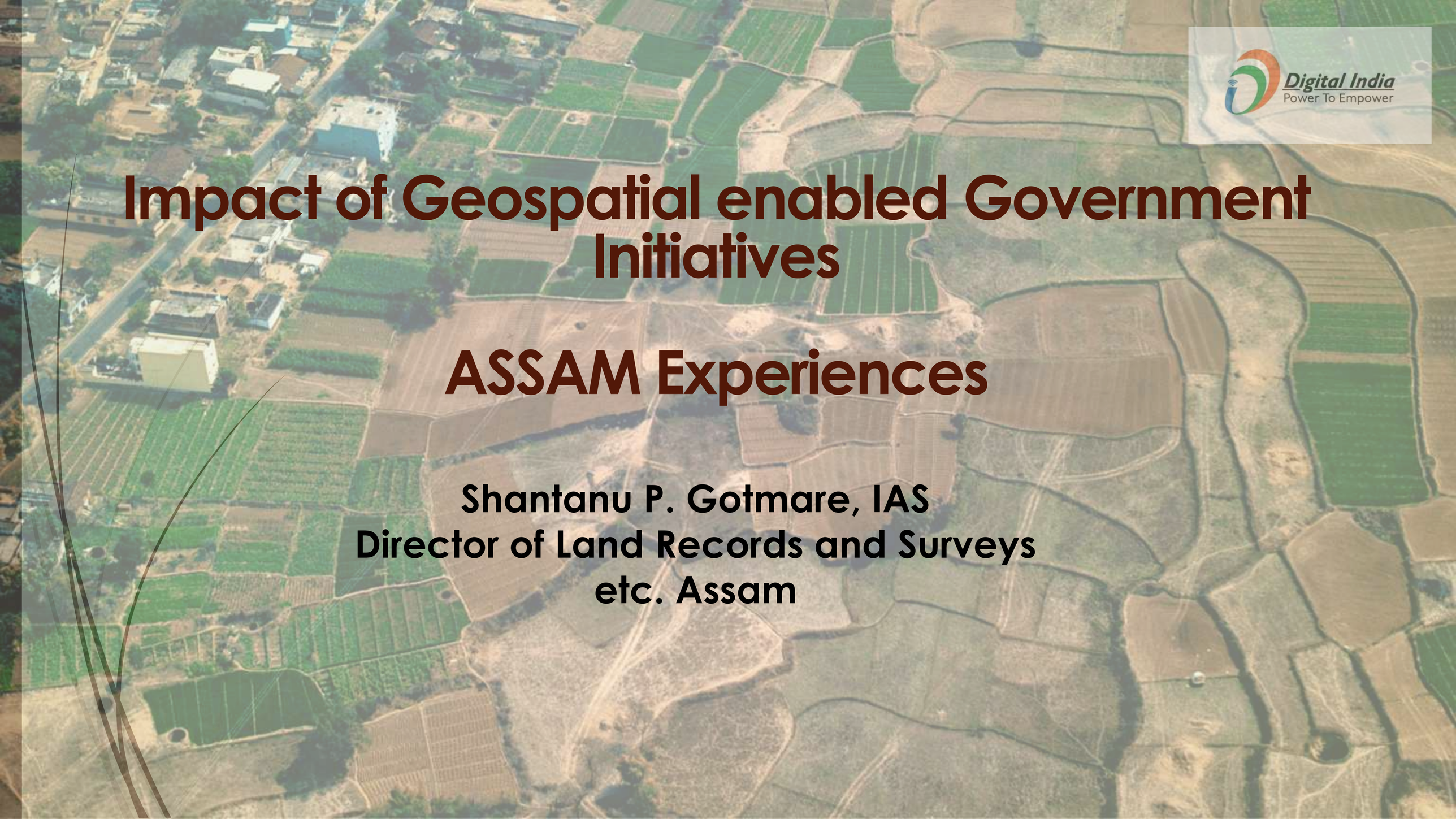


Impact of Geospatial enabled Government Initiatives

ASSAM Experiences

Shantanu P. Gotmare, IAS
Director of Land Records and Surveys etc. Assam

Organisation of the Presentation

- Enhancing the concept of Ownership
- DILRMP
- DILRMP in Assam
- Mission *Basundhara*
- SVAMITVA in Assam
- Geospatial Mission: Assam
- Interoperability/Ease of Doing Business

Enhancing the concept of Ownership

-Record of Rights (document with details of the property)
-Tax Receipts
-Survey documents.
-Possession
-Interest

Digital Land Data Ecosystem

Mission Basundhara 1.0	**Mission Basundhara 2.0**	**SVAMITVA (Survey of NC villages)**	**Resurvey**	**E-Khazana**
Auto - mutation	**Digital Stamping**	**Centre for Land Governance, Research & Training**	**National Generic Document Registration System (NGDRS)**	**Direct purchase policy for land**

MISSION BASUNDHARA

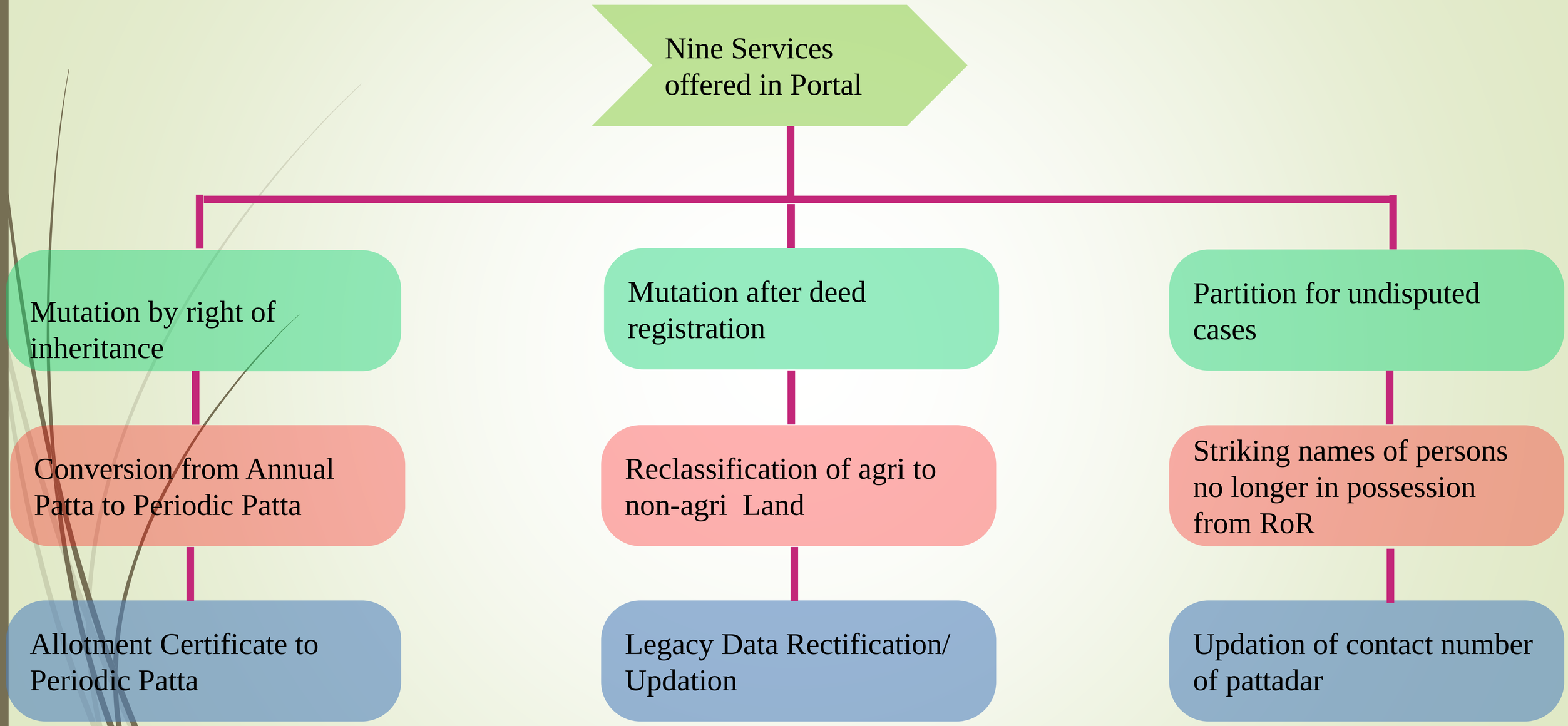
Step towards Conclusive Titling Regime

Re – Survey
of
Cadastral villages

Purification of Land Records
through
Online Services

Survey
of
Non - Cadastral Villages

Services of Mission Basundhara 1.0



Mission Basundhara 2.0 Services

Settlement of Government Khas & Ceiling Surplus Land

Conferring ownership rights to Occupancy Tenants

Settlement of Transferred Annual Patta land

Settlement of VGR/PGR Land

Settlement of land for indigenous special cultivators (tea, coffee, rubber etc.)

Settlement of hereditary land of Tribal communities

Auto – mutation roll out across the state
(Composite Land Transfer Service)

E - KHAZANA

National Generic Document Registration System

https://ngdrs.gov.in

GDRS

- Prevention of Fraudulent Transactions & Disputes
- eSigning of Documents
- Auto Calculation of Duty and other charges
- Integration with PAN and Aadhaar
- Minimum Physical Interface

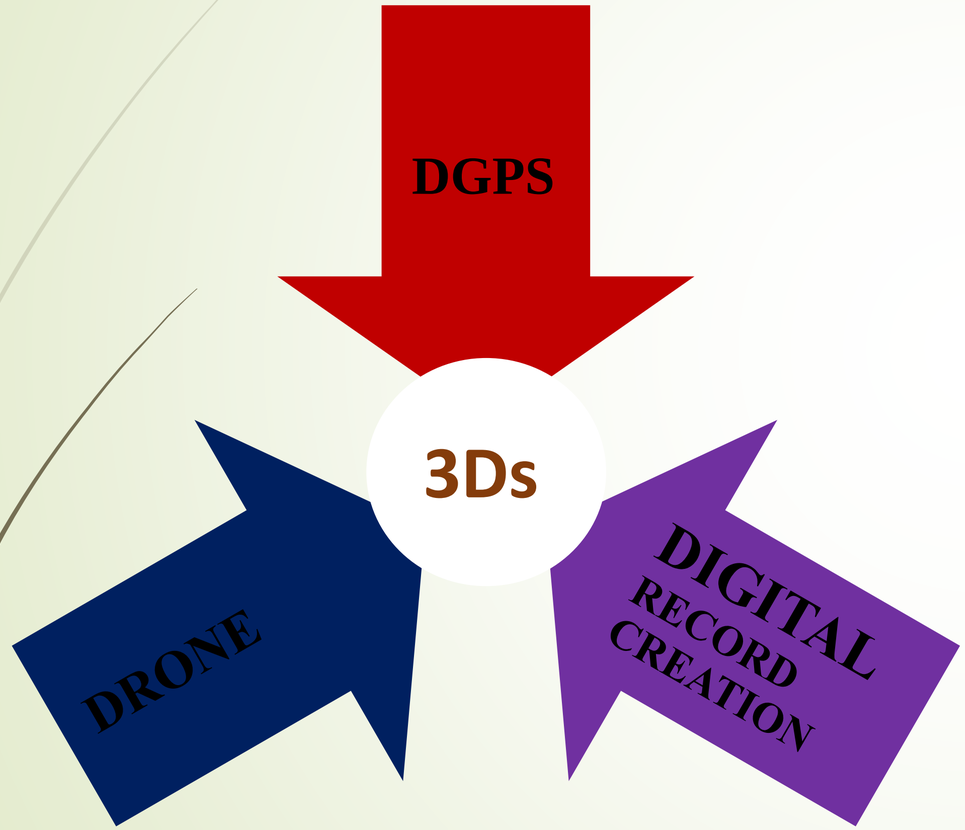
13 1039 3302915 353763

- **Assam where has decided to cover Unsurveyed Villages (NC) under SVAMITVA Scheme where there is no conclusive and legal land right of the people.**

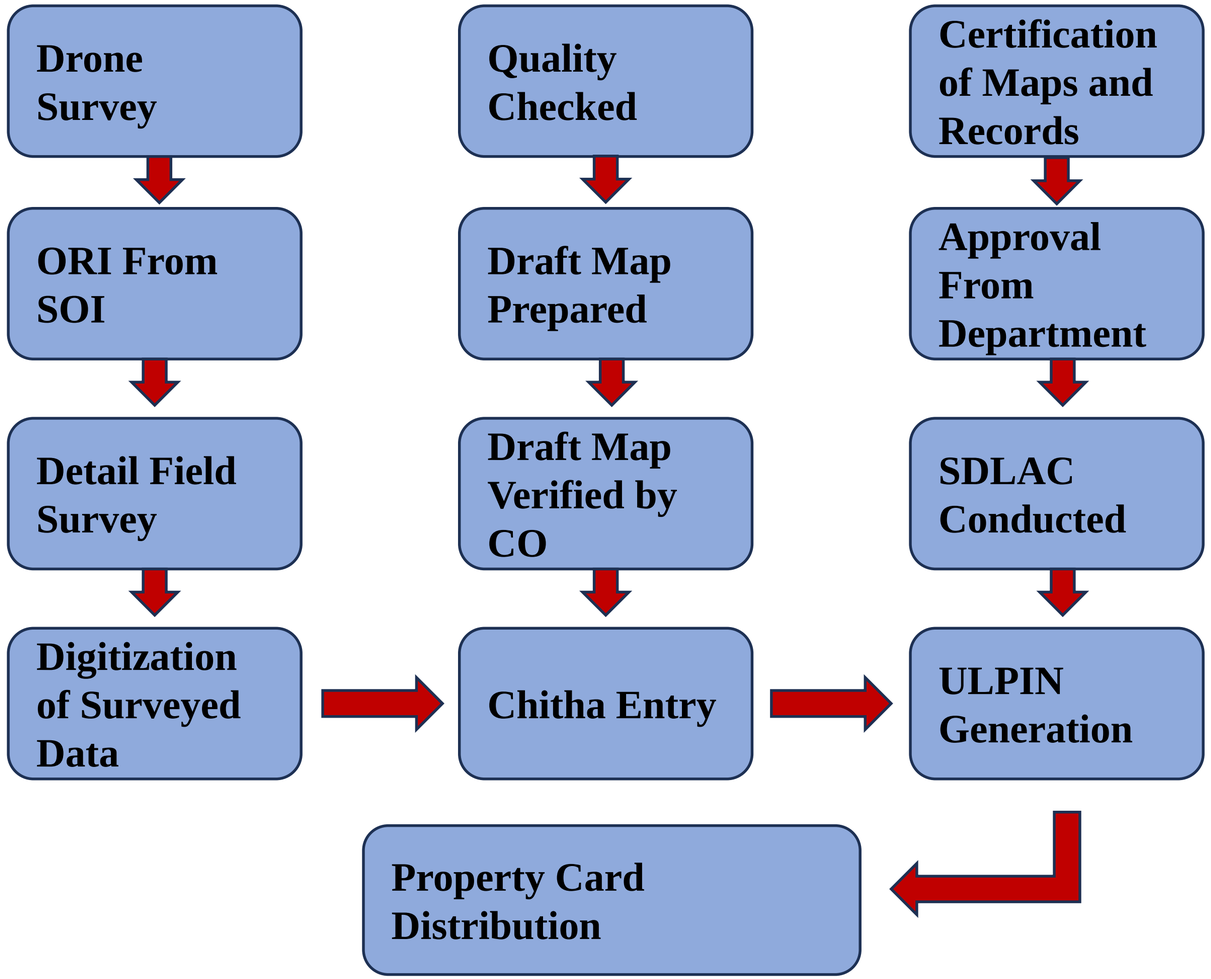
Settlement Pattern in Abadi Area

Settlement Pattern in Assam

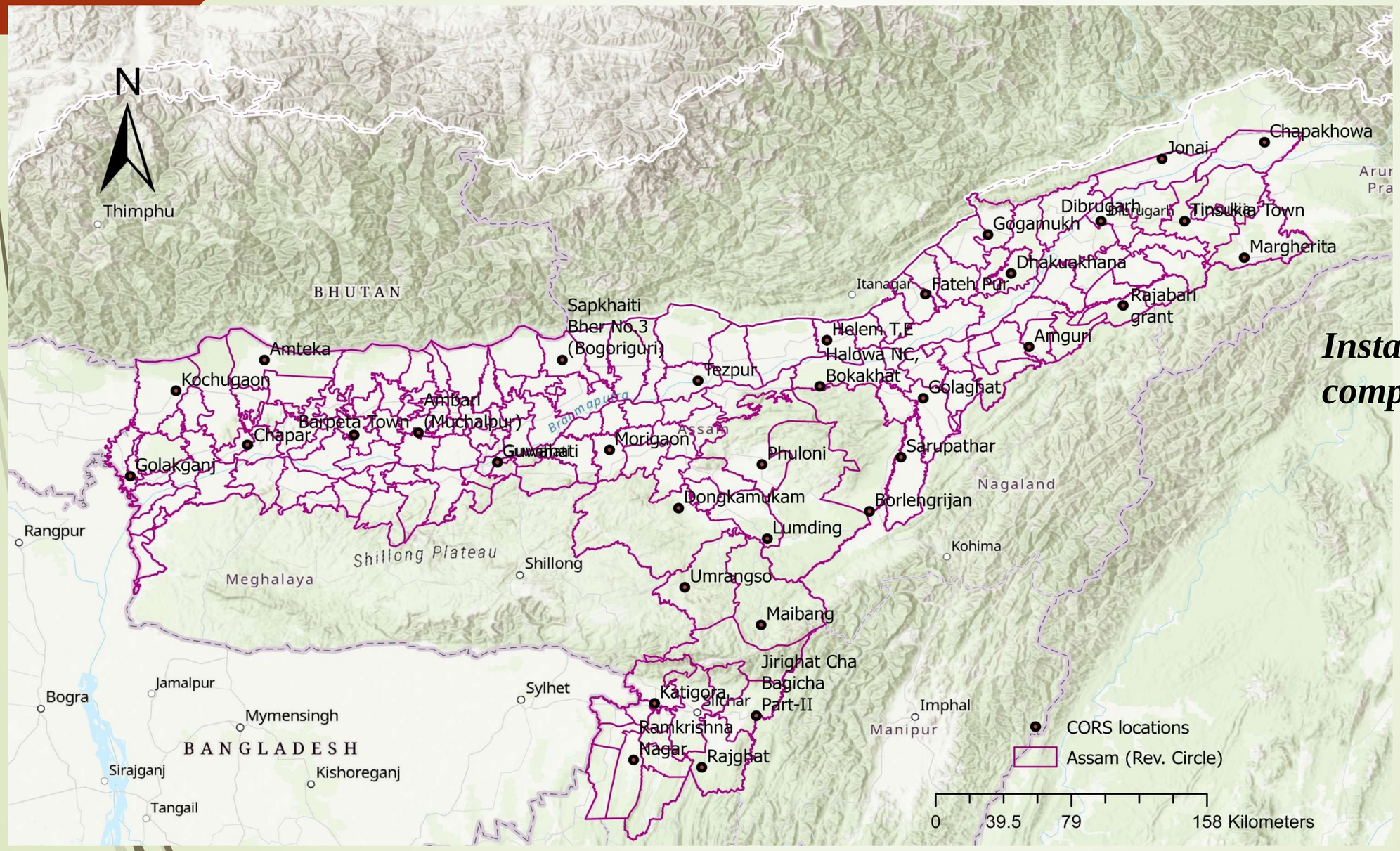
Survey of Villages And Mapping With Improvised Technology in Village Areas



FLOW CHART

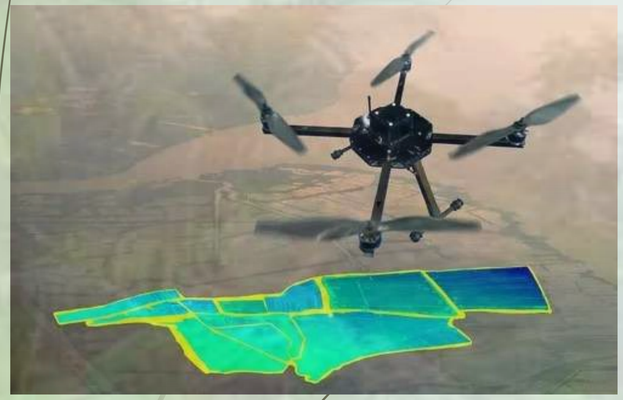

Drone Survey
ORI From SOI
Detail Field Survey
Digitization of Surveyed Data
Quality Checked
Draft Map Prepared
Draft Map Verified by CO
Chitha Entry
Certification of Maps and Records
Approval From Department
SDLAC Conducted
ULPIN Generation
Property Card Distribution

34 Continuously Operating Reference Station (CORS)



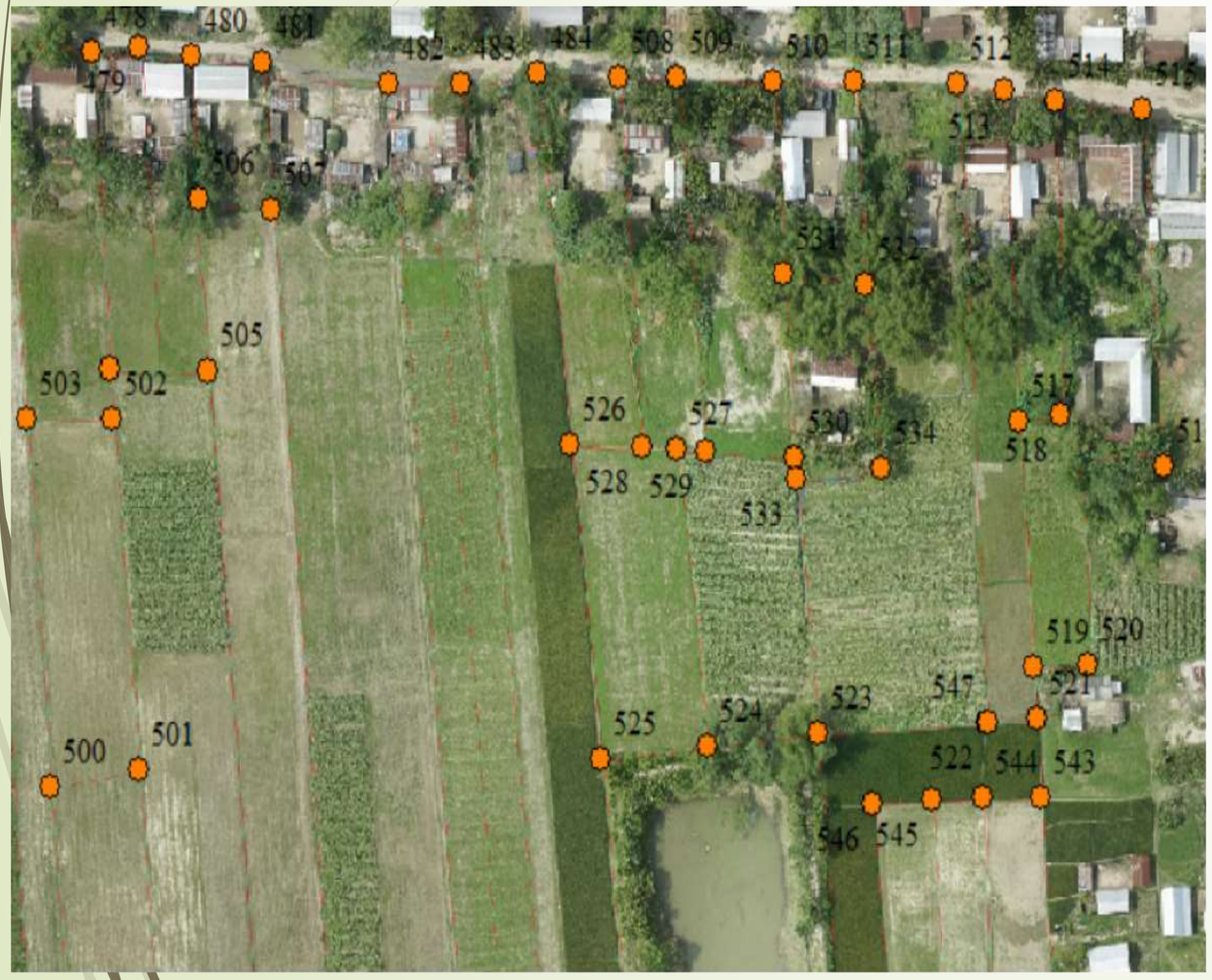
Installation completed

Drone Survey



Map Preparation

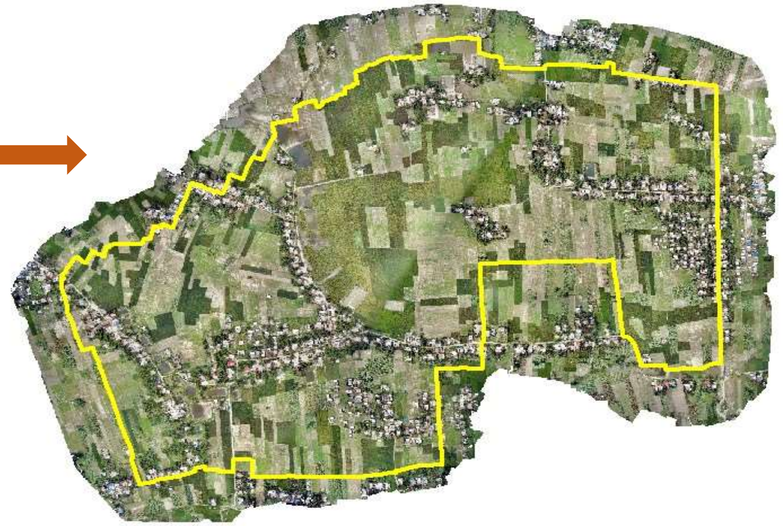
Point Data

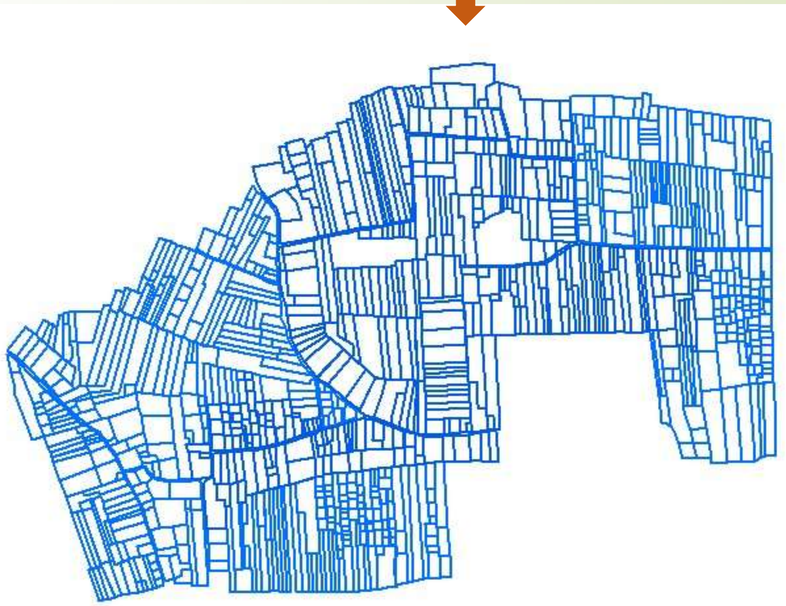


Digitized Data

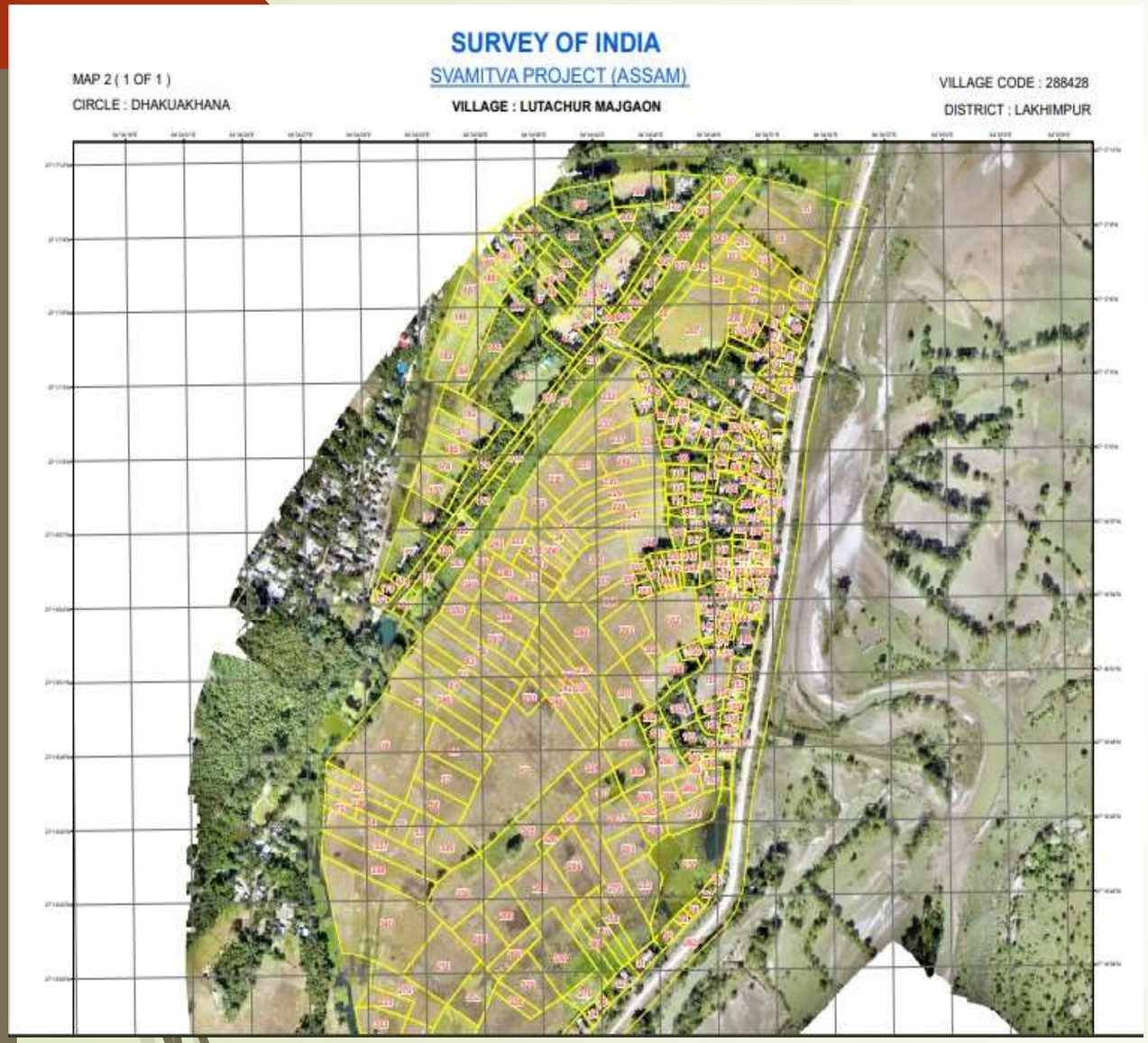
Finalisation of Maps

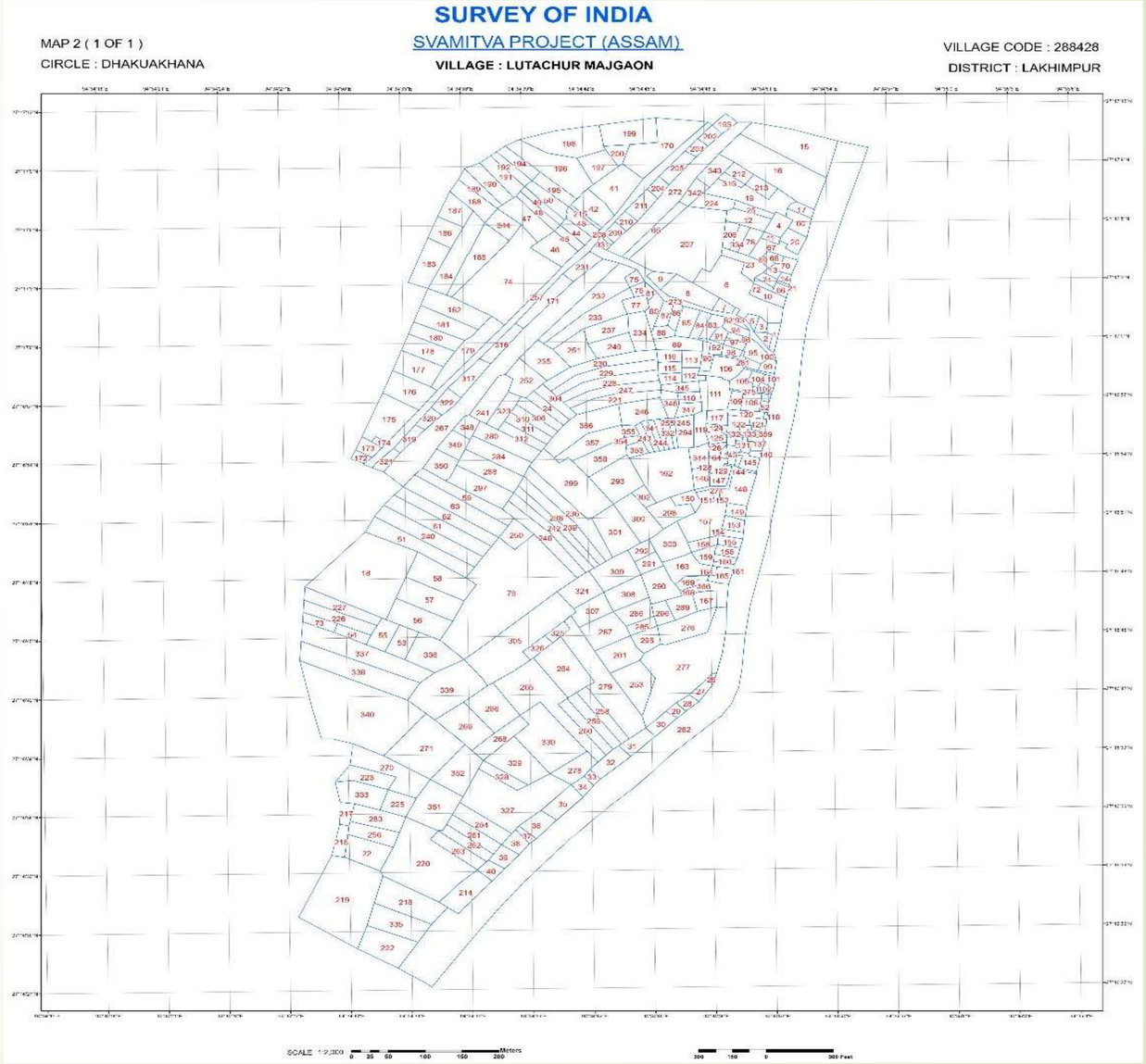
- Village boundary verification LM.
- Ground validation of draft land parcel and ownership detail.
- He/she shall do the necessary correction in the plots like partition, amalgamation etc. and submit again to DLRS for digitization.
- Once the verification of the plots is completed, the final map shall be examined by the Circle Officer and forwarded to DLRS with necessary correction list and certification by LM,SK and CO.





Draft Map - Lutachur Majgaon (Lakhimpur)





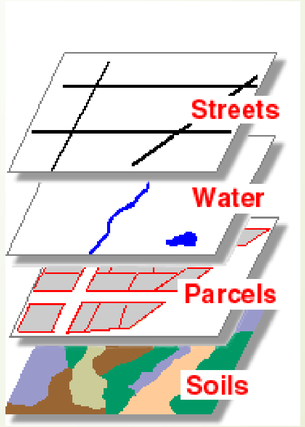
3-Layered Approach

Layer-1:HRSI Base Layer for the entire Assam

Layer-2: Drone ORI, <5 cm GSD for areas under survey/ resurvey

Layer-3: Ground verification for canopy/dense settlement areas using CORS-compatible rovers

Output Layer: Accurate GIS Data Model



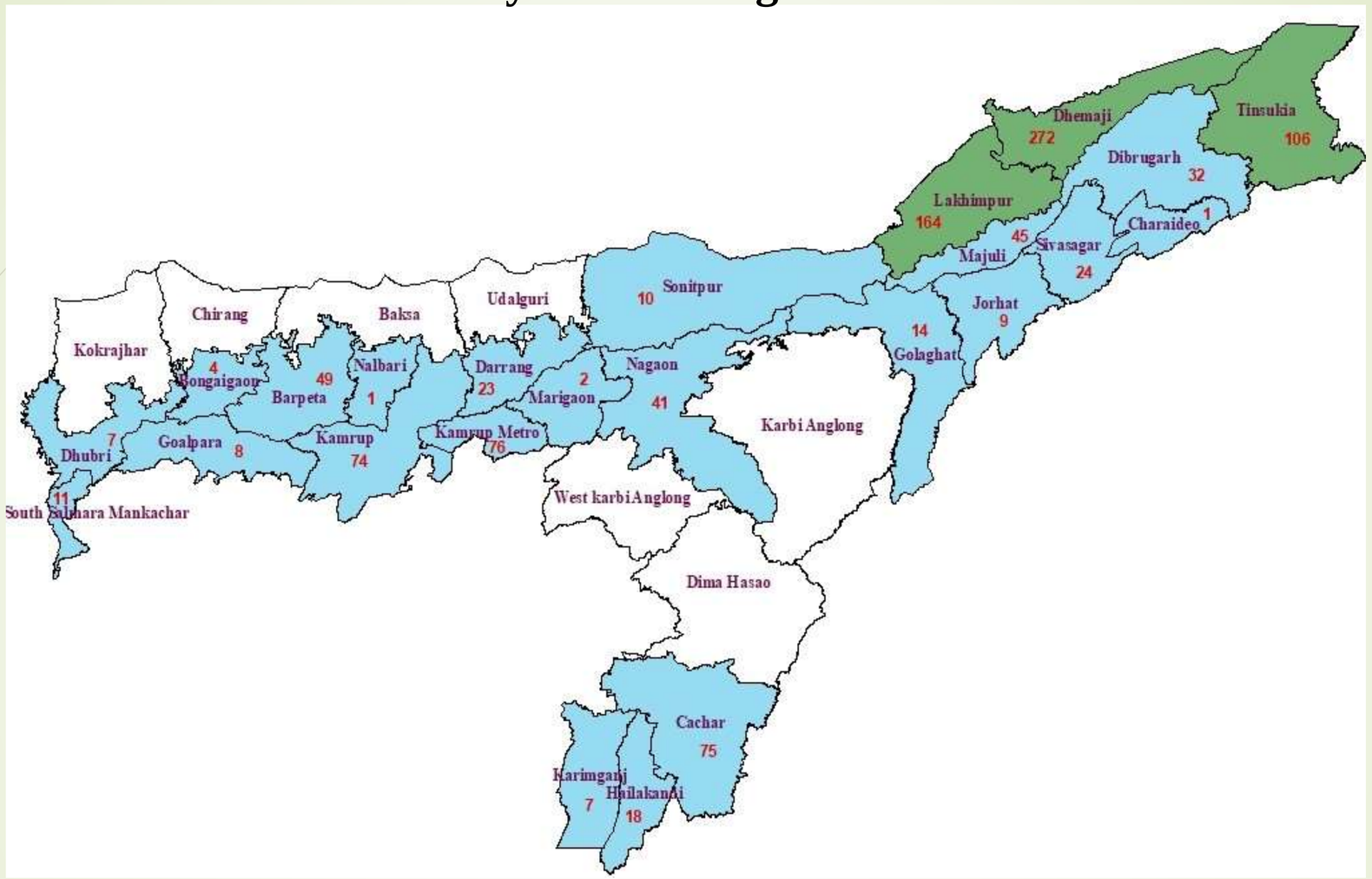
Common Identity: Bhu-Aadhaar (ULPIN)

Area Covered under Drone Flying - Resurvey

Sl.No	District	Total Area Covered	Total No of Villages (as per kml)	Number of Villages Covered	Progress of Drone mapping
1	BARPETA	1171.2	609	499	81.94
2	BISWANATH	1407.49	715	713	99.72
3	BONGAIGAON	531.28	415	251	60.48
4	CACHAR	127.8	592	51	8.61
5	CHORAIDEO	882.17	324	287	88.58
6	DARANG	1359.1	540	524	97.04
7	DHEMAJI	895.91	585	594	101.54
8	DHUBRI	822.68	1219	482	39.54
9	DIBRUGARH	722.8	411	384	93.43
10	GOALAPARA	1524.82	659	524	79.51
11	GOLAGHAT	1802.24	558	530	94.98
12	HAILAKANDI	499.84	210	161	76.67
13	HOJAI	905.78	359	367	102.23
14	JORHAT	1183.35	618	415	67.15
15	KAMRUP (M)	112.2	246	39	15.85
16	KAMRUP (Ru)	1866.87	865	669	77.34
17	KARIMGANJ	567.1	691	386	55.86
18	MAJULI	423.28	232	132	56.90
19	LAKHIMPUR	1632.88	943	767	81.34
20	MARIGAON	1391.8	623	509	81.70
21	NAGAON	1975.53	991	823	83.05
22	NALBARI	947.93	427	414	96.96
23	SONITPUR	729.67	789	321	40.68
24	SIVSAGAR	1069.2	478	329	68.83
25	TINSUKIA	1539.41	949	711	74.92
Total		**26092.33**	**15048**	**10882**	**72.32**

Details	Area (sq. km)	Yet to fly (~sq. km)
Total area for drone flying (except Barak Valley) in sq. km	28452.44	1165.37
Red Zones (~ sq. km)	3790.75	3790.75
Yellow Zones (~ sq. km)	532.30	532.30
Barak Valley (~ sq. km)	6922.00	5727.26

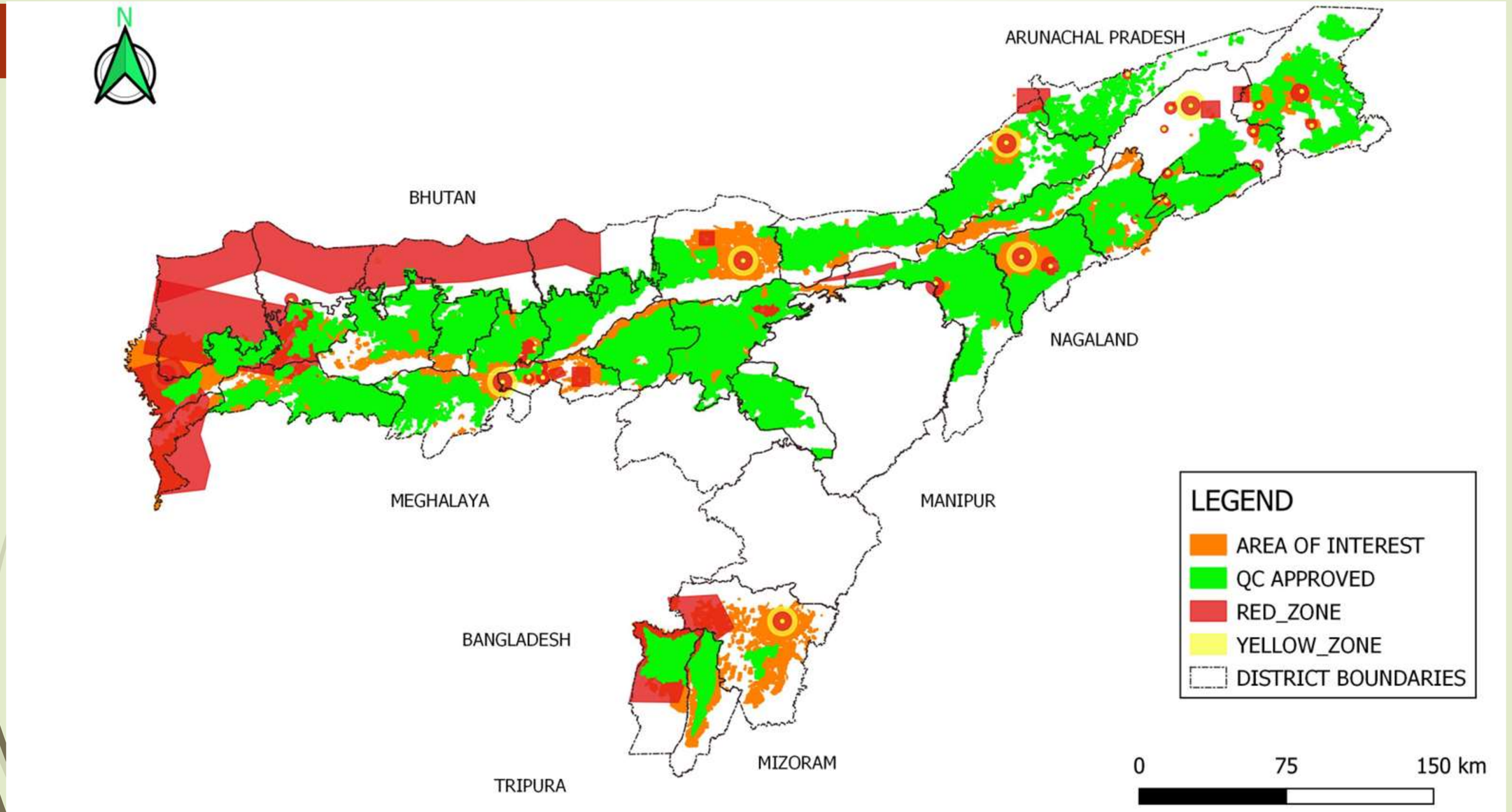
Status of detailed survey of NC villages



Total No of NC Village	Drone Flying Completed	ORI Received from SOI	Detail Field Survey Completed	Digitization of Surveyed data	Quality Checked	Draft Map Prepared	Draft map Verified by CO	Chitha Entry Completed	Landholders for Property Card
1074	849	574	236	236	166	107	67	65	19369

As on 09-10-2023

Visualization of Drone Flying completed under Re-survey



Latest Data

Sample Ortho-Rectified Image (ORI) of Sivasagar District acquired by Drones (<=5 cm GSD)

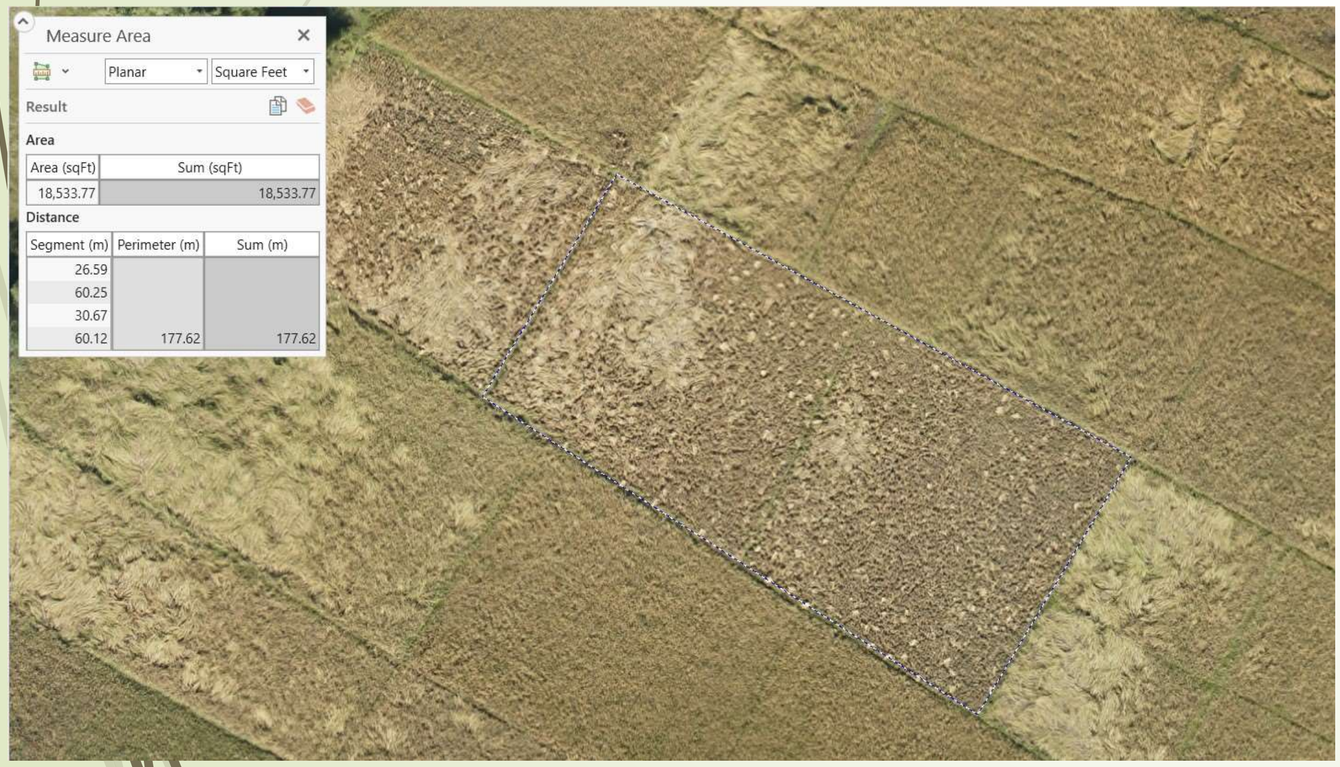
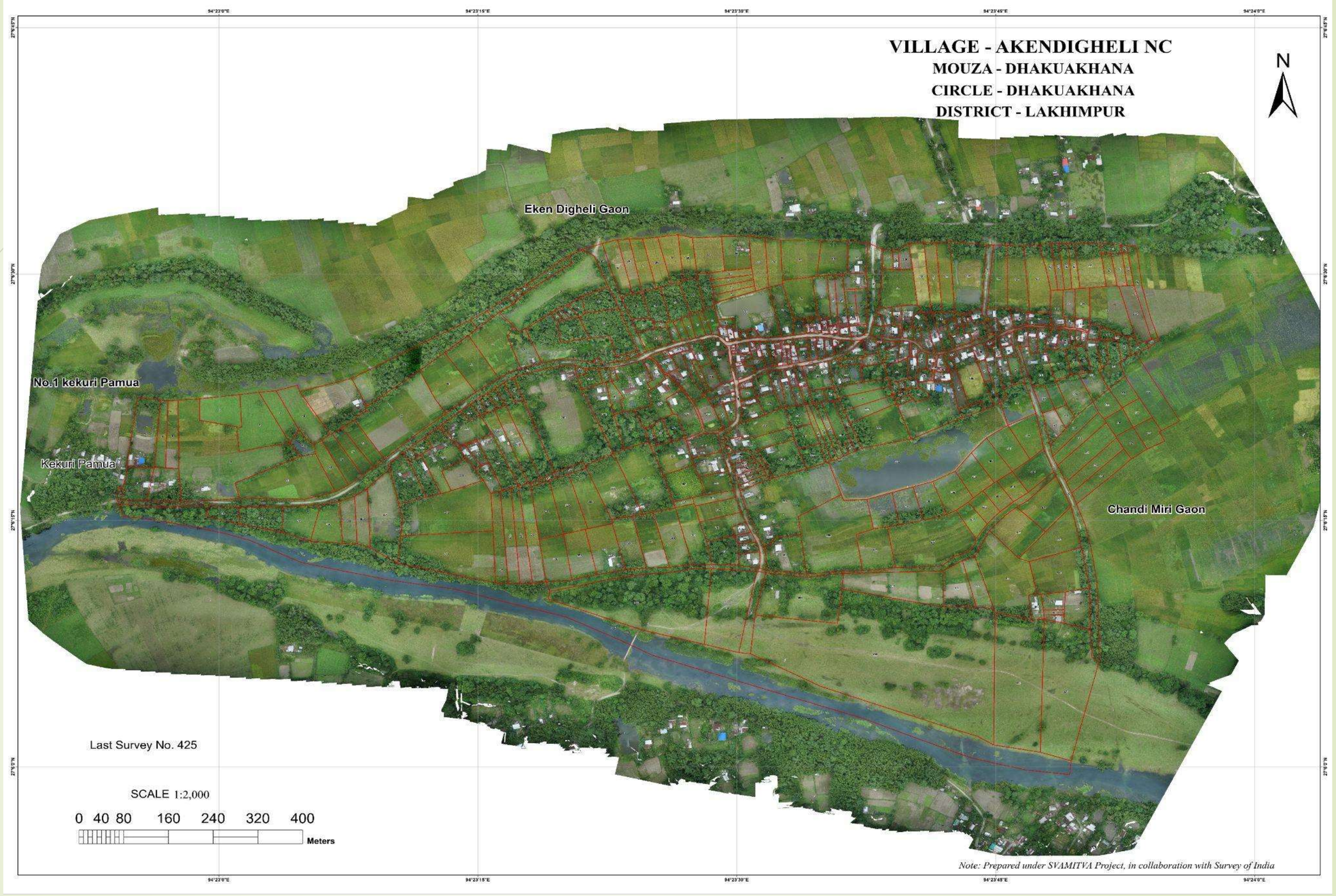


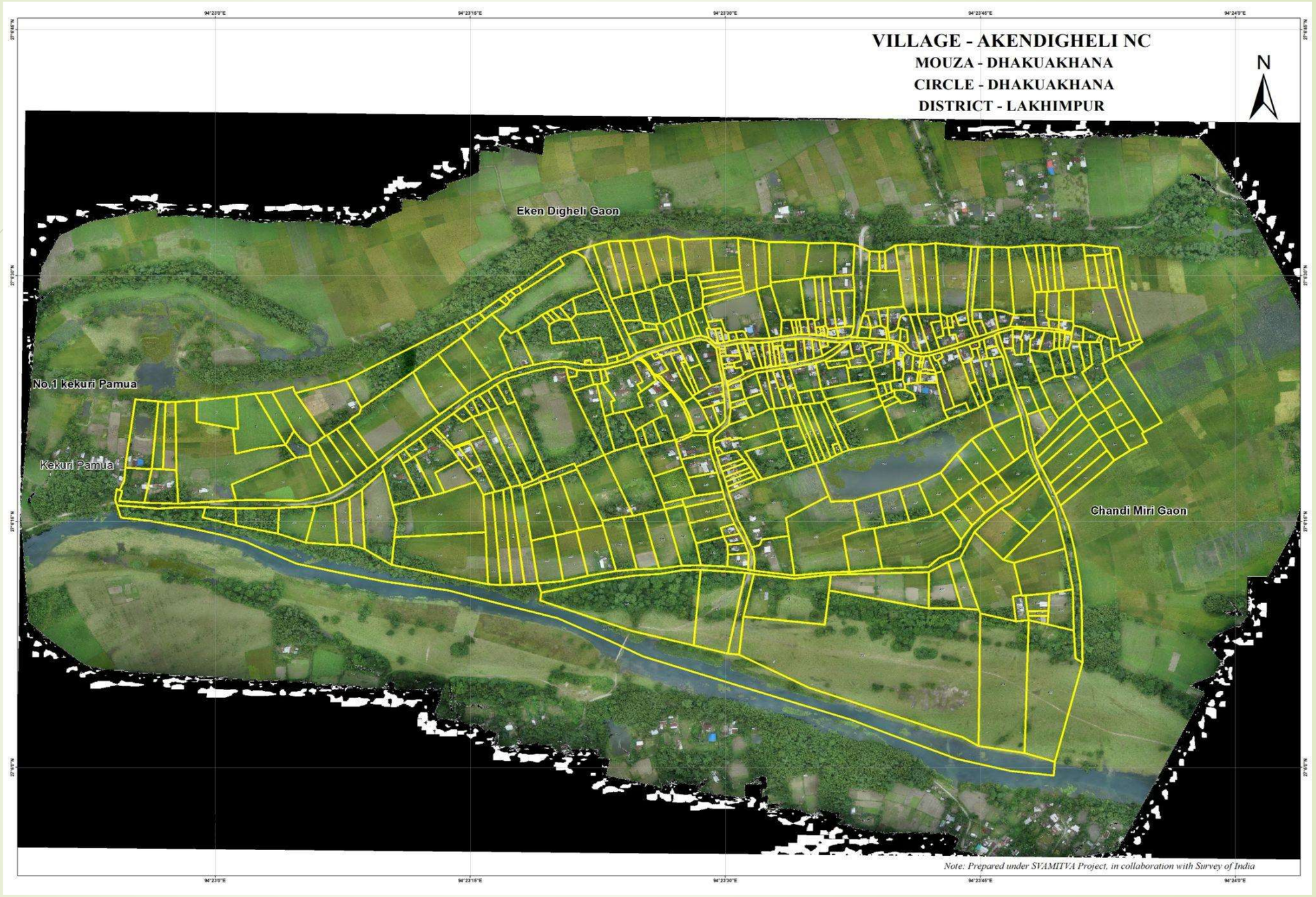
Fig 2: Land parcel measurement (example)

Fig 1: Drone ORI (<=5 cm) on ESRI base imagery (~30 cm)

Latest Data acquired under SVAMITVA



Latest Data acquired under SVAMITVA



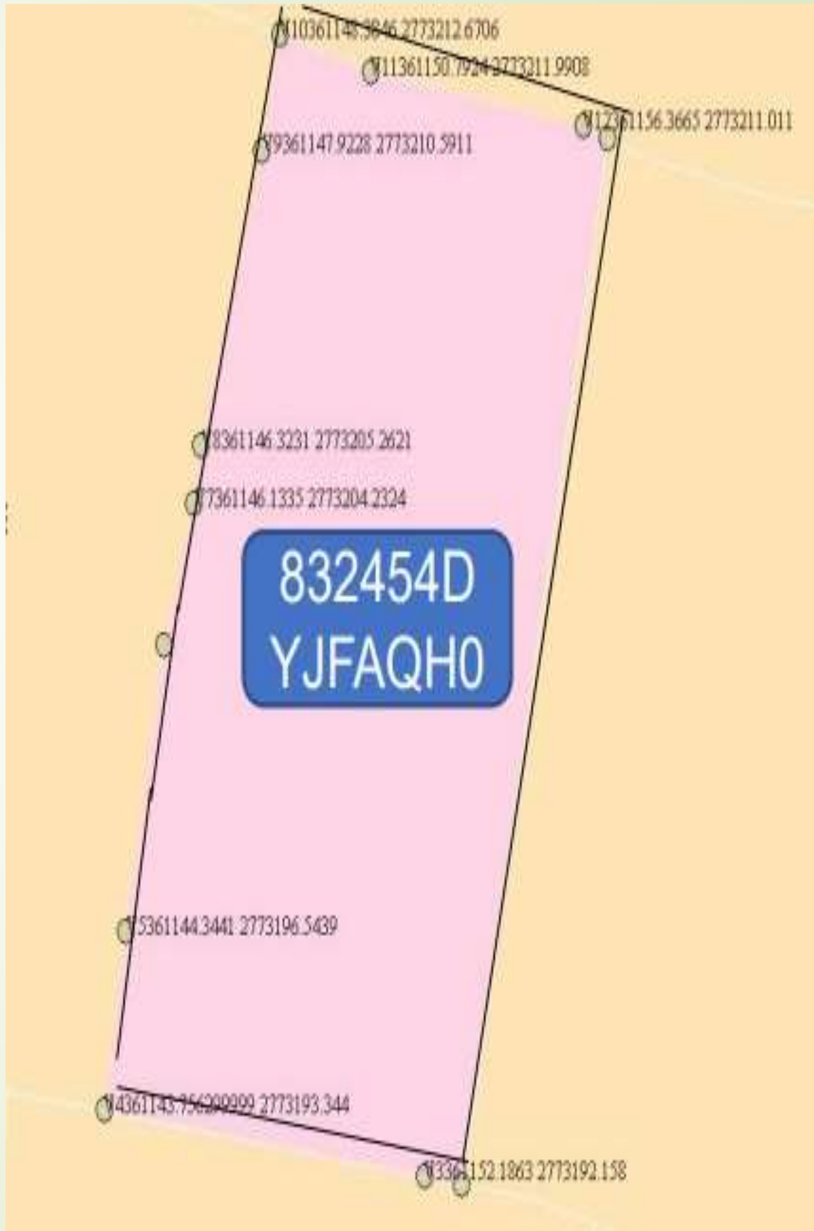
Latest Data acquired under SVAMITVA With HRSI Image, 30 cm

ULPIN

- ULPIN is a 14-digit Alpha–Numeric Unique ID for each land parcel.
- The ULPIN generated using Electronic Commerce code Management Association (ECCMA) standard during the importing of georeferenced shape file into Bhunaksha.
- The identification is based on longitude and latitude coordinates of the land parcel, and is dependent on detailed surveys and geo-referenced cadastral maps.
- ULPIN will be provided to each land parcel that are digitized and verified.
- ULPIN is a part of the Digital Land Records Modernization Program.

Why ULPIN

- Different states use different methods for assigning unique IDs to the land parcel
- Land parcel numbers repeat in each village
- Difficult to do data analytics and establish people-Land relationship
- Need for sharing of land records data across departments, financial institutions and all stakeholders.
- Standardization at data and application level would bring in effective integration and interoperability across departments.
- Need for providing services to other sectors- Financial Institutions, Courts, Crop insurance, Fertilizer subsidies



PART-III RECORD CREATION	
Activities	**Explanation**
Writing and entry of Chitha	After a village has been surveyed, demarcated and map finalized; the Chitha shall be written by the LM with the details from the field book. The chitha shall be properly arranged according to the dag numbers. From the Chitha, the entry shall be made in the module prepared by National Informatics Centre. The correct & detail entry shall be frequently supervise & checked by the Circle Officer. All the particulars in the columns should be filled for creation of a all inclusive database.
Certification of Chitha by DC	The Deputy Commissioner shall verify and certify the Chitha to be final and intimate the Government for notification .
Notification by department	The Revenue & Disaster Management Department shall issue notification pertaining to offering of settlement, changes of name or any other issue which it finds necessary.
SDLAC Conducted	

Generation of ULPIN	ULPIN is a 14-digit Alpha–Numeric Unique ID for each land parcel which is based on the longitude and latitude coordinates of the land parcel, and is dependent on detailed surveys and geo-referenced cadastral maps. ULPIN will be provided to each land parcel that are digitized and verified.
Offering of Settlement	After receipt of orders from Department (if needed), the Deputy Commissioner shall prepare (through the Circle officer concerned), sign and seal the Patta/ Property Card. • The settlement procedure shall follow the rules laid in the extant Land Policy. • Deputy Commissioner shall offer settlement with approval from the Land Advisory Committees whose decision shall be final.

Draft Property Card

Government of Assam

SVAMITVA Card

Revenue & Disaster Management Department

Photograph

ULPIN	

Pattadar Details				
Name	Address	Father/Mother Name	Gender	Category
Married/unmarried	Spouse name(if married)	Mobile number.	Current Occupation	Family details

Land Details						
Patta No.		Dag No.		Land Class	Land Revenue	Local Rate
Old	New	Old	New			
					Total:	
Area				Zonal Value	Revenue paid up to (year)	
in B-K-L		in Are				

(Above information are true as dated on…… and supersedes the same provided on……)

Geographical Details		
Property Sketch with drone image	North description	
	South description	
	East description	
	West description	

Property Details		
Type of Property	Description	Approx Value
Encumbrance Details, if any		

Remarks related to property transaction	**Digital Signature**

Notes

- *This Property Card is issued under Govt Notification NO……..*
- *It shall carry same evidentiary value as certified copies of RoR and other public records for all intents and purposes before the courts and financial institutions.*
- *It is responsibility of every Property Card holder to intimate the authority for any change occurred and get it updated.*

(Above information are true as dated on…… and supersedes the same provided on……)

Geospatial Mission: Assam

Primary Objectives of the GIS lab in Land Governance

- Command & Control Centre for Seamless Geospatial data model creation, updation, utilization, preservation & dissemination for Revenue & DM Department.
- Precise mapping of the Cadastral villages and Non-cadastral villages.
- Accurate ULPIN generation for geospatial data interoperability
- Citizen-centric Geospatial service delivery system (example: “Map as a service”)
- Capacity building for revenue functionaries as well as for line departments & organisations.
- GIS service for various line departments
- Research platforms for budding researcher/student communities.

GIS Lab Infrastructure

- Available Hardware/Software Infrastructure & Specialised Human resource

High-end workstations	High-end Desktops	Physical Storage	Printer cum plotter
10	20	500 TB NAS	01

Software (Proprietary)

- ArcGIS Pro/ ArcGIS Advanced (03)
- ArcGIS Pro/ ArcGIS Standard (22)

Software (Open-source)

QGIS (30)/ Google Earth Pro

Specialised Human Resources in GIS lab

- GIS Expert (02)
- System Admin (01)

Data Catalogue

GIS Lab Network-Attached Storage (NAS)

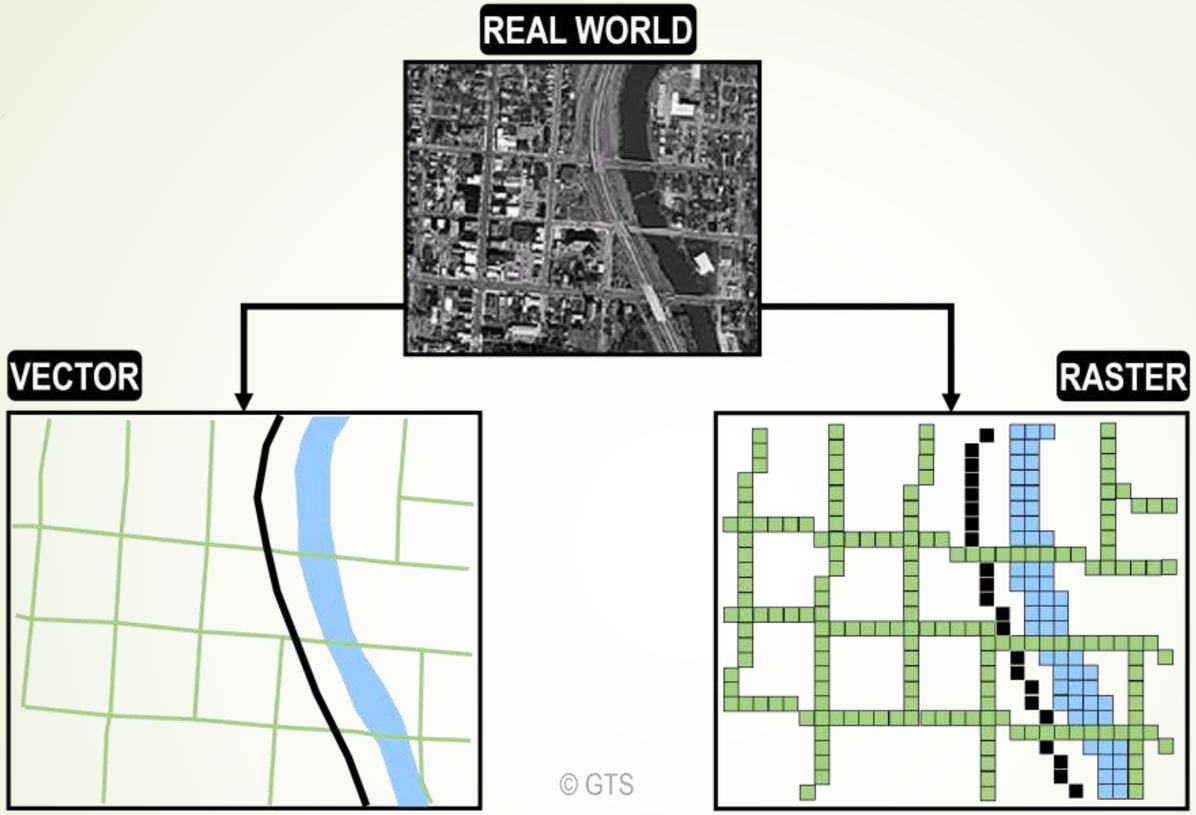
Latest Data

- ORI (5 cm) (Raster)
- DSM & DTM
- HRSI

Archival Data

- Scanned Cadastral Maps (Raster)
- Digitized Cadastral Maps (Vector)

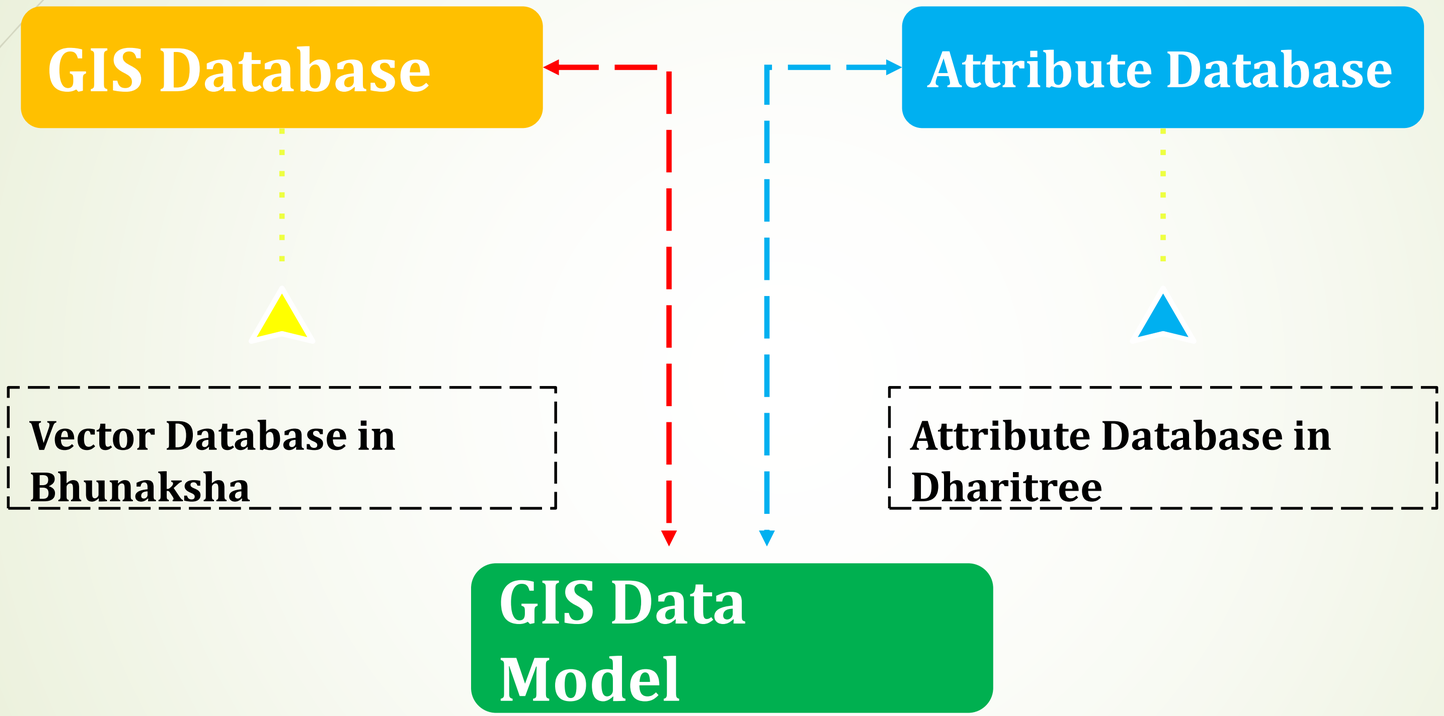
What is a GIS data Model?



- The **vector data model** also called the discrete object model uses discrete objects to represent spatial features on the Earth's surface.
- **The vector data model uses the geometric objects of points, lines, and polygons** to represent spatial features

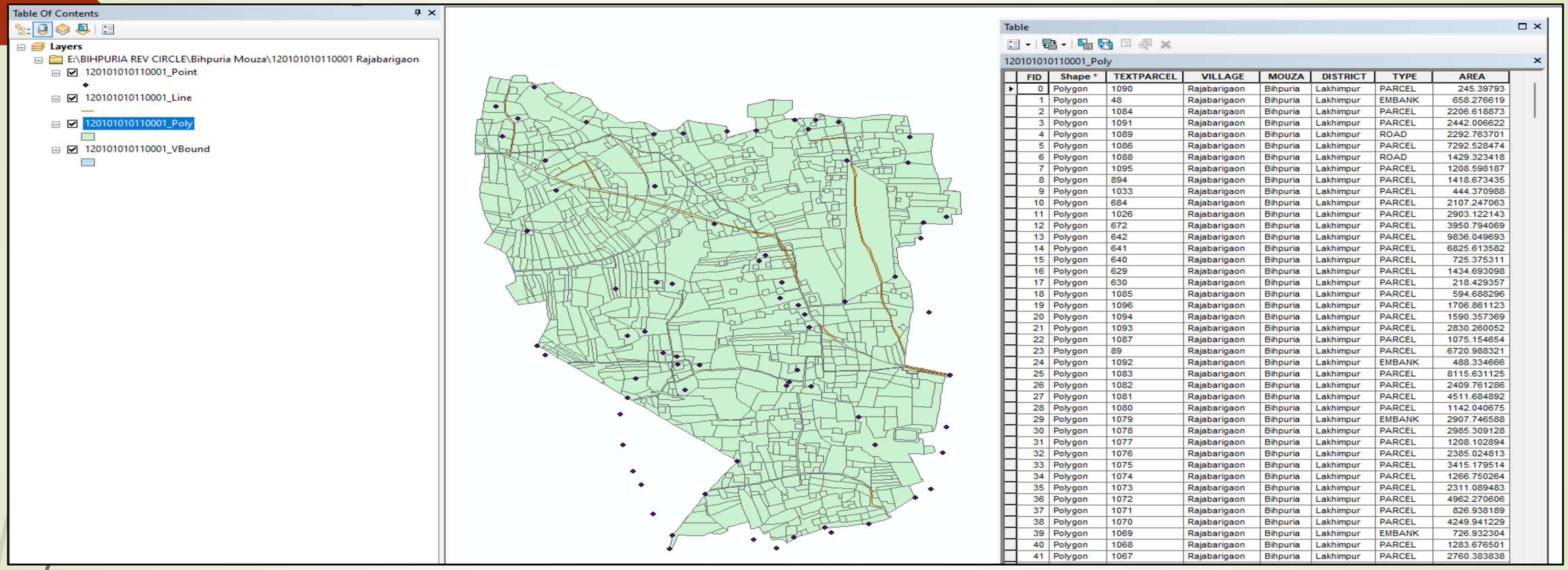
- Representing continuous phenomena is the raster data model, also called the field-based model. **The raster data model uses a regular grid to cover the space.**
- The value in each grid cell corresponds to the characteristic of a spatial phenomenon at the cell location.

Why is it required to have a standard GIS data model in Revenue & DM ecosystem?



- Complete Database containing geospatial attributes of DLR&S
- It ensures data quality and integrity
- Topological relationships between spatial features
- Information Extraction based on visual interpretation.

The present structure of the GIS database under Assam Survey



Table

120101010110001_Poly

FID	Shape *	TEXTPARCEL	VILLAGE	MOUZA	DISTRICT	TYPE	AREA
0	Polygon	1090	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	245.39793
1	Polygon	48	Rajabarigaon	Bihpuria	Lakhimpur	EMBANK	658.276619
2	Polygon	1084	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2206.618873
3	Polygon	1091	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2442.006622
4	Polygon	1089	Rajabarigaon	Bihpuria	Lakhimpur	ROAD	2292.763701
5	Polygon	1086	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	7292.528474
6	Polygon	1088	Rajabarigaon	Bihpuria	Lakhimpur	ROAD	1429.323418
7	Polygon	1095	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1208.598187
8	Polygon	894	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1418.673435
9	Polygon	1033	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	444.370988
10	Polygon	684	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2107.247063
11	Polygon	1026	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2903.122143
12	Polygon	672	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	3950.794069
13	Polygon	642	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	9836.049693
14	Polygon	641	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	6825.613582
15	Polygon	640	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	725.375311
16	Polygon	629	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1434.693098
17	Polygon	630	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	218.429357
18	Polygon	1085	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	594.688296
19	Polygon	1096	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1706.861123
20	Polygon	1094	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1590.357369
21	Polygon	1093	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2830.260052
22	Polygon	1087	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1075.154654
23	Polygon	89	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	6720.988321
24	Polygon	1092	Rajabarigaon	Bihpuria	Lakhimpur	EMBANK	488.334666
25	Polygon	1083	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	8115.631125
26	Polygon	1082	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2409.761286
27	Polygon	1081	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	4511.684892
28	Polygon	1080	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1142.040675
29	Polygon	1079	Rajabarigaon	Bihpuria	Lakhimpur	EMBANK	2907.746588
30	Polygon	1078	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2985.309128
31	Polygon	1077	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1208.102894
32	Polygon	1076	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2385.024813
33	Polygon	1075	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	3415.179514
34	Polygon	1074	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1266.750264
35	Polygon	1073	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2311.089483
36	Polygon	1072	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	4962.270606
37	Polygon	1071	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	826.938189
38	Polygon	1070	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	4249.941229
39	Polygon	1069	Rajabarigaon	Bihpuria	Lakhimpur	EMBANK	726.932304
40	Polygon	1068	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	1283.676501
41	Polygon	1067	Rajabarigaon	Bihpuria	Lakhimpur	PARCEL	2760.383838

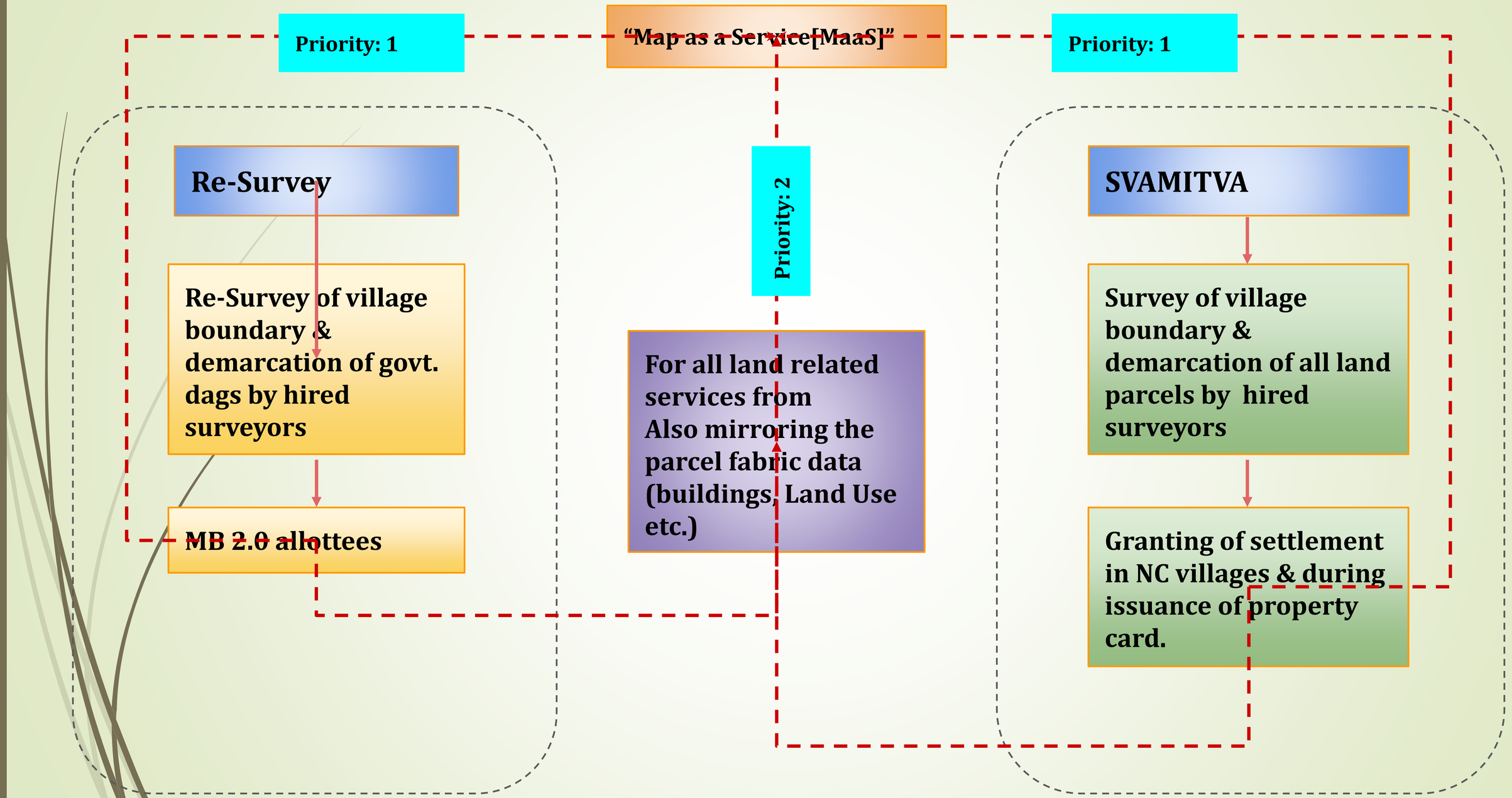
Attributes Information:

1. **Text Parcel (representing Dag Numbers)**
2. **Village Name**
3. **Mouza**
4. **District**
5. **Type of attribute (eg. Parcel)**
6. **Area**

- **Map as a Service (MaaS) refers to the provision of mapping and geospatial data services through an application programming interface (API) or a cloud-based platform. Here's an approach towards Map as a Service:**

1. Infrastructure and Data: Establish a robust infrastructure to host and manage the geospatial data required for the service. This includes building or utilizing existing servers, databases, and storage systems to handle the data. Acquire and maintain accurate and up-to-date mapping data from reliable sources, such as satellite imagery, drone ORI, or third-party providers.

Database	**Planning of Execution for GIS lab**	**To be process for the ground data verification and data collection**
● Existing cadastral maps & of previous settlement ● Mission Basundhara service wise application database for MaaS. ● Drone ORI ● HRSI (soon to be procured)	● Command & Control Centre ● Seamless ORI for entire AOI ● 2 km X 2 km square grid wise ORI and HRSI clipping for data management and hosting. ● Village boundary fixation applying whole to part approach in the lab environment. ● Visual identifications of the Govt land parcel	● Finalization of village boundary and govt dags using CORS compatible rovers. ● Monitoring of the field data collection process and QA/QC of the data from the **GIS Lab.** ● Finalization of the database centrally form the GIS lab.


Priority: 1
“Map as a Service[MaaS]”
Priority: 1
Re-Survey
Priority: 2
SVAMITVA
Re-Survey of village boundary & demarcation of govt. dags by hired surveyors
For all land related services from
Also mirroring the parcel fabric data (buildings, Land Use etc.)
Survey of village boundary & demarcation of all land parcels by hired surveyors
MB 2.0 allottees
Granting of settlement in NC villages & during issuance of property card.

The way ahead..

- Land Governance Bill &
  Title Guarantee Regime
- National Registry of Guaranteed Titles - Blockchain
- Geo spatial services after comprehensive survey
- Linking Land Revenue with Zonal Valuation
- Land Acquisition Portal

Land Governance Bill with Title Guarantee Framework

1. **Land Governance Bill – consolidation of all land governance statutes**
2. **Create a single source of truth of ownership status and history of a property transaction**
3. **Guaranteed titles** to all property owners and **compensation for indemnifying** the property holder against any loss arising due to inaccuracies out of **Title Guarantee Fund**
4. **Pre-requisite -** Updated Land Records and real time maps
5. **The most essential is the integration of textual and spatial records through comprehensive survey/resurvey**
6. **A legal framework formulated to maintain the records, register titles, dispute resolution, appellate mechanism to confer conclusive titles**
7. **Implement Conclusive Titling in a modular way by introducing it in villages which complete all precursory activities**

GIS for Governance

(Mapping a Smarter Future: The Power of GIS Infrastructure)

- To provide a **cutting-edge technological** environment and implement **geospatial solutions** to address real-world challenges.
- To leverage advanced geospatial technologies and data-driven approaches to support the current requirement in the process of **Digital India .**
- To understand complex spatial relationships, support evidence-based **decision-making**, and promote **sustainable and equitable development**.
- To fostering partnerships with **Line Departments**, **Agencies,Industry, and Academia** to promote knowledge exchange, **capacity building, and social impact**.

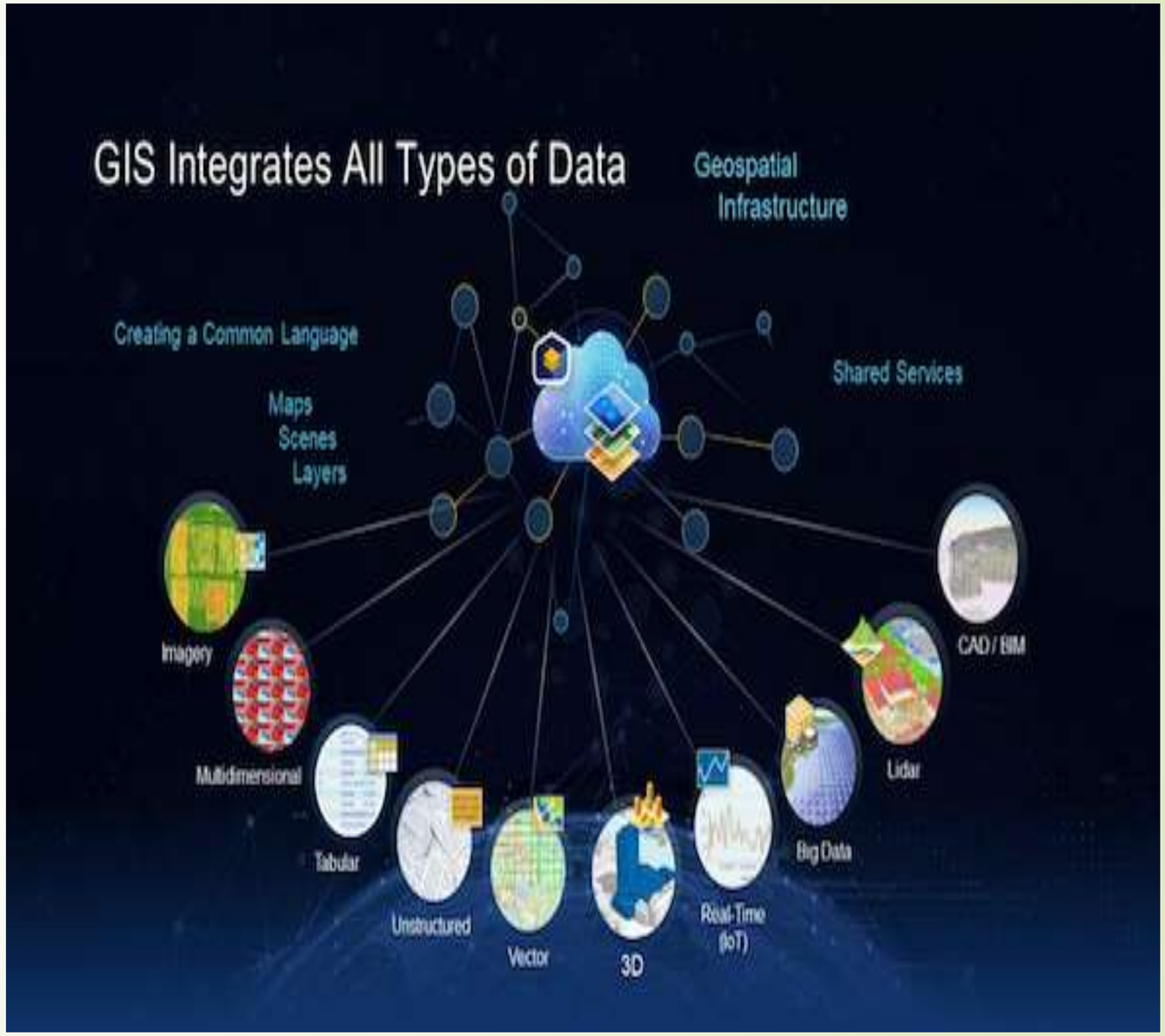
Ease of Doing business:

- Faster inter-departmental clearances.
- Accurate data/information.

- Facilitating monetisation of properties and enabling bank loans and other financial facilities.
- Reducing property related disputes, thereby enabling faster transaction and settlement.
- Comprehensive Village-level planning.
- Sharing land records data across departments, financial institutions and all stakeholders.
- Providing services to other sectors: Financial institutions, Courts, crop insurance, Fertiliser subsidies.
- Standardisation at data and application level would bring in effective integration and interoperability across departments.

Interoperability with Department

- Department of Housing & Urban Affairs
- Agriculture Department
- Disaster Management
- Land Acquisition
- Water Resource Department
- FREEMA
- Environment & Forest Department
- Irrigation
- Border Protection & Development Department
- PHED Department
- Panchayat and Rural Development Department
- PWD (Roads) Department
- Infrastructural Planning (Water Treatment Plant, Sewage Treatment, Solar Potential Mapping, Power Grid Mapping)



Way points

1. GIS lab as the nerve centre for geospatial information & planning.
2. Setup of Geospatial Unit in Assam Survey for providing geospatial consultancy services to departments of GoA.
3. Business model under ALMIS for providing such services.
4. Citizen centric service for dynamic maps pre - land transaction and post transaction/change in classification etc. i.e. including all geographical information in addition to land information.

Thank you.