संख्याः 1034/8–3–18–170 विविध/17 टी0सी0

प्रेषक,

नितिन रमेश गोकर्ण,
प्रमुख सचिव,
उत्तर प्रदेश शासन।

सेवा में,

1. उपाध्यक्ष,
समस्त विकास प्राधिकरण,
उत्तर प्रदेश।
2. समस्त अध्यक्ष,
विशेष विकास प्राधिकरण (साडा)
3. अधिशासी निदेशक,
आवास बन्धु,
उ0प्र0, लखनऊ।
4. मुख्य नगर एवं ग्राम नियोजक,
नगर एवं ग्राम नियोजन विभाग,
उ0प्र0, लखनऊ।

आवास एवं शहरी नियोजन अनुभाग–3 लखनऊः दिनांक 4 जुलाई, 2018

विषय–जोनल प्लान तैयार किये जाने के सम्बन्ध में।

महोदय,

उत्तर प्रदेश के समस्त विकास क्षेत्रों की महायोजनाओं के अन्तर्गत उत्तर प्रदेश, नगर योजना एवं विकास अधिनियम, 1973 की धारा–9 तथा विशेष क्षेत्र विकास प्राधिकरण अधिनियम, 1986 की धारा–8 के अन्तर्गत जोनल प्लान बनाये जाने अनिवार्य हैं, परन्तु अपरिहार्य कारणों से अधिकांश महायोजनाओं के अन्तर्गत जोनल प्लान तैयार नहीं किए गए हैं। शासन के संज्ञान में यह भी आया है कि कतिपय प्राधिकरणों द्वारा अपने–अपने स्तर से निजी कन्सलटेन्ट्स से जोनल प्लान तैयार कराये जा रहे है, परन्तु प्रदेश स्तर पर ऐसे जोनल प्लान्स में एकरूपता नही होगी जिसके कारण प्रदेश स्तर पर नगर नियोजन सम्बन्धी कार्यवाहियों के लिये समग्र विश्लेषण किया जाना कठिन होगा। भारत सरकार की अमृत योजनान्तर्गत विकास प्राधिकरणों से आच्छादित अधिकांश नगरों की महायोजनाओं को जी.आई.एस. प्रौद्योगिकी पर तैयार कराये जाने की कार्यवाही प्रगति पर है। जोनल प्लान्स को ऐसी जी.आई.एस. आधारित महायोजनाओं के साथ समन्वय करके तैयार किया जाना अत्यन्त आवश्यक है ताकि समय–समय पर भारत सरकार एवं राज्य सरकार के कामन पोर्टल पर महायोजनाओं एवं जोनल प्लान्स के मेटा डाटा को सुगमता से उपलब्ध कराया जा सके। वर्तमान में उपलब्ध अद्यतन प्रौद्योगिकियों एवं संसाधनों से इन जोनल प्लान्स को उपरोक्तानुसार अत्यन्त लघु अवधि में तथा सुगमता से तैयार किया जा सकता है।

2– उक्त की पृष्ठभूमि में शासन द्वारा विचारोपरान्त तात्कालिक प्रभाव से निम्न व्यवस्था लागू किये जाने का निर्णय लिया गया है :–

(क) उत्तर प्रदेश के समस्त विकास क्षेत्रों एवं विशेष विकास क्षेत्रों की महायोजना के जोनल डेवलपमेंट प्लान निजी विशेषज्ञ कन्सल्टेन्ट्स के सहयोग से जी0आई0एस0 तकनीक पर तत्काल तैयार कराए जाएं।

(ख) प्रदेश के समस्त जोनल प्लान्स के फार्मेट यथा–नियोजन नार्मस, इनडेक्सिंग/लीजेंड, बेस मैप इत्यादि में एकरूपता रखे जाने के लिए जी.आई.एस. प्रौद्योगिकी हेतु आवश्यक "डिजाइन एवं स्टैन्डर्ड" संलग्न है। जिन प्राधिकरणों द्वारा जोनल प्लान्स तैयार करवाये जा रहे हैं व उक्त "डिजाइन एवं स्टैन्डर्ड" के अनुसार जोनल प्लान में आवश्यक संशोधन सुनिश्चित करें।

(ग) अमृत योजनान्तर्गत तैयार कराई जा रही महायोजनाओं के लिए सेटेलाइट इमेजरी का क्रय, इनका डिजिटाईजेशन इत्यादि कार्यवाहियॉ NRSC हैदराबाद

द्वारा भारत सरकार के वित्तीय अनुदान से कराया जा रहा है। इस योजनान्तर्गत तैयार होने वाले डाटा का इष्टतम उपयोग किया जाना चाहिए ताकि प्राधिकरणों को अनावश्यक धनराशि व्यय न करनी पड़े तथा कार्यो की डुप्लीकेसी न हो। अतः जोनल प्लान्स को यथासम्भव भारत सरकार की अमृत योजनान्तर्गत तैयार कराई जा रही महायोजनाओं के लिए साथ डवटेल किया जाए।

(घ) जोनल प्लान्स को तैयार करने के लिए निजी विशेषज्ञ कन्सल्टेन्ट का चयन करने हेतु ई–निविदा की कार्यवाही नगर एवं ग्राम नियोजन विभाग, उ0प्र0 द्वारा की जाए, जिसके लिए आवश्यक RFP cum RFQ document को नगर एवं ग्राम नियोजन संगठन, भारत सरकार द्वारा AMRUT योजनान्तर्गत GIS Based Master Plan हेतु तैयार किये गये Template के आधार पर तैयार किया जाय। जोनल प्लान्स को तैयार कराने के लिए प्रत्येक प्राधिकरण में उपलब्ध सुसंगत डाटा, अमृत योजना से तत्काल प्राप्त होने वाला जी.आई.एस. का डाटा इत्यादि का पूर्ण उपयोग सुनिश्चित करके ही RFP cum RFQ document को अन्तिम रूप दिया जाये, इस हेतु समस्त प्राधिकरण वांछित सूचनायें संलग्न प्रारूप पर तत्काल नगर एवं ग्राम नियोजन विभाग ,उ.प्र. को उपलब्ध करायें।

(ड.) ई–निविदा के माध्यम से कन्टेन्ट्स का चयन करने के लिए मुख्य नगर एवं ग्राम नियोजक, उ0प्र0 की अध्यक्षता में निम्न "कन्सल्टेन्ट्स चयन एवं अनुश्रवण समिति" (CSRC) गठित की जाती है :–

1.	मुख्य नगर एवं ग्राम नियोजक, नगर एवं ग्राम नियोजन विभाग, उ0प्र0	अध्यक्ष
2.	सलाहकार (नियोजन) आवास बन्धु।	सदस्य
3.	मुख्य नगर नियोजक, लखनऊ विकास प्राधिकरण	सदस्य
4.	मुख्य नगर नियोजक, आगरा विकास प्राधिकरण	सदस्य
5.	किसी ख्याति प्राप्त इन्स्टीट्यूट के नगर नियोजन में अनुभवी प्रोफेसर	सदस्य
6.	वित्त नियन्त्रक, लखनऊ विकास प्राधिकरण	सदस्य
7.	नगर नियोजक, मुख्यालय, नगर एवं ग्राम नियोजन विभाग, उ0प्र0	सदस्य–सचिव

(च.) कन्सलटेन्ट्स के चयन प्रकिया में CSRC को सहयोग प्रदान करने के हेतु मुख्य नगर एवं ग्राम नियोजक, उ0प्र0 की अध्यक्षता में निम्न "टेक्निकल इवेलुऐशन कमेटी" (TEC) गठित की जाती है :–

1.	मुख्य नगर एवं ग्राम नियोजक, नगर एवं ग्राम नियोजन विभाग, उ0प्र0	अध्यक्ष
2.	सम्बन्धित अध्यक्ष/उपाध्यक्ष द्वारा नामित अधिकारी	सदस्य
3.	सम्बन्धित प्राधिकरण के नियोजन प्रभारी	सदस्य
4.	सम्बन्धित प्राधिकरण के वित्तीय कार्य से सम्बन्धित मुख्य अधिकारी	सदस्य
5.	किसी ख्याति प्राप्त इन्स्टीट्यूट के नगर नियोजन में अनुभवी प्रोफेसर	सदस्य
6.	नगर एवं ग्राम नियोजन विभाग, उ0प्र0 के सम्बन्धित वरिष्ठ नियोजक	सदस्य

(छ.) प्रत्येक महायोजना के अन्तर्गत ड्राफ्ट जोनल प्लान तैयार करने की सम्पूर्ण कार्यवाही 05 से 06 माह में पूर्ण की जाए।

(ज.) समस्त जोनल प्लान्स को मुख्य नगर एवं ग्राम नियोजक, उ0प्र0 के तकनीकी मार्गदर्शन में सम्बन्धित प्राधिकरण द्वारा तैयार कराया जाए। कन्सल्टेन्ट्स का भुगतान सम्बन्धित प्राधिकरण द्वारा RFP cum RFQ document में निर्धारित शर्तों/प्रतिबन्धों एवं समय सारिणी के अनुसार किया जाए।

(झ.) जोनल प्लान्स को तैयार किये जाने की प्रक्रिया का अनुश्रवण अधिशासी निदेशक, आवास बन्धु द्वारा नियमित रूप से किया जाए।

3– कृपया उपरोक्त व्यवस्था को तात्कालिक प्रभाव से सुनिश्चित कराया जाए।

संलग्नक: (1)Design & Standards for GIS based plans.
(2)जोनल प्लान्स हेतु सूचना प्रपत्र।

भवदीय,

5/2/2018

(निलिन रमेश गोकर्ण)
प्रमुख सचिव।

संख्या एवं दिनांक तदैव।

प्रतिलिपिः– निदेशक, आवास बन्धु, को शासनादेश की प्रति विभाग की शासकीय वेबसाइट में तत्काल अपलोड कराये जाने हेतु प्रेषित।

आज्ञा से,

(संजय कुमार सिंह)
अनु सचिव।

: जोनल प्लान तैयार करने हेतु सूचना प्रपत्र :

प्राधिकरण का नाम : .....

महायोजना का नाम	सम्बन्धित नगर का नाम	लागू महायोजना की अवधि	महायोजना में चिन्हित जोन्स की संख्या	जोन्स का नाम	जोन का क्षेत्रफल (वर्ग कि.मी. में)	जोनल प्लान की अद्यतन स्थिति (यदि प्राधिकरण स्तर पर तैयार किये जा रहे हैं)	महायोजना डिजिटाइज्ड फार्मेट में उपलब्ध है अथवा नहीं (Auto CAD or GIS पर)	बेस मैप की स्थिति (उपलब्ध है अथवा नहीं)	टिप्पणी
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1.			उदाहरण : कुल 05 जोन्स	(1)					
				(2)					
				(3)					
				(4)					
				(5)					
2.			उदाहरण : कुल 04 जोन्स	(1)					
				(2)					
				(3)					
				(4)					

नोट : 1. महायोजना के भू–उपयोग मानचित्र पर प्रदर्शित प्रत्येक जोन का मानचित्र (हार्ड प्रति व .pdf फार्मेट साफ्ट प्रति) संलग्न करें।

2. यदि महायोजना में जोन्स का प्लान नहीं है तो महायोजना के भू–उपयोग मानचित्र पर प्राधिकरण की प्रशासनिक आवश्यकता एवं नियोजन के दृष्टिकोण से विवेकपूर्ण जोन्स की संख्या एवं जोन्स की सीमा को चिन्हांकित करके प्राधिकरण बोर्ड से प्रस्ताव पारित कराकर उपलब्ध कराया जाए। ऐसे प्रस्ताव जो प्रचलित महायोजना में संशोधन होंगे, हेतु शासन स्तर से निर्णय लिया जाएगा।

3. यदि जोनल प्लान को निजी कन्सल्टेन्ट के माध्यम से तैयार किये जाने की कार्यवाही प्राधिकरण स्तर से की जा रही है तो कार्य पूर्ण होने की अवधि का उल्लेख करें।

Formulation of GIS Based Zonal Development Plans & Sector Plans

Design and Standards

Town & Country Planning Department
Ministry of Housing & Urban Planning,
Government of Uttar Pradesh

SOURCE : FORMULATION OF GIS BASED MASTER PLANS FOR AMRUT CITIES (Design and Standards), issued by Town & Country Planning Organisation, Ministry of Urban Development, Government of India & National Remote Sensing Centre, Deptt. Of Space Government of India

ACRONYMS

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
Admin	Adminstrative
AOI	Area of Interest
ASPRS	American Society for Photogrammetry and Remote Sensing
ATM	Automated Teller Machine
BOD	Biological Oxygen Demand
BPL	Below Poverty Level
BRTS	Bus Rapid Transit System
CBR	Crude Birth Rate
CE	Circular Error
CFL	Compact fluorescent lamp
CGWB	Central Ground Water Board
CHC	Community Health Centre
Cline	Central Line
CNG	Compressed Natural Gas
DA	Development Authority
D.P	Development Plan
DD	Date
DEM	Digital Elevation Model
DGPS	Differential Global Positioning System
Dia	Diameter
DIC	District Industries Centre
DoS	Department of Space
Drain	Drainage
DTM	Digital Terrain Model
DU	Dwelling Unit
EB	Enumeration Block
EO	Earth Observation
GCP	Ground Control Point
GDOP	Geometric Dilution of Precision
GIS	Geographic Information System
GLR	Ground Level Reservoir
GoI	Government of India
GPS	Global Positioning System
GSI	Geological Survey of India
HH	Household
HHI	Household Industry
HP	Horse Power
HPMV	High Pressure Mercury Vapour
HQ	Head quarters
HRIDAY	Heritage City Development and Augmentation Yojana
hrs	Hours
HT	High Tension
ID	Identification Number
IGS	International Ground Station
IMR	Infant Mortality Rate

IR	Infra-red
IRC	Indian Roads Congress
ISO	International Organization for Standardization
ISRO	Indian Space Research Organisation
IT	Information Technology
ITRF	International Terrestrial Reference Frame
LE	Linear Error
LFDC	Large Format Digital Camera
LISS	Linear Imaging Self-Scanner
LPCD	Litre per Capita per Day
LPG	Liquefied Petroleum Gas
LT	Low Tension
Mat	Material
mg/L	Milligrams per Litre
MILMA	Brand household name of The Kerala Co-operative Milk Marketing Federation
MKWH	Million KiloWatt per Hour
MLD	Mega Litter per Day = 10*6 L/day (unit of water storage in dams and reservoirs)
MMTS	Multi-Modal Transport System
MoUD	Ministry of Urban Development
MRTS	Metro Rapid Transit System
MSL	Mean Sea Level
MW	MegaWatt
NAS	Network Attached Storage
NCC	Natural Colour Composite
NDMA	National Disaster Management Authority
NGO	Non-Government Organization
NHAI	National Highway Authority of India
NMP	National Map Policy
NNRMS	National Natural Resource Management System
NO	Nitric Oxide also known as Nitrogen Monoxide
NRSC	National Remote Sensing Centre
NSDI	National Spatial Data Infrastructure
NSSO	National Sample Survey Organisation
NUIS	National Urban Information System
OGC	Open Geospatial Consortium
PAN	Panchromatic
pH	Potential of Hydrogen
PHC	Primary Health Care
PPP	Public Private Partership
QA	Quality Assurance
QC	Quality Check
R& B Dept.	Roads and Buildings Department
RGI	Registrar General of India
RMSE	Root Mean Square Error
RPC	Rational Polynomial Coefficient
RWA	Resident Welfare Association
SEZ	Special Economic Zone
SADA	Special Area Development Authority
SO_2	Sulphur di-oxide

SPM	Suspended Particulate Matter
TCPO	Town & Country Planning Organisation
TCPD	Town & Country Planning Department, U.P.
TV	Telivision
UA	Urban Agglomeration
UFS	Urban Framework Survey
ULB	Urban Local Body
ULU	Urban landuse/landcover
URDPFI	Urban and Regional Development Plans Formulation and Implementation
UT	Union Territory
UTM	Universal Transverse Mercator
VHRS	Very High Resolution Satellite
WBM	Water Bound Macadam
WFPR	Workforce Participaticate Rate
WGS84	World Geodetic System (WGS) established in 1984
SHG	Self Help Group
LCS	Low Cost Sanitation
WTP	Water Treatment Plant

ELEMENTS OF STANDARD

Remote Sensing data, Base map & Urban Land use GIS database including spatially linked socio-economic attribute information and administrative boundaries are important datasets for the formulation of Master Plan/Zonal Development Plans. Development of uniform design and standards is necessary to enable the central and state level departments to adopt the implementation of national/state urban schemes. The main elements of Standards are given below.

1. Remote Sensing Image Standards
2. Spatial Reference Standards
3. Geo-spatial Data Content and GIS Database Standards
4. Quality Assurance/Quality Check
5. GIS database dissemination to DAS/SADASs for Master Plan/Zonal Development Plan formulation
6. Metadata standards

1. Remote Sensing Image Standards

Very High Resolution satellite images or Aerial Large Format Digital Camera (LFDC) multi-spectral photography data are the best input sources for large scale mapping. The following tables describe the input image standards-

1. Raw image standards- required for satellite data procurement
2. Ground Control Points (GCPs) – for geo-referencing/ortho-rectification of satellite image
3. Geo-referenced/Ortho-rectified image – the final image used for feature extraction.

1.1 Raw Image Standards

Table 1: Raw Image Standards

S. No	Description	Value	Remarks
1	Spatial Resolution	0.5 metres or Better	
2	Spectral Resolution	PAN Sharpened (Bands:Panchromatic,Red, Green, Blue and Near Infrared)	IR band is optional
3	Band to Band registration	Less than 1/4th of pixel size	
4	Radiometry	10 bit or better	
5	Image Resampling	Nearest Neighbourhood	
6	a. Monoscopic/Stereoscopic	Plain Areas:Monoscopic Highly Hilly areas:Stereoscopic	Need of Stereoscopic to be reviewed case by case. If the city is built on the terrain slope more than 15degrees.
	b. Monoscopic data View angle	Less than 10 degree from nadir	In specific cases, maximum upto 15 degrees view angle shall be allowed
	c. Stereoscopic	One of the stereo image view angle should be less than 10degrees from nadir	Base to Height(B/H) ratio: 0.6<B/H< 0.8
7	Vantage imaging	Fresh acquisition: Within 6 months Archived Data: Less than 1 year	If one town/city is covered by multiple scenes, the time difference among the scenes should be less than 3 months.
8	Product type	Image data should be associated with corresponding Rational Polynomial Coefficients (RPCs) Format: 1. image data: Geo-tiff	Ortho-kit data with RPCs

S. No	Description	Value	Remarks
		2. RPCs : Open standards	
9	Spatial Reference	Datum : WGS84 Projection : UTM	
10	Cloud Coverage	Zero % in the core town/city, Less than 10% in the periphery of town/city limits	Cloud free datais preferable

1.2 *Ground Control Points (GCPs) Standards required for Photogrammetric Block Adjustment and Ortho-rectification of satellite data*

Table 2: Ground Control Points (GCPs) Standards

S. No	Description	Value	Remarks
1	Survey method used for GCPs	Differential GPS Survey (DGPS)	DGPS survey points should be processed using closed network traverse. The reference station coordinate shall be computed using ITRF (International Terrestrial Reference Frame)
2	Accuracy	Positional accuracy (X,Y): better than 0.5mts Height accuracy (Z) : better than 0.5mts	With reference to absolute accuracy of Reference station coordinates in ITRF
3	Spatial reference	Horizontal Datum : WGS84 Projection : UTM Vertical Datum : WGS84 or MSL Units : Meters	Towns for which Stereo data is selected: The GCPs vertical Datum must be MSL.
4	No. of GCPs	a. Uniform Distribution for the entire city/town planning area b. At least one GCP for every 5 sq. km. c. At the overlap of images GCPs should be available d. The position of GCPs should be on the non-variable features	GCPs must be clearly visible in the Satellite image. GPS reference station shall be a monument in Cement concrete and embedded brass-plate to ensure station revisit, whenever the need arises.

(Brief DGPS survey method is given Annexure-II)

1.3 Ortho-rectification of Satellite data Standards

Table 3: Ortho-rectification of Satellite data Standards

S. No	Description	Value	Remarks
1	Procedure/ Methodology	Photogrammetric Bundle block adjustment for monoscopic or stereoscopic data using Control points	Photogrammetric Bundle Block level accuracy better than one pixel
2	Ortho-rectification	DEM Source: Monoscopic data: CartoDEM or open source DEMs Stereoscopic data: DEM/DTM generated from the stereo pair	
		Ortho-rectified image Output Format	
4	Spatial Reference	Datum: WGS 84 Projection : UTM/Geographic	
5	Spatial Resolution	0.5 meters or better	
6	Spectral resolution	PAN sharpened Natural Color Composite (NCC)	
7	Radiometry	Input Data radiometric resolution	
8	Planimetric Accuracy	• RMSE (Root Mean Square Error) = better than 1mts • CE 90 (Circular error) = 2.4 X $RMSE_{XY}$ • LE 90 (Linear error) = 2.4 X $RMSE_Z$	CE 90 & LE 90 means 90% of samples fall within that range.
9	Resampling	Nearest Neighbourhood	While interpretation of image online re-sampling may be changed to bi-linear or cubic as per interpreter's choice.
10	Format	Town/city mosaic in Geo-tiff	

2. Spatial Reference Standards

Spatial reference standards define the coordinate system, geographic extent of city level GIS databases.

2.1 Coordinate System

Spatial reference is selected as per National Map Policy (NMP) 2006, accordingly spatial reference standards are given below:

Table 4: Spatial Reference Standards

S. No	Description	Value	Remarks
1	Datum	WGS84	
2	Projection	➢ For mapping/printing maps/ publishing =UTM, if city falls in more than one UTM zone, the maximum covered zone will be considered. ➢ For GIS database, storing &management = Geographic	Data will be stored in Geographic co-ordinate system and will be projected to UTM online for mapping/interpretation, analysis & printing.
3	Extent	Extent of each town = Minimum bounding box to Planning area boundary with 5km. buffer	Additional 5km.buffer is selected to cater to accommodate the near future increase in Planning Area.

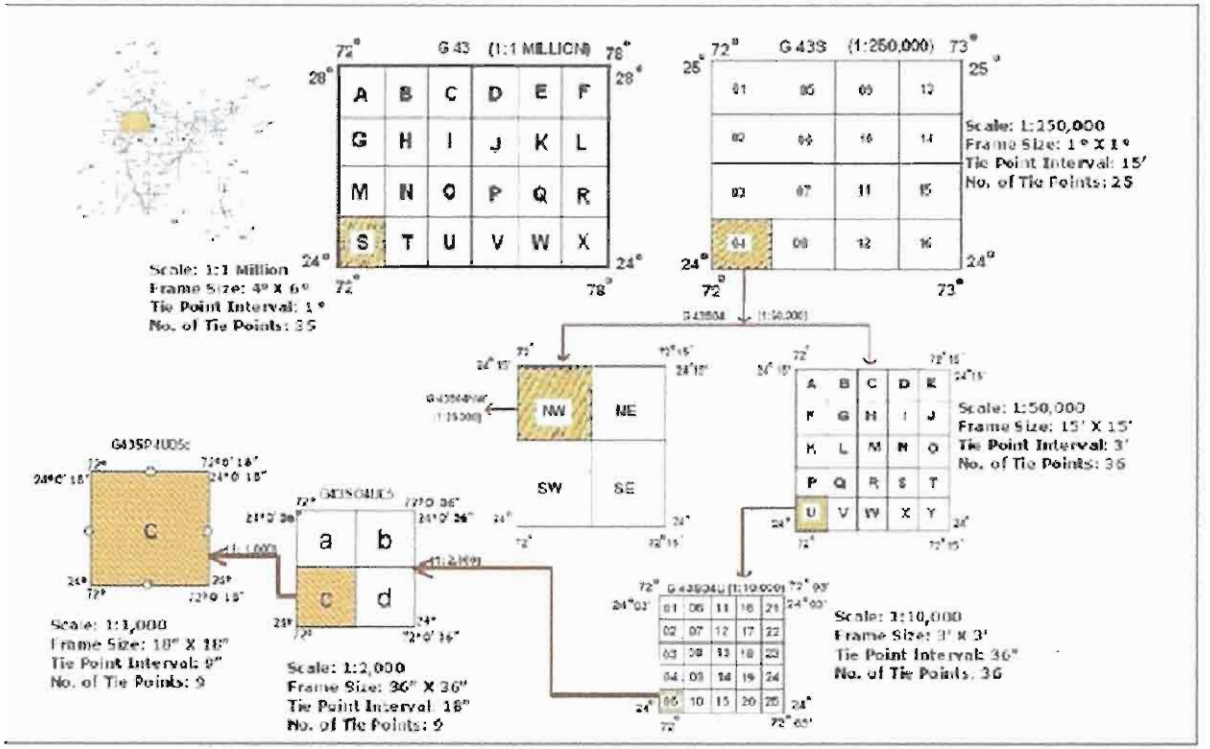
2.2 *Map sheet frame for hardcopy prints*

With the advancements in GIS, the utilisation of hard copy maps is limited to the field work and field verification of data. The digital GIS environment can be used for spatial and attribute data analysis and GIS based Master Plan/Zonal Development Plan formulation. The proposed 1:4000 scale under this scheme is not compatible to National Scheme of Map series. In view of this, it is proposed to use the existing National Map Scheme which was developed and adopted in NUIS Scheme.

Whenever required hard copy maps can be printed for visualisation purpose at different scale for example at 1: 10000 for town/city map; 1:2000 or 1:1000 for field verification and data collection purpose. The Schematic Representation of Map Frame and Tie Pointsis given in Figure 1.

To enable the compatibility of cadastral map scales, it is proposed to adopt State specific cadastral map sheet series at 1:4000scale, 1:8000 scale or any other specific scale. The extent of the Map sheet, Map sheet number and size shall be according to the scale adopted by the respective State/UT.

Figure 1: Schematic Representation of Map Frame and Tie Points



3. Geo-Spatial Data Content and GIS Data Structure Standards

3.1 Geo-Spatial Data Content

Existing Urban Land use/Land cover, base map and utilities network data at 1: 4000 scale and city local data in GIS format are the important inputs for formulation of GIS based Master Plan/Zonal Development Plan and Infrastructure Development Plan. These geo-spatial data layers and their basic source are given in Table-5.

Table 5: Geo-Spatial Data Content

Sl No.	Spatial Layers	Source for Spatial data generation	Classification based on Use & Attributes	
			Classes	Sub Classes
I	Base layers	Very High Resolution satellite data	5	46
	1. Road			
	2. Rail			
	3. Bridges			
	4. Flyovers			
	5. Water bodies			
II	Urban Land Use/Land cover	Very High Resolution satellite data	28	220
III	Building Footprints	Very High Resolution satellite data	22	144
IV	Utilities			
	1. Water Supply Network	Urban Local Bodies	1	12
	2. Storm Water Drainage Network		1	2
	3. Sewerage Network		1	8
	4. Power Supply Network		1	8
	5. Gas Distribution Network		1	6
V	Hypsography			
	1. Digital Elevation Model(DEM) Type : Digital Terrain Model (DTM)	Topographic Survey; existing DEMs or contour maps.	1	1
	2. Contour		1	1
	3. Ground Control Points		1	2
VI	Cadastral Layer	Urban Local Bodies /State Revenue Department	1	-
VII	Boundaries			
	1. Administrative boundaries	State Revenue Department	1	7
	2. Planning boundaries	Urban Local Bodies	1	8
	3. Municipal boundaries	Urban Local Bodies	1	4
	4. Other Boundaries – Enumeration Block(EB), Urban Framework Survey(UFS) & Mining Area	EB from Registrar General Of India (RGI), UFS from National Sample Survey Organisation (NSSO) & Mining area boundary from concerned State Departments.	1	3
VIII	Hazard Prone Areas	Information from NRSC, ISRO, GSI, NDMA, Other State & Central Government Dept.	1	3

Totally there are 69 major classes and 475 sub-classes for 1:4000 scale urban geo-spatial data for GIS based

Zonal Development Plan/Sector Plan formulation. Details of classification and sub-classification are given in the subsequent Tables 6 to 25.

3.2 Feature Geometry

The size, shape and scale at which the geo-spatial feature is mapped define its geometric representation in GIS. Area features like water bodies are represented in polygon geometry; line features like water supply network are represented in line geometry; point features like Electric Pole are represented in point geometry. Some of the area features like roads are represented in both polygon and line geometry. For example, the width of road is represented in polygon and road centreline is represented in line geometry. In such cases attributes are associated with line feature. The basic criteria to define the geometry of geo-spatial features are given below:

- Features having an area more than of 5 pixels by 5 pixels (as per image standards 6.25 sq. mt.) shall be represented as polygons. Inother cases, where the features have area less than 5 pixels by 5 pixels, defined as point or line based on the feature type.
- In the Road layer, Roads having width of 7.5m and more will be captured as polygon and the road centre as line. Roads having width of less than 7.5m will be captured only as line.
- Rail feature, shall be captured as line. Railway track area shall be captured as polygon.
- All utility network layers are defined as lines and the nodes (starting point, intersections, valves, end points etc.) defined as points.
- Features such as garbage collection point, electric poles, cell towers etc., are defined as point.

3.3 GIS Data Structure

Geographic/urban feature is classified and further sub-classified based on its use & attributes. Cities in plain terrain or rolling terrain, ortho-rectified satellite image is used to capture the features in 2-dimention. As mentioned in image standards (Table 1),the cities in high relief hilly areas, the stereo data is used to capture the features in 3-dimension. In 3D mapping, x,y,z of the each vertex is stored in the feature geometry. According to the feature dimensionality (2D or 3D), the GIS data structure of polygon, line or point features can be 2 dimension or 3-dimension. OGC compliant GIS database models like shape file, geodatabase, oracle spatial data model, Postgres data model etc., may be implemented for generation of GIS layer data structure for storing spatial & attribute data.

3.4 Coding Scheme

Each GIS feature is assigned with a unique four character alphanumeric code. The code is unique with respect to the feature, irrespective of its geometry and layer.The first two characters of the code represent the Class and next two characters represent the Sub Class. For example, **Code: 01-02**; 01 represents Road Class; 02 represents the Road Sub-class State Highway.

3.5 Layer wise Data content, Classification and GIS data Structure

I. BASE LAYERS:

The road feature will be captured as both Polygon and Line. Road area is represented as polygon and Road centreline as Line.

Table 6: Road: Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	01-01	Road	*National Highway*	Polygon / Line	
	01-02		*State Highway*	Polygon / Line	
	01-03		*Major District Road*	Polygon / Line	
	01-04		*Other District Road*	Polygon / Line	
	01-05		*Expressway*	Polygon / Line	
	01-06		*Bypass*	Polygon / Line	
	01-07		*Ring Road*	Polygon / Line	
	01-08		*Service Road*	Polygon / Line	
	01-09		*Major City Road#*	Polygon / Line	
	01-10		*Minor City Road#*	Polygon / Line	
	01-11		*Other Public Road*	Polygon / Line	
	01-12		*Other Private Road*	Polygon / Line	
	01-13		*BRTS*	Polygon / Line	
	01-14		*Cycle Track*	Polygon / Line	
	01-15		*Village road*	Polygon / Line	
	01-16		*Foot path*	Line	
	01-17		*Cart track*	Line	
	01-18		*Ropeway*	Line	
	01-19		*Carriageway**	Line	
	01-20		*Right of way**	Line	

#Roads having width of 10.5m/11m and more will be called Major City Road and less than 10.5m/11m as Minor City Road(for information, the road widths mentioned are as per IRC standards)
**Source for Carriageway and Right of way: Revenue records.*

Table 6a: Road Line GIS Data Structure

Geo-spatial Layer Name: Road_CLine

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Road Id	**Rd_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 6
Sub-Class	**Sub_Class**	Text	20	Sub Class as given in Table 6
Length in km.	**Length_km.**	Double	10 Up to 4 decimals	Length (in km.)
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road Name	**Rd_Name**	Text	30	Specific Name of the feature, if any
Road Construction	**Cons_Mat**	Text	10	Concrete/Asphalt/WBM/AnyOther

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Material				
Carriage Width (in mt.)	**CW_Width**	Double	10 Up to 4 decimals	Carriage Width in metres
Right of Way Width (in mt.)	**ROW_Width**	Double	10 Up to 4 decimals	Right of Way Width in metres
Maintained By	**Maintain**	Text	15	Municipal body/NHAI/R & B Dept./Other
Foot Path	**FP**	Text	3	Yes/No
Foot path width(in mt.in case Yes)	**FP_Width**	Double	10 Up to 2 decimals	Footpath Width in metres
Foot Path Construction material	**FP_Cons_Ma**	Text	15	Shabad/Tiles/Concrete/Other Stone

Table 6b: Road Polygon GIS Data Structure

Geo-spatial Layer Name: Road_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	**Code**	Alphanumeric	10	Code as given in Table 6
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 6
Road Name	**Rd_Name**	Text	30	Specific Name of the road, if any

Table 7: Rail – Geo-Spatial Data Content

All the railway lines will be captured as lines in Base layer and the railway track area shall be captured as polygon in Urban Land Use layer.

S.No	Code	Class	Sub-Class	Geometry	Symbol
2	**02-01**	**Rail**	*Broad Gauge*	Line	
	02-02		*Narrow Gauge*	Line	
	02-03		*Meter Gauge*	Line	
	02-04		*Metro/MRTS*	Line	
	02-05		*MMTS*	Line	

Table 7a: Rail Line GIS Data Structure

Geo-spatial Layer Name: Rail_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Rail Id	**Rail_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 7
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 7
Railway Line Name	**Rly_Name**	Text	30	Specific Name of the railway line, if any

Table 8: Bridges/Flyovers –Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
3	03-01	Bridges	*Culvert*	Line	
	03-02		*Tunnel*	Line	
	03-03		*Bridge across river*	Line	
	03-04		*Over Bridge*	Line	
	03-05		*Under Pass*	Line	
	03-06		*Road Bridge across Rail*	Line	
	03-07		*Subway*	Line	
	03-08		*Foot over bridge*	Line	
	03-09		*Rope bridge*	Line	
4	04-01	Flyovers	*Flyover*	Line	

Table 8a: Bridges & Flyovers GIS Data Structure

Geo-spatial Layer Name: Bridge_Flyover_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Bridge & Flyover ID	Br_Fly_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 8
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 8
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Rail Id	Rail_ID	Alphanumeric	15	Rail ID same as in Rail_Line
Railway Line Name	Rly_Name	Text	30	Railway Line Name same as in Rail_Line
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Locality Name	Locality	Text	50	Locality Name
Bridge/Flyover Width (in mt.)	Width	Double	10 Upto 2 decimals	Width in metres
Bridge/Flyover Length (in mt.)	Length	Double	10 Upto 2 decimals	Length in metres
Construction Material	Cons_Mat	Text	15	Iron/Masonry/Concrete/Any Other
Construction Year	Cons_Yr	Text	4	Year of Construction

Table 9: Water bodies – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
5	05-01	Water Bodies	*River*	Polygon	
	05-02		*Stream*	Polygon / Line	
	05-03		*Canal*	Polygon / Line	
	05-04		*Drain*	Polygon / Line	
	05-05		*Ponds*	Polygon	
	05-06		*Lake*	Polygon	
	05-07		*Tank*	Polygon	
	05-08		*Island (River/Lake)*	Polygon	
	05-09		*Reservoir*	Polygon	
	05-10		*Back Water*	Polygon	
	05-11		*Sea*	Polygon	

Table 9a: Water bodies Line (Stream, Canal, Drain) GIS Data Structure

Geo-spatial Layer Name: Waterbodies_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 9
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 9
Name of the Waterbody	Name	Text	50	Specific Name of the Stream, Canal, Drain, if any

Table 9b: Water bodies Polygon GIS Data Structure

Geo-spatial Layer Name: Waterbodies_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 9
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 9
Name of the Waterbody	Name	Text	50	Specific Name of the waterbody, if any

I. URBAN LAND USE/LAND COVER:

All the urban land uses are extracted as polygons, except a few, such as Community Toilet, Fire Station, Garbage Collection points, Landfill sites & Dumping yard, Cell towers, Slums, Bus Stops, Trees etc, which are extracted as points. Out of these urban land use point features, some of them have feature specific attributes which are provided in the following respective attribute and GIS structure tables.

Table 10: Urban Land use/Land cover - Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	06-01	Residential	*Residential Area/Colony*	Polygon	
	06-02		*Township*	Polygon	
	06-03		*Housing scheme*	Polygon	
2	07-01	Commercial	*Retail*	Polygon	
	07-02		*Wholesale*	Polygon	
	07-03		*General Business*	Polygon	
	07-04		*Hotel / Lodge / Restaurant*	Polygon	
	07-05		*Shopping Centre / Mall*	Polygon	
	07-06		*Multiplex / Cinema*	Polygon	
	07-07		*Function Hall / Marriage Garden*	Polygon	
	07-08		*Warehouse*	Polygon	
	07-09		*Storage Godown*	Polygon	
	07-10		*Resort*	Polygon	
	07-11		*Petrol Pump / LPG filling station*	Polygon	
	07-12		*Informal Shop*	Polygon	
	07-13		*Hostel*	Polygon	
	07-14		*Market (Daily & Weekly) / Mandi*	Polygon	
3	08-01	Industrial	*Manufacturing*	Polygon	
	08-02		*Service*	Polygon	
	08-03		*Chemical*	Polygon	
	08-04		*Pharmaceutical*	Polygon	
	08-05		*Textile*	Polygon	
	08-06		*IT Parks*	Polygon	
	08-07		*Industrial Estate / SEZ*	Polygon	
	08-08		*Agro based & Food Processing*	Polygon	
	08-09		*Obnoxious*	Polygon	
	08-10		*Cottage and Household*	Polygon	
	08-11		*Other Industries*	Polygon	
4	09-01	Mixed	*Residential &Commercial*	Polygon	
	09-02		*Residential &Household Industry*	Polygon	
	09-03		*Residential & Educational*	Polygon	
	09-04		*Residential & Health Services*	Polygon	
	09-05		*Commercial & Industrial*	Polygon	
	09-06		*Commercial &Health Services*	Polygon	
	09-07		*Commercial & Educational*	Polygon	

S.No	Code	Class	Sub-Class	Geometry	Symbol
	09-08		*Commercial & Recreational*	Polygon	
	09-09		*Residential & Commercial & Institutional*	Polygon	
5	10-01	Educational	*School*	Polygon	
	10-02		*College*	Polygon	
	10-03		*University*	Polygon	
	10-04		*Vocational Institute*	Polygon	
	10-05		*Anganwari*	Polygon	
	10-06		*Training Institute*	Polygon	
6	11-01	Health Services	*Govt. Hospital*	Polygon	
	11-02		*Private Hospital*	Polygon	
	11-03		*Diagnostic Centre*	Polygon	
	11-04		*Clinic/Dispensary*	Polygon	
	11-05		*Nursing Home*	Polygon	
	11-06		*Primary/Community Health Centre*	Polygon	
7	12-01	Central Govt. Property	*Office*	Polygon	
	12-02		*Quarter*	Polygon	
8	13-01	State Govt. Property	*Office*	Polygon	
	13-02		*Quarter*	Polygon	
9	14-01	Railway Property	*Railway Property®*	Polygon	
10	15-01	Public& Semi-public	*Private Office*	Polygon	
	15-02		*Banks*	Polygon	
	15-03		*Credit Society*	Polygon	
	15-04		*Foreign Establishment*	Polygon	
	15-05		*Police Station*	Polygon	
	15-06		*Cantonment/Battalion*	Polygon	
	15-07		*Jail*	Polygon	
	15-08		*Crematorium Burial Groun /Grave Yard*	Polygon	
	15-09		*Guesthouse*	Polygon	
	15-10		*Community hall*	Polygon	
	15-11		*Dharmashala*	Polygon	
	15-12		*Tourist Facility Centre*	Polygon	
	15-13		*Auditorium*	Polygon	
	15-14		*Convention Centre*	Polygon	
	15-15		*Museum*	Polygon	
	15-16		*Public Library*	Polygon	
	15-17		*Art Gallery & Cultural Centre*	Polygon	
	15-18		*LPG/CNG Gas Booking Office*	Polygon	

S.No	Code	Class	Sub-Class	Geometry	Symbol
	15-19		*Ticket Booking & Reservation Office*	Polygon	
	15-20		*Stock Exchange*	Polygon	
	15-21		*Disaster Management Centre*	Polygon	
	15-22		*Metrological Station*	Point	
	15-23		*Dhobi Ghat*	Polygon	
	15-24		*Crech/Day Care*	Polygon	
	15-25		*Public/Community Toilet*	Polygon	
	15-26		*Social Welfare Centre*	Polygon	
	15-27		*Orphanage*	Polygon	
	15-28		*Old Age Home*	Polygon	
	15-29		*Night Shelter*	Polygon	
	15-30		*Fire Station*	Polygon	
	15-31		*ATM*	Point	
11	16-01	Religious	*Temple*	Polygon	
	16-02		*Mosque*	Polygon	
	16-03		*Idgah*	Polygon	
	16-04		*Church*	Polygon	
	16-05		*Gurudwara*	Polygon	
	16-06		*Monastery*	Polygon	
	16-07		*Synagogue*	Polygon	
	16-08		*Chhatri*	Polygon	
12	17-01	Recreational	*Garden*	Polygon	
	17-02		*Park*	Polygon	
	17-03		*Play Ground*	Polygon	
	17-04		*Club*	Polygon	
	17-05		*Sports Centre*	Polygon	
	17-06		*Gymnasium*	Polygon	
	17-07		*Swimming Pool*	Polygon	
	17-08		*Stadium*	Polygon	
	17-09		*Planetarium*	Polygon	
	17-10		*Aquarium*	Polygon	
	17-11		*Open Air Theatre*	Polygon	
	17-12		*Golf Course*	Polygon	
	17-13		*Race Course*	Polygon	
	17-14		*Exhibition Ground*	Polygon	
	17-15		*Amusement /Theme Park*	Polygon	
13	18-01-01	Public Utilities	*Water Treatment Plant*	Polygon	
	18-01-02		*Water Pumping Station*	Polygon	
	18-01-03		*Ground Level Reservoir*	Polygon	

S.No	Code	Class	Sub-Class	Geometry	Symbol
	18-03-01		*Sewage Treatment Plant*	Polygon	
	18-03-02		*Sewage Pumping Station*	Polygon	
	18-04-01		*Electric Power Plant*	Polygon	
	18-04-02		*Electric Sub-Station*	Polygon	
	18-05-01		*City Gate Metering Stations*	Polygon	
	18-05-02		*Area Regulator Stations*	Polygon	
	18-06		*Rain Water Harvesting System*	Polygon	
	18-07		*Effluent Treatment Plant*	Polygon	
14	19-01	**Solid Waste Management**	*Land Fill Site*	Polygon	
	19-02		*Dumping Yard*	Polygon	
	19-03		*Recycling Plant*	Polygon	
	19-04		*Garbage Collection Point/Dumper*	Point	
15	20-01	**Communication**	*Telephone exchange*	Polygon	
	20-02		*Post/Telegraph Office*	Polygon	
	20-03		*Radio/TV Station*	Polygon	
	20-04		*Satellite & Telecommunication Centre*	Polygon	
	20-05		*Public Telephone Booth*	Point	
	20-06		*Cell Tower*	Point	
	20-07		*WiFi Hotspot*	Point	
16	21-01	**Heritage**	*Monument*	Polygon	
	21-02		*Fort*	Polygon	
	21-03		*Archaeological Site*	Polygon	
17	22-01	**Slum**	*Notified Slum*	Polygon	
	22-02		*Non- notified Slum*	Polygon	
	22-03		*Squatter / Kachibasti*	Polygon	
18	23-01	**Vacant Land**	*Private Vacant*	Polygon	
	23-02		*Municipal Asset*	Polygon	
	23-03		*Government Asset*	Polygon	
	23-04		*Reclaimed Land*	Polygon	
	23-05		*Layout / Plotted*	Polygon	
19	24-01	**Transportation**	*Bus stand /Terminus*	Polygon	
	24-02		*Railway Station*	Polygon	
	24-03		*Railway Yard / Siding*	Polygon	
	24-04		*Railway Track Area*	Polygon	
	24-05		*Airport / Airstrip*	Polygon	

S.No	Code	Class	Sub-Class	Geometry	Symbol
	24-06		*Helipad*	Polygon	
	24-07		*Port*	Polygon	
	24-08		*Harbour*	Polygon	
	24-09		*Jetty*	Polygon	
	24-10		*Truck Terminus*	Polygon	
	24-11		*Freight Complex*	Polygon	
	24-12		*Taxi Stand*	Polygon	
	24-13		*Auto Stand*	Polygon	
	24-14		*Cycle rickshaw/Cycle /Cart stand*	Polygon	
	24-15		*Bus Bay*	Polygon	
	24-16		*Bus Stop*	Polygon/Point	
	24-17		*Transport Nagar*	Polygon	
20	25-01	**Traffic related**	*Traffic Island*	Polygon	
	25-02		*Median / Divider*	Polygon	
	25-03		*Parking Space / Area*	Polygon	
21	26-01	**Rural**	*Village / Abadi Area*	Polygon	
22	27-01	**Green Areas**	*Reserved Forest*	Polygon	
	27-02		*Protected Forest / Notified Forest*	Polygon	
	27-03		*Social*	Polygon	
			Green belt	Polygon	
	27-04		*Tree Clad Area*	Polygon	
	27-05		*Tree*	Point	
23	28-01	**Agricultural Land**	*Cropland*	Polygon	
	28-02		*Fallow land*	Polygon	
	28-03		*Plantations*	Polygon	
	28-04		*Orchard*	Polygon	
	28-05		*Horticulture*	Polygon	
	28-06		*Plant nursery*	Polygon	
24	29-01	**Wetlands**	*Waterlogged*	Polygon	
	29-02		*Low lying area*	Polygon	
	29-03		*Marshy*	Polygon	
	29-04		*Swampy*	Polygon	
	29-05		*Mudflat*	Polygon	
	29-06		*Creek*	Polygon	
25	30-01	**Wastelands**	*Scrubland*	Polygon	
	30-02		*Barren*	Polygon	
	30-03		*Rocky*	Polygon	
	30-04		*Sandy area*	Polygon	
	30-05		*Salt affected*	Polygon	
	30-06		*Gullied*	Polygon	
26	31-01	**Specific Land**	*Hill / Mountain*	Polygon	

S.No	Code	Class	Sub-Class	Geometry	Symbol
	31-02	Use	Snow covered area	Polygon	
	31-03		Mining Area	Polygon	
	31-04		Grazing land	Polygon	
	31-05		Pastures	Polygon	
	31-06		Meadows	Polygon	
	31-07		Tea/Coffee Garden	Polygon	
	31-08		Ghats	Polygon	
	31-09		Coral Reef	Polygon	
	31-10		Sand Dunes	Polygon	
27	32-01	Eco-Sensitive Areas	Bird Sanctuary	Polygon	
	32-02		Bio-diversity Park	Polygon	
	32-03		Botanical Garden	Polygon	
	32-04		Zoo	Polygon	
	32-05		National Park	Polygon	
	32-06		Mangrove	Polygon	
	32-07		Oxbow Lakes	Polygon	
	32-08		Paleo channels	Polygon	
28	33-01	Others	Salt pan	Polygon	
	33-02		Aquaculture	Polygon	
	33-03		Brick kiln	Polygon	
	33-04		Quarry	Polygon	
	33-05		Dam	Polygon	
	33-06		Barrage	Polygon	
	33-07		Aqueduct	Polygon	
	33-08		Weir	Polygon	
	33-09		Farm house	Polygon	
	33-10		Dairy farm	Polygon	
	33-11		Poultry farm	Polygon	
	33-12		Nursery	Polygon	
	33-13		Slaughter House	Polygon	
	33-14		Dairy Booth	Polygon/Point	
	33-15		Lighthouse	Point	
	33-16		Beach	Polygon	

@includesOffice, Quarters, Recreational Space, Institutions etc. under Railways

Table 10a: Urban Land Use/Land Cover Polygon GIS Data Structure

Geo-spatial Layer Name: ULU_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 10
Class	Class	Text	25	Class as given in Table 10

Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 10
Area in sq. mt.	**Area**	Double	10 Up to 4 decimals	Area of corresponding feature in sq. mt.
Name	**Name**	Text	50	Name of the Landmark

Table 10b: Community Toilet GIS Data Structure

Geo-spatial Layer Name: Community_toilet

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Toilet ID	**CT_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 10
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Toilet Status	**Status**	Text	15	Working/Not working
Toilet Type	**Type**	Text	15	Eco-friendly/General
Mode of Construction	**Mode**	Text	5	Public/PPP

Table 10c: Fire Station GIS Data Structure

Geo-spatial Layer Name: Fire_Station

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Fire Station ID	**FS_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 10
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Fire Station Status	**Status**	Text	15	Working/Not working

Table 10d: Garbage Collection Points/Dumper GIS Data Structure

Geo-spatial Layer Name: Garb_Coll_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Garbage collection point ID	**GC_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 10
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_Cline
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_Cline
Locality Name	**Locality**	Text	50	Locality Name
Type of garbage	**Garb_Type**	Text	30	Domestic/Biomedical/Kitchen/Construction/Mixed
Status of Garbage collection point	**Status**	Text	30	Temporary/Permanent and Collection point/Transfer point
Coverage area of a collection point	**Cov_area**	Double	10 Up to 4 decimals	Coverage area (No of houses or colonies covered by a point)

Table 10e: Landfill Sites and Dumping Yard GIS Data Structure

Geo-spatial Layer Name: Landfill_Dumpyard_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Landfill site/Dumping Yard point ID	**LD_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 10
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 10
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Name of the Landfill site/Dumping Yard	**Name**	Text	30	Specific Name of the landfill site or dumping yard, if any

Table 10f: Cell Towers, Wi-Fi Hotspots& Public Telephone Booth GIS Data Structure

Geo-spatial Layer Name: Communication_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Communication Point ID	Com_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Description	Descr	Text	15	On Building/On ground

Table 10g: Slums GIS Data Structure

Geo-spatial Layer Name: Slum_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Slum ID	Slum_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 10
Sub-Class	Sub_Class	Text	20	Sub Class as given in Table 10
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Slum Number	Slum_Num	Text	10	Slum Number (from ULBs)
Name of the Slum	Slum_ Name	Text	30	Name of the Slum
Locality Name	Locality	Text	50	Locality Name
Notified Area	Notfd_Area	Double	10 upto 4 Decimals	Notified Area if any, from DAS/SADASs

Table 10h: Bus Stop GIS Data Structure

Geo-spatial Layer Name: Bus_Stop_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Bus stop ID	**BS_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 10
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name

Table 10i: Tree GIS Data Structure

Geo-spatial Layer Name: Tree

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	**Code**	Alphanumeric	10	Code as given in Table 10

Table 10j: Other Urban Landuse Points: ATM, Meteorological Station, Dairy Booth, Light House and Other if any GIS Data Structure

Geo-spatial Layer Name: ULU_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Point ID	**Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 10
Class	**Class**	Text	25	Class as given in Table 10
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 10
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name

II. BUILDING FOOTPRINT:

Buildings falling within each of the Class/Sub-class of urban land use/land cover shall be represented in the same Sub-class of Building Footprint Layer. For example, buildings falling within 'Commercial Retail' urban landuse/land cover area will be represented as 'Commercial Retail' buildings. The building footprints shall overlap with urban landuse/land cover.

A single symbol ☐ *shall be used for representation of all buildings. The Sub-Class details for each building will be provided as an attribute.*

Table 11: Building Footprint – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry
1	06-04	Residential	*House*	Polygon
	06-05		*Group of Houses*	Polygon
	06-06		*Apartment*	Polygon
2	07-01	Commercial	*Retail*	Polygon
	07-02		*Wholesale*	Polygon
	07-03		*General Business*	Polygon
	07-04		*Hotel/Lodge/Restaurant*	Polygon
	07-05		*Shopping Centre/Mall*	Polygon
	07-06		*Multiplex/Cinema*	Polygon
	07-07		*Function Hall/ Marriage Garden*	Polygon
	07-08		*Warehouse*	Polygon
	07-09		*Storage Godown*	Polygon
	07-10		*Resort*	Polygon
	07-11		*Petrol Pump/LPG filling station*	Polygon
	07-12		*Informal Shop*	Polygon
	07-13		*Hostel*	Polygon
3	08-01	Industrial	*Manufacturing*	Polygon
	08-02		*Service*	Polygon
	08-03		*Chemical*	Polygon
	08-04		*Pharmaceutical*	Polygon
	08-05		*Textile*	Polygon
	08-06		*IT Parks*	Polygon
	08-07		*Industrial Estate/SEZ*	Polygon
	08-08		*Agro based & Food Processing*	Polygon
	08-09		*Obnoxious*	Polygon
	08-10		*Cottage &Household*	Polygon
	08-11		*Other Industries*	Polygon
4	09-01	Mixed	*Residential & Commercial*	Polygon
	09-02		*Residential &Household Industry*	Polygon
	09-03		*Residential & Educational*	Polygon
	09-04		*Residential & Health Services*	Polygon
	09-05		*Commercial & Industrial*	Polygon
	09-06		*Commercial &Health Services*	Polygon

S.No	Code	Class	Sub-Class	Geometry
	09-07		*Commercial and Educational*	Polygon
	09-08		*Commercial and Recreational*	Polygon
	09-09		*Residential & Commercial & Institutional*	Polygon
5	10-01	Educational	*School*	Polygon
	10-02		*College*	Polygon
	10-03		*University*	Polygon
	10-04		*Vocational Institute*	Polygon
	10-05		*Anganwari*	Polygon
	10-06		*Training Institute*	Polygon
6	11-01	Health Services	*Govt. Hospital*	Polygon
	11-02		*Private Hospital*	Polygon
	11-03		*Diagnostic Centre*	Polygon
	11-04		*Clinic/Dispensary*	Polygon
	11-05		*Nursing Home*	Polygon
	11-06		*Primary/Community Health Centre*	Polygon
7	12-01	Central Govt. Property	*Office*	Polygon
	12-02		*Quarter*	Polygon
8	13-01	State Govt. Property	*Office*	Polygon
	13-02		*Quarter*	Polygon
9	14-01	Railway	*Railway Property*[@]	Polygon
10	15-01	Public& Semi-public	*Private Office*	Polygon
	15-02		*Banks*	Polygon
	15-03		*Credit Society*	Polygon
	15-04		*Foreign Establishment*	Polygon
	15-05		*Police Station*	Polygon
	15-06		*Cantonment /Battalion*	Polygon
	15-07		*Jail*	Polygon
	15-08		*Crematorium/Burial Ground/Grave Yard*	Polygon
	15-09		*Guesthouse*	Polygon
	15-10		*Community hall*	Polygon
	15-11		*Dharmashala*	Polygon
	15-12		*Tourist Facility Centre*	Polygon
	15-13		*Auditorium*	Polygon
	15-14		*Convention Centre*	Polygon
	15-15		*Museum*	Polygon
	15-16		*Public Library*	Polygon
	15-17		*Art Gallery & Cultural Centre*	Polygon
	15-18		*LPG/ CNG Gas Booking Office*	Polygon
	15-19		*Ticket Booking & Reservation Office*	Polygon
	15-20		*Stock Exchange*	Polygon
	15-21		*Disaster Management Centre*	Polygon

S.No	Code	Class	Sub-Class	Geometry
	15-24		Crech/Day Care	Polygon
	15-25		Public/Community Toilet	Polygon
	15-26		Social Welfare Centre	Polygon
	15-27		Orphanage	Polygon
	15-28		Old Age Home	Polygon
	15-29		Night Shelter	Polygon
	15-30		Fire Station	Polygon
11	16-01	Religious	Temple	Polygon
	16-02		Mosque	Polygon
	16-03		Idgah	Polygon
	16-04		Church	Polygon
	16-05		Gurudwara	Polygon
	16-06		Monastery	Polygon
	16-07		Synagogue	Polygon
	16-08		Chhatri	Polygon
12	17-01	Recreational	Garden	Polygon
	17-02		Park	Polygon
	17-04		Club	Polygon
	17-05		Sports Centre	Polygon
	17-06		Gymnasium	Polygon
	17-07		Swimming Pool	Polygon
	17-08		Stadium	Polygon
	17-09		Planetarium	Polygon
	17-10		Aquarium	Polygon
	17-11		Open Air Theatre	Polygon
	17-12		Golf Course	Polygon
	17-13		Race Course	Polygon
	17-14		Exhibition Ground	Polygon
	17-15		Amusement /Theme Park	Polygon
13	18-01-01	Public Utilities	Water Treatment Plant	Polygon
	18-01-02		Water Pumping Station	Polygon
	18-01-03		Ground Level Reservoir	Polygon
	18-03-01		Sewage Treatment Plant	Polygon
	18-03-02		Sewage Pumping Station	Polygon
	18-04-01		Electric Power Plant	Polygon
	18-04-02		Electric Sub Station	Polygon
	18-07		Effluent Treatment Plant	Polygon
14	19-03	Solid Waste Management	Recycling Plant	Polygon
15	20-01	Communication	Telephone Exchange	Polygon
	20-02		Post /Telegraph Office	Polygon
	20-03		Radio/TV Station	Polygon
	20-04		Satellite & Telecommunication Centre	Polygon
16	21-01	Heritage	Monument	Polygon
	21-02		Fort	Polygon
	21-03		Archaeological Site	Polygon
	24-01		Bus stand /Terminus	Polygon
17	24-02	Transportation	Railway Station	Polygon
	24-03		Railway Yard / Sliding	Polygon
	24-05		Airport / Airstrip	Polygon

S.No	Code	Class	Sub-Class	Geometry
	24-07		*Port*	Polygon
	24-08		*Harbour*	Polygon
	24-10		*Truck Terminus*	Polygon
	24-11		*Freight Complex*	Polygon
	24-17		*Transport Nagar*	Polygon
18	25-04	Traffic related	*Multi-level Parking*	Polygon
19	26-02	Rural	*House*	Polygon
	26-03		*Group of Houses*	Polygon
	26-04		*Apartment*	Polygon
20	31-07	Specific Land use	*Tea/Coffee Garden*	Polygon
21	32-01	Eco-Sensitive Areas	*Bird Sanctuary*	Polygon
	32-02		*Bio-diversity Park*	Polygon
	32-03		*Botanical Garden*	Polygon
	32-04		*Zoo*	Polygon
	32-05		*National Park*	Polygon
22	33-09	Others	*Farm house*	Polygon
	33-10		*Dairy farm*	Polygon
	33-11		*Poultry farm*	Polygon
	33-13		*Slaughter House*	Polygon
	33-14		*Dairy Booth*	Polygon

@*includesOffice, Quarters, Recreational Space, Institutions etc. under Railways*

Table 11a: Buildings GIS Data Structure

Geo-spatial Layer Name: Building_footprint

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 11
Class	Class	Text	25	Class as given in Table 11
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 11
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Colony Name	Colony	Text	50	Colony Name
Number of floors	No_floors	Numeric	5	Number of floors in a building
Construction Type	Cons_type	Text	15	Pucca/Semi Pucca/Kutcha
Area in sq. mt.	Area	Double	10 Up to 4 decimals	Area of corresponding building footprint
Description	Descr	Text	50	Name of building and Details, if any

IV. UTILITIES:

Utility Layers:

All utility layers like Water Supply Network, Drainage Network, Sewage Network, Electricity Supply Network, Natural Gas Distribution Network database will be prepared from the data collected by ULBs from the concerned engineering and line departments.

All network lines are represented as lines and the nodes (starting point, intersections, valves, end points etc.) are represented as points.

Table 12: Water Supply Network – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	18-01-01	Water Supply Network	*Water Treatment Plant*	Point	
	18-01-02		*Water Pumping Station*	Point	
	18-01-03		*Ground Level Reservoir*	Point	
	18-01-04		*Raw Water Main Pipeline*	Line	
	18-01-05		*Pumping Line*	Line	
	18-01-06		*Distribution Pipeline*	Line	
	18-01-07		*Service Pipeline*	Line	
	18-01-08		*Supply Valve*	Point	
	18-01-09		*Over Head Tank*	Point	
	18-01-10		*Public Stand Post*	Point	
	18-01-11		*Tube Well*	Point	
	18-01-12		*Hand Pump*	Point	

Table 12a: Water Supply Network Line GIS Data Structure

Geo-spatial Layer Name: Water_NW_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Water Supply ID	**WS_Line_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 12
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 12
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Distance from road(in mt.)	**Dis_frm_rd**	Double	10 Upto 2 Decimals	Distance from road in meters
Construction Material	**Cons_Mat**	Text	10	PSC/DI/HDPE/MS/RCC/Others/GI/AC/CI/PVC
Pipe Dia in mt.	**Pipe_Dia**	Numeric	5	Pipe Diameter in meters

Table 12b: Water Supply Network Points GIS Data Structure

Geo-spatial Layer Name: Water_NW_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Water Supply ID	**WS_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 12
Sub_Class	**Sub_Class**	Text	50	Sub Class as given in Table 12
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Capacity	**Capacity**	Text	10	Capacity of Treatment plant, Pumping station, GLR, overhead tank in the respective units

Table 13: Storm Water Drainage Network – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
2	**18-02-01**	**Storm water Drainage**	*Storm Water Drain*	Line	
	18-02-02		*Storm Water Vent*	Point	

Table 13a: Storm water Drainage Network Line GIS Data Structure

Geo-spatial Layer Name: Str_Drain_NW_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Storm Water Drainage ID	**Dr_Line_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 13
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 13
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Distance from road(in mt.)	**Dis_frm_rd**	Double	10 Upto 2 Decimals	Distance from road in meters
Depth in mt.	**Depth**	Double	10 Upto 2 Decimals	Depth of Drainage in meters
Construction Type	**Cons_Type**	Text	10	Box/Open Channel
Network Line Type	**NW_Type**	Text	15	Mainline/Service/Pumping
Name of the Storm water drain	**Name**	Text	50	Specific Name if any

Table 13b: Storm water Drainage NetworkPoints GIS Data Structure

Geo-spatial Layer Name: Str_Drain_NW_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Storm Water Drainage ID	**Dr_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 13
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 13
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Distance from road (in mt.)	**Dis_frm_rd**	Double	10 Upto 2 Decimals	Distance from road in meters

Table 14: Sewerage Network – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	**18-03-01**	**Sewerage Network**	*Sewage Treatment Plant*	Point	
	18-03-02		*Sewage Pumping Station*	Point	
	18-03-03		*Pumping Line*	Line	
	18-03-04		*Main Sewer Line*	Line	
	18-03-05		*Branch Sewer Line*	Line	
	18-03-06		*Service Sewer Line*	Line	
	18-03-07		*Manhole*	Point	
	18-03-08		*Vent Valve*	Point	

Table 14a: Sewerage Network Line GIS Data Structure

Geo-spatial Layer Name: Sew_NW_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Sewerage ID	**SW_Line_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 14
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 14
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Distance from road(in mt.)	**Dis_frm_rd**	Double	10 Upto 2 Decimals	Distance from road in meters
Depth in mt.	**Depth**	Double	10 Upto 2 Decimals	Depth of Sewer line in meters
Pipe Dia in mm.	**Pipe_Dia**	Double	10 Upto 2 Decimals	Pipe Diameter in millimeters
Construction Material	**Cons_Mat**	Text	10	RCC/CI/SWG/PVC/GI/AC/Others

Table 14b: Sewerage Network Points GIS Data Structure

Geo-spatial Layer Name: Sew_NW_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Sewerage ID	SW_Pnt_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 14
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 14
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Distance from road(in mt.)	Dis_frm_rd	Double	10 Upto 2 Decimals	Distance from road in meters

Table 15: Power Supply Network – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	18-04-01	Power	*Electric Power Plant*	Point	
	18-04-02		*Electric Sub-Station*	Point	SUB
	18-04-03		*Transmission Tower*	Point	
	18-04-04		*Transformer*	Point	
	18-04-05		*33 Kv Line*	Line	
	18-04-06		*11 Kv Line*	Line	
	18-04-07		*Pole*	Point	
	18-04-08		*Street Light*	Point	

Table 15a: Power Supply Network Line GIS Data Structure

Geo-spatial Layer Name: Power_NW_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Power Supply ID	PS_Line_ID	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 15
Sub-Class	Sub_Class	Text	50	Sub Class as given in Table 15
Ward Number	Ward_No	Alphanumeric	10	Ward Number
Road ID	Rd_ID	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	Rd_Name	Text	30	Road Name same as in Road_CLine
Locality Name	Locality	Text	50	Locality Name
Name of Power Line	Pow_Name	Text	30	Power Line Name if any

Table 15b: Power Supply Network Points GIS Data Structure

Geo-spatial Layer Name: Power_NW_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Power Supply ID	**PS_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 15
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 15
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name
Capacity	**Capacity**	Text	10	Capacity of Power Plant, Sub-station and Transformer, in the respective units
Street Light-ID	**St_Lt_ID**	Alphanumeric	5	Unique Id for Street Light
Type of Street Light Pole	**Pole_Type**	Text	15	Iron/Concrete/Other
Type of Street Light	**St_Lt_Ty**	Text	15	HPMV/Sodium/Tube Light/CFL/High Mast/Others
Source of Energy	**Sou_ Energy**	Text	15	Electricity/Others/Solar

Table 16: Gas Distribution Network- Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	**18-05-01**	**Natural Gas**	*City Gate Metering Station*	Point	
	18-05-02		*Area Regulator Station*	Point	
	18-05-03		*Main Distribution Line*	Line	
	18-05-04		*Branch Distribution Line*	Line	
	18-05-05		*Regulator*	Point	
	18-05-06		*Flow Meter*	Point	

Table 16a: Gas Distribution Network Line GIS Data Structure

Geo-spatial Layer Name: Natural_Gas_NW_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Gas Distribution ID	**GD_Line_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 16
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 16
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name

Table 16b: Gas Distribution Network Points GIS Data Structure

Geo-spatial Layer Name: Natural_Gas_NW_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Gas Distribution ID	**GD_Pnt_ID**	Alphanumeric	15	Unique Id
Code	**Code**	Alphanumeric	10	Code as given in Table 16
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 16
Ward Number	**Ward_No**	Alphanumeric	10	Ward Number
Road ID	**Rd_ID**	Alphanumeric	15	Road ID same as in Road_CLine
Road Name	**Rd_Name**	Text	30	Road Name same as in Road_CLine
Locality Name	**Locality**	Text	50	Locality Name

V. HYPSOGRAPHY:

Table 17: DEM Layer

Towns for which monoscopic data is selected, the DEM shall be generated by Total Station survey and Towns for which stereo data is selected, the DEM shall be generated from stereo data. The DEM is a DTM which represent bare earth surface.

S.No	Class	Accuracy	Pixel Value	Geometry
1	Digital Terrain Model (DTM)	*0.5 m*	Height in metres	Raster

Table 18: Contour- Geo-Spatial Data Content

Contour shall be generated from the DTM.

S.No.	Code	Class	Contour Interval	Geometry	Symbol
1	34-01	Contour	*1 m*	Line	

Table 18a: Contour Layer GIS Data Structure

Geo-spatial Layer Name: Contour_Line

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	Code	Alphanumeric	10	Code as given in Table 18
Contour Value	Cntr_Val	Numeric	5	Height in metres

Table 19: Ground Control Points (GCPs) Layer- Geo-Spatial Data Content

DGPS survey is used for generation of GCPs. DGPS survey data shall be processed using closed network traverse and the reference station coordinate shall be computed using ITRF reference frame.

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	35-01	GCP	*Reference station*	Point (X,Y,Z)	
	35-02		*Rover Station*	Point (X,Y,Z)	

Table 19a: Ground Control Points GIS Data Structure

Geo-spatial Layer Name: GCP_Pnt

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Ground Control point ID	GCP_Id	Alphanumeric	15	Unique Id
Code	Code	Alphanumeric	10	Code as given in Table 19
Sub-Class	Sub_Class	Text	25	Sub Class as given in Table 19
X Coordinate	X	Double	Up to 8 decimals	X Coordinate
Y Coordinate	Y	Double	Up to 8 decimals	Y Coordinate
Z Coordinate	Z	Double	Up to 8 decimals	Z Coordinate
Description of the Ground Control point	Descr	Text	250	Description
Monument	Monument	Text	5	Yes/No
Sketch Map or Image	Sketch	Blob		Sketch Map or Image to be attached
Ground Photo	Gr_Photo	Blob		Ground Photo to be attached

VI. CADASTRAL LAYER:

Table 20: Cadastral Layer- Geo-Spatial Data Content

Cadastral layer will be prepared from the data collected by ULBs from the line departments.

Table 20a: Cadastral Layer GIS Data Structure

Geo-spatial Layer Name: Cadastre_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	**Code**	Alphanumeric	10	Code as given in Table 20
Survey Number	**Survey_Num**	Alphanumeric	15	Khasra Number/Survey Number
Area	**Area**	Double	Up to 4 decimals	Area of Village Cadastre or Parcel

VII. BOUNDARIES:

Table 21: Administrative Boundaries – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	**37-01**	**Administrative Boundaries**	*International Boundary*	Polygon	
	37-02		*State Boundary*	Polygon	
	37-03		*District Boundary*	Polygon	
	37-04		*Tehsil / Mandal / Block Boundary*	Polygon	
	37-05		*Village Boundary*	Polygon	
	37-06		*Forest Boundary*	Polygon	
	37-07		*Revenue Boundary*	Polygon	

Table 21a: Administrative Boundaries GIS Data Structure

Geo-spatial Layer Name: Admin_Bnd_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	**Code**	Alphanumeric	10	Code as given in Table 21
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 21
Area in sq. km.	**Area**	Double	Up to 4 decimals	Area of corresponding Admin boundary
Name	**Name**	Text	50	Name of the Admin Boundary

Table 22: Planning Boundaries – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
2	38-01	Planning Boundaries	*Planning Area Boundary*	Polygon	
	38-02		*Highway Corridor Development Zone*	Polygon	
	38-03		*Peripheral Control belt boundary*	Polygon	
	38-04		*Controlled Area boundary*	Polygon	
	38-05		*Urbanisable Area Boundary*	Polygon	
	38-06		*Industrial Zone / Area*	Polygon	
	38-07		*Special Economic Zone*	Polygon	
	38-08		*National Park / Sanctuary / Conservation Area*	Polygon	

Table 22a: Planning Boundaries GIS Data Structure

Geo-spatial Layer Name: Planning_Bnd_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	**Code**	Alphanumeric	10	Code as given in Table 22
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 22
Area in sq.km.	**Area**	Double	Up to 4 decimals	Area of corresponding Planning boundary
Name	**Name**	Text	50	Name of the Planning Boundary

Table 23: Municipal Boundaries – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
3	39-01	Municipal Boundaries	*Municipal Boundary*	Polygon	
	39-02		*Zone Boundary*	Polygon	
	39-03		*Ward Boundary*	Polygon	
	39-04		*Taxzone Boundary*	Polygon	

Table 23a:Municipal Boundaries GIS Data Structure

Geo-spatial Layer Name: Municipal_Bnd_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	**Code**	Alphanumeric	10	Code as given in Table 23
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 23
Area in sq.km.	**Area**	Double	Up to 4 decimals	Area of corresponding Municipal boundary
Name	**Name**	Text	50	Name of the Municipal Boundary
Ward Number	**Ward_No**	Numeric	5	Ward Number in case of Ward boundary
Taxzone Number	**Taxzone_No**	Numeric	5	Tax zone Number in case of Tax zone boundary

Table 24: Other Boundaries (EB, UFS, Mining area) – Geo-Spatial Data Content

S.No	Code	Class	Sub-Class	Geometry	Symbol
4	40-01	Other Boundaries	*Urban Frame Survey Boundary*	Polygon	
	40-02		*Enumeration Block Boundary*	Polygon	
	40-03		*Mining Area Boundary*	Polygon	

Table 24a: Boundaries (EB, UFS, Mining area) GIS Data Structure

Geo-spatial Layer Name: Other_Bnd_Poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	**Code**	Alphanumeric	10	Code as given in Table 24
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 24
Area in sq. km.	**Area**	Double	Up to 4 decimals	Area of corresponding Admin boundary
Enumeration Block Number	**EB_No**	Numeric	5	Enumeration Block Number
Urban Frame Survey Number	**UFS_No**	Numeric	5	Urban Frame Survey Number

Table 25: Hazard Prone Areas – Geo-Spatial Data Content

Database available with NRSC/ISRO, GSI, NDMA, Other State & Central Government Departments will be incorporated into the final database.

Table 25a: Hazard prone Areas - GIS Data Structure

Geo-spatial Layer Name: Hazard_poly

Attribute Name	Attribute Field Name	Attribute Field Type	Attribute Field Width	Description/Value
Code	**Code**	Alphanumeric	10	Code as given in Table 25
Sub-Class	**Sub_Class**	Text	50	Sub Class as given in Table 25

3.6 Accuracy Standards

The geo-spatial data has to meet the feature's Planimetric accuracy and thematic accuracy in compliance to the 1:4000 scale databases.

S.No	Code	Class	Sub-Class	Geometry	Symbol
1	41-01	Hazard	Flood	Polygon	
	41-02		Earthquake	Polygon	
	41-03		Landslide	Polygon	

Planimetric Accuracy

Large scale Base maps and thematic databases, at 1:4000 scale, shall be incompliance to 0.25mm of the scale (as per ASPRS, NNRMS standards).

Thematic Accuracy of Classification
UrbanLanduse classification is based on attribute data and therefore it has to be done based on the latest attribute data.

4. Quality Assurance/Quality Check

Quality Assurance and Quality Check (QA/QC) shall be carried out at all levels of project execution. The main products covered under QA/QC are (i) Input high resolution satellite data (ii) Geo-referenced/Ortho-rectified satellite data (iii)GIS Feature extraction from high resolution data(iv) Final GIS database(v) Supply of the GIS database to the respective DAS/SADASs for Master Plan/Zonal Development Plan formulation.
QA/QC is carried out at two different stages - (1) In-progress/Internal QA/QC and (2) External QA/QC for each of the product.

(1) **In-progress/Internal QA/QC:** In-progress QA/QC shall be carried out during the generation of the product by the product generation team. The Internal quality check is carried out for each product as per the prescribed product specifications/standards, by the identified QA/QC expert of the product generation team. In-progress/Internal QA/QC shall ensure 100% quality check and accord certification.

(2) **External QA/QC:**Expert in the respective product domain and outside the product generation team shall carry out the random quality check, up to maximum of 15% of product quantity and accord certification. The non-compliance products as per the specifications shall be rejected. Rejected products will be regenerated by the product generation team within the stipulated time.

Apart from the product specifications and standards the following parameters are important in assuring the final GIS database product quality.

a. ***Completeness:*** Entire study area should be covered – (i) There should not be any gaps within the study area/AOI (ii) Ensure that all features are mapped, as per the feature content, which are present in the study area/AOI.

b. ***Correctness :***(i) Feature extraction should ensure correct interpretation, shape of the feature as per the image and feature geometry definition (ii) The feature classification as per the ground truth and attribute data.

c. ***Conformity:*** GIS database should conform to the specifications i.e. Classification of the features should conform to the Geo-Spatial Data content and GIS Data Structure tables given in the Section 3.3.5 (Table 6 - 25). Also, the classification of features should be as per the Attribute data, verified and certified by the DAS/SADASs.

d. ***Consistency:*** Interpretation, feature extraction/digitization, its geometry should be consistent in all parts of the Study area.

e. ***GIS Compatibility:*** The Geo-Spatial Data should conform to the co-ordinate system and extent as given in section 3.2.1 (Table 4) and conform to the GIS data structures given in section 3.3.5 (Table 6 - 25). It should be topological clean, free from errors such as sliver polygons, duplicates, overlaps and gaps.

Attribute Data Quality Check: Attribute data is collected from field and line departments and shall be verified and certified by the respective Urban Local Bodies with the Time stamp.

Note: *Each product specification and standards are given in the respective sections of the document. The project execution team may design appropriate QA/QC forms for carrying out the In-progress/Internal, External QA/QC and certification.*

5. GIS database Dissemination to DAS/SADASs for Master Plan/Zonal Development Plan Formulation

Maintenance of GIS database at s for GIS based Master Plan/Zonal Development Plan formulation demands the basic pre-requisites such as computer hardware infrastructure like workstations and error resistance storage like NAS, GIS software packages and IT experts at DAS/SADAS level. In view of this, NRSC/ISRO and TCPO/MOUD has developed web based application "Bhuvan-NUIS for GIS based Master Plan/Zonal Development Plan formulation"and imparted the nationwide training & capacity building for Town Planning personnel.The main features/advantages of Bhuvan-NUIS are:

Databases

- Ortho-rectified Satellite image
- Existing Urban GIS database (Layer wise) including attribute information, Admin boundaries.
- Older versions of databases
- 1:4000 Scale GIS database for Formulation of Master Plan/Zonal Development Plan
- Meta data

GIS Tools for Master Plan/Zonal Development Plan formulation for the DAS/SADASs

- GIS data can be edited/modified and updated with latest Satellite images/ground information
- Local attribute data can be updated or new attributes can be added
- GIS analysis (both Spatial and attribute) tools required for Master Plan/Zonal Development Plan formulation
- On line approval and governance for creation, updating database within the DAS/SADAS according to the approval procedure

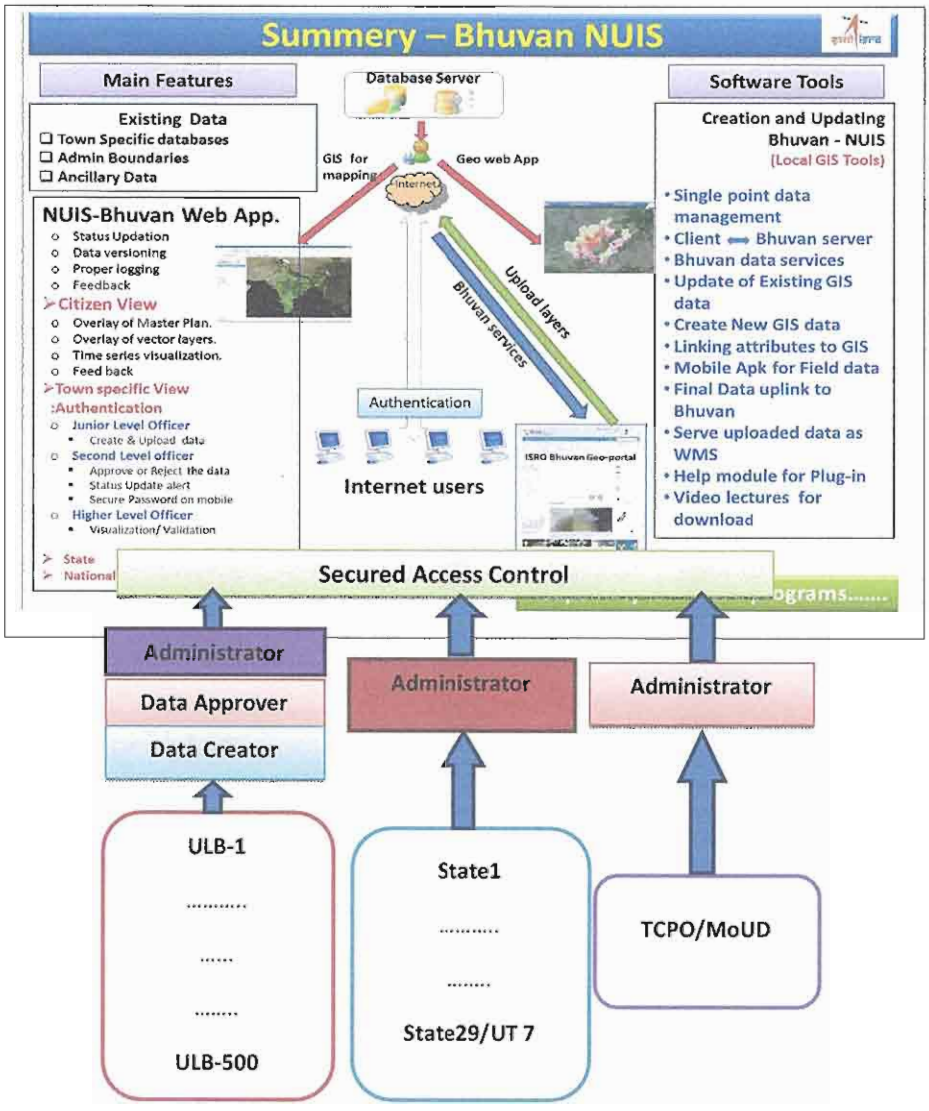
Access control and Management

- Authorised personnel at DAS/SADAS level can only access the specific city data
- Authorised personnel at State Town Planning Directorate level can view and read the status of cities within the particular state
- Authorised personnel at TCPO/MoUD level can view and read the status of all the cities.

Advantages

- No need of maintaining any spatial computer systems and commercial software for Remote Sensing data processing and GIS analysis. Complete database storage, management including backup at Bhuvan-NUIS server. No cost to DAS/SADASs.
- Only desktop system with internet facility can enable GIS database creation, updating and GIS based Master Plan/Zonal Development Plan preparation at DAS/SADAS.
- Avoid the database redundancy, duplicate work in different divisions of State and Central government departments
- Data can be shared with line departments;which would enable updating of database in near real time.
- Enable the investment protection and facilitate cost &time effectiverevision of Master Plan/Zonal Development Plans periodically.

Bhuvan-NUIS based architecture for GIS database dissemination to DAS/SADASs in compliance to OGC standards



Each city GIS data would be maintained as individual database unit and respective town DAS/SADAS shall own the responsibility of secured access control and updating data for Master Plan/Zonal Development Plan formulation.

6. Metadata Standards

Meta data describes data characteristics of content, quality, access, format, scale, when, who,where. how data generated and availability of the data. Meta data standard is required to enable the users to be aware of method, accuracy, exchange of data and limitations of the data for the intended purpose.

NSDI ver 2.0 Metadata standards are proposed to be adopted. The following are main Metadata Elements as per OGC compliance standard.

I.Data Identification Information

S. No.	Name of the Element	Format	Width
1	Name of the Dataset	Text	250
2	Theme	Text	250
3	Keywords	Text	250
4	Access Constraints	Text	250
5	Use Constraints	Text	250
6	Purpose of creating data	Text	250
7	Data Type	Text	128
8	Edition	Text	128
9	Status	Text	250

II. Contact Information

S. No.	Name of the Element	Value	Width
1	Contact Person	Text	250
2	Organisation	Text	250
3	Mailing Address	Text	250
4	City/Locality	Text	250
5	Country	Text	250
6	Contact Telephone	Text	250
7	Contact Fax	Text	250
8	Contact Email	Text	250

III. Geographic Location

S.No	Name of the Element	Value	Width
1	Datum	Text	128

IV. Coverage

S.No	Name of the Element	Value	Width
1	Upper left	Double	128
2	Upper right	Double	128
3	Lower right	Double	128
4	Lower left	Double	128

V. Citation

S.No	Name of the Element	Value	Width
1	Data Prepared by	Text	250
2	Original Source	Text	250
3	Source Date	Text	250
4	Lineage State: City: Area of Interest (sq. km.): Scale:	 Text Text Double Text	250

VI. Metadata Stamp

S.No	Name of the Element	Value
1	Metadata Date Stamp	Date (DD/MM/YYYY)

VII. Dataset Topic Category

S.No	Name of the Element	Value	Width
1	Data Identification topic category	Text	250

VIII. Language

S.No	Name of the Element	Value	Width
1	Language ISO 0639-2Bsh	Text	250

IX. Abstract describing the data

S.No	Name of the Element	Value	Width
1	Data Identification abstract	Text	250

7. MAP SYMBOLOGY

For cartographic representation/visualisation of the GIS database or to generate a hard copy/soft copy maps, appropriate symbols have to be used. In urban applications, it is also important to choose appropriate symbols as a statutory requirement in the States/UTs Town Planning Act. To facilitate uniform symbology across all the cities of Uttar Pradesh this section provides proposed symbols for the feature data content given in the Tables 6 to 25.