TERMS OF REFERENCE (TOR)

For

Development & Maintenance of Land Acquisition and Requisition Management System (LARMS)

Prepared By

Land Automation Management Project;
Ministry of Land

Table of Contents

Abbreviations:

Acronyms	Abbreviation
ACID	Atomicity, Consistency, Isolation, and Durability.
AI	Artificial Intelligence
ADM	Architecture Development Method
AMQP	Advanced Message Queuing Protocol
API	Application Programming Interface
AQ	Advanced Queuing
BPM	Business Process Management
CRM	Customer Relationship Management
CSV	Comma-Separated Values
CMS	Content Management System
DB	Database
DDL	Data Definition Language
DLRS	Department of Land Record & Survey
DR	Disaster Recovery
EIP	Enterprise Integration Patterns
ELRS	Electronic Land Record System
ERP	Enterprise Resource Planning
FAQ	Frequently Asked Question
GIS	Geographic Information System
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
IMAP	Internet Message Access Protocol
IVR	Interactive Voice Response
IWA	Integrated Windows Authentication

Acronyms	Abbreviation
JSON	JavaScript Object Notation
JWT	JSON Web Token
KPI	Key Performance Indicator
LARMS	Land Acquisition Management System
LSG	Land Service Gateway
LAMS	Learning Activity Management System
MIS	Management Information System
MFS	Mobile Financial Services
MSMQ	Microsoft Message Queuing
MQ	Message Queuing
MQTT	MQ Telemetry Transport
NID	National Identification Card
NTLM	Windows New Technology LAN Manager
ODS	Operational Data Store
OAT	Operational Acceptance Test
PDF	Portable Document Format
POP	Post Office Protocol
PWA	Progressive Web Application
RDBMS	Relational Database Management System
SAML	Security Assertion Markup Language
SMTP	Simple Mail Transfer Protocol
SMS	Short Message Service
SLA	Service Level Agreement
SOAP	Simple Object Access Protocol
SRS	Software Requirements Specification
SSO	Single Sign on

Acronyms	Abbreviation
SQA	Software Quality Assurance
TOGAF	The Open Group Architecture Framework
ToR	Terms of Reference
UAT	User Acceptance Testing
UDC	Union Digital Centre
URL	Uniform Resource Locator
VAPT	Vulnerability Assessment and Penetration Testing
VPN	Virtual Private Network
XML	Extensible Markup Language

1. Background

"Digital Bangladesh" is an integral part of the government's Vision 2021—which promises a prosperous and equitable middle-income Bangladesh by its golden jubilee of independence. The Honorable Prime Minister outlined the Digital Bangladesh having four key priorities – (a) developing efficient human resources for the 21st century; (b) connecting citizens in the ways most meaningful to them (c) taking services to citizens' doorsteps; and, (d) making the private sector and market more productive and competitive through the use of digital technology. In alignment with the goal of Digital Bangladesh, the services of the government should be designed to be more citizen centric and automated which will reduce the hassle and difficulties which service providers and service recipients are facing right now. There are various digital systems and solutions in pipeline targeting vision 2041. More than 1800 services will be converted into e-services for serving the citizen of Bangladesh where around 100+ e-Services are land related. All upcoming e-Services are advised to take whole of government approach. Some bottlenecks/challenges have been identified in the land management.

The people have to go to the Union Land Office with great difficulty to pay the land development tax. It costs them additional money and wastes their time and sometimes they need to pay a lot more than they should for receiving the services. Moreover, in most cases, their tax is not taken on various pretexts and they face harassments from different level of people. Due to these various reasons, many people do not show interest in paying LD Tax on time. As a result, the government's revenue is not being earned as desired. After all, it is often said that the general public has a bad idea about land rent. As part of digital land management, the Ministry of Land has taken steps to alleviate the suffering and harassment of the people and to radically change their attitude towards land development tax payment. Landowners across the country are now able to easily pay land rent online. National identity card and passport number of every citizen along with identification of every citizen is being used to pay land development tax online. The land development tax collected online is being automatically deposited in the government treasury through automated invoice system. LRB and ministry of Land taken initiative to Design, Development, and Maintenance & Support Service of Land Development Tax Management System (LDTMS (2nd Generation)) to make sure more smooth operation to serve the citizen.

2. About the organization

Ministry of Land (MoL) is managing the entire land related activities on behalf of Bangladesh Government. The formulation of different Act, policies and subsequent implementation is done by MoL. Moreover, the entire land administration, citizen services and co-ordination among the stakeholders are done by MoL and its different organizations. MoL is implementing the land related activities through its organizations like Land Appeal Board, Land Reform Board, Land Record & Survey Department, Land Administration Training Center and various stakeholders like Cabinet Division, Divisional Commission offices and Deputy Commission Offices. It also works with Registration Department.

Currently, MoL is implementing various automation activities under Land Management Automation Project.

3. Objectives of the Assignment

The Acquisition and Requisition of Immovable Property Act 2017 has already been Gazetted and brought into force. According to that Act for any Acquisition or Requisition of land, Prospective organizations have to apply to the concerned Deputy Commissioner (DC) in a prescribed form with necessary supporting documents. According to the Act, all the process/steps of Acquisition or Requisition are time bound. According to section 6(1) of the said Act, if there is a need to acquire land above 50 (fifty) bighas in a single project, there is a provision to send the acquisition proposal to the Ministry of Land for final approval. Besides, in case of acquisition of any amount of land in the area covered by the Central Land Allocation Committee, a proposal has to be submitted to the Ministry of Land. In both cases after receiving the proposal from a Ministry/Department or the office of the Deputy Commissioner, it is found that many important documents/information to be filed with the acquisition case are not provided. Due to this, in many cases the approval of acquisition cases or presentation and decision making to the Central Land Allocation Committee is delayed. In view of this, despite the goodwill of the Ministry of Land, in some cases it is not possible to provide the desired services related to acquisition cases on time.

The Ministry of Land aims to build a robust "Land Acquisition and Requisition Management System (LARMS)" which will serve Digital service platform in an easy manner for all over the country excluding three hill districts (Bandarban, Rangamati

and Khagachari) to digitalize the land acquisition process. Introducing the latest technology like AI, Big Data, Deep Learning to provide better service and support. All related data will be well arranged in Database in such a way to reflect in UI with a less access time. All front-end/UI will be as per regular format with respect to its present location/User Experience. They should be interlinked with all other necessary internal and external applications using the latest technology. It will be a distributed load balanced system. A central Single Sign on (SSO) via a Land Service Gateway (LSG) will be used for all applications. This Land Acquisition and Requisition Management System (LARMS) could be accessed using that SSO in LSG.

Key Points are below:

- Creating a new Land Acquisition and Requisition Management System (LARMS) by digitizing the manual application to compensation disbursement process and integrating it with all other land related service systems which would be an AI based Service Delivery Platform.
- Online Land Acquisition Application/Requisition, LA Emancipation, Appeal, Online Payment, Compensation Prepare, Dag Suchi Prepare, Compensation disbursement, Mutation etc.
- Change Detection Management Module.
- Application Status, Notification and various types of report Generate.
- Integration with Digital Mouza Map, Zoning with GIS information in an efficient way.
- It is also integrated with all other services/systems via LSG for SSO, Payment etc.
- AI Chatbot
- Ensuring up to date standard of security and protecting facility that makes the systems hack-proof & zero penetrated.
- Support & Maintenance Service for the System as per SLA.

4. Scope of work

4.1 Requirement Analysis of Existing Process

- Collection and validation of Requirements excluding three hill districts (Bandarban, Rangamati and Khagrachari) for LARMS.
- Provide a development plan with all required Designs (System design, UI Design, Physical Design, Logical Design (DFD), Database Design, Architecture Design etc.) which should include a context diagram of the proposed system, Sequence Diagram, Use Case Diagram, Class Diagram, CRC, Process Flow Diagram with an appropriate project plan.

4.2 System Development

The system will include platform components, specific solution components, Core Services, and Shared services etc. The solution will cover all over the country excluding the three hill districts (Bandarban, Rangamati and Khagrachari). As the land management system is different in those districts, the solution will have to adopt the management too related to the equivalent process. Dynamic workflow management facility should be in this system.

i) **Web Application Development:** Responsive UI with easily understandable UX web portal.
ii) **Mobile Apps Development**: Develop and implement Android and iOS mobile apps for the solution to enhance and be available among the citizens and stakeholders.
iii) **Integration:** The platform/solution will have integration scope to share data and service as an integrated service among all stakeholders (i.e., systems and organizations.) through the Land Service Gateway (LSG).

Architecture and standard (Data, API, etc.) will be followed as LSG. LARMS developers must use Middleware - Land Service Bus, Message Oriented Middleware, API gateway, Access Control, payment gateway and others of the LSG system.

4.3 Some key features are listed below as per requirement:

Land Acquisition

Module	Sub-Module	Features
Admin	Workflow setup	• Application-wise Workflow setup • Approval condition/pre-requisite setup • Reviewer/Approver Setup • Stage Setup • Approval Process Setup • Appeal Process Setup • Appeal Approver Setup • Committee Process Setup
	User Management	• Create User • Role Management • User Privilege Setup
	Application Setup	• Application forms template setup • Required Document Setup
	Committee Setup	• Committee Creation/Update • Committee Member setup
	Land Valuation Setup	• Land Valuation Setup • Valuation Indicator Setup • Edit/Update Land Valuation
	Land Acquisition Application Configuration	• LA Application class/category create • Type wise Rules and condition setup • Compensation Rules Setup
	Performance Management	• Performance Indicator setup • Performance Indicator update
	Template Setup	• All Type of Application Template • All Type of Reporting Template • All Type of Form Template
Land Acquisition Requiring Body Portal	Land Verify	• Search • Check Mouza • Land Classification Check • Present Land Status

Module	Sub-Module	Features
		● Valuation of Land
	Land Acquisition Application Submission	● Create Application ● Queries/Notice Notification ● Queries Feedback Response ● Application Approval Notice ● Application Status
	Dashboard	● Notification ● Application Status ● Payment Status ● All Applications Status (Graphical View)
	LA Release (অবমুক্তকরণ) Process	● Application LA Release (অবমুক্তকরণ) ● Status
	Arbitration	● Arbitration judgment
	Payment Management	● Online Payment ● Payment History
	LA Plot Information	● Plot Information Entry
	Plot owner & Family Information	● Plot Owner and Family Information Entry
	Project Information Entry	● Project Information Entry
	Rehabilitation Plan	● Rehabilitation Plan Entry ● Rehabilitation Family Information Entry
	Application History	● Application life Cycle ● Queries History
Citizen Portal	Complaint and Appeal	● Create Complaint ● Create Appeal ● Queries/Notice Notification ● Queries Feedback Response ● Appeal Approval Notice ● Appeal Status
	Compensation Application Process	● Compensation Application ● Status ● Payment Receive
	Arbitration	● Arbitration Entry

Module	Sub-Module	Features
		● Arbitration judgment
	Dashboard	● Notification ● Application Status ● Payment Status ● All Complaint/Appeal Status (Graphical View)
Land Acquisition Reviewer Portal	Plot Estimation (Dag Suchi)	● Information Entry ● Dag Suchi Generate
	Project Information	● Project Information Entry ● Project Information View
	Rehabilitation Plan	● Rehabilitation Plan Entry ● Rehabilitation Family Information Entry ● Rehabilitation Plan View
	Land Verify and Image Analysis	● Search ● Mouza Check ● Land Classification Check ● Present Land Status ● Valuation of Land ● Present Land Map View (From GIS Project)
	Notice Management	● Notice Create ● Notice Publish/Send
	Valuation of land, infrastructure and plants	● Information Entry ● Upload Video, Image with Ref. Indexing ● Valuation Report
	Layout Create	● Draw Digital Layout ● Details Information ● Previous Layout ● Layout Upload (Manual)
	Compensation Create	● Compensation Application Receive ● Compensation Generate for Acquisition ● Compensation Generate for Requisition ● Previous Compensation
	Land Acquisition	● Create Cancelation

Module	Sub-Module	Features
	Cancelation	• Cancelation Status
	Land Acquisition Resume	• Create Resume Application (Partial/Full) • Resume Status • Resume Notice
	Land Acquisition Approval Correction/Change	• Create Approval Correction/Change • Status • Notice
	Royedad (রোয়েদাদ) Book	• Case wise Royedad (রোয়েদাদ) Book Prepare • Royedad History
	Award Prepare	• Award Prepare • Award Amount Online Receive • Award History
	Payment Management	• Prepare Advice for Bill • Online Payment • Payment Disbursement • Payment History
	Publication of Gazette	• Publication of Gazette
	Possession Hand Over/Transfer	• Possession Handover • E-Mutation
	Arbitration	• Arbitration Information • Arbitration judgment
	Lease Post Activity Management	• Change Lease Purpose • Lease Transfer
	Miss case Entry & Hearing	• Miss case Entry • Miss case hearing • All Miss Case Information • Status
	Legal Status	• Case Entry • Case Update • Create Legal Notice • Payment Stop • Status
	Performance	• Performance Check

Module	Sub-Module	Features
	Management	• Division/District/Zilla based performance Evaluation • Performance Details • Performance Report
	Reports	• Parameterized Report • Required as per Requirement
	Dashboard	• Graphical Reporting • New/Working in progress (WIP) • Application Notify • LA Applications Status • Muza based LA Information • Category Based LA Info (Govt., Pvt etc.) • Year wise List & Status • Cadastral & Satellite Image • Rehabilitated & Resettlement Information • Court Case Information • Next & Last Hearing Information • Change Detection Notification • Required as per Requirement

Land Requisition

Module	Sub-Module	Features
Admin	Workflow setup	- Application-wise Workflow setup - Approval condition/pre-requisite setup - Reviewer/Approver Setup - Stage Setup - Approval Process Setup - Appeal Process Setup - Appeal Approver Setup - Committee Process Setup
	User Management	- Create User - Role Management - User Privilege Setup
	Application Setup	- Application forms template setup - Required Document Setup
	Committee Setup	- Committee Creation/Update - Committee Member setup
	Land Valuation Setup	- Land Valuation Setup - Valuation Indicator Setup - Edit/Update Land Valuation
	Requisition Application Configuration	- Requisition Application class/category create - Type wise Rules and condition setup - Compensation Rules Setup
	Performance Management	- Performance Indicator setup - Performance Indicator setup update
	Template Setup	- All Type of Application Template - All Type of Reporting Template - All Type of Form Template
LA and Requisition Requiring Body Portal	Land Verify	- Search - Check Mouza - Land Classification Check - Present Land Status - Valuation of Land - Present GIS Map View

Module	Sub-Module	Features
	Land Requisition Application Submission	• Create Application • Create Renew Requisition • Create Release Requisition • Queries/Notice Notification • Queries Feedback Response • Application Approval Notice • Application Status
	Dashboard	• Notification • Application Status • Payment Status • All Applications Status (Graphical View)
	Land Requisition Release	• Application Requisition Release (অবমুক্তকরণ) • Status
	Arbitration	• Arbitration Information • Arbitration judgment
	Payment Management	• Online Payment • Payment History
	Land Requisition Plot Information	• Plot Information Entry • Plot Information View
	Plot owner & Family Information	• Information Entry • Information View
	Project Information Entry	• Project Information Entry
Citizen Portal	Complaint and Appeal	• Create Complaint • Create Appeal • Queries/Notice Notification • Queries Feedback Response • Appeal Approval Notice • Appeal Status
	Compensation Application Process	• Compensation Application • Status • Payment Receive
	Arbitration	• Arbitration Entry • Arbitration judgment
	Dashboard	• Notification • Application Status

Module	Sub-Module	Features
		● Payment Status ● All Complaint/Appeal Status (Graphical View)
Land Requisition Reviewer Portal	Plot Estimation (Dag Suchi)	● Information Entry ● Dag Suchi Generate
	Land Verify and Image Analysis	● Search ● Check Mouza ● Land Classification Check ● Present Land Status ● Valuation of Land ● Present GIS Map View
	Notice Create	● Notice Create ● Notice Publish/Send
	Valuation of land, infrastructure and plants	● Information Entry ● Upload Video, Image with Ref. Indexing ● Valuation Report
	Layout Create	● Draw Digital Layout ● Details Information ● Previous Layout ● Layout Upload (Manual)
	Compensation Create	● Compensation Application Receive ● Compensation Generate for Acquisition ● Compensation Generate for Requisition ● Previous Compensation
	Royedad (রোয়েদাদ) Book	● Case wise Royedad (রোয়েদাদ) Book Prepare ● Royedad History
	Payment Management	● Prepare Advice for Bill ● Online Payment ● Payment Disbursement ● Payment History
	Arbitration	● Arbitration Information View ● Arbitration judgment
	Lease and Requisition	● Change Lease Purpose

Module	Sub-Module	Features
	Post Activity Management	- Lease Transfer
	Miss case Entry & Hearing	- Miss case Entry - Miss case hearing - All Miss Case Information - Status
	Legal Status	- Case Entry - Case Update - Create Legal Notice - Payment Stop - Status
	Performance Management	- Performance Check - Division/District/Zilla based performance Evaluation - Performance Details - Performance Report
	Reports	- Parameterized Report - Required as per Requirement
	Dashboard	- Graphical Reporting - New/Working in progress (WIP) - Application Notify - LA Applications Status - Muza based LA Information - Category Based LA Info (Govt., Pvt etc.) - Year wise List & Status - Cadastral & Satellite Image - Rehabilitated & Resettlement Information - Court Case Information - Next & Last Hearing Information - Change Detection Notification - Required as per Requirement

4.4 Data Migration and Data Entry:

The consultant should have the plan to manual meta data and relevant document migration with indexing. The consultant should submit the data migration and data entry plan.

4.5 Capacity Development:

Capacity management of the stakeholders (i.e. Government/non-government agencies, industry, academia etc.) Should be done according to the front-end user during UAT and back-end operation team during Software Development Period to run the application properly.

4.6 Support & Maintenance:

Provide extensive 24x7 support services for the new development platform with Configuration facilities and other required services in the new platform during the operational period in LARMS as per SLA.

5. Mobile Application Requirements

- The platform/solution should be mobile responsive, device responsive and adaptable to all screen size and resolution
- The platform/solution and access portals should comply all the standards and requirements of Progressive Mobile App (PWA)
- Design and develop a splash screen for android and iOS mobile apps.
- Develop mobile applications for android & iOS using the portal URL. The mobile app will be similar to the mobile version.
- The Firm/Service Provider will be responsible for deployment of Android App in Google Play Store and IOS in the App Store or provision for downloading necessary Android/IOS apps using Individual's login Id from a customized web link or ftp/file server.
- Chatbot should be accessed from Android and iOS apps.
- Platform will have the dashboard on logging into the app
- Users will be able to view and filter all the available services
- Users will be able to view progress/status for requested/rendered services
- Users will get auto notification regarding service status through the mobile app
- Users will be able to make online payment and view transaction report through the app
- Digital wallet payment methods need to be facilitated through the mobile app.
- Firm/Service Providers will be required to arrange necessary assistance for integrating payment gateway with related/selected providers

- Users will be able to view sub account mini statement/report of the transaction suitable for mobile app view
- The mobile app should follow all the platform standards, guidelines and principles.
- Selected Firm/Service Provider will have to develop all the API required for mobile app development
- External/3rd party API will be provided by the service provider

6. Capacity Development

The consultant shall deliver a plan for training of the LARMS. It is required that the consultant works in partnership with LMAP and other stakeholders identified by the LMAP to ensure knowledge transfer and further build local capacity for maintenance of the system.

Operational Training: 20 persons

The consultant should be arranged batch wise day long operational training in two batch. Around 10 persons in a batch.

7. Feature Details Description for Application as below:

The selected applicant needs to perform an extensive requirement analysis phase by conducting workshops, interviews, surveys among different stakeholders and citizens to identify the requirements. The applicant also needs to analyze the hill districts' LA implementation process for the system on those areas. The applicant needs to design and develop the solution considering the hill districts land management and the current and future technology trend along with Artificial Intelligence (AI) in a WoG (Whole of Government) approach for the other land e-Services and stakeholders e-Services like SSO using Land Service Gateway (LSG), NID, e-Mutation, LD Tax etc. The applicant needs to develop the following feature but are not limited to:

6.1 Workflow setup

This feature will facilitate the authority to create/change/simplify workflow, working stage, approval person, approval criteria based on different condition/rules etc. for the Land Acquisition application submission to approval. It helps to minimize the working procedure, paperless office etc. This feature reduces the dependency on manual file transfer, cross checking with different authorities/organizations, documents etc.

6.2 Others Admin Setup

All kinds of administrative setup facilitate to set Application Form template, reporting template, fields in any form, attachment fields etc. Also facilitate to system user care for new employee, different type of rules setup without any backend coding.

6.3 Application Class/Category & Rules Setup

This feature will facilitate the authority to create/change/simplify by application class/type/category setup, simplify the application form, add/change any field in application form, different types of application condition/rules setup etc. for the Land Acquisition Management System. It helps to minimize the working procedure, time consume etc.

6.4 Committee Setup

This feature will facilitate the authority to create/change/simplify committees and add/remove/update committee members based on different conditions/rules etc. from the system. It is also an easy way to inform and conduct committee meetings in online through the system anywhere in He/She stays.

6.5 LA Requiring Body Portal

This feature will facilitate the Requiring Body to Apply for their demand land to the authority through the system. They can see their application status, all types of notifications, approval and they can pay the Awarded amount through this system. It helps to minimize the working procedure; time consumption etc. of requiring bodies. Requiring person also applies for land Emancipation (অবমুক্তকরণ).

6.6 Citizen Portal

This feature will facilitate the Land Owner to Appeal against acquisition/ Arbitration/ to the authority through the system. They can see their application status, all types of notifications, approval and they get compensation payment amount through this system. It helps to minimize the working procedure; time consumption etc. of land owner.

6.7 LARMS Reviewer Portal

This feature will facilitate the authority to continue their Land Acquisition procedure through the system. They can input plot information to the system and generate Dag Suchi from the system. They can send notice to the related person, prepare all types of report, prepare valuation of land in an easy manner, generate compensation sheet, prepare and publish Award notice, receive payment, monitor, manage court case, advocate enlist, advocate assign etc. The authority also disbursement the compensation to the land owner through online payment process. It helps to minimize the working procedure, paperless office etc. This feature reduces the dependance of manual file transfer, cross checking with different authorities/organizations, documents etc. Authority can easily monitor through an intelligent and interactive dashboard tool. All kind of appeal, meeting

can be conducted through this system. Any Change Detection can be trace easily through this system.

8. Non-functional Requirement

High Performance: Each of the portals should be able to handle thousands of concurrent visitors and should be able to render simple pages within 5 seconds or less. Visitors of the portals should not feel any lag in response time when they are browsing through different sections of the portals.

Highly Optimized Database: The portal databases are needed to be highly optimized and normalized so that performance stays high as the data volume increases.

High Scalability: The portal framework will be scalable in order to sustain more and more users as it grows. the LAMS platform is going to handle a large volume of information as well as large number of users in the following days. To handle this large amount of data, the consulting firm need to pay a great effort on infrastructure management **LARMS** service delivery Platform.

High Availability: The portals should have a very high availability rate. There should be real-time monitoring of server health and in document of any trouble, backup servers should be available to continue providing services as needed

- o Monitor the operating system, database, application, application server and the integration among them to ensure the availability of **LARMS** service delivery Platform
- o To implement the load balancer, database replicator, cluster software etc. to ensure high availability computing environment as and when required
- o Update the security settings and version of the operating system, database, application, application setting to ensure secure computing environment and service.
- o Develop and maintain installation and configuration procedures and system standards.

The consulting firm shall have to satisfy the following resourcefulness to ensure infrastructure services;

- o Configure necessary staging & production server.

- Security: Protection & security of content, hosting environment, servers, network elements, access & network must be ensured.
- Ensure necessary configuration and management of IP addresses & bandwidth arrangement as collaborated derived requirements with the ministry of land to accommodate scalability, user growth & integration to other systems.
- Provide version control solution, user feedback recording system, incident management mechanism, CMS & DB tuning services for the aforesaid systems.
- Continues server monitoring sizing and tuning.
- Maintain system uptime as per standard SLA.
- Server configuration as a continuous job of operation as and when required.
- Data Migration as an active support assignment during integration.
- Change Management of both application and infrastructure

9. Security Management

This system will contain different land record related data which is highly valuable & crucial for both citizen/landowner and government. So, the solution needs to have security features to handle all types of data confidentiality, authentication, authorization etc. The LARMS has to ensure this security features for data encryption & VPN features so that any kind land record related data entry/edit/modification. In order to ensure the security of the system the consulting firm will have to ensure the following.

Injection

Injection flaws, such as SQL, NoSQL, OS, and LDAP injection, occur when untrusted data is sent to an interpreter as part of a command or query. The attacker's hostile data can trick the interpreter into executing unintended commands or accessing data without proper authorization.

Broken Authentication and Session Management

Application functions related to authentication and session management are often implemented incorrectly, allowing attackers to compromise passwords, keys, or session tokens, or to exploit other implementation flaws to assume other users' identities temporarily or permanently.

Insecure Direct Object References

This issue occurs when an application provides direct access to objects based on user-supplied input. As a result of this vulnerability attackers can bypass authorization and access resources in the system directly, for example database records or files.

Security Misconfiguration

Security misconfiguration is the most commonly seen issue. This is commonly a result of insecure default configurations, incomplete or ad hoc configurations, open cloud storage, misconfigured HTTP headers, and verbose error messages containing sensitive information. Not only must all operating systems, frameworks, libraries, and applications be securely configured, but they must be patched and upgraded in a timely fashion.

Insecure Cryptographic Storage

This is a common vulnerability that occurs when sensitive data is not stored securely. Insecure Cryptographic Storage isn't a single vulnerability, but a collection of vulnerabilities.

Insufficient Transport Layer Protection

Not all traffic flowing between two endpoints is properly secured, which makes it possible for attackers to perform man-in-the-middle attacks. We have to implement HTTP Strict Transport Security in all browsers, which makes it possible to better enforce secure connections. Additionally, implementation of Certificate and Public Key pinning in browsers is necessary where applicable.

Invalidated Redirects and Forwards

Invalidated redirect vulnerabilities occur when an attacker is able to redirect a user to an untrusted site when the user visits a link located on a trusted website. This vulnerability is also often called Open Redirect.

Sensitive Data Exposure

Many web applications and APIs do not properly protect sensitive data, such as financial, healthcare, and PII. Attackers may steal or modify such weakly protected data to conduct credit card fraud, identity theft, or other crimes. Sensitive data may be compromised without extra protection, such as encryption at rest or in transit, and requires special precautions when exchanged with the browser.

Using Components with Known Vulnerabilities

Components, such as libraries, frameworks, and other software modules, run with the same privileges as the application. If a vulnerable component is exploited, such an

attack can facilitate serious data loss or server takeover. Applications and APIs using components with known vulnerabilities may undermine application defenses and enable various attacks and impacts.

Broken Access Control

Restrictions on what authenticated users are allowed to do are often not properly enforced. Attackers can exploit these flaws to access unauthorized functionality and/or data, such as access other users' accounts, view sensitive files, modify other users' data, change access rights, etc.

Insecure Deserialization

Insecure deserialization often leads to remote code execution. Even if deserialization flaws do not result in remote code execution, they can be used to perform attacks, including replay attacks, injection attacks, and privilege escalation attacks.

Insufficient Logging & Monitoring

Insufficient logging and monitoring, coupled with missing or ineffective integration with incident response, allows attackers to further attack systems, maintain persistence, pivot to more systems, and tamper, extract, or destroy data. Most breach studies show time to detect a breach is over 200 days, typically detected by external parties rather than internal processes or monitoring.

10. Support & Maintenance

- Provide support service for current system and new developed system under structured SLA and Change Management Architecture.
- Continuous health check of Database and database back-up, tuning database, tuning codes & queries and mitigating the issues.
- Updating training manual adjusting the changes in the system.
- Managing database security/ integrity and backup procedures
- Fixing all bugs in the system irrespective of its nature and complexities.
- Fixing Authentic Data entered into the system following a structured authorization system.
- Enhance and/or re-arrange existing feature of extended development of any supplementary feature within the existing technology framework complying with core SRS.
- Consultant should introduce (install/enhance or develop) a centralized customer relationship management (CRM) tools by which users (basically, service provider type users) will have access to support service to open support ticket

and track ticket for resolution

● Ensure system availability 24/7.

11. API integration (with other systems) through LSG

For system-to-system communication it will be necessary to provide combined easy and managed API access with full API governance and analysis:

- o An online repository needs to be developed for all the common components/modules/features. The repository will manage all the reusable assets and should include integration prerequisite, integration compliance, integration guideline, integration standards and integration specification segregated by asset.
- o System should have the ability to build and publish APIs/Services to a selected set of gateways in a multi-gateway environment.
- o System should support enforcement of government and system policies for actions like API/Service subscriptions, application creation, etc., via customizable workflows.
- o Manage API/Service visibility and restrict access to specific agencies or systems
- o Manage API/Service lifecycle
- o Ensure API/Service security by restricting API access tokens to domain/IPs, validating APIs payload contents against a schema, applying security policies to APIs authentication and authorization and provide threat protection, bot detection and token-fraud detection
- o System should generate JSON web tokens for consumption by back- end servers
- o System should have proper capabilities to manage and scale API traffic and enforce rate limiting and dynamic throttling based on usage quotas and bandwidth quotas.
- o System should have configuration payment schemes to monetize API usage
- o System should monitor SLA compliance for the API
- o System should have provision to do the proper/required integration with SSO System
- o System must expose data by Advanced Message Queuing Protocol and REST via TLS
- o All imported data must undergo data validation to ensure full integrity.
- o Data exchange within the system at different levels via the internet shall be encrypted.

- The system should have functionality to exchange data with other own systems or external institute systems.
- The system shall have functionality to export/import files based on the standard template defined through web services and/or API

Full API documentation must be provided so that third party integrators can integrate their system with this system. The following list of connectivity is given, however, while implementing the project more connectivity may be required:

The Firm/Service Provider will integrate the following External System using Land Service Bus but not limited to:

Sl-No	External System	Integration Scope
1.	LSG (Land Service Gateway)	The Firm/Service Provider needs to analyze the integration scope and do the necessary enhancement if required to integrate with LSG and of LARMS.
2.	e-Mutation	The Firm/Service Provider needs to analyze the integration scope and do the necessary enhancement if required to integrate with Revamping of e-Mutation Platform and LARMS.
3	Mutated khatian	The Firm/Service Provider needs to analyze the integration scope and do the necessary enhancement if required to integrate with Revamping of e-Khatian Platform and LARMS.
4	LD tax	The Firm/Service Provider needs to analyze the integration scope and do the necessary enhancement if required to integrate with Revamping of LD Tax Platform and LARMS.
5	LAMS	The Firm/Service Provider needs to analyze the integration scope and do the necessary enhancement if required to integrate with Revamping of LAMS and LARMS.
6	EkPay & Other Payment Gateway	The Firm/Service Provider needs to analyze the integration scope and do the necessary enhancement if required to integrate with with Revamping of EkPay & other Payment Gateway and LARMS.
7	Others Solutions /Applications that will be come up under "Land Management	If the client identifies any new scope for integration with the government/non-government/relevant stakeholder system. The Firm/Service Provider needs to analyze the integration scope and do the necessary enhancement if required to

SI-No	External System	Integration Scope
	Automation Project" and Existing Systems	integrate with of others application and LARMS.

The consultant should provide the list of data / records that can used for other systems by Ministry of Land and other Government database for providing better services / management.

12.Implementation Plan

The consulting firm must complete the assignment within a stipulated timeline based on the proposed SDLC methodology. The assignment timeline can be divided in three below phases that is – Development, UAT and Maintenance & Support. As the entire assignment's functional scope will be divided into 2 parts, therefore the release and deployment of the part for going live will be based on the completion of the iteration. The assignment is divided into three phases. The entire assignment is divided as following phases:

PHASE-I: Requirement Analysis, Design & Development – **04** Months

Tittle	Duration
▪ Inception report ▪ Requirement Analysis, SRS ▪ High Level Design (HLD), ▪ LLD Design	4 (Four) Months

PHASE-II: Data Migration, UAT & Deployment – **10** Months

Part	Duration
▪ Software Development (Phase-1) ▪ Mobile Apps Development (Phase-1)	4 (Four) Months
▪ UAT (Phase-1) ▪ UAT Feedback incorporation (Phase-1)	1 (One) Month
▪ Data Migration and Data Entry	1 (One) Month
▪ Software Development (Phase-2) ▪ Mobile Apps Development (Phase-2)	4 (Four) Months
▪ UAT, SQTC (Phase-2) ▪ UAT Feedback incorporation (Phase-2)	1 (One) Month

Some Activities could be done in parallel manner.

PHASE-III: Final Deployment, OAT, Fix Bugs and Go Live – **02** Months

Tittle	Duration
▪ TOT Training ▪ Deployment ▪ Bug Fixing ▪ OAT ▪ Functional Traceability Matrix ▪ Integration (All integrated Application through LSG) Traceability Matrix	2 (Two) Months

PHASE-IV: Support & Maintenance– Total: **24** Months

Tittle	Duration
Support and Maintenance service after new version development and go live	24 Month

13. Technology Specification

The consulting firm will follow the TOGAF 9.x or similar open source-based technologies, frameworks, platforms and guidelines. Following are some technical specifications which the consulting firms should consider as reference but not as the ultimate method of revamping of LDTMS (2nd Generation) Platform for Developing New Generation of LDTMS (2nd Generation) System.

- TOGAF compatible or similar open-source platform to ensure enterprise level management
- The ArchiMate3.x Modelling Language Common data platform
- e-Service bus (Enterprise Service Bus)
- Java, PHP, Laravel, Node JS, SpringBoot or Go or Python or any other language at back-end or server-side scripting layer
- React, Next JS, View JS or similar types open source for front end.
- API centric enterprise level design using JSON or other data delivery format.
- Micro service architecture following micro-service design approach.
- Secure interaction with Core-service and shared service using dynamic token
- API lifecycle, policy and community governance using proper analytics
- Multi-tenancy support in platform
- SAML2 bearer grant type, JWT assertion grant type and NTLM-IWA grant type
- Messaging protocol support e.g., AMQP 1.0, STOMP, MQTT, HTTP

- OAuth2 token revocation support
- OAuth token introspection
- SAML 2.0 or above based Single Logout, metadata profile and
- assertion query/request profile
- OpenID connect based session management, discover and dynamic client registration
- Federated SSO via SAML2 or OpenID with external identity providers to incorporate with central SSO/LSG
- White label login and registration process
- Rule-based authorization support for SSO
- Support for multi-option/multi-step authentication
  - X.509 Authentication
  - 2-factor authentication (2-FA) (hardware based or soft OTP)
  - Time-based one-time password (TOTP) based authentication
- Apache Maven, Apache Ant and Oracle JDK
- Maven or Gradle build is recommended to use.
- Enterprise Linux to host all application
- Bootstrap, jQuery and Ajax for best UX
- Oracle 12c or higher RDBMS or Any Similar Open-Source DB.
- MySQL, MongoDB or any other NoSQL database as/when required with proper justification
- Redis, Memcached, CDN or Varnish for caching and faster data delivery
- Must ensure load balancing for scalability and failover for high availability of service endpoints
- Code Version Controlling using GIT or Bitbucket in private mode
- GIT issue board or Jira or Asana for issue tracking and feature change management
- Notification to web and mobile with current and future OS of corresponding devices must be ensured
- Future technology change, iterative prototyping and agility in framework design are the generic expectation