase IV: Operationalization and Scaling							x	x	x	x	

CHAPTER 7: CONCLUSION

07

The journey toward establishing a Municipal Spatial Data Infrastructure (MSDI) in Dodhara Chandani Municipality represents a crucial shift toward modern, data-driven governance. This study has demonstrated that while the potential for a geospatial ecosystem to enhance urban planning and disaster resilience is vast, its ultimate success depends on the holistic integration of technical, institutional, and human capacities. By bridging the gap between national standards and local operational realities, the municipality can move away from anecdotal planning toward evidence-based decision-making.

The primary bottleneck identified throughout this assessment is the lack of formalized governance and institutional frameworks. While there is a growing awareness of the importance of Geographic Information Systems (GIS), the current absence of clear protocols for data sharing, security, and inter-departmental collaboration significantly limits municipal efficiency. Establishing a formalized structure for data governance—including the enactment of directives that define roles for data stewardship and custodianship—is not merely a technical requirement but a strategic necessity for the long-term sustainability of the MSDI.

Technical and human resource gaps also present significant hurdles that must be addressed to ensure the infrastructure's viability. Currently, technical infrastructure remains underutilized due to a combination of outdated hardware and a scarcity of trained personnel capable of managing complex geospatial datasets. To bridge this gap, the municipality must prioritize a phased approach to capacity building, focusing on both the recruitment of specialized experts and the continuous professional development of existing staff.

The data ecosystem in Dodhara Chandani is presently fragmented, with critical information often siloed within individual departments or lost following the completion of donor-funded projects. This fragmentation results in the wasteful duplication of effort and prevents a comprehensive understanding of the municipality's socio-economic and spatial dynamics. Transitioning toward a unified, real-time data repository—facilitated by a centralized Municipal Geoportal—is essential to provide a "single source of truth" for all municipal functions, from property tax estimation to disaster risk reduction.

Ultimately, the success of the MSDI relies on "human-ware"—the fostering of a culture of collaboration among local government officials, technical experts, and the community. Engaging these stakeholders ensures that the data system remains inclusive and responsive to the actual needs of the residents. While the path to a fully functional MSDI is complex, the benefits—including enhanced disaster resilience, improved service delivery, and sustainable urban growth—provide a compelling value proposition for the municipality's future. The roadmap provided in this report serves as an actionable blueprint to transform Dodhara Chandani into a modern, digitally resilient logistics hub.

ANNEX

08

Annex A

दोधारा चाँदनी नगरपालिकाको भौगोलिक तथ्याङ्क संकलन, व्यवस्थापन तथा वितरण सम्बन्धी कार्यविधि, २०८२

प्रस्तावना: नेपालको संविधान तथा स्थानीय सरकार सञ्चालन एन, २०७४ ले स्थानीय तहलाइ प्रदान गरेका अधिकार तथा जिम्मेवारीहरूको प्रभावकारी कार्यान्वयनका लागि तथ्यपरक र वस्तुनिष्ठ नीति निर्माण, योजना तर्जुमा तथा कार्यक्रम कार्यान्वयन गर्न आवश्यक भएकाले,
नगरपालिकाबाट प्रवाह हुने सेवा, पूर्वाधार विकास, विपद् जोखिम व्यवस्थापन, वातावरण संरक्षण एवं भू-उपयोग व्यवस्थापन लगायतका कार्यहरूलाइ प्रमाणमा आधारित (Evidence-based) बनाउन भौगोलिक तथ्याङ्कको महत्त्वपूर्ण भूमिका रहने हुँदा,
नेपालको संविधानको अनुसूची–८ मा उल्लिखित स्थानीय तहको एकल अधिकारको सूचीबमोजिम 'स्थानीय तथ्याङ्क र अभिलेख संकलन' गर्ने अधिकारको प्रयोग गरी नगरपालिकाको समग्र विकास प्रक्रियालाइ प्रमाणमा आधारित बनाउन र तथ्याङ्कीय प्रणालीलाइ व्यवस्थित, एकीकृत र प्रविधिमैत्री बनाउन आवश्यक भएकाले,
दोधारा चाँदनी नगरपालिका क्षेत्रभित्र उपलब्ध तथा संकलन गरिने भौगोलिक तथ्याङ्कको संकलन, अभिलेखीकरण, भण्डारण, अद्यावधिक, व्यवस्थापन तथा वितरण प्रक्रियालाइ व्यवस्थित गर्न, तथ्याङ्कको सहज पहुँच, प्राविधिक तादम्यता (Interoperability) तथा गुणस्तर सुनिश्चित गर्न र तथ्याङ्कको दोहोरोपन न्यूनीकरण गरी पुनः प्रयोगलाइ प्रवर्द्धन गर्न वाञ्छनीय भएकाले,
दोधारा चाँदनी नगर कार्यपालिकाले स्थानीय सरकार सञ्चालन एन, २०७४ को दफा १०२ बमोजिम प्रदत्त अधिकार प्रयोग गरी यो "भौगोलिक तथ्याङ्क संकलन, व्यवस्थापन तथा वितरण सम्बन्धी कार्यविधि, २०८२" जारी गरेको छ।

परिच्छेद - १

प्रारम्भिक

१. संक्षिप्त नाम र प्रारम्भः (१) यस कार्यविधिको नाम " दोधारा चाँदनी नगरपालिकाको भौगोलिक तथ्याङ्क संकलन, व्यवस्थापन तथा वितरण सम्बन्धी कार्यविधि, २०८२" रहेको छ।
(२) यो कार्यविधि नगरपालिकाको स्थानीय राजपत्रमा प्रकाशन भएको मितिदेखि प्रारम्भ हुनेछ।

२. परिभाषाः विषय वा प्रसङ्गले अर्को अर्थ नलागेमा यस कार्यविधिमा-
(क) "नगरपालिका" भन्नाले दोधारा चाँदनी नगरपालिका सम्झनु पर्छ।
(ख) "नगर कार्यपालिका" भन्नाले दोधारा चाँदनी नगर कार्यपालिका सम्झनु पर्छ।
(ग) "नगर प्रमुख" र "उप-प्रमुख" भन्नाले क्रमशः दोधारा चाँदनी नगरपालिकाका नगर प्रमुख र नगर उप-प्रमुख सम्झनु पर्छ।
(घ) "प्रमुख प्रशासकीय अधिकृत" भन्नाले नगरपालिकाको प्रशासनिक प्रमुखको रुपमा कार्यरत कर्मचारी सम्झनु पर्छ।
(ङ) "शाखा" भन्नाले नगर कार्यपालिकाको संगठन संरचना अन्तर्गतका विषयगत शाखाहरू सम्झनु पर्छ।
(च) "भौगोलिक तथ्याङ्क (Geospatial Data)" भन्नाले पृथ्वीको सतहमा रहेका प्राकृतिक वा मानव निर्मित वस्तुहरूको भौगोलिक अवस्थितिसँग सम्बन्धित तथ्याङ्क, नक्सा, उपग्रह चित्र (Satellite Imagery), हवाइ तस्बिर (Aerial Photo), र सोसँग सम्बन्धित अन्य विवरणहरू समेत सम्झनु पर्छ।
(छ) "स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार / Municipal Spatial Data Infrastructure (MSDI)" भन्नाले नगरपालिकाको भौगोलिक तथ्याङ्कको संकलन, व्यवस्थापन तथा वितरणका लागि आवश्यक पर्ने नीतिगत, संस्थागत, प्राविधिक र मानवीय संसाधनको एकीकृत संरचना सम्झनु पर्छ।
(ज) "निर्देशन समिति" भन्नाले यस कार्यविधिको दफा ५ बमोजिम गठित स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार निर्देशन समिति सम्झनु पर्छ।
(झ) "कार्यान्वयन समिति" भन्नाले यस कार्यविधिको दफा ६ बमोजिम गठित स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार कार्यान्वयन समिति सम्झनु पर्छ।
(ञ) "आधारभूत भौगोलिक तथ्याङ्क (Foundation Geospatial Data)" भन्नाले कुनै पनि भौगोलिक तथ्याङ्क संकलन तथा नाप-नक्साङ्कन कार्यमा आधारका रूपमा रहने दफा ७ बमोजिमका तथ्याङ्क सम्झनु पर्छ।
(ट) "मेटाडेटा (Metadata)" भन्नाले कुनै भौगोलिक तथ्याङ्कको स्रोत, संकलन विधि, संकलन मिति, मापदण्ड, गुणस्तर, अन्तिम पटक अद्यावधिक गरिएको मिति, र प्रयोगका शर्त लगायतका विवरण खुल्ने गरी तयार पारिएको संरचनागत (Structured) जानकारी सम्झनु पर्छ।
(ठ) "भौगोलिक तथ्याङ्कको अभिलेख (Geospatial Data Inventory)" भन्नाले दफा ८ बमोजिमको अभिलेख सम्झनु पर्छ।
(ड) "भौगोलिक तथ्याङ्कको क्याटलग (Geospatial Data Catalog)" भन्नाले दफा ९ बमोजिमको क्याटलग सम्झनु पर्छ।
(ढ) "भौगोलिक तथ्याङ्कको एकीकृत डाटाबेस (Integrated Geospatial Database)" भन्नाले दफा १० बमोजिमको डाटाबेस सम्झनु पर्छ।
(ण) "भू-पोर्टल (Geoportal)" भन्नाले दफा ११ बमोजिमको वेबमा आधारित पोर्टल सम्झनु पर्छ।

दोधारा चाँदनी नगरपालिकाको भौगोलिक तथ्याङ्क संकलन, व्यवस्थापन तथा वितरण सम्बन्धी कार्यविधि, २०८२

प्रस्तावना: नेपालको संविधान तथा स्थानीय सरकार सञ्चालन एन, २०७४ ले स्थानीय तहलाइ प्रदान गरेका अधिकार तथा जिम्मेवारीहरूको प्रभावकारी कार्यान्वयनका लागि तथ्यपरक र वस्तुनिष्ठ नीति निर्माण, योजना तर्जुमा तथा कार्यक्रम कार्यान्वयन गर्न आवश्यक भएकाले,
नगरपालिकाबाट प्रवाह हुने सेवा, पूर्वाधार विकास, विपद् जोखिम व्यवस्थापन, वातावरण संरक्षण एवं भू-उपयोग व्यवस्थापन लगायतका कार्यहरूलाइ प्रमाणमा आधारित (Evidence-based) बनाउन भौगोलिक तथ्याङ्कको महत्त्वपूर्ण भूमिका रहने हुँदा,
नेपालको संविधानको अनुसूची–८ मा उल्लिखित स्थानीय तहको एकल अधिकारको सूचीबमोजिम 'स्थानीय तथ्याङ्क र अभिलेख संकलन' गर्ने अधिकारको प्रयोग गरी नगरपालिकाको समग्र विकास प्रक्रियालाइ प्रमाणमा आधारित बनाउन र तथ्याङ्कीय प्रणालीलाइ व्यवस्थित, एकीकृत र प्रविधिमैत्री बनाउन आवश्यक भएकाले,
दोधारा चाँदनी नगरपालिका क्षेत्रभित्र उपलब्ध तथा संकलन गरिने भौगोलिक तथ्याङ्कको संकलन, अभिलेखीकरण, भण्डारण, अद्यावधिक, व्यवस्थापन तथा वितरण प्रक्रियालाइ व्यवस्थित गर्न, तथ्याङ्कको सहज पहुँच, प्राविधिक तादम्यता (Interoperability) तथा गुणस्तर सुनिश्चित गर्न र तथ्याङ्कको दोहोरोपन न्यूनीकरण गरी पुनः प्रयोगलाइ प्रवर्द्धन गर्न वाञ्छनीय भएकाले,
दोधारा चाँदनी नगर कार्यपालिकाले स्थानीय सरकार सञ्चालन एन, २०७४ को दफा १०२ बमोजिम प्रदत्त अधिकार प्रयोग गरी यो "भौगोलिक तथ्याङ्क संकलन, व्यवस्थापन तथा वितरण सम्बन्धी कार्यविधि, २०८२" जारी गरेको छ।

परिच्छेद - १

प्रारम्भिक

१. संक्षिप्त नाम र प्रारम्भः (१) यस कार्यविधिको नाम " दोधारा चाँदनी नगरपालिकाको भौगोलिक तथ्याङ्क संकलन, व्यवस्थापन तथा वितरण सम्बन्धी कार्यविधि, २०८२" रहेको छ।
(२) यो कार्यविधि नगरपालिकाको स्थानीय राजपत्रमा प्रकाशन भएको मितिदेखि प्रारम्भ हुनेछ।

२. परिभाषाः विषय वा प्रसङ्गले अर्को अर्थ नलागेमा यस कार्यविधिमा-
(क) "नगरपालिका" भन्नाले दोधारा चाँदनी नगरपालिका सम्झनु पर्छ।
(ख) "नगर कार्यपालिका" भन्नाले दोधारा चाँदनी नगर कार्यपालिका सम्झनु पर्छ।
(ग) "नगर प्रमुख" र "उप-प्रमुख" भन्नाले क्रमशः दोधारा चाँदनी नगरपालिकाका नगर प्रमुख र नगर उप-प्रमुख सम्झनु पर्छ।
(घ) "प्रमुख प्रशासकीय अधिकृत" भन्नाले नगरपालिकाको प्रशासनिक प्रमुखको रुपमा कार्यरत कर्मचारी सम्झनु पर्छ।
(ङ) "शाखा" भन्नाले नगर कार्यपालिकाको संगठन संरचना अन्तर्गतका विषयगत शाखाहरू सम्झनु पर्छ।
(च) "भौगोलिक तथ्याङ्क (Geospatial Data)" भन्नाले पृथ्वीको सतहमा रहेका प्राकृतिक वा मानव निर्मित वस्तुहरूको भौगोलिक अवस्थितिसँग सम्बन्धित तथ्याङ्क, नक्सा, उपग्रह चित्र (Satellite Imagery), हवाइ तस्बिर (Aerial Photo), र सोसँग सम्बन्धित अन्य विवरणहरू समेत सम्झनु पर्छ।
(छ) "स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार / Municipal Spatial Data Infrastructure (MSDI)" भन्नाले नगरपालिकाको भौगोलिक तथ्याङ्कको संकलन, व्यवस्थापन तथा वितरणका लागि आवश्यक पर्ने नीतिगत, संस्थागत, प्राविधिक र मानवीय संसाधनको एकीकृत संरचना सम्झनु पर्छ।
(ज) "निर्देशन समिति" भन्नाले यस कार्यविधिको दफा ५ बमोजिम गठित स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार निर्देशन समिति सम्झनु पर्छ।
(झ) "कार्यान्वयन समिति" भन्नाले यस कार्यविधिको दफा ६ बमोजिम गठित स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार कार्यान्वयन समिति सम्झनु पर्छ।
(ञ) "आधारभूत भौगोलिक तथ्याङ्क (Foundation Geospatial Data)" भन्नाले कुनै पनि भौगोलिक तथ्याङ्क संकलन तथा नाप-नक्साङ्कन कार्यमा आधारका रूपमा रहने दफा ७ बमोजिमका तथ्याङ्क सम्झनु पर्छ।
(ट) "मेटाडेटा (Metadata)" भन्नाले कुनै भौगोलिक तथ्याङ्कको स्रोत, संकलन विधि, संकलन मिति, मापदण्ड, गुणस्तर, अन्तिम पटक अद्यावधिक गरिएको मिति, र प्रयोगका शर्त लगायतका विवरण खुल्ने गरी तयार पारिएको संरचनागत (Structured) जानकारी सम्झनु पर्छ।
(ठ) "भौगोलिक तथ्याङ्कको अभिलेख (Geospatial Data Inventory)" भन्नाले दफा ८ बमोजिमको अभिलेख सम्झनु पर्छ।
(ड) "भौगोलिक तथ्याङ्कको क्याटलग (Geospatial Data Catalog)" भन्नाले दफा ९ बमोजिमको क्याटलग सम्झनु पर्छ।
(ढ) "भौगोलिक तथ्याङ्कको एकीकृत डाटाबेस (Integrated Geospatial Database)" भन्नाले दफा १० बमोजिमको डाटाबेस सम्झनु पर्छ।
(ण) "भू-पोर्टल (Geoportal)" भन्नाले दफा ११ बमोजिमको वेबमा आधारित पोर्टल सम्झनु पर्छ।

३. उद्देश्यहरुः (१) यस कार्यविधिका प्रमुख उद्देश्यहरू देहाय बमोजिम रहेका छन्:–
(क) नीति निर्माण तथा योजना तर्जुमामा सहयोग: नगरपालिकाको नीति निर्माण, योजना तर्जुमा तथा कार्यक्रम कार्यान्वयनको निम्ति आवश्यक भौगोलिक तथ्याङ्कको उपलब्धता, तथ्याङ्कहरू बीचको प्राविधिक तादात्म्यता (Interoperability) र पुनः प्रयोग गर्ने वातावरण सुनिश्चित गर्ने।
(ख) एकीकृत व्यवस्थापन: नगरपालिकाका विभिन्न शाखा र वडाहरूमा छरिएर रहेका वा छुट्टाछुट्टै राखिएका भौगोलिक तथ्याङ्कहरू (Data Silos) लाइ एकीकृत गरी एकद्वार प्रणालीमार्फत सबैको साझा पहुँच र उपयोग सुनिश्चित गर्ने।

(ग) दोहोरोपन निराकरण: भौगोलिक तथ्याङ्क संकलनमा हुने दोहोरो लगानी र प्रयासलाइ न्यूनीकरण गर्दै भौगोलिक तथ्याङ्कको सरल, सहज र सुरक्षित पहुँच सुनिश्चित गर्ने।
(२) यस कार्यविधिका विशिष्ट उद्देश्यहरु देहाय बमोजिम रहेका छन्;-
(क) आधारभूत भौगोलिक तथ्याङ्क पहिचान गरी सोको उपलब्धता सुनिश्चित गर्ने।
(ख) भौगोलिक तथ्याङ्कको अभिलेख (Inventory) खडा गरी उपलब्ध स्थानीय भौगोलिक तथ्याङ्कको सूची तयार गर्ने।
(ग) भौगोलिक तथ्याङ्कको क्याटलग (Catalog) निर्माण गरी तथ्याङ्कको विस्तृत जानकारी प्रदान गर्ने।
(घ) नगरपालिकाका विभिन्न शाखा, वडा कार्यालय तथा अन्य सरोकारवाला निकायहरूबाट संकलन हुने भौगोलिक तथ्याङ्कहरूलाइ एकीकृत गरी एक केन्द्रीय भौगोलिक डाटाबेस (Centralized Geospatial Database) को निर्माण, व्यवस्थापन र अद्यावधिक गर्ने।
(ङ) भू-पोर्टल (Geoportal) मार्फत अनलाइन माध्यमबाट भौगोलिक तथ्याङ्क खोज्न, विश्लेषण गर्न, अद्यावधिक गर्न र डाउनलोड गर्न सक्ने वातावरण निर्माण गर्ने।
(च) नगरपालिकाभित्र संकलन हुने भौगोलिक तथ्याङ्कहरू बीच प्राविधिक तादात्म्यता कायम गर्न भौगोलिक तथ्याङ्कको मापदण्ड तर्जुमा तथा कार्यान्वयन गर्ने।
(छ) भौगोलिक तथ्याङ्कको संकलन तथा वितरण प्रक्रियालाइ थप व्यवस्थित र सुरक्षित गर्ने।

परिच्छेद - २

कार्यान्वयन संरचना

४. स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार निर्देशन समितिः (१) स्थानीय भौगोलिक तथ्याङ्कको संकलन, सूचीकरण, भण्डारण, उपयोग तथा वितरणको प्रभावकारी व्यवस्थापन र नियमनका लागि नीतिगत निर्देशन दिन, प्राविधिक मापदण्डहरू स्वीकृत गर्न र आवश्यक जनशक्ति तथा स्रोत साधनको व्यवस्थापन गर्न एक स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार निर्देशन समिति रहनेछ।
(२) नगर कार्यपालिकाले नै यस कार्यविधिको प्रयोजनका लागि स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार निर्देशन समितिको रूपमा कार्य गर्नेछ।
(३) प्रमुख प्रशासकीय अधिकृतले समितिको सदस्य-सचिवको रूपमा कार्य गर्नेछन्।
(४) समितिको बैठक आवश्यकता अनुसार बस्नेछ र बैठक सम्बन्धी अन्य कार्यविधि सोही समितिले तोके बमोजिम हुनेछ।
(५) यस समितिको सचिवालय नगरपालिकाको कार्यालयमा रहनेछ।

५. स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार कार्यान्वयन समितिः (१) स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार निर्देशन समितिले दिएको निर्देशन कार्यान्वयन गर्न, निर्देशन समितिलाइ आवश्यक सुझाव तथा सहयोग पुर्‍याउन तथा यस कार्यविधिमा उल्लेख भए बमोजिमका कार्य गर्न देहाय बमोजिमको एक "स्थानीय भौगोलिक तथ्याङ्क पूर्वाधार कार्यान्वयन समिति" रहनेछ:

(क) प्रमुख प्रशासकीय अधिकृत - संयोजक
(ख) नगरपालिकाका सम्पूर्ण शाखाका प्रमुखहरू - सदस्य
(ग) प्रमुख प्रशासकीय अधिकृतले तोकेको भूमि व्यवस्थापन, सूचना प्रविधि वा योजना शाखाका शाखा प्रमुख - सदस्य-सचिव

(२) यस समितिको मुख्य काम, कर्तव्य र अधिकार देहाय बमोजिम हुनेछ:
(क) निर्देशन समितिबाट भएका निर्णय तथा दिइएका निर्देशनहरूको कार्यान्वयन गर्ने तथा गराउने।
(ख) आधारभूत भौगोलिक तथ्याङ्कको पहिचान, संकलन, अभिलेखीकरण, व्यवस्थापन तथा अद्यावधिक गर्ने।
(ग) नगरपालिकामा उपलब्ध भौगोलिक तथ्याङ्कको अभिलेख (Inventory) कायम गर्ने तथा नियमित रूपमा अद्यावधिक राख्ने।
(घ) भौगोलिक तथ्याङ्कसम्बन्धी प्राविधिक मापदण्ड (Standards) तर्जुमा गरी स्वीकृतिका लागि निर्देशन समितिमा पेश गर्ने तथा स्वीकृत मापदण्ड कार्यान्वयन गर्ने।
(ङ) अभिलेखमा सूचीकृत तथ्याङ्कहरूको मेटाडाटा (Metadata) सहितको भौगोलिक तथ्याङ्क क्याटलग (Geospatial Data Catalog) निर्माण, सञ्चालन तथा अद्यावधिक गर्ने।
(च) नगरपालिका क्षेत्रभित्रका भौगोलिक तथ्याङ्कहरू एकीकृत डाटाबेसमा व्यवस्थित रूपमा भण्डारण तथा व्यवस्थापन गर्ने व्यवस्था मिलाउने।
(छ) नगरपालिकाको भू–पोर्टलको निर्माण, सञ्चालन, व्यवस्थापन तथा अद्यावधिक गर्ने।
(ज) विभिन्न भौगोलिक तथ्याङ्कहरूको प्राविधिक तादात्म्यता (Interoperability) कायम गर्ने तथा आवश्यक समन्वय गर्ने।
(३) यस समितिको बैठक आवश्यकता अनुसार बस्नेछ र यसले गरेका कार्यहरूको प्रगति विवरण समय-समयमा निर्देशन समिति समक्ष पेश गर्नुपर्नेछ।

परिच्छेद - ३

कार्यान्वयन विधि

६. आधारभूत भौगोलिक तथ्याङ्क (Foundation Geospatial Data) सम्बन्धी व्यवस्थाः

(१) कार्यान्वयन समितिले नगरपालिकाको नीति निर्माण, योजना तर्जुमा तथा विभिन्न विकास कार्यक्रमहरूको सञ्चालनका लागि साझा रूपमा आवश्यक पर्ने भौगोलिक तथ्याङ्कहरू पहिचान गर्नुपर्नेछ। त्यस्ता आधारभूत भौगोलिक तथ्याङ्कमा देहाय बमोजिमका विषय (Theme) सम्बन्धी तथ्याङ्कहरू समावेश हुन सक्नेछन्:

(क) भू-मापन आधार संरचना (Geodetic Reference Frame)

(ख) ठेगानाहरू (Addresses) र भौगोलिक नामहरू (Geographical Names)

(ग) कार्यगत क्षेत्रहरू (प्रशासनिक, राजनीतिक, आदि) (Functional Areas)

(घ) भवन तथा बस्तीहरू (Buildings and Settlements)

(ङ) जग्गाका कित्ताहरू (Land Parcels/Cadastral)

(च) यातायात सञ्जाल (Transportation Network)

(छ) उचाइ र गहिराइ (Elevation and Depth)

(ज) जनसङ्ख्या वितरण (Population Distribution)

(झ) भू-आवरण (Land Cover) तथा भू-उपयोग (Land Use)

(ञ) भू-गर्भ (Geology) र माटो (Soil)

(ट) जल क्षेत्र (नदी, ताल, सतहको पानी)

(ढ) हवाइ चित्र (Orthophoto/Aerial Imagery) आदि।

(२) कार्यान्वयन समितिले साझा रूपमा आवश्यक भौगोलिक तथ्याङ्कहरू पहिचान गरी सो लाइ आधारभूत भौगोलिक तथ्याङ्कको सूचीमा समावेश गर्न निर्देशन समिति समक्ष पेश गर्नुपर्नेछ।

(३) निर्देशन समितिबाट स्वीकृत भए पश्चात् ती तथ्याङ्कहरू आधारभूत भौगोलिक तथ्याङ्कको सूचीमा समावेश गर्नुपर्नेछ।

(४) आधारभूत भौगोलिक तथ्याङ्कको सूचीमा समावेश भएका तथ्याङ्कहरूलाइ प्राथमिकतामा राखी तिनको संकलन, व्यवस्थापन तथा अद्यावधिक गर्ने व्यवस्था मिलाउनुपर्नेछ।

७. भौगोलिक तथ्याङ्कको अभिलेख (Geospatial Data Inventory) सम्बन्धी व्यवस्था:

(१) कार्यान्वयन समितिले नगरपालिका अन्तर्गत विभिन्न प्रयोजनका लागि संकलन भएका वा हुने तथा अन्य निकायबाट प्राप्त भएका वा भविष्यमा प्राप्त हुने सम्पूर्ण भौगोलिक तथ्याङ्कहरूको अभिलेखीकरण गर्न भौगोलिक तथ्याङ्क अभिलेख किताब खडा गर्नुपर्नेछ।

(२) उपदफा (१) बमोजिमको भौगोलिक तथ्याङ्क अभिलेख किताबको ढाँचा अनुसूची–१ बमोजिम हुनेछ।

८. भौगोलिक तथ्याङ्कको क्याटलग (Geospatial Data Catalog) सम्बन्धी व्यवस्था:

(१) कार्यान्वयन समितिले भौगोलिक तथ्याङ्कको क्याटलग तयार गर्दा मेटाडाटाको मापदण्ड सम्बन्धित संघीय वा प्रादेशिक निकायले तोकेबमोजिम अवलम्वन गर्नुपर्नेछ।

(२) सम्बन्धित संघीय वा प्रादेशिक निकायले मेटाडाटाको मापदण्ड नतोकेको अवस्थामा, अनुसूची–२ मा तोकिएका विवरणहरू समावेश हुने गरी मेटाडाटा तयार गर्नुपर्नेछ।

(३) भौगोलिक तथ्याङ्क क्याटलग मेटाडाटा व्यवस्थापन गर्न खुला स्रोत सफ्टवेयर (Open Source Software) को प्रयोग गरी विद्युतीय प्रणालीमार्फत कार्यान्वयन गरिनेछ।

(४) कार्यान्वयन समितिले नगरपालिकामा संकलन हुने वा प्राप्त हुने सबै भौगोलिक तथ्याङ्कहरूको मेटाडाटा तयार गराइ सोको पूर्णता, शुद्धता तथा अद्यावधिकताको सुनिश्चितता गर्नुपर्नेछ।

९. भौगोलिक तथ्याङ्कको एकीकृत डाटाबेस (Integrated Geospatial Database) सम्बन्धी व्यवस्था:

(१) कार्यान्वयन समितिले नगरपालिकामा उपलब्ध तथा भविष्यमा संकलन वा प्राप्त हुने सम्पूर्ण भौगोलिक तथ्याङ्कहरूलाइ एकीकृत रूपमा व्यवस्थापन गर्न एक केन्द्रीय सर्भर (Centralized Server) मा व्यवस्थित भण्डारण तथा सञ्चालनको व्यवस्था मिलाउनेछ।

(२) केन्द्रीय सर्भरमा भौगोलिक तथ्याङ्क व्यवस्थापनका लागि प्राविधिक रूपमा उपयुक्त खुला स्रोत सफ्टवेयर (Open Source Software) को प्रयोग गरी डाटाबेस प्रणाली कार्यान्वयन गरिनेछ।

(३) एकीकृत डाटाबेसमा रहेका तथ्याङ्कहरूको पहुँच 'भूमिकामा आधारित पहुँच नियन्त्रण' (Role-based Access Control – RBAC) प्रणाली अनुसार निर्धारण गरिनेछ, जसअनुसार प्रयोगकर्तालाइ तोकिएको जिम्मेवारी र अधिकारका आधारमा मात्र तथ्याङ्क हेर्न, सम्पादन गर्न वा अद्यावधिक गर्न अनुमति प्रदान गरिनेछ।

१०. भू-पोर्टल (Geoportal) सम्बन्धी व्यवस्था:

(१) नगरपालिकाको स्वामित्वमा रहेका भौगोलिक तथ्याङ्कहरू अनलाइन (Online) माध्यमबाट खोज्न, अवलोकन गर्न, विश्लेषण गर्न, अद्यावधिक गर्न तथा आवश्यकता अनुसार डाउनलोड गर्न सकिने सुविधा सहितको स्थानीय भू-पोर्टल (Municipal Geoportal) निर्माण गरी सञ्चालनमा ल्याइनेछ।

(२) उक्त भू-पोर्टलमा भौगोलिक तथ्याङ्कको अभिलेख (Geospatial Data Inventory), भौगोलिक तथ्याङ्कको क्याटलग (Geospatial Data Catalog), तथा भौगोलिक तथ्याङ्क संकलनको अनुमति, तथ्याङ्क दाखिला र तथ्याङ्क माग सम्बन्धी सेवाहरू समावेश गरिनेछ।

(३) भू-पोर्टलको पहुँच 'भूमिकामा आधारित पहुँच नियन्त्रण' (Role-based Access Control – RBAC) प्रणालीमा आधारित हुनेछ, जसअनुसार प्रयोगकर्ताको तोकिएको जिम्मेवारी र अधिकारका आधारमा मात्र तथ्याङ्क अवलोकन, डाउनलोड, सम्पादन वा अद्यावधिक गर्ने सुविधा प्रदान गरिनेछ।

११. भौगोलिक तथ्याङ्कको मापदण्ड सम्बन्धी व्यवस्थाः

(१) नगरपालिका भित्र संकलन र प्रयोग हुने भौगोलिक तथ्याङ्कहरूमा एकरूपता, गुणस्तर र प्राविधिक तादात्म्यता ल्याउन कार्यान्वयन समितिले आवश्यकता अनुसार भौगोलिक तथ्याङ्क सम्बन्धी विभिन्न मापदण्ड तर्जुमा गर्नुपर्नेछ।

(२) यसरी मापदण्ड तर्जुमा गर्दा मुख्यतया देहायका प्राविधिक पक्षहरूलाइ समेटिनुपर्छ:

(क) स्थानिक सन्दर्भ प्रणाली (Spatial Reference System): प्रयोग गरिने 'Projection System' र 'Datum' (जस्तै: MUTM वा WGS 84)।

(ख) तथ्याङ्कीय ढाँचा (Data Format): फाइलको स्वरूप (जस्तै: Geodatabase, Shapefile, GeoJSON, GeoTIFF आदि)।

(ग) मेटाडेटा मापदण्ड (Metadata Standards): भौगोलिक सूचनाको गुणस्तर र स्रोत खुल्ने गरी समावेश गरिने अनिवार्य विवरणहरू।

(घ) विशेषता संरचना (Attribute Schema): डेटा भित्रका तालिकाहरूको शीर्षक, डाटाको प्रकार (Data Type) र परिभाषा।

(ङ) शुद्धताको तह (Accuracy Level): संकलन गरिने तथ्याङ्कको स्केल (Scale) र न्यूनतम शुद्धताको सीमा (Positional and Attribute Accuracy)।

(३) कार्यान्वयन समितिले मापदण्ड तयार गरेपछि स्वीकृतिको लागि निर्देशन समितिमा पेश गर्नुपर्नेछ।

(४) मापदण्ड स्थानीय राजपत्रमा प्रकाशित भएपछि कार्यान्वयन गरिनेछ।

१२. भौगोलिक तथ्याङ्कको प्राविधिक तादाम्यता (Interoperability) सम्बन्धी व्यवस्थाः

(१) नगरपालिकाका विभिन्न शाखा वा अन्य निकायले भौगोलिक तथ्याङ्क संकलन गर्दा तथ्याङ्कहरू बीच प्राविधिक तादाम्यता कायम गर्न, संघीय वा प्रादेशिक निकायले तोकेका मापदण्ड भएमा ती मापदण्ड पालन गर्नुपर्नेछ। यदि मापदण्ड तोकिएको छैन भने, धारा ११ बमोजिम तयार पारिएका मापदण्ड लागू हुनेछ।

(२) भौगोलिक तथ्याङ्कहरू बीच प्राविधिक तादाम्यता सुनिश्चित गर्नका लागि आधारभूत भौगोलिक तथ्याङ्कहरू सरल, सहज र निःशुल्क उपलब्ध गराइनेछ।

(३) विभिन्न विषयगत भौगोलिक तथ्याङ्क संकलन गर्दा आधारभूत भौगोलिक तथ्याङ्क (Foundation Data) सँग तादाम्यता कायम हुने गरी कार्य गर्नुपर्नेछ।

१३. भौगोलिक तथ्याङ्क संकलन सम्बन्धी व्यवस्थाः

(१) नगरपालिकाको कुनै पनि शाखा वा नगरपालिका बाहेकका अन्य निकायलाइ आफ्नो कार्यसम्पादनका लागि भौगोलिक तथ्याङ्क संकलन गर्नुपरेमा, प्रचलित कानूनमा अन्य व्यवस्था भएको बाहेक, नगरपालिकाबाट अनुमति लिनुपर्नेछ।

(२) अनुमतिको निम्ति अनुसूची–३ मा उल्लेखित ढाँचामा निवेदन दिनु पर्नेछ।

(३) प्राप्त निवेदनका आधारमा कार्यान्वयन समितिले माग गरिएको तथ्याङ्कको उपलब्धता तथा गुणस्तर भौगोलिक तथ्याङ्कको अभिलेख किताब तथा भौगोलिक तथ्याङ्कको क्याटलग बाट यकिन गर्नुपर्नेछ।

(४) माग गरिएको तथ्याङ्क नगरपालिकासँग उपलब्ध नभएको वा मौजुदा तथ्याङ्कको गुणस्तर र प्रकृतिले मागकर्ताको उद्देश्य पूरा गर्न नसक्ने अवस्थामा मात्र नयाँ भौगोलिक तथ्याङ्क संकलनका लागि अनुमति प्रदान गरिनेछ।

१४. भौगोलिक तथ्याङ्क दाखिला सम्बन्धी व्यवस्था: (१) संघीय तथा प्रादेशिक सम्बन्धित निकायले अन्य व्यवस्था गरेको बाहेक, यस नगरपालिकामा संकलित भौगोलिक तथ्याङ्क नगरपालिकामा दाखिला गर्नुपर्नेछ।

(२) भौगोलिक तथ्याङ्क दाखिलाको लागि, अनुरोधक संस्था वा निकायले अनुसूची-४ मा तोकिएको ढाँचामा भौगोलिक तथ्याङ्क तथा सोसँग सम्बन्धित मेटाडेटा सहित निवेदन दिनुपर्नेछ।

(३) कार्यान्वयन समितिले निवेदन सहित प्राप्त भौगोलिक तथ्याङ्क तथा मेटाडेटाको आवश्यक जाँचबुझ गरी उपयुक्त ठहर भएमा, दाखिला गर्ने संस्था वा निकायलाइ लिखित रूपमा तथ्याङ्क दाखिला भएको निस्सा दिनुपर्नेछ।

(४) कार्यान्वयन समितिले दाखिला भएका तथ्याङ्कलाइ अभिलेख किताबमा दर्ता गराउने, क्याटलग अद्यावधिक गराउने, र एकीकृत डाटाबेस तथा भू-पोर्टलमा अद्यावधिक हुने व्यवस्था मिलाउनुपर्नेछ।

१५. भौगोलिक तथ्याङ्कको वर्गीकरणः

(१) कार्यान्वयन समितिले नगरपालिकाको स्वामित्वमा रहेका भौगोलिक तथ्याङ्कहरुलाइ तिनको संवेदनशीलता, उपयोगिता र सुरक्षाका आधारमा देहाय बमोजिम वर्गीकरण गर्नेछः

(क) सार्वजनिक तथ्याङ्क (Public Data): सर्वसाधारणको जानकारीका लागि खुला गरिएका आधारभूत सूचनाहरू, पर्यटकीय स्थल, सार्वजनिक सेवा केन्द्रहरू, र स्वीकृत योजनाहरू जस्ता तथ्याङ्कहरू, जुन भू-पोर्टल मार्फत सहजै उपलब्ध हुनेछन्।
(ख) आन्तरिक तथ्याङ्क (Internal Data): नगरपालिकाको दैनिक प्रशासनिक प्रयोजन, योजना तर्जुमा र कार्यान्वयनका लागि प्रयोग हुने तर सर्वसाधारणका लागि खुला नगरिएका विषयगत शाखाहरू बीच साझा गरिने तथ्याङ्कहरू।
(ग) प्रतिबन्धित तथ्याङ्क (Restricted Data): व्यक्तिगत गोपनीयता, सुरक्षाका दृष्टिकोणले संवेदनशील पूर्वाधारका विवरण, वा प्रचलित कानूनले गोप्य राख्नुपर्ने भनी तोकेका तथ्याङ्कहरू। यस्ता तथ्याङ्कहरू विशेष अनुमति बिना पहुँच योग्य हुने छैनन्।

(२) वर्गीकरण गरिएको तथ्याङ्कको सूची र सोको पहुँच सम्बन्धी अधिकार (Access Rights) कार्यान्वयन समितिले समय-समयमा पुनरावलोकन गर्न सक्नेछ।

१६. भौगोलिक तथ्याङ्कको वितरण सम्बन्धी व्यवस्थाः (१) नगरपालिकाको स्वामित्वमा रहेका भौगोलिक तथ्याङ्कहरू, प्रचलित कानूनले गोप्य राख्नुपर्ने भनी तोकेका वा बन्देज लगाएका बाहेक, माग गर्ने व्यक्ति वा निकायलाइ नगरपालिकाले तोकेका शर्तहरू पालना गर्ने गरी उपलब्ध गराइनेछ।
(२) भौगोलिक तथ्याङ्क प्राप्त गर्न चाहने संस्था / निकायले यस कार्यविधिको अनुसूची ५ मा उल्लिखित ढाँचामा निवेदन पेश गर्नु पर्नेछ।
(३) नगर भू-पोर्टल (Municipal Geoportal) सञ्चालनमा आएपछि नगरपालिकाको स्वामित्वमा रहेका सम्पूर्ण भौगोलिक तथ्याङ्कको सूची तथा मेटाडेटा (Metadata) हेर्न मिल्ने व्यवस्था मिलाइनेछ।
(४) 'सार्वजनिक' भनी वर्गीकृत गरिएका भौगोलिक तथ्याङ्कहरू सोही पोर्टल मार्फत खोज्न, हेर्न र डाउनलोड गर्न सकिने व्यवस्था मिलाइनेछ।

अनुसूची-१
(दफा ८ को उपदफा (२) सँग सम्बन्धित)
भौगोलिक तथ्याङ्कको अभिलेख किताबको ढाँचा

क्र.सं (S.N.)	पहिचान संकेत (Unique Identifier	तथ्याङ्कको नाम (Dataset Name)	जिम्मेवार शाखा / निकय (Owner Dept. / Institution)	सम्पर्क व्यक्ति/ पद (Steward/ Role)	सम्पर्क नं./इमेल (Contact Details)	भण्डारणको प्रकार (Storage Type)	पहुँचको तह (Access Level)	अन्तिम अद्यावधिक (Last Updated)

अनुसूची २
(दफा ९(२) सँग सम्बन्धित)
भौगोलिक तथ्याङ्कको क्याटलग तयार गर्दा मेटाडेटामा संलग्न गर्नुपर्ने विवरणको तालिका

S.N.	Information Category	Sub S.N.	Key Information Elements	Description
1	Identification Information	1.1	Unique Identifier (UID)	
		1.2	Dataset Title	
		1.3	Abstract	
		1.4	Purpose	
		1.5	Keywords	
2	Spatial Reference Information	2.1	Coordinate System (CRS)	
		2.2	Projection	
		2.3	Datum	
		2.4	Geometry Type	
3	Extent (Spatial and Temporal)	3.1	Bounding Box	
		3.2	Temporal Extent	
		3.3	Scale	

S.N.	Information Category	Sub S.N.	Key Information Elements	Description
4	Data Quality and Lineage	4.1	Lineage	
		4.2	Positional Accuracy	
		4.3	Completeness	
		4.4	Logical Consistency	
5	Entity and Attribute Names	5.1	Attribute Names	
		5.2	Domain Values	
		5.3	Units of Measure	
6	Distribution and Constraints	6.1	Access Constraints	
		6.2	Use Constraints	
		6.3	File Format	
		6.4	Contact Information	

अनुसूची ३

(दफा १४(२) सँग सम्बन्धित)

भौगोलिक तथ्याङ्क संकलनको अनुमति माग गर्दा दिइने निवेदनको ढाँचा

श्री दोधारा चाँदनी नगरपालिका,
कञ्चनपुर।

विषय: भौगोलिक तथ्याङ्क संकलनको अनुमति सम्बन्धमा।

प्रस्तुत विषयमा यस संस्था/निकायलाइ देहाय बमोजिमको प्रयोजन तथा विवरणको भौगोलिक तथ्याङ्क संकलन गर्न आवश्यक भएकोले सोका लागि आवश्यक अनुमति/स्वीकृति प्रदान गरिदिनुहुन अनुरोध छ।

संकलन गर्न स्वीकृती माग गरेको तथ्याङ्कको संक्षि्प्त प्रयोजनः - _____
_____

संकलन गर्न स्वीकृती माग गरेको तथ्याङ्कको संक्षिप्त विवरण:- _____
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नाम, थर :-
दर्जाः-

संलग्न:-
१. प्रतिनिधिको परिचय पत्रको प्रतिलिपि
२. तथ्याङ्कको प्रयोजन तथा विवरण खुल्ने कागजात
प्रतिनिधिको विवरण
दस्तखत :-
नाम, थर :-
दर्जा :-
फोन नं:
मोबाइल नंः-
इमेल :-

अनुसूची ४

(दफा १५(२)सँग सम्बन्धित)

भौगोलिक तथ्याङ्क दाखिलाको लागि दिइने निवेदनको ढाँचा

श्री दोधारा चाँदनी नगरपालिका,
कञ्चनपुर।

विषय: भौगोलिक तथ्याङ्क दाखिला सम्बन्धमा।

प्रस्तुत विषयमा यस संस्था/निकायले देहाय बमोजिमको प्रयोजनको निम्ति देहायको विवरणको भौगोलिक तथ्याङ्क संकलन गरेकोमा सो दाखिला गरिदिनुहुन अुरोध छ।

दाखिलाको लागि पेश गरिएको तथ्याङ्क संकलनको संक्षिप प्रयोजन -

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दाखिलाको लागि पेश गरिएको तथ्याङ्कको संक्षिप्त विवरणः-

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नाम, थर :-

दर्जाः-

संलग्नः-

१. प्रतिनिधिको परिचय पत्रको प्रतिलिपि

२. तथ्याङ्कको प्रयोजन तथा विवरण खुल्ने कागजात

३. अनुसूची(२) बमोजिमको मेटाडेटा

प्रतिनिधिको विवरण

दस्तखत :-

नाम, थर :-

दर्जा :-

फोन नं:

मोबाइल नंः-

इमेल :-

अनुसूची ५

(दफा १७(२) सँग सम्बन्धित)

भौगोलिक तथ्याङ्क मागका लागि दिइने निवेदनको ढाँचा

श्री दोधारा चाँदनी नगरपालिका,
कञ्चनपुर।

विषय: भौगोलिक तथ्याङ्क मागको लागि निवेदन।

प्रस्तुत विषयमा यस संस्था/निकायलाइ देहाय बमोजिमको प्रयोजन तथा विवरणको भौगोलिक तथ्याङ्क आवश्यक भएकोले सो उपलब्ध गराइदिनुहुन अनुरोध छ।

माग गरेको तथ्याङ्कको संक्षिप्त प्रयोजनः - _____
_____
माग गरेको तथ्याङ्कको संक्षिप्त विवरण:- _____
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नाम, थर :-

दर्जाः-

संलग्न:-

१. प्रतिनिधिको परिचय पत्रको प्रतिलिपि

२. तथ्याङ्कको प्रयोजन तथा विवरण खुल्ने कागजात

प्रतिनिधिको विवरण

दस्तखत :-

नाम, थर :-

दर्जा :-

फोन नं:

मोबाइल नंः-

इमेल :-

Annex B

Thematic Municipal Geodatabase for Spatial Data Management

Theme	Category	Sub Category	Data Type	Data Layer
Baseline Datasets	Administrative Datasets	Municipal Boundary with attributes	Polygon	Municipal boundary polygon (code, name, type, province, district)
		Ward Boundary with attributes	Polygon	Ward boundary polygons (ward number, ward name)
		Settlement Clusters	Polygon	Tole / settlement boundary polygons (settlement name, ward)
		Tole/localities/villages/cities location	Point	Location Points of villages, localities, informal settlements, etc.
	Settlements and Buildings	Individual Building Footprints	Point	Individual Building footprints of all types of buildings located in a municipality polygons with attributes (building ID, address, building type, building use ,structural category, construction year, risk class, etc.)
		Colonial Footprint	Polygon	Polygon layer of colonies with House ID of individual building registered in the municipality or provincial/central governemental offices.
		Apartment Footprint	Polygon	Polygon layer of apartments with attributes and IDs of individual apartments registered in the municipality or provincial/central governemental offices.
	Population Metrics	Demographic Distribution	Polygon	Polygon area (Ward level) attributed with age-sex pyramids, literacy rates, and GESI (Gender Equality and Social Inclusion) indicators.
		Settlement Population Density	Raster	Raster surface derived from household census data showing the concentration of inhabitants per hectare across the urban and rural landscape.
		Household Locations	Point	Point location of individual residential units with demographical attributes of the households.
	Land and Spatial Planning	Statutory Land Use and Zoning	Polygon	Land use polygons (residential, commercial, industrial, institutional, agricultural, forest, open space, transport, utilities, etc.) Zoning polygons (residential, commercial, industrial, institutional, mixed use, special zones etc.)
		Legal Land Cadastral Parcels	Polygon	The official "Kitta" map. Includes Parcel ID, Sheet Number, Land Category (Abbal/Doyam/Sim/Chahar), and Area.
		Development Buffers - Right of Way (RoW) Corridors	Polygon	Declared ROW zones along Roads, Rivers, and High-Tension lines where construction is prohibited or limited.
		Land Pooling and Land Readjustment	Polygon	Boundaries of municipal or provincial land readjustment and pooling projects where land is reorganized.
		Land Plotting Sites	Polygon	Approved private subdivisions, real estate plotting, and neighborhood layout schemes.
	Topographical Surface Model Products	Digital Terrain Model	Raster	Bare-earth elevation (DTM). Essential for flood modeling and slope analysis.
		Digital Surface Model	Raster	Elevation including buildings and vegetation (DSM). Vital for telecommunications and "Smart City" viewshed analysis.
		Elevation Contours	Line	Isolines showing elevation. Standard intervals are 1 meter for urban areas and 5 meters for rural terrain.
	Imagery Products	Drone Orthomosaic	Raster	Orthorectified High-resolution (3cm – 10cm) seamless image produced from UAV surveys. The primary base map for modern municipalities.
		Satellite Orthomosaic	Raster	Orthorectified Medium to high-resolution (30cm – 1m) imagery for larger areas where drone data is unavailable.
		UAV Imagery (Raw Footprints)	Raster	Raw drone imagery across multi-spectral bands with footprints and flight lines with acquisition metadata
		Satellite Imagery (Raw Images)	Raster	Satellite scene across multi-spectral bands with footprints and metadata (sensor, date, resolution)
	Health Services	Health Facility Nodes	Point	Point location of Hospitals, PHCs, Health Posts, Clinics, and Pharmacies. Includes attributes for bed capacity and facility level.
		Health Facility Footprints	Polygon	Polygon area covering the physical campus of hospitals and specialized medical centers.
		Health Service Catchments	Polygon	Polygon area representing the 15-minute or 30-minute walking/driving service radius for health access.
	Education	Education Facility Nodes	Point	Point location of ECD/Montessori, Schools (Basic to Secondary), Colleges, and Universities. Including attributes like type of building, purpose of blocks, staffing, students, etc.
		Education Facility Footprints	Polygon	Polygon area of school and college campuses, including playgrounds and building blocks.
		Library and Learning Centers	Point	Point location of public libraries, community learning centers (CLC), and specialized training institutes.
		School Catchment Areas	Polygon	Polygon area defining the official or natural student enrollment zones for specific schools.
	Governance	Administrative Office Nodes	Point	Point location of Municipal offices, Ward offices, and Provincial/Federal line agency buildings.
		Security Service Posts	Point	Point location of Nepal Police stations, APF bases, and Traffic Police checkpoints. (Note: Disaster units moved to 'Disaster' theme).
		Community User Groups	Point	Centroid point representing the office or primary meeting location of Tole/Forest/Water user committees.
	Finance	Banking and ATM Nodes	Point	Point location of Commercial Banks, Development Banks, and standalone ATM booths.
		Cooperative Institutions	Point	Point location of SACCOS, Agricultural, Dairy, and multipurpose cooperatives.
		Insurance and Reinsurance Organizations	Point	Point location of insurance and re-insurance provider offices.
		Currency and Remittance Points	Point	Point location of foreign exchange bureaus and formal money transfer service points.

Theme	Category	Sub Category	Data Type	Data Layer
Civic Infrastructures	Commerce	Commercial Complex Footprints	Polygon	Polygon area of shopping malls, large marts, and integrated shopping centers.
		Bazaar and Market Areas	Polygon	Polygon area defining the boundaries of central business districts (CBD), Hat Bazaars, and wholesale markets.
		Retail and Service Points	Point	Point location of general stores, hardware shops, salons, gyms, and local workshops.
		Warehouse and Cold Storage	Polygon	Polygon area of large-scale storage facilities and industrial warehouses.
		Industrial and Large Scale Units	Point	Point location of vehicle showrooms, large workshops, manufacturing plants, and agro-processing units.
		Storage and Logistics Hubs	Polygon	Polygon area of municipal and private warehouses, cold storage facilities, and bulk trade depots.
	Civil Society	NGO and INGO Nodes	Point	Point location of registered non-governmental organization offices, development partner fields, and humanitarian agency headquarters.
		Social Clubs and Associations	Point	Point location of Aama Samuha (Mothers' groups), Youth clubs, Sports clubs, and Women's saving/credit groups.
	Social Services	Social Care Facilities	Point	Point location of Daycare centers, Orphanages (Baal Griha), and Old Age Homes.
		Community Hall Nodes	Point	Point location of public meeting spaces, event lounges, and party palaces.
	Religious and Heritage	Protected Monument Nodes	Point	Point location of individual temples, monasteries (Gumbas), churches, mosques, and shrines. Includes attributes for age, era, and religious affiliation.
		Heritage Structure Footprints	Polygon	Polygon area covering the physical boundaries of archaeological sites, historic palaces (Durbar Squares), and large monastery complexes.
		Restricted Conservation Zones	Polygon	Polygon area defining legally protected heritage areas (PMZs) where building bylaws are strictly enforced to preserve the site's authenticity.
		Vernacular Housing Clusters	Polygon	Polygon area identifying historic settlements (e.g., Old Bhaktapur or Bungamati) with traditional Newari or ethnic architecture.
		Rest Stops and Shelters	Point	Point location of traditional resting structures like Sattals, Paatis, Dharmasalas, and Party-pauwas.
		Public Water Heritage	Point	Point location of historic Stone Spouts (Dhunge Dhara) and Masonry Wells (Kua/Inar) of cultural significance.
		Museum and Archive Sites	Point	Point location of museums, art galleries, and cultural documentation centers.
		Traditional Learning Centers	Point	Point location of Sanskrit teaching centers, Buddhist Gumba schools (Shedras), and other indigenous knowledge centers.
		Public Sculpture and Statues	Point	Point location of major outdoor statues, Chhortens, and commemorative monuments.
		Religious Performance Spaces	Polygon	Polygon area of open grounds used for Jatras, festivals, and traditional dances (e.g., Khala, Dabali).
	Public Amenities	Recreational Open Spaces	Polygon	Polygon area of public parks, playgrounds, and organized fun-fields.
		Deathcare Sites	Point	Point location of burial grounds, cremation ghats, and crematoriums.
		Cremation and Burial Sites	Point	Point location of active cremation ghats, crematoriums, and formal burial grounds.
		Cemetery Plot Boundaries	Polygon	Polygon area defining individual burial plots or family vaults within a municipal cemetery.
	Hydrology	Natural River Centerlines	Line	Line network of perennial and seasonal rivers. Attributes: name, Strahler stream order, and flow direction.
		Natural Waterbody Extents	Polygon	Polygon area of naturally occurring lakes, ponds (Pokhari), and wetlands (Simsar).
		Watershed Boundaries	Polygon	Polygon area defining topographical drainage catchments and sub-basins based on natural terrain ridges.
		Natural Spring Sources	Point	Point location of groundwater discharge points (Muhan) and unmanaged, non-structural springs.
		Drinking Water Recharge Areas	Polygon	Polygon area defining critical infiltration zones essential for groundwater and spring replenishment.
		Aquifer Extents	Polygon	Polygon area representing the horizontal boundary of underground water-bearing geological formations.
	Geology and Geomorphology	Lithological Formations	Polygon	Polygon area defining surface and bedrock geology, including rock types, mineralogy, and age.
		Tectonic Fault Lines	Line	Line network of regional and local geological faults, thrust lines (MBT/MCT), and tectonic folds.
		Geomorphological Units	Polygon	Polygon area representing landforms such as river terraces, valley floors, ridges, and glacial cirques.
		Soil Series Classifications	Polygon	Polygon area of natural soil varieties including attributes for texture, depth, and parent material.
		Soil Drainage Classes	Polygon	Polygon area classifying land by natural soil permeability and water retention characteristics.
		Mineral Resource Deposits	Point	Point location of naturally occurring mineral occurrences, ore bodies, and gemstone sites.
		Geological Lineaments	Line	Line network identifying linear features on the Earth's surface that indicate underlying structural trends.
		Natural Cave Entrances	Point	Point location of natural underground caverns and speleological features.

Theme	Category	Sub Category	Data Type	Data Layer
Climate and Environment	**Ecology**	National Park Boundaries	Polygon	Polygon area defining the legal limits of National Parks and designated Wildlife Reserves.
		Buffer Zone Limits	Polygon	Polygon area representing the peripheral areas of protected sites where human-nature interaction is regulated.
		Community and Protected Forests	Polygon	Polygon area of forest blocks managed by the state or communities, including plantation forests.
		Rangelands and Pastures	Polygon	Polygon area representing high-altitude meadows (Kharka), grasslands, and open grazing lands.
	Wildlife	Wildlife Habitat Corridors	Line	Line network identifying critical movement and migration routes for terrestrial and avian wildlife.
		Endemic Species Hotspots	Polygon	Polygon area defining regions with high concentrations of endemic or threatened flora and fauna.
		Individual Heritage Trees	Point	Point location of ecologically, historically, or culturally significant trees (e.g., Peepal, Bar, Swami).
		Riparian Vegetation Belts	Polygon	Polygon area defining the natural green strips along river banks essential for ecological stability.
	Cryosphere	Glacial and Snow Extents	Polygon	Polygon area of permanent snow, ice bodies, and glaciers.
		Glacial Lake Boundaries	Polygon	Polygon area defining the physical extent of naturally formed pro-glacial and supra-glacial lakes.
		Glacial Moraine Formations	Polygon	Polygon area representing the physical debris and till deposited by glacial movement.
	Protected Natural Assets	Protected Museum Grounds	Polygon	Polygon area of physical grounds for protected natural history sites or open-air ecological museums.
		Natural Heritage Sites	Point	Point location of legally protected natural monuments and restricted conservation zones.
	Atmosphere and Climate	Mean Annual Precipitation	Raster	Raster surface representing the spatial distribution of annual rainfall depths across the municipal territory.
		Temperature Isotherm Contours	Line	Line network of isolines connecting points of equal average temperature, used for micro-climate analysis.
		Bioclimatic Thermal Zones	Polygon	Polygon area classifying regions into Alpine, Cool Temperate, Subtropical, and Tropical zones.
		Climate Classification Units	Polygon	Polygon area defining zones such as Perpetual Snow, Subarctic, and Humid Subtropical regions.
		Wind Speed and Directionality	Raster	Raster surface or vector field representing natural prevailing wind patterns and average velocities.
		Solar Radiation Potential	Raster	Raster surface calculating the natural incoming solar energy based on slope, aspect, and sun-angle.
Disaster Risk Management	**Natural Hazards**	Seismic Hazard Zonation	Raster	Raster surface representing Peak Ground Acceleration (PGA) and seismic intensity probabilities.
		Flood Inundation Extents	Polygon	Polygon area derived from hydraulic modeling showing inundation for 10, 50, and 100-year return periods.
		Landslide Susceptibility Index	Raster	Raster surface derived from slope, geology, and rainfall data indicating the probability of slope failure.
		Landslide Inventory Points	Point	Point location of historical and active landslide events used for validation and training models.
		Glacial Lake Outburst Flood (GLOF) Path	Line	Line network representing the modeled downstream path of a potential glacial lake outburst.
		Drought Severity Index	Raster	Raster surface representing areas of chronic water deficit based on historical climatic data.
		Wildfire Susceptibility Zones	Polygon	Polygon area of forests and rangelands classified by fuel load and ignition probability.
	Anthropogenic Hazards	Industrial Hazard Zones	Polygon	Polygon area (buffer) around chemical storage, fuel depots, or factories for "Na-Tech" (Natural-Technological) risk.
		Urban Heat Island Intensity Map	Raster	Raster surface representing temperature anomalies in built-up areas compared to rural surroundings.
		Epidemic Outbreak Hotspots	Point	Point location of clusters for water-borne or vector-borne disease outbreaks (e.g., Dengue/Cholera).
		Structure Fire Risk Zones	Polygon	Polygon area identifying dense, high-occupancy areas with poor fire-fighting access (e.g., old bazaar areas).
	Exposure & Vulnerability	Building Vulnerability Classification	Polygon	Polygon area (Building Footprint) attributed with structural vulnerability scores (RCC, Stone/Mud, age, height).
		Critical Infrastructure Exposure	Point	Point location of hospitals, schools, and utility hubs located within high-hazard zones.
		Multi-Sectoral Vulnerability Index	Polygon	Polygon layer of vulnerability index of different sectors such as health, education, WaSH, etc.
		Socio-Economic Vulnerability Index	Polygon	Polygon area (Ward level) representing population clusters with low coping capacity (elderly, low-income, GESI).
	Risk Metrics	Multi-Hazard Risk Atlas	Raster	Raster surface representing the combined spatial risk of all overlapping natural and anthropogenic hazards.
		Hazard-wise Expected Annual Loss (EAL)	Polygon	Polygon area representing modeled economic loss for different natural and anthropogenic hazards for municipal budgeting.
	Response & Preparedness Assets	Designated Emergency Shelters	Point	Point location of earthquake-resistant buildings (schools/community halls) designated for displaced populations.
		Humanitarian Open Spaces	Polygon	Polygon area of identified open grounds, parks, HSAs or stadiums reserved for IDP camps and helicopter landing.
		Evacuation Route Network	Line	Line network of primary and secondary routes designated for emergency exit and relief vehicle access.
		Emergency Operation Centers (EOC)	Point	Point location of Municipal and District level coordination hubs for disaster response.

Theme	Category	Sub Category	Data Type	Data Layer
		Fire Hydrant & Dry Riser Points	Point	Point location of dedicated fire-fighting water sources within the urban grid.
		Early Warning & Monitoring Systems	Point	River gauge stations, Rain gauge stations, Landslide monitoring sensors, Flood early warning sirens, Automated weather stations (AWS), Community early warning dissemination points
	Recovery & Reconstruction	Post-Disaster Damage Extents	Polygon	Polygon area derived from satellite/drone imagery following an event to map building and infrastructure damage.
		Debris Management Sites	Polygon	Polygon area designated for the temporary storage and sorting of construction waste post-disaster.
Transport Infrastructure	**Roadways**	Road Network Centerlines	Line	Line network of road central axes. Attributes: name, unique IDs, codes, functional classification, technical classification, administrative classification (National/Provincial/Municipal), surface type, and geometric/structural characteristics.
		Road Surface Polygons	Polygon	Polygon area representing the physical pavement footprint for area-based maintenance and volume calculations.
		Road Junction Nodes	Point	Point location of major intersections including 3-dobato, 4-dobato, and 7-dobato nodes.
		Major Transport Corridors	Line	Line network of primary freight routes and national highways passing through the municipality.
	Road Structural Assets	Sidewalks and Footpaths	Polygon	Polygon area of pedestrian path segments and paved sidewalks including attributes for width and surface condition.
		Pedestrian Bridge Nodes	Point	Point location of overhead sky-walks or dedicated pedestrian bridges.
		Bridge and Flyover Centerlines	Line	Line network segments where the road or rail track utilizes a bridge, flyover, or suspension structure.
		Culvert and Drain Crossings	Point	Point location of Hume pipes, box culverts, and causeways passing beneath the road network.
		Non Motorized Transport Lanes	Line	Line network of dedicated bicycle lanes, shared paths, and NMT corridors.
	Public Transit	Public Transit Route Lines	Line	Line network of bus and micro-bus service routes including Route IDs and service types.
		Transit Stop Points	Point	Point location of designated passenger boarding and alighting points for buses and micro-buses.
		Transit Terminal Facilities	Point	Point location of major bus parks and micro-bus terminals.
	Aviation and Railway	Railway Track Alignments	Line	Line network of active and proposed railway tracks.
		Railway Station Nodes	Point	Point location of station buildings, platforms, or primary passenger entry nodes.
		Aviation Location Points	Point	Point location of public and private helipads or airport terminals with status and type attributes.
		Aviation Footprint Polygons	Polygon	Polygon area covering the physical extent of runways, taxiways, aprons, and helipad landing pads.
	Traffic and Safety	Traffic Asset Points	Point	Point location of traffic signals, mandatory/informational signs, and convex mirrors.
		Traffic Calming Features	Point	Point location of speed breakers, humps, rumble strips, roundabouts, and zebra crossings.
		Street Lighting Poles	Point	Point location of individual municipal light poles categorized by type (Grid/Solar) and status.
	Parking Facilities	On Street Parking Segments	Point	Point location or marked segment for on-street parking including regulation type and capacity.
		Off Street Parking Polygons	Polygon	Polygon area of formal parking lots, parking buildings, or informal municipal parking grounds.
Tourism	**Attractions**	Tourism Destination Nodes	Point	Point location of specific landmarks: Viewpoints, View towers, Yoga villages, and historical statues.
		Natural Tourism Sites	Point	Point location of geomorphic attractions such as Caves, Waterfalls, and Hot springs.
		Tourism Hub Extents	Polygon	Polygon area defining the boundaries of lakeside tourism districts, picnic spots, and recreational parks.
	Hospitality Services	Tourism Information Centers	Point	Point location of official government information desks and visitor centers.
		Travel and Guide Agencies	Point	Point location of tour operators, trekking agencies, and licensed guide association offices.
		Permit and Ticketing Points	Point	Point location of TIMS (Trekkers' Information Management Systems) check-posts and park entry ticketing counters.
		Tourist Support Utilities	Point	Point location of specific utilities: Public toilets in tourist zones, foreign exchange bureaus, and ATM hubs.
	Accommodation	Hospitality Service Nodes	Point	Point location of Hotels, Lodges, Guest houses, and Resorts. Includes attributes for star rating, room capacity, and unique property IDs.
		Homestay and Community Lodges	Point	Point location of registered Homestays, Eco-lodges, and community-managed Trekking lodges.
		Camping and Tent Sites	Point	Point location of designated seasonal camping grounds and semi-permanent tented camps.
	Catering and Leisure	Food and Beverage Outlets	Point	Point location of Restaurants, Cafés, Coffee shops, and traditional Tea houses.
		Nightlife and Entertainment	Point	Point location of Dance houses, Dohori restaurants, Clubs, and Live music venues.
		Local Product Outlets	Point	Point location of specialized souvenir shops, handicraft centers, and organic local product stores.

Theme	Category	Sub Category	Data Type	Data Layer
	Mobility and Access	Tourism Trails	Line	Line network of primary Hiking, Trekking, and Pilgrimage routes. Attributes: Difficulty level, length, and elevation profile.
		Specialized Cycling Tracks	Line	Line network of dedicated mountain bike trails and leisure cycling corridors.
		Cable Car and Ropeway Lines	Line	Line network representing the path of tourist cable cars and ropeway systems.
Municipal Utility Services	**Water Supply System**	Water Source Points	Point	Point location of intakes, deep tube wells, lift irrigations, pumps and historic Stone Spouts (Dhunge Dhara).
		Water Treatment and Reservoirs	Point	Point location of filtration plants, Overhead Tanks (OHT), and Ground Level Reservoirs (GLR).
		Water Distribution Pipelines	Line	Line network of primary, secondary, and tertiary pipes delivering potable water to neighborhoods.
		System Control Valves	Point	Point location of air-release valves, gate valves, and washouts for flow management.
		Consumer Water Meters	Point	Point location of individual household and industrial meters for billing and leakage tracking.
		Fire Hydrant Points	Point	Point location of dedicated hydrants and emergency water storage for fire-fighting.
	Sanitation System	Wastewater Treatment Plants	Point	Point location of Wastewater treatment plants
		Sewerage Gravity Networks	Line	Line network of underground pipes carrying domestic wastewater to treatment sites.
		Manhole Inspection Chambers	Point	Point location of access points for maintenance at junctions or grade changes in the sewer lines.
		Septic Tank Clusters	Point	Point location of large-scale community or institutional septic tanks where no main sewer exists.
		Wastewater Treatment Extents	Polygon	Polygon area defining the physical boundary of centralized or DEWATS treatment facilities.
		Public Sanitation Blocks	Point	Point location of municipal public toilets and community hand-washing stations.
	Stormwater & Drainage System	Stormwater Drain Network	Line	Line network of open surface drains, roadside RCC conduits, and primary stormwater canals.
		Cross Drainage Culverts	Point	Point location of conduits passing under roads or walkways to maintain natural water flow.
		Drainage Inlets and Outfalls	Point	Point location of entry grates (inlets) and final discharge points (outfalls) into rivers.
	Solid Waste Management System	Waste Collection Nodes	Point	Point location of community bins, transfer stations, and ward-level segregation hubs.
		Waste Collection Routes	Line	Line network of designated vehicle paths for scheduled waste pickup and street sweeping.
		Landfill and Composting Sites	Polygon	Polygon area outlining the physical footprint of disposal, recycling, and composting plants.
	Electricity Distribution Services	Local Power Distribution Lines	Line	Line network of 11kV/33kV Primary and 400V/230V Low-Tension (LT) service cables.
		Distribution Transformers	Point	Point location of pole-mounted or ground-mounted step-down units serving residential clusters.
		Utility and Streetlight Poles	Point	Point location of physical poles supporting overhead wires and municipal streetlight fixtures.
		Consumer Electric Meters	Point	Point location of household service entry points and billing meters.
	Telecommunications Services	Fiber Optic Backbone	Line	Line network of underground or overhead optical fiber cables for high-speed connectivity.
		Mobile and Radio Towers	Point	Point location of BTS towers, radio masts, and wireless ISP distribution masts.
		Wireless Signal Coverage Area	Polygon	Polygon area representing signal strength footprints for 4G, 5G, and municipal Wi-Fi zones.
		Public Wi-Fi Hotspots	Point	Point location of specific routers providing public internet access in squares or parks.
		Communication Hub Points	Point	Point location of Post Offices, Data Centers, and Radio/TV broadcasting stations.
	Fuel and EV Services	Fuel and LPG Stations	Point	Point location of petrol pumps and non-household LPG distribution and storage centers.
		EV Charging Nodes	Point	Point location of electric vehicle charging hubs and battery swapping facilities.
	Digital Smart City IoT	CCTV Surveillance Nodes	Point	Point location of security cameras, traffic monitoring units, and municipal monitoring hardware.
		IoT Environmental Nodes	Point	Point location of smart sensors for trash-bin levels, smart parking, or noise monitoring.
	Hydropower Infrastructure	Hydropower Plant Locations	Point	Point location of the powerhouse where energy is generated. Attributes include capacity (kW/MW) and operational status.
		Dam and Intake Structures	Point	Point location of physical river barriers and headworks where water is diverted for power.
		Water Conveyance Lines	Line	Line network representing penstock pipes, headrace canals, or tunnels that carry water to the powerhouse.
		Forebay and Reservoir Extents	Polygon	Polygon layer defining the surface area of water storage basins, reservoirs, or forebay tanks.
	Solar and Wind Infrastructure	Solar Array Boundaries	Polygon	Polygon layer representing the physical footprint of utility-scale or community-managed solar farms.
		Wind Turbine Sites	Point	Point location for individual windmills or wind turbines. Includes hub height and capacity attributes.

Theme	Category	Sub Category	Data Type	Data Layer
Energy & Power Systems		Inverter and Battery Stations	Point	Point location for structural housing of energy conversion equipment and large-scale storage batteries.
	Biomass and Alternative Energy	Biogas Digester Plants	Point	Point location of institutional or community biogas units, including large-scale waste-to-energy digesters.
		Biomass Processing Sites	Polygon	Polygon layer outlining the grounds used for processing and storing agricultural or forest biomass fuel.
	Energy Transmission and Distribution Infrastructures	High Voltage Transmission Lines	Line	Line network of bulk power cables ranging from 66kV to 400kV. These are the main arterial lines crossing the municipality.
		Transmission Support Towers	Point	Point location of high-tension pylons or lattice towers that support the high-voltage transmission lines.
		Grid Transmission Substations	Point	Point location of major facilities where extra-high or high voltage (e.g., 132kV) is stepped down to sub-transmission levels (33kV).
		Primary Distribution Lines	Line	Line network of 11kV or 33kV medium-voltage lines that move power from grid substations to local neighborhoods.
		Secondary Service Lines	Line	Line network of Low-Tension (LT) cables (400V three-phase or 230V single-phase) that connect directly to households.
		Distribution Transformers	Point	Point location of pole-mounted or ground-mounted transformers (typically 11/0.4kV or 33/11kV) within the community.
		Distribution Utility Poles	Point	Point location of street-level poles (steel, concrete, or wood) that support both primary and secondary distribution lines.
		Local Distribution Substations	Point	Point location of smaller-scale facilities (typically 33/11kV) that manage the local municipal power supply.
		Service Meter Points	Point	Point locations for industrial or large-scale consumer meters (Smart Meters).
Environmental Monitoring and Sensor Networks	Atmospheric Monitoring	National Meteorological Stations	Point	Synoptic, climatological, and agrometeorological stations managed by the Department of Hydrology and Meteorology (DHM).
		Local Weather Sensors	Point	Automated weather stations (AWS) installed by the municipality or local organizations for neighborhood-level rainfall and temperature tracking.
		Reference Air Quality Stations	Point	High-precision stations managed by the Department of Environment (DoEnv) and ICIMOD for official Air Quality Index (AQI) reporting.
		Community Air Sensors	Point	Dense network of low-cost sensors (e.g., PurpleAir or Prana Air) used for monitoring localized smog and residential pollution.
	Hydrological Monitoring	River Gauging Stations	Point	Strategic locations for measuring river discharge and flow volume for national hydrological records.
		Flood Early Warning Sensors	Point	Telemetry-based radar or ultrasonic sensors that trigger community sirens and SMS alerts when water reaches danger levels.
		Groundwater Monitoring Wells	Point	Specific points used to track seasonal fluctuations and the quality of the municipal groundwater table.
	Hazard Monitoring	Seismic Monitoring Nodes	Point	National network sensors used to detect ground acceleration, earthquake magnitude, and epicenters.
		Landslide Monitoring Sensors	Point	Localized soil moisture probes and tiltmeters installed in high-risk slope zones to provide localized disaster warnings.
		Cryosphere Monitoring Stations	Point	High-altitude sensors tracking snow depth and glacier melt in mountain catchments that feed into municipal river systems.
	Environmental Health	Noise Pollution Sensors	Point	Decibel monitoring stations located in industrial areas or high-traffic urban corridors to track and regulate noise levels.
		In Situ Water Quality Sensors	Point	Automated sensors at river basins or municipal intakes monitoring pH, turbidity, and dissolved oxygen levels.

Municipal Socio-Economic Data and Associated Attribute Datasets

Theme	Category	Sub Category (given)	Finer sub-category / Attribute dataset (add these)
Demography	Population Status (जनसंख्याको अवस्था)	Ward wise Population Distribution Status of m	Municipal total population count
			Ward-level total population distribution
			Settlement and Tole-specific population counts
			Ward-level population density (Persons per square kilometre)
		Municipal summary of Population by Age	Municipal population distribution by major age categories (0–4, 5–14, 15–59, 60+)
			Municipal population distribution by 5-year chronological age cohorts
		Wardwise population distribution by age	Ward-level population distribution by broad functional age groups
			Ward-level population distribution by 5-year chronological age cohorts
		Population by Gender	Municipal population distribution by biological sex
			Ward-level population distribution by biological sex
			Municipal sex ratio (Number of males per 100 females)
			Ward-level sex ratio (Number of males per 100 females)
		Population by Mother Tongue	Municipal population distribution by primary mother tongue
			Ward-level population distribution by primary mother tongue
		Population by Religion	Municipal population distribution by religious affiliation
			Ward-level population distribution by religious affiliation
		Population by Caste/Ethnicity	Municipal population distribution by caste and ethnic identity
			Ward-level population distribution by caste and ethnic identity
		Population by Occupation	Municipal population distribution by primary occupational sector
			Ward-level population distribution by primary occupational sector
		Economically Active Population	Municipal count of economically active population (Ages 15+)
			Ward-level count of economically active population (Ages 15+)
			Municipal labour force participation rate (Percentage)
			Municipal and ward-level age dependency ratios
		Population by Disability	Municipal population with disabilities categorized by disability type
			Ward-level population with disabilities (Total and type-specific counts)
		Beneficiaries of Social Security Programs	Municipal social security beneficiaries by programme category
			Ward-level social security beneficiaries by programme category
	HouseholdDetails (पारिवारिक विवरण)	Settlement and Household Details	Municipal total household count
			Ward-level household distribution count
			Settlement and Tole-level household distribution (Survey-based)
			Municipal average household size (Persons per household)
			Ward-level average household size (Persons per household)
			Ward-level household density (Households per square kilometre)
		ward wise Household Head Details	Ward-level household head distribution by biological sex
			Municipal distribution of female-headed households
			Ward-level distribution of female-headed households
			Ward-level household head distribution by age group
			Ward-level household head distribution by literacy and educational attainment
		Household Head gender	Municipal summary of household head distribution by gender
			Ward-level distribution of household head by gender
		mobile number	Municipal and ward-level mobile telephony access rates
			Municipal and ward-level internet connectivity access rates
		Settlement and Household Details	Household distribution by structural construction typology (RCC, Masonry, etc.)
			Household distribution by residential tenure status (Owned, Rented, etc.)
			Household distribution by primary drinking water source
			Household distribution by toilet facility type and functional status
			Household distribution by primary cooking fuel type

Theme	Category	Sub Category (given)	Finer sub-category / Attribute dataset (add these)
			Household distribution by primary lighting and energy source
			Percentage of households with active electricity grid access
	Migration Details (बसाइ सराइ सम्बन्धी विवरण)	In-migration rate	Municipal in-migration rate per annum
			Ward-level in-migration rate per annum
		Out-migration rate	Municipal out-migration rate per annum
			Ward-level out-migration rate per annum
		Absentee/foreign employment	Municipal count of absentee population (International labour migration)
			Ward-level count of absentee population (International labour migration)
	Personal Event Details (व्यक्तिगत घटना सम्बन्धी विवरण)	Personal Event Details	Municipal total annual birth registration count
			Ward-level annual birth registration count
			Municipal total annual death registration count
			Ward-level annual death registration count
			Municipal and ward-level annual marriage registration count
			Municipal and ward-level internal migration registration logs
	Institutional Population Details (संस्थागत जनसंख्या विवरण)	Institutional Population Details	Municipal total institutional population (Hostels, Barracks, Monasteries, etc.)
			Ward-level distribution of institutional population
Economic Status	**Major Economic Details (प्रमुख आर्थिक विवरण)**	gdp of municipality	Municipal Gross Domestic Product (GDP) annual estimate
		Skilled and Technically Qualified Human Reso	Municipal count of skilled workforce by specific vocational skill type
			Ward-level distribution of skilled workforce
		Details on Main Occupation	Municipal economic occupational structure (Primary, Secondary, Tertiary sectors)
			Ward-level economic occupational structure
		Average Income	Municipal average monthly household income
			Ward-level average monthly household income
		Average Expenditure and Savings	Municipal and ward-level average monthly household expenditure
			Municipal and ward-level household savings and cooperative participation status
		Poverty Level Details	Municipal poverty classification (Poor, Vulnerable, Non-poor)
			Ward-level poverty classification distribution
		Food Security Status	Municipal and ward-level food security and vulnerability status
			Ward-level Months of Adequate Household Food Provisioning (MAHFP) index
		Housing Structure Distribution	Municipal residential building type distribution
			Ward-level residential building type distribution
		Poverty Rate (Population Below Poverty Line)	Municipal poverty headcount rate (Below national poverty line)
			Ward-level poverty headcount rate
		Import and Export Status	Municipal inventory of major imported commodities by volume and value
			Municipal inventory of major exported commodities by volume and value
		Status of Industrial Raw Material Production	Ward-level production status of local raw materials (Agri, Forest, Mineral)
		Unemployment Details	Municipal annual unemployment rate (Percentage)
			Ward-level annual unemployment rate (Percentage)
		Details on Foreign Employment	Municipal count of citizens in foreign employment
			Ward-level count of citizens in foreign employment
		Details on Landless/Squatter Population	Municipal and ward-level count of landless households
			Ward and settlement-level count of informal squatter (Sukumbasi) households
	Land Use and Ownership (भू-उपयोग तथा स्वामित्व)	Current Land Use	Municipal land use and land cover classification summary
			Ward-level land use and land cover distribution
		Land Ownership	Municipal and ward-level distribution of owned vs. leased land parcels
		Type of Land	Land capability classification (Arable, Barren, Forest, Built-up)
		Details of Arable Land	Municipal total arable land area (Hectares)
			Ward-level arable land area (Hectares)
		Details of Barren Land	Municipal total barren or uncultivated land area
			Ward-level barren or uncultivated land area
		Details on Public Ponds and Fish Farming	Ward-level inventory of functional fish ponds and aquaculture sites

Theme	Category	Sub Category (given)	Finer sub-category / Attribute dataset (add these)
	Agriculture and Livestock (कृषि तथा पशु विकास)	Availability of Irrigation Facilities	Ward-level total irrigated land area
		Sources of Irrigation	Ward-level distribution of irrigation source types
		Details on Agricultural Production	Ward and municipal-level agricultural production by major crop types
		Livestock and Poultry Production	Ward and municipal-level livestock population by species
		Diseases and Pests in Food Crops	Ward-level agricultural pest and disease incidence records
		Diseases and Pests in Fruits and Vegetables	Ward-level crop disease vulnerability status
		Diseases and Pests in Livestock	Ward-level livestock disease outbreak history and risk
		Details on Commercial Agricultural Farms	Ward-level inventory of commercial agricultural farms by type
		Details on Modern (Commercial) Livestock Fa	Ward-level inventory of commercial livestock enterprises
		Human Resources Related to Agriculture and	Municipal and ward-level count of agricultural and veterinary technicians
		Groups and Community Organizations Relate	Ward-level directory of farmer groups and agricultural cooperatives
		Details on Collection and Cold Storage Cente	Inventory of agricultural collection centres and cold storage facilities
	Tourism Development (पर्यटन विकास)	Details of Tourist Sites	Municipal tourist site inventory (Name, Category, Location, Accessibility)
		Details on Hotels, Resorts and Restaurants	Ward-level hospitality facility inventory (Hotels, Lodges, Bed Capacity)
		Details on Available Tourist Services and Facil	Inventory of municipal tourist services (Guides, Transport, Info Centres)
		Details of Religious, Historical and Tourist Site	Ward-level inventory of religious and historical heritage sites
	Industry, Trade and Banking (उद्योग, व्यापार तथा बैंकिङ)	Industrial Development (Small, Cottage, Medi	Municipal and ward-level industrial registry (Scale, Ownership, Type)
		Details on Manufacturing and Service-based I	Ward-level directory of manufacturing versus service industries
		Details on Mills, Collection and Processing Un	Inventory of mills and processing units including operational capacity
		Trade and Businesses (Grocery, Plots, Fruits, e	Ward-level commercial business registry by category
		Details on Minerals and Mining	Municipal and ward-level inventory of natural resource extraction sites
		Details on Local Markets and Commercial Cer	Ward-level inventory of markets and major commercial centres
		Details on Banks and Financial Institutions	Ward-level inventory of banks, financial institutions, and service points
		Details on Cooperatives	Ward-level inventory of cooperatives (Savings, Agri, Multipurpose)
		Literacy Status (5+ and 15+ Age Groups)	Municipal literacy rate (Population ages 5+)
			Ward-level literacy rate (Population ages 5+)
			Municipal adult literacy rate (Population ages 15+)
			Ward-level adult literacy rate (Population ages 15+)
			Municipal and ward-level literacy rates disaggregated by biological sex
			Municipal and ward-level gender literacy gap (Percentage point difference)
		Educational Attainment (5+ Age Group)	Municipal distribution of population by highest educational attainment
			Ward-level distribution of population by highest educational attainment
		Education Institutions and Student Details by	School facility inventory (Name, Ward, Type, Level, Management)
			Municipal and ward-level count of schools by level (ECD, Basic, Secondary)
		Students by Education Level	Municipal total student enrollment by educational level
			Ward-level student enrollment by educational level
			Student enrollment disaggregated by sex (School and Ward level)
		Campus and Technical School Student Details	Inventory of higher education campuses and technical institutes
			Technical and campus student enrollment by programme and sex
		Out-of-School and Dropout Children Details	Ward-level count of out-of-school children (Ages 5–12 and 13–16)
			School and ward-level student dropout counts by grade and sex
		Learning Achievement and Pass Rate	School-level examination participation and pass rates by grade
			Ward and municipal-level aggregate academic pass rates

Theme	Category	Sub Category (given)	Finer sub-category / Attribute dataset (add these)
Social Status	Education and Human Resource Development (शैक्षिक तथा मानव संसाधन विकास)	Net Enrollment, Retention, and Survival Rates	Municipal and ward-level Net Enrollment Rate (NER) (Basic and Secondary)
			Ward and municipal-level student retention rate by grade
			Ward and municipal-level student survival rate to Grade 5, 8, and 10
		Early Childhood Development Center Details	Inventory of Early Childhood Development (ECD) centres (Location, Type)
			Ward-level count of children enrolled in ECD programmes
		School as Peace Zone and School Improveme	Inventory of schools with active School Improvement Plans (SIP)
			Inventory of schools officially declared as Zones of Peace
		Teacher and Education Workforce Details	School-level teacher counts disaggregated by level, subject, and sex
			School, ward, and municipal-level pupil-teacher ratios (PTR)
		Access to Basic and Secondary Schools	Ward and settlement-level average travel time to nearest school
			Ward-level educational service coverage (Percentage access to levels)
		Physical Infrastructure and Facilities in Schoo	School-level infrastructure audit (Classrooms, Toilets, Water, Boundary)
			Ward and municipal-level count of schools meeting minimum WASH standards
		Scholarship and Targeted Facility Availability	Ward and municipal-level scholarship beneficiaries by category
		Internet-Enabled Schools	School inventory of internet connectivity (Type and Provider)
		Earthquake-Resistant or Retrofitted Schools	Inventory of retrofitted and earthquake-resistant school buildings
		Local Government Investment in Education	Annual municipal education budget allocation and expenditure trends
		Technical and Skilled Human Resources	Municipal technical human resource stock (Engineers, Health, IT, Agri)
			Ward-level vocational and technical skills distribution (Survey-based)
		Special Education Resource Class and Studer	Inventory of schools providing integrated resource classes
			Enrollment in resource classes disaggregated by disability type and sex
		Educational Quality	School-level quality indicators (Teacher attendance, Learning environment)
		Child-Friendly Education	School-level child-friendly status (Checklist-based quality score)
		Physical Condition of Schools	School building structural condition grading (Good, Fair, Poor)
	Health and Nutrition (स्वास्थ्य तथा पोषण)	Health Institutions	Health facility inventory (Name, Category, Ward, Ownership, Services)
			Municipal and ward-level health facility density (Facilities per capita)
		Health Workers and Medical Personnel	Facility-level health workforce inventory by cadre (Doctor, Nurse, HA)
			Ward and municipal-level total health workforce counts
		Access to Primary Health Services	Ward and settlement-level average travel time to nearest health facility
			Ward-level primary health service coverage percentage
		Available Health Services and Facilities	Health facility service availability matrix (OPD, Birthing, Lab, etc.)
		Immunization and Safe Motherhood Details	Ward and municipal-level immunization coverage rates by antigen
			Ward and municipal-level maternal health indicators (ANC 4+, Inst. Delivery)
		Child Health and Malnutrition Status	Ward and municipal-level prevalence of child malnutrition (Stunting, Wasting)
		Major Diseases and Treatment	Ward and municipal-level incidence of major communicable diseases
			Facility-level clinical treatment and referral statistics
		Safe Motherhood	Municipal and facility-level maternal mortality and complication audits
		Drinking Water Facility Status	Ward and municipal-level percentage of households with piped water access
			Inventory of functional water supply schemes and coverage areas
		Sources of Drinking Water	Ward and municipal-level distribution of water source types

Theme	Category	Sub Category (given)	Finer sub-category / Attribute dataset (add these)
	Drinking Water and Sanitation (खानेपानी तथा सरसफाइ)	Toilet Usage Status	Ward and municipal-level percentage of households with improved toilets
		Public Toilets	Public toilet inventory (Location, Condition, Gender-inclusivity)
		Waste Management	Ward-level municipal solid waste collection service coverage
			Inventory of waste management sites (Transfer, Landfill, Dumping)
		Sewerage Management	Ward-level sewerage network coverage and household connection rate
			Municipal inventory of drainage and sewerage infrastructure assets
	Women, Children and Social Inclusion (महिला, बालबालिका तथा सामाजिक समावेशीकरण)	Child Marriage by Gender	Ward and municipal-level annual child marriage cases by sex
		Children Working Outside Home	Ward and municipal-level child labour counts by sector and sex
		Child Clubs and Networks	Ward-level inventory of child clubs (Name, Members, Activities)
		Status of Orphaned Children	Ward and municipal-level count of orphaned and vulnerable children
		Population Facing Social Issues	Ward and municipal-level incidence of GBV, substance abuse, and trafficking
		Senior Citizens and Single Women	Ward and municipal-level senior citizen count and allowance coverage
			Ward and municipal-level single women and widow support coverage
		Minority and Marginalized Population Details	Ward and municipal-level distribution of marginalized groups (Dalit, Janajati)
		Allocation and Expenditure in Targeted Progra	Annual budget allocation and expenditure for targeted social programmes
	Youth, Sports and Recreation (युवा, खेलकुद र मनोरञ्जन)	Playgrounds, Parks, Picnic and Recreational Si	Inventory of municipal recreation sites (Parks, Playgrounds, Condition)
		Professional Athletes	Municipal athlete registry disaggregated by sport, ward, and sex
		Youth Clubs Details	Ward-level youth club inventory (Name, Members, Activities)
		Youth Creativity, Entrepreneurship and Engag	Municipal and ward-level count of youth-led enterprises and startups
			Municipal and ward-level participation in vocational and entrepreneurship training
	Art, Language and Culture (कला, भाषा तथा संस्कृति)	Religious and Historical Sites	Ward-level heritage and religious site inventory (Category and Condition)
		Public Spaces, Party Pauwas and Chautaras	Inventory of public community spaces (Pati, Pauwa, Chautara)
		Local Festivals, Jatras and Fairs	Municipal festival and cultural event calendar (Scale and Seasonality)
		Students in Special Education Resource Class	School-level enrollment of students in specialized resource classes
		Local Festivals and Jatras Details	Inventory of Jatra/Festival management committees and safety plans
	Status of Peace and Security (शान्ति तथा सुरक्षाको अवस्था)	Status of Peace and Security	Ward and municipal-level annual crime incidents by category
			Police post inventory and geographical service coverage areas
			Inventory of GBV reporting points and local mediation centres
	Forest Area Status (वन क्षेत्रको अवस्था)	Forest Area and Type Details	Municipal forest area distribution (Community, Private, Leasehold, Govt)
			Ward-level forest coverage area and percentage
		Forest Management (Community, Leasehold,	Inventory of CFUG and leasehold forests (Name, Ward, Area)
		Details on Vacant Land for Plantation	Spatial inventory of vacant land parcels suitable for afforestation
		Forest Products Details	Ward and municipal-level timber and non-timber forest product (NTFP) volume
		Medicinal Herbs Production, Collection and E	Spatial inventory of medicinal herb collection and production sites
		Forest Products Exported from the Municipali	Annual forest product export inventory by quantity and value
	Water Resources and Watershed Area (जलस्रोत तथा जलाधार क्षेत्र)	Major Watershed and Sub-watershed Status	Polygon inventory of watershed and sub-watershed boundaries
		Water Sources Details	Spatial inventory of water sources (Spring, Spout, Well, Intake)
		Rivers and Streams Details	Municipal river and stream network (Name and Flow classification)
		Lakes, Ponds, and Wetlands Details	Spatial inventory of lakes, ponds, and wetlands including surface area

Theme	Category	Sub Category (given)	Finer sub-category / Attribute dataset (add these)
Forest		Status of Water Resources and Utilization	Water source utilization classification (Drinking, Irrigation, Hydropower)
		Structured Water Sources, Land and Physical	Inventory of water infrastructure assets (Intakes, Tanks, Canals)
	Biodiversity and Environmental Services (जैविक विविधता तथा वातावरणीय सेवा)	Important Animals and Birds by Habitat	Municipal fauna species list (Habitat, Sightings, Protected areas)
		Important Plant Species Details	Municipal flora species list and primary distribution zones
		National Parks, Reserves, Buffer and Protecte	Spatial boundaries and regulations of protected areas and buffer zones
	Parks and Gardens Details (पार्क तथा उद्यान विवरण)	Parks and Gardens Details	Ward-level inventory of parks and gardens (Area, Facilities, Condition)
	Disaster Risk Management (विपद् जोखिम व्यवस्थापन)	Households Living in Vulnerable Locations	Ward-level count of households located in high-risk hazard zones
			Spatial inventory of settlements located in hazard-prone areas
		Human and Physical Damage due to Disasters	Historical disaster loss database (Casualties, Injuries, Damage)
			Ward-level annual and seasonal disaster impact summaries
		Disaster Risk Period by Type	Municipal seasonal risk calendar (Flood, Landslide, Fire, Cold wave)
		Damaged Structures and Infrastructure due t	Inventory of hazard-damaged buildings and infrastructure assets
		Disaster Preparedness	Ward and municipal-level DRM plan status and committee rosters
			Emergency stockpile inventory (Items, Quantities, and Locations)
		Emergency Transportation Means	Ward-level availability of emergency transport (Ambulance, Boats, etc.)
		Open Space Details	Inventory of designated evacuation open spaces (Area, Access, Facilities)
Infrastructure Development Status	Transportation Infrastructure (यातायात पूर्वाधार)	Current Status of Road Network	Ward and municipal-level road network length by typology
			Segment-level road condition grading (Good, Fair, Poor)
		Ongoing Municipal-Level Road Projects	Municipal road project inventory (Budget, Status, Length, Ward)
		Vehicle Services and Routes	Municipal public transport route network (Stops and Frequency)
		Vehicles Operating Within Municipal Area	Municipal and ward-level count of registered vehicles by type
		Suspension Bridges and Culverts	Bridge and culvert inventory (Location, Span, Structural Condition)
		Estimated Travel Time to Municipal Center fro	Settlement-level travel time analysis to municipal headquarters
		Bus Parks and Rest Stops Details	Inventory of bus parks and rest stops (Capacity and Condition)
	Electricity and Alternative Energy (विद्युतीय तथा वैकल्पिक ऊर्जा)	Households by Cooking Fuel Type	Municipal distribution of primary cooking fuels
			Ward-level distribution of primary cooking fuels
		Households by Lighting Fuel Source	Ward and municipal-level distribution of primary lighting sources
		Electricity Generation from Hydro, Solar, Bio-	Inventory of energy generation sites and operational capacity (kW)
		Households with Electricity Access	Ward and municipal-level percentage of household electricity access
		Households Using Alternative Energy (Solar, E	Ward-level adoption rates of alternative energy (Solar, Biogas, ICS)
	Communication and Technology (सञ्चार तथा प्रविधि)	Internet and Telephone Details	Ward-level internet coverage percentage and primary service providers
			Municipal mobile network signal quality and coverage zoning
		Local Newspapers	Inventory of local media outlets (Print and Online)
		Radio Stations	Radio station inventory and estimated signal coverage area
		Access to Modern Information Systems	Municipal digital service adoption rates (E-payments, Digital Registry)
	Housing and Buildings (आवास तथा भवन)	Urbanisation Status	Ward-level built-up growth and urbanization transition status
		Surface Drainage System Status	Municipal drainage network inventory and structural condition
		Households by Type of House	Ward and municipal-level residential building material distribution
		Government Buildings within Municipality	Inventory of government buildings (Offices, Schools, Health, Police)
		Distance from Municipality Office to Ward Ce	Ward-level average travel time/distance to ward administration centres

Theme	Category	Sub Category (given)	Finer sub-category / Attribute dataset (add these)
		Slaughterhouse Details	Inventory of slaughterhouses (Location, Capacity, Compliance)
		Cremation Site Details	Inventory of cremation and burial sites (Location, Facilities, Condition)
	Organizational and Human Resource Status (संगठनात्मक तथा मानव संसाधनको अवस्था)	Municipal Organizational Structure	Municipal latest approved organizational structure (Departments/Sections)
		Sectoral Units and Human Resources of Muni	Municipal staff count disaggregated by unit, position, and contract type
		Federal and Provincial Offices Located in the	Inventory of federal and provincial offices located within the municipality
		Revenue and Expenditure of Past 5 Fiscal Yea	Five-year municipal revenue and expenditure trends (Sectoral)
		Fixed Assets Details of the Municipality	Municipal fixed assets inventory (Vehicles, Buildings, Equipment)
	Service Operation and Management (सेवा सुविधा सञ्चालन र व्यवस्थापन)	Types of Available Services and Facilities	Municipal service catalogue (Inventory of all provided public services)
		Service Delivery Process and Support System	Municipal process maps (Citizen Charter and SOP availability)
	Institutional Relations and Civil Organizations (संस्थागत सम्बन्ध र नागरिक संगठन)	Citizens' Awareness Centers, Forums, and Ne	Ward-level inventory of Citizen Awareness Centres (CAC) and forums
		Traditional and Community-Based Organizati	Ward-level inventory of Community-Based Organisations (CBO, Guthis)
		Thematic Groups and Institutions (Agriculture	Ward-level inventory of thematic groups and cooperatives
		Community Mediation Details	Ward-level inventory of mediation centres and caseload statistics
		Details and Annual Budget of NGOs and INGO	Municipal inventory of NGO/INGO programmes and annual budgets
	Policy, Regulation and Procedures (नीति, नियम र कार्यप्रणाली)	Approved Acts, Policies, Rules, Guidelines and	Municipal policy and regulation registry (Name, Status, Reference)
		Major Projects/Programs and Performance in	Three-year municipal project performance and KPI summary
		Major Ongoing Programs and Projects	Inventory of ongoing municipal projects (Ward, Budget, Progress %)
		Employees Working in the Municipal Executiv	Municipal employee registry (Position, Section, Assignment)
		Special Protected Autonomous Areas	Spatial boundaries and rules for protected or autonomous areas

List of Resource Maps for Municipal Spatial Inventory

SN	CATEGORIES	Types of MAPS	Maps-Nepali	Datasets	Data Type	Data Source
1	**Administrative Maps**	**Ward and Municipal Boundary Map**	प्रत्येक वडा र नगरपालिकाको सिमाना सहितको नक्सा	Four-directional boundaries; Ward limits; Municipal extent	Vector (Polygon)	Survey Department /field survey
2	**Topographic Maps**	**Topographical Map**	भु-वनौट तथा धरातलिय नक्सा	Slope; Aspect; Hillshade; DEM; Contour; Land cover	Raster	Survey Department
3	**Socio-Economic Maps**	**Population Distribution Map**	जनसंख्या वितरन विवरण नक्सा	Household data; Ward-wise population counts	Excel File with coordinates of all households and information of population in each HH in the attribute table	Primary Survey
		Population Density Map	जनसंख्या घनत्व नक्सा	Population counts per unit area; Residential density	Excel File with coordinates of all households and information of population in each HH in the attribute table	Primary Survey
		Literacy Rate Map	जनसंख्याको साक्षरता नक्सा	Household literacy status; Educational attainment	Excel File with coordinates of all households and information on literacy in each HH in the attribute table	Primary Survey
		Unemployment Status Map	बेरोजगारी नक्सा	Employment status; Pensioners; Profession/Business types	Excel File with coordinates of all households and information on employment in each HH in the attribute table	Primary Survey
		Households with Agricultural Land Map	कृषि भुमि भएका घरहरुको नक्सा	Land ownership; Size of agricultural holdings	Excel File with coordinates of all households and information on Agricultural land in each HH in the attribute table	Primary Survey/CBS
		Poverty Distribution Map	गरीबी वितरण नक्सा	Food sufficiency; Income levels; Cooking stove status		Primary Survey/CBS
		Caste and Ethnicity Map	जातजाति र जनजाति विवरण नक्सा	Distribution of Dalit, Janajati, and other groups		Primary Survey/CBS
		Disability and Vulnerability Map	अपाङ्गता तथा जोखिमपूर्ण घरधुरी नक्सा	PwD locations; Female-led households; Elderly	Excel File with coordinates of all households and information on availability of sufficient food for each HH in the attribute table	Primary Survey/CBS
4	**Risk, Hazard, DRR Related Maps**	**Distribution of Open Spaces and Critical/E,ergency Services Map**	खुल्ला क्षेत्र तथा आपतकालीन सेवा प्रदायक संस्थाको वितरन नक्सा	Open spaces; Airport; Helipad; Logistic hubs; Bus stops	Point/Polygon	Primary survey
		Multi-Hazard Map	बहु प्रकोपिय नक्सा	Wild animal attack; Flood; Landslide; River cutting; Drought	Point/Polygon	Primary Survey. GIS analysis
		Earthquake Affected Household Map	भूकम्प प्रभावित घरधुरीको विवरण नक्सा	Damaged structures; Beneficiary status	Secondary sources (NRA/Purnima)	Secondary sources
5	**Resource Maps**	**Major Settlements, Roads & River Network Map**	प्रमुख बस्ती, खोला नाला तथा सडक सञ्जाल नक्सा	Settlements distribution, road network, river network		Primary survey, Survey Department
		Health and WASH Facilities Map	स्वास्थ्य तथा सरसफाइ सेवा प्रदायक संस्थाहरुको नक्सा	Health institutions (hospitals, primary health centers, ayurved centers, health post and others), drinking water facility, public toilets		Primary survey
		Institutions Map	संघ संस्था नक्सा	Government organization, non government organization, community based organization, municipal/ward centers, security forces		Primary survey
		Educational Institutions Map	शैक्षिक संस्था नक्सा	Educational institutions (schools, colleges, university, library, training center, technical institutions)		Primary survey
		Financial Institutions Map	बैंक तथा वित्तिय संस्थाहरुको नक्सा	Banks, microfinance, cooperatives, business centers, ATM		Primary survey
		Industries /Factories Map	उद्योग तथा कलकारखाना नक्सा	Location of industries, factories, mill, powerhouse, Microhydro and other structures		Primary survey
		Bridges, Culverts Map	पुल पुलेसा वितरन विवरण नक्सा	Suspension Bridge, Culverts, Motorable Bridge and Other bridges		Primary survey
6	**Other Maps (Accessibility, Planning)**	**Accessibility to Health Facilities Map**	स्वास्थ्य सेवा पहुँच नक्सा	Service travel time; Catchment analysis		Secondary source, DEM
		Tourism Map	पर्यटकीय आकर्षण नक्सा	Trekking routes; Heritage sites; Monasteries; Gumbas		Primary survey
		Project Plan Map	परियोजना योजना नक्सा	Ongoing and planned infrastructure projects		Primary Survey, Participatory Interactions
		Development Potential Area Maps	विकास सम्भावित क्षेत्र नक्शा	Industrial zones; Urban expansion areas; Agri-pockets		Participatory mapping

Annex C

Summary of Thematic Infrastructure Dataset Categories and Attribute Framework

SN	Category	ID	Category Used	What This Category Covers	Why This Category Is Important
1	**Household datasets**	**HH-1**	Basic Information	Unique household identifiers; house numbering; geolocation (latitude, longitude, altitude); settlement and ward association; residency duration; primary and secondary emergency contact details; preferred communication languages.	Establishes the spatial anchor for the entire database. Without this geodetic link, socio-economic and hazard data remain "aspatial" and cannot be mapped. It is the prerequisite for all spatial queries and location-based service delivery.
		HH-2	Demographics	Family size and composition; gender-disaggregated data; vulnerability markers (disability, chronic illness, elderly); social security eligibility; nutrition and food consumption frequencies; citizenship status and education levels.	It allows for the identification of "at-risk" populations. By mapping these attributes, the municipality can design targeted social protection interventions and ensure that the most vulnerable residents are prioritized during disaster response and aid distribution.
		HH-3	Socio-Economic Status	Primary and secondary income sources; monthly income and saving brackets; land tenure and ownership types; registered land area; agricultural dependencies; crop types; livestock inventory (counts and types); household vehicle and utility assets.	Provides the empirical baseline for municipal revenue planning and poverty alleviation. Tracking land ownership and income sources allows for more accurate property tax assessments and the development of localized economic growth strategies.
		HH-4	Housing & Infrastructure	Building typology and construction materials; physical dimensions (length, breadth, height); floor counts; foundation and soil types; building code compliance (NBC); water, sanitation, and hygiene (WASH) indicators; energy and cooking fuel sources.	This information is critical for infrastructure audits and public health monitoring. It enables the Engineering Department to identify non-compliant or unsafe structures and allows the WASH section to visualize service gaps in water and sanitation coverage.
		HH-5	Disaster Management	Historical hazard exposure profiles; multi-hazard seasonality calendars; flood inundation levels and durations; proximity to high-risk areas (rivers, highways); quantified economic and human losses from past events; evacuation history.	Facilitates proactive risk reduction. By analyzing historical damage patterns alongside spatial proximity to hazards (e.g., distance to the Mahakali River), the municipality can develop high-resolution risk maps and evidence-based mitigation plans.
		HH-6	Preparedness & Capacity	Search and Rescue (SAR) and First Aid training status; availability of emergency "Go-Bags"; knowledge of evacuation routes; access to Early Warning Systems (EWS); mobile and internet connectivity; willingness to receive digital alerts.	It evaluates the self-reliance of the community. This data identifies wards that require urgent capacity-building workshops and ensures that early warning alerts are sent through the community's preferred and most accessible communication mediums.
		HH-7	Perception & Governance	Observations of climate shifts (temperature and rainfall); feedback on previous municipal support; perceived causes of local hazards; community expectations from the government; preferred media for information sharing.	Institutionalizes administrative accountability and transparency. By recording resident perceptions, the municipality can align its periodic plans with the actual needs of the people, fostering a more inclusive and responsive governance model.
2	**Settlements/Tole Datasets**	**S-1**	Basic Information	Settlement nomenclature; unique administrative identification codes; urban/rural/emerging classification; hierarchy of administrative location (Province, District, Ward); historical and colonial heritage characteristics; planning service coverage descriptions; polygon boundary geometry; centroid geocoordinates.	Establishes the formal administrative and spatial identity of each community cluster. Defining these boundaries is critical for ward-level planning, resource allocation, and jurisdictional clarity in service delivery.
		S-2	Demographics	Total population counts; population distribution and density status; age and gender-disaggregated tables; cultural profiles (mother tongue, religion, caste/ethnicity); labour force and occupational statistics; disability and vulnerability counts; social security beneficiary registries; migration status; vital event statistics (births, deaths, marriages).	Provides the human baseline for settlement-level resource planning. Analysing population density and cultural diversity ensures that municipal services, such as schools and social security, are distributed equitably and effectively.
		S-3	Land & Housing	Land use composition statistics; total housing unit stock; housing typology distribution (apartments, multi-storey, etc.); multi-storey housing presence; tenure proportions (owner-occupied vs. rental percentages).	Informs land management and urban development strategies. Understanding the housing stock and tenure status is essential for urban renewal projects, building permit enforcement, and revenue (property tax) estimation.
		S-4	Community Services	Educational facility counts; school types and travel time access metrics; health facility counts and travel time benchmarks; market facility presence; WASH service coverage (piped water and sanitation percentages); solid waste collection availability.	Identifies gaps in essential service delivery. Mapping travel times to schools and health posts highlights underserved settlements, guiding the prioritisation of new infrastructure investments.
		S-5	Infrastructure	Primary electricity sources; grid infrastructure (substations); water supply infrastructure types; road connectivity hierarchy; year-round motorable access status.	Monitors the physical connectivity and utility resilience of settlements. Tracking road access and utility infrastructure is vital for economic integration and ensuring year-round access to remote clusters.
		S-6	Disaster Management	Evacuation open spaces; operating response agencies; ongoing DRR projects; community disaster management committees (CDMC); emergency stockpiles and response teams; multi-hazard profiles (frequency and history); service disruption logs; Early Warning System (EWS) coverage and alert types.	Facilitates settlement-level risk mitigation and emergency response. Knowing which settlements have functional CDMCs and EWS coverage allows for rapid coordination during climate-induced disasters such as floods or droughts.
		S-7	Data Management	Departmental data stewardship assignments; last update timestamps; planned data update frequencies; data sharing and access protocols.	Ensures the institutional sustainability and reliability of the geospatial data. Defining stewardship and update cycles prevents the use of outdated information in critical municipal decision-making.
3	**Health**	**H-1**	Basic Information	Facility nomenclature and unique identifiers; licensing and registration details; administrative location hierarchy; geodetic coordinates (latitude, longitude, elevation); coordinate accuracy estimates; establishment year; operating hours and days; contact information; primary patient access modes; road connectivity status.	Establishes the foundational georeferenced identity of each health post or hospital. Precise spatial location is critical for emergency dispatch, ambulance routing, and determining the physical catchment area for healthcare services.
		H-2	Institutional Service	Facility level and type; estimated catchment and served populations; regulatory inspection and quality audit logs; management committee (HFOMC) and IPC committee status; referral facility protocols and distances; emergency transfer agreements (MoU).	Defines the functional mandate and legal standing of the health facility. It allows planners to evaluate if the facility level is adequate for its catchment population and ensures that referral pathways are formalised before disaster events.
		H-3	Workforce	Total staff counts (gender-disaggregated); permanent versus contract employment status; technical vs. administrative composition; specific counts for doctors, nurses, and technicians; patient-to-staff workload ratios; emergency staffing and surge capacity plans; disaster response training records.	Optimises human resource management and monitors the readiness of the health workforce. It ensures that facilities have sufficient clinical staff to handle surge demands during disease outbreaks or mass casualty events.
		H-4	Infrastructure (Building Specific)	Building inventory on the compound; construction year and renovation history; structural system types and roof materials; compliance with national building codes; structural damage history; physical accessibility (wheelchair ramps); proximity to external risks; helipad availability.	Evaluates the physical vulnerability and accessibility of the health infrastructure. Identifying non-compliant or damaged buildings is essential for prioritising retrofitting projects to ensure facilities remain functional "Safe Hospitals" during hazards.
		H-5	Operation and Maintenance	Utility reliability (grid and backup power systems); water source, storage, and quality testing logs; HVAC and ventilation adequacy; medical supply chain and cold chain status; essential medicine buffer stocks; biomedical and hazardous waste management systems.	Monitors the critical life-support systems required for clinical operations. Ensuring backup power for cold chains and adequate water storage is vital for maintaining maternal and child health services during service disruptions.
		H-6	Disaster Management	Written emergency preparedness plans; multi-hazard risk assessments; backup communication channels; evacuation route mapping; community Early Warning System (EWS) coverage; historical hazard impact logs; post-disaster recovery and service restoration plans.	Strengthens the resilience of health services against climate-induced hazards. Integrated EWS and preparedness plans ensure that staff and patients are protected and that essential services can be restored rapidly after a disaster.
		H-7	Data Management	Routine health reporting systems used (HMIS); electronic medical record (EMR) status; designated data focal points; profile update frequencies; metadata completion status; data sharing protocols and timestamps.	Ensures the institutional sustainability and interoperability of health information. Formalised data sharing between the health office and the municipal GIS unit prevents the use of outdated facility profiles in planning.
4	**Education**	**E-1**	Basic Information	Institutional nomenclature and level; registration and establishment details; geodetic coordinates (latitude, longitude, elevation); land area and ownership status; road condition and distance to motorable road; student walking travel times.	Establishes the spatial and legal identity of each school. Precise geolocation is necessary to evaluate the physical accessibility of the education network and to identify clusters of students facing excessive travel distances.
		E-2	Institutional Service	Service hours; total and disaggregated student enrollment (gender/disability); dropout rates; student health records and chronic illness tracking; parent-school communication channels; medical insurance coverage.	Monitors educational delivery and student welfare. Disaggregated enrollment data allows the municipality to track progress toward inclusive education and identify ward-level trends in dropout rates or health vulnerabilities.
		E-3	Workforce	Total teaching and non-teaching staff counts (gender-disaggregated); staff with disabilities; disaster risk and emergency response training status; gender-sensitive and inclusion training frequency.	Evaluates the human capital and readiness of the education sector. Ensuring that both teaching and non-teaching staff are trained in DRR protocols is essential for safeguarding students during disaster events.
		E-4	Infrastructure	Building count and construction history; building code compliance; structural typology and materials; classroom counts and orientation; ventilation and insulation adequacy; disability-friendly accessibility (ramps/toilets); safety signage and drainage conditions.	Informs infrastructure prioritisation and safety audits. Identifying non-compliant structures or those with poor ventilation allows for evidence-based budgeting for renovations, retrofitting, and the creation of safe learning environments.
		E-5	Operation and Maintenance	Power supply reliability and backup systems; water source, quality, and scarcity history; sanitation facilities (separate toilets for boys/girls/staff); handwashing stations; Menstrual Hygiene Management (MHM) products and disposal systems.	Monitors the critical utilities and hygiene standards required for a healthy learning environment. Functional MHM facilities and year-round water access are key factors in maintaining high attendance rates, particularly for adolescent girls.
		E-6	Disaster Management	Written School Safety Plans and SIP updates; hazard risk mapping; governance (SMC meeting frequency); regular drills; Early Warning System (EWS) reception and dissemination; historical hazard impacts and recovery costs; student evacuation history.	Strengthens the resilience of the education sector against climate-induced hazards. Integrated EWS and safety plans ensure that schools can act as safe havens and that educational continuity is restored rapidly after a disaster.
		E-7	Data Management	Digital record storage status; sex and disability disaggregated data collection; student safety perceptions; inclusive participation in DRR planning.	Ensures the institutional sustainability and reliability of the education information system. The transition to digital records and disaggregated data enables more sophisticated planning for marginalised and vulnerable student groups.

SN	Category	ID	Category Used	What This Category Covers	Why This Category Is Important
5	**Governance**	**G-1**	Basic Information	Office nomenclature and unique identification codes; administrative levels (Local/Provincial/Federal); geodetic coordinates (latitude, longitude, elevation); establishment year; official contact details including digital profiles (websites/URLs); physical landmark descriptions.	Establishes the formal spatial identity of the administrative infrastructure. Accurate geolocation of government offices is the prerequisite for the "Citizen Charter" mapping, allowing residents to find the nearest ward office or judicial service point.
		G-2	Institutional Service	Working schedules and daily service recipient loads; land and building ownership types; parent authority coordination; judicial and digital service availability; emergency contingency budget allocations; records management status (digitisation and safe storage).	Ensures the operational transparency of public institutions. Tracking the availability of digital and judicial services at the ward level identifies administrative gaps and facilitates the transition toward "E-Governance."
		G-3	Workforce	Total staff counts (gender and disability disaggregated); designated Information Officers, IT Officers, and DRR Focal Persons; staff training logs for GESI-responsive service delivery and emergency response.	Monitors the institutional capacity and inclusion of the municipal workforce. Assigning and geolocating DRR and IT focal persons ensures that there is a clear chain of command during both technical upgrades and disaster events.
		G-4	Infrastructure	Building inventory and construction chronology; structural typology and earthquake-resistance status; fire safety and emergency exit functionality; year-round motorable access; disability-inclusive physical access (ramps and low-height counters).	Evaluates the safety and inclusivity of the physical workspace. Identifying non-compliant or inaccessible offices is vital for meeting the national "Universal Design" standards and ensuring that government services are accessible to all citizens, regardless of mobility.
		G-5	Operation and Maintenance	Reliability of grid and backup power systems; year-round water supply and public drinking water availability; gender-segregated and disability-accessible toilets; ICT infrastructure (internet connectivity/speed); essential office and emergency response equipment (megaphones/radios); vehicle fleet availability.	Ensures that the "Digital Backbone" of the municipality remains functional. Reliable backup power and internet connectivity are critical for ward offices to maintain connection with the central municipal server during service disruptions.
		G-6	Disaster Management	Business Continuity Plans (BCP); emergency standard operating procedures (SOPs); alternative service delivery arrangements; evacuation drill history; Early Warning System (EWS) reception; historical hazard impact logs and service disruption durations.	Secures government continuity during and after climate-induced hazards. Having alternative service arrangements and a tested BCP ensures that critical statutory services are not halted by floods, fires, or extreme heat events.
		G-7	Data Management	Data stewardship assignments; metadata and last update timestamps; update frequency mandates; sex-disaggregated service user data; community feedback mechanisms.	Institutionalises data accountability and evidence-based governance. Tracking disaggregated service user data allows the municipality to monitor who is accessing services and identify marginalised groups who may be facing barriers.
6	**DRRM**	**D-1**	Basic Information	Administrative jurisdiction; spatial coverage polygons; georeferenced EOC and stockpile locations (latitude, longitude, elevation); emergency contact directories; focal person mobile and digital contact details.	Establishes the command-and-control geography of the municipality. Precise location data for EOCs and focal persons is the prerequisite for rapid communication and spatial coordination during the onset of a disaster.
		D-2	Risk Assessment	Hazard identification profiles; historical disaster loss databases; settlement-level exposure logs; critical facility vulnerability audits; identification of at-risk population groups.	Provides the empirical evidence required for risk-informed planning. Mapping historical impacts against exposed settlements allows the municipality to predict future losses and prioritise structural mitigation in high-risk zones.
		D-3	Governance & Planning	Legislative status of municipal and ward-level DRM plans; land-use control policies; committee structures and meeting minutes; community-based DRM group rosters; project portfolios for DRR interventions.	Secures the institutional and legal framework for disaster management. Formalised plans and active committees ensure that disaster response is a coordinated administrative function rather than an ad-hoc reaction.
		D-4	Stockpile & Facilities	Physical warehouse and EOC profiles; structural typology and seismic safety assessments; flood-safe location verification; utility backups; truck and helicopter landing accessibility.	Ensures the survival and functionality of relief infrastructure. Identifying "Safe Hubs" for stockpiling prevents the loss of relief materials during floods and ensures that logistical channels remain open for heavy vehicle access.
		D-5	Inventory Assets	Shelter and NFI (Non-Food Item) relief quantities; food and water security stocks; WASH emergency supplies (sanitary and hygiene kits); medical first aid and trauma kits; rescue equipment and heavy machinery; stock update timestamps.	Facilitates real-time logistics and supply chain management. Maintaining a live inventory of relief materials allows the municipality to identify resource gaps and coordinate with provincial or federal authorities for rapid replenishment.
		D-6	Response & Recovery Operations	Emergency vehicle fleet counts (ambulances, rescue boats, fire trucks); humanitarian open space capacities and amenities; human resource rosters (SAR, medical, volunteers); SOP triggers and drill records; recovery and rehabilitation logs.	Manages the operational tempo of disaster response and recovery. Centralising information on rescue vehicles and trained personnel ensures that the right assets are deployed to the right location within the "Golden Hour" of an emergency.
		D-7	Data Management	Departmental data stewardship assignments; metadata and last update timestamps; update frequency mandates; inter-agency data sharing protocols.	Institutionalises the reliability and transparency of disaster data. Clear sharing protocols ensure that the EOC has immediate access to the latest data from the health, engineering, and social welfare sections during a crisis.

Household Infrastructure Dataset and Attribute Structure

Hierarchy	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
1. Basic Information	Identity	B-00	Respondent willingness to participate	consent_status	Boolean	Survey Team	Interview
		B-01	House number	house_number	Text	Census/Admin	Survey
		B-02	Name of head of household	head_name	Text	Census/Admin	Survey
		B-03	Sex of household head	head_sex	Categorical	Census/Admin	Survey
		B-04	Leadership of household (Male/Female/Joint)	head_leadership	Categorical	Census/Admin	Survey
		B-05	Ethnicity of household head	head_ethnicity	Categorical	Census/Admin	Survey
		B-06	Religion	religion	Categorical	Census/Admin	Survey
	Location	B-07	Name of the place (Tole/Basti)	settlement_name	Text	Census/Admin	Survey
		B-08	Ward number	ward_number	Integer	Census/Admin	Survey
		B-09	GPS location (Latitude, Longitude, Alt)	gps_location	Geopoint	GIS Unit	GPS Device
	Residency	B-10	Length of stay in the project area	stay_duration_years	Integer	Census/Admin	Survey
	Contact	B-11	Name of responder	responder_name	Text	Survey Team	Interview
		B-12	Age of responder	responder_age	Integer	Survey Team	Interview
		B-13	Sex of responder	responder_sex	Categorical	Survey Team	Interview
		B-14	Contact number of responder	responder_contact	Text	Survey Team	Interview
		B-15	Available mobile number (Secondary)	secondary_contact	Text	Survey Team	Interview
		B-16	Use of Indian SIM card	indian_sim_usage	Boolean	Survey Team	Interview
		B-17	Indian mobile number (if used)	indian_contact	Text	Survey Team	Interview
		B-18	Preferred language for information	preferred_language	Categorical	Survey Team	Survey
2. Demographics	Family Size	D-01	Total number of family members	family_size_total	Integer	Survey Team	Survey
		D-02	Number of members currently present	family_present_count	Integer	Survey Team	Survey
	Vulnerability	D-03	Number of members with disability	disability_count	Integer	Survey Team	Survey
		D-04	Members with disability card	disability_card_holders	Integer	Survey Team	Survey
		D-05	Number of members with chronic illness	chronic_illness_count	Integer	Survey Team	Survey
		D-06	Number of pregnant/lactating women	pregnant_lactating_count	Integer	Survey Team	Survey
	Social Security	D-07	Beneficiaries of social security allowance	social_security_status	Boolean	Survey Team	Survey
		D-08	Type of social security allowance received	social_security_type	Multi-select	Survey Team	Survey
		D-09	Social Security Card Number	social_security_id	Text	Survey Team	Survey
	Citizenship	D-10	Number of members without citizenship	no_citizenship_count	Integer	Survey Team	Survey
		D-11	Reason for not having citizenship	citizenship_issue_reason	Text	Survey Team	Survey
	Education	D-12	Highest education level in family	max_education_level	Categorical	Survey Team	Survey
	Nutrition	D-13	Consumption of grains (days/week)	nut_grains_freq	Integer (0-7)	Survey Team	Survey
		D-14	Consumption of pulses/dal (days/week)	nut_pulses_freq	Integer (0-7)	Survey Team	Survey
		D-15	Consumption of vegetables (days/week)	nut_veg_freq	Integer (0-7)	Survey Team	Survey
		D-16	Consumption of Vitamin A fruits (days/week)	nut_fruit_vitA_freq	Integer (0-7)	Survey Team	Survey
		D-17	Consumption of meat/fish/eggs (days/week)	nut_protein_freq	Integer (0-7)	Survey Team	Survey
		D-18	Consumption of dairy products (days/week)	nut_dairy_freq	Integer (0-7)	Survey Team	Survey
		D-19	Consumption of sugar/honey (days/week)	nut_sugar_freq	Integer (0-7)	Survey Team	Survey
		D-20	Consumption of oil/fats (days/week)	nut_oil_freq	Integer (0-7)	Survey Team	Survey
		D-21	Consumption of spices (days/week)	nut_spices_freq	Integer (0-7)	Survey Team	Survey
3. Socio-Economic Status	Livelihood	SE-01	Main source of income	income_source	Categorical	Survey Team	Survey
		SE-02	Monthly income range	income_range	Categorical	Survey Team	Survey
		SE-03	Monthly saving range	saving_range	Categorical	Survey Team	Survey
	Financial	SE-04	Bank account status	bank_account_status	Boolean	Survey Team	Survey
		SE-05	Life insurance status	life_insurance_status	Boolean	Survey Team	Survey
		SE-06	Member of saving group	saving_group_member	Boolean	Survey Team	Survey
		SE-07	Received financial help (last 1 year)	financial_aid_received	Boolean	Survey Team	Survey
	Housing	SE-08	Current residence status (Own/Rent)	housing_tenure	Categorical	Survey Team	Survey
		SE-09	Rental contract available	rental_contract	Boolean	Survey Team	Survey
		SE-10	Monthly rent amount	rent_amount	Integer	Survey Team	Survey
	Land	SE-11	Land ownership status	land_ownership_type	Categorical	Survey Team	Survey
		SE-12	Registered land area	land_area_reg	Decimal	Survey Team	Survey
		SE-13	Land location (Inside/Outside Municipality)	land_location	Categorical	Survey Team	Survey
		SE-14	Land area outside municipality	land_area_outside	Decimal	Survey Team	Survey
	Agriculture	SE-15	Dependency on agriculture	agriculture_dependency	Boolean	Survey Team	Survey
		SE-16	Number of crop types cultivated	crop_count	Integer	Survey Team	Survey
		SE-17	Food sufficiency duration (months)	food_sufficiency_months	Categorical	Survey Team	Survey
		SE-18	Irrigation provision available	irrigation_avail	Boolean	Survey Team	Survey
		SE-19	Access to seeds/crops	seed_access	Boolean	Survey Team	Survey
		SE-20	Access to agricultural market	agri_market_access	Boolean	Survey Team	Survey
		SE-21	Crop insurance status	crop_insurance	Boolean	Survey Team	Survey
		SE-22	Crop sowing months (Last 5 years)	crop_sowing_5yr	Multi-select	Survey Team	Survey
		SE-23	Crop harvesting months (Last 5 years)	crop_harvest_5yr	Multi-select	Survey Team	Survey
	Livestock	SE-24	Livestock ownership	livestock_status	Boolean	Survey Team	Survey
		SE-25	Types of livestock owned	livestock_types	Multi-select	Survey Team	Survey
		SE-26	Number of Cows	count_cow	Integer	Survey Team	Survey
		SE-27	Number of Buffaloes	count_buffalo	Integer	Survey Team	Survey
		SE-28	Number of Goats/Sheep	count_goat_sheep	Integer	Survey Team	Survey
		SE-29	Number of Pigs/Boars	count_pig	Integer	Survey Team	Survey
		SE-30	Number of Poultry (Chicken/Duck)	count_poultry	Integer	Survey Team	Survey
		SE-31	Commercial purpose farming	livestock_commercial	Boolean	Survey Team	Survey
		SE-32	Livestock Insurance	livestock_insurance	Boolean	Survey Team	Survey
	Assets	SE-33	Vehicle ownership	vehicle_ownership	Boolean	Survey Team	Survey
		SE-34	Types of vehicles owned	vehicle_types	Multi-select	Survey Team	Survey
		SE-35	Number of Motorcycles	count_motorcycle	Integer	Survey Team	Survey
		SE-36	Number of Bicycles	count_bicycle	Integer	Survey Team	Survey

Hierarchy	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
		SE-37	Household Utilities (Fridge/TV/etc.)	household_assets	Multi-select	Survey Team	Survey
4. Housing & Infrastructure	Building	I-01	Year of construction	construction_year	Year	Survey Team	Survey
		I-02	Number of storeys	storey_count	Integer	Survey Team	Survey
		I-03	Building typology (Structure type)	building_typology	Categorical	Survey Team	Survey
		I-04	Roof material type	roof_type	Categorical	Survey Team	Survey
		I-05	Wall material type	wall_type	Categorical	Survey Team	Survey
		I-06	Floor material type	floor_type	Categorical	Survey Team	Survey
		I-07	Foundation soil type	foundation_type	Categorical	Survey Team	Survey
		I-08	Supervision during construction	supervision_status	Categorical	Survey Team	Survey
	Dimensions	I-09	Building length (feet)	bldg_length_ft	Decimal	Survey Team	Survey
		I-10	Building breadth (feet)	bldg_breadth_ft	Decimal	Survey Team	Survey
		I-11	Building height (feet)	bldg_height_ft	Decimal	Survey Team	Survey
		I-12	Building shape	bldg_shape	Categorical	Survey Team	Survey
	Compliance	I-13	Building map passed	map_pass_status	Boolean	Survey Team	Survey
		I-14	Completion certificate received	completion_cert_status	Boolean	Survey Team	Survey
		I-15	Compliance with NBC (Code)	nbc_compliance	Boolean	Survey Team	Survey
		I-16	House insurance status	house_insurance	Boolean	Survey Team	Survey
	Media	I-17	Photograph of house (Front)	photo_front	Image	Survey Team	Survey
		I-18	Photograph of house (Side/Angle)	photo_side	Image	Survey Team	Survey
	WASH	I-19	Main source of drinking water	water_source	Multi-select	Survey Team	Survey
		I-20	Dependency on tap water	tap_dependency	Categorical	Survey Team	Survey
		I-21	Drinking water disruption during hazard	water_disruption_hazard	Boolean	Survey Team	Survey
		I-22	Toilet availability	toilet_available	Boolean	Survey Team	Survey
		I-23	Toilet type	toilet_type	Categorical	Survey Team	Survey
		I-24	Waste collection service provision	waste_collection_prov	Boolean	Survey Team	Survey
		I-25	Visible wastewater flowing nearby	wastewater_visible	Boolean	Survey Team	Survey
	Health	I-26	History of health conditions in family	health_history	Boolean	Survey Team	Survey
		I-27	Evidence of vectors (flies/rats) on waste	waste_vectors	Boolean	Survey Team	Survey
	Energy	I-28	Access to electricity	electricity_access	Boolean	Survey Team	Survey
		I-29	Main cooking fuel	cooking_fuel	Multi-select	Survey Team	Survey
	Access	I-30	Road type (Main road to house)	access_road_type	Categorical	Survey Team	Survey
		I-31	Road width in front of house	road_width	Categorical	Survey Team	Survey
		I-32	Time to nearest school	time_to_school	Categorical	Survey Team	Survey
		I-33	Time to nearest market	time_to_market	Categorical	Survey Team	Survey
		I-34	Time to nearest health post	time_to_healthpost	Categorical	Survey Team	Survey
		I-35	Time to nearest open space	time_to_openspace	Categorical	Survey Team	Survey
5. Disaster Management	Hazard Profile	DM-01	Hazards observed by household	hazards_observed	Multi-select	Survey Team	Survey
		DM-02	Flood hazard months (Last 5 years)	flood_months_5yr	Multi-select	Survey Team	Survey
		DM-03	Flood hazard months (30 years ago)	flood_months_30yr	Multi-select	Survey Team	Survey
		DM-04	Fire hazard months (Last 5 years)	fire_months_5yr	Multi-select	Survey Team	Survey
		DM-05	Cold wave hazard months (Last 5 years)	coldwave_months_5yr	Multi-select	Survey Team	Survey
		DM-06	Drought hazard months (Last 5 years)	drought_months_5yr	Multi-select	Survey Team	Survey
		DM-07	Animal attack hazard months (Last 5 years)	animal_months_5yr	Multi-select	Survey Team	Survey
	Exposure	DM-08	Distance to river	river_distance	Categorical	Survey Team	Survey
		DM-09	House adjacent to highway	highway_adjacency	Boolean	Survey Team	Survey
		DM-10	Leaking transformer nearby	transformer_risk	Boolean	Survey Team	Survey
		DM-11	Industrial site/pollution source nearby	industrial_risk	Boolean	Survey Team	Survey
	History (Flood)	DM-12	Has house ever been inundated?	inundation_history	Boolean	Survey Team	Survey
		DM-13	Number of flood occurrences	flood_count	Integer	Survey Team	Survey
		DM-14	Year of most recent flood	last_flood_year	Year	Survey Team	Survey
		DM-15	Inundation level (cm)	inundation_level_cm	Integer	Survey Team	Survey
		DM-16	Duration of inundation (Days)	inundation_days	Integer	Survey Team	Survey
	Impacts	DM-17	Parts of house damaged	damaged_parts	Multi-select	Survey Team	Survey
		DM-18	Estimated repair cost	repair_cost	Integer	Survey Team	Survey
		DM-19	Agriculture loss (Quintals)	agri_loss_qty	Integer	Survey Team	Survey
		DM-20	Livestock loss (Count)	livestock_loss_count	Integer	Survey Team	Survey
		DM-21	Human casualty (Death/Injury)	human_casualty	Boolean	Survey Team	Survey
		DM-22	Total economic loss (Rupees)	total_loss_nrs	Integer	Survey Team	Survey
	Psychosocial	DM-23	Evacuation frequency in past	evacuation_count	Integer	Survey Team	Survey
		DM-24	Psychosocial issues faced	psychosocial_issues	Boolean	Survey Team	Survey
		DM-25	Best perceived time to evacuate	perception_evac_time	Categorical	Survey Team	Survey
	Coldwave	DM-26	Heater/AC available	heating_avail	Boolean	Survey Team	Survey
		DM-27	Distance to collect firewood	firewood_dist	Categorical	Survey Team	Survey
		DM-28	Govt help received during winter	winter_relief	Boolean	Survey Team	Survey
6. Preparedness & Capacity	Training	PREP-01	Members trained in SAR	sar_trained_count	Integer	Survey Team	Survey
		PREP-02	Members trained in First Aid	first_aid_trained_count	Integer	Survey Team	Survey
	Planning	PREP-03	Emergency kit (Go-Bag) available	go_bag_avail	Boolean	Survey Team	Survey
		PREP-04	Knowledge of evacuation route	evac_route_known	Boolean	Survey Team	Survey
		PREP-05	Distance to safe shelter	shelter_distance	Categorical	Survey Team	Survey
	EWS	PREP-06	Access to weather forecast	weather_forecast_access	Boolean	Survey Team	Survey
		PREP-07	Timely receipt of flood info	flood_alert_timely	Boolean	Survey Team	Survey
		PREP-08	Knowledge of EWS	ews_knowledge	Boolean	Survey Team	Survey
		PREP-09	Fire extinguisher nearby	fire_extinguisher_nearby	Boolean	Survey Team	Survey
	Communication	PREP-10	Mobile phone access	mobile_access	Boolean	Survey Team	Survey
		PREP-11	Internet access	internet_access	Boolean	Survey Team	Survey
		PREP-12	Willingness to receive alerts	alert_consent	Boolean	Survey Team	Survey

Hierarchy	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
7. Perception & Governance	Perception	GOV-01	Perception of temperature change	temp_change_perception	Categorical	Survey Team	Survey
		GOV-02	Perception of rainfall change	rainfall_change_perception	Categorical	Survey Team	Survey
		GOV-03	Perceived causes of flood	flood_causes_perceived	Multi-select	Survey Team	Survey
	Support	GOV-04	Support received from Municipality	muni_support_received	Boolean	Survey Team	Survey
		GOV-05	Expected support from government	govt_expectation	Categorical	Survey Team	Survey
		GOV-06	Preferred info sharing medium	info_medium_pref	Categorical	Survey Team	Survey
		GOV-07	Additional suggestions	suggestions	Text	Survey Team	Survey

Settlement Infrastructure Dataset and Attribute Structure

Hierarchy	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
1. Basic Information	Identity	B-01	Settlement name	settlement_name	Text	Municipality	Municipality Records
		B-02	Settlement unique code	settlement_id	Text	Municipality	Municipality Registry
		B-03	Settlement classification (Urban/Rural/Emerging)	settlement_type	Categorical	Municipality	Planning Documents
	Location	B-04	Province name	province_name	Text	Administrative	Admin Records
		B-05	District name	district_name	Text	Administrative	Admin Records
		B-06	Municipality name	municipality_name	Text	Administrative	Admin Records
		B-07	Ward number	ward_number	Integer	Administrative	Admin Records
		L-07	Historical or colonial settlement characteristics	is_historical	Boolean	Municipality	Heritage Inventory
	Geospatial	B-08	Settlement service coverage description	service_area_desc	Text	Municipality	Planning Documents
		B-09	Settlement boundary geometry	boundary_geom	Polygon	GIS Unit	GIS Database
		B-10	Settlement centroid coordinates	centroid_coords	Point	GIS Unit	GIS Database
2. Demographics	Population	D-01	Total population	pop_total	Integer	CBS	Census/Survey
		D-02	Population distribution status	pop_dist_status	Categorical	CBS	Census/Survey
		L-08	Residential density	pop_density	Decimal	GIS Analysis	GIS Calculation
	Age-Gender	D-03	Population by age and gender group	pop_age_gender_table	Table/JSON	CBS	Census Data
	Cultural	D-04	Population by mother tongue	pop_mother_tongue	Table/JSON	CBS	Census Data
		D-05	Population by religion	pop_religion	Table/JSON	CBS	Census Data
		D-06	Population by caste or ethnicity	pop_ethnicity	Table/JSON	CBS	Census Data
	Socio-Econ	D-07	Population by main occupation	pop_occupation	Table/JSON	CBS	Census Data
	Labor Force	D-08	Economically active population	pop_active_labor	Integer	CBS	Census Data
	Vulnerability	D-09	Population with disabilities	pop_disability	Integer	CBS / Survey	Census/Survey
	Beneficiaries	D-10	Beneficiaries of social security programs	social_security_count	Integer	Municipality	Social Security Log
	Households	D-11	Total households	hh_total	Integer	CBS	Census Data
		D-12	Household head attributes	hh_head_stats	Table/JSON	CBS / Survey	Census/Survey
	Migration	D-13	Migration status of population	migration_status	Categorical	CBS	Census Data
	Vital Events	D-14	Recorded births, deaths, marriages	vital_events_stats	Table/JSON	Vital Registry	Vital Registration
	Institutional	D-15	Population in institutions	pop_institutional	Integer	Municipality	Institutional Records
3. Land & Housing	Land Use	L-01	Land use composition statistics	land_use_stats	Table/JSON	GIS / Survey	Land Use Map
	Housing Stock	L-02	Total housing units	housing_units_total	Integer	Survey	Building Census
		L-03	Housing type distribution	housing_type_dist	Categorical	Survey	Building Census
		L-04	Presence of apartments or multi-storey housing	apartments_present	Boolean	Survey	Field Observation
	Tenure	L-05	Owner-occupied housing proportion	housing_owner_pct	Percentage	Survey	Household Survey
		L-06	Rental housing proportion	housing_rental_pct	Percentage	Survey	Household Survey
4. Community Services	Education	S-01	Number of schools	school_count	Integer	Education Section	School Registry
		S-02	Schools by type	school_type_dist	Table/JSON	Education Section	School Registry
			Average travel time to School	school_travel_time	Decimal (min)	Survey	Access Survey
	Health	S-03	Number of health facilities	health_facility_count	Integer	Health Section	Facility Registry
		S-04	Average travel time to health facilities	health_travel_time	Decimal (min)	Survey	Access Survey
	Markets	I-06	Market facilities present	market_present	Boolean	Municipality	Business Registry
	WASH	S-05	Households served by piped water service	water_coverage_pct	Percentage	Water Unit	Utility Records
		S-06	Households covered by sanitation services	sanitation_coverage_pct	Percentage	Municipality	Utility Records
		S-07	Municipal solid waste collection service available	waste_collection_avail	Boolean	Municipality	Service Map
5. Infrastructure	Electricity	I-01	Primary electricity source	elec_source_primary	Categorical	Utility	Utility Records
		I-02	Electricity substation present	substation_present	Boolean	Utility	Grid Map
	Water Supply	I-03	Water supply infrastructure type	water_infra_type	Categorical	Water Unit	Infrastructure Map
	Transport	I-04	Road connectivity type	road_connectivity	Categorical	Municipality	Road Network Map
		I-05	Year-round motorable access	road_access_yearround	Boolean	Survey	Field Verification
6. Disaster Management	Planning	E-01	Designated open spaces for evacuation	evac_open_space	Boolean	DRM Unit	DRM Plan
		E-06	Agencies currently operating for disaster response	response_agencies	Table/List	DRM Unit	Coordination Log
		E-07	Ongoing disaster risk reduction projects	drr_projects_ongoing	Table/List	Municipality	Project Portfolio
	Preparedness	E-02	Community disaster management committees present	cdmc_present	Boolean	DRM Unit	Committee Records
		E-03	Disaster preparedness trainings conducted	drr_training_conducted	Boolean	DRM Unit	Training Logs
		E-04	Community response teams available	response_team_avail	Boolean	DRM Unit	Team Roster
		E-05	Emergency stockpiles available	emergency_stockpile	Boolean	DRM Unit	Inventory
	Hazard Profile	HAZ_1	Primary hazards affecting the settlement	hazard_types	Multi-select	DRM Unit	Hazard Map
		HAZ_2	Frequency of major hazard impacts in last 10 years	hazard_freq_10yr	Categorical	DRM Unit	History Log
		HAZ_3	Date of most recent major hazard event	last_hazard_date	Date	DRM Unit	Incident Log
		HAZ_4	Households damaged/destroyed in last major event	hazard_hh_damage	Integer	DRM Unit	Assessment Report
		HAZ_5	Population displaced/evacuated in last major event	hazard_displacement	Integer	DRM Unit	Incident Report
		HAZ_6	Livelihoods (crops/livestock/business) severely affected	hazard_livelihood_loss	Boolean	DRM Unit	Assessment Report
		HAZ_7	Access roads blocked during last major event	access_blocked_event	Boolean	Municipality	Field Report
		HAZ_8	Duration of disruption to essential services (water/power	service_disruption_days	Integer (days)	Utility	Service Log
	Early Warning	EWS_1	Settlement covered by functional Early Warning System	ews_coverage	Boolean	DRM Unit	EWS Map
		EWS_2	Type of EWS alerts received (Siren/SMS/Community)	ews_alert_type	Multi-select	DRM Unit	Inventory
		EWS_3	Community knows evacuation routes	community_evac_aware	Boolean	DRM Unit	Survey/Drill
7. Data Management	Stewardship	M-01	Responsible department for dataset	data_steward_dept	Text	Municipality	Data Policy
	Update	M-02	Date of last data update	last_update_date	Date	Municipality	Metadata Log
		M-03	Planned data update frequency	update_frequency	Categorical	Municipality	Data Policy
	Sharing	M-04	Data sharing and access protocol	data_access_protocol	Text	Municipality	Data Policy

Health Infrastructure Dataset and Attribute Structure

Category	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
1. Basic Information	Identity	A1	Health facility official name	facility_name	Text	Administration	Registration Records
		A1b	Health facility unique ID	facility_uid	Text	Administration	HMIS Registry
		A1c	Health facility registration/license number	license_number	Text	Administration	Licensing Records
	Location	A2a	Municipality name	municipality_name	Text	Administration	Admin Boundary Records
		A2b	Ward number	ward_number	Integer	Administration	Admin Boundary Records
		A2c	Tole/settlement name	tole_name	Text	Administration	Field Verification
		A2d	Landmark description	landmark_desc	Text	Administration	Field Observation
	Geo-Coordinates	A3a	Latitude	latitude	Decimal	IT-GIS	GPS Survey
		A3b	Longitude	longitude	Decimal	IT-GIS	GPS Survey
			Elevation/Altitude	elevation	Decimal	IT-GIS	GPS Survey
		A3c	Coordinate capture method	coord_capture_method	Categorical	IT-GIS	GIS Notes
	Profile	A4	Establishment year	est_year_bs	Integer (BS)	Administration	Facility Records
	Operating Hours	A5b	Facility opening time	facility_open_time	Time	Administration	Admin Records
		A5c	Facility closing time	facility_close_time	Time	Administration	Admin Records
		A5d	Days of operation	operating_days	Multi-select	Administration	Admin Records
	Contact	A6	Primary telephone number	phone_primary	Text	Administration	Admin Records
		A7	Primary email address	email_primary	Text	Administration	Admin Records
	Access	A8	Primary patient access mode	access_mode	Categorical	Administration	Interview/Observation
		A9	Road access available year-round	road_access_yearround	Boolean	Administration	Field Verification
		A10	Distance to nearest motorable road	dist_motorable_road_km	Decimal (km)	Engineering	GIS/Field Verification
		A10b	Typical travel time from nearest motorable road	travel_time_road_min	Integer (min)	Administration	Interview
	Ownership	A11a	Facility ownership type	ownership_type	Categorical	Administration	Legal Docs
		A11b	Land ownership type	land_ownership	Categorical	Administration	Land Records
		A11c	Managing organization / authority	managing_authority	Text	Administration	Admin Records
2. Institutional Service	Registration and Facility Details	A13	Health facility level/type	facility_type	Categorical	Health Office	MoHP Registry
		A14	Estimated catchment population	pop_catchment_est	Integer	Planning	Census/Municipality
		A15	Estimated population served	pop_served_actual	Integer	HMIS	HMIS Data
		A16	Facility currently licensed/registered	is_licensed	Boolean	Administration	License Certificate
		A17	Licensing authority name	licensing_authority	Text	Administration	License Certificate
		A18	License issue date	license_issue_date	Date	Administration	License Certificate
		A19	License expiry/renewal due date	license_expiry_date	Date	Administration	License Certificate
		A20	Last regulatory inspection date	last_inspection_date	Date	Administration	Inspection Reports
		A21	Last quality/standards audit date	last_audit_date	Date	Quality Focal	Audit Records
		A22	Accredited under national quality scheme	is_accredited	Boolean	Quality Focal	Accreditation Cert
		A23	Facility management committee exists	hfomc_exists	Boolean	Administration	Meeting Minutes
		A24	IPC committee exists (nfection Prevention and Control committee)	ipc_committee_exists	Boolean	IPC Focal	Committee Minutes
	Referral	A25	Primary referral facility name	referral_facility_name	Text	Administration	Referral Protocols
		A26	Primary referral facility level/type	referral_facility_type	Categorical	Administration	Referral Protocols
		A27	Distance to primary referral facility	referral_dist_km	Decimal (km)	Administration	GIS/Road Network
		A28	Typical travel time to referral facility	referral_time_min	Integer (min)	Administration	Ambulance Log
		A29	Typical travel time to referral facility during disasters	referral_time_disaster	Integer (min)	Administration	Staff Interview
		A30	Emergency referral/transfer agreement or MOU exists	referral_mou_exists	Boolean	Administration	Documentation
		A31	Cross-border referral commonly used	cross_border_referral	Boolean	Administration	Interview
		A32	Nearest cross-border referral point	cross_border_point	Text	Administration	System Mapping
	Type of Services		General/ OPD/ Emmergency/ ICU (time, dayss, Services, No of Bed, No Of HR Categoriies .....)				
	OPD	B1	OPD services available	opd_available	Boolean	OPD	Service Register
		B2a	OPD operates 24 hours	opd_24hr	Boolean	OPD	Admin Records
		B2b	OPD opening time	opd_open_time	Time	OPD	Admin Records
		B2c	OPD closing time	opd_close_time	Time	OPD	Admin Records
		B2d	OPD days of operation	opd_days	Multi-select	OPD	Admin Records
		B3	OPD service types available	opd_service_types	Multi-select	OPD	Service Directory
	Inpatient	B4	Total general ward bed capacity	beds_general_total	Integer	Nursing	Inventory
		B5	Functional general ward beds	beds_general_functional	Integer	Nursing	Inventory
	Emergency	B6	Emergency unit/ward available	emergency_unit_available	Boolean	Emergency	Service Directory
		B7	Emergency unit bed capacity	emergency_beds	Integer	Emergency	Unit Records
	Isolation	B8a	Isolation room available	isolation_room_avail	Boolean	IPC	IPC Records
		B8b	Quarantine room available	quarantine_room_avail	Boolean	IPC	IPC Records
		B9	Isolation/quarantine bed capacity	isolation_beds	Integer	IPC	Ward Inventory
	Critical Care	B10	ICU/HDU available	icu_hdu_available	Boolean	ICU	Service Directory
		B11	ICU/HDU bed capacity	icu_hdu_beds	Integer	ICU	ICU Inventory
	Maternal/Child	B12a	Maternity unit available	maternity_unit_avail	Boolean	Maternity	Service Directory
		B13	Maternity/maternal unit bed capacity	maternity_beds	Integer	Maternity	Ward Records
		B12b	Child health unit available	child_unit_avail	Boolean	Pediatrics	Service Directory
		B14	Child health unit bed capacity	child_beds	Integer	Pediatrics	Ward Records
	Support Services	B15	Laboratory services available	lab_available	Boolean	Laboratory	Service Directory
		B16	Laboratory test types available	lab_test_types	Multi-select	Laboratory	Lab Register
		B17	Laboratory operates 24 hours	lab_24hr	Boolean	Laboratory	Admin Records
		B18a	Laboratory opening time	lab_open_time	Time	Laboratory	Admin Records
		B18b	Laboratory closing time	lab_close_time	Time	Laboratory	Admin Records
		B19	Laboratory functional during emergencies	lab_emergency_functional	Boolean	Laboratory	After-action Reports
		B20	Pharmacy/dispensing unit available	pharmacy_available	Boolean	Pharmacy	Service Directory
		B21	Essential emergency medicines available 24/7	emergency_meds_24_7	Boolean	Pharmacy	Stock Policy
	Transport	B23	Ambulance service available	ambulance_available	Boolean	Transport	Transport Records
		B24	Number of ambulances	ambulance_count	Integer	Transport	Transport Records
		B25	Ambulance operates 24 hours	ambulance_24hr	Boolean	Transport	Duty Roster
		B26	Ambulance equipped for emergency transport	ambulance_equipped	Boolean	Transport	Equipment Checklist
		B27	Ambulance service functional during disasters	ambulance_disaster_func	Boolean	Transport	After-action Reports
	Inclusivity	H9	Information materials available in local language	local_lang_materials	Boolean	Health Ed	Observation
		H14	GBV clinical services or referral pathway available	gbv_pathway_avail	Boolean	Social Service	Referral SOPs
	Counts	C1	Total staff count	staff_total	Integer	HR	Payroll/HR Records
		C2	Male staff count	staff_male	Integer	HR	HR Records
		C3	Female staff count	staff_female	Integer	HR	HR Records
		C4	Other gender staff count	staff_other_gender	Integer	HR	HR Records
	Employment status	C5	Permanent staff count	staff_permanent	Integer	HR	HR Records
		C6	Temporary/contract staff count	staff_contract	Integer	HR	HR Records
	Benefits	C7	Staff receiving Social Security Allowance / SSF	staff_ssf_count	Integer	HR	SSF Documentation
	Inclusion	C8	Staff with disability count	staff_disability_count	Integer	HR	HR Records
		H8	Female health worker available for women	female_provider_avail	Boolean	HR	HR Roster
	Composition	C9	Clinical/technical staff count	staff_clinical	Integer	HR	HR Records
		C10	Administrative/support staff count	staff_admin	Integer	HR	HR Records
	Categories/Staff Type	C11	Nurse count	nurse_count	Integer	Nursing	HR Records
		C12	Doctor/medical officer count	doctor_count	Integer	Medical Dir	HR Records
		C13	Midwife/SBA count	midwife_count	Integer	Maternity	HR Records
		C14	Laboratory technician count	lab_tech_count	Integer	Laboratory	HR Records

Category	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
3. Workforce		C15	Pharmacist/pharmacy assistant count	pharmacist_count	Integer	Pharmacy	HR Records
	Workload	C16	Average OPD patients per doctor per day	opd_patient_load	Decimal	OPD	OPD Register
		C17	Nurse-to-patient ratio (General Ward)	nurse_patient_ratio_gw	Decimal	Nursing	Ward Census
		C18	Nurse-to-patient ratio (Emergency)	nurse_patient_ratio_er	Decimal	Emergency	Unit Census
		C19	Nurse-to-patient ratio (ICU/HDU)	nurse_patient_ratio_icu	Decimal	ICU	Unit Census
	Adequacy	C20	Staffing sufficient to meet current demand	staffing_sufficient	Boolean	Administration	Mgmt Assessment
	Emergency HR	C21	Written emergency staffing plan/roster exists	emergency_staffing_plan	Boolean	HR/Disaster	Emergency Plan
		C22	Emergency staffing plan tested/functional	emergency_plan_tested	Boolean	HR/Disaster	Drill Report
		C23	Surge/backup staffing arrangements included	surge_staffing_exists	Boolean	HR/Disaster	Emergency Plan
	Training	C24	Any staff trained in DRR/emergency response	staff_drr_trained	Boolean	HR/Disaster	Training Records
		C25	Disaster/emergency training types received	drr_training_types	Multi-select	HR/Disaster	Training Records
		H15	Staff trained on respectful/non-discriminatory care	respectful_care_training	Boolean	HR	Training Records
	Triage	C26	Standardized triage system in use	triage_system_used	Boolean	Emergency	Observation/SOPs
		C27	Triage protocol prioritizes high-risk/vulnerable groups	triage_prioritizes_vuln	Boolean	Emergency	Triage SOPs
		C28a	Triage staff clearly designated	triage_staff_designated	Boolean	Emergency	Duty Roster
		C28b	Triage staff trained on triage protocol	triage_staff_trained	Boolean	Emergency	Training Records
4. Infrastructure (Building Specific)	Inventory	I1	Number of buildings on facility compound	building_count	Integer	Engineering	Site Plan
		I2_1	Building identifier/name	building_id	Text	Engineering	Building Register
		I2_2	Services provided in building	building_services	Multi-select	Administration	Service Directory
		I2_3	Number of rooms in building	room_count	Integer	Engineering	Building Plan
	Physical	A12	Total land area	land_area_sqm	Decimal (m²)	Engineering	Land Records
		I2_4	Building construction year	build_year_bs	Integer (BS)	Engineering	Records
		I2_5	Year of last major renovation/retrofit	retrofit_year_bs	Integer (BS)	Engineering	Records
		I2_6	Number of storeys/floors	storey_count	Integer	Engineering	Observation
		I2_7	Compliance with national building codes	code_compliance	Boolean	Engineering	Approval Records
		I2_8	Primary structural system type	structure_type	Categorical	Engineering	Observation
		I2_9	Primary roof material	roof_material	Categorical	Engineering	Observation
	Condition	I2_10	Any structural damage recorded from past disasters	past_damage_recorded	Boolean	Engineering	Assessment Reports
		I2_11	Visible moisture damage present	moisture_damage	Boolean	Engineering	Observation
	Accessibility	H4	Wheelchair ramp / accessible entry point	wheelchair_access	Boolean	Engineering	Observation
		J11	Corridors/doors wheelchair accessible	corridor_accessible	Boolean	Engineering	Audit
	Access	SC11	Helicopter landing area/helipad available nearby	helipad_avail	Boolean	Disaster Mgmt	Site Survey
	Site Context	I3	External risks within 500m	external_risks_500m	Multi-select	Engineering	GIS/Survey
		I4	Settlements/residential areas within 200m	settlements_nearby	Boolean	Engineering	GIS/Survey
	Safety	I5	Designated open space/assembly area available	assembly_area_avail	Boolean	Safety Focal	Site Plan
		I6	Time to reach nearest safe open space	safe_space_time_min	Integer (min)	Safety Focal	Field Estimation
			Emergency Evacuation plan				
		I2_12	Emergency exit signage visible and functional	exit_signs_visible	Boolean	Safety Focal	Safety Audit
		D32	Emergency siren available on-site	siren_available	Boolean	Safety Focal	Observation
			Is this Building Solar Powered/ Connected to the Grid				
	Insurance	A15	building insured	building_insured	Boolean	SMC/Admin	Insurance Policy
5. Operation and Maintenance	Utilities: Power	J1	Grid electricity supply reliable	grid_power_reliable	Boolean	Engineering	Utility Bills/Log
		J2	Alternative/backup electricity source available	backup_power_avail	Boolean	Engineering	Inventory
		J3	Types of backup electricity sources	backup_power_types	Multi-select	Engineering	Inventory
		J4	Critical service areas connected to backup power	critical_power_connected	Boolean	Engineering	Electrical Plan
		J5	Backup power duration at typical load	backup_duration_hrs	Decimal (hrs)	Engineering	Specs/Test Logs
		J6	Backup power system location description	backup_loc_desc	Text	Engineering	Site Plan
		J7	Backup system protected from flood/heat/other risks	backup_protected	Boolean	Engineering	Safety Audit
		J49	Share of renewable energy used	renewable_energy_share	Decimal (%)	Engineering	Utility Bills
		J50	Energy efficiency measures implemented	energy_efficiency	Boolean	Engineering	Maintenance Records
	Utilities: Water	J12	Primary water source	water_source_primary	Multi-select	WASH	Inventory
		J13	Approximate daily water requirement	daily_water_req_l	Integer (L/day)	WASH	Assessment
		J14	Minimum water requirement for emergency operations calculated	emergency_water_calc	Boolean	WASH	Contingency Plan
		J15	Water available year-round from primary source	water_yearround	Boolean	WASH	Logs
		J16	Backup water supply system exists	backup_water_exists	Boolean	WASH	Inventory
		J17	Types of backup water sources	backup_water_types	Multi-select	WASH	Inventory
		J18	Total water storage capacity	water_storage_cap_l	Integer (L)	WASH	Tank Specs
		J38	Hand-washing stations available	handwash_avail	Boolean	WASH	Observation
		J39	Primary wastewater disposal method	wastewater_method	Categorical	WASH	Eng Records
		J40	Frequency of water quality testing	water_test_freq	Categorical	WASH	Test Logs
		J47	Frequency of safety testing for handwashing water	handwash_test_freq	Categorical	WASH	Logs
		J51	Water reuse/recycling system available	water_reuse_sys	Boolean	WASH	Records
		H5a	Separate toilets available for women/girls (Building Specific)	toilets_female	Boolean	WASH	Observation
		H5b	Separate toilets available for men/boys	toilets_male	Boolean	WASH	Observation
		H6	At least one disability-accessible toilet available	toilets_accessible	Boolean	WASH	Observation
	Utilities: HVAC	J24a	AC/Heating/Cooling system available	ac_hc_sys_avail	Boolean	Engineering	Inventory
		J24b	AC/Heating/Cooling system operational	ac_hc_sys_ops	Boolean	Engineering	Maint. Logs
		J24c	Cooling measures used during heatwaves	cooling_measures_used	Multi-select	Engineering	Interview
		J24d	Sufficiency and reliability of AC/Heating/Cooling	ac_hc_sys_adequacy	Categorical	Engineering	Assessment
		J28a	Rooms adequately ventilated	ventilation_adequate	Boolean	Engineering	Assessment
	Supply Chain	SC1	Primary medical supply source/supplier	supply_source_primary	Text	Procurement	Procurement Records
		SC2	Alternative supplier identified for emergencies	supply_source_alt	Boolean	Procurement	Emergency Plan
		SC3	Average resupply lead time for essential medicines	supply_lead_time	Integer (days)	Procurement	Stock Records
		SC5	Cold chain dependent on grid without backup	cold_chain_grid_dep	Boolean	EPI/Eng	Inventory
		SC6	Cold chain contingency plan exists	cold_chain_plan	Boolean	EPI	SOPs
		SC7	On-site fuel storage available	fuel_storage_avail	Boolean	Engineering	Inventory
		SC8	Fuel reserve quantity for generators/vehicles	fuel_reserve_qty	Integer (L)	Engineering	Fuel Logs
		SC9	Fuel reserve sufficient for emergency operations	fuel_reserve_days	Integer (days)	Engineering	Estimates
		SC10	Alternative patient transport arrangement for floods exists	alt_transport_flood	Boolean	Transport	Emergency Plan
		J26	Cold chain/refrigeration system for vaccines available	cold_chain_avail	Boolean	EPI/Pharmacy	Inventory
		J27	Backup power sufficient to maintain cold chain	cold_chain_backup	Boolean	EPI/Pharmacy	Test Logs
		J28c	Any building/room used for emergency stockpiling	stockpile_room_avail	Boolean	Store	Inventory
		J29	Essential medicines generally available	meds_availability	Categorical	Pharmacy	Assessment
		J30	Buffer stock maintained for emergencies	meds_buffer_kept	Boolean	Pharmacy	Records
		J31	Buffer stock level	meds_buffer_level	Decimal (%)	Pharmacy	Records
		J22a	Emergency medicine buffer stock maintained	buffer_stock_maintained	Boolean	Pharmacy	Store Records
		J22b	Emergency medicine buffer stock coverage	buffer_stock_days	Integer (days)	Pharmacy	Store Records
		J22c	Tracer essential medicines availability	tracer_meds_pct	Decimal (%)	Pharmacy	Stock Check/LMIS
		J22d	Date of last tracer medicines stock assessment	last_stock_check_date	Date	Pharmacy	Stock Report
		J34	Computerized inventory management system used	inv_mgmt_system	Boolean	Store/IT	System Records
	Environment/Waste	J42	Functional solid waste management system	waste_mgmt_func	Boolean	WASH	Assessment
		J43	Biomedical waste management method	biomed_waste_method	Categorical	WASH/IPC	Records
		J44	Functional IPC policy/committee with written procedures	ipc_policy_func	Boolean	IPC	Policy Docs
		J45	Written antibiotic stewardship policy exists	antibiotic_policy	Boolean	Pharmacy/Clinical	Documents
		J46	Designated isolation room physically separated	isolation_room_sep	Boolean	IPC	Layout/Assessment

Category	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
		J48	Hazardous waste risk assessment conducted	haz_waste_assess	Boolean	WASH/IPC	Reports
		J52	Environmental footprint monitored	env_footprint_monitor	Boolean	Administration	Reports
6. Disaster Management	Planning	D1	Written emergency preparedness/response plan exists	emergency_plan_exists	Boolean	Disaster Mgmt	Emergency Plan
		D2a	Date of last emergency plan update	plan_last_update	Date	Disaster Mgmt	Revision Log
		D2b	Emergency plan review frequency	plan_review_freq	Categorical	Disaster Mgmt	Emergency Plan
		D13	Staff roles and responsibilities in emergencies defined	roles_defined	Boolean	Disaster Mgmt	Emergency Plan
	Risk Assessment	D3	Health facility hazard risk assessment completed	risk_assessment_done	Boolean	Disaster Mgmt	Assessment Report
		D4	Hazards included in facility risk assessment	hazards_assessed	Multi-select	Disaster Mgmt	Assessment Report
	Communication	D5	Emergency communication plan exists	comm_plan_exists	Boolean	Disaster Mgmt	Emergency Plan
		D6	Backup communication available for power/network outage	backup_comm_avail	Boolean	IT/Disaster Mgmt	Inventory
		D7	Internal emergency messaging channels	internal_msg_channels	Multi-select	Administration	Staff Interview
	Preparedness	D8	Evacuation routes identified and marked	evac_routes_marked	Boolean	Safety Focal	Signage/Audit
		D9	Staff aware of evacuation routes	staff_evac_aware	Boolean	HR	Interview/Drill
		D10	Emergency supply cache exists	emergency_cache_exists	Boolean	Store/Logistics	Inventory
		D11	Emergency supplies checked/restocked frequency	cache_check_freq	Categorical	Store/Logistics	Logs
		D12	Staff trained in emergency/disaster response	staff_response_trained	Boolean	HR	Training Records
		D14	Number of full-scale disaster drills conducted per year	annual_drill_count	Integer	Disaster Mgmt	Drill Reports
		HAZ_D1	Specialized drill conducted (Flood, Heat, etc.)	drill_specialized_recent	Boolean	Disaster Mgmt	Drill Reports
	Response	D16	Time to activate emergency protocols after official alert	activation_time_min	Integer (min)	Disaster Mgmt	Drill Evaluation
	Security	D17a	Security personnel available on-site	security_onsite	Boolean	Administration	Staffing Roster
		D17b	Crowd management plan for mass-casualty events	crowd_mgmt_plan	Boolean	Administration	Emergency Plan
		D17c	Perimeter fencing/controlled entry points present	perimeter_fencing	Boolean	Security	Observation
		D17d	System for reporting security incidents	security_incident_sys	Boolean	Security	SOPs
	Early Warning	D18	Receives official early-warning alerts	ews_official_recv	Boolean	Disaster Mgmt	EWS Records
		D28	Channels used to share early-warning info to community	ews_community_channel	Multi-select	Administration	Interview
		D29a	Sensors installed nearby	sensors_nearby	Boolean	IT/Eng	Observation
		D29b	Sensor types installed nearby	sensor_types	Multi-select	IT/Eng	Observation
		D33	Early-warning messages accessible to vulnerable groups	ews_accessible	Boolean	GEDSI Focal	Community Feedback
		D34	Early-warning thresholds trigger predefined actions	ews_trigger_action	Boolean	Disaster Mgmt	SOPs
		D35	Preparedness topics covered when EWS triggers actions	ews_action_topics	Multi-select	Disaster Mgmt	SOPs
		D36a	EWS alerts and actions documented	ews_documented	Boolean	Disaster Mgmt	Logbook
		D36b	EWS actions reviewed periodically for improvement	ews_reviewed	Boolean	Disaster Mgmt	Meeting Minutes
	Climate Monitor	D37	Indoor temperature monitoring system available	indoor_temp_monitor	Boolean	Engineering	Inventory
		D39	Facility maintains archive of local climate/EWS records	climate_archive_kept	Boolean	Disaster Mgmt	Logbook
	Hazard Profile	HAZ_1	Located within officially identified hazard-prone area	hazard_prone_area	Boolean	Municipality	Hazard Maps
		HAZ_2	Primary hazards identified for this location	hazard_types	Multi-select	Disaster Mgmt	Assessment
		HAZ_3	Number of major hazard events in past 10 years	hazard_freq_10yr	Integer	Disaster Mgmt	Incident Records
		HAZ_4	Date of most recent major hazard event	last_hazard_date	Date	Disaster Mgmt	Incident Log
		HAZ_5	Types of impacts experienced during last major event	hazard_impact_types	Multi-select	Disaster Mgmt	AAR Report
		HAZ_6	Received early warning for most recent event	last_hazard_warned	Boolean	Disaster Mgmt	EWS Log
		HAZ_7	Days essential services disrupted in most recent event	service_disruption_days	Integer (days)	Administration	Service Logs
		HAZ_8	Physical access to facility blocked during event	access_blocked	Boolean	Administration	Interview
		HAZ_9	Duration access was blocked	access_blocked_days	Integer (days)	Administration	Interview
		HAZ_10	Change in patient load during event	patient_load_change	Categorical	HMIS	OPD Register
		HAZ_11	Health conditions increasing after event	health_impacts_observed	Multi-select	HMIS	HMIS Data
		HAZ_12	Temporary measures used to continue services	coping_measures	Multi-select	Administration	AAR Report
		HAZ_13	Groups with most difficulty accessing facility during event	vulnerable_groups_access	Multi-select	GEDSI Focal	Community Feedback
		HAZ_14	Operational challenges faced during event	operational_challenges	Text	Administration	Interview
		HAZ_15	Severity indicator of last event (e.g. depth, temp)	hazard_severity_value	Decimal	Engineering	Measurement
	Recovery	R1	Post-disaster damage and loss assessment conducted	pds_conducted	Boolean	Administration	Assessment Reports
		R2	Date of most recent post-disaster assessment	last_pds_date	Date	Administration	Assessment Reports
		R3	Service recovery plan exists	recovery_plan_exists	Boolean	Administration	Recovery Plan
		R4	Time to restore full essential services after last major event	recovery_time_days	Integer (days)	Administration	After-action Review
		R5	Lessons learned documented and reviewed after events/drills	lessons_learned_doc	Boolean	Disaster Mgmt	After-action Review
		R6	Structural/non-structural upgrades implemented after disasters	post_disaster_upgrades	Boolean	Engineering	Project Reports
		SC4	Supply chain disruption experienced in last major disaster	supply_disruption	Boolean	Procurement	After-action Review
		H10	Groups facing greatest access barriers during disasters	disaster_access_barriers	Multi-select	GEDSI Focal	Feedback
		H11	Main reasons vulnerable groups cannot access services	disaster_barrier_reasons	Multi-select	GEDSI Focal	Feedback
		H12	Measures in place to support PwD during emergencies	pwd_emergency_support	Boolean	GEDSI Focal	Emergency Plan
		H13	Protocols prioritize pregnant/lactating women/children	mch_priority_protocol	Boolean	Maternity	Emergency Plan
		H16	Inclusive community representatives involved in planning	community_participation	Boolean	Disaster Mgmt	Minutes
		H17	Priority change needed to improve inclusivity	inclusion_priority	Text	GEDSI Focal	Consultation
7. Data Management	Systems	A33	Routine health reporting system used	reporting_system_type	Categorical	HMIS	Facility Records
		A34	Electronic medical record system used	emr_used	Boolean	HMIS	Admin Records
	Governance	A35	Facility profile last updated date	profile_update_date	Date	HMIS	Data Log
		A36	Facility profile update frequency	profile_update_freq	Categorical	HMIS	Data Guidelines
		A37	Designated data focal person name/role	data_focal_person	Text	HMIS	HR Records
		A38	Data sharing protocol/SOP exists	data_sharing_sop	Boolean	HMIS	SOP Documents
		A39	Last data shared with municipality date	last_data_share_date	Date	HMIS	Receipt Log
		A40	Metadata completed for facility dataset	metadata_complete	Boolean	HMIS	HMIS Documentation

Education Infrastructure Dataset and Attribute Structure

Category	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
1. Basic Information	Identity	A1	Name of the school	school_name	Text	Administration	Registration Certificate
		A9	Type of school	school_type	Categorical	Administration	Registration
		A10	Facility level (Basic/Secondary)	school_level	Categorical	Administration	Registration
	Location	A2	Full address (Municipality, Ward, Settlement)	school_address	Text	Administration	Admin Records
	Geo-Coordinates	A3a	Latitude	latitude	Decimal	IT-GIS	GPS Survey
		A3b	Longitude	longitude	Decimal	IT-GIS	GPS Survey
		A3c	Coordinate capture method	coord_capture_method	Categorical	IT-GIS	GIS Notes
		A3d	Coordinate accuracy estimate	coord_accuracy_m	Decimal (m)	IT-GIS	GPS Metadata
	Profile	A4	Year of establishment (BS)	established_bs	Year	Administration	Admin Records
	Contact	A5	Phone number	school_phone	Text	Administration	Admin Records
		A6	Email address	school_email	Text	Administration	Admin Records
	Respondent	R1	Name of Respondent 1	respondent1_name	Text	Administration	Interview
		R2	Contact details of Respondent 1	respondent1_contact	Text	Administration	Interview
	Land & Ownership	A7	Total land area	land_area_total	Number	Admin/SMC	Land Deed
		A8	Ownership of school facility and land	ownership_type	Categorical	SMC/Admin	Legal Docs
	Access	A12	Main access road condition	access_road_condition	Categorical	Administration	Observation
		A13	Distance to nearest motorable road	dist_motorable_road	Number	Administration	Field Survey
		B21	Students regularly walking >30 minutes to school	students_walk_30min	Number	Administration	Estimate
2. Institutional Service	Operations	A11	Usual service hours	service_hours	Categorical	Administration	Routine Info
	Enrollment	B13	Total enrolled students	students_total	Number	Admin/EMIS	EMIS/Register
		B14	Male students	students_male	Number	Admin/EMIS	EMIS/Register
		B15	Female students	students_female	Number	Admin/EMIS	EMIS/Register
	Inclusion	B16	Number of students with disabilities (total)	students_disability_total	Number	Admin/EMIS	EMIS/Register
		B17	Male students with disabilities	students_disability_male	Number	Admin/EMIS	EMIS/Register
		B18	Female students with disabilities	students_disability_female	Number	Admin/EMIS	EMIS/Register
		B25	Dropout rate of students	dropout_rate	Number	Admin/EMIS	EMIS Data
	Health Services	B19	Number of students with chronic illness	students_chronic_illness	Number	Health Focal	Health Records
		B24	Availability of school nurse/health focal person	health_focal_available	Boolean	Administration	HR Records
	Communication	B26	School's main communication channels with parents	comm_channels	Multi-select	Comms Focal	Policy/Interview
	Insurance	A16	Students covered by medical insurance	student_med_insured	Categorical	Administration	Insurance Policy
3. Workforce	Teaching Staff	B1	Total number of teaching staff	teachers_total	Number	Admin/HR	HR Records
		B2	Male teaching staff	teachers_male	Number	Admin/HR	HR Records
		B3	Female teaching staff	teachers_female	Number	Admin/HR	HR Records
		B4	Other gender teaching staff	teachers_other	Number	Admin/HR	HR Records
	Non-Teaching	B5	Total number of non-teaching staff	nonteach_total	Number	Admin/HR	HR Records
		B6	Male non-teaching staff	nonteach_male	Number	Admin/HR	HR Records
		B7	Female non-teaching staff	nonteach_female	Number	Admin/HR	HR Records
		B8	Other gender non-teaching staff	nonteach_other	Number	Admin/HR	HR Records
	Inclusion	B9	Number of staff with disabilities	staff_disability_total	Number	Admin/HR	HR Records
		B10	Male staff with disabilities	staff_disability_male	Number	Admin/HR	HR Records
		B11	Female staff with disabilities	staff_disability_female	Number	Admin/HR	HR Records
		B12	Other gender staff with disabilities	staff_disability_other	Number	Admin/HR	HR Records
	Training	B22	Teachers receive training for disaster risks	teachers_disaster_training	Categorical	DRR Focal	Training Logs
		B23	Non-teaching staffs receive training for disaster risks	nonteach_training_topics	Multi-select	DRR Focal	Training Logs
		H5	Teachers trained in emergency preparedness	emergency_training_teachers	Categorical	DRR Focal	Training Log
		J15	Teachers trained on gender-sensitive behavior	inclusion_training	Categorical	GEDSI Focal	Training Logs
4. Infrastructure	Inventory	C1	Number of buildings	building_count	Number	Infra Focal	Site Plan
		C2	Name of building	building_name	Text	Infra Focal	Site Plan
	Construction	C3	Year of construction/establishment (BS)	building_year_bs	Year	Infra Focal	Records
		C6	Constructed by (agency/community/contractor)	constructed_by	Text	SMC/Infra	Records
	Structure	C7	Number of storeys (floors)	storey_count	Number	Infra Focal	Observation
		C8	Building complies with national building codes	building_code_compliance	Boolean	SMC/Infra	Approval Docs
		C9	Building structure type	structure_type	Categorical	Infra Focal	Observation
		C10	Roof material	roof_material	Categorical	Infra Focal	Observation
	Capacity	C5	Number of rooms	room_count	Number	Infra Focal	Site Plan
	Environment	C4	Orientation of classroom blocks	classroom_orientation	Categorical	Infra Focal	Observation
		C11	Roof/walls properly insulated (reducing indoor heat)	insulation_ok	Categorical	Infra Focal	Assessment
		C13	Classrooms adequately ventilated	ventilation_classrooms	Categorical	Infra Focal	Observation
		C14	Curtains/blinds available in classrooms	curtains_blinds	Boolean	Administration	Observation
		C16	Average number of students per classroom	students_per_class	Number	Admin/EMIS	Calculation
		D10	Shaded areas available (trees, sheds, corridors)	shade_availability	Categorical	Infra Focal	Observation
		CS9	Cooling devices available in classrooms (Fan/AC)	cooling_devices	Categorical	Infra Focal	Observation
	Accessibility	A17	Corridors/entrances accessible for persons with disabilities	wheelchair_access	Boolean	Infra Focal	Observation
		J9	Toilets disability-friendly (handrails, wide doors)	toilets_disability	Boolean	Infra Focal	Observation
		J10	Entrances and classrooms wheelchair accessible	classrooms_accessible	Categorical	Infra Focal	Observation
		J12	Playgrounds safe and accessible for all students	playground_accessible	Categorical	Infra Focal	Observation
	Safety	C12	Visible emergency exit signs	exit_signage	Boolean	DRR Focal	Observation
		I5	Time needed to reach the nearest open safe space	time_to_safe_space	Categorical	DRR Focal	Drill Record
		E28	Condition of drainage around the school	drainage_condition	Categorical	Infra Focal	Observation
	Assets	C18	Library books/materials stored above ground level	library_stored_elevated	Boolean	Library	Observation
	ICT	C19	Internet connection available in school	internet_available	Boolean	ICT/Admin	Observation
5. Operation and Maintenance	Utilities: Power	D8	School electricity supply reliability	power_reliability	Categorical	Utilities Focal	Interview
		D9	Backup power available (type)	backup_power_type	Categorical	Utilities Focal	Inventory
	Utilities: Water	D1	Main drinking water source	water_source_main	Categorical	WASH Focal	Inventory
		D2	Drinking water available year-round	water_year_round	Categorical	WASH Focal	Logs/Interview
		D7	Regular water quality testing frequency	water_test_freq	Categorical	WASH Focal	Test Logs
		D11	During water shortage, school prioritizes water use for	water_priority_use	Categorical	WASH Focal	Protocol
		CS14	Frequency of drought/water scarcity events	water_scarcity_freq	Categorical	WASH Focal	Interview
		CS15	Faces water shortages during dry periods	water_shortage_dry	Categorical	WASH Focal	Interview
		CS16	Typical duration of water shortage	water_shortage_dur	Categorical	WASH Focal	Interview
		CS18	Any water sources unreliable during dry periods	water_sources_unreliable	Multi-select	WASH Focal	Interview
		CS20	Approximate daily water requirement	water_daily_need	Categorical	WASH Focal	Estimate
		CS21	Water storage facilities available	water_storage	Categorical	WASH Focal	Inventory
		CS24	Drinking water unsafe during dry periods	water_contamination_dry	Categorical	WASH Focal	Test/Observation
		D4	Separate toilets for boys, girls, teachers	toilets_separate	Multi-binary	WASH Focal	Observation
		D5	Disability-accessible toilet available	toilet_disability	Boolean	WASH Focal	Observation

Category	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
	WASH: Sanitation	J3	Separate toilets for boys and girls (adequacy)	toilets_boys_girls	Categorical	WASH Focal	Observation
		J4	Condition of girls' toilets	girls_toilet_condition	Categorical	WASH Focal	Observation
		J8	Water available inside or near girls' toilets	girls_toilet_water	Categorical	WASH Focal	Observation
		J14	Separate functional toilets for male/female staff	staff_toilets_separate	Boolean	WASH Focal	Observation
		CS22	Condition of toilets during water shortage	toilet_cond_shortage	Categorical	WASH Focal	Observation
	WASH: Hygiene	D6	Handwashing station availability	handwash_availability	Categorical	WASH Focal	Observation
		CS23	Handwashing stations functional during shortage	handwash_shortage	Categorical	WASH Focal	Observation
	WASH: MHM	J5	Menstrual hygiene products (pads) available	mhm_pads_available	Categorical	Health Focal	Inventory
		J6	Disposal bin for menstrual pads	mhm_disposal_bin	Boolean	WASH Focal	Observation
		J7	Private changing area for girls	mhm_private_space	Boolean	Administration	Observation
	Supply Chain	H8	Emergency supplies stocked (first aid, ORS)	emergency_supplies	Categorical	Health Focal	Inventory
		CS10	Access to drinking water during hot season	water_access_hot	Categorical	WASH Focal	Interview
		CS19	School purchases tanker water during shortages	tanker_water_purchase	Boolean	Administration	Accounts
	Insurance	A15	School building insured	building_insured	Boolean	SMC/Admin	Insurance Policy
6. Disaster Management	Planning	A14	Written School Safety Plan available	school_safety_plan	Boolean	DRR Focal/SMC	Document Review
		H1	Updated School Improvement Plan (SIP)	sip_updated	Categorical	Administration	SIP Document
		H2	Approved DRR/School Safety Plan	drr_plan_approved	Categorical	SMC	Plan Document
		H9	Early communication strategy for emergencies	emergency_comm_strategy	Multi-select	Comms Focal	Strategy Doc
		E26	Hazard-prone zone map available	hazard_risk_map	Categorical	DRR Focal	Risk Map
		E27	Written SOPs/checklists for emergency response	response_sops	Categorical	DRR Focal	Documents
	Governance	H3	School Management Committee (SMC) meeting frequency	smc_meeting_freq	Categorical	SMC	Meeting Minutes
		H4	Child protection policy in place	child_protection_policy	Boolean	Head Teacher	Policy Document
		H7	Budget allocated for DRR and safety	drr_budget	Categorical	Administration	Financial Records
		H10	School coordinates with municipality during disasters	coord_municipality	Boolean	Head Teacher	Meeting Minutes
	Preparedness	C20	Safety amenities available (extinguisher, first aid, etc.)	safety_amenities	Multi-select	DRR Focal	Inventory
		H6	Regular drills conducted (fire, earthquake, flood)	drills_regular	Categorical	DRR Focal	Drill Report
		CS12	Heatwave/Hazard action/response plan available	hazard_action_plan	Categorical	DRR Focal	Plan Document
	Early Warning	EWS_1	School receives official early warning alerts	ew_received	Categorical	Comms Focal	Interview
		EWS_2	Main sources of early warning alerts	ew_sources	Multi-select	Comms Focal	Interview
		EWS_3	Communication of warnings to parents/students	ew_comm_methods	Multi-select	Comms Focal	SOPs
		EWS_4	How quickly can the school disseminate alerts?	alert_dissem_speed	Categorical	Comms Focal	Drill Evaluation
		EWS_5	Improvements needed in early-warning communication	ew_improvements	Long text	Comms Focal	Interview
	Hazard Profile	HAZ_1	Primary hazards that affected the school in last 10 years	hazard_types	Multi-select	DRR Focal	History Log
		HAZ_2	Frequency of major hazard impact in last 5 years	hazard_freq_5yr	Categorical	DRR Focal	History Log
		HAZ_3	Date/period of the most recent major hazard event	hazard_event_date	Text/Date	DRR Focal	Incident Log
		HAZ_4	Maximum severity indicator during last event	hazard_severity_indicator	Categorical	DRR Focal	Assessment
		HAZ_5	Hazard impacts entered/affected buildings	hazard_building_impact	Boolean	Infra Focal	Damage Report
		HAZ_6	Areas within school compound affected during event	hazard_affected_areas	Multi-select	DRR Focal	Damage Report
		HAZ_7	Duration school remained closed due to the event	event_closure_duration	Categorical	Administration	Attendance Log
		HAZ_8	Were any students or staff evacuated during the event?	event_evacuation	Boolean	DRR Focal	Incident Report
		HAZ_9	Was access to the school blocked during the event?	event_access_blocked	Boolean	Administration	Interview
		HAZ_10	Duration access was seriously affected	event_access_duration	Categorical	Administration	Interview
		HAZ_11	Did the event damage teaching/learning materials?	event_material_damage	Boolean	Store/Admin	Damage Report
		HAZ_12	Student attendance change during/after event	event_attendance_change	Categorical	Administration	Attendance Log
		HAZ_13	Difficulty conducting classes during/after event	event_class_difficulty	Boolean	Head Teacher	Interview
		HAZ_14	Main operational challenges faced during the event	event_challenges	Multi-select	DRR Focal	After Action Review
		HAZ_15	Common health problems observed among students	event_health_problems	Multi-select	Health Focal	Health Log
		HAZ_16	Modification of class schedules during events	event_schedule_change	Categorical	Head Teacher	SOPs
		HAZ_17	Temporary measures used to continue classes	event_temp_measures	Multi-select	Head Teacher	Interview
	Recovery	F1	Post-disaster damage and loss assessment conducted	pds_conducted	Boolean	SMC	Assessment Report
		F2	Types of losses experienced	loss_types	Multi-select	SMC	Assessment Report
		F5	Estimated recovery cost	recovery_cost	Number	SMC	Financial Records
		F6	Building suffered structural damage previously	structural_damage	Boolean	Infra Focal	Damage Report
		F7	Building renovated/retrofitted after disasters	retrofit_done	Boolean	SMC	Project Report
		F8	Year of last major renovation/retrofit	retrofit_year	Year	SMC	Project Report
	Recovery (GEDSI)	E17	Student groups facing difficulty reaching school	event_difficult_groups	Multi-select	GEDSI Focal	Interview
		J17	Student groups facing most difficulty in emergencies	vuln_students_emerg	Multi-select	GEDSI Focal	Interview
		J18	Support measures most needed for inclusion	inclusion_support_needs	Multi-select	GEDSI Focal	Interview
		J11	Students with disabilities face difficulties accessing	disability_access_diff	Boolean	GEDSI Focal	Interview
7. Data Management	Systems	C17	Important records stored digitally	records_digital	Boolean	Admin/ICT	Observation
	Disaggregation	J1	School collects sex-disaggregated student data	data_sex_disagg	Categorical	Administration	EMIS Check
		J2	School collects disability-disaggregated data	data_disability_disagg	Categorical	Administration	EMIS Check
	Inclusion	J13	Girls, Dalit or marginalized groups feel safe	student_safety_percept	Categorical	Head Teacher	Student Survey
		J16	Women, Dalit, disability groups involved in DRR	inclusive_drr_part	Categorical	SMC	Meeting Minutes

Government Infrastructure Dataset and Attribute Structure

Hierarchy	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
1. Basic Information	Identity	G-01	Government office name	office_name	Text	Administration	Office Signage/Docs
		G-02	Type of government office (Municipality/Ward/Unit)	office_type	Categorical	Administration	Charter/Regulation
		G-03	Government level (Local/Provincial/Federal)	govt_level	Categorical	Administration	Charter/Regulation
		G-03b	Unique Office ID/Code	office_id	Text	Administration	MoFAGA/Admin
	Location	G-04	Full administrative address	office_address	Text	Administration	Admin Records
		G-05	Ward number	ward_number	Integer	Administration	Admin Records
	Geo-Coordinates	G-06	Latitude	latitude	Decimal	GIS Unit	GPS Survey
		G-07	Longitude	longitude	Decimal	GIS Unit	GPS Survey
		G-08	Elevation above mean sea level	elevation_m	Decimal	GIS Unit	GPS Survey
	Contact	G-C1	Official telephone number	office_phone	Text	Administration	Admin Records
		G-C2	Official email address	office_email	Text	Administration	Admin Records
		G-C3	Official website/digital profile URL	office_website	Text	IT Unit	Admin Records
		G-C4	Name of Office Head/Chairperson	head_name	Text	Administration	HR Records
2. Institutional Service	Operations	G-09	Office working days and hours	working_schedule	Text	Administration	Citizen Charter
		G-11	Average daily service recipients	daily_service_load	Integer	Administration	Service Log
	Governance	G-15	Ownership of land and building	ownership_type	Categorical	Property Unit	Legal Docs
		G-16	Managing authority or parent ministry	parent_authority	Text	Administration	Official Records
		G-17	Coordination with disaster management authorities	drm_coordination	Boolean	Office Head	Meeting Minutes
	Finance	G-18	Emergency or contingency budget allocated	emergency_budget	Boolean	Finance Unit	Budget Doc
	Service Delivery	G-10	Primary public services delivered	core_services_list	Table/List	Concerned Dept	Citizen Charter
		G-12	Critical records or statutory services handled	critical_records_list	Table/List	Administration	Admin Records
		G-JD1	Judicial Committee services available (Muni/Ward)	judicial_services	Boolean	Legal Section	Service Charter
	Digital Services	G-13	Digital service delivery available	digital_services_avail	Boolean	IT Unit	IT System Check
	Records Mgmt	G-20	Critical records digitized and backed up	records_digitized	Boolean	Admin / IT	IT Audit
		G-RM1	Physical records stored in fire/flood proof cabinets	safe_storage	Boolean	Administration	Observation
3. Workforce	Counts	G-21	Total number of staff	staff_total	Integer	HR Unit	HR Records
		G-22	Male staff count	staff_male	Integer	HR Unit	HR Records
		G-23	Female staff count	staff_female	Integer	HR Unit	HR Records
	Inclusion	G-24	Staff with disabilities	staff_disability	Integer	HR Unit	HR Records
	Roles	G-HR1	Designated Information Officer available	info_officer_avail	Boolean	Administration	HR Records
		G-HR2	Designated DRR Focal Person assigned	drr_focal_assigned	Boolean	Administration	Nomination Letter
	Roles	G-HR3	Designated IT Officer/Focal Person assigned	it_officer_assigned	Boolean	Administration	HR Records
	Training	G-25	Staff trained in emergency or disaster response	staff_drr_trained	Boolean	HR / DRR Focal	Training Logs
		G-TR1	Staff trained in GESI responsive service delivery	gesi_training	Boolean	HR Unit	Training Logs
4. Infrastructure	Inventory	G-26	Number of buildings	building_count	Integer	Engineering Unit	Site Plan
		G-B1	Name/ID of building	building_id	Text	Engineering Unit	Site Plan
	Construction	G-28	Year of building construction	construction_year	Year	Engineering Unit	Eng Records
	Structure	G-27	Primary building structural type	structure_type	Categorical	Engineering Unit	Observation
		G-B2	Number of storeys	storey_count	Integer	Engineering Unit	Observation
	Safety	G-29	Earthquake-resistant construction	earthquake_resistant	Boolean	Engineering	Assessment
		G-30	Fire safety equipment available (Extinguishers)	fire_safety_equip	Boolean	Safety Unit	Observation
		G-SF1	Emergency exits clearly marked and functional	emergency_exits	Boolean	Safety Unit	Observation
	Access	G-35	Year-round motorable access to office	road_access_yearround	Boolean	Survey	Field Verification
	Accessibility	G-39	Office accessible for persons with disabilities (Ramp)	office_accessible	Boolean	Engineering	Observation
		G-AC1	Public counters are wheelchair accessible (Low height)	counters_accessible	Boolean	Engineering	Observation
	Environment	G-EN1	Offices adequately ventilated and lit	ventilation_lighting	Boolean	Engineering	Observation
		G-EN2	Heating/Cooling systems installed	hvac_installed	Boolean	Engineering	Inventory
5. Operation and Maintenance	Utilities: Power	G-31	Electricity supply reliability	power_reliability	Categorical	Engineering Unit	Interview
		G-32	Backup power system available	backup_power	Boolean	Engineering Unit	Inventory
		G-33	Water supply available year-round	water_year_round	Boolean	WASH / Admin	Interview
		G-WS1	Safe drinking water available for service seekers	public_drinking_water	Boolean	WASH / Admin	Observation
	WASH	G-WS2	Functional toilets available on site	toilet_functional	Boolean	WASH / Admin	Observation
		G-WS3	Separate toilets for male and female	toilet_separate	Boolean	WASH / Admin	Observation
		G-WS4	Disability-accessible toilet available	toilet_accessible	Boolean	WASH / Admin	Observation
	ICT	G-34	ICT infrastructure and internet connectivity	ict_connectivity	Categorical	IT Unit	Speed Test/Obs
	Assets	G-36	Essential office equipment available (Computers/Printers)	office_equip_list	Table/List	Administration	Inventory
		G-37	Security equipment available (CCTV/Guards)	security_equip_list	Table/List	Security	Inventory
		G-38	Emergency response equipment available (Megaphone/Radio)	response_equip_list	Table/List	DRR Focal	Inventory
		G-AS1	Office vehicles/fleet availability	vehicle_count	Integer	Administration	Vehicle Reg
DRM	Planning	G-19	Office emergency preparedness or continuity plan	continuity_plan_exists	Boolean	Office Head	Plan Document
		G-45	Standard operating procedures for emergencies available	emergency_sops	Boolean	DRR Focal	SOP Docs
		G-14	Alternative service delivery arrangements during emergencies	alt_service_plans	Text	Administration	Continuity Plan
	Preparedness	G-46	Office evacuation conducted during disasters/drills	evacuation_conducted	Boolean	DRR Focal	Drill/Incident Log
	Early Warning	G-47	Receives early warning alerts for hazards	ews_alerts_received	Boolean	Communication	Interview
	Hazard Profile	HAZ_1	Primary hazards affecting the office in last 10 years	hazard_history	Multi-select	DRR Focal	Incident Log
		HAZ_2	Frequency of major hazard impacts	hazard_freq	Categorical	DRR Focal	Incident Log
		HAZ_3	Date of most recent major hazard event	last_hazard_date	Date	DRR Focal	Incident Log
		HAZ_4	Disaster impacts on office operations	disaster_impacts	Table/List	Administration	After Action Review
		HAZ_5	Service disruption duration during disasters	service_disruption_dur	Categorical	Administration	Admin Records
		HAZ_6	Physical access to office blocked during events	access_blocked_event	Boolean	Administration	Interview
		HAZ_7	Extreme heat or water stress affects operations	climate_stress_impact	Categorical	Administration	Interview
	Recovery	G-49	Estimated disaster loss and recovery cost	disaster_loss_cost	Decimal	Finance Unit	Financial Records
		G-RC1	Post-disaster damage assessment conducted	damage_assess_done	Boolean	Engineering	Assessment Report
7. Data Management	Stewardship	G-50	Responsible department for building data maintenance	data_steward_dept	Text	Municipality	Data Policy
	Update	G-51	Date of last data update	last_update_date	Date	Municipality	Metadata Log
		G-52	Planned data update frequency	update_frequency	Categorical	Municipality	Data Policy
	GEDSI Data	G-40	Sex-disaggregated service user data collected	service_data_disagg	Boolean	MIS Unit	Data Log
	Inclusion	G-41	Special provisions for elderly, women, and vulnerable groups	vulnerable_provisions	Text	Administration	Observation
		G-IN1	Feedback mechanism available for service seekers	feedback_mechanism	Boolean	Administration	Suggestion Box

Disaster Risk Reduction and Management Infrastructure Dataset and Attribute Structure

Hierarchy	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
1. Basic Information	Jurisdiction	D-01	Municipality name	municipality_name	Text	Administration	Admin Records
		D-02	Ward number	ward_number	Integer	Administration	Admin Records
		D-03	Disaster management jurisdiction description	drm_jurisdiction_desc	Text	Municipality	DRM Policy
	Geospatial	D-04	Disaster management coverage area	drm_coverage_polygon	Polygon	GIS Unit	GIS Database
		D-SP-04	Latitude (Stockpile/EOC location)	latitude	Decimal	Engineering	GPS Survey
		D-SP-05	Longitude (Stockpile/EOC location)	longitude	Decimal	Engineering	GPS Survey
		D-SP-06	Elevation	elevation_m	Decimal	Engineering	GPS Survey
	Contacts	D-SP-09	Emergency operations contact number	contact_phone	Text	Logistics	Field Survey
		D-SP-10	Emergency operations email address	contact_email	Text	Logistics	Field Survey
		D-SP-11	Website URL	website_url	Text	Logistics	Official Records
		D-SP-12	Focal person name	contact_person_name	Text	Logistics	Field Survey
		D-SP-13	Focal person mobile number	contact_person_phone	Text	Logistics	Field Survey
		CONT-1	List of key emergency contacts (Police/Fire/Hospital)	emergency_contact_list	Table/List	DRM Unit	Directory
2. Risk Assessment	Hazard Profile	D-05	Identified hazard types in municipality	hazards_identified	Categorical	Risk Assessment	Hazard Map
		D-09	Historical disaster losses and impacts	disaster_history	Table/List	DRM Unit	DesInventar/Logs
	Exposure	D-06	Settlements in hazard-prone zones	exposed_settlements	Table/List	GIS / Risk Maps	Risk Map
		D-07	Critical facilities exposed to hazards	exposed_critical_facilities	Table/List	GIS / Sector Data	Risk Map
	Vulnerability	D-08	Vulnerable population groups identified	vulnerable_groups	Categorical	Social Welfare	Assessment
3. Governance & Planning	Planning	D-14	Municipal disaster management plan available	muni_drm_plan_exists	Boolean	DRM Unit	Official Records
		D-15	Ward-level disaster preparedness plans available	ward_drm_plan_exists	Boolean	Ward Office	Ward Records
		D-SP-56	Emergency operation plan available	eop_available	Boolean	DRM Unit	Official Records
		D-SP-57	Evacuation plan available	evacuation_plan	Boolean	DRM Unit	Official Records
		D-12	Land-use controls in hazard-prone areas	land_use_controls	Text	Municipality	Land Use Plan
		D-11	Non-structural mitigation policies in place	policy_measures	Table/List	Municipality	Policy Docs
	Committees	D-16	Municipal Disaster Management Committee (MDMC) formed	mdmc_formed	Boolean	Municipality	Meeting Minutes
		D-WC-1	Ward-wise DRM committee details	ward_drm_committees	Table/List	Ward Office	Committee Registry
	Community	D-34	Community-based disaster management groups	cbdm_groups	Table/List	Ward Office	Group Registry
		D-18	Community awareness programs conducted	awareness_programs	Table/List	DRM Unit	Program Log
	Projects	D-31	Completed disaster risk reduction projects	completed_projects	Table/List	Planning	Project Portfolio
		D-32	Ongoing disaster-related projects	ongoing_projects	Table/List	Planning	Project Portfolio
		D-33	Planned disaster risk management projects	planned_projects	Table/List	Planning	Project Portfolio
4. Stockpile & Facilities	Identification	D-SP-01	Stockpile or emergency center name	stockpile_name	Text	Logistics	Field Survey
		D-SP-02	Local address of facility	stockpile_address	Text	Logistics	Field Survey
		D-SP-07	Managing authority	managing_authority	Text	Logistics	Official Records
		D-SP-08	Ownership type	ownership_type	Categorical	Logistics	Official Records
	Facility Profile	D-SP-14	Facility type (Warehouse/EOC/Open Space)	facility_type	Categorical	Engineering	Field Survey
		D-SP-15	Total storage area	storage_area_sqm	Decimal	Engineering	Eng Records
		D-SP-16	Storage capacity (volume)	storage_capacity_vol	Decimal	Engineering	Eng Records
		D-SP-17	Number of buildings	building_count	Integer	Engineering	Asset Register
	Structure	D-SP-18	Structure type	structure_type	Categorical	Engineering	Field Survey
		D-SP-19	Earthquake resistant building	earthquake_resistant	Boolean	Engineering	Assessment
		D-SP-20	Flood safe location	flood_safe_loc	Boolean	Engineering	Risk Assessment
		D-10	Structural mitigation measures implemented	structural_mitigation	Table/List	Engineering	Project Records
	Safety	D-SP-21	Fire extinguisher available	fire_extinguisher	Boolean	Safety	Field Survey
		D-SP-22	Security guard available	security_guard	Boolean	Security	Field Survey
		D-SP-23	CCTV available	cctv_present	Boolean	Security	Field Survey
	Utilities	D-SP-24	Power backup available	power_backup	Boolean	Engineering	Field Survey
	Access	D-SP-25	Truck accessibility	truck_access	Boolean	Engineering	Field Survey
		D-SP-31	Helicopter landing site nearby	helipad_nearby	Boolean	Logistics	Field Survey
5. Inventory Assets	Relief: Shelter	D-SP-39	Tents available quantity	tent_count	Integer	Store	Inventory
		D-SP-40	Tarpaulins quantity	tarpaulin_count	Integer	Store	Inventory
		D-SP-41	Blankets quantity	blanket_count	Integer	Store	Inventory
		D-SP-42	Sleeping mats quantity	sleeping_mat_count	Integer	Store	Inventory
	Relief: NFI	D-SP-43	Family relief kits quantity	family_kits	Integer	Store	Inventory
		D-SP-44	Kitchen sets quantity	kitchen_sets	Integer	Store	Inventory
		D-SP-45	Clothing stock available	clothing_stock	Boolean	Store	Inventory
	Food & Water	D-SP-46	Drinking water quantity (liters)	water_qty_liters	Decimal	Store	Inventory
		D-SP-47	Water purification tablets quantity	purification_tabs	Integer	Store	Inventory
		D-SP-48	Dry food stock quantity (kg)	dry_food_kg	Decimal	Store	Inventory
		D-SP-49	Ready-to-eat food quantity	rte_food_qty	Integer	Store	Inventory
		D-SP-50	Baby food available	baby_food_avail	Boolean	Store	Inventory
	WASH	D-SP-51	Temporary toilets quantity	temp_toilets	Integer	WASH Unit	Inventory
		D-SP-52	Hygiene kits quantity	hygiene_kits	Integer	WASH Unit	Inventory
		D-SP-53	Sanitary pads quantity	sanitary_pads	Integer	WASH Unit	Inventory
		D-SP-54	Soap and disinfectants quantity	soap_disinfectants	Integer	WASH Unit	Inventory
		D-SP-55	Waste disposal facility available	waste_facility_avail	Boolean	WASH Unit	Field Survey
	Medical	D-SP-33	First aid kits quantity	first_aid_kits	Integer	Health Unit	Inventory
		D-SP-34	Trauma kits quantity	trauma_kits	Integer	Health Unit	Inventory
		D-SP-35	Emergency medicines available	emerg_meds_avail	Boolean	Health Unit	Inventory
		D-SP-36	Oxygen cylinders quantity	oxygen_cylinders	Integer	Health Unit	Inventory
		D-SP-37	PPE kits quantity	ppe_kits	Integer	Health Unit	Inventory
		D-SP-38	Body bags quantity	body_bags	Integer	Health Unit	Inventory
	Equipment	D-SP-28	Number of stretchers	stretcher_count	Integer	Store	Inventory
		D-SP-29	Wheelchairs available	wheelchair_count	Integer	Store	Inventory
		D-SP-32	Heavy equipment available (Excavator/Dozer)	heavy_equip_avail	Boolean	Logistics	Inventory
	Logistics	D-SP-60	Last stock update date	last_stock_update	Date	Store	Inventory Log
	Vehicles	D-SP-26	Number of ambulances	ambulance_count	Integer	Transport	Inventory
		AMB-1	Ambulance category (A/B/C)	ambulance_category	Categorical	Health Unit	Vehicle Reg
		D-SP-27	Number of rescue vehicles	rescue_vehicle_count	Integer	Transport	Inventory
		D-SP-30	Boats available	boat_count	Integer	Transport	Inventory
		FIRE-1	Fire trucks/engines available	fire_truck_count	Integer	Fire Dept	Inventory

Hierarchy	Component	Code	Full Attribute Name	Short Name	Data Type	Responsible Dept	Source
6. Response & Recovery Op		FIRE-2	Fire response equipment (hoses, pumps)	fire_equipment_list	Table/List	Fire Dept	Inventory
	Open Spaces	OS-1	List of humanitarian open spaces	open_spaces_list	Table/List	DRM Unit	Land Records
		D-SP-58	Identified safe assembly point	assembly_point	Boolean	DRM Unit	Field Survey
		OS-2	Capacity of open spaces (persons)	open_space_capacity	Integer	DRM Unit	Estimation
		OS-3	Water supply available at open space	open_space_water	Boolean	WASH Unit	Field Survey
		OS-4	Toilets available at open space	open_space_toilets	Boolean	WASH Unit	Field Survey
	HR	D-SP-62	Total staff	staff_total	Integer	HR	HR Records
		D-SP-63	Trained search and rescue personnel	sar_personnel	Integer	HR	Training Records
		D-SP-64	Medical staff available	medical_staff	Integer	Health Unit	HR Records
		D-SP-65	Volunteers available	volunteers_avail	Integer	DRM Unit	Volunteer Registry
		D-35	Registered community volunteers	local_volunteers	Integer	DRM Unit	Volunteer Registry
		D-24	Search and rescue teams available	sar_teams	Table/List	DRM Unit	Team Roster
	Procedures	D-SP-59	Disaster types covered by SOPs	disasters_covered	Categorical	DRM Unit	DRR Plan
		D-SP-61	Last emergency drill conducted date	last_drill_date	Date	DRM Unit	Drill Records
		D-17	Disaster preparedness trainings conducted	community_training	Table/List	DRM Unit	Training Log
		D-19	Early warning dissemination mechanisms	ews_mechanisms	Categorical	DRM Unit	SOPs
		D-22	Response agencies and roles	response_agencies	Table/List	DRM Unit	SOPs
		D-23	Emergency operation center activated during events	eoc_activation	Boolean	DRM Unit	Incident Log
		D-25	Relief distribution mechanisms	relief_distribution_mech	Text	DRM Unit	SOPs
	Status	D-SP-66	Operating status	operating_status	Categorical	Admin	Field Survey
		D-SP-67	Remarks or comments	remarks	Text	Admin	Field Survey
	Recovery	D-27	Post-disaster damage and loss assessments conducted	pdna_conducted	Boolean	DRM Unit	Assessment Reports
		D-28	Infrastructure rehabilitation activities	infra_rehab	Table/List	Engineering	Project Records
		D-29	Livelihood recovery support programs	livelihood_support	Table/List	Social Welfare	Program Records
		D-30	Housing reconstruction programs	housing_reconstruction	Table/List	Engineering	Project Records
7. Data Management	Data Mgmt	D-37	Responsible municipal department for DRM data	data_steward_dept	Text	Municipality	Data Policy
		D-38	Date of last data update	last_update_date	Date	Municipality	Metadata Log
		D-39	Data update frequency	update_frequency	Categorical	Municipality	Data Policy
		D-40	Inter-agency data sharing protocols	sharing_protocols	Text	Municipality	Data Policy