

Functional Requirement Specifications

for developing a

Online System for Transferring Land and Property Titles

in Thimphu, Bhutan

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Acronym and Abbreviations

Abbreviation	Full Form
API	Application program interface
BIC	Business Identifier Code
BPM	Business process management
CID	Citizen Identification
DMS	Document management system
DO	Dealing officer at Thromde
DR	Disaster recovery
EJB	Enterprise Java Beans
EMS	Enterprise management system
ESB	Enterprise service us
FRS	Functional requirement specifications
НТТР	Hypertext transfer protocol
ICT	Information and communication technology
IDD	Industrial Development Division
IPS/IDS	Intrusion prevention system/intrusion detection system
LDAP	Lightweight directory access protocol
NEC	National environmental clearance
NLC	National Land Commission
NLCS	National Land Commission Secretariat
РТ	Penetration testing
RDBMS	Relational database management system
RoC	Registrar of Companies
RPO	Recovery point objective
RTIO	Regional Trade and Industry Office
RTO	Recovery time objective
SAN	Storage area network
SLA	Service level agreement
SOAP	Simple object access protocol

Abbreviation	Full Form
SSL	Secure sockets layer
SSL/TLS	Secure sockets layer/transport layer security
TPN	Tax Payer Number
T-WAN	Thimphu wide area network
UDDI	Universal description, discovery, and integration
URL	Universal resource locator
VA	Vulnerability assessment
WSDL	Web services description language
XML	Extensible markup language

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Executive Summary

NLC is at the forefront among agencies in Bhutan that have leveraged the potential of ICTs for enhancing efficiency in government functioning

According to the *Doing Business 2016* report, Bhutan ranks 51 among 189 countries in the ease of registering a property. On average, it takes 3 procedures and 77 days to transfer a property title in Thimphu, while in New Zealand, ranked first, registration takes 2 procedures and 1 day.

The recent achievements of Bhutan's National Land Commission (NLC) in automating the backend registration systems are not yet reflected in widespread impact and enhancement of the service experience for business and citizens for a number of reasons, including the

following: (i) the system continues to lack a citizen interface (citizen services portal), a prerequisite for good e-Governance practices; (ii) the multiple software systems developed so far remain disjointed and therefore difficult for evaluators to access and assess; (iii) policies and action plans at Thimphu Thromde (the citizen-facing component of the services) are not consistently enacted; (iv) a comprehensive framework for ensuring end-to-end online service delivery is not yet in place.

The NLC is scaling up its ICT-based governance process reengineering with an aim of making Bhutan one of the leading countries in terms of delivery of services related to online property transfers. In particular, the development and deployment of a citizen services delivery portal will enable citizens and businesses to electronically transfer a property title using either the web site or a mobile application. The improved system will include the following:

- Fully operational eSakor in Thimphu with bug fixing and addition of new modules.
- Integration of the cadastral geodatabase with eSakor.
- Development and deployment of citizen-engagement and grievance-redress modules, fully integrated with the workflow of Thimphu Thromde as well as of the National Land Commission Secretariat (NLCS).
- Local development environments that ensure eSakor's flexibility and adaptability.
- Enhanced capability in urban eSakor to allow flat, apartment, and strata transactions.

This report present the functional requirement specifications (FRS) that will enable the NLC to clearly identify the process reengineering requirements and define the functionalities of the enhanced system, in addition to specify an appropriate data hosting platform and horizontal integration requirements. The report was developed in consultation with the NLC and other stakeholders, including the G2C Initiative, DITT, and the Land Tax Department.

The following tasks were undertaken in developing the FRS:

 Review of all documents, current systems' technical manuals, and assessment reports and provision of recommendations for governance process reengineering (GPR).

- Formulation of the broad features of the new system.
- Sharing outputs of the system study and consulting with stakeholders.
- Invitation to owner departments and partner agencies to comment on the new functionalities proposed.
- Incorporation of the inputs received from the workshops into the final features of the proposed system.
- Assessing technical requirements for hosting the solution online, including backup and disaster recovery
 options.

Figure 1.1. Organizational Stages for Developing an Improved Online Registry for Transferring Land and Property



The following recommendations will be presented in details:

- Develop a citizen services portal allowing citizens and businesses to do most of their transactions online, while legal processes continue to be handled offline.
- Remove all bugs from the current system (both Rural and Urban eSakor), as well as enhance the current system to keep manual intervention at a minimum.
- Integrate all systems (including Rural eSakor, Urban eSakor, ArcGIS, and the citizen services portal) to eliminate duplicate entries.
- Upgrade the land cadastral system from ArcGIS 9.2 to ArcGIS 10.3, along with its associated tools and software modules.

- Develop an application program interface (API) linking the new online land registry and transfer system with all other relevant external systems.
- Develop a grievance redressal system with defined service levels and web and mobile interfaces that allow users to track the status of their grievance and internal departments to monitor the response mechanism.

This FRS document covers all enhancements required in both the short and the long term. The development of the needed modules, however, should be done in the order outlined in Figure 1.1 above, devised in consultation with relevant officials at the NLC and Thimphu Thromde. (Detailed requirements for each stage are outlined in Appendix A.)

1.0 Current System Summary

1.1 Background

The land registry system currently consists of four functions, with the following software providing the back-end support for operations:

- The Rural Land Registry: Rural eSakor
- The Urban Land Registry: Urban eSakor
- The Rural Cadastral
- The Urban Cadastral

The system output consists of printing and issuing ownership certificates, called *lagthrams*. A primary eSakor function is processing land transactions online. In Rural eSakor, printing is done through VB software, with input from Rural eSakor software.

The Land Commission entirely manages and hosts the system at its headquarters, with data entry for most transactions taking place at the regional (district) offices. Currently, Rural eSakor, Urban eSakor, and ArcGIS (the land cadastral and urban cadastral software) function separately, and the systems retain many bugs and require extensive manual intervention. The systems are not integrated.

In addition to the lack of internal integration, interaction with external systems, including citizen identification (CID) records, is unavailable. Registry employees must import citizen identification data manually, and as a result the information is always a few months to a year old. The initial process through which citizens apply to register a land transaction is all manual, and citizens must bring all records physically to the registry office.

Currently, a team of ten information and communication technology (ICT) personnel supports NLCS activities. These staff members perform operational activities, including data room management, network management, client-level system troubleshooting, and first-level support for all NLCS systems.

1.2 Current Processes and Software Systems

NLCS uses four separate, largely unintegrated systems:

- The Rural eSakor system, developed by Microsoft Technologies
- The Urban eSakor system, developed by Php Technologies
- The Cadastral Geodatabase, based on AcrGIS, used by both Rural and Urban eSakor
- A Microsoft Visual Basic (VB) system used by Rural eSakor to print lagthrams

As these system are not updated frequently many bugs persist and many manual entries are required.

1.3 Challenges in the Current System

- Registering a property title is a lengthy process in Bhutan.
- Rural eSakor is only accessible to officials at the district and municipality levels.

- Mapping software (ArcGIS) is not integrated with other services. ESakor provides only a simple link to a map view, allowing surveyors to open maps and update coordinates.
- The property mortgage system is not currently operational.
- Property tax records are not linked with the corresponding property titles and land information from the Land Commission's registries.
- Software tools built up on ArcGis 9.3 must be migrated to 10.3, but resources to migrate the tools seem not to be available.
- Most of work at the district level is done manually. Documents are uploaded using eSakor but are taken up into the NLC's workflow manually.
- The NLC hosting facility is good, but it does not meet Tier III data center standards, a level essential for providing effective citizen interface services.
- Two separate systems run currently, maintained by different teams. Upgrades are not coordinated or systematic, leading to support issues and software inconsistencies.
- Given the lack of regular, coordinated upgrades, continuing back-end data entry leads to inconsistent data and reports.
- Users do not receive sufficient alerts from the system explaining pending tasks, leading to escalation to management when tasks are not completed within the scheduled time.
- Lack of online integration with external systems, such as CID, lead to time wasted pulling data from external systems. This increases the possibility data will be out of date and exposes the system to possible fraud.

2.0 Proposed System and Processes

2.1 Desired Features of the Proposed System

- Citizen service delivery portal
- Citizen engagement module
- Automated back end
- Grievance redressal module

2.2 Process Reengineering

The complete requirements for the reengineered system can be categorized using the four areas shown in Figure 2.1. Each must be addressed in the context of the Urban eSakor, Rural eSakor, and ArcGIS systems.





2.2.1 Citizen Service Delivery Portal

An effective citizen service delivery portal will require the following characteristics:

• Multichannel access (web and mobile)

- Integration with the systems at Urban eSakor (in the first phase) and Rural eSakor (second phase).
- Key services to be delivered include:
 - Online land transfer applications
 - Online submission of requisite documents
 - Application status viewable online
 - Updates and alerts receivable through SMS and email
 - Online submission of queries, complaints, and feedback

2.2.2 Enhancement of Urban eSakor Software

Steps necessary for enhancing Urban eSakor include the following:

- Fixing bugs
- Installing new features
- Improving current workflow
- Developing new workflow
- Enhancing security and rights-based access

2.2.3 Integration

Various levels of integration with other government databases will enhance system functioning. These include the following:

- Integration with the census system, so that updated citizen records can be pulled on a real-time basis.
- Integration with ArcGIS, so the eSakor system can access maps generated from ArcGIS.
- Integration with the tax management system, making tax information relevant to land transactions available online.
- Integration with the land mortgage system, clarifying the status of mortgaged property in real time.

2.2.4 Upgrades

Basic necessary upgrades include the following:

- Upgrading ArcGIS from version 9.3 to version 10.3
- Upgrading ArcGIS tools to conform to ArcGIS 10.3

2.3 Summary of Impacts

The short- and long-term effects of these improvements will include the following:

• Efficient delivery of services to citizens

- Improved speed of land transactions
- Integration with other systems thereby initiating eGov mechanisms
- Time savings for administrators through online delivery of services to citizens
- Simplified communications with today's "connected" citizens
- Increased transparency regarding administrative work for both citizens and internal staff

2.4 Constraints and Way Forward

Bringing these changes into effect will require alignment of a number of factors:

- Sufficient bandwidth must be available to serve the online components.
- A robust and dedicated network must be established.
- A Project Task Force must be established to monitor the selected vendor, as any project delay will lead to derailment of the whole process.
- The multiple systems currently functional at the NLC employ different technologies, making finding a vendor with all the skills required will be a challenge. One solution would be to engage a consortium.
- Capacity building of both citizens and service providers must occur.
- Citizens will benefit from having a Citizen Helpdesk, both web- and mobile-based, to support them in using the online process.

3.0 Detailed Characteristics of the Proposed System

3.1 Process Overview with Proposed Performance Timelines

The typical land transfer takes place in ten steps, the first five of which are completed at Thromde. The proposed new process will automate the Thromde workflow. The next four steps take place at NLCS, and the last step, printing and handing over the *lagthram*, is again done at Thromde using eSakor software. The reengineered process will revise this workflow. Adjustments to the time requirements appear in Table 3.1.

S. No	Location	Function	Proposed Time
1	Thromde / Web	Citizen module and land transfer initiation	1
2	Thromde	Thromde verification process	1
3	Thromde	Survey readiness	1
4	Thromde	Survey process and "cooling off" period for public notification /a	2–30
5	Thromde	Submit to NLCS	1
6	NLCS	Mapper process	1 /b
7	NLCS	Map verifier	1 /b
8	NLCS	NLCS verification and approval	1 /b
9	NLCS	Post approval	1 /b
10	Thromde	Lagthram printing and handover	1 /b
		Total Time	11–39

Table 3.1. Process Steps with Proposed Time Requirements

Notes:

/a: It is proposed that the survey begin before the end of the cooling period. The range indicated of 2–30 days accommodates the wide variation in time required for the surveys, which can even extend beyond 30 days.

/b: The time required from submission to the NLCS to handover of the lagthram could be reduced from 5 to 1 or 2 days through Solid Thram Transfer and addition of a co-owner to the property.

The reengineered functions will be devised in keeping with the software currently in use at NLCS. As previously mentioned, the functions can be categorized in four areas of citizen service delivery portal, enhancement,

integration, and upgradation. Figure 3.1 indicates the work required in the 10 steps proposed.

Figure 3.1. Overall Process Steps with Type of Work Required



3.2 Application Flow Stages

The land transfer application passes through an elaborate internal workflow from Thromde to NLCS and then back to Thromde before the citizen finally receives the *lagthram*. The various stages through which the application passes are shown in Figures 3.2 and 3.3. The proposed citizen services delivery portal will be capable of tracking the status of an application at any point in this flow. Accuracy will be ensured through the use of an assigned Application Number, unique to each application. The stages of this flow will be further described in the subsections following.









3.2.1 Process Map 1A: Proposed Citizen Module and Land Transfer Initiation Workflow

This process outlines the functionalities to be provided by the citizen module and the land and property transfer initiation at the Thromde level. Verification of documents takes place at two levels: at the electronic level and at the manual level of the original documents. Once the electronic documents posted through the citizen module are verified by the dealing officer at Thromde, an email and SMS are sent to the applicant requesting presentation of the original documents at the Thromde office. Figure 3.4 illustrates this flow, and table 3.2 provides details on the steps involved.



Figure 3.4 Process Map 1A: Proposed Citizen Module and Land Transfer Initiation Workflow

Table 3.2. I	Land Transfer	Initiation
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Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
1. Submit Application + doc. via citizen module Documents (See Appendix C)	The Application Form for Thromde Land Conveyance (LT(U) FORM 1) along with the required documents for Land Transfer is submitted online through the citizen module.	Transferor and Transferee	Manual submission of documents at Thromde office.	Citizen module, both web- and mobile-based, enabling the Transferor to fill out the application form and upload the required documents. Disclaimer in the application form to be modified. On upload, a unique registration no. is created. Registration no. is a unique 9 digit no. and is used as a reference for application tracking and any other queries or searches.
2. Electronic Application Verification	The submitted application form and documents submitted by the Transferor and Transferee are checked for completeness by the dealing officer at Thromde.	Dealing Officer	Manual verification of the forms and documents.	The dealing officer views the list of applications submitted online. On selecting a particular application form the dealing officer can see the details of the application form along with the attached documents. The DO can then do the following: View Details: View the application form and the attached documents Verify CID: Through connection to the census database through an API, the CID numbers provided by the Transferor and Transferee are verified. Approximately 10 fields are obtained from this database and stored in the system, including photographs. Verification: Accept: Initiates an email / SMS trigger to the Transferor and Transferee to come to Thromde for physical verification of the original documents. It also moves the application to the next bucket, "Applications for Original Document Verification." Verification: Reject: The application is rejected and returned to the initiator. The remarks specify the items missing, and the application can be resubmitted by the initiator. Initiates an email / SMS trigger to the Transferor and Transferee explaining the rejection.
4. Physical Verification of the Document at Thromde	The Transferor and Transferee come to Thromde with the original documents for verification. The DO checks the documents for authenticity.	Dealing Officer	Manual	The DO checks the documents for authenticity and marks the application status showing the physical verification was done.
5. Payment to the	Payment of Registration fees is done in the	Transferor and	Manual	Registration payment is made at the Revenue Section, and the

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
Revenue Section and Receipt Information Updated	Revenue Section	Transferee		receipt is handed over to the DO for upload and generation of a registration no. Suggestion option 1: Online Payment and receipt Information updated. Suggestion option 2: Offline Payment and receipt Information updated by Revenue Section.
6. Initiate Transfer	A land transfer is initiated in the system	Dealing Officer	Generated in eSakor Verbally communicated to the Transferor and Transferee	Land transfer is initiated in the system. Email / SMS trigger to the Transferor and Transferee about status and initiation of the registration no.

3.2.2 Process Map 2A: Proposed Thromde Verification Process Workflow

The public notice creation date marks the beginning of the "cooling off" period of 30 days. Verification with the three departments at the Thromde level starts immediately after the publication of the notice. The verification letter is approved by the Land Section, Revenue Section, and the Building Section. Approvals from all three are required to proceed to the next step, the survey. The process is illustrated in Figure 3.5 and described in Table 3.3.

Figure 3.5. Process Map 2A: Proposed Thromde Verification Process Workflow



Table 3.3. Thromde Verification Process

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
7. Create Public Notice	A Public Notice is created.	Dealing Officer	Manually	On initiating the land transfer, a public notice is created in the standard template. The same is printed for Office Notice Board and sent to the IT section for uploading to the Thromde web site. Suggestion: Integrate with web site for automatic upload at time of notice creation.
8. Generate Verification Letter	A General Verification Letter is generated as well as three letters one from each of the Land Records, Building Section, and Revenue Section.	Dealing Officer	Manually	A button "Generate Verification Letter" auto-generates a verification letter in the standard template. Three letters are generated by each of Land Records, Building Section, and Revenue Section. Approved users in the Land Section, Building Section, and Revenue Section have access rights to the system and can generate verification letters on behalf of the respective department. These letters are available for further processing.
9A. Land Records	Land Records Verification Letter: transfer is approved or rejected.	Land Records Officer	Manually	The land records officer logs into the system and views the list of applications for land records verification. The land records officer can do the following: Update Fields : Update the fields meant for the Building Section Verification: Accept: The application is marked with the status "Land Records Verification Accept" and is visible to the Dealing Officer. Verification: Reject: The application, if rejected, is returned to the Dealing Officer. Remarks specify the items missing. The application can be resubmitted by the Dealing Officer.
9B. Building Section	Building Section Verification Letter: transfer is approved or rejected.	Building Section Officer	Manually	The building section officer logs into the system and views the list of applications for building section verification. The building section officer can do the following. Add Documents: Add Building Evaluation Documents. Update Fields: Update the fields meant for the Building Section. Verification: Accept: The application is marked with the status "Building Section Verification Accept" and is visible to the Dealing Officer. Verification: Reject: The application, if rejected, is returned to the Dealing Officer. Remarks specify the items missing. The

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
				application can be resubmitted by the Dealing Officer.
9C. Revenue Section	Revenue Section Verification Letter: transfer is approved or rejected.	Revenue Section Officer	Manually	The Revenue Section Officer logs into the system and views the list of applications for revenue section verification. The revenue section officer can do the following. Verify Land Mortgage System: Verify any mortgage using the system through API. Update Fields: Update the fields meant for the Building Section. Verification: Accept: The application is marked with the status "Revenue Section Verification Accept" and is visible to the Dealing Officer. Verification: Reject: The application, if rejected, is returned to the Dealing Officer. Remarks specify the items missing. The application can be resubmitted by the Dealing Officer.

3.2.3 Process Map 3A: Survey Readiness Process Workflow

Land transfers can be any of 16 transaction types. These fall into the 4 categories described below.

The processing of solid Thram transfer and add co-owner transfer does not require a resurvey and can be processed directly at the Land Section of Thromde. The processing of land fragmentation and land merging require a resurvey and are forwarded to the survey department for fragmentation or merging, as the case may be. Currently the Survey Department concludes processing 30 days after creation of the public notice, that is, after the end of the "cooling off" period. Even the scheduling of the survey begins after 30 days. The process would be expedited if the Survey Department automatically scheduled its work immediately after the preceding steps. In this way, the survey can begin immediately after the "cooling off" period. This segment of the workflow is illustrated in Figure 3.6 and further detailed in Table 3.4.



Figure 3.6. Process Map 3A: Survey Readiness Process

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
10A. Solid Thram Transfer / Add Co- Owner	No action is taken here.	Dealing Officer	eSakor	These records are passed on for submission to NLSC, where they are verified and submitted once the cooling period is over.
10B. Land Fragmentation 9B1. Create <i>Thram</i> and Plot No.	New Thram and plot no. is created here.	Dealing Officer	eSakor	In case of land fragmentation, a new <i>Thram</i> and plot no. is created. The number of Thram and plot numbers is equal to the fragments of land to be transferred.
10C. Land Merge 10C1. Create <i>Thram</i> and Plot No.	New <i>Thram</i> and plot no. is created here.	Dealing Officer	Direct entry to database by IT	In case of land merge, a new <i>Thram</i> and plot no. is created.
10B2 / 10C2. Create Survey Initiate Note	Survey initiate note is created and sent to the survey department to start doing their work.	Dealing Officer	eSakor	The moment the <i>Thram</i> and a plot no. are created, a note to initiate survey, using a standard template, is created and visible to the Survey Officer for scheduling and further processing.

3.2.4 Process Map 4A: Survey Process Workflow

The workflow for the survey process is illustrated in Figure 3.7 and described in Table 3.5.

Figure 3.7 Process Map 4A: Survey Process



Table 3.5 Process Map 4A: Survey Process Workflow

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
11. Records for Survey	List view of records ready to be surveyed. Scheduling of records as per the completion of the 30-day cooling period.	Survey Officer	Manual	Survey Officer logs into the system and views the records available for survey. The survey records are scheduled for survey per the availability of Survey Officer schedule. Suggestion: A 30-day window should be administratively configurable. Suggestion: Currently, the survey is scheduled after the completion of the 30-day cooling period. In the new system, the survey will be initiated even if the 30-day period is not completed.
12. Physical Survey Done	Physical survey is carried out as per the schedule.	Survey Officer	Manual	Total station is used for survey and maps generated from the device.
13. Survey Report / Endorsement Report	The reports generated by the Survey Officer are uploaded in the system.	Survey Officer	Manual	Survey Officer uploads the survey report, the endorsement report, and other reports into the system.
14. Upload Map / XML Files	The Map and XML files created by the Survey Officer are uploaded in the system.	Survey Officer	Sent through email to the Dealing Officer	The map generated through total station device and XML files generated through ListCat are uploaded into the system. After uploading the relevant documents, the Survey Officer marks the Survey as complete, thus updating the application status to "Surveyed," visible to the Dealing Officer for further processing.

3.2.5 Process Map 5A: Proposed Work Flow for Submission to NLCS

The workflow for submission to NLCS is illustrated in Figure 3.8 and described in Table 3.6.

Figure 3.8 Process Map 5A: Submission to NLCS



 Table 3.6 Process Map 5A: Submission to NLCS Workflow

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
15. Transfer Documents Ready Survey Ready Solid Thram Transfer Ready Add Co-Owner Transfer Ready	List of documents available for next step. Type of documents are as follows : Survey ready documents (after resurvey) Solid Thram transfer Add co-owner	Dealing Officer	Upload the documents at eSakor	All survey documents ready (after resurvey), solid Thram transfer and add co-owner are visible in the transfer documents ready list. The DO further processes this record for verification with the document checklist.
16. Document Checklist	Document checklist verification	Dealing Officer	Manual	Each transfer record is checked against the document checklist for completeness. (The document checklist is shown in Appendix D.)
17. Submit to NLCS	Documents submitted to NLCS	Dealing Officer	Upload the documents at eSakor	Documents are submitted to NLCS for further processing. A check is made of the cooling period while submitting these documents.

3.2.6 Process Map 6A: Mapper Process Workflow

The Mapper receives the resurveyed records with the XML files and the map data generated by the Survey Department. This data is used to make modifications to the main cadastral database. The initial modification is made to a temporary database; the main database is updated following authorization from the head of the Land Division. The workflow for the mapper process is illustrated in Figure 3.9 and described in Table 3.7.

Figure 3.9 Process Map 6A: Mapper Process Workflow



Table 3.7 Process Map 6A: Mapper Process Workflow

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
18. Survey Ready Records	Mapper gets the records where resurvey has been done by the Survey Section.	Mapper	eSakor	The mapper views the list of records submitted after the survey is done at the Thromde level.
19. Geo-Database Changes in ArcGIS	Mapper does the geo-database changes in the ArcGIS software in cases of land fragmentation or land merging.	Mapper	ArcGIS	Tools to access ArcGIS come directly from the eSakor software. Mapper selects the record and goes on ARC GIS to make the geo-database changes.
20. Submit to Map Verifier	The changes are submitted to the map verifier.	Mapper	eSakor + ArcGIS	The changes made are submitted to the map verifier.
21. Map Verifier Approval	Approval or rejection.	Map Verifier	eSakor	Map verifier approves or rejects the work done by the mapper.

3.2.7 Process Map 7A: Map Verifier Workflow

The map verifier verifies the geo-database modifications made by the mapper to the main cadastral database. The verifier also verifies records for which a resurvey was not required, such as for a solid Thram transfer or addition of a co-owner. The workflow for map verification appears in Figure 3.10 and is described in 3.8.

Figure 3.10. Process Map 7A: Map Verifier Process Workflow



Table 3.8.	Process Map 7A:	Map Verifier Workflow
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Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
22. No Survey Records	Solid <i>Thram</i> transfer and add co-owner records for approval.	Map Verifier	eSakor	Map verifier checks the list of records arriving directly without a survey (solid Thram / add co-owner).
23. Map Verifier Approval	Map verifier approves or rejects the records.	Map Verifier	eSakor	Map verifier can select a single record and approve or reject the record. Map verifier can select multiple records at a time and approve or reject them.

3.2.8 Process Map 8A: NLCS Verification and Approval Workflow

The NLCS verifier verifies all the documents before sending them for approval along with the original *Sathram* copy. Approval by the Land Division head involves two steps: an online and an offline process. The process is illustrated in Figure 3.11 and described in Table 3.9.

Figure 3.11 Process Map 8A: NLCS Verification Workflow



Table 3.9 Process Map 8A: NLCS Verification and Approval Workflow

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
24. Map Verified Records	List of map verified records for processing	Verifying Officer	eSakor	List view of map verified records that are visible for approval of rejection.
25. Checklist	Checklist verification	Verifying Officer	Manual	Verify the uploaded documents with the checklist.
26. Create Note Sheet	Creation of note sheet	Verifying Officer	Manual	Create a note sheet automatically.
27. Sathram Search	Search for the original <i>Sathram</i> from the back-end data	Verifying Officer	Manual	Scan original Sathram uploaded in the system.
28. Manual Approval Doc	Approval note sheet printed	Approving Office	Manual	Manual approval on the note sheet by the approving officer.
29. Online Approval	Online approval	Approving Office	eSakor	Checklist of all documents to be checked by the Approving Officer.
30. Approval	Approval check	Approving Office	eSakor	Check both approvals. Update status to "approved."

3.2.9 Process Map 9A: Post-Approval Workflow

The post-approval workflow represents the final process before the soft copy of the *lagthram* is sent to Thromde. The process is illustrated in Figure 3.12 and described in Table 3.10.

Figure 3.12. Process Map 9A: Post-Approval Workflow



Table 3.10 Process Map 9A: Post-Approval Workflow

Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
31. Approved Applications	Check approved applications.	Verifying Office	eSakor	List view of approved applications.
32.CheckLagthramandSathram	Search <i>sathram</i> original from the records and attach.	Verifying Office	Manual	Select an application and upload the scanned copy of the original <i>sathram</i> .
33. Forwarding Letter	Create a forwarding letter to be sent to Thromde.	Verifying Office	Manual	Automatic forwarding letter created for Thromde.
34. For Filing Original <i>Sathram</i>	Print the original <i>sathram</i> for filing in office records.	Verifying Office	Manual	Original sathram printed signed and filed.
35. Electronic Post to Thromde	Electronic post of documents to Thromde (i.e., post on the computer).	Verifying Office	Manual	Electronic post to Thromde moves the documents required by Thromde to its bucket.

3.2.10 Process Map 10A: Lagthram Printing and Handover Workflow

After approval, the *lagthram* is printed at the Thromde and handed over to the applicant. The workflow for this stage is illustrated in Figure 3.13 and described in Table 3.11.

Figure 3.13 Process Map 10A: Lagthram Printing and Handover Workflow



Step	Function	Initiator	Current Method	Proposed Software Module / Functionality
36. Approved Lagthrams	List of approved <i>lathrams</i>	Dealing Officer	Manual	List of approved <i>lagthrams</i> from NLCS.
37. For Printing	Lagthram printing	Dealing Officer	Manual	 Select a particular <i>lagthram</i> and print the following: 1. Forwarding letter 2. Lagthram owner copy 3. <i>Sathram</i> original Thromde copy Status updated to "<i>Lagthram</i> Printing Done." Email / SMS trigger notifying stakeholders the <i>lagthram</i> is ready.
38. Payment Voucher Creation	Payment voucher for transfer tax	Dealing Officer	Manual	Auto-payment voucher created from the data obtained from Land and Building Section; status updated to "Voucher Created." Status change visible to Revenue Section.
39. Transfer Payment	Transfer payment by client	Dealing Officer	Manual	Payment deposited by the client at the Revenue Section of Thromde. Revenue Section uploads the payment receipt, and status updated to read "Transfer Payment Done."
40. <i>Lagthram</i> Handover	Lagthram handover to the client	Dealing Officer	Manual	After checking the status of the application reads ""Transfer Payment Done," the <i>agthram</i> is handed over to the client and the system status is updated to read "Transaction Complete."

Table 3.11 Process Map 10A: Lagthram Printing and Handover Workflow

3.3 Suggested Reports and Dashboards

The system's comprehensive reporting module will ensure that reports can be made against all its functionalities. A dashboard will be configured to give all stakeholders an overview. The list of necessary and recommended reports is not yet comprehensive. More reports will be required as NLCS and Thimphu Thromde discover and make known their needs.

The dashboard should offer both graphs and numbers and should possess options to export to Excel and pdf. Integrating it with Google map will provide location viewpoint of various processes. The dashboard should be customized for all stakeholders. The following list of reports, only indicative at this point, can be increased per evolving requirements. The system should have the option to generate standard reports based on parameters defined by NLCS users:

- Daily /weekly /fortnightly reports of specified transactions
- Lists of people becoming landless
- Buying patterns with regard to individual incomes
- Ownership trends
- Transaction patterns
- Acquisitions of private registered land
- Monitoring of eSakor transactions to highlight trends of user behavior
- SMS notifications to users that land titles have been printed, indicating the tentative date on which he or she can follow up with local authorities, with a second SMS notification once the land title has reached local authority
- Email alerts for official of pending overdue transactions as indicated by transactions' defined timelines
- Email or SMS alerts to senior officials of pending staff activities

4.0 Design Considerations

4.1 Workflow Management

- 1. An integrated system able to accommodate hierarchies and roles in workflow, using for the most part three layers of hierarchy.
- 2. Configurable data limits, validation, and data approval frameworks.
- 3. User-access privileges maintained according to the hierarchy and roles in the system.
- 4. Flexible provision of full or partial system access to the user depending on role.
- 5. Flexible system access immediately modifiable if required.
- 6. Soft deletion of users transfers all records to new selected user.

Figure 4.1 Overview of NLC Citizens Services Portal



4.2 Reports and Dashboards

- 1. Reports should be available in text as well as graphic formats.
- 2. All reports should be exportable to Excel and pdf.
- 3. Reports should have capability to depict trends and behaviors.
- Reports should provide brief depictions of the work on Google map or GIS system adopted by the NLC.

4.3 Grievance Management

- 1. Complaints. The system should allow users to register complaints according to type of service.
- 2. Queries. Users should be able to ask queries regarding how to complete a task or enter information.
- 3. Status Tracker. Users should have the ability to track the status of their complaints and queries.

4.4 Failure Contingencies

- 1. Backup. The transactional database will be backed up daily.
- 2. *Fallback*. To ensure continuity of service in the event of a potentially disruptive event, a disaster recovery system, including a fallback data connection, will be set up identical to the production system.
- 3. *Degraded Modes of Operation*. Stated priorities will be established for restoring the essential functional processing steps in the event that full processing capability is not available.

4.5 e-Government Interoperability Framework (e GIF)

The software developed for business registration must support the ICT standards for smooth implementation of the e-Government Interoperability Framework (eGIF) laid down by the Bhutanese government.

The eGIF standard facilitates and promotes integration and interoperability of ICT systems used by the government to establish efficient delivery of e-services and facilitate better coordination and collaboration in implementing government ICT programs with a whole- government perspective. Bhutan's eGIF uses international standards and best practices catered towards Bhutan's needs.

The eGIF enterprise architecture defines technical standards and best practices to enable ICT systems to integrate and interoperate across all government agencies and departments. It institutes a set of standards and guidelines that government agencies must adopt to enable better sharing and collaboration among them. It allows government application systems to exchange data seamlessly and to use that data meaningfully, with support from standardized technologies, data, and applications. This common framework ensures general coherence among public-sector ICT systems for effectively and seamlessly sharing information.

The software developed for the business registration process must follow the eGIF standards defined in the e-Government Interoperability Framework.

5.0 Environment

IT operations are a crucial aspect of organizational operations, for which a main concern is continuity. Companies rely on their information systems to run operations. If a system becomes unavailable, company operations may be impaired or stopped completely. To avoid any chance of disruption, the data center must maintain reliable infrastructure for IT operations. Information security, another prime concern, must also be ensured through a secure data center environment that minimizes the chances of a security breach. A data center must keep high standards to assure users of the integrity and functionality of its hosted computer environment. Please note that all infrastructure requirements are suggestions only. The exact requirements will need to be worked out based on the facilities currently available at the Data Center on hire.

5.1 Equipment Environment

The land system (NLC) currently consists of four electronic databases and applications:

- The Rural Land Registry or Rural eSakor Application
- The Urban Land Registry or Urban eSakor Application
- The Rural Cadastral via ArcGis Application and Database
- The Urban Cadastral via ArcGis Application and Database

5.1.1 Current Structure

- High-end servers with 2*Hexa core CPU with 128 GB of RAM and 3 TB of storage for each of Rural eSakor, Urban eSakor, and ArcGIS Platform
- T-WAN connectivity (fiber channel based government WAN) for intraoffice connectivity.
- Bhutan Telecom's Internet leased line
- Offline data backup at the Bhutan Telecom Data center, for SAN-to-SAN replication

5.1.2 Key Issues with Infrastructure

- T-WAN Intranet and Bhutan Telecom's bandwidth fluctuations are major cause of delay, inconsistency of data, and other reliability issues.
- The environment has no redundancy at the infrastructure layer.
- The eSakor setups do not have a high-availability environment and lack a disaster recovery (BCP) setup. In case of any failure, recovery might require days.
- NLC does not use a data center standard or security level that supports online services with public access.
- No systems are in place to monitor performance or applications.
- SMS and email alerts are not currently integrated into the application flow.

5.1.3 Suggested Infrastructure for data centre, including hardware and security.

- Overall, the current infrastructure at NLC will absorb the enhanced system.
- The eSakor application has been hosted on single server. The application requires redesign to support high availability with active-to-active configurations with a load balancer.
- The eSakor DR site should be redesigned to establish a recovery point Objective (RPO) of zero and a

(Recovery Time Objective (RTO) of no more than one hour.

- Security audits by registered security auditors with VA/PT assessments and fixes should be scheduled every three months to ensure compliance with IT and cybersecurity standards.
- The bandwidth of T-WAN and Bhutan Telecom's should be enhanced to 10 Mbs dedicated to each of the eSakor systems.
- A strict service level agreement (SLA) with bandwidth providers should specify and guarantee uptime. SLAs should cover the following:
 - Suggested SLA for the data centers
 - Colocation service availability 24 hours per day, 365 days a year
 - Exceptions
 - o Defined infrastructure maintenance days and windows
 - Specified events considered outside the control of data center service providers
 - Data center availability: 99.98 percent
 - Network availability: 99.9 percent
- Movement of eSakor and ArcGIS servers and related infrastructure to a Tier 3 or higher data center.
- Monitoring 24/7 of infrastructure, applications, databases, security, etc., for availability and performance of all integrated components.
- Established management procedures for key components, including zoning, firewalls, IPS/IDS, access management control, and central audit log maintenance.
- Documented processes will address updates to and upgrades of operating systems, application engines, database engines, and API.

5.2 Software Environment

5.2.1 Current Software Environment

Platform/Engine	Rural eSakor	Urban eSakor
Operating System	Microsoft Windows	Open source/ linux
User Interface and Business Logic Development Platforms	Ser Interface and Business ogic Development Platforms HTML, CSS, JS, AJAX, PHP, OOPS	
Web Services	WCF C#	Zend SOAP Services
Database Engine	MS SQL Server	MySQL Server
Current Databases	Sathram, eSakor Census, eSakor User Accounts, eSakor Services Directory	Sathram, eSakor Census, eSakor User Accounts (Urban), eSakor Services Directory
GIS Platform ArcGIS		ArcGIS
Hosting Environment	Multiple Servers in NLC HQ	Multiple Servers in NLC HQ

5.2.2 Suggested Improvement

- Upgrade eSakor (Rural and Urban) to Active-to-Active high availability applications. Upgrade web engines, application servers, and databases to support high availability.
- Upgrade web engines, application engines, database engines, and operating systems to current stable releases. This is a mandatory action required for meeting security compliances and application enhancements.

5.2.3 Recommended Software Components

Web Servers. Web servers deliver content or services to end-users over the Internet. A web server consists of a physical server, a server operating system (OS), and the software used to facilitate hypertext transfer protocol (HTTP) communication. Web Server should support the following:

- Static file serving
- SSL/TLS support
- Multiprocessing and threading
- Virtual hosts
- Reverse proxying.
- Load balancing
- Compression
- Access controls
- URL rewriting
- Custom logging
- Server-side includes
- Limited WebDAV
- FLV streaming
- FastCGI
- Multi Language

Application Servers. An application server, a component-based product, resides in the middle tier of a servercentric architecture. It provides middleware services for security and state maintenance along with data access and persistence. The following list indicates the necessary attributes for an application server emphasizing J2EEcompliant application servers in multi-tier architectures and supporting web service and expose business level services (such as Enterprise Java Beans):

- Support for application server frameworks with a comprehensive service layer model.
- Implementation of services such as clustering, fail-over, and load-balancing.
- Support for virtual machine for running applications.

- Declarative transaction management and improved application scalability.
- Support for Web 2.0.
- Support for web services, including SOAP, WSDL, UDDI, LDAP v3, SSL v3, Java 1.3, and XML 1.0 standards.
- Comprehensive XML support compliant with the W3C XML standards and basic building blocks to XML-enable applications, including reading, manipulating, transforming, and viewing XML documents.
- Support for developing, publishing, and consuming web services and integrating (for both push and pull data) with other systems via web services.
- Use of only components based on standards and selected to provide ease of management and to avoid compatibility issues.
- Use of only components easily maintainable in a manner that allows corrective and preventive maintenance to be performed without affecting the working of system.
- Use of only components capable of being managed and of providing information on performance parameters from a remote management station.

Support for a broad range of standards including, for example: DOM 1.0, HTML 5, HTTP, HTTPS, MathML, ODBC, ODF (IS26300), Open XML (IS29500), OpenSearch, OpenType, PDF 1.7, PDF/A, RTF, RSS, ATOM, SOAP, SVG, REST, UDDI, Unicode, URI/URN, W3C XML Schema, WCAG 2.0, WebDAV, WSDL, WSRP, XHTML, XML, XML Web Services, XMLDsig, XPATH, XPS, XSLT, and AJAX.

Database Servers. A database holds and organizes information to make it can easily accessed, managed, and updated. This project will require a relational database management system (RDBMS) with the following features:

- The RDBMS should be available on standard operating systems like Windows, Linux and Unix.
- The RDBMS should provide continuous availability of features to address hardware failures, instance failures, and human errors such as accidental deletion of dat. It should also be capable of providing tables and repairs at block level. These features should be available on all the platforms.
- The RDBMS should have clustering with scalability, high availability, and load balancing.
- The RDBMS should have a disaster-recovery (DR) solution replicating changes in the database to the DR site.
- The RDBMS should store scanned images, text documents, xml, and multimedia inside tables. This should be part of the basic database distribution without any additional cost to the organization.
- The RDBMS should provide strong encryption capabilities within the database for information stored in the tables as well as for the information transmitted over network.

5.3 Communications Environment

The system will be developed keeping in view that it will be used by citizen and government officials on web technologies. Citizens will use Internet or mobile channels to access the given interface. Government officials will use TWAN intranet for access and back office processing.

The following points should be considered:

- Enhancement of T-WAN and Bhutan Telecom's bandwidth to a 10 Mbs dedicated link.
- Acceptable response time for the application should be not more than 4 seconds even during the peak hours.

5.3.1 Communications Overview

Following diagram shows the architecture and communication channels of the system:



5.4 Interfaces

The application access for citizens and government officials will be available both through a web browser or a mobile connection. The application must be built so as to be responsive to user needs and should support connection via laptop and other mobile devices as well as desktop machines. The supported browsers should include Firefox, Internet Explorer/Microsoft Edge, Google Chrome, Opera, and Safari. The mobile application should use the Android system.

5.5 Failure Contingencies: Restart and Recovery

The system architecture design should take account of points of possible failure. The servers, network, storage, data center, ISP, and application should be designed to respond to and resolve any failure. The architecture design requires Active – Active components at each layer.

The disaster recovery site must have the capacity to reach the recovery point objective (RPO) with zero delay and

the recovery time objective (RTO) within a maximum of one hour. The following considerations should be accommodated:

- In case of failure, any physical servers in the application access path will have another physical node available to take care of demand.
- The network design and architecture should have redundancy at all possible layers, including network cards, cabling, switches, routers, firewalls, unified thread management (UTM), and load balancers.
- Application servers, web servers, and database servers will be placed in active active mode. In case of single component failure, application access will still be available.
- In case of data center failure, the environment will be moved to the DR site with a maximum delay of no more than one hour. The system will not allow any data discrepancy or lag.

5.6 Security: Control Points, Vulnerabilities, and Safeguards

IT security protects information systems from theft or damage to the hardware, software, and information as well as from disruption or misdirection of services provided. Security requires controlling physical access to the hardware as well as protecting against harm from unauthorized network access, data and code injection,, or malpractice by operators, whether intentional or accidental or from being tricked into deviating from secure procedures.

The Following guidelines should be followed:

- Monitoring infrastructure, applications, databases, security, and so on, 24/7 for availability and performance of all integrated components.
- Maintain systems governing components including zoning, firewalls, IPS/IDS, access management control, and central audit log management.
- Document processes for updates and upgrades to the OS, application engines, database engines, and API.
- Schedule security audits every three months conducted by registered security auditors with VA / PT assessment and fixes to ensure compliance with IT and cybersecurity standards.
- Document IT security policies and proof of quarterly audits indicating adherence to the standards set.
- System code design should take account of potential back doors, denial-of-service attacks, direct-access attacks, eavesdropping, tampering, spoofing, privilege escalation (rootkit), and phishing.

Option 1: Additional Infrastructure Requirement for phase 1: All Components are shifted to Data Centre

Туре	Application	Specifications
Server	Primary web server (citizen interface)	Xeon processors, 3.4 Ghz, Hexa Core, 16 GB RAM, 500 GB SAS
Server	Primary application server (Urban eSakor)	Xeon processors, 3.4 Ghz, Hexa Core, 32 GB RAM, 500 GB SAS
Server	Primary database server (Urban eSakor)	Xeon processors, 3.4 Ghz, Hexa Core, 64 GB RAM, 300 GB SAS, DUAL HBA

Server	Primary ArcGIS server	Xeon processors, 3.4 Ghz, Hexa Core, 32 GB RAM, 300 GB SAS, DUAL HBA
Storage	Primary SAN storage	SAN with fiber channel, iSCSI, and SAS host interfaces with populated 3 TB and extendable to 20 TB
Server	Disaster Recovery web server (citizen interface)	Xeon processors, 3.4 Ghz, Hexa Core, 16 GB RAM, 500 GB SAS
Server	Disaster Recovery application server (Urban eSakor)	Xeon processors, 3.4 Ghz, Hexa Core, 32 GB RAM, 500 GB SAS
Server	Disaster Recovery database server (Urban eSakor)	Xeon processors, 3.4 Ghz, Hexa Core, 64 GB RAM, 300 GB SAS, DUAL HBA
Server	Disaster Recovery ArcGIS server	Xeon processors, 3.4 Ghz, Hexa Core, 32 GB RAM, 300 GB SAS, DUAL HBA
Storage	Disaster Recovery SAN storage	SAN with fiber channel, iSCSI, and SAS host interfaces with populated 3 TB and extendable to 20 TB

Option 2:	Current NLC	Data Centre i	s used as DR	and additiona	al services from	external dat	a centre are
taken for j	primary servio	ces					

Туре	Application	Specifications
Server	Web server (citizen interface)	Xeon processors, 3.4 Ghz, Hexa Core, 16 GB RAM, 500 GB SAS
Server	Application server (Urban eSakor)	Xeon processors, 3.4 Ghz, Hexa Core, 32 GB RAM, 500 GB SAS
Server	Database server (Urban eSakor)	Xeon processors, 3.4 Ghz, Hexa Core, 64 GB RAM, 300 GB SAS, DUAL HBA
Storage	SAN storage	SAN with fiber channel, iSCSI, and SAS host interfaces with populated 3 TB and extendable to 20 TB

In both the cases, we will be using external datacenter for primary services, so system performance will be same. In case of primary failure, in second case, NLC local data center will be used for providing data center services. In which case since local datacenter is on internal network, users can face performance issues.

Recommendation is to select Option 1.

Appendix A: Detailed Functional Requirements

S. No	Function	Туре	Urban eSakor	Rural eSakor	Phase 1	Phase 2
1	ArcGIS 9.3 to be upgraded to 10.3 with tools / models upgrade and data migration.	Upgrade	Yes	Yes		Urban, Rural
2	ArcGIS 9.3 geo-database model to be upgraded to ArcGIS 10.3. Tools currently used in version 9.3 to be upgraded to 10.3.	Upgrade	Yes	Yes		Urban, Rural
3	eSakor systems to be integrated with ArcGIS cadastral geo-database.	Integration	Yes	Yes		Urban, Rural
3a	The ReadXML software to be made available as a command inside the ArcMap environment.	Integration	Yes	Yes		Urban, Rural
3b	Make system more accessible and minimize need for switching between different software. The generated image of the map can also be automatically added to the transaction directly from within ArcMap.	Integration	Yes	Yes		Urban, Rural
Зс	Currently, the mapper requires many manual steps to download the XML file, create a version, load the XML file into the version and do additional edits. This can be partly automated so the mapper has access to eSakor as a form inside ArcMap. Using this form, the mapper can browse pending transactions. When selecting one of the transactions the system can automatically create a version having the correct name and add that as data source to the map document.	Integration	Yes	Yes		Urban, Rural
4	Implementation of cadastral geo-database data dictionary in the surveying instruments.	Integration	Yes	Yes		Urban, Rural
5	Online integration of eSakor with citizen identification database (CID).	Integration	Yes	Yes	Urban	Rural
6	When searching Thrams all information in the Land Title Certificate should be displayed.	Enhancement	Yes	Yes	Urban	Rural
7	Need to incorporate transaction status in eSakor online system.	Enhancement	Yes	Yes	Urban	Rural
8	NEED TO DEVELOP SYSTEM TO CHECK TRANSACTION HISTORY AND TRANSACTION DOCUMENTS IN ESAKOR SYSTEM.					Urban, Rural
8a	Once the transaction is approved, only people in HQ are able to check transaction history from offline LAN, Microsoft Access interface, which deprives people from other areas of ability to check transaction history, especially Dzongkhag people.		Yes	Yes		Urban, Rural
8b	Even if village, plot name, area, plot no. or other elements change, everything should be reflected with file reference no. All tracking of changes (e.g., plot name, number, area, remarks, plot location, land type, etc., should be reflected in history.		Yes	Yes		Urban, Rural

S. No	Function	Туре	Urban eSakor	Rural eSakor	Phase 1	Phase 2
9	Whenever area or plot ID changes occur, map is affected; therefore, map must be updated and routed through surveyor, mapper and mapper verifier.	Enhancement	Yes	Yes		Urban, Rural
10	NEED TO DEVELOP LAGTHRAM PRINTING WIZARD IN RURAL ESAKOR SYSTEM.	Enhancement	No	Yes		Rural
10a	Current practice of printing the final Chhazha Thram, Lagthram using offline Microsoft Access interface should be integrated in eSakor online system.		No	Yes		Rural
10b	Currently, once new Thram is created, it can't be edited or ownership shown. New system should make it possible to see ownership type and to edit.		Yes	Yes	Urban	Rural
10c	All fields reflected in <i>Lagthram</i> (final land title certificate) should be visible while transaction is processed in eSakor for all users, including ownership type, census details, plot name in Dzongkha, Bunds, Kasho area, Kasho date, plot location Dzongkha, and Dzongkha remarks.		Yes	Yes	Urban	Rural
10d	After approving the transaction, <i>lagthram</i> , Chazhag Thram, and map should be printed in pdf.				Urban	Rural
10e	<i>Lagthram</i> , Dzongkhag, and Gewog chhazha sathram printed from respective Dzongkhag itself.					Rural
11	NEED TO DEVELOP PROCESS FOR FOLLOWING TRANSACTION IN ESAKOR SYSTEM.	Enhancement	Yes	Yes	Urban	Rural
11a	Change of administrative boundary				Urban	Rural
11b	Excess				Urban	Rural
11c	Restriction				Urban	Rural
11d	Seized				Urban	Rural
11e	Surrendered land				Urban	Rural
12	NEED TO RE-DEVELOP PROCESS FOR FOLLOWING TRANSACTION IN ESAKOR SYSTEM.	Bug	Yes	Yes	Urban	Rural
12a	Change of ownership.				Urban	Rural
12b	Donation to religious institution: Can't create new thram. (If an individual donates 50 decimals in the name of Lhakhang, new thram must be created in the name of Lhakhang.)				Urban	Rural
12c	Land Substitute: Should be able to add new plot in different block or district.				Urban	Rural
12d	GRF land exchange: Transaction history problem (when plot deleted, system states it was transferred to thram). It should state plot deleted from thram 500.				Urban	Rural
12e	Dispute: Can't create new thram or edit plot.				Urban	Rural
12f	Land type conversion: Should be able to subdivide the plot.				Urban	Rural
12g	Correction: Should be able to create new thram.				Urban	Rural

S. No	Function	Туре	Urban eSakor	Rural eSakor	Phase 1	Phase 2
12h	Omission: No provision for omission for Lhakhang, Institution, etc., without CID. Recipient is made compulsory for valid CID here. (Need option to add thram as well.)				Urban	Rural
12i	Kasho: No provision to add kasho land for Lhakhang, Institution, etc., without CID. Recipient is made compulsory for valid CID here. (Need option to add thram as well.)				Urban	Rural
12j	Additional owner: For all transaction types, problem adding owner to joint owner. (Can only add CID, not additional owners.)				Urban	Rural
13	Urban eSakor system should be upgraded to cater for strata transaction.	Enhancement	Yes	No	Urban	Rural
14	Thromde workflow creation.	New development	Yes	Yes	Urban	Rural
15	Citizen module for initiating the land transfer.	New development	Yes	Yes	Urban	Rural

Appendix B: Reference Documents

Name of Document	Comments
LR_ICT Assessment of Property Registration in Bhutan-Sep03	World Bank assessment of NLC system
eSakor Operational Manual	Operational manual mode by the user
eSakor process brief	Presentation made by eSakor resource during the mission
eSakor WCF Web Services	Brief system overview and system document
LagThram_Dzongkha_Sample	Sample of laghram
LagThram_English_Sample	Sample of <i>laghram</i> in English
Logging into the system	Partial user manual
The eSakor Map Roles	Map roles of eSakor system
User Manual eSakor	User manual of eSakor
Transaction Type and Transaction Activity Mapping	Transaction activity mapping
Transaction Types Steps and Functions to be present	Steps and functions in different transaction types
Urban eSakor ToR v1.3	RFP for Urban eSakor system in 2013
Urban eSakor Workflow	Workflow of Urban eSakor system
Agreement	Agreement sample
Geog Authentication letter	Geog authentication letter
Internal agreement	Internal agreement sample
LT4	Sample LT4 document
LTAG	Sample LTAG document
LTED	Standard LTED document
NLC_Approval	NLC approval document
eSakor problem	Internal presentation of eSakor problems
Document Check list for Urban land Transaction	Document checklist for urban land transaction
Land ownership transfer verification form	Land ownership transfer verification form
National Land Commission	Document checklist for urban and rural land transaction
Public Notification	Public notification for transfer of property
Survey Report	Survey report -1
Survey Section Id 0281.jpg	Survey report -2
Survey Section ID 00281	Survey report -3
Transferee information	Transferee information
Urban Land Division	Sample note sheet
Urban Land Division Form1	Sample note sheet
Urban Land Division Form 1	Sample note sheet
Urban Land Division Form-1	Forwarding letter
Agreement Deed	Agreement deed

Name of Document	Comments
Agreement Deed (3)	Sales deed
Checklist	Checklist for documentation
City Validation Form	Verification and validation form
City Validation Form (1)	Verification and validation form, part 2
Map Files (2)	Sample map file
Others	Sample land title certificate
Others (1)	Family household register
Others (2)	No objection letter
Others (3)	Sample land title certificate
Site Plan	Cadastral map
141500018	Approval of transfer of ownership
141500040_19	Information on transfer of ownership
141500169-	Information on transfer of ownership
141500194	Information on approval of transfer of ownership
urban.nlcs.gov.bt SAKOR public application print lagthram thram 3928 thromde_village _18	Print lagthram
Urban eSakor _ 2	Application screenshot

Appendix C: Land Transfer Application Form

	-			#3	1415000 93	3	\mathcal{O}
		ROYAL	GOVERN	MENT	OF BHUTAN	LT(U)	FORM 1
TUT	Service P.	NATIONAL	L LAND C (Par	OMMIS t I)	SION SECRE	TARIAT	
	Transfe	r of ownership by !	National Land	Commiss	ion Secretariat for	Thromde	
						Date:	10-06-2015
*	Part I -	APPLICATION	FORM FOR	THRO	MDE LAND CO	NVEYANCI	2
		(To be filled in b	y the applicant/s) and submit	to the respective three	omde Office)	
	We hereb	y submit the detail	s for land conv	eyance an	d are as follows:		
	1. N	ature of transactic	n: (Tick one oj	f them depe	ending on its nature	e)	
_		Sale/purchase	:	V]		
5		Inherited			i -		-
		Exchanged:			1		
		Gifted	:		1		
		Donated	:]		
	2. Po	ersonal Informatio	n				
Transferor	's information	v/Authorized Person		Transfe	eree's information		
Name.	ena Ab	ugao -		Name.	Deatar		
Male/Fem	No 11410	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		Male/	FemaleAge	53	
Thram No	32.66			I.D. Ci	ard No. //4/100	1039	
House No.	P.H-11-0	505		House	No. 141-1-56		
():hrom/	LIM The	274		Throm			
Unique Ho	ousehold No	Diana a	and.	Unique	e Household No	411.00.122	
Dzongkna Present Ad	g/Thromde idress		some	Dzong	khag/Thromde	Mayshu	
				Presen	t Address(./.AA	app. Iu	aysau
1	78749	02			10		
Telephone	#	Fax		Teleph	198/1225	Fax	
	1.						
	1						
			P	age 1 of 5			
			d	angm	0		

56

<form><form><form></form></form></form>	Transf	er of owner	ship by Natio	(Part I) onal Land Co	mmission Se	cretariat for T	hromde
Owner's Name: Jean Type of ownership:	3.	DETAILS OF	OWNERSHIP	OF LAND TO B	E TRANSFER	RED	arounde
Type of ownership: Individual : Pamily :: Join :: Joint :: Joint :: Thram No. 32.66. Throm, M.M. Anow. Dzongkhag/Thromde, Minthe M. Month Charle DETAILS Sheet no Plot No. Land Type Location Existing Area to be Remarks area area area area area area area are	Owner's Na	ame: Per	a Naad	RED			
<form></form>	Type of own	nership: Ir	dividual ·				
Joint Thram No. 22.66 Throm, Juin, Answer, Doongkhag/Thromde, Juin/Hu, Jusould AND DETAILS Sheet no Plot No. Land Type Location Existing Area to be Remarks Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 10 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 19,015 16 fewinkt field treas 9 Mar.2411 (Abbau Sink to the A 16 fewinkt 10000 Mar.2411 (Abbau Total 16 fewinkt 100000 </td <td></td> <td></td> <td></td> <td></td> <td> ;</td> <td></td> <td></td>					;		
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Thram No. 22.6.4 Throm. JUM. Michael Doongkhag/Thromde. JUM. Michael Michael Control LAND DETAILS Sheet no Plot No. Land Type Location Existing Area to be Remarks area MI-241 (106au Shuktoffee 29,015 //// Area Michael Med Area MI-241 (106au Shuktoffee 29,015 ///// Area ///////////////////////////////////	1	J	oint :			2,	5
LAND DETAILS Sheet no Plot No. Land Type Location Existing Area to be Remarks MI-244 SM-244 (Mbbau Smk Pokka 29, 015 16 Deumath field frida 9 Mu-244 SM-244 (Mbbau Smk Pokka 29, 015 16 Deumath field frida 9 Mu-244 SM-244 (Mbbau Smk Pokka 29, 015 16 Deumath field frida 9 Mu-244 Muelhuu 1 29, 015 16 Deumath field frida 9 Muelhuu 1 29, 015 16 Deumath field frida 9 Muelhuu 1 10, 100 100 100 Muelhuu 1 100 100 1	Thram No.	54.6.6 Thr	om)ШМ-	MSOW Dzor	ngkhag/Thro	mde/WAY	hu psoule
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 4. Documents to be furnished together with this application a. Internal agreement of the parties involved in original with two witnesses. b. No objection certificate from family members of the Transferor for family land Or coowner in case of joint ownership. c. Total and the transfere and transferor. d. Census record of the transfere and transferor. d. Original Lag thram g. Financial Clearance from Financial Institute if the Property is mortgaged b. Site plan of the plot with coordinates c. Endorsement Form to be signed by the adjacent Land owners where LAP has not been approved and finalized d. Certification of the Local Authority in case of Diseased/ Death Certificate d. Building occupancy certificate, if there is any structure on the plot. 	M-241	SM1-241	Unbau	Sintotha	29,015	16 Deina	Wel trea of
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Appendix D: Documents Checklist for Upload via Citizen Module

- 1. Sathram copy
- 2. Validation by Dzongkhag / Thromde
- 3. Transaction application
- 4. Internal agreement
- 5. No objection certificate of family members/co-owners for family and joint ownership
- 6. Landed property declaration of transferee
- 7. Lag Thram copy of the plot under transaction (especially for Dechencholing LAP)
- 8. Financial clearance if the plot is mortgaged
- 9. Recommendation from the Thromde, if the land is to be registered in the name of minor
- 10. Death certificate /certificate from the local authority in case of deceased
- 11. Building occupancy certificate

QUITERWER 94 Post Box No - 215 Thimphu-11001: Bhutan Manually Document Check List for Urban Land Transaction Transaction ID No. Simtokha lap (141500093)Denka ripload Yes No NA 10 X 1. Transaction Application e sakor Validation by Thimphu Thromde X Landed Property Form Internal Agreement 4 5. No objection certificate of family members/ co-owners for family and joint ownership (individual ownership) 6. Census details and ID card copy of transferor 7. Census details and ID card copy of transferee 8. Original Lag Thram under transaction X 9. Site plan / cadastral map of the plot under transaction × 10. Authorization Letter / Power of Attorney 11. Financial Institution Clearance (... No, MOR 909e) Sub-dimision fee: NU. 697 (Six hundred ninely seven only) Verifie Dealing Office Head, Survey & L int Section Kuezang Dasho Thrompon: +975-2-323665 Executive Secretary:+975-2-340355 +975-2-336310/322757/322265 Fax: +975-2-323662/340415/338951/334203 www.thimphucity.bt Phone

Appendix E: Thromde Final Documents Checklist

Appendix F: Verification Letter

Page 1 :

LT (U) FORM 1 **ROYAL GOVERNMENT OF BHUTAN** NATIONAL LAND COMMISSION SECRETARIAT Part II- Verification and validation by Thromde (Land Conveyance to be submitted to Land Registrar General) a) The land conveyance application with documents between Mr./ Mrs. Pema Wangmo (Transferor) and Mr. / Mrs. Tshering Dema,2. Denkar (Transferee) has been received on dated 15/6/2015 and registered with transaction ID No. Simtokha LAP (141500093) dated 15/6/2015 for further review and scrutiny by the Thromde Land Record Sector. b) The transaction has been posted on the notice board as well as in web site for the purpose of Public viewing for the dated, 19/05/2015 to 19/6/2015 .as per section 161 of the Land Act 2007. c) According to Thram and cadastral map, the above land is found registered in the name of Mr. /Mrs./MsPema Wangmo, Thram No.3266, of Thram Record. d) The citizenship of the transferee is as per section 58 & 59 of the Land Act, 2007. e) The proposed transaction on scrutiny is in consonance to the following provisions of the Land Act, 2007; Identification of land owner/and other information Section 17(b), 17(c) -Sections 58, 59 Entitlement to own land Land Ceiling Sections 64, 65, 66 Prohibition of registration of land in the name of minor Section 83 Right to registered land Sections 86, 87 Right to transact land Sections 93, 96 Sections 132, 134, 135, 137, 138 - Prohibited land transaction No transaction of land under process of ownership change Section 140 Transaction of private registered land Sections 160, 161 Declaring tsatong land Section 212 f) Page 6 of 6

Page 2:



Appendix G: Sample *Lagthram*

Appendix H: Transaction Type and Transaction Activity Mapping

1. Sale Purchase (Land Transaction) (witness required)

- a. Add Transferor Info (Button)
- b. Add Existing Thram (Button)
- c. Create New Thram (Button)
- d. Transfer Plot (Button)
- e. Subdivide Plot (Button)
- f. Create New Plot (Button)
- g. Display Owner (Button)

2. Inheritance (Land Transaction)

- a. Add Transferor Info (Button)
- b. Add Existing Thram (Button)
- c. Create New Thram (Button)
- d. Transfer Plot (Button)
- e. Subdivide Plot (Button)
- f. Display Owner (Button)

3. Gift (Land Transaction) (witness required)

- a. Add Transferor Info (Button)
- b. Add Existing Thram (Button)
- c. Create New Thram (Button)
- d. Transfer Plot (Button)
- e. Subdivide Plot (Button)
- f. Display Owner (Button)

4. Court Verdict (Land Transaction)

- a. Add Transferor Info (Button)
- b. Add Existing Thram (Button)
- c. Create New Thram (Button)
- d. Transfer Plot (Button)

e. Subdivide Plot (Button)

5. Donation (Land Transaction)

- a. Add Transferor Info (Button)
- b. Add Existing Thram (Button)
- c. Create New Thram (Button)
- d. Transfer Plot (Button)
- e. Subdivide Plot (Button)

6. Exchange – Private and Private (Land Exchange) (witness required)

- a. Add Transferor Info (Button)
- b. Add Existing Thram (Button)
- c. Create New Thram (Button)
- d. Transfer Plot (Button)
- e. Subdivide Plot (Button)

7. Private Land Acquisition (Land Exchange)

- a. Add Existing Thram (Button)
- b. Subdivide Plot (Link)
- c. Delete Plot (Link)
- d. Restore Plot (Link)

8. Kasho (Land Exchange)

- a. Add Existing Thram (Button)
- b. Create New Thram (Button)
- c. Create New Plot (Button)
- d. Edit Plot (Link)
- e. Add Thram Owner (Button)
- f. Edit Thram Owner (Link)
- g. Delete Thram Owner (Link)
- h. Restore Thram Owner (Link)
- i. Display Thram Owner (Button)
- 9. Allotment (Land Exchange)

- a. Add Existing Thram (Button)
- b. Create New Thram (Button)
- c. Create New Plot (Button)
- d. Edit Plot (Link)

10. Change of Administrative Boundary (Land Registration)

- a. Add Existing Thram (Button)
- b. Create New Thram (Button)
- c. Create New Plot (Button)
- d. Edit Plot (Link)
- e. Subdivide Plot (Link)
- f. Delete Plot (Link)
- g. Restore Plot (Link)

11. Satshab (Land Exchange)

- a. Add Existing Thram (Button)
- b. Create New Thram (Button)
- c. Create New Plot (Button)
- d. Delete Plot (Link)
- e. Restore Plot (Link)
- f. Delete Thram (Link)
- g. Restore Thram (Link)

12. Omission (Thram Updation)

- a. Add Existing Thram (Button)
- b. Create New Thram (Button)
- c. Create New Plot (Button)
- d. Edit Plot (Link)
- e. Delete Plot (Link)

13. Annulment (Thram Updation)

- a. Add Existing Thram (Button)
- b. Subdivide Plot (Link)

- c. Delete Plot (Link)
- d. Restore Plot (Link)
- e. Delete Thram (link)
- f. Restore Thram (Link)

14. Correction (Thram Updation)

- a. Add Existing Thram (Button)
- b. Edit Plot (Link)
- c. Edit Thram (link)

15. Exchange – State and Private (Land Exchange)

- a. Add Existing Thram (Button)
- b. Create New Thram(Button)
- c. Create New Plot (Button)
- d. Edit Plot (Link)
- e. Subdivide Plot (Link)
- f. Delete Plot (Link)
- g. Restore Plot (Link)

16. Plot Consolidation (Thram Updation)

- a. Add Existing Thram (Button)
- b. Edit Plot (Link)

17. Government Land Acquisition (Land Exchange)

- a. Add Existing Thram (Button)
- b. Create New Thram (Button)
- c. Create New Plot (Button)
- d. Edit Plot (Link)