Request for Proposals

For

Selection of Service Provider for undertaking GIS based Mapping of Properties and Utilities for Gwalior Smart City Development Corporation Limited (GSCDCL)

Volume – II

Scope of Work

NIT Number: GSCDCL/66/E-Tendering/2018-19
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DISCLAIMER

The information contained in this Request for Proposal document (the "RFP") or subsequently provided to Bidder(s), whether verbally or in documentary or any other form by or on behalf of the Gwalior Smart City Development Corporation Limited (the "Authority") or any of its employees or advisors, is provided to Bidder(s) on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.

This RFP is not an Agreement and is neither an offer nor invitation by the Authority to the prospective Bidders or any other person. The purpose of this RFP is to provide interested parties with information that may be useful to them in making their financial offers (Bids) pursuant to this RFP. This RFP includes statements, which reflect various assumptions and assessments arrived at by the Authority in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This RFP may not be appropriate for all persons, and it is not possible for the Authority, its employees or advisors to consider the investment objectives, financial situation and particular needs of each party who reads or uses this RFP. The assumptions, assessments, statements and information contained in the Bidding Documents, may not be complete, accurate, adequate or correct. Each Bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP and obtain independent advice from appropriate sources.

Information provided in this RFP to the Bidder(s) is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Authority accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.

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The issue of this RFP does not imply that the Authority is bound to select a Bidder or to appoint the Successful Bidder or Contractor, as the case may be, for the Project and the Authority reserves the right to reject all or any of the Bidders or Bids without assigning any reason whatsoever.

The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Authority or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and the Authority shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid, regardless of the conduct or outcome of the Bidding Process.

Definition of Terms

1. **Agreement/Contract** means; the Contract entered into by the parties with the entire documentation specified in the RFP.

2. **Applicable Law(s)** means**;** any statute, law, ordinance, notification, rule, regulation, judgment, order, decree, bye-law, approval, directive, guideline, policy, requirement or other governmental restriction or any similar form of decision applicable to the relevant party and as may be in effect on the date of the execution of this Agreement and during the subsistence thereof, applicable to the Project.

3. **Authority** means; the Gwalior Smart City Development Corporation Limited. The project shall be executed in Gwalior and shall be owned by Gwalior Municipal Corporation.

4. **Contract Value** means; the price payable to the successful bidder under this Contract for the full and proper performance of its contractual obligations

5. **Document** means; any embodiment of any text or image however recorded and includes any data, text, images, sound, voice, codes, databases or any other electronic documents as per IT Act 2000.

6. **Service level agreement (SLA)** is the service level and performance commitment of a System Integrator to AUTHORITY that defines the performance output and availability of the deliveries and installations under this RFP Requirements.

7. **Consortium** means; the entity named in the contract for any part of the work has been sublet with the consent in writing of the AUTHORITY and the heirs, legal representatives, successors and assignees of such person.

8. **OEM** means; the Original Equipment Manufacturer of any equipment / system / software / product which are providing such goods to the AUTHORITY under the scope of the RFP.

9. **Services** means; the work to be performed by the successful bidder pursuant to the RFP and to the contract to be signed by the parties in pursuance of any specific assignment awarded by the AUTHORITY.

Acronyms

Acronyms	Description
3D	Three Dimensional
ABD	Area Based Development
AMC	Annual Maintenance Contract
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
AMS	Asset Management System
API	Application Program Interface
ASI	Archaeological Survey of India
ATM	Automatic Teller Machine
ATS	Annual Technical Support
AV	Audio Visual
BEC	Bid Evaluation Committee
BSNL	Bharat Sanchar Nigam Limited
BOM	Bill of Material
BOQ	Bill of Quantity
CAD	Computer Aided Design
CAMP	Comprehensive Annual Maintenance Period
CAPEX	Capital Expenditure
CBT	Computer Based Tutorial
CEO	Chief Executive Officer
CERT-IN	Computer Emergency Response Team – India
CMMi	Capability Maturity Model Integration
COTS	Commercial Off The Shelf
CS	Computer Science
CSS3	Cascading Style Sheets version 3
CV	Curriculum Vitae
DC	Data Centre
DD	Demand Draft
DEM	Digital Elevation Model
DGPS	Differential Global Positioning System
DR	Disaster Recovery
DSS	Decision Support System
eFDR	Electronic Fixed Deposit Receipt
EMD	Earnest Money Deposit
EPL	Electronic Pipe Locator
ER	Entity Relationship
ERP	Enterprise Resource Planning
FDR	Fixed Deposit Receipt
GCP	Ground Control Point
GIGW	Guidelines for Indian Government Websites
GIS	Geographic Information System
GMC	Gwalior Municipal Corporation
GST	Goods and Service Tax
GoI	Government of India
GoMP	Government of Madhya Pradesh
GPR	Ground Penetrating Radar
GPS	Global Positioning System

Acronyms	Description
GSCDCL	Gwalior Smart City Development Corporation Limited
HRSI	High Resolution Satellite Imagery
HTML5	Hyper Text Markup Language version 5
H/W	Hardware
ICCC	Integrated Command and Control Centre
ICT	Information Communication Technology
ID	Identity
IDC	International Data Corporation
INR	Indian National Rupee
IoT	Internet of Things
IR	Infrared
ISO	International Organization for Standardisation
IT	Information Technology
ITeS	Information Technology Enabled Services
IT	Information Technology
ITIL	Information Technology Infrastructure Library
LIDAR	Light Detection and Ranging
LOA	Letter of Award
LLP	Limited Liability Partner
MP	Madhya Pradesh
MPMKVVC	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company
MSL	Mean Sea Level
NCR	National Capital Region
NEFT	National Electronic Fund Transfer
NGO	Non Government Organization
NRSC	National Remote Sensing Centre
NSDI	National Spatial Data Infrastructure
NUIS	National Urban Information System
O&M	Operation and Maintenance
OEM	Original Equipment Manufacturer
OPEX	Operational Expenditure
OS	Operating System
PBG	Performance Bank Guarantee
PDA	Personal Digital Assistant
PSU	Public Sector Unit
QA/QC	Quality Analysis / Quality Control
RADAR	Radio Detection and Ranging
RBAC	Role Based Access Control
RFP	Request for Proposal
RPC	Rational Polynomial Coefficient
RTGS	Real Time Gross Settlement
SCADA	Supervisory Control and Data Acquisition
SCM	Smart City Mission
SCP	Smart City Proposal
SDK	Software Development Kit
SI	System Integrator
SLA	Service Level Agreement
SPV	Special Purpose Vehicle

Acronyms	Description
Sq. Km	Square Kilometre
SQL	Structured Query Language
SRS	Software Requirement System
STQC	Standardisation Testing and Quality Certification
S/W	Software
TCB	Total Cost of Bid
TPA	Third Party Auditors
UAT	User Acceptance Testing
UI	User Interface
ULB	Urban Local Body
UTM	Universal Transverse Mercator
W3C	World Wide Web Consortium
WCAG	Web Content Accessibility Guidelines
WGS	World Geodetic System

Scope of Work

1. Introduction

1.1. Smart City Project Background

Gwalior Smart City Proposal (SCP) has been selected by the Government of India (GoI) under Smart City Mission (SCM) in the second round of smart cities challenge wherein Gwalior secured 9th position.

The Area Based Development (ABD) proposal spreads across a total area of 803 acres, having a population of 1.02 Lakhs which is almost 8.8% of the total population of Gwalior city. The 771 acres, earmarked area is proposed to be retrofitted with smart features/infrastructure wherein out of total proposed area, 32 acres of land will be redeveloped with zonal/layout/building level smart features/infrastructure in accordance with SCP and SCM guidelines.

The pan city proposal is divided into thirteen projects packaged into three modules namely Intelligent Operations and Control Unit, Urban Transit Module and Waste Management Module.

For the purpose of implementing the Smart Cities project, Gwalior Smart City Development Corporation Limited (GSCDCL) (the "Authority"), a Special Purpose Vehicle (SPV) for Gwalior Smart City Project has been incorporated as a public limited company, under the Indian Companies Act, 2013. District Collector is Chairman and Municipal Commissioner is Executive Director of the Company. GSCDCL has received funds from Government of India and Government of Madhya Pradesh (GoMP) for the development of Gwalior as smart city. GSCDCL intends to apply part of this fund for the said consultancy services. Pursuant to above, GSCDCL invites eligible consulting entities to provide consultancy services for planning, design and implementation of smart city projects of Gwalior city.

Smart Cities are the result of a dynamic process which develops along six dimensions: smart economy, smart people, smart mobility, smart environment, smart living and smart governance. These six dimensions identify urban growth and development, and are based on theories of regional competitiveness, human and social capital, participation of citizens in the governance of cities, transport and ICT economics, natural resources, quality of life and provide an image of how much a given community has achieved in the process of transforming itself into a smart city, and can be used to rank or describe the development towards 'Smart City' status.

1.2. City Profile – Gwalior

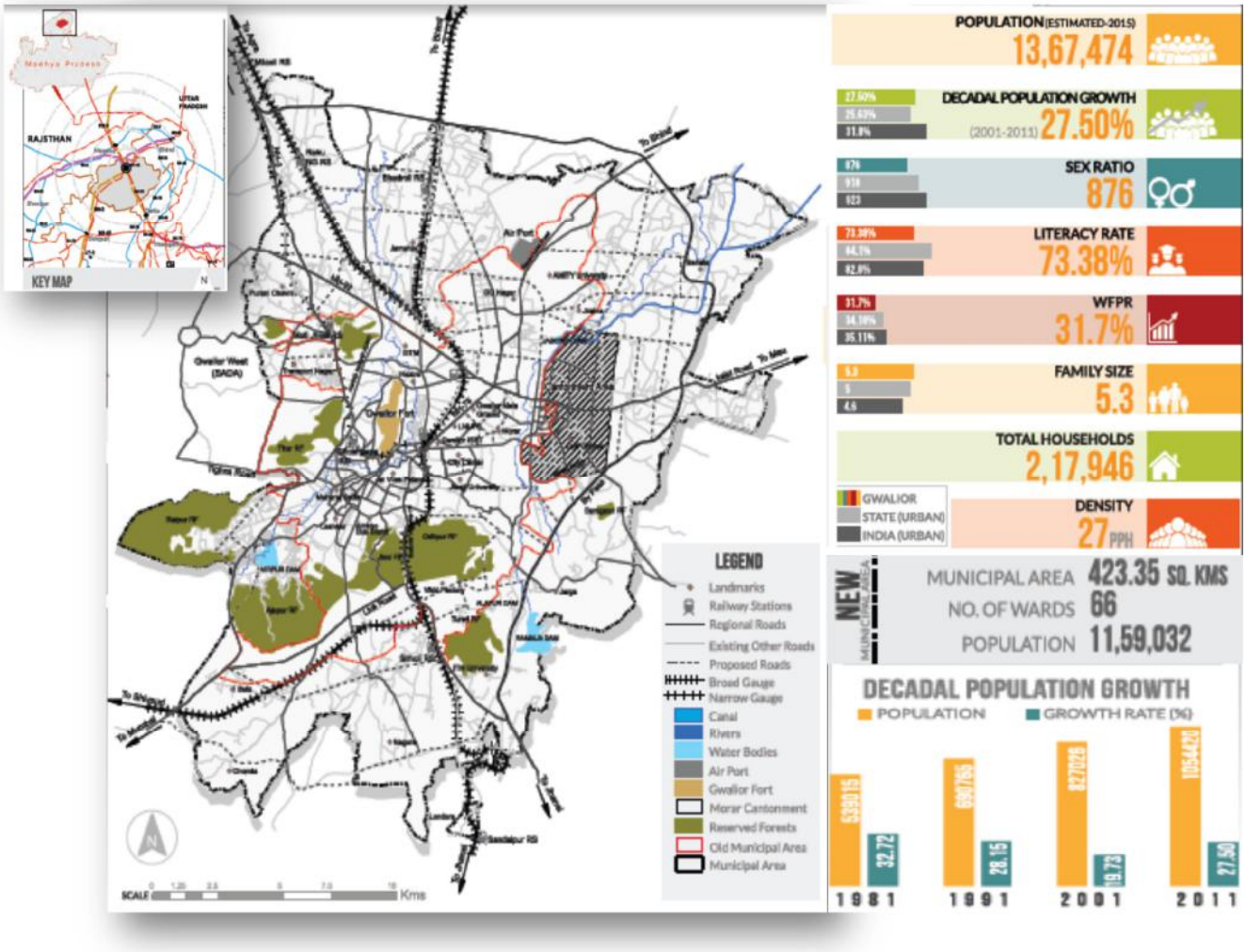


Figure 1: City Profile as in SCP

The Cultural & Historic city of Gwalior is the Tourist Capital of the Indian State of Madhya Pradesh. Gwalior -A million-plus city situated 320 Km south to Delhi, has been identified as a Counter-magnet City to the National Capital Region (NCR). The city has potential to develop as an independent growth center and attract migrants moving to Delhi.

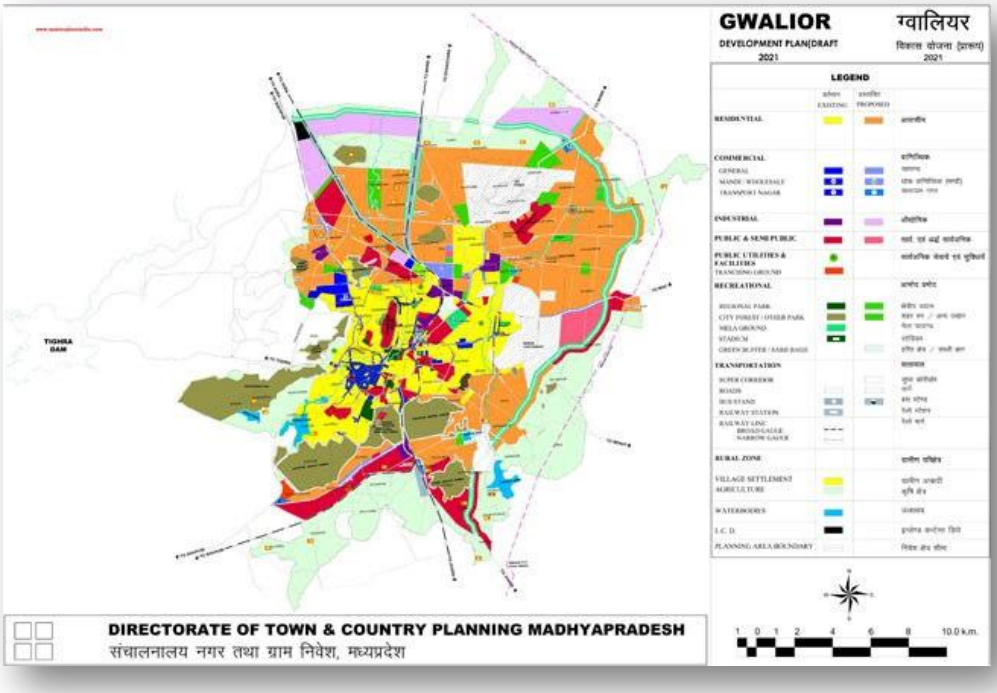


Figure 2: Gwalior Development Plan 2021 map

Awarded as the "Best Heritage City" in National Tourism Award 2013-14. About 400 tangible heritage structures exist in the city. Gwalior Fort and Tomb of Tansen are the two ASP monuments of National Importance which falls with-in the city limits.

Gwalior is one among the eleven Counter-Magnet Cities to the National Capital Region. Gwalior Junction is a major railway junction in the Northern central region. It lies on Delhi-Chennai & Delhi-Mumbai line of central railways. About 1000 trains passes through the city every day, 36 Trains have scheduled halts & 11 trains originate from the junction. (The prestigious tourist train, Taj Express halts at Gwalior Junction.). Gwalior Airport connects Delhi and Gwalior with regular domestic flights.

Trade, Commerce and Service sector are the major drivers of the economy of Gwalior. The Gwalior Trade Fair is India's second largest trade fair with over 100 participating artisans & visitor footfall above 150 Lakhs; making an estimated sale of about 500 Cr. With the fast growing Industrial pace, investment in MSME has doubled in last ten years by adding more than 6,000 MSME units. WFPR surged to 31% (2011) from 25.9%(2001). Stone mining is one of the significant economic activities of Gwalior Region. There are total 132 mineral stone mines and 77 FarSP stone mines in Gwalior district. GoMP has established a Garment Park and an IT Park at Gwalior in 2012.

1.3. Overview of the Smart City Project

Gwalior Smart City Proposal was selected by the Government of India under Smart City Mission in the second round of smart cities challenge. Gwalior Smart City Development Corporation Limited was incorporated as a Special Purpose Vehicle to implement the Smart City initiatives. Gwalior has a unique opportunity to address its three most pressing concerns: urban mobility, waste management and economic development through loT and ICT platforms to target improved service delivery. The projects have been structured into Area Based Development and Pan City Configuration to address the needs of the entire population in an efficient manner.

1.4. ABD Area

The Gwalior Smart City ABD Area has been selected through massive public participation and consultation, several rounds of meetings, discussions with various citizens groups, welfare associations, women and youth groups, NGOs, market and banking associations, local councilors and legislators, administrative officers and staff, structured questionnaires, online and offline polling through dedicated accounts, kiosks and vans, public events.

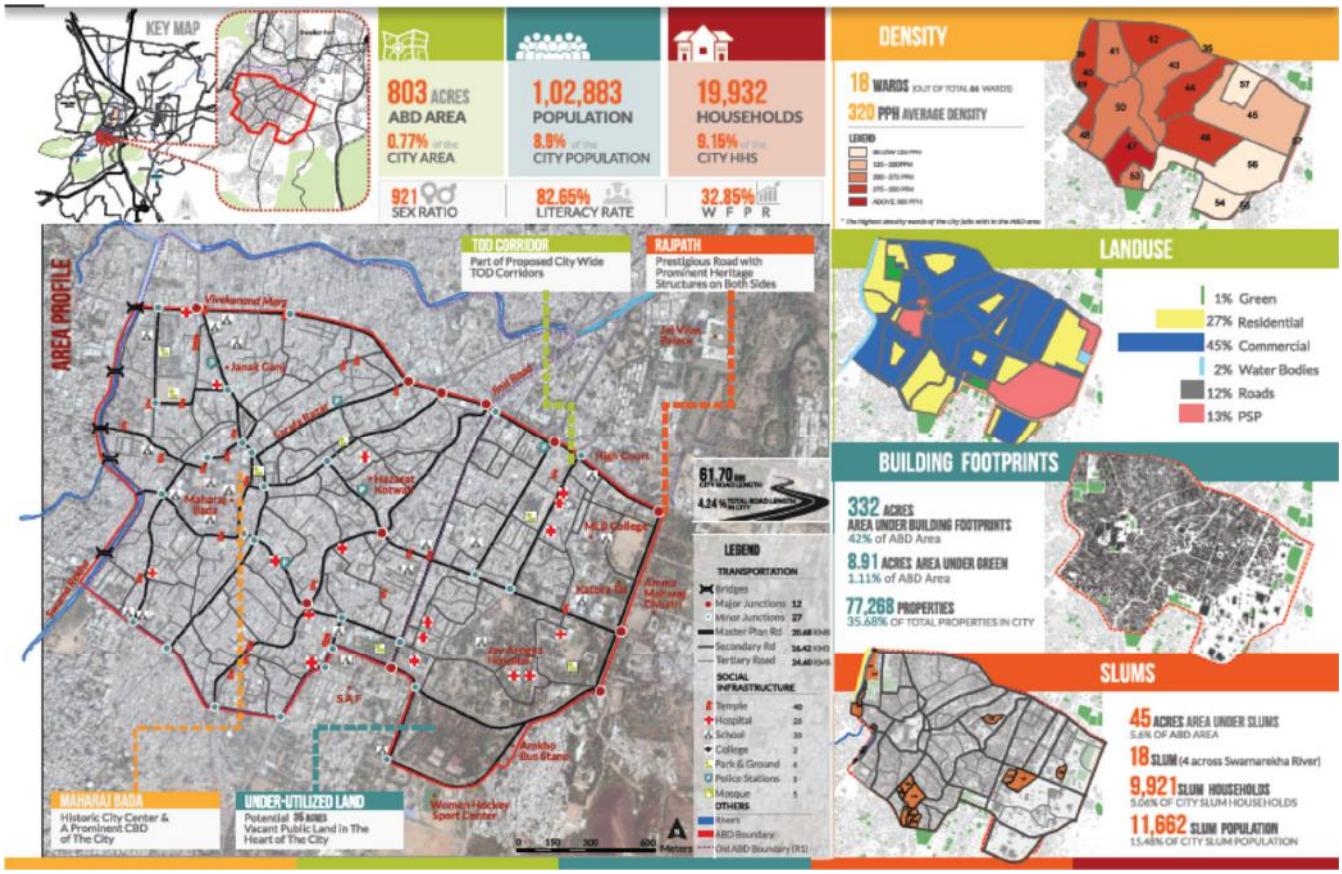


Figure 3: ABD Area Profile

It was decided that the ABD extent of 638 acres finalised in Smart City Plan Preparation Stage 1 needed to be extended to include vacant land for further development and land monetization as the “Maharaj Bada” area is already very congested. Hence the vacant land of 35 acres belonging to Govt. was included in the ABD area to a total of 803 acres.

The public voted for revitalization of “Maharaj Bada Area” as the area to be prioritized for development as a “Smart City”, an area replete with beautiful historical buildings and heritage structures, history and culture. Bada Area and its immediate surroundings accounts for more than 75 heritage structure (out of 400 listed structures in the city). Temples, palaces, public squares, historical markets and shops are being functioning since several generations; all Gwalior citizens identify with Maharaj Bada as the must visit place for all shopping activities.

The area is a real life example of the dense, mixed use, walkable precinct with families living and working in this area for generations. This is well reflected in the fact that the area account for only 0.77% (803 acres) of the city area (out of about 1 lakh acre) and accommodated 8.88% (1.02 lakhs) of total city population (11.59 lakhs).Gwalior Municipal Area is divided into 66 wards out of which 18 wards falls under ABD Area. As per the Smart City Plan Proposal, the total ABD area i.e. 803 acres which is around 0.77% of the total area of Gwalior city.

ABD Area is bounded by Swarnarekha River on its western boundary, Vivekananda Marg forming the northern boundary, Rajpath forming the eastern boundary. Not all wards are falling in totality in ABD Area. Under such cases the extrapolation of the ABD area for each ward has been done

1.5. Project Background and Need

Most ULBs depend on the revenue collection from property tax to finance their infrastructure and city operations. Lack of these funds causes growth and progress to be delayed and reduces the economic potential of the city. By developing a GIS-based tax assessment and management system the ULB is able to: check the total tax collected for a defined area like a ward; compare this against what would be expected to be collected from the ward; re-plan tax amount based on changing urban development plan and new construction; and develop more detailed system focusing on new development areas to improve tax collection.

There is no regular update or monitoring in the addition or removal of different units in those source of revenues. For example, in case of property tax there is no close monitoring of whether appropriate property taxes are made by owners on the addition of houses, additions of floors in houses, change of ownership etc. As a result, municipalities are seemingly in loss of large amounts of revenue. This project aims to show, how the GIS could help in efficiently monitoring this process and thereby stop the loss of revenue through effective enforcement of property tax practices. Property tax isn't being acknowledged to its maximum capacity because of poor evaluation rates of properties and weaker effectiveness in revenue collections. The biggest challenge faced by municipalities and local civic bodies today is to define better methods for property valuation, keeping a regular track on revenue collections and record losses on account of exemptions.

GIS could help monitor the property tax revenue by preparing a common platform that visually links all property-related data such as the number of floors in each building, the total constructed area of each building, individual plot areas, details of locality, and road facing details with the applied tax calculation principles. An efficient GIS can store accurate information on tax payables and revenue collection which can be monitored visually. It can send automated notices to tax payers periodically to update them about pending dues. Visual representation of the whole property tax system shall not only build an efficient and accurate tax collection mechanism, but also reduces the frequency of field visits for complaint redressal and other assessment purposes. This would also provide accessibility to all the related civic departments and shall enable a transparent and consistent system for tax assessment.

1.6. Objectives of the project

The objective of this project is to:

i. Increase the revenue generating potential of GMC by accurately finding and tapping into the sources of leakage with the help of Web GIS based DSS and AMS.
    a. Property tax payments
        - Updation of property records,
        - Management of payment
    b. Maintenance of utilities
        - Managing and monitoring inventory,
        - Undertaking preventive maintenance thus reducing costly repairs

ii. Make available a unified platform for data visualization and decision making for all stakeholders within the city

- GIS based unified City Dashboard for ICCC
- Repository of data pertaining to city at one place
- All spatial data from different stakeholders (spatially correlated) on the unified dashboard
- Spatial analytical tools for management of information
- Updated base maps showing various natural and man-made features extracted from latest satellite images
- Interactive web based platform for report generation and spatial analysis by various departments.

2. Scope of Work

Successful Bidder/System Integrator is supposed to:

i. Conduct geo-enabled property tax survey using mobile / handheld device (to be arranged by the selected bidder at no additional cost) for faster, transparent and better survey of Buildings / property details

ii. Integrate all the surveyed data with GIS database of Authority

iii. Design and develop a web based system to incorporate the integrated data with visualization tool to display attribute and spatial data

iv. Design web based system to provide Tagging facility for public / private property numbers in Visual and map data

v. Conduct analysis of the integrated data with the property data available with the GMC to identify any deviating properties from the property tax perspective

vi. Provide training on complete solution

vii. Provide handholding support to the identified users

viii. Provide a dedicated development team to undertake future customization of the application as per requirements of various user departments

ix. Provide integration capability with ICCC and other Smart City Solutions

The GIS based Property Tax Mapping project is proposed to provide a robust, reliable and futuristic decision support system. Various sub-activities that are imperative to achieve the proposed solution to be delivered by Successful Selected Bidder shall include the following in three broad phases of – Data collection, Design & Implementation and Post Implementation. The detailed scope of work for each of these phases is given below:

#	Scope of Work	Responsibility
i.	**Data Collection**	

#	Scope of Work	Responsibility
a.	Creation of Base Map for AUTHORITY	GIS Manager > Senior Image Processing Expert > Image Processing Expert GPR Expert > Field Surveyors GIS Digitization Supervisor > GIS Digitization Operator
b.	Mobile Application for Property Assessment Survey	Survey Manager > Senior GIS Developer > Senior Developer > UI Designer
c.	Key Features	GIS Manager / Survey Manager / GPR Expert > Business Analyst > Solution Architect
d.	Data Requirements	Business Analyst, GIS Analyst, Technical Writer
ii.	**Design and Implementation**	
a.	Geo enabled door to door property tagging survey	Survey Manager / GPR Expert > Field Surveyors >
b.	Property Assessment Survey for all properties under the jurisdictional boundary of AUTHORITY	
c.	Sizing of servers required for hosting GIS solution	Project Manager > Database Expert > GIS Manager, GPR Expert, Survey Manager, Senior Image Processing Expert > Solution Architect
d.	Supply and Installation of GIS solution for creation, storage and maintenance of GIS data	GIS Manager, Database Expert > Senior GIS Developer > GIS Developer/Analyst
e.	Design of Enterprise GIS Architecture	Senior GIS Developer > GIS Developer > Solution Architect > Analyst
f.	Development of GIS application and Citizen Portal	GIS Developer, Application Developer > UI Designer > Solution Architect > Business Analyst, GIS Analyst
g.	Setting up GIS Cell	Project Manager > GIS Manager
h.	Functional Requirement Specification	Business Analyst, GIS Analyst, Technical Writer

#	Scope of Work	Responsibility
i.	Testing, Training and Go-Live of the System	Release Implementation Manager > Security Expert > Integration Expert > Testing Lead > Senior Tester
j.	Integration of GIS with all smart city elements	GIS Manager > Release Implementation Manager > Security Expert > Integration Expert
k.	Other details and requirements relation to application development	
l.	Application software additions/enhancements/modifications	Business Analyst, Solution Architect, Application Developer
m.	Data management	Database Expert, GIS Manager, Survey Manager
iii.	**Approach to support GMC in property tax improvement**	
a.	Phase –I – Support GMC in updating property tax demand and GIS	Project Manager > GIS Manager
b.	Phase II – Handholding (including capacity building) Support	Project Manager > GIS Manager
iv.	**Post Implementation**	
a.	Testing and Acceptance Criteria	Release Implementation Manager > Security Expert > Integration Expert > Testing Lead > Senior Tester
b.	System Documents/User Documents	Business Analyst, Solution Architect, Application Developer
c.	Go-Live Preparedness and Go-Live	Release Implementation Manager > Security Expert > Integration Expert
d.	Annual Technical Support for GIS Solution and the Mobile Application	Project Manager > GIS Manager > Database Expert, Application Developer, Solution Architect, Business Analyst, Survey Manager, Senior Developer

The indicative requirements to be delivered by the successful Selected Bidder/SP against various scope activities are given below:

2.1. Data Collection

The Selected Bidder must follow all (but not limited to) below mentioned guidelines and standards issued by different Government Departments/Ministries related to spatial data collection, storage and dissemination:

i. Remote Sensing Image Standards
ii. Spatial Reference Standards
iii. Geo-spatial Data Content and GIS Database Standards
iv. Quality Assurance/Quality Check
v. GIS database dissemination to ULBs for Master Plan formulation
vi. Metadata standards
vii. Design and Standards - Formulation of GIS based Master Plan for AMRUT Cities

2.1.1. *Creation of Base Map for Authority*

The base map must have layers as listed under Annexure- 19 of this RFP.

In order to complete the base map preparation the following steps MUST be followed:

i. **Collect relevant layers from relevant govt. dept. (including GMC)**
ii. **Purchase relevant layers from private mapping entities**
iii. **Digitize basic features (road, building footprint, vegetation, water bodies etc.) from satellite imagery (in case not available from above mentioned sources).**

A city base map between 1:2000 – 1:4,000 scale may be available with the GMC or any other department of State Govt. In such cases, the first step will be collection of those base maps for the "planning area" including boundaries of municipal area, zones, wards & slums. These maps may be in two forms i.e. paper maps (hard copy or soft copy) or GIS layers. These maps/layers can be used /modified for preparation of updated city base map. In case of existing GIS data, only the required layers need to be extracted, updated and converted to prescribed output data format and projection system (if the data format and projection system are different). In case of paper maps, the data for preparation of city base map will be captured in three steps, i.e. scanning, geo-referencing and digitisation. Geo-referencing of scanned paper maps (scanned paper map usually called raster map/image) after scanning paper maps will be converted to raster image). These steps may change depending on the software selected for geo-referencing of raster image.

Authority has also identified GIS data providers who have created different GIS layers for Gwalior City. These layers should also be explored by Selected Bidder for complementing the base map preparation.

It is recommended that for utility networks such as Electrical, Gas and Telecom, instead of going for a fresh Ground Penetrating Radar (GPR) or Electronic Pipe Locator (EPL) based survey to map the underground utilities, Authority may directly approach Avantika

Gas Limited for gas network, MPMKVVC for electrical utilities, and BSNL/Reliance/Airtel and other telecom operators to arrange for the GIS data layers as they have already created a comprehensive GIS database for operation and maintenance of their assets. It is also suggested that MP Land Records Department may also be requested to share their land ownership data in the form of web services so that the same can be linked to the GIS property database using Unique ID and can be accessed from the proposed Web GIS portal.

The potential Interpretation, Updation and digitization of all physical features such as Building foot prints, Roads, and other visible features from satellite imagery.

- The satellite imagery would be procured in the name of Authority and delivered to the Selected Bidder/SI.
- The digitization process shall include vectorization, Symbolization, edge matching, topological integrity, data base linking and QA/QC.
- Selected Bidder/SP is expected to suggest inclusion of any important information other than that mentioned above, during the pre-bid meeting and subsequently during the project execution, for improving the overall Urban Management.
- **All the data available with Authority, with respect to above proposed GIS layers, would be shared with the Selected Bidder/SI.**
- **In case spatial data is found to be incomplete for the project area (as available with Govt. Depts. including GMC) then the next step should be to purchase relevant layers for base maps from private entities**
- **Following activities needs to be carried out for successful implementation:**

2.1.1.1. Satellite Imagery

Selected Bidder will have to procure cloud free high resolution multispectral imagery data sets (Ortho-rectified) and geo-referenced from NRSC meeting following requirements:

- Geo-referenced & Geo-coded, mosaiced and color matched satellite data of 0.5m resolution as per the required scale and grid base with proper spatial referencing and accuracy.
- Geo-database (GIS database) for the project area (GMC) as per the standards with proper topology, code and linkages for other data integration with GIS.
- Digitized and Geo-referenced sanction layout maps under GMC jurisdiction. (optional)
- Digitized Land Property (Plot Boundaries - Optional) and Assets Properties (Buildings)
- Digitize any map data available with the GMC and integrate with the GIS database
- Authority will provide geo data base and usable base maps with required feature extraction to the successful Selected Bidder for integration in to the web GIS system.

#	Description	Value	Remarks
1	Spatial Resolution	0.5 metres or Better	Not older than 6 months
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 15 degrees.
7	b. Monoscopic data View angle	Less than 10 degree from nadir	In specific cases, maximum upto 15 degrees view angle shall be allowed
8	c. Stereoscopic	One of the stereo image view angle should be less than 10 degrees from nadir	Base to Height(B/H) ratio: 0.6<B/H< 0.8
9	Vantage imaging	Fresh acquisition: Within 6 months Archived Data: Less than 1 year	If city is covered by multiple scenes, the time difference among the scenes should be less than 3 months.
10	Product type	Image data should be associated with corresponding Rational Polynomial Coefficients (RPCs) Format: i. Image data: Geo-tiff ii. RPCs : Open standards	Ortho-kit data with RPCs
11	Spatial Reference	Datum : WGS84 Projection : UTM	
12	Cloud Coverage	Zero % in the core town/city, Less than 10% in the periphery of town/city limits	Cloud free data is preferable

Area coverage: With sufficient buffer of 2 kms around GMC area of ~ 423 Sq. Km

The Selected Bidder/SP will verify the correctness of the imagery and data via on field data verification. The correctness of image is to be checked with respect to any issues in the coverage, and file format. The imagery that does not confirm to the correctness with respect to Coverage and file format must be reported within one week. AUTHORITY will discuss the same with the Selected Bidder and provide further instructions

Only the supplied imagery must be used for the preparation of Base Maps. Use of data from alternative online sources such as Google Earth / Google Maps is strictly prohibited as this is strictly against the usage policies of the respective services. The Selected Bidder/SP will be solely liable for any legality and any such deviations will lead to disqualification of the Selected Bidder/SI.

2.1.1.2. Collection of Data

a. ***Inventory of Existing High Resolution Satellite Image (HRSI)*** - In some cases, high resolution satellite image (Cartosat – II, Quickbird, World View etc.) may also be available in GMC or any other department of State Govt. If these images have been procured recently, it can also be used for city base map preparation.

b. ***Procurement of HRSP*** - If base map/GIS layers/ high resolution satellite image are not readily available with the Authority, then HRSP needs to be procured from National Remote Sensing Centre (NRSC) for the entire "Planning Area" of the City.

c. ***Collection of GCPs for Geo-referencing of Satellite Image*** - After procurement of satellite images, GCPs should be collected from field using DGPS for geo-referencing of Satellite Image. Minimum 10 GCPs should be collected. These points should ideally be spread over the entire planning area.

d. ***Geo-referencing of Satellite Image*** - The GCPs collected during DGPS survey can directly be downloaded in the GIS platform and will be used as tie point for geo-referencing the Satellite image.

e. ***Feature Extraction from Satellite Image for preparation of City Base Map*** - Following thematic layers needs to be extracted/digitised:

    i. Administrative boundaries (planning area, municipal, zones & wards). Each boundary needs to be marked on the satellite image using GPS survey points.

    ii. Key physical features such as roads, rivers, railways, water bodies, important land marks etc.

    iii. Land use & Land cover

f. ***Property details from GMC:*** Attribute data pertaining to property tax (available with GMC) to be made available to Selected Bidder for use in the mobile application during field survey. This will help the surveyor to tag location and photographs of a specific property to an attribute data. And then, in case any changes have happened to the property (that doesn't reflect in the system) can be added using the mobile app itself.

g. ***Property Mapping using Handheld Devices:*** Use the updated base map for property survey using handheld devices such as smartphone/tablet with an in-built application to capture the data and having internet connection to transfer the data.

    i. The data from the handheld device is required to be synced with the central database immediately after capturing the data.

    ii. The details to be captured as per the form attached at **Annexure 11**

h. Utility Data

i. Collection of underground utilities data alongside the street within GMC jurisdiction using the Ground Penetrating Radar (GPR)

ii. Update the utility networks above the ground within GMC jurisdiction using the as- is drawings available in GMC.

iii. SP will required to survey the following underground utilities along the roads:

a. Water Networks
- pipe routes including fire mains with levels
- valve and meter pits.
- diameters specifications.
- depth below ground shall be annotated at each surface feature and at significant changes of depth.

b. Sewerage Networks
- all sewers and sewer connections with invert levels.
- all manholes within the survey area with locations
- depth and diameter of pipe work.
- connections to foul/storm and combined water sewers.
- depth below ground shall be annotated at each surface feature and at significant changes of depth.

c. Underground Power Cables
- Cable routes and levels.
- Cable draw pits and manholes
- Depth below ground shall be annotated at each surface feature and at significant changes of depth.
- Dimensions and levels of concrete surrounds (if available).
- Internal dimensions of cable draw pits and manholes.

d. Other utilities
- Other utilities which are located during GPR survey would be mapped with any available information regarding the identity or type of utility.

iv. SP is required to survey the underground utilities using a Ground Penetrating Radar along the roads. SP will take the all possible precautions while carrying out such survey and will ensure not to create any traffic inconvenience, as well inconvenience to the Public at large and avoid any survey to be carried out in restricted areas, if any.

v. Each utility should, at minimum, have following attribute data attached with it:

a. Type of utility (Water, Sewerage, Power (Electricity), Tele-communication).
b. Depth of Utility.

c. Size (diameter) of pipe/cable.
d. Length
e. Starting point
f. End point

vi. All the connections, bends, sudden change in depth /direction should be shown. The SP shall locate and identify all underground services within the area to be mapped.

vii. Underground services shall be located continuously and recorded in three dimensions at intervals not exceeding 40 meters and at each surface feature, change of direction and bifurcation. Where bands of utilities are identified the upper and lower utility will be placed in order to be able to provide a cross section of the utility bands.

viii. All underground utilities should have continuity with the surface features depicted on the data supplied.

ix. Positions and levels shall be related to the specified grid and datum and shall normally be related to the center of metallic pipes or cables, crown of ducts and inverts of sewers and drains.

i. Field Survey data

i. SP should conduct the field survey for collection of property attributes as per the details shared in **Annexure 11**. This survey is envisaged to capture the details of each of the property within the GMC jurisdiction. This data will be captured using the handheld devices with the data capture app supplied by the SI.

ii. Data so captured during the onsite survey will be sent directly to the central database to avoid any manipulation of the captured data. The handheld device must have a capability to capture the Latitude and Longitude of the surveyed property to ensure that the data is captured at the actual location.

iii. The SI's team leaders, data analysts, etc. shall process collected Data, undertake necessary Quality Assurance (QA) and Quality Checking (QC) activities and remove errors, if any. After the QA/QC the data should be pushed into the database and integrated with base map.

iv. Wherever the property Owner refuses to co-operate with the SP for data collection, the SP team shall flag the same in the data collection form indicating the specific reason like "Non- co-operation by Occupier" with date(s) of visit.

v. If such cases occur in large numbers, the Authority shall depute its staff along with SP survey team to ensure that the data is collected. The SP will have to bear the cost of this survey.

vi. The land/ building property attributes to be collected as per details mentioned at **Annexure 11** are applicable for all buildings / land assets. However all the details may not be applicable to all the government own properties. It is envisaged that a different attribute table will be created for each type of government own properties. e.g. if the government run property is a primary health center, a unique attribute data table will be defined after discussion with

Authority. Authority may collect data form available resources as per the define attributes and provide it to the SP for importing the data into the system.

All the surveyed data including property attribute data and underground utility data will be approved & accepted by the competent authority. The system generated report on the work accomplished should be submitted by SP along with commercial invoices.

j. Post Processing of Satellite Imageries

To correct various geometric anomalies in raw satellite imagery, Ground Control Points (GCP) collected through Differential Global Positioning System (DGPS) survey will be used for Geo referencing of the imagery. For this purpose, the Selected Bidder/SP shall carry out the following functions:

i. The Selected Bidder/SP shall carry out Geo Referencing and Geo-coding of data on WGS-1984 with projection on UTM.

ii. For the DGPS Survey, the Selected Bidder/SP should select the Ground Control Points (GCPs) at well- defined sharp points both on the ground and on imagery. The Ground Control Points (GCPs) should be located at nearly desired locations and should be clearly visible on the imagery. Sketch, coordinate both in latitude, longitude and Easting, Northing of GCP's including GPS observation and adjustment data should be provided to AUTHORITY for necessary approval.

iii. The Selected Bidder/SP shall make sure that while taking DGPS survey all position fixes must use at least four satellites.

iv. The horizontal accuracy of the GCPs should be 0.3– 0.5 meters.

v. During static point-mode surveys, the minimum recording duration at each survey point shall be 60 seconds with at least 60 individual position fixed during that period.

vi. The Selected Bidder/SP shall make sure that the pair of GCP's to be established is collected at minimum 2 km (depending upon the size and shape of the Municipal Corporation Boundary) and these should be evenly distributed over the AUTHORITY City area.

vii. The Selected Bidder/SP shall also do a mosaicking of the image tiles which are geo-referenced and ortho- rectified. The mosaics shall be verified once by the GIS representatives from AUTHORITY before proceeding for Base Map Creation/Update.

#	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.

#	Description	Value	Remarks
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.

Note: Refer Brief DGPS survey method given under Annexure-II of the document named 'Formulation of GIS based Master Plan for AMRUT Cities – Design & Standards' prepared by Town and Country Planning Organization.

2.1.1.3. Data Dictionary / Data Model:

The Data Model for storing the spatial & Non-Spatial data shall be created by the SI/Selected Bidder with the help of detailed round of discussion with each of the concerned AUTHORITY department officials. The Selected Bidder shall user proper tools to create the data model. The final data model shall be approved by the AUTHORITY and before proceeding further the data model needs to be finalized. Once the data model is finalized, the Selected Bidder/SP shall give the details of the data model diagram (ER Diagram) to AUTHORITY for future references or for any modifications in future. The data model shall be created in such a way that all the layers that are already available with AUTHORITY are considered while finalizing the data model. The data model may include the few layers that may not have any data. However provision of the same shall be kept in the enterprise GIS database.

The Selected Bidder shall take care of the changes in the Data Model as per the requirements from the AUTHORITY users and shall maintain the changes history for the entire period, the Selected Bidder is working with AUTHORITY under the contract. An indicative list of layers and its relevant attributes are added in the Annexure 19 (Indicative list of non-spatial data for every layer).

2.1.1.4. Base Map Preparation and Digitization

The Selected Bidder/SP is expected to provide technical and management support during the planning, design, development and implementation phases of GIS base maps preparation and other department layers mapping activities as described below but not limited to, for satisfactory performance of the services within the Project Duration.

The main objective of the project is to develop a detailed GIS Base map on a scale of 1:4000 or better for all the wards/zones of GMC. The details of features to be interpreted are given

later in the document. The preliminary interpreted map should be ground verified and the final map is to be prepared by incorporating the ground truth data.

Post the processing of the satellite imagery by removing the geometric anomalies (if any), the Selected Bidder/SP shall prepare a Grid of 1Km x 1Km for positioning AUTHORITY with respect to its Geographic Location. These grids then further shall be divided into 250m x 250m scenes for future usage like Map Book creations, Smart Asset ID creation etc. and future analysis. All the grids and scenes shall have unique IDs. The Selected Bidder/SP shall then take sufficient number of Ground Control Points (GCPs) collected through Differential Global Positioning System (DGPS) survey. The Selected Bidder/SP shall prepare an up-to- date large-scale base map (Scale 1:4000 or better) of all the wards/zones of GMC using satellite imageries. The Selected Bidder/SP shall then prepare a new GIS Database as unified Geo-spatial Data with infrastructure details.

Using the heads on digitization technique, the satellite image is to be digitized to prepare a base map by digitizing all the features available in the satellite map like Buildings, Vacant Plots, Roads, Bridges, Railway Tracks, Parks, Gardens, Stadiums, Slums, Traffic Squares, Water Bodies (River, Lake, Pond, Drainage, and Canal etc.), Over Head Tanks, etc. While doing the digitization, a special care of data correctness to be taken like no overshoots / undershoots, proper layering, proper symbology etc.

The Selected Bidder has to ensure that the existing AutoCAD and GIS Shapefiles that are already available with AUTHORITY are used while preparing the base map. These base layers will be provided by the concerned department of AUTHORITY as mentioned above. The Selected Bidder/SP shall integrate information of Utilities features such as Street lighting, Water supply line, Sewerage network, Wastewater, Storm water drain, sanitation facilities (Household/public/private), Solid Waste management and unauthorized properties as and when provided by AUTHORITY as layers with base map.

Selected Bidder has to undertake the Base Map Creation/Update activity at AUTHORITY premises, Selected Bidder has to bring all the required IT and Non- IT infrastructure for undertaking this activity. AUTHORITY will only provide raw power and empty room.

The digital map data should be GIS compatible. Each map object should be defined uniquely by its feature code and symbology (point, line, and polygon) and should be approved by AUTHORITY. Demonstration on digital map production line, producing digital base map using any of the digital mapping system should be made to the AUTHORITY.

2.1.1.5. Data Validation

The Selected Bidder/SP shall check the source and reliability of the collected data from Authority and document the details which can be taken into account and usage. Type of validation to be carried out on the available datasets from Authority with the satellite imagery shall be:

i. ***Positional Accuracy***: The Selected Bidder/SP shall check whether the positional accuracy of the existing data available with the Authority is in sync with the Satellite Imagery. Selected Bidder/SP needs to digitize the satellite imagery.

ii. Further Selected Bidder/SP would have to carry out Geo-referencing of the available data by using DGPS for collecting GCPs as required for the process and also spatially adjust in case of vector data.

The Selected Bidder/SP also needs to prepare Base Map using the available and fetched data and validation of the same will be carried out by the authorized officials of AUTHORITY.

iii. ***Accuracy Requirement*:**

The 10% of GCPs will be randomly selected as sample for the accuracy. If any incorrectness in accuracy is found in any sample, the entire work of GCPs shall be rejected and Selected Bidder/SP shall be required to rework

iv. ***Reliability***: The Selected Bidder/SP shall also check from the available data with AUTHORITY, whether the data (spatial or non-spatial) is recent or accurate enough to be used and not obsolete.

v. ***Data Validity:*** The Selected Bidder/SP shall make sure by taking a signoff from authorized officials of AUTHORITY on the authenticity of the data taken from any department of AUTHORITY.

vi. 10% of the overall properties surveyed by the SP shall be audited by agency(ies) selected by Authority. The inspections may be in the form of concurrent or post-survey inspection.

vii. If any irregularities are found as a result of these inspections, the selected bidder needs to rectify the same. Bidder shall be responsible to provide requisite information and facilitate inspection by audit Selected Bidder.

viii. The findings of the audit agency shall be binding on the bidders and they shall have to re-do the survey and provide necessary explanation for the earlier error, if any.

ix. In case of discrepancy between audit agency and SI, the Authority shall accompany both these Selected Bidder and both Selected Bidder shall demonstrate actual survey results to the Authority whose decision in this matter will be final

x. SLA measurement and monitoring for quality of property survey are attached at **Annexure 12.**

2.1.2. *Mobile Application for Property Assessment Survey*

AUTHORITY intends to carry out a household level geo-tagging survey. SP shall create/customise a Mobile Application to be used for Property Assessment Survey. This mobile application should have the following features:

1. It should be compatible with android 5.1 and above OS
2. It should geotag each survey sheet
3. Alpha numeric data collected via survey should be stored in .xls or .dbs format for better computing
4. Apart from alpha numeric input as answers to questions, the mobile application should accept input in the following forms too (they should also be geo located/ geo tagged):

a. Images – stored in .jpeg format

b. Videos clips – stored in .mp4 or .3gp format

c. Audio clips – stored in .mp3 or .wma format

The Selected Bidder must design, develop, deploy and end user training of GIS database and a customized Mobile based GIS application for geotagging all the properties within GMC jurisdiction. The scope of work is as follows:

- Mobile app surveyor module for GPS enabled handheld device with good accuracy for effective and real time geospatial property tax survey.
- Provide documented functional requirements, as and when gathered throughout the period, for validation with the AUTHORITY's stakeholders, or persons appointed thereby.
- Develop wireframes for new UI or existing UI revamps, wherever required, upon written request by the AUTHORITY or representatives thereof. Please note that this includes creation of new UI or enhancements or adjustments to be made to existing UI, in response to external events, change in functionality or other factors.
- Provide robust design and solutions considering the integration with backend systems and the integration with existing systems.
- Provide web services and APIs for the mobile applications, on written request by the AUTHORITY or representatives thereof.
- Design, development, testing, deployment and end user training of the mobile application developed. End user training may be required more than once.
  Deliver and provide handover for the source code and any additional software components that are developed to fulfil the project requirements
- Provide technical documentation: requirements, design, architecture, installation, configuration, testing related documents.
- Suggest UI and UX improvements based on current trends and technology available.
- Integrate the latest developments from the mobility space into the mobile application, as and when deemed suitable by the AUTHORITY or representatives thereof.
- The mobile application provided by Selected Bidder should comply with CERT-IN guidelines for web security and should be audited by a CERT-IN empaneled Security Auditor. Selected Bidder shall be required to submit security audit certificates of all the deliverables.
- Provide development and testing environments for any and all software components in the mobile applications. UAT and production environments shall be provided by the AUTHORITY.
- Develop components keeping in mind performance issues specific to mobility, such as call interruption behaviour, battery consumption and usability according to the form factor specified.
- Develop components that are W3C, WCAG and GIGW compliant.
- At the end of the engagement, the Selected Bidder will be required to submit a learnings document that must contain the content including, but not limited to, the following:
  i. Best practices for software development employed
  ii. Learnings from the engagement
  iii. Recommendations for new features in the mobile app

2.1.3. *Key Features*

The following are the indicative features of the Property Tax Survey Mobile Application

- Provision for field related Data entry for every property as per AUTHORITY requirement
- The separate data should be collected for Under Construction / Incomplete Buildings including geo-tagged and geo-controlled with timestamp Photograph
- Attach photograph which should be geo-tagged and geo-controlled with timestamp. The photograph capture should not be allowed beyond particular distance (in meter) and this distance should be configurable as AUTHORITY will decide it later
- Application should restrict upload photograph facility from gallery so that Surveyor has to click the property photograph on the field within allowed area.
- Surveyor should be provided very user friendly dashboard which can directly take him to the location where he stands as soon as he logs in. The surrounding buildings should provide clear distinction between work done, work not done and work in progress for his benefit.
- The distinction of properties should be configurable which can be decided by AUTHORITY about indicators like outlines and color.
- As surveyor completes field level data entry he should be able to submit details from field
- Surveyor should be able to work on any properties within his allocated area that are also rejected by office users
- Surveyor should also be able to search properties by giving property number
- Provision for new property addition
- Provision for Alpha numeric GIS IDs for all property
- Provision for Property Ground Truthing
- Provision for other Asset layers Ground Truthing
- Provision for uploading documents from site for new assessment
- GIS Navigation facilities and Search Tool
- Geofencing "Ward wise"

2.1.4. *Data Requirements*

- Mobile Application has to be integrated with Property Management System managed by Property Tax Department.
- Data must flow seamlessly between mobile application to application
- Data exchange between application and Property Management System must be secure and encrypted.

2.1.4.1. Key Assumptions and Dependencies

- Property Tax department will be providing access to the Property Management System
- Property Tax department will provide all required forms

2.1.4.2. Data Transfer and Size of Content

Uploaded photos, signature and details need to be lightweight for quick data transfer and also provision need to be provided for surveyors facing technical problem in data transfer through cellular data network should be able to transfer the collected data to server over internet as a package.

2.2. Design and Implementation

2.2.1. *Geo enabled door to door Property tagging survey*

1. A Survey to be conducted of all properties including vacant sites (All residential, Commercial, Industrial, Educational, Religious Buildings, etc.).
2. Selected Bidder should conduct Geo-enabled tagging survey of all already assessed and yet to be assessed properties, Private Properties, Government Properties, Properties owned by GMC, Mobile towers, religious properties, all type of properties etc. under GMC jurisdiction, ground truth of location on map and real time updates in the database of property tax assessment system.
3. Bifurcation of property and verification of ground realities of Residential / non-residential and open Plot.
4. Selected Bidder should use Mobile devices for property tax geotagging survey which will help in effective property tax survey completion and real time updates in centralize GIS database.
5. The Mobile device shall have a data dictionary developed by the surveyor for geo-enabled field survey. Selected Bidder has to ensure that the survey is carried out by the same Mobile device and same data dictionary is used for data collection on the field.
6. Selected Bidder needs to purchase scaled survey maps from City Survey Office for allotted before going for any kind of survey. Also pre scanned documents from property tax department need to be attached to each property which is being surveyed before the survey activity takes place.
7. In case of any deviation / change of use / unassessed properties identified by the Selected Bidder, the information of this change must be informed to the Department through Mobile Application
8. The survey team will have to follow the details as per the workflow mentioned in this RFP.
9. The Selected Bidder will be responsible for loading the reference map in the Mobile device.
10. It is Selected Bidder's responsibility to bring the Mobile handheld devices as per the number of surveyors Selected Bidder chooses to put on field.
11. The Mobile device should have camera with active data connection and having good minimum 3G internet connectivity during the period of survey.
12. The cost of handheld Mobile device, service provider Sim Card and data connection for every device will have to be borne by Selected Bidder.
13. The survey team will have to maintain decorum while carrying out the survey activity keeping citizen's convenience at prime. In case of any activity that is out of acceptable limits, AUTHORITY may take legal actions against the Selected Bidder.
14. Any complaints related to device and device network connection will not be entertained by AUTHORITY and Selected Bidder will have to resolve it without

hampering the ongoing survey work. Any such delay will not be attributable to AUTHORITY.

15. The Selected Bidder can perform survey work all days including public holidays from SUNRISE till SUNSET.
16. The captured property tagging details should be sent to higher levels of hierarchy for further addition of office level data. The indicative list of fields that will have to be surveyed from the field is provided as annexure.
17. The 5% of each ward properties will be randomly selected as sample for accuracy checks.

2.2.2. *Property Assessment Survey for all properties under the jurisdictional boundary of AUTHORITY*

The Selected Bidder has to carry out detailed property assessment survey of all the properties within the jurisdictional boundary of AUTHORITY and as specified by AUTHORITY. An indicative list of data to be collected as part of the Property Assessment Survey is provided in annexure.

2.2.3. *Sizing of servers required for hosting the GIS Solution*

The Selected Bidders will have to do proper Sizing and undertake Supply, Installation & Maintenance of the Server for Database & Application Software for GIS. The Selected Bidder needs to quote one of the top 5 OEMs as per the latest IDC / Gartner report for the same.

The servers will be centrally located at ICCC being commissioned at AUTHORITY office. The Selected Bidder should include a list of the proposed hardware elements as part of their response to the Tender.

2.2.4. *Design of Enterprise GIS Architecture to meet the requirements specified in the RFP*

AUTHORITY will procure a GIS platform to support enterprise wide GIS, development of web based GIS applications and desktop based GIS for smooth editing of GIS data. Following are the estimates of the approximate usage of the proposed GIS application:

- Minimum No. of users on Intranet simultaneously viewing GIS data - 40
- Minimum No. of users on Intranet simultaneously editing GIS data - 5
- Minimum No. of users on Internet simultaneously viewing GIS data through AUTHORITY web portal – 10000

Above indicative numbers of users is given to get a fair idea to the prospective Selected Bidders on overall usage of the Enterprise GIS System. Selected Bidders are required to utilize the system available with the Authority.

As a part of implementation services the Selected Bidder will have to setup an enterprise GIS environment for GSCDCL using the proposed GIS platform. This setup will have a centralized GIS database having all departmental GIS datasets within one

enterprise GIS database of GSCDCL. All the departments will be accessing this centralized GIS database for editing and managing their own departmental layers using web based, desktop based and mobile based interface, all of which will be created by the SI. The SP / Selected Bidder will have to provide support to all the department officials in using the enterprise setup. The SI/ Selected Bidder will also have to manage and support the centralized GIS setup. The GIS System and Database Administrators from the S P / Selected Bidder's side will have to manage and support the system.

Note: Selected Bidder should only procure the required hardware needed to deploy the enterprise GIS solution.

2.2.5. *Development of GIS application and Citizen Portal*

The Selected Bidder should develop a web base GIS applications suite for AUTHORITY. This will cater to the viewing, analyzing, & utilizing the Geographic Information needs of the different departments of AUTHORITY. This should also play a role of decision support system for AUTHORITY departments for which the field information and geographic data plays a vital role. Once the base map is digitized and enterprise GIS setup is done by the Selected Bidder, the GIS applications suite and Citizen Portal is to be developed for core GIS web based platform for AUTHORITY departments and citizens of Gwalior city. The Selected Bidder is expected to follow the complete SDLC for the development of the GIS application suite.

The system should be provided with a web interface and tools to view street level panoramic images that are geo-referenced with base map; view and edit tags of attribute information created from existing records, and information on identified properties with deviations and represented on the street level panoramic imagery and map; store, view and edit observation information; search and display options with selection criteria; generate reports and option to export attribute information.

Proposed GIS Application Suite should follow all guidelines and standards laid out by Govt. of India and State Govt. of Madhya Pradesh including National Spatial Data Infrastructure (NSDI) Meta standards, should be compatible with National Urban Information System (NUIS) Scheme, Guidelines for development of e-Governance applications developed by NIC etc.

The application suite should also have mobile compatibility for field users from AUTHORITY. The Selected Bidder should develop a web base GIS enabled Citizen portal for the citizens. This will facilitate the citizens to view and utilize the Geographic Information of different departments of AUTHORITY. The Selected Bidder is expected to provide technical and management support during the planning, design, development and implementation of GIS based Citizen Portal of AUTHORITY. The Selected Bidder must gather all the data and information, which needs to be kept open for citizens to view and utilize, from all the departments of AUTHORITY.

2.2.6. *Setting up GIS Cell*

Maintenance of spatial and non-spatial database is critical since the quality of decisions made from a GIS depends largely on the quality of the GIS database. It is apparent that

the maintenance of database is always a key issue upon which the success of GIS is centered. In particular, maintaining data quality and routinely updating the system is imperative. Therefore, Authority will be setting up a GIS Cell for supervising and managing the GIS data and controlling the Selected Bidders during the implementation and operation & maintenance of the GIS.

2.2.7. *Functional Requirements Specifications*

Broad requirements of the solutions to be provided by the Selected Bidder for the design, development and implementation of the GIS System. This means that the Selected Bidder still has to exercise his due diligence to gather the requirements through meetings or interviews with users to finalize the requirements, on commencement of the project. All detailed parameters shall be included in the SRS document, which falls under the scope of the Successful Selected Bidder during the pre- implementation phase.

The system should have minimum, but not limited to the following functionalities. It should be web-based, accessible to authorized users only and should facilitate:

a. A seamless walkthrough/navigation over the panoramic imagery with pan/zoom functionality and interactivity with map corresponding to panoramic imagery
b. Tagging of attribute information against the identified properties on panoramic images with icons.
c. Creation new layers based on the attributes of various assets
d. Import data in to the system for any asset
e. Search/Select options with specific Point of Interest based on criteria including-
    - '**Search Around'** - Search all the assets around a specified point within a given radius in a specified zone
    - '**Search Along'** - Draw the path on the map to search all the assets along a specified path within a given width in a specified zone
    - '**Attribute Specific search query'** – Search any asset based on any attributes and all operators – Like/ unlike for alpha-numeric fields and equal/ not-equal/ less than / greater than for numeric fields etc.
f. Modifications of tags based on user authorization/authentication with log details on the changes against the users and create a certificate of the log details with the print option.
g. Identification and display of properties on geo-referenced panoramic images with attribute information displayed on the grid.
h. Export of attribute information displayed on the grid based on search criteria into MS Excel/pdf file.
i. Selection of an object on the map and interactively display the corresponding panoramic image with related attributes.
j. Selection of multiple objects on the map and interactively displays corresponding attribute information in the grid with panoramic view options.

k. Multiple User Access – Allows multiple users to access the system with their unique user ids and passwords

l. Provision to define access rights by administrator to different users / groups.

m. Modifications of tags - (Create/Edit/Delete) based on user authorization/authentication

n. Facility to load the appropriate satellite image for reference purposes

o. Audit Trail – Create the log of the user after every modification

p. Print – User should be able to print reports/maps

2.2.8.1. Components of the system

The major components of the system will be as follows:

a. **Data Base and File Systems:**

The SP should develop the system using suitable database to store both spatial and non-spatial data, which should include the following:

- Panoramic Imagery data
- Satellite image data
- Map data (Base Map)
- Attribute data for all the GIS assets such as Buildings, utilities etc

i. Tagged data

The system should provide Tagging facility on the immersive visual image data. It should also provide various fields to be added as a tagging parameter and record the observations by users. Facility should be provided to categorize the tagged data based upon recorded observations.

ii. Storage

The System must provide facilities for the secure archival / storage of entered data and calculated values, allowing data collected from different locations to be consolidated and accessible to various users.

b. **Map Viewer**

The Map viewer should support basic functionality like zooming and panning, the Map component of the Platform should render its service for viewing the map to the users of the system, with appropriate authentication. The tags on the panoramic imagery should be searchable in the Map Viewer as well.

c. **Image Viewer**

- The Image Viewer should support Panning, Zooming and provision for addition, deletion and moving of tags.

- Should enable a seamless immersive walkthrough over the panoramic images with pan/zoom functionality and interactivity with map
- Should provide for identification and display of assets on geo-referenced panoramic images with attribute information displayed on the grid
- Should allow selection of any asset on the map and interactively display the corresponding panoramic image with related attributes

- Should have a facility for adding comments against a base map asset identified

d. **Result Grid**

This component of the application should display the search results, with attributes of properties in a grid or appropriate layout.

e. **Tagging tool**

- For tagging of attribute information against the identified properties on panoramic images with icons
- For modifying tags based on user authorization/authentication with traceability and printing options

f. **Search**

- Search options should be made available with specific Point of Interest from a set of pull down values as the search criteria.
- Export of search result into an excel sheet should be carried out from an export to excel option, available in the application.

g. **Report Viewer**

- Options for viewing the different Report Types (to be discussed and finalized with various category of users) should be made available in the application.
- SI, while designing the application, should provide filters to prepare reports on parameters, (other than the standard reports, in the Report viewer) in the form of export to excel.

h. **Integration with External systems**

The solution must be platform and database independent and should have the capability to integrate with other external systems such as Property Tax System and Building Plan Management System and online services with Department of Registration and stamps. The system should provide a facility to export data and import data to update the existing database.

It is expected that bidder will be responsible to integrate the below mentioned systems with web Geo-portal:

- e-Governance platform for GMC (Property & water tax)

- Building plan management system
- Digitized record of property rights of Revenue Dept.

i. **Technology**

The system could be developed using a proprietary or open source components. The SP will provide unlimited enterprise license for unlimited users for the system components.

j. **Users and User Management**

- The system must support a hierarchy of users and user groups. The System Administrator should be the Super User who should be able to create user groups and assign permissions to access data and to access the functionality of the system.
- Access to data should be given in terms of permission to access data resources. The roles of the users can be hierarchical and may be finalized at the time of project Inception phase.
- The System Administrator will have all the rights to amend the user groups and access rights in future.
- Should be possible to audit users at the form level, user level, application module level and at the organizational role level.

k. **Auditing & Validation of Data**

- The System should provide facility for auditing data entry and validation of each asset database.
- An audit trail should be maintained for the changes made to each feature and attribute value in the database.
- An audit trail should be maintained for the insertions, amendments and deletions made in each table of the database.

l. **Security Principles**

- The privacy of data has to be ensured by the SP at all times.
- Information, software must be secured to both internal and external parties (such as through password encryption).
- The system must follow a role based access control at all levels. All the access logs needs to be captured and monitored. Audit trails should be provided to allow the activities of users to be monitored
- Should not require opening of any special protocols for connecting the user client to the web/application server used by the package. All communication should be on HTTP or HTTPs.
- Infrastructure and Application Access should follow 2 Factor Authentication
- All the Databases and Data stores must be encrypted.
- SP has to ensure data security life cycle as a principle in securing data while creating, storing, sharing, archiving or destroying.

- SP has to ensure database protection with database activity monitoring and file activity monitoring
- Security in Design would encompass security risk assessment on user specifications, secure information architecture, proper role based access design and secure application and database design.
- The system must be secure at all user touch points by using suitable security protocols and data protection methods
- All types of network attacks must be identified and counter measures must be put in place.
- The Network layer must have in depth packet inspection and intelligence in blocking attacks. The system should support configurable password policies including;
- Password expiry
- Password complexity
- Password history and reuse policy
- Forced password change on first log on
- Capability of self-service reset of passwords in case of forgotten passwords or locked accounts.
- Should support security system with a full-fledged Role Based Access Control (RBAC) model

m. **Management Principles**

- The management of system shall be SLA based.
- System should have an Enterprise Management Solution that provides end-to-end, comprehensive, modular and integrated management of IT infrastructure components to maximize the availability of IT services and SLA performance
- System Management shall follow all processes as per to ITIL standards. This includes Asset Management, Selected Bidder Management, Configuration Management, Incident Management, Performance Management and Capacity Management.
- Management to have minimal overhead on the system
- Extensive reporting to help management and administrators to take quick decisions
- System should track all the assets in use or acquired for use in real time.
- Real-time status of the system should be available at all times.
- System Management should intelligently perform root-cause analysis to rapidly bring the system back to normal working conditions
- The system should be upgradeable without affecting the production

n. **Technology Principles**

The server based GIS application should support any client and device including mobile, smart clients, web browsers (internet explorer, google chrome, Mozilla Firefox). It should also support modern cross-platform HTML5 and CSS3

i. The underlying GIS application should support integration with a variety of mobile applications on multiple platforms – smartphone and tablet operating on iOS, android and Windows
ii. Software should have software development kits (SDKs) for application developers to build custom mobile applications for iOS, Android, Windows phone and Windows mobile
iii. The GIS server solution should support n-tier architecture consisting of a database, an application server (and/or web server) and a browser.
iv. All functionality should be supported using a standard browser.
v. All server processes should be capable of being deployed in an active-passive cluster using either software based capabilities or load balancers.
vi. Server software should run as a native 64-bit application and should support windows 64- bit and Linux 64-bit operating system
vii. The system should be built from best of breed components with no obsolescence and with futuristic designs.
viii. Bidder shall consider Open Source Software along with Closed Source Software while responding. Bidders shall provide justification for exclusion of Open Source Software in their response, as the case may be. This is in line with ***"Deity Open Source guidelines"*** for all government organizations. Authority shall check compliance with this requirement and decide by comparing both Open Source Software along with Closed Source Software options with respect to capability, strategic control, scalability, security, life-time costs and support requirements.
ix. Interoperability of servers from different Selected Bidders is required at all levels.
x. Scalability, manageability to handle huge data volumes
xi. Efficient Resource Utilization by separation of Compute and Storage resources.
xii. The SP has to implement application software using latest available technologies after in-depth study of the prevailing ground conditions, processes and workflows.
xiii. The SP shall be responsible for procurement of necessary Enterprise (perpetual) licenses (unlimited number of users) for proper functioning of the software. All licenses will be procured in the name of Authority and will include AMC for the entire duration of the contract. Bidder will maintain an inventory of all software components procured (commercially or open source), license renewals, etc. This list will be made available to Authority on request.
xiv. Bidder shall ensure that latest patches/ upgrades for software components being used will be applied in consultation with Authority.
xv. Bidder shall be responsible for configuration / customization of the software components procured as required for the solution.
xvi. Bidder shall carryout development of any software which is required within solution adopting industry leading practices.
xvii. Bidder shall maintain a software configuration management system with appropriate version control for the software deployed
xviii. Bidder shall adopt leading practices for release deployment in production environment
xix. Bidder shall be responsible to carry out white box and black box testing, unit testing,

integration testing, volume testing, performance testing, penetration and vulnerability testing

xx. Testing cases executed, testing logs, bugs fixed, testing results, etc. will be maintained by bidder and shall be made available to Authority on request if required.

xxi. Comprehensive development and rollout plan for each of the software component will be provided by bidder and status updates against planned milestones will be provided in project status update reports periodically

xxii. Post deployment bug fixing, patches, fine-tuning, minor changes, etc. will have to be carried out by bidder as a part of ongoing support and maintenance of the software

xxiii. While writing the source code for application modules the bidder should ensure high-quality documentation standards to improve the readability of the software module. An illustrative list of comments that each module contained within the source file should be preceded by is outlined below :

- The name of the module
- The date when module was created
- A description of what the module does
- A list of the calling arguments, their types, and brief explanations of what they do
- A list of required files and/or database tables needed by the module
- Error codes/Exceptions
- Operating System (OS) specific assumptions
- A list of locally defined variables, their types, and how they are used
- Modification history indicating who made modifications, when the modifications were made, and what was done.

xxiv. Apart from the above the SP needs to follow appropriate coding standards and guidelines inclusive of but not limited to the following while writing/configuring the system:

- Proper and consistent indentation
- Inline comments
- Structured programming
- Meaningful variable names
- Appropriate spacing
- Declaration of variable names

o. **Meaningful** error messages *Functional Scope of Work for Application Development*

i. Guiding and coordinating with the base map team.
ii. Preparation of hardware sizing, network requirements report.
iii. Helping the Selected Bidder working with Integration of all GIS data and survey Selected Bidders
iv. Design document
v. Acceptance test plans

vi. Schedule, monitor and control the activities.
The expected output is a complete GIS solution for the AUTHORITY area covering all aspects of revenue mapping, infrastructure, and municipal assets.

Consequently the outputs will include

vii. An accurate, reliable and integrated GIS for the entire AUTHORITY area.
viii. Documentation and Reports of the Contact Surveys, including reference to information source within AUTHORITY (such as Assessment Records, etc.)
ix. Framework and schedule for GIS training in AUTHORITY offices.
x. Efficient GIS base Decision Support System.

Following are the services that AUTHORITY provides through different departments and where GIS is needed. The high level scope of work includes developing an application suite for the following areas:

- Creation of a web base GIS application to be made available across departments.
- GIS based application will be built for municipal services (part of post implementation development)

2.2.8.2. Functionalities of Web based GIS application (Indicative)

The basic web based GIS will have following things:

#	Name of Functionality	Description
1	Dashboard	The basic dashboard will have departmental GIS module links which will be added as a part of post implementations phase. Also there will be a common GIS module on the dashboard where below mentioned generic GIS functionalities will be available.
2	Layer Management	The solution available enterprise wide will be based and shall have capacity to manage layers by switching on or off layers. Also transparency and visibility scale shall be fixed for each layer.
3	Attribute Viewer	The Attribute Viewer allows us to view the attribute fields of selected features
4	Query Panel	Select features in a layer using a SQL-based expression against their attributes
5	Predefined queries	Predefined query to make it easier for users to view particular subsets of a map's data from an end- user perspective, executing the query is simple and is performed with a single button click. It is designed to work on a single layer.
6	Map Contents	Map contents list all the layers on the map and shows what the features in each layer represent. The check box next to each layer indicates whether its display is currently turned on or off.
7	Navigation	Navigating the map

8	Buffer	It creates a zone around a map feature (Point & Line) measured in units of distance or time. This buffer is useful for proximity analysis.
9	Proximity	Selecting the features based on their location relative to features in another layer. For instance, if we want to know how many homes were falling in certain Zone for tax implementation, we can select all the homes that fall within the Zone boundary.

2.2.8.3. Functionalities of Citizen Portal (Indicative)

#	Name of Functionality	Description
1	Heritage Site	'Heritage site' based tab (Representation on map with photo & Details) which helps citizens to look for heritage sites like Museums, Forts, Lakes, etc.
2	Social Media	Facebook, twitter, WhatsApp, Instagram, LinkedIn sharing links
3	My Location	To locate citizens' current location , display nearby utilities & distance between current location and searched utility
4	Print, Bookmark, Measure	Facility to Print, Bookmark & perform Measurement (Find Distance, Area & Latitude/Longitude)
5	Free Search	Searching services or utilities like Education, Emergency, Government offices, Health service, etc.
6	Theme	This will have categorized view of all the layers (with attributes: details, complete address, phone numbers, etc.) available for the citizen
7	Legend window	A legend window explaining all the symbologies used in the map
8	Query tab	It will have common queries for citizens: Locate Toilet, Locate building based on construction type, Locate building by total number of floors, Locate Garbage disposal bins, Locate building by Usage type, Locate building by no. of floors, Locate slums, Locate hotels/bus stop/ATMs , etc.
9	Draw	The tool should basically allow citizen to draw the shapes like Point, Line, Polygon, Triangle, extent, freehand polyline, circle, ellipse, freehand & save & share it in .pdf, .jpg or other format
10	Event	It displays the event in the city for next 7 days/1 month along with the details/phone numbers & coordinates, provision for the citizen to request to add any event in the city & submit it to AUTHORITY
11	Around ME	This will have all the map layers (ATM, Banks, Primary Schools, Church, Fitness clubs, etc.) available for the citizen to select & set the aerial distance (within which they wish to see the utilities)
12	Ward Information	Ward details, zone details, officers, educational institutes, health facilities, hotel, entertainment, grievances etc.
13	Know your property	Searching one's property by property ID, phone number, address

14	Know your Survey Number and Ward Number	
15	Site Tutorial	
16	Language toggle	A button for toggling the languages English and Hindi
17	AUTHORITY announcements	Any announcements made by AUTHORITY for citizens is to be displayed here
18	Help	Help regarding functionalities of all the features of the portal is to be found here
19	Feedback	Citizen can submit their feedbacks here
20	ADD button	Provision for citizens to add image ,data on the portal & submit it to AUTHORITY
21	From - To	Network analysis running back hand is to help citizens find route from one place to another in the city
22	Mobile compatibility of the citizen portal	

2.2.8. *Testing, Training and Go-Live of the System*

2.2.9.1. User Acceptance Testing (UAT)

The primary goal of Acceptance Testing is to ensure that the proposed GIS System meets requirements, standards, and specifications as set out in this RFP and as needed to achieve the desired outcomes. The Selected Bidder/SP will prepare the UAT criteria document and sample data for UAT, and take approval from AUTHORITY, well in advance before start of the UAT process.

For UAT the test cases should be discussed and the test data will have to be formally requested from each of the departmental users to ensure that each of the module user get real time feel of the application. This approach would also help in availing faster acceptance from respective user departments of AUTHORITY and their key stakeholders. AUTHORITY reserves its right to undertake this exercise of Testing, Acceptance and Certification through a third party.

The basic approach for UAT should ensure that the following are associated with clear and quantifiable metrics for accountability:

- Functional requirements
- Performance
- Security
- Manageability
- SLA Reporting System
- Project Documentation
- Data Quality Review

Upon completion of above activities, Successful Selected Bidder will have to submit detailed plan for live implementation of the system. Successful Selected Bidder has to ensure that the Application Software is completely operational as per the requirements in this RFP and all the acceptance tests are successfully concluded as per the satisfaction of AUTHORITY or AUTHORITY Consultant. AUTHORITY reserves the right to undertake Test Implementation of the system before making it public.

2.2.9.2. Training

- Prepare and organize training programs to facilitate the departmental users in the efficient usage of the whole system.
- The Selected Bidder/SP shall provide training to departmental users to efficiently use the system. The staff thus trained would subsequently train the other staff as and when required.
- The Selected Bidder/SP shall provide training as per the proposed training plan schedule to be shared as part of Approach and Methodology section in technical bid.
- Selected Bidder has to conduct a proper Training Needs Analysis of all the concerned staff and draw up a systematic training plan in line with the overall project plan. For all these training programs the Selected Bidder has to provide necessary course material and reference manuals (user/ maintenance/ administration)
- Based on the roles and responsibilities of the AUTHORITY officials at various levels, the training plan should be proposed; it should address level wise functional and general training requirements in accordance with the existing skillset and capacity of the AUTHORITY officials.
- The Selected Bidder/SP shall provide training to the selected officials of AUTHORITY as decided by the authorized official. The training batch size should not be more than 25 officials.
- Selected Bidder has to train around 150 key department users for hands on training regarding the GIS application usage.
- The Selected Bidder will have to take 5 training session for each user department
- A detailed training schedule, including the dates, areas to be covered, time and the training literature (to be supplied to AUTHORITY) at various stages of the training cycle and feedback for effectiveness will be agreed to by both parties (AUTHORITY and the Selected Bidder/SI) during the performance of the Contract.
- Training shall also be provided for teaching the basic trouble shooting activities in case of problems.
- For imparting training; SP will have to provide training material, trainer, along with training infrastructure such as Training Rooms, Sitting arrangement, overhead projector, computing infrastructure for the trainees, etc.
- Trainings shall be provided as per the training schedule provided by SI/Selected

Bidder.

- Training shall be imparted in Hindi and English language as per the requirement of the trainees. The printed manuals and training manuals should also be available in Hindi and English Language.
- The trainers imparting the training should be well versed in Hindi and English language.
- Training is an important aspect of every project, and AUTHORITY expects the successful Selected Bidder to undertake it in a very professional manner. All the module users will have to be trained with respect to the functionality of the corresponding modules.
- Trainings have to be imparted at a location mutually agreed by Selected Bidder and AUTHORITY and within the City limits.
- Selected Bidder has to provide CBT for each of the functional module on the intranet for reference of the departmental users. CBT has to be in both Hindi and English Language
- Training to be imparted to users:
    - Functional Training: This training would focus on the usage of application software so that the users are aware of all the operations of the application systems, ensuring a smooth run of Citizen Services or Departmental Operations. It would be covered for each of the functional module.
    - Administrative Training: This training would focus on the administration of Application Software and Server Infrastructure and would be imparted to the relevant staff of AUTHORITY.

2.2.9. *Integration of GIS with all smart city elements*

The GIS enterprise that is developed as part of this project will not function as a standalone platform but will have integration points with other smart city elements – Integrated Command and Control Centre, ERP for Municipal Operations, Water SCADA Project, Smart Mobility elements of CityBus Service and others as specified by AUTHORITY.

The SP has to do detailed sizing of all the infrastructure component and co-ordinate with AUTHORITY and the SP of ICCC project. The SP of the ICCC project will provide Infrastructure Hosting Services on cloud to the SP of GIS Project as a service.

2.2.10. *Other details and requirements relating to Application Development*

- The bidder shall be entirely responsible for proposing the solution which satisfies all features, functions and performance as described in this document. Bidder shall be responsible for design, development, and implementation of the proposed solution. Bidder shall ensure that systems/applications/product, which are being proposed,

are current to not lower than at N-1 level (where N is the current latest commercially available release) at the cost of the bidder for entire life of the project.

- Development and Testing Environment: Bidder need to set up development and testing environment at its own cost in its own development centre. Staging environment to be co- hosted in project DC/DR.
- While doing application development and maintenance the bidder is expected to follow and comply with the processes as per CMMi guidelines and standards.
- Data Entry: All the data entry in the system shall be performed in English and Hindi only.
- System should have a provision to display labels of the application software in English language as well as Hindi.
- Authority will review and approve all deliverables of bidder;

2.2.11. *Application Software Additions / Enhancements / Modifications*

As mentioned in the implementation phase, AUTHORITY will be adding the department specific GIS and will develop department specific applications in the post implementation phase.

Also the Selected Bidder will have to develop the GIS based modules for each department as per availability of GIS spatial and non-spatial data for each department and department's request. The Selected Bidder will have to discuss the requirement of the application with the department and finalize the functional requirements of the application. The Selected Bidder will then have to propose man-months effort estimation and schedule required for the development of the module which will be approved by the department after discussions.

The Selected Bidder will have to develop the module using the post implementation team proposed as a part of response to the requirement of this RFP. Also the commercials identified for each type of team member in post implementation phase will remain the same for the duration of the project and Selected Bidder will be paid as per the man-months utilized.

Every new department module will be added as a part of GIS applications suite developed in the implementation stage. In case AUTHORITY requires any modifications or enhancement in the deployed applications suite as well in the developed modules, AUTHORITY may ask for the services of the Selected Bidder's staff as per the requirement of the Change. This change would form the part of change management process, Selected Bidder will be asked to submit a formal change request note along with the man-month effort estimation and schedule of deployment of resources. Commercial rates specified by the Selected Bidder for various categories of resources will be taken as base for reviewing the change request submitted by the Selected Bidder. Post the approval of AUTHORITY the Change request will be processed and the activity can be completed.

Roles and Responsibility of the System Integrator (Successful Selected Bidder) are:

1. Approval & Sign Off from each department.
2. Provide support and Maintenance with its own man-power for the period of 5

years from the Go-Live stage.

3. Preparation of necessary user manuals for all the modules and review of the same
4. Carry out Training programs / workshops for the department personnel
5. Should ensure the compliance with all the required standars and to obtain the quality and security certification from STQC or any other CERT-IN certified agency at their own expense.
6. Selected Bidder/SP should prepare and provide to AUTHORITY documents including User Manuals, Configuration Manuals, Operational Manual, Maintenance Manuals, etc. as per acceptable standards.
7. During the Project Term, Selected Bidder/SP would be completely responsible for defect free functionality of the application software and would resolve any solution related issues including bug fixing etc. within Project Term agreed between AUTHORITY and the Selected Bidder/SI.
8. Selected Bidder/SP should provide the latest updates, patches/ fixes, version upgrades relevant for the GIS solution components.

2.2.12. *Data Management*

Successful Selected Bidder would be responsible for extending all possible support to different departmental or contract staff for Data Management (like Data entry Screens, Report Generation, Data Analysis, Data Cleansing, etc.). Data could be in English as well as in Hindi. Data should be Unicode compliant. For the data entered during the Base Map Creation/Updating, Selected Bidder will be responsible for data management of the collected data and its digitization. Also AUTHORITY intends to carry out GIS based field surveys for collection of spatial and non-spatial attributes from the field. The successful Selected Bidder has to support the departments and its survey Selected Bidders. The successful Selected Bidder will also have to train and support the department officials in using the enterprise GIS setup by importing the surveyed GIS data for each department into the enterprise GIS database and maintaining it for department specific edits and application development.

2.3. Approach to Support GMC in Property Tax Improvement

An indicative approach for the support in property tax improvement in GMC is illustrated below.

	Task set	Purpose
1	Review of processes / procedures associated assessing realistic potential of revenues from property tax (as entered into demand registers)	To identify points of potential gaps in terms of compliance as defined in the Municipal Law and Rules and to identify areas which could be potentially improved in line with best practices elsewhere in India.

2	Development of a standardised database structure including training	Standardising the data parameters for use in computation of property tax and processes used to establish monies to be demanded; internalising the use of these parameters
3	Support in updation of property tax demand in selected wards (in phase I)	Demonstrating that the method of capture of data parameters and their use can be productively used to assess current tax demand
4	Test run of billing & collection process	To demonstrate that the captured data can be internalised in normative property tax administration processes

The Selected Bidder is required to deploy Technical Team that will be responsible for assisting GMC in updating the property tax demand and GIS.

The Selected Bidder would be expected to carry out the following sets of tasks:

2.3.1. *Phase I - Support GMC In Updating Property Tax Demand & GIS*

This work shall focus upon the updating of property tax demand and GIS in selected wards.

It is clarified that the oversight and ultimate responsibility of ensuring that the demand collection registers reflect the correct demand shall remain with the ULB. The Selected Bidder shall be expected to perform all supporting tasks as indicated below.

2.3.1.1. Part A: Assessment of Prevailing Methods and Practices with respect to Administering Property Tax

Review of Processes related to Updation of Property Tax Demand

The Selected Bidder shall undertake review of processes associated with the updation of property tax demand registers as laid down in Municipal law. The Selected Bidder is expected to contribute to the scope of this project by conducting a baseline assessment as regards processes followed in (but not limited to):

1. Identification, enumeration & measurement of property
2. Classification of properties
3. Encoding of property in the assessment register (issuance of PIN), including process of mutation in case of sale, transfer, natural succession or acquisition of intestate properties;
4. Determination of annual letting value of properties
5. Process by which demand is placed
6. Collection of property tax including issue of receipt(s), accounting for received property tax, tax credits etc.

7. In the case of outstanding arrears, action followed along with timelines
8. Settlement of claims, disputes and grievances

Note: Specific mention shall be made of the security measures related to storage of manual or digital data and the methods (audit trail) used in order to make any changes.

The Selected Bidder shall undertake a detailed review of current state of systems and processes and resources which are employed and indicating compliance and/or exceptions in collection of data and to processes as defined in the law. Compliance and exception between the two (processes and resources as proposed and as actually utilised by GMC) should be highlighted.

At the end of this step, the Selected Bidder should develop a series of indicators and benchmarks on which GMC can be graded in terms of compliance.

Rapid review of existing data and comparison to actual required for updating of demand collection registers and GIS

The Selected Bidder shall be responsible for review of the quality, quantity and nature of data that is contained in the demand collection registers of GMC.

The Selected Bidder would be expected to provide specific recommendations as regards the nature, quantity, quality and characteristics of information required to accurately place demand of tax.

The numbering system currently followed for the property tax system should also be studied

Note: As per prevailing practice, each property is assigned a unique Property Identification Number (PIN), which has to be used as a basis of identification of property. For all subsequent tasks related to design and development of a database, the bidder may use this as a reference 'primary key' or identifier.

2.3.1.2. Part B: Support for Updation of Property Tax Demand and GIS

The Selected Bidder shall be responsible for migration of data of selected wards into the e-Nagarpalika database.

1. Using the database structure/ output developed in e-Nagarpalika, the Selected Bidder shall arrange for data from selected wards to be populated into the database.

The Selected Bidder would have the overall responsibility of ensuring that the quality standards and time deadlines of data entry, data conversion and data migration are met.

2. Determination of ALV and computation of property tax (including allied

taxes) would also include current tax amount of GMC for each property in the selected wards.

3. Identification of exceptions: Exceptions may be in the form of missing data or data which may appear inaccurate with respect to other variables for the same property or any other reason while comparing surveyed data with GMC registered records. Selected Bidder will identify a list of exceptions in selected wards which will be discussed with the concerned municipal authority.

4. GMC shall be responsible for resolving the exceptions as identified above. The municipal commissioner shall authorise the concerned municipal officials who will be responsible for addressing the exceptions as per the relevant Municipal Laws and Rules. Technical support for interpretation of surveyed data related to exceptions shall be provided by the Selected Bidder if and when required. Selected Bidder will be responsible for incorporating the validated information related to exceptions (property tax data & GIS) as furnished by GMC into the database.

5. Generation of current year property tax demand for each of the property whose details are entered into the system, adding the demand for the current year, arrears and penalty amount (if any). The details of each property including all parameters with details on determination of ALV and computation of property tax, allied taxes and amount of arrears (year-wise) and penalty (if any) will be produced in the form of a single page format. The updated information on arrears (property-wise) will be provided by GMC.

6. Production of demand notices – The Selected Bidder shall assist GMC in producing the hard copies of demand notices in the prescribed format which would be issued by the respective Municipal Corporation.

7. Final database linking with GIS: Selected Bidder shall be responsible for linking details of each property with property photograph (including all parameters with ALV and computation of property tax, allied taxes and arrears) with GIS. Some of the most common thematic maps which can be generated using simple queries in GIS using updated property tax data are given below. For example; GIS map showing:

    - Coverage of properties under tax net,
    - Overview of property use – residential or commercial or industrial properties
    - Overview of properties as per construction type
    - Range of property tax demand (tax amount)
    - Rapid access to any property tax record by on screen clicking of any building / plot appearing on the screen along with property details.

8. Test Run of Billing and Collection Process at GMC: The Selected Bidder shall be responsible for test run of billing and collection process (i.e. printing of bills, demand notices, receipts, posting, etc.) in selected wards. GMC shall provide all the required support to test run the billing and collection process.

    a. For challans/ receipts issued against property tax receipts (only for properties within the selected wards) prior to having updated tax data and demand in the database, the Selected Bidder shall separately enter such details on an ex-post facto basis (subject to the challans being supplied by the municipal body).

    b. For each property, for which any property tax and allied taxes is paid and a receipt is generated by the municipal cashier, the Selected Bidder will enter details of such payment into the database, including the mode of payment, amount and the number of the receipt/ challan. This will be done on a daily basis as and when provided by GMC for selected wards.

Selected Bidder shall be responsible for training of the concerned ULB staff in the use of GIS to support property tax improvement.

The Selected Bidder shall bear all costs related to stationery and consumables required to support the process of updation of property tax demand including production of demand notices, test run of billing and collection, MIS, GIS reports etc for the **Phase I** of the contract.

The Selected Bidder shall be obligated by contract to ensure complete confidentiality with respect to the data that s/he shall be required to handle in course of this assignment. The Selected Bidder is prohibited to retain or make any copies of the data for use in any place not authorised by GMC.

2.3.2. *Phase II – Handholding (Including Capacity Building) Support*

This phase involves providing comprehensive technical support to GMC for a period of 10 months to update demand collection registers (including billing & collection process) and GIS at ULB level.

2.3.2.1. Completion of Updation of Property Tax Demand For All Wards in GMC

Selected Bidder shall continue to support GMC in updating property tax demand and GIS for the remaining wards. Selected Bidder must ensure that the GMC staff are fully trained and involved to operate the database for updating demand collection registers.

2.3.2.2. **Support in Updation of Demand Collection Registers**

The handholding support should include the following, but not limited to:

- **Support in updating demand collection registers (including billing & collection process) and GIS:** Selected Bidder shall support GMC in updating demand collection registers and GIS. The billing and collection would be done by the trained GMC staff with technical support from the Selected Bidder.
- **MIS Reports generation**: For example: reports as required in the day to day operations such as zone wise, ward wise, month wise, year wise tax collection status, defaulters list, property details, etc.
- **Storage and backup management**: Data shall be made available to the e-nagar palika system.

All data created, particularly in terms of database files, reports generated and any instructions for use of this data with other RDBMS platforms shall be the exclusive property of GMC and shall vest with the municipal body.

The Municipal Corporation shall provide all the required hardware on which all the developed database files, reports and any instructions for use of this data or any other related outputs to be uploaded by the Selected Bidder. The Selected Bidder shall also ensure:

- Handover of such data in appropriate digital media as well as hard copies where applicable.
- Complete erasure of all data from the Selected Bidder' systems in an irretrievable manner.

2.4. Post Implementation

2.4.1. *Testing & Acceptance Criteria*

The bidder shall provide the testing strategy including traceability matrix, test cases and shall conduct the testing of various components of the software developed/customized and the solution as a whole. The testing should be comprehensive and should be done at each stage of development and implementation. The detailed testing requirements are mentioned below.

- Bidder shall demonstrate the following mentioned acceptance criteria prior to acceptance of the solution as well as during project operations phase, in respect of scalability and performance etc. The bidder may propose further detailed Acceptance criteria which Authority will review. Once Authority provides its approval, the Acceptance criteria can be finalized. In case required, parameters

might be revised by Authority in mutual agreement with bidder and the revised parameters shall be considered for acceptance criteria. Bidder would set up a testing environment in its own facility that is separate from the development, staging and production environment. A comprehensive system should be set up that would have the capability to log & track the testing results, upload & maintain the test cases and log & track issues/bugs identified.

The following table depicts the details for the various kinds of testing envisaged for the project:

Type of Testing	Responsibility	Scope of Work
System Testing	Bidder	• Bidder to perform System testing in its own premises where the development work is being executed. • Bidder to prepare test plan and test cases and maintain it. Authority may request the bidder to share the test cases and results • The testing should be performed through manual as well as automated methods • Automation testing tools to be provided by bidder. Authority doesn't intend to own these tools.
Integration Testing	Bidder	• Bidder to perform Integration testing in its own setup • Bidder to prepare and share with Authority the Integration test plans and test cases • The bidder to perform Integration testing as per the approved plan • Integration testing to be performed through manual as well as automated methods • Automation testing tools to be provided by bidder. Authority doesn't intend to own these tools
Performance and load Testing	Bidder	• The bidder to do performance and load testing in production setup. • Various performance parameters such as transaction response time, throughput, hits per second and transactions per second etc. should be taken into account. • Load and stress testing of the Authority system to be performed on business transaction volume • Test cases and test results to be shared with Authority. • Performance testing to be carried out in the exact same architecture that would be set up for production. • Bidder need to use performance and load testing tool for testing. Authority doesn't intend to own these tools. Authority if required, could involve third party auditors to monitor/validate the performance testing. Cost for such audits to be paid by Authority. **Note:** Before Go-Live of the project, Authority needs to do load testing in the production environment to showcase the

		capability of the system to handle concurrent user connections. The Bidder will work out, in consultation with Authority, the no of concurrent users. In case the system fails to handle the expected loads, the bidder will have to take corrective action (e.g. hardware ramp up, tuning of application / middleware / hardware, etc.) at no extra cost to Authority.
User Acceptance Testing of Centralized Web- based System	Authority	• Authority to perform User Acceptance Testing • Bidder shall assist in preparing/ guiding User Acceptance Testing test cases • UAT to be carried out in the exact same environment/architecture that would be set up for production • Bidder should fix bugs and issues raised during UAT and get approval on the fixes from Authority before production deployment • Changes in the application as an outcome of UAT shall not be considered as Change Request. • Bidder has to rectify the observations.
Security Testing (including Penetration & Vulnerability testing)	Bidder	• The solution should demonstrate the compliance with security requirements as mentioned in the RFP including but not limited to security controls in the application, at the network layer, network, data centre(s), security monitoring system deployed by the bidder • The solution shall pass vulnerability and penetration testing for rollout of each phase. The solution should pass web application security testing for the portal and security configuration review of the baseline infrastructure. • Bidder should carry out security and vulnerability testing on the developed solution. • Security testing to be carried out in the exact same environment/architecture that would be set up for production. Testing to be done at the data centre(s) • Security test report and test cases should be shared with Authority.

2.4.2. *System Documents, User documents*

The Successful Selected Bidder will provide documentation, which should follow the ITIL (Information Technology Infrastructure Library) standards. This documentation should be submitted as the project undergoes various stages of implementation. Indicative list of documents include:

- Project Commencement Documentation: Project Plan in giving out micro level activities with milestones & deadlines.
- Resource and team plans

- Details of ward wise division of work
- Template for project tracking and review
- Any other document(s) deemed necessary for implementation, operation and maintenance of the overall system.
- The Selected Bidder shall prepare a process document in accordance with the ISO 9001 standard; containing all the process being carried out during the entire tenure of the project and share the same with AUTHORITY.
- Periodic reviews (at least once every month) shall be carried out for measurement of effectiveness for each of the process implemented and the same shall be shared by the System Integrator with AUTHORITY
- Escalation Mechanism
- Exit Management Plan

Note: The successful Selected Bidder will ensure Upkeep & Updating of all documentation and manuals.

2.4.3. *Go-Live Preparedness and Go-Live*

- The bidder shall prepare and agree with Authority, the detailed plan for Go-Live (in-line with Authority's implementation plan as mentioned in this document).
- The bidder shall define and agree with Authority, the criteria for Go-Live and the timelines for the same. Bidder shall submit signed-off UAT report (issue closure report) ensuring all issues raised during UAT are being resolved prior to Go-Live.
- Bidder shall ensure that Go –Live criteria as mentioned in User acceptance testing of the centralized system is met and bidder needs to take approval from Authority team on the same.
- Go-live of the application shall be done as per the finalized and agreed upon Go-Live plan.

2.4.4. *Annual Technical Support for GIS Solution and the Mobile Application*

Successful Selected Bidder would be completely responsible for the defect free functioning of the application software and would undertake following as part of ATS for Application Software:

- Resolve any issues including bug fixing, improvements in presentation and/or functionality and others within a duration mentioned in Service Level Agreement.
- Provide the latest updates, patches / fixes, version upgrades relevant for the software components.

Software version management and software documentation management reflecting features and functionality of the solution. Annual Maintenance Contract (AMC) for all Software component Supplied under this project

- Provide the latest updates, patches / fixes, version upgrades, etc.
- Selected Bidder has to ensure that annual technical support is available for software application, operating systems, and database for the entire O&M phase.
- Software version management and software documentation management reflecting features and functionality of the solution.
- Database / Application Software tuning to enhance the performance of the overall system
- Undertake regular, proactive Database Management activities.

3. Service Level Agreements

3.1. Purpose

The purpose is to define the levels of service provided by SELECTED BIDDER to the Authority for the duration of the contract. The benefits of this are:

1. Start a process that applies to Authority and SELECTED BIDDER attention to some aspect of performance, only when that aspect drops below the threshold defined by the Authority.
2. Help the Authority control the levels and performance of SELECTED BIDDER's services.
3. The Service Levels are between the Authority and SELECTED BIDDER.

This section is agreed to by Authority and SELECTED BIDDER as the key performance indicator for the project. This may be reviewed and revised according to the procedures detailed in Service Level Change Control.

3.2. Training and Capacity Building

i. For any delay in completion of proposed training, GSCDL/ GMC will charge penalty of @ 0.5% of the corresponding milestone value for first week and for 1.0% for all the subsequent weeks or part thereof, subject to a maximum of 5% of the training cost

ii. Below mentioned SLA will be monitored for the training provided to each batch of department users through feedback survey forms to be provided to each attendee within the program.

iii. Desired parameter: At least 85% of the trainees within the training program should give a rating of satisfactory or above

iv. If the training quality in the program falls below the minimum service level, it will be treated as one (1) violation.

v. All the violations for the trainings conducted during quarter will be logged and penalties will be calculated on violations/batch.

Desired Parameter	Violations/	Penalty
At least 85% satisfied attendees	0-4	No penalty
	5-6	5 % of per batch cost (Functional / Refresher)
	7-8	10 % of per batch cost (Functional / Refresher)

	>8	20% of per batch cost (Functional / Refresher)

3.3. Survey and Map Creation

#	Parameter	Condition	Penalty
1	DGPS ground control point accuracy	Should be <0.3m.	Rs. 5000 for every inaccurate point and a resurvey. The penalty will be charged to a maximum of 5% of the DGPS survey milestone.
2	Map Digitization	100% features to be digitized as per the approved data model.	Rs. 5000 for every missed feature in the output map. The penalty will be charged to a maximum of 5% of the map creation milestone.
3	Accuracy of Property survey data	100% of the sample considered through random sampling	0.1% of the property survey cost proposed by the bidder for every instance of inaccurate data collection. The penalty will be charged to a maximum of 5% and resurvey of the sampled area

3.4. Software Support

Any patch released by the OEM needs to be applied to the corresponding product within 7 working days. Any delay in applying the patch will attract penalty of Rs. 2000/- per day.

Any Software bug identified by GSCDL/ GMC/ Bidder/ SI's service engineer, will be classified in types:

1. Critical: Having bearing on the day-to-day functioning of the respective system / availability of application (full functionality or part functionality) for the GSCDL/ GMC users
2. Non-critical: Not-having bearing on the day-to-day functioning of the respective system

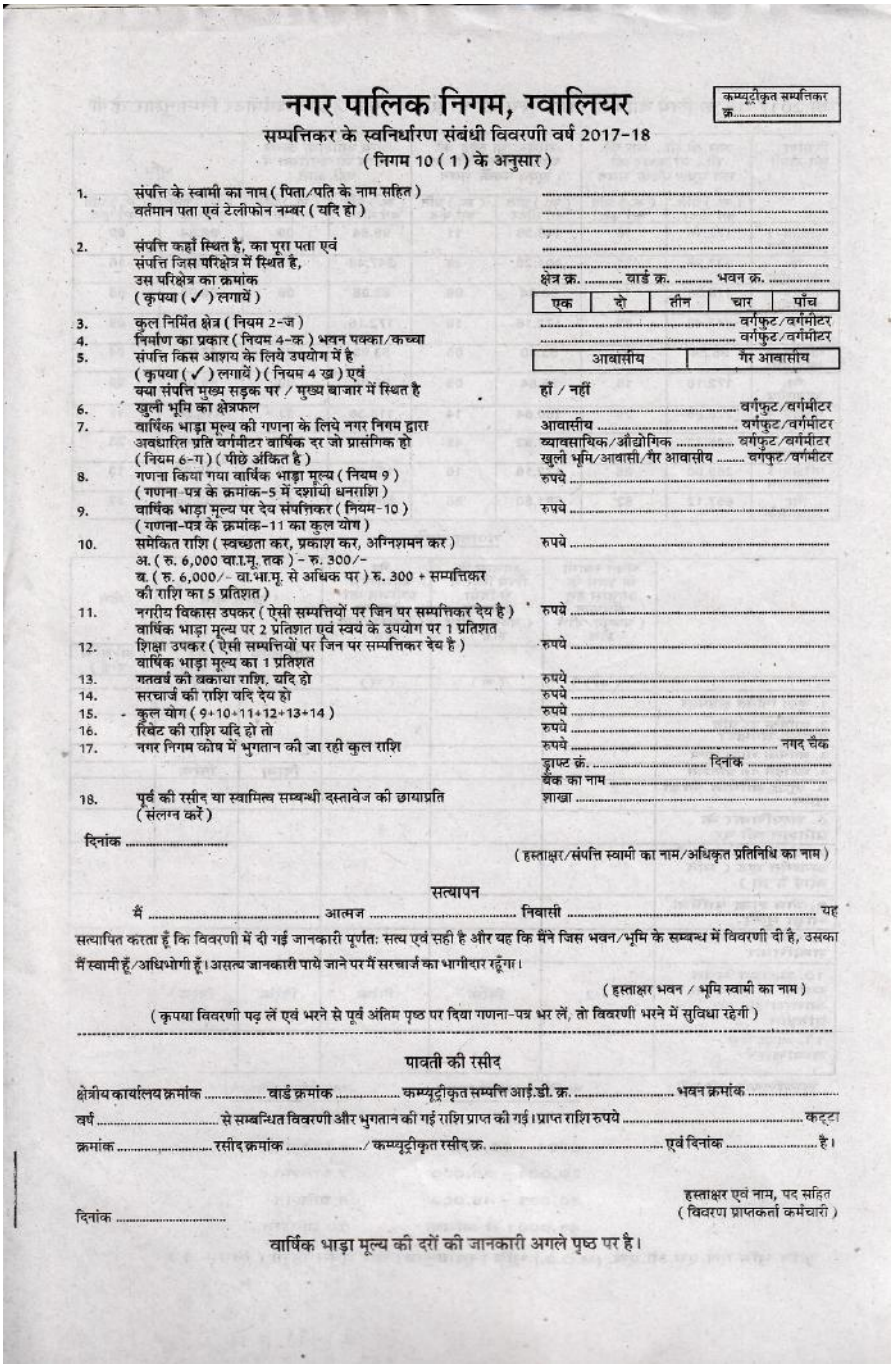
In case of dispute between GSCDL/ GMC and the successful Bidder with respect to classification of bugs as Critical or Non-Critical, decision of the Commissioner, GSCDL/ GMC, shall be final and binding on the Successful Bidder.

Resolution time & the penalty component for the bug fixing is given below (applicable on 24 * 7 basis):

Type of Bug	Bug / Problem resolution time	Penalty Amount
Critical	2 hours	**Rs. 2000/- (per hour)**
	1 hour if the bug / problem has re-occurred within 7 days of the earlier resolution	**Rs. 2000/- per hour beyond 8**
		Rs. 4000/- per hour beyond 24 hours

Non-critical	3 working days	**Rs. 500/- (per day)**
	1 working day if the bug / problem has re- occurred within 15 days of the earlier resolution	**Rs. 2000/- per day beyond 7**
		Rs. 2000/- per day beyond 10 days

Annexure 11 – Self Assessment Form 2017-18



नगर पालिक निगम, ग्वालियर

कम्प्यूटीकृत सम्पत्तिकर क्र.....

सम्पत्तिकर के स्वनिर्धारण संबंधी विवरणी वर्ष 2017-18

(निगम 10 (1) के अनुसार)

1.	संपत्ति के स्वामी का नाम (पिता/पति के नाम सहित) वर्तमान पता एवं टेलीफोन नम्बर (यदि हो)	.....
2.	संपत्ति कहाँ स्थित है, का पूरा पता एवं संपत्ति जिस परिक्षेत्र में स्थित है, उस परिक्षेत्र का क्रमांक (कृपया (✓) लगायें)	..... क्षेत्र क्र. ..... वार्ड क्र. ..... भवन क्र. ..... एक | दो | तीन | चार | पाँच
3.	कुल निर्मित क्षेत्र (नियम 2-ज)	..... वर्गफुट/वर्गमीटर
4.	निर्माण का प्रकार (नियम 4-क) भवन पक्का/कच्चा	..... वर्गफुट/वर्गमीटर
5.	संपत्ति किस आशय के लिये उपयोग में है (कृपया (✓) लगायें) (नियम 4 ख) एवं क्या संपत्ति मुख्य सड़क पर / मुख्य बाजार में स्थित है	आवासीय | गैर आवासीय हाँ / नहीं
6.	खुली भूमि का क्षेत्रफल	..... वर्गफुट/वर्गमीटर
7.	वार्षिक भाड़ा मूल्य की गणना के लिये नगर निगम द्वारा अवधारित प्रति वर्गमीटर वार्षिक दर जो प्रासंगिक हो (नियम 6-ग) (पीछे अंकित है)	आवासीय ..... वर्गफुट/वर्गमीटर व्यावसायिक/औद्योगिक ..... वर्गफुट/वर्गमीटर खुली भूमि/आवासी/गैर आवासीय ..... वर्गफुट/वर्गमीटर
8.	गणना किया गया वार्षिक भाड़ा मूल्य (नियम 9) (गणना-पत्र के क्रमांक-5 में दर्शायी धनराशि)	रुपये .....
9.	वार्षिक भाड़ा मूल्य पर देय संपत्तिकर (नियम-10) (गणना-पत्र के क्रमांक-11 का कुल योग)	रुपये .....
10.	समेकित राशि (स्वच्छता कर, प्रकाश कर, अग्निशमन कर) अ. (रु. 6,000 वा.भा.मू. तक) - रु. 300/- ब. (रु. 6,000/- वा.भा.मू. से अधिक पर) रु. 300 + सम्पत्तिकर की राशि का 5 प्रतिशत)	रुपये .....
11.	नगरीय विकास उपकर (ऐसी सम्पत्तियों पर जिन पर सम्पत्तिकर देय है) वार्षिक भाड़ा मूल्य पर 2 प्रतिशत एवं स्वयं के उपयोग पर 1 प्रतिशत	रुपये .....
12.	शिक्षा उपकर (ऐसी सम्पत्तियों पर जिन पर सम्पत्तिकर देय है) वार्षिक भाड़ा मूल्य का 1 प्रतिशत	रुपये .....
13.	गतवर्ष की बकाया राशि, यदि हो	रुपये .....
14.	सरचार्ज की राशि यदि देय हो	रुपये .....
15.	कुल योग (9+10+11+12+13+14)	रुपये .....
16.	रिबेट की राशि यदि हो तो	रुपये .....
17.	नगर निगम कोष में भुगतान की जा रही कुल राशि	रुपये ..... नगद/चैक ड्राफ्ट क्र. ..... दिनांक ..... बैंक का नाम ..... शाखा .....
18.	पूर्व की रसीद या स्वामित्व सम्बन्धी दस्तावेज की छायाप्रति (संलग्न करें)	

दिनांक .....

(हस्ताक्षर/संपत्ति स्वामी का नाम/अधिकृत प्रतिनिधि का नाम)

सत्यापन

मैं ..... आत्मज ..... निवासी ..... यह सत्यापित करता हूँ कि विवरणी में दी गई जानकारी पूर्णतः सत्य एवं सही है और यह कि मैंने जिस भवन/भूमि के सम्बन्ध में विवरणी दी है, उसका मैं स्वामी हूँ/अधिभोगी हूँ। असत्य जानकारी पाये जाने पर मैं सरचार्ज का भागीदार रहूँगा।

(हस्ताक्षर भवन / भूमि स्वामी का नाम)

(कृपया विवरणी पढ़ लें एवं भरने से पूर्व अंतिम पृष्ठ पर दिया गणना-पत्र भर लें, तो विवरणी भरने में सुविधा रहेगी)

पावती की रसीद

क्षेत्रीय कार्यालय क्रमांक ..... वार्ड क्रमांक ..... कम्प्यूटीकृत सम्पत्ति आई.डी. क्र. ..... भवन क्रमांक .....

वर्ष ..... से सम्बन्धित विवरणी और भुगतान की गई राशि प्राप्त की गई। प्राप्त राशि रुपये ..... कट्टा क्रमांक ..... रसीद क्रमांक ...../ कम्प्यूटीकृत रसीद क्र. ..... एवं दिनांक ..... है।

दिनांक .....

हस्ताक्षर एवं नाम, पद सहित
(विवरण प्राप्तकर्ता कर्मचारी)

वार्षिक भाड़ा मूल्य की दरों की जानकारी अगले पृष्ठ पर है।

Annexure 12 – SLAs related to validation of 10% of surveyed land/building assets

S. No	Service Level	Penalty
1.	For submitted property survey data of any property, if there is up to 5% of error identified by the Audit Agencies	No penalty imposed. The Successful Bidder(s) is required to perform re-survey of the identified properties and correct the erroneous data entries. No additional payment would be made for re-survey.
2.	For submitted property survey data of any land/ asset property, if there is up to 10 % of error identified by the Audit Agencies	4* 'X' Where X= Price Quoted by the Bidder for property survey. The bidder will be penalized 4 times the rate quoted for the number of properties in which errors were identified by the audit agencies. The Successful Bidder(s) shall be required to perform re-survey of the identified properties and correct the erroneous data entries. No additional payment would be made for re-survey.
3.	For submitted property survey data of any land/ asset property, if there is more than 10 % and upto 15% of error identified by the Audit Agencies	8* 'X' Where X= Price Quoted by the Bidder for property survey. The bidder will be penalized 8 times the rate quoted for the number of properties in which errors were identified by the audit agencies. The Successful Bidder(s) shall be required to perform re-survey of the identified properties and correct the erroneous data entries. No additional payment would be made for re-survey.
4.	For submitted property survey data of any land/ asset property, if there is more than 15 % and upto 20% of error identified by the Audit Agencies	10 * 'X' Where X= Price Quoted by the Bidder for property survey. The bidder will be penalized 10 times the rate quoted for the number of properties in which errors were identified by the audit agencies. The Successful Bidder(s) shall be required to perform re-survey of the identified properties and correct the erroneous data entries. No additional payment would be made for re-survey.
5.	For submitted property survey data of any land/ asset property, if there is more than 20 % of error identified by the Audit Agencies	Termination of Contract without clearing any of the pending invoices

6.	For completion of survey in the defined timelines as per the time schedule given in RFP	In case the survey is not completed in the defined timelines as specified in the RFP the bidder will be charged 1% per month penalty on the balance amount to be paid for survey maximum upto 10%, beyond which the contract will be terminated without clearing any of the pending invoices

Error Definitions:

In the above table error shall mean any one of the following:

Data Captured for all mandatory fields shall be validated by the audit agencies for all the fields other than those mentioned in (a).
Discrepancies between the data captured by survey agencies and audit agencies shall be analysed and accordingly errors will be calculated.

Maximum Penalty applicable to the bidder shall not exceed 10% of the Total Work Order value till the completion of property survey. If the total Penalty exceeds beyond 10%, it would be considered as non- conformance to the Quality of Services and may lead to termination of the Contract and GMC may on their sole discretion cancel the order and go afresh with the entire property survey exercise without clearing any of the pending payment of the bidder and forfeiting the performance bank guarantee submitted by the bidder after receiving the order.

Annexure- 13: Data Input parameters for Asset Property

#	Field Details	Unit of Measurement	Details	Mandatory (M) for the bidder at the time of survey/ Support From ULB (U)	Methodology for Capturing Response
1.	Old Property Number	-		U	Earlier Database of Properties available with ULB
2.	Assessment year	-		U	Earlier Database of Properties available with ULB
3.	Old Assessment Value	-		U	Earlier Database of Properties available with ULB
4.	Old Assessment Year	-		U	Earlier Database of Properties available with ULB
5.	City Survey Number	-		Optional	ULB / Revenue Dept.
6.	Name of the Property Owner	-		M	Aadhaar Integration
7.	UID number of Property Owner	-		Optional. If owner can provide the same, it shall be captured	Survey
8.	Type of Owner 1.Private 2.Public 3.Government 4.Municipality 5.Co-op Society (CHS) 6.Other	-		M	Survey
9.	Name of Occupier	-		M	Survey
10.	UID number of Occupier	-		Optional. If occupier can provide the same, it shall be captured	Survey
11.	Address of Property	-		M	Survey
12.	Name of the Property			M	Survey
13.	Postal Pincode of Property	-		M	Survey

#	Field Details	Unit of Measurement	Details	Mandatory (M) for the bidder at the time of survey/ Support From ULB (U)	Methodology for Capturing Response
14.	Latitude	-		M	GPS on mobile
15.	Longitude	-		M	GPS on mobile
16.	Category of Property 01- Owner 02-Occupier 2A- lease or rent 2B-encroacher	-		M	Survey
17.	Copy of rental agreement if available	-		M	Survey
18.	Nature of Property 1.Open Plot 2.Building 3.Apartments	-		M	Survey
19.	Building Permission 1.Yes 2.No	-		M / U	Survey / Earlier Database of Properties
20.	Year of Building Permission	-		M / U	Survey / Earlier Database of Properties
21.	Year of Building Construction	-		M	Survey
22.	Approximate age of Building	-		M	Survey
23.	Telephone Number	-		Optional. If owner/occupier can provide the same, it shall be captured	Survey
24.	Email ID	-		Optional. If owner/occupier can provide the same, it shall be captured	Survey
25.	Usage of Property 1.Residesntial 2.Commercial 3.Institutional 4.Religious 5.Government	-		M	Survey
26.	If Commercial, name of shop, Industry Items	-		M	Survey

#	Field Details	Unit of Measurement	Details	Mandatory (M) for the bidder at the time of survey/ Support From ULB (U)	Methodology for Capturing Response
	they are trading / manufacturing				
27.	Width of road on which plot is located	Mtr		M	Tape
28.	Total Plot area	Sq. Mtr		M	Tape
29.	Total Plinth area	Sq. Mtr		M	Tape
30.	If group housing, then whether sewage treatment facility available	-		M	Survey
Floor-wise details					
31.	Floor Number	-		M	Survey
32.	Floor wise Carpet area	Sq. Mtr		M	Laser Distometer
33.	Floor wise type of constructi on a) Kuccha b) Load Bearing c) RCC d) High RCC	-		M	Survey
34.	Floor wise type of use a) Residential b) Commercial c) Institution d) Religious e)Government	-		M	Survey
35.	Self-Occupied/Rented	-		M	Survey
36.	Year of Floor Construction	-		M	Survey
37.	Rental value	Rs.		M	Survey
38.	Room No	-		M	Survey
39.	Rainwater harvesting	-		M	Survey

#	Field Details	Unit of Measurement	Details	Mandatory (M) for the bidder at the time of survey/ Support From ULB (U)	Methodology for Capturing Response
40.	Solar Unit	-		M	Survey
41.	Number of Toilets	-		M	Survey
42.	Water connection 1.Municipal 2.Borewell 3.Municipal+Bore well 4.Well	-		M	Survey
43.	Water pipe size	Mm		M	Survey
44.	Water Meter (Y/N)	-		M	Survey
45.	Electricity Connection	-		M	Survey
46.	Stair/Lift	-		M	Survey
47.	Drain(01)/ Septic tank (02)	-		M	Survey
48.	If septic tank, please provide dimensions				Survey
49.	Advertisement of Building Yes/No	-		M	Survey
50.	Type of advertisement	-		M	Survey
51.	Photograph of Building property atleast from 2 visible locations				Mobile

Annexure- 14: Mobile Application Data Input Parameters for Land Property

#	Field Details	Unit of Measurement	Details	Mandatory (M) for the bidder at the time of survey/ Support From ULB (U)	Methodology for Capturing Response
1.	Old Land ID	-		U	Earlier Database of Properties available with ULB
2.	Assessment year	-		U	Earlier Database of Properties available with ULB
3.	Old Assessment Value	-		U	Earlier Database of Properties available with ULB
4.	Old Assessment Year	-		U	Earlier Database of Properties available with ULB
5.	Name of the Assesse/ Lessor / Lessee / Sub Lessee			M	Survey
6.	Name of the Present owner			M	Aadhaar Integration
7.	UID number of Land Owner	-		Optional. If owner can provide the same, it shall be captured	Survey
8.	E-mail and Telephone Details				Survey
9.	Type of Owner 1.Private 2.Public 3.Government 4.Municipality 5.Co-op Society (CHS) 6.Other	-		M	Survey
10.	Address of Land	-		M	Survey
11.	Postal Pincode of Land	-		M	Survey

12.	Latitude	-		M	GPS on mobile
13.	Longitude	-		M	GPS on mobile
14.	Nature of Land Property 1.Open Plot 2.Building 3.Apartments			M	Survey
15.	Boundaries of the Land				
	North	Mtr		M	Survey
	West	Mtr		M	Survey
	South	Mtr		M	Survey
	East	Mtr		M	Survey
16.	Description of Land Property 1.Residesntial 2.Commercial 3.Institutional 4.Religious 5.Government	-		M	Survey
17.	Width of road on which plot is located	Mtr		M	Survey
18.	Photograph of land property atleast from 2 visible locations				Mobile

Annexure- 15: DGPS Survey for GPS points for Geo-referencing/Ortho-rectification of Satellite Image

ESTABLISHING GEODETIC REFERENCE FRAME FOR ULBS USING GNSS TECHNIQUES

GPS provides accurate and uniform reference frame for the geospatial data. DGPS techniques are required for geo-referencing of high resolution image data which essentially needs positional accuracy that matches the spatial resolution.

The satellite image shall cover the entire ULB area and sufficient no. of GCPs shall be planned to geo-referenced the satellite image data as well as to check the accuracy parameters of the corrected image datasets with the aid of check points.

The GCP configuration and density of the GCPs are key parameters to be implemented suitably to achieve high quality data product after for geo-referencing process. Spatial distribution of the GCPs over the study area and type of features that are being selected as GCPs, play an important role in this process.

The DGPS survey procedure involves:

- Establishment of Monumented Reference station
- Data collection and processing procedures
- Upkeep of the reference station for future surveys

A permanent station shall be established which can be used as a reference station for the GPS surveys. A location, preferably in the central part of the ULB area, which is clear to sky without obstructions like tree canopy, high-raised building, HT electrical lines, shall be identified, either on ground or on the top of a building for constructing the reference station.

A cement concrete structure of 2 ft x 2 ft x 2ft shall be made and a brass plate marked with dot and circle shall be embedded on the top of the monument. A survey-grade dual frequency GPS receiver shall be operated with Tripod in static mode at this reference monument for a period of 3 consecutive days with a minimum of 12 hrs per day with 15 sec epoch rate and the 3 days data shall be processed with Single Point Positioning or Precise Point Positioning technique to derive the geodetic coordinates of the reference station in ITRF reference frame.

Establishing reference station coordinates in ITRF reference frame serves multiple benefits to the geospatial data in terms of maintaining uniform reference frame in future updates and also to use other datasets in GIS environment. ITRF reference frame can be implemented in two ways either by linking the reference station to IGS station nearby or processing using Precise Point Positioning technique using IGS data precise ephemeris and clock files. The derived Reference station geodetic coordinate shall be recorded properly and is documented in the records for future use by the ULB authorities.

Each GCP shall be identified with suitable permanent feature which is seen on the ground as well as on the image data. The location where GPS is being operated shall be clear to sky without obstruction to track GPS signals. Geodetic survey grade GPS receivers shall be employed to collect the data. Base station and rover stations shall be operated at 15 sec epoch rate and observation period of min. 1 hr shall be adopted for base line length of 10 km. Baseline distances of 10 km. - 20 km. shall be observed with minimum of 2 hrs time period.

Observations shall be made using dual-frequency GPS receivers and L1/L2 geodetic ground plane antennas tripods with bubble levels shall be used to minimize setup errors. Post processing of the data shall be carried out on daily basis using broadcast ephemeris and post- processing software. Validity checks shall be documented with analysis of base line vector solutions and loop closure errors. All the data produced shall pass ambiguity resolved vector solutions and loop closure exceeding one part per million relative positioning accuracy.

GPS antenna shall be mounted on tripod during survey for reference station as well at GCP location during data collection. The GCP location shall be marked with paint to ensure relocation at later data and it shall be post-pointed on the image. A detailed description of the GCP location shall be written in the field log sheet with a neat sketch.

Data quality parameters like cycle slips, no of satellite tracked, observed GDOP values shall be checked soon after the survey to ensure good quality of the data collected at reference station as well as at rover stations before data processing.

Data processing shall be carried out with baseline processing for each session and network adjustment for all the sessions and ensure that loop closure accuracy results shall be better than 1 on 50000 which is the geodetic standard for static surveys. The final adjusted coordinates shall be in Geographic coordinate system and also in WGS-84 coordinate system and UTM projection.

A project report shall be submitted with the details about GCP planning diagram, GPS equipment details and manuals, reference station details and its geodetic coordinate in ITRF latest epoch, data collection parameters, field photographs of all the locations, processing results, GCP network diagram and list of adjusted coordinates.

Annexure- 16: Sample Format for Comparison of Survey Data with GMC MIS Records

Survey Data																	IMC MIS Records							
							Built-up Area (in sq ft)																	
GIS Parcel Number	Property Unique ID	Owner's Name	Address	Total Plot Area (sq ft)	Plinth Area (sq ft)	Vacant Area (sq ft)	Basement	Ground floor	1st floor	2nd floor	3rd floor	4th floor	Total	Use of Property	Type of Construction	Rent /Own use	Location	ULB PIN / Property Tax Number	Owner's Name	Address	Built-up Area (sq ft)	Use of Property	Type of Construction	Rent / Own use	Location

Note: *The above data of each property should be submitted in soft (DVD) & hard copy (in A3 size) duly approved by the concerned revenue officer.*

Fields or items can be added, deleted or edited as per the GMC's requirement.

Annexure- 17: Ward-wise Summary Findings

Ward-wise Summary Findings of Comparison between Survey data and GMC MIS

Municipal Zone No._____ **Ward No. _____**

#	Detail	Nos	%
1	**Total number of GIS parcels**		
2	**Total number of properties surveyed**		
3	**Total number of properties as per GMC Record**		
4	**No. of surveyed properties compared with GMC**		
4.1	Number of under-assessed properties		
4.2	Number of over-assessed properties		
4.3	No change between surveyed data and GMC records		
4.4	Number of properties registered in GMC but parameter of assessment not available in GMC		
5	**Number of surveyed properties un-compared**		
	(a) Open plots / under construction		
	(b) Governments / GMC / Religious Buildings		
	(c) Other than (a) and (b)		
6	**Number of GMC registered properties un-**		

Ward-wise Change in PT Demand for Compared Properties

#	Detail	
1	Property Tax and Allied Taxes Demand as per survey data (to be calculated at current prevailing rates) (in INR)	
2	Current Year Property Tax & Allied Taxes Demand for registered properties as per GMC records (in INR)	
3	**Percentage of increase in Tax Demand**	

Prepared by:

Name

Designation *Signature*

Approved by:

Name

Designation

Name of the office / sub-office *Signature:*

Annexure- 18: Sample Property Details and Tax Demand

GWALIOR MUNICIPAL CORPORATION				
PROPERTY DETAILS				
Tax Rate Zone No	Municipal Zone No.	Ward No.	GIS Parcel No.	Property UID.

	Parameter	As per property survey	As per GMC records
1.	Name of Property Owner with Father		
2.	Full Address of Property and Telephone no. /		
3.	PIN No./ Property ID of the property if registered in ULB* and if not registered then mention NEW		
4.	Property Ownership (Individual, State govt, Central govt, Municipal Corporation, Others – pls specify)		
5.	Property Rented/ Own Use/ Both		
6.	Property Location (main road/main market/any other location)		
7.	Property Use (Pls specify)		
8.	Total Area of Land / Plot		
9.	Plinth Area of Property		
10.	Vacant Land/Plot area attached with the building		
11.	Area exempted for Vacant Land attached with building		
12.	Taxable Net Vacant Land Area		
13.	Total Constructed Area of Property		
14.	Property Tax Demand (including allied taxes)		
15.	Percentage change in Property Tax Demand (including allied taxes)		

16. Photograph of the property (4" x 6")

17. Details of Constructed Area of Property as per property survey

Type of Construction	Floor	Residential		Commercial		Industrial		Other use pls specify
		Self-Occupied	Rented	Self-Occupied	Rented	Self-Occupied	Rented	
Roof made of RCC / RBC / Stone	Basement							
	Ground							
	First							
	Second							
	Third							
	Fourth							
	Total							
Roof made of Sheet of cement, iron, tiles	Ground							
	First							
	Second							
	Third							
	Fourth							
	Total							
Semi Pucca / Kutcha								
	Total							

18. Details of Constructed Area of Property as per GMC records

Type of Construction	Floor	Residential		Commercial		Industrial		Other use pls specify
		Self-Occupied	Rented	Self-Occupied	Rented	Self-Occupied	Rented	
Roof made of RCC / RBC / Stone	Basement							
	Ground							
	First							

	Second							
	Third Fourth							
	Total							
Roof made of Sheet of cement, iron, tiles	Ground							
	First							
	Second							
	Third							
	Fourth.							
	Total							
Semi Pucca / Kutcha								
	Total							

Annexure- 19: Geo-Spatial Data Content and GIS Data Structure Standards

#	Spatial Layers	Source for Spatial data generation	Classification based on Use	
			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		**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

#	Spatial Layers	Source for Spatial data generation	Classification based on Use	
			Classes	Sub Classes
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 Organization (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

Table 1: Geo-Spatial Data Content

Totally there are 69 major classes and 475 sub-classes for 1:4000 scale urban geo-spatial data for GIS based Master Plan formulation under AMRUT scheme. Details of classification and sub-classification are given in concerned document.

Annexure- 20: List of layers available with GMC

List of Layers available with GMC				
S No	**Name of Group GIS Layer**	**Name of GIS Layer**	**Sub – GIS Layer (If any)**	**File Format**
1	Administrative Boundary	GDA Boundary		.SHP File
2		Municipal Boundary		.SHP File
3		Village Boundary		.SHP File
4		Ward Boundary		.SHP File
5		City Survey Boundary		.SHP File
6		Final Plot Boundary		.SHP File
7		Plot Boundary		.SHP File
8		Building Foot Print		.SHP File
9		GDA Scheme Boundary		.SHP File
10	Transportation	Road	Street Road	.SHP File
11			State Road	.SHP File
12		Transport Facilities	Airport	.SHP File
13			Bus Stops	.SHP File
14		Transport Facilities	Railway Station	.SHP File
15		Railway Line		.SHP File
16		Road Center Line		.SHP file
17	Water Supply	Water Supply line		.SHP File
18	Sewage Network	Sewer line		.SHP File
19		Sewage Treatment plant		.SHP File
20	Landmark		Hospital	.SHP File
21			Police Station	.SHP file
22			Fire Stations	.SHPFile
23	Other Facilities		River	.SHP File
24		Zoo		.SHP File

List of Layers available with GMC

Annexure- 21: List of layers that will need to be collected from other sources/need to be surveyed

List of layers that will need to be collected from other sources/surveyed					
S No	Name of Group GIS Layer	Name of GIS Layer	Sub – GIS Layer (If any)	Survey Required (Yes/No)	Available with Data Provider
1	**Administrative Boundary**	Landuse Zone			**Town & Country**
2		Survey/Khasra Boundary			**Survey and Land Records**
3		Hissa Boundary			
4		Property Tax Zone Boundary			
5		Government Land			**Town & Country Planning**
6		Agriculture Land			**Town & Country Planning**
7		Open Space			**Town & Country Planning**
8		Rental Housing			**Town & Country Planning**
9		Industrial Zones			**Town & Country Planning**
10		SEZ			
11		SWM Zone Boundary			
12	**Transportation**		National Road		
13		Transport Facilities	Auto Stand	Yes	
14			Taxi Stand	Yes	
15			Bus Depots		
16			Parking		
17			Road Junction		
18		Footpath			
19		Railway Crossing			
20		Railway Over Bridge			
21		Bridge			
22		Flyover			
23		Foot Over Bridge			

List of layers that will need to be collected from other sources/surveyed					
S No	Name of Group GIS Layer	Name of GIS Layer	Sub – GIS Layer (If any)	Survey Required (Yes/No)	Available with Data Provider
24		ROW (right-of-way)			
25		Traffic Signals			
26		Pump Station			
27		Central Channel			
28		Holding point			
29	**Water Supply**	Water Pipe line	Internal line		
30			Feeder line		
31		Water Reservoir	MBR (Master Balance Reservoir)		
32					
33					
34					
35			Ground Storage Reservoir		
36			ESR (Elevated storage Reservoir)		
37			Dams		
38		Valves			
39		Pressure Junction			
40		Manholes			
41		Hydrants			
42		Fire Hydrants			
43		Culvert			
44		Smart Meter			
45		Bore Holes			
46	**Electrical Network**	HT Line			**MPMKVVC**
47		LT Line			**MPMKVVC**
48		Transformer			**MPMKVVC**
49		Street Light Pole			**MPMKVVC**
50		Smart Street Poles			**MPMKVVC**
51		GRID			**MPMKVVC**
52	**Sewage Network**	Valves			
53		Sewage Pump House			
54		Pressure Junction			
55		Conduit			
56		Manholes			
57	**Strom Water Drain**	Strom Water Drain line			
58	**Other Utilities**	Telecom Network	Optical Fiber Cable		
59			Cell Tower		
60		Gas pipeline			
61	**Land Marks**		Educational Institute (School, College, Universities etc.)		

List of layers that will need to be collected from other sources/surveyed					
S No	Name of Group GIS Layer	Name of GIS Layer	Sub – GIS Layer (If any)	Survey Required (Yes/No)	Available with Data Provider
62			Petrol Pump		
63			CNG Station		
			Religious Facility		
64			Play Ground		
65			Government office		
66			Culture Facility		
67			Sports Facility		
68			Lodging Facility		
69			Entertainment Facility		
70			Restaurants		
71			Banks		
72			ATM		
73			Public Toilets		
74			Police Posts		
75			Shopping Markets		
76			Garden/Parks		
77	**Other Facilities**		Forest Boundary		
78			Pond		
79			Trees		
80		Pharmacies			
81		Post Offices			
82		Wireless Access Points			
83		Hoardings			
84		Grid			
85		City Colony			
86		CCTV			
87		Polling Booth			
88		**Milk Booth**			

Table 2: List of layers that will need to be collected from other sources/surveyed

END OF DOCUMENT