Feasibility Study

for the

OSCAR Pilot in Nepal

Prepared by:
Neil Pullar

Version	[1.2]
Status	[FINAL]
Version date	[04/10/2009]
Document Id	Feasibility Study Report - Nepal

Document Control

Version Summary

Version	Date	Author	Change summary
1.0	29/08/2009	Neil Pullar	Initial draft
1.1	06/09/2009	Neil Pullar	Incorporate FAO comments (05/09/2009)
1.2	04/10/2009	Neil Pullar	Finalise report (status, date, resolve outstanding items)

Contact for Enquiries

If you have any questions regarding this document, please contact:

Name Neil Pullar
email npullar@cadastre.co.nz
Phone + 64 21 529825

Table of Contents

1 Introduction 6

1.1 Purpose 6
1.2 Scope 6
1.3 Definitions, Acronyms and Abbreviations 6
1.4 References 6

2 Key Findings 8

2.1 Approach 8
2.2 Proposed Outline of the OSCAR Pilot in Nepal 8
2.3 Critical Issues 9
2.4 Recommended Actions 10

3 Existing Environment 16

3.1 Land Tenure in Nepal 16
3.2 Legal Framework 16
3.3 Data Communication 18
3.4 Applicable Government of Nepal Policies 18

4 Nepali Land Administration Priorities 20

4.1 Future Land Administration Modernisation Initiatives supported by OSCAR Project 20
4.2 Other Future Land Administration Modernisation Initiatives 21
4.3 Prerequisite Tasks 22
4.4 Digital Data Issues and Initiatives 22
4.5 Business Process Descriptions 25

5 Statement of Requirements 28

5.2 Business Requirements 28
5.3 Functional Requirements 32
5.4 Non-functional Requirements 41
5.5 System Architecture Constraints 44

6 Pilot Implementation 48

6.1 Critical Issues 48
6.2 Issues for initial OSCAR Shell Development 53
6.3 Software Development Methodology 58
6.4 Project Organization 58
6.5 Pilot Project Plan 60
6.6 Staff 66
6.7 Risk Assessment 67

Appendix 1 71

Acronyms 71

Appendix 2 73

Terms of Reference – Project Land Administration Consultant (Nepal) 73

Appendix 3 74

Draft Technical Specification for Required Hardware and other Equipment 74

Appendix 4 81

Terms of Reference for Feasibility Study 81

Appendix 5 88

Legacy System Details 88

Appendix 6 ..... **106**
Feasibility Study Activities 106
Appendix 7 ..... **109**
Current District Office Business Process Flow Charts 109
Appendix 8 ..... **122**
Suggested Changes to OSCAR Pilot project document 122
Appendix 9 ..... **124**
Terms of Reference – Software Development to Customise OSCAR for Nepal 124

Feasibility Study Report

1 Introduction

1.1 Purpose

This document describes the proposed Nepal pilot of the Open Source Cadastral and Registration (OSCAR) implementation. It is intended to capture and convey the significant aspects of this proposed pilot implementation, the associated issues and key implementation recommendations. It serves as a communication medium between all key stakeholders including donors, the recipient (the Nepal Ministry of Land Reform and Management (MLRM) and the consultants who will be involved in the design, development and implementation of the OSCAR shell software application and its customisation for use in MLRM.

1.2 Scope

This Feasibility Study applies to the proposed customised implementation in the MLRM of the OSCAR Shell software application.

1.3 Definitions, Acronyms and Abbreviations

Refer to Appendix 1

1.4 References

Title	Date / Version	Prepared by
OSCAR Project Document	13 February 2009 (version 1.5)	NRLA, United Nations Food and Agriculture Organisation
ADB TA 4969: Strengthening Land Administration Services in Nepal Final Report	8 March 2009	Fincom Inc. Canada
ADB RSC – C71416 (NEP) Fact-finding Mission Strengthening Land Administration Services in Nepal Land Administration Consultant Report	June 2007	Kevin Nettle
Spatial Application Extension for ArcGIS 8 User's Manual	March 2002 (version 1.0.0)	Ministry of Land Reform & Management, Department of Land Information & Archive (WELINK Consultants)
(ADB) Request for Proposal : Consultant Service Assignments for Land Record Management	November 2008 (Draft)	Ministry of Land Reform & Management,

Title	Date / Version	Prepared by
Information System (LRMIS)		Department of Land Reform & Management
Report of Feasibility Study for OSCAR Pilot in Samoa	20 August 2009 (Initial Draft version)	Cadastre Limited, New Zealand
Rapid Rural Land Tenure Assessment; Nepal	12 December 2008	Mika-Petteri Törhönen, Land Tenure Officer, FAO NRLA

2 Key Findings

2.1 Approach

This feasibility study is based on a 2 week visit to Nepal (16 - 28 August 2009). The study was highly influenced by the need to produce the work products specified in the terms of reference and by the relatively short time for this study. This meant that considerable use was made of existing reports on land administration modernization (these reports are noted in Section 1.4). The time in Nepal was largely spent visiting district survey and revenue offices and talking to technical staff in MLRM departments in Kathmandu. These discussions were used to update my understanding of plans for initiatives that might impact on the implementation of an OSCAR pilot within the MLRM in Nepal. The consultant was encouraged by MLRM to share his suggestions for how land administration could be strengthened generally. Although this might be seen to be outside the terms of reference, it was considered compatible with the focus of his assignment in that the OSCAR pilot in MLRM was more likely to be successful within a robust land administration system.

A complication in assessing the effort and complexity of the work to customize the generic OSCAR shell software for Nepal requirements is that the scope of the generic OSCAR shell software has not yet been defined and so some assumptions on that generic functionality were made based on a comparison of requirements for Nepal and Samoa (where a similar OSCAR pilot is planned and where the consultant had recently completed a similar feasibility study).

2.2 Proposed Outline of the OSCAR Pilot in Nepal

The initial implementation of OSCAR in Nepal will be focused on supporting the operation of the survey office and the revenue office in one district. It will include all the data currently recorded in the District Land Information System (DLIS) and the digitized cadastral maps for the district. The initial functionality provided in those district offices will include:

- updating for both revenue office and survey office data (ie DLIS and the digitized cadastral mapping)
- generating standard certificates such as ownership certificates and restriction (rokka) certificates, reports such as tile check (area) report and map prints
- accessing ownership, restriction and cadastral map related records through a range of search keys (instead of having to search the various paper based index records)
- monitoring the progress of each request for service from clients of the survey office and the revenue office and providing reports on completed work and work-in-progress
- storing all new deeds presented for registration and new certificates issued (once signed) as scanned images in the digital archive component of this system and therefore providing an alternative way to accessing these scanned images through the system (rather than accessing the paper records from the archive)

It is proposed that this initial implementation be called the “Integrated District Land Information System” (IDLIS).

Further “iterations” that could be included within the OSCAR pilot in Nepal are :

IDLIS GIS Viewer to provide simple read-only access to a stand-alone copy of the IDLIS database including a comprehensive range of search keys, a map viewer for the cadastral map, and a range of standard reports

District Registration & Cadastral Map Update Notification to allow Survey Offices and Revenue Offices to inform a central facility of data update details. This would support offices where it is not possible to implement IDLIS or where there has been a system failure which means that IDLIS is unable to operate for a significant period of time.

Central Registration & Cadastral Map Update Centre where a copy of each district IDLIS database will be held (ideally copied at the end of each working day). Data update notifications can be actioned and copies of district IDLIS database can be copied back to the district when their system becomes operational again

Central Integrated Land Information System where nationwide searches can be performed and reports generated. Ultimately, when there is reliable and affordable data communication and in particular links to the internet are available from each district survey office and revenue office, then the IDLIS functionality could be provided by a web based application and the IDLIS database in each district "retired". At this stage it would also be possible to offer MLRM clients web based services including the online lodgement of new deeds to be registered.

District Office Data Synchronisation where in a district it is not possible to provide a direct data connection between the survey office and revenue office in a district, there will be a need for regular synchronizing of the two versions of the IDLIS database

Project Cadastral Mapping System to support the cadastral mapping of unmapped areas (Village Blocks) and re-survey work. This system would accept digital input from total station data loggers and also ownership details and scanned images of documents collected as part of the adjudication phase of this work. When the cadastral mapping is completed for an area, an export file would be created that can be loaded into the district IDLIS database.

The national implementation of IDLIS into all district revenue offices should proceed as quickly as possible once the initial implementation of IDLIS has been completed. The national implementation of IDLIS into district survey offices should proceed as soon as some digital cadastral map data is available in a district.

2.3 Critical Issues

A number of issues need to be addressed as the planning for the OSAR pilots progresses:

1. Aligning the plans and approaches for the OSCAR pilot in Nepal and the ADB funded e-Application Land Records Management Information System (LRMIS) (refer to Section 6.1.1).

2. The decision on whether the software development work to customize OSCAR for use in Nepal is out-sourced or completed using project consultants (software developers) working within MLRM (DOLIA).

3. The funding for the identified hardware and equipment required for a district implementation of the OSCAR system significantly exceeds the OSCAR Project budget and alternative source of funding needs to be identified (refer to Appendix 3)

4. The acceptance by district office staff that the computerized system is an essential tool that will need to be used by all staff in these offices who are involved in registration or survey functions.

5. The "harsh" environment in many survey and revenue offices for computer workstations and other IT equipment.

6. That currently most survey offices and revenue offices are not located close to each other in the districts.

7. The need for a central cadastral and registration data update centre and where such a centre should be located.

8. The likely time it will take to digitize the computer maps for all districts.

9. The approach to geo-reference (spatially reference) "island/free" (graphical) cadastral maps.

10. The need to complete the cadastral mapping of unmapped areas (village blocks) and areas requiring re-survey.

11. The poor physical condition of many land related records held in district office archives and the deteriorating condition .

12. The need for a comprehensive review of the impact of the introduction of modern technology on all provisions of the Land (Survey & Measurement) Act, the Land Revenue Act 1977 and the Land Related Act 1964 along with all associated regulations.

2.4 Recommended Actions

Prerequisite Tasks

That MLRM complete the following actions prior to October 2009:

- to coordinate with the Office of the Prime Minister and Council of Ministers and ADB consultants (responsible for the preparation of the RFP for consultant services to develop the e-Application, the Land Records Management Information System (LRMIS)) to get clarification if it is possible to resolve the apparent overlap and incompatibilities between the OSCAR pilot and LRMIS (these issues are detailed in Section 6.1.1). The issues to be resolved concern scope, timing and technical issues ideally including the adoption of an open source approach by both initiatives. The clarification of these issues needs to be dealt with urgently (before October 2009) for Nepal to continue to be considered for involvement in the OSCAR pilot programme.

- to investigate funding options for the hardware and equipment required for the initial implementation of OSCAR pilot in one district. Currently the OSCAR Project budget covers the cost the server but not the other equipment that has been estimated as costing US$50,000 (Refer to Appendix 3)

- to confirm the district to be used for the initial implementation of the OSCAR pilot in Nepal (Biratnagur (Terrai) and Lalitpur (Kathmandu) are two suitable districts (refer to Section 4.4)).

- to nominate a pilot coordination team consisting of representatives from each of the (central) MLRM departments and the survey office and district office of the district selected for the initial implementation of the OSCAR pilot. One member of the pilot coordination team to be designated pilot coordinator.

That MLRM complete the following actions prior to October 2010:

- to adopt Postgre SQL (& POSTGIS) as the standard database management system for all new software applications in MLRM and plan for the migration of existing applications to this standard.

- to identify an Open Source GIS tool (such as Quantum GIS) as the standard GIS tool for all new software applications in MLRM and plan for the migration of existing GIS applications to this standard.

- to identify office space and organisational responsibility for a Central Registration and Cadastral Map Update Centre.

That MLRM complete the following actions prior to July 2011:

- to complete the digitisation of cadastral maps for the district selected for the initial implementation of the OSCAR pilot in Nepal.
- to complete the migration of the DLIS database to Microsoft SQL Server for the district selected for the initial implementation of the OSCAR pilot in Nepal.

Priorities for OSCAR functionality in Nepal

That the FAO OSCAR design and development team note the following priorities for OSCAR functionality in Nepal:

- the migration of the existing DLIS database and software application to an open source environment.
- the storage of the digitized cadastral mapping for a district (in an open source environment) and an associated digital cadastral mapping update tool (with similar functionality to that included in the current tool - the ArcGIS Spatial Application Extension developed by DOLIA).
- an integrated land information system for a district supporting both survey office and revenue office functions including updates, generating standard outputs, access to all main records using a range of search keys (person name, parcel number, document number, by spatial selection from cadastral map display etc), service request/transaction monitoring and reporting.
- a digital archive of scanned images of all new documents presented for registration or new certificates generated by the system (once signed) and that these scanned images are accessible through the integrated land information system for the district.
- a GIS Viewer and attribute data enquiry system that provides simple read-only access to the spatial and attribute data stored in the district database with a comprehensive range of search keys, a map viewer for the cadastral map, and a range of standard reports. To be provided through the integrated land information system for the district and also as a stand-alone version for users without access to the LAN hosting the integrated land information system.
- a system that supports the cadastral mapping activity that:
    - imports data from total station data loggers,
    - the creation of polygons,
    - the calculation of parcel areas,
    - the entry of parcel and ownership and other “field book” attribute data,
    - the checking of the topological correctness of parcel and building polygons,
    - the generation of hard copy maps and field books (if required),
    - the storage of scanned images collected during the adjudication phase

    - the monitoring of the legally defined steps leading through to the approval of the cadastral maps and the associated field book and the issuing of ownership certificates and
    - the generation of an export file that can be directly imported into the integrated land information system for the district.
- a centralised Registration and Cadastral Data Update facility that can update data from any district and provide the updated database back to the district.
- a district (survey office and revenue office) data update notification system (to the centralised Registration and Cadastral Data Update facility) where there is a significant system failure in the district office and it is not able to process data updates locally.

OSCAR Shell Development

That the FAO OSCAR Project Management consider:

- the involvement of the project coordinators from each of the 3 pilots (Ghana, Samoa and Nepal) in the initial workshop (early 2010) of the OSCAR pilot project planned for Rome.

- the out-sourcing of the OSCAR customisation software development in Nepal (this being the MLRM practice for software development with software support being retained as an in-house MLRM function delivered by DOLIA).

- the recruitment of a local Nepali project consultant with experience in district office operations (survey office or revenue office) and a post graduate qualification in land administration.

That the FAO OSCAR Design and Development team consider:

- giving priority to the early delivery of the functionality required for what has been described as the "Integrated District Land Information System" (refer to Section 2.2).

Recommendations for Land Administration Infrastructural Improvements

For the OSCAR pilot in Nepal to be a complete success it not only needs to have produced software that is capable of supporting revenue office and survey office functions in the districts, but it must also be being used by district office staff. In addition, the nationwide implementation of the resulting system into all districts must be able to be achieved in as short a timeframe as possible.

To increase the likelihood that the OSCAR pilot in Nepal is a success in this widest context any possible barriers must be removed and this means improvements should be made to the land administration infrastructure and environment within MLRM and its departments. Although many of these recommendations have been previously documented in the ADB funded "Strengthening Land Administration" project final report, these are restated to add weight to their relevance:

	Recommendation	**Actioning Agency**
1.	That Biratnagur District be selected for the initial implementation of the (OSCAR based) Integrated District Land Information System	MLRM
2.	That the selection of further districts for the implementation of the	DOLIA

	Recommendation	Actioning Agency
	Integrated District Land Information System give priority to districts where the survey office and district office are close, the district offices are owned by the Government, there is a suitable office environment and layout, the DLIS is implemented and is being updated and digital cadastral mapping data is available.	
3.	That there be intensive training and at least 3 months of close on-site user support provided to the district offices where the Integrated District Land Information System is implemented in the selected district	Nepal OSCAR customisation team Local OSCAR project consultant MLRM OSCAR Coordination Team
4.	That a contingency plan be prepared to cover the eventuality of a long system outage for the Integrated District Land Information System through either: • a system hardware or software failure, • district office staff reluctance or inability to perform key functions related to the computerised system • adverse office conditions	Local OSCAR project consultant
5.	That the organisational responsibility for the Central Registration and Cadastral Map Data Update Centre be given to NCIIP or, alternatively DOLIA (this centre would be the key contingency measure to safeguard against a long system outage in the Integrated District Land Information System in any district)	MLRM
6.	That there be a single programme for acquiring office space for district survey offices and district revenue offices based on the need to co-locate the two offices, to ensure office space was suitable for the introduction of networked computers and for client service and waiting areas.	MLRM
7.	That a five year programme for the completion of digitisation of the cadastral maps in all districts be planned and funding sought for this initiative	DOLIA
8.	That specifications and procedures be prepared for the digitisation of cadastral maps including descriptions of how "island" maps are to be spatially referenced in terms of the national map projection using scanned topographical maps or orthophotos or other cost effective methods involving no or limited survey field work	DOLIA
9.	That digital cadastre include the capture of land parcels, buildings and	SD

	Recommendation	Actioning Agency
	"floor" parcels, where applicable	
10.	That a Digital Cadastre manual be prepared describing field and office practices to be followed in the mapping of unmapped areas and future re-survey work. All such work will use total station and GIS tools.	SD
11.	That comprehensive training be given to all SO staff in the use of total stations and the Digital Cadastre processes	SD / Training Centre
12.	That survey office staff (including goshwara survey staff) not involved in providing routine SO services, assist with the retracing of poor quality cadastral maps or in digital cadastre work of Village Blocks (and in some approved cases, re-survey work)	SO chiefs
13.	That in survey office the Parcel Map and File Map and the associated Plot Register record be scanned (beginning with the most recent records)	SO chiefs
14.	That a central warehouse be acquired for the storage of revenue office archive records from all districts. Initially, infrequently accessed district office archive records to be transferred and a document retrieval service established to satisfy district office requests for centrally archived records. Where feasible such requests should be satisfied through the transfer of a scanned image (possibly by fax) back to the district office	DOLIA
15.	Once the database structure for the IDLIS /OSCAR database is known verification software should be prepared to verify each current DLIS database can be transformed to the IDLIS database. Records with problems should be identified for remedial work. Critical fields to be verified will be parcel details, owner details and tenant details.	Nepal OSCAR customisation team DOLIA
16.	The format of land related Deeds presented for registration and Certificates issued by the Revenue Office should be standardised to facilitate computerised operations and their use controlled by regulations	DOLR
17.	To undertake a comprehensive review of the impact of the introduction of modern technology on all provisions of the Land (Survey & Measurement) Act, the Land Revenue Act 1977 and the Land Related Act 1964 along with all associated regulations	MLRM

Software Development Methodology

Although there is no standard software development methodology within MLRM, reference is made in the draft ADB RFP for Consultant Services for the development of a Land Record Management Information System to the need for the prospective consultants to specify a methodology and reference is made to the Rational Unified Process (RUP) methodology.

For this reason there appears to be no reason why RUP should not be adopted for the OSCAR customisation work in Nepal.

Proposed Project Organisation

That FAO consider the following proposal for the project organisation within Nepal for the OSCAR Nepal Pilot:

- Joint Project Steering Committee (with LRMIS development project)
- Project Coordinator
- Project Coordination Team
- OSCAR Software Technical Coordinator
- Outsourced Software Development Team

This proposed project organisation is detailed in Section 6.4.2 .

3 Existing Environment

3.1 Land Tenure in Nepal

"Nepal is a landlocked country situated between China and India. It is a very diverse country in terms of physical, agro-ecological and socio-economic conditions as well as in terms of cultures and religions practised. Depending upon the elevation, the country is divided into five physiographic regions namely: Terai (Plain area) 60-300 m, Siwalik Hills 200 - 1500m, Middle mountains 800 - 2400m, High mountains 2200 - 2400m, and Himalayas 5000 - above. The population is about 23.5 million and the majority of the people reside in rural areas. The rural life is shaped by diversity of farming systems integrating crop and livestock productions, and forest use. The farming in mainly for subsistence partly due to the remoteness of production from markets and there is a high level dependence on subsistence agriculture for livelihood."[1] The total geographic area of Nepal is 147,181 square kilometres.

The main categories of land tenure are government and public land, Guthi land (products or revenue are used for religious purposes) and private land.

Modern land administration began in Nepal with the implementation of land reform in 1964 including the current system of cadastral mapping. Subsequent changes in 1978 saw the establishment of local revenue offices in districts where cadastral mapping had been established.

For land administration purposes there are 75 districts covering Nepal and the Ministry of Land Reform and Management (LRM) is responsible for land administration including land registration and cadastral mapping. It fufils these functions through the Departments of Land Reform and Management (83 local revenue offices), the Survey Department (75 local survey offices) and the Department of Land Information and Archive.

3.2 Legal Framework

3.2.1 Current Cadastral Mapping Arrangements

The responsibilities of updating and re-survey of cadastral maps is with the district survey offices of the Survey Department. Since the amendment to the Land (Survey and Measurement) Act in 1997 there is the provision for the licencing of private surveyors but this provision has yet to be fully implemented and so effectively all the routine cadastral map work is done within the district survey office

Re-survey work to create new cadastral maps (and the accompanying field books recording parcel areas and adjudication details including the identification of land owners and land tenants) using traditional plane table mapping methods has been completed in areas where the original maps are in very poor condition, there is a high rate of development and the land is of high value. Currently this re-survey work is on hold and the survey staff involved in this work ("goshwara") are in the process of being integrated into the district survey offices.

The cadastral mapping of unmapped village blocks continues and is also being undertaken with the same methods as used in re-survey work. A "digital cadastre" pilot where the cadastral map is being created using

[1] Rapid Rural Land Tenure Assessment; Nepal

total station methods is being trialled in Banepa. There is a need to review this pilot and to decide upon and document the approach to be taken for future re-survey and "village block" cadastral mapping using total stations.

Unfortunately the time and cost of the "village block" and resurvey cadastral mapping work under current arrangements will take an unacceptably long time to complete all this cadastral mapping work. This means that new approaches will need to be designed to ensure there is complete cadastral mapping coverage for all of Nepal in the next 5 years.

The Department of Land Information and Archive (DOLIA) has scanned the cadastral maps for some districts and in this current year plans to contract out the digitisation of cadastral maps for 7 districts. Various initiatives within areas in various district survey offices have resulted in some digital cadastral mapping but not for a complete district. In these initiatives the commercial software (ESRI) ArcGIS has been used. Although DOLIA has developed an application (SAEx) (that is an extension to ArcGIS) to simplify the cadastral mapping update process for digital cadastral mapping, this application has not been widely implemented because of a lack of ArcGIS licences, a lack of digital cadastral mapping and because survey office staff lack confidence in using this application. From a review of the SAEx documentation it seems to have been well designed and well aligned to survey office cadastral map update processes with the paper cadastral maps.

Apart from the "re-survey" work, the most common form of cadastral map updating is initiated through the district revenue office receiving a request for the registration of the sale of a part parcel. For this registration to proceed the district survey office must prepare a "tracing sketch" of the new parcels. This sketch is based on a tracing of the underlying parcel from the cadastral map and sometimes requires a simple tape based field survey. A new parcel number is allocated, the area calculated and often an additional "Parcel Map" (for parcels within municipalities) or "File Map" (for parcels outside of municipalities) is prepared in addition to the modifications to the cadastral map. Various checks are performed by the chief of the district survey office and then the completed "tracing sketch" is sent to the district revenue office to complete registration and the preparation of new ownership certificates. The "Parcel Map" and "File Map" are typically A4 size, made on a transparent media and are stored in folders in the district survey office.

3.2.2 Current Registration & Recording Arrangements

The responsibilities for land related deed registration and other recording of land interests are defined in the Land Revenue Act 1977 and the Land Related Act 1964

District Revenue Offices are responsible for:

- the registration of deeds directly or indirectly relating to land ownership;
- the adjudication of land ownership;
- the protection of land tenancy rights[2];
- the monitoring of compliance with the "Land Holding Ceiling" requirement; and

[2] This function is normally performed by the district revenue office but in some cases (such as Biratnagur) it is performed in separate Land Reform district offices

- the provision of related services, such as the registration of encumbrances/restrictions ('Rokka/Fukuwa'), record search and copying, and deciding on changes to ownership details resulting from applications and court orders ('Misil')

The deed registration (and adjudication) process is initiated when land owners (including the conveyancing parties) for a sale transaction) make application at the district revenue office. The applicants may be assisted by private "writers" who have been licenced to perform this service. When an application is received by the district revenue office, a check is made against the office records like the Moth and Rokka records to verify that registration can proceed. The registration fees and taxes payable are calculated, payment made, a receipt provided to the applicant and a copy of the receipt attached to the deed. The application returns to the registration section and queued (unless the application concerns the sale of a part parcel, in which case it is forwarded to the district survey office for the preparation of a "tracing" sketch map). Depending on the type of deed or type of application different checks are performed and entries made in the relevant register. In revenue offices where the computerised District Land Information System (DLIS) is operating the details of the registration are entered into DLIS and where a new Ownership Certificate is required the DLIS will prepare the certificate. (Similarly for Rokka applications, a rokka certificate is printed by the DLIS software) A photo of the owner and fingerprints will be added to the Ownership Certificate and the associated Moth record. Another fee for the new Ownership Certificate is paid. The new land owner receives their new ownership certificate and registered deed, the relevant office registers are updated and the duplicate copy of the deed is archived in bound volumes.

3.3 Data Communication

The need to strengthen the national information technology and communication (ITC) in Nepal is well recognized and is being addressed by a major ADB supported project (Information Technology and Communications Development Project) with the ADB grant coming effective in July 2008. The implementation of this project runs 2009 – 2012.

Nepal has a government agency, the National Information Technology Centre (NITC) and when it was established, the intention was that this agency would become the repository of all government data. The current reality is that government agencies such as the MLRM host their own digital data resources but this could change when the ITC infrastructure is strengthened.

Within the district revenue and survey offices the communication links are limited to simple peer-to-peer LAN supporting the District Land Information System (DLIS) but these LAN only support the data entry function and do not provide access to registration staff in the district revenue offices. External communication links from the district offices are limited to telephone and in some cases fax.

At the central level within the Survey Department, the Department of Land Information and Archives and the offices of the Ministry of Land Reform and Management there are LAN based on servers.

3.4 Applicable Government of Nepal Policies

The High Level Commission for Information Technology (HLCIT) provides reasonably comprehensive policies guidelines and standards for the application of information technology in government agencies. Many of these policies are available in English for download from their website (www.hlcit.gov.np). A brief review of some of the apparently relevant polices did not identify any barriers to the implementation of the OSCAR pilot in Nepal or to the use of open source. In fact on the HLCIT website there is a link to the "FOSS Community in Nepal" (which unfortunately was not useable at the time).

Within the ITC policies mentioned on the HLCIT no reference could be found to geospatial standards. However, it should be noted that the centralization of most digital mapping activity within the Survey Department's National Geographic Information Infrastructure Programme (NGIIP) has provided a consistent and robust framework for the management of geospatial data resources (www. ngiip.gov.np).

4 Nepali Land Administration Priorities

4.1 Future Land Administration Modernisation Initiatives supported by OSCAR Project

The following initiatives were identified as possible inclusions within the OSCAR Pilot in Nepal and an initial prioritisation made to assist with the planning for the OSCAR pilots.

Priority	Land Administration Modernisation Initiative	Comments
1	DLIS Migration to Open Source platform	With similar functionality to existing MS Access application
2	Open Source platform for the storage of Digital Cadastral Map data and an associated Cadastral Mapping Update Tool	With similar functionality as is provided in the existing SAEx application
3	Integrated District Office LIS	Involving both the Revenue Office and the Survey Office
4	District Office Digital Archive	Initially to capture and store all new transactions and certificates
5	Land Information Access (including GIS viewer)	With both district wide and nationwide coverage for central MLRM and department use.
6	District Office Transaction Monitoring	For Performance Management reporting and to identify any transactions that are taking longer than expected
7	Project Cadastral Mapping Tool	For use in Village Block mapping and re-surveys
8	District Office Change Notification	
9	Centralised Cadastral & Registration Update Processing	
10	NGIIP POSTGIS Migration of Geospatial Data Resources (typically shapefiles)	

Another consideration for the implementation of the OSCAR pilot in Nepal is to identify where OSCAR will be initially implemented. There are certain prerequisite tasks such as ensuring suitable digital data is available, ensuring that there are no local constraints to an OSCAR pilot implementation and also no adverse budgetary implications with respect to ensuring the computing infrastructure is in place.

The objective of the OSCAR project is to develop open source software capable of supporting key registration and cadastral land administration functions. To meet this objective, it is recommended that the initial implementation is limited to one district where:

- the revenue office and survey office are in close proximity (so the integrated (survey office and revenue office) functionality can be tested and demonstrated)
- the revenue office and survey office are accommodated in government owned buildings (not rented buildings)
- the office is of a sufficient standard to provide a good environment for computing equipment
- there is a significant coverage (preferably district wide) of both digital registration and cadastral mapping data and the spatial data is of good quality with respect to topological integrity.

For both the digital registration and cadastral mapping data the completeness and timeliness (how up to date the data is) is important but not critical providing there is a way whereby completeness and timeliness deficiencies can be corrected. Within the operation of the district offices, digital cadastral mapping data relative spatial accuracy is important, not absolute spatial accuracy. However in the longer term when digital cadastral mapping data will be overlaid with other spatial data themes, then absolute spatial accuracy does become important. But this long term need for higher absolute spatial accuracy should not dominate priorities at this stage. Having the cadastral mapping data in a digital environment will allow spatial accuracy improvement work to be completed in a more cost effective way minimizing the need for complete resurveys of problem areas.

4.2 Other Future Land Administration Modernisation Initiatives

The following initiatives were identified as being related to the OSCAR Pilot in Nepal but outside the scope of the OSCAR pilot.

Priority	Land Administration Modernisation Initiative	Proposed Key Responsibility
1	Migration of the DLIS (MS Access) to MS SQL Server	DOLIA
2	Digitization of district wide cadastral maps	DOLIA
3	Retracing of Cadastral Maps in poor condition	Survey Office (including using former “goshwara” survey staff)
4	Cadastral Mapping of unmapped Village Blocks	Survey Office (including using former “goshwara” survey staff)
5	Spatial Registration of “Island” Cadastral Maps	Survey Office (including using former “goshwara” survey staff)
6	Resurvey of Cadastral Maps in high development, high value areas where map sheets are poor quality or missing	Survey Office (including using former “goshwara” survey staff)
7	Complete Digital Cadastre trial at Banepa and prepare documentation for procedures for resurvey and new cadastral mapping work	SD
8	Arrange Total Station training for SO staff to be involved in future resurvey and new cadastral mapping work	SD

Priority	Land Administration Modernisation Initiative	Proposed Key Responsibility
9	Scanning of Parcel Maps and File Maps	SO (including using former "goshwara" survey staff)
10	New district office building programme be reassessed to ensure new office layout is compatible with the introduction of computerized systems and that Revenue Offices and Survey Offices are co-located in districts.	MLRM

4.3 Prerequisite Tasks

There are a number of tasks that should be completed before the OSCAR customisation work begins in Nepal.

Priority	Task	Proposed Key Responsibility
1	Adoption of Postgre SQL and POSTGIS as the MLRM standard database management system for all future land related applications	MLRM
2	Identification of an open source GIS (such as Quantum GIS) as the standard GIS tool for future GIS applications in MLRM	MLRM
3	Comprehensive training for MLRM staff using GIS in the identified MLRM standard GIS tool	MLRM through some future development technical assistance
4	Conduct introductory training in software development within proposed OSCAR software development environment	Suggestion for early training supported through OSCAR pilot
5	Digitisation of Cadastral Maps for district selected for the initial implementation	This will need to include the spatial referencing of any "island" cadastral maps
6	Migration of DLIS to MS SQL Server for district selected for the initial implementation	
7	Identification of office space for Central Cadastral and Registration Update Processing Centre within or near to IGIIP office	The Central Cadastral and Registration Update Processing Centre can also be used for the test environment for the customized OSCAR software developed in Nepal

4.4 Digital Data Issues and Initiatives

It has not been possible to do a comprehensive review of the existing digital data because it is recorded in Nepali language. However, anecdotal observations are that:

- Multiple owners (and possibly multiple tenants) are entered into single "owners" (and "tentants") fields with owners name separated by commas

- There is potential to widen the scope of the digital data from that is held within DLIS with respect to paper records maintained in the revenue office (as well as the additional functionality proposed for the OSCAR pilot)

- Possibly the digital data held within DLIS is not up to date

The issues to do with the paper based cadastral mapping are well documented. The challenge is to define an initially acceptable level of quality for the digital cadastral mapping rather than the ideal level of quality. It is recommended that the overwhelming important quality issue is to have as complete a coverage of parcel polygons as is possible where the parcel polygons are consistent. "Consistent" includes:

- being topologically correct with no overlaps or gaps between parcel polygons;

- that the parcel polygon is identified with the correct parcel number (and is consistent with the standard form of parcel identification); and

- that one polygon defines one parcel.

Quality deficiencies concerning absolute spatial accuracy and lack of timeliness (not up to date) are secondary because there are processes that can be performed after there is a consistent and near complete digital parcel framework.

A number of data initiatives have been identified as "prerequisite" tasks (refer to Section 4.3). In addition, there are a number of data preparation tasks that are required so that the initial implementation of the OSCAR pilot can demonstrate its full functionality:

1 the spatial registration of all "island" cadastral maps within the district where the initial implementation will occur (This could be as part of the digitization of the cadastral maps where the orthophotos or scanned topgographical maps are used to spatially register the maps. Or it could be by field survey where measurements are made from survey control points to boundary marks on each map and these coordinated boundary marks become the means of spatial registration)

2 The automated parsing of DLIS owner (and tenant) fields to create separate owner records where there are multiple owners and also to attempt to separate the different components of the name (first name, family name, fathers name) into separate fields. This could be done as part of DLIS to OSCAR migration scripts but the advantage of doing this parsing earlier is that it allows records where the automating parsing fail to be identified and remedial work to be completed

3 Further DLIS data entry to remedy records that fail automated parsing routines (or any other quality issues identified prior to the migration of DLIS to OSCAR database structures

4 The scanning of Parcel Maps, File Maps and Plot Registers (from SO records) for the district where initial implementation will occur. Scanning should begin with the most recently created parcels and work back in time with this scanning.

5 The redesign of the most common forms and certificates used within the district revenue office and district survey office to assist them to be used within (for data entry and scanning) the OSCAR computerized system and also to make it easier for the OSCAR computerized system

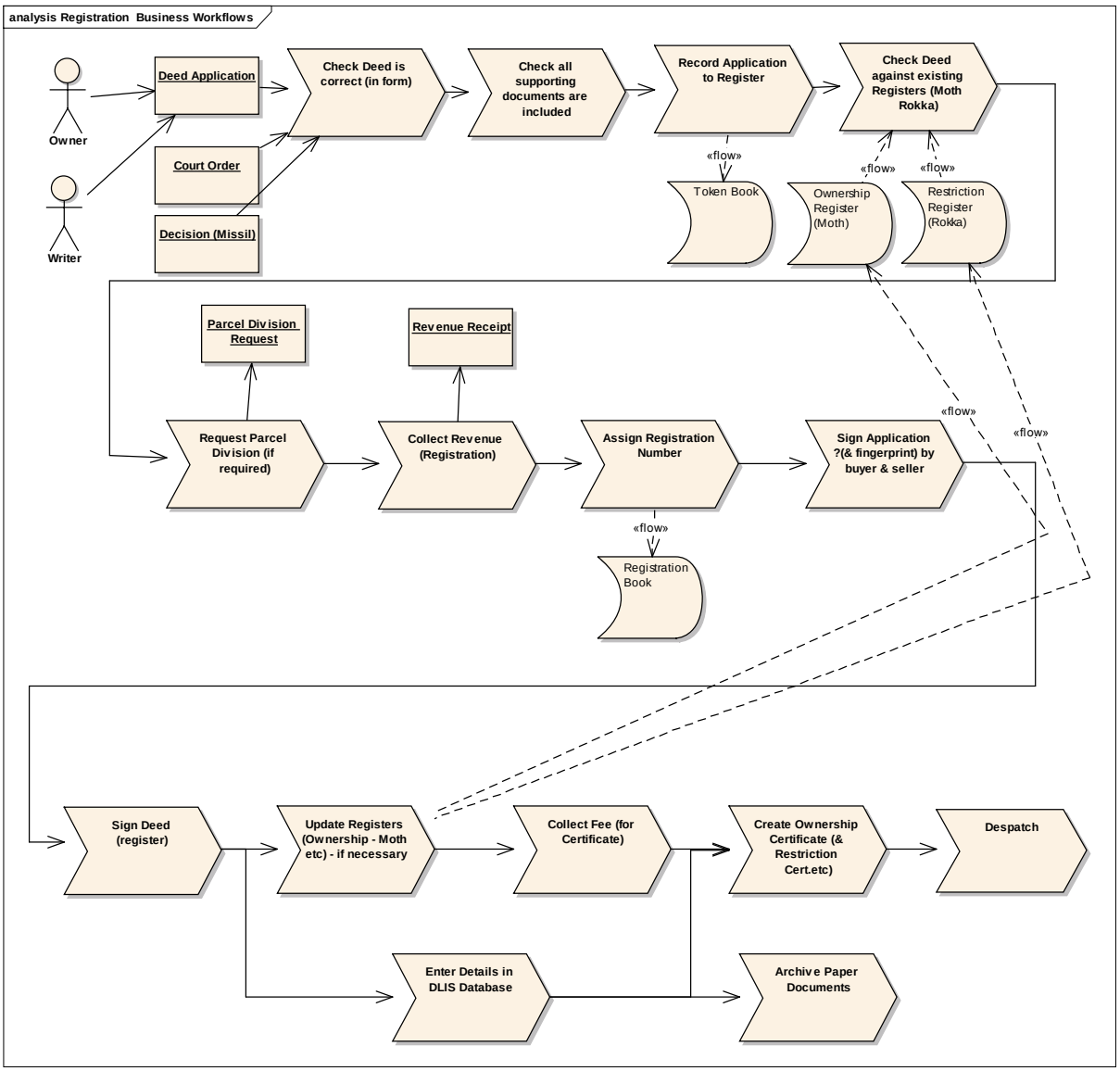
to generate the (usually completed form or certificate) as a printed output. As a minimum this will mean form sizes being standardized on A4 format preferably and possibly A3 format.

6 The need for a comprehensive review of the impact of the introduction of modern technology on all provisions of the Land (Survey & Measurement) Act, the Land Revenue Act 1977 and the Land Related Act 1964 along with all associated regulations.

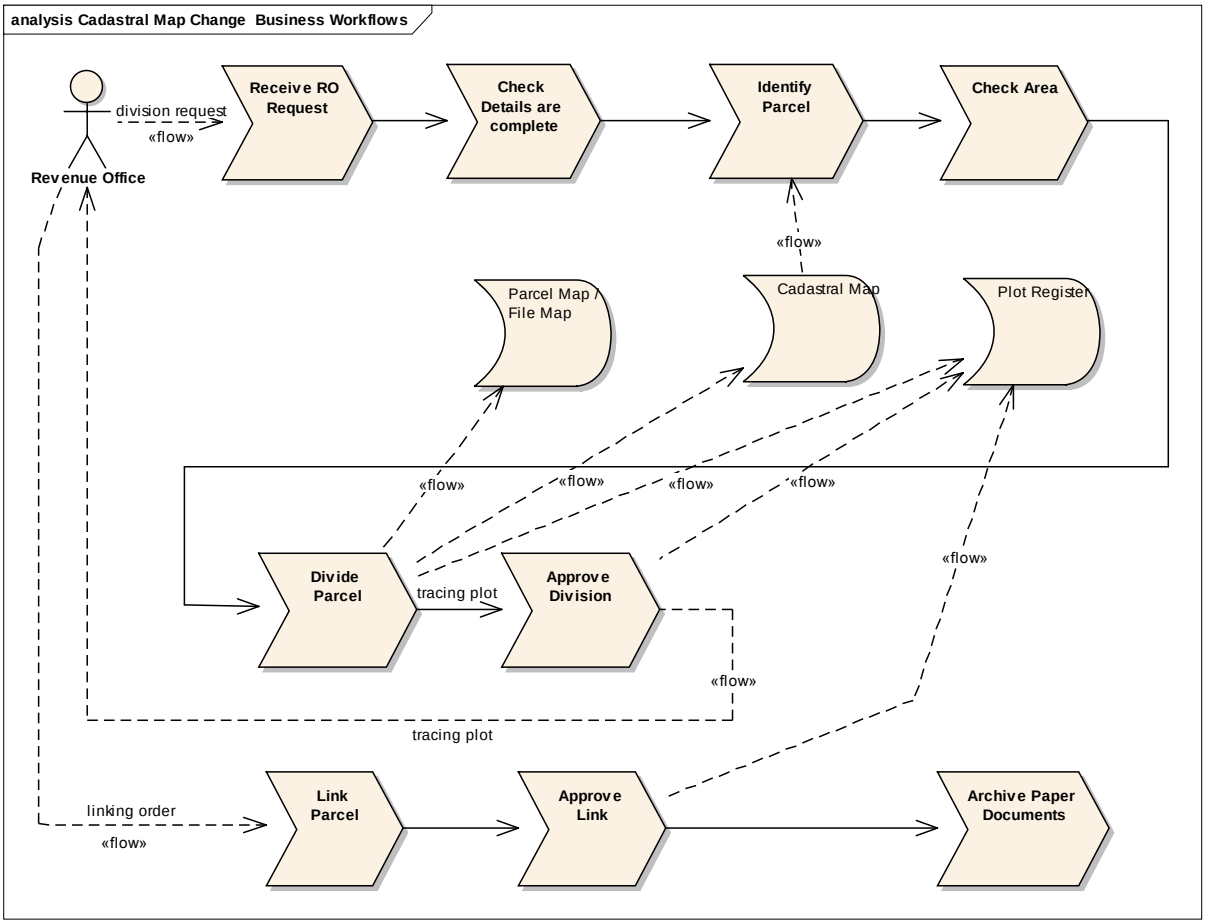
4.5 Business Process Descriptions

The following diagrams are high level work flow descriptions of the three current (AS-IS) main business processes to be supported by the integrated district information system provided through the OSCAR pilot. The diagrams only describe the "main flow" and do not describe any "alternative flows".

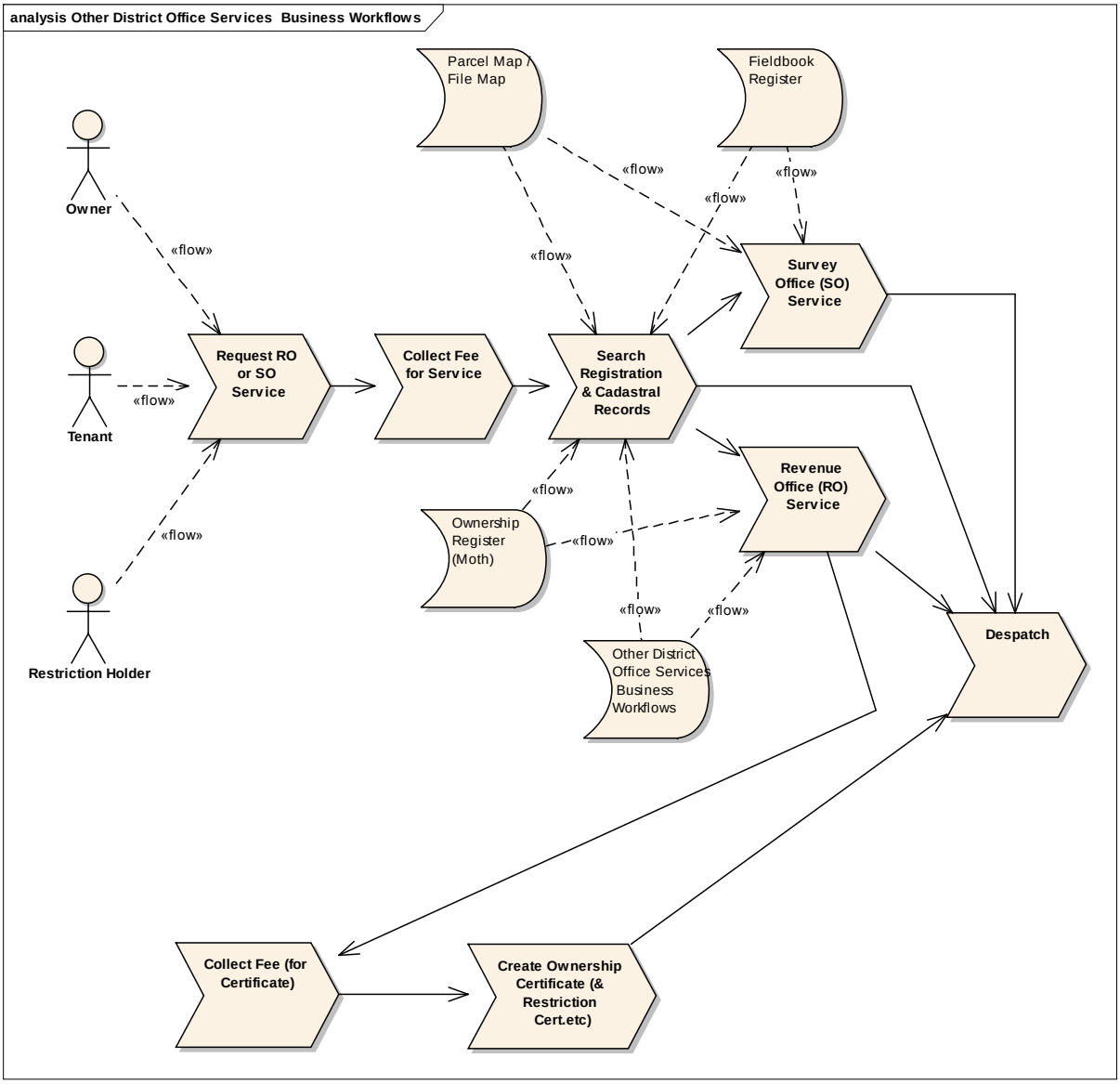
4.5.1 Registration Process Workflow



4.5.2 Cadastral Map Change Process Steps



4.5.3 Providing Other Revenue Office & Survey Office Service



5 Statement of Requirements

5.1.1 Business Needs

ID	Business Need
BN - 1	To reduce processing times for land related deeds registration, land interest recording and the updating of the cadastral map
BN - 2	To provide better access to land information and improved delivery of land related deeds registration, land interest recording and cadastral mapping related services
BN - 3	To ensure an acceptable quality standard is maintained with deeds registration, land interest recording and cadastral mapping transactions
BN - 4	To reduce the processing effort for delivery of land related deeds registration, land interest recording and cadastral mapping updating
BN - 5	To produce Transaction Monitoring Performance Statistics Reports
BN - 6	To incorporate audit traceability for changes to key fields describing land interests and land parcel boundaries
BN - 7	To enable system recovery (deeds registration, land interest recording and scanned documents) in the case of a disaster involving damage or destruction of property records
BN - 8	To provide a high level of security against unauthorised access and changes to key deeds registration, land interest recording and cadastral mapping records

5.2 Business Requirements

5.2.1 Key Stakeholder Summary

Stakeholder	Role
MLRM Clients	All people who are parties to deeds presented for registration. Land owners (or other interest holders such as tenants) requesting certificates confirming their interests in land. Land owners may also request changes to the details describing their land interests.
Ministry of Land Reform & Management	The Government of Nepal agency responsible for (land related) deed registration and for maintaining records on land ownership (and other interests in land) and cadastral mapping
Donor organization	UN FAO

5.2.2 User Environment

The selection of the site for the initial implementation of the OSCAR pilot has yet to be confirmed. It is recommended that this initial implementation be for a district where the system would be able to serve both the Revenue Office and the Survey Office. Based on the suggested criteria (outlined in Section 4.4) there are two district offices that generally meet those criteria; Lalitpur (Kathmandu) and Biratnagur (Terai).

It should be noted that following this initial implementation in a district, the next implementation should be for a central update facility in Kathmandu which would provide a backup data update service for both revenue office and survey office digital data should there be a significant disruption in the operation of the system in the districts or for those districts where updating the digital data locally is just not feasible.

Location	District Office Biratnagur		District Office Lalitpur		Central Data Update Centre Kathmandu (NGIIP Min Bhawan or DOLIA Babar Mahal)
	Revenue Office	**Survey Office**	**Revenue Office**	**Survey Office**	
Number of Staff	43	56[3]	50	20	To be decided after initial district office implementation
Average number of transactions / day (estimate)	225	120	100	180	
Estimated number of parcels (2008)	279648		281018		

Nepal OSCAR System	
Hours of Operation required for computerized system	Normal Office Hours (10 am – 5 pm Sunday – Friday excluding public holidays)
Required response times	Maximum response time of 5 seconds on a typical desktop workstation
Required Access Control	Individual User Accounts with passwords and comprehensive firewall protection on any connections outside of the Local Area Network.
Data Protection	Inserts, deletions and changes to key fields to be logged to support Internal Audit function Rigorous backup regime which would allow the Nepal OSCAR System to be reconstituted with the maximum loss of 1 days transactions in the case of a disaster
Acceptable Maximum Interruption in Service	2 days

[3] Including 25 goshwara survey staff operating from a different office in Biratnagur

Potential Systems to be linked to computerized system (in the future)	National Geographic Information Infrastructure Programme National Personal ID System Municipality revenue collecting systems Judiciary court systems

5.2.3 Key Stakeholder Needs

5.2.3.1 Stakeholder Group: MLRM Clients

Priorities, goals and interests:	• That recording of their property interests safeguards these interests • Land related deeds registration process should be simple, timely and affordable
Previous involvement in computerized land related applications	• DLIS has been operating in the two candidate districts for the past year
Resources required from this group during the project:	• None
Expects Solution to involve:	• Less time spent at the MLRM district offices (revenue and survey) • Quicker turn-around times for services provided by Revenue Office and Survey Office (including deeds registration)
Supporting System Capability	• Better search functionality through being able to search by person name, parcel number and map location
Likely benefit(s):	• Improved levels of service from the MLRM district revenue and survey offices.

5.2.3.2 Stakeholder Group: Ministry of Land Reform & Management (MLRM)

Priorities, goals and interests:	• To meet its legal obligations with respect to the Land Revenue Act 1977, Land (Survey and Measurement) Act 1997 and Land Related Act 1964 • To be more efficient • To provide a service to MLRM Clients that is considered comparable to international "best practice"
Previous involvement in computerized land related applications	Over the past 15 years (central) Survey Department (especially the NGIIP) and Department of Land Information and Archives have been involved in various computerisation initiatives. At a district level, computerisation experience is limited to the implementation of

	the DLIS in 7 districts (with a planned national implementation in all districts within the next 2 years) and various implementations of computerised cadastral mapping in various districts (typically not district wide coverage and without any systematic update process implemented)
Resources required from this group during the project:	• Significant retraining of district revenue office and survey office staff to use computerised system (current DLIS system is used only by data entry staff) • One-off data conversion tasks such as the scanning of Parcel (and File) Maps
Expects Solution to involve:	• Staff training • Computerized system relevant to district office operations • Improved measures to guard against disaster (including fraud)
Supporting System Capability	• Local Area Network • Desktop access to key title and survey records • Workflow management (to cater for revised business process work flows) • Sustainable technical support for Nepal OSCAR System
Likely benefit(s):	• Reduced software licence costs • In-house software support expertise • Improved access to land information • Reduced vulnerability to district office operations when there is a disaster • Reduced likelihood of fraud affecting land interest records

5.2.3.3 Stakeholder Group: Project Donors (UN FAO)

Priorities, goals and interests:	• The successful completion of the Nepal OSCAR Pilot on time and on budget • Improved sustainability of computerised systems supporting land tenure security.
Previous involvement in computerized property registration	UN FAO has been involved in similar land related computerisation projects in other countries throughout the world. OSCAR is also being piloted in Samoa and Ghana in the same timeframe as in Nepal.
Resources required from this group during the project:	• Capital funding for initial pilot test environment in Nepal

	• Funding of technical assistance for the customisation of OSCAR for operation in Nepal • Project oversight
Expects Solution to involve:	• Staff training • Software support capability within MLRM • A version of OSCAR customised for use in Nepal
Supporting System Capability	• Local Area Network and server to host pilot implementation of OSCAR in Nepal • Computerised monitoring of district office transactions • Scanning of critical records describing land interests and parcel boundaries • Disaster recovery plan
Likely benefit(s):	• More robust systems supporting land tenure • Fully operational example of OSCAR for at least one district • Nepal committed to ongoing contributions to the OSCAR open source community

5.3 Functional Requirements

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
Register Application (Lodgement)				
FN - 1	Lodge. checklist	Revenue Office staff member enters type of transaction and system presents a checklist of supporting documents required for selected transaction type. If all supporting documents are present, lodgement proceeds	10	BN – 1
FN - 2	Calculate.Fees	The system shall calculate (BR – 3) the fee applicable to the transaction. (future function)	10	BN – 1

[4] Refers to business need identified in Section 5.1.1

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
FN - 3	Lodge.New Application	Revenue Office staff member, identifies the person making the application (Owner or licenced "writer" action on behalf of owner), records the receipt for the fees and the system allocates the next unique sequential number applicable to the transaction type		BN – 1 BN – 5
FN - 4	Record. Application Details	Revenue Office staff member with a series of linked screens and, where practical, selection of values from a list of controlled values and default values to capture the details of the application, including the applicant details.	10	BN – 1
FN - 5	Print. Application	Revenue Office staff member choses to print application details (future requirement)	1	BN – 1
Prepare Registration				
FN - 6	Identify. Current Owner and Parcel	Revenue Office staff member to use owner's name (from application) to search system to confirm applicant is owner of parcel specified in application and uses recorded details to verify applicant is the owner	10	BN – 1, BN – 3 BN - 4
FN - 7	Identify. Current Restriction	Revenue Office staff member searches system to confirm whether there are any registered restrictions against this parcel of land	10	BN – 1, BN - 4
FN - 8	Record. Deed. Details	System to present Revenue Office staff member with a series of linked screens and, where practical, selection of values from a list of controlled values and default values to capture all the details describing the deed.	10	BN – 1, BN – 4
FN - 9	Record. Restriction. Details	System to present Revenue Office staff member with a series of linked screens and, where practical, selection of values from a list of controlled values and default values to capture all the details describing the restriction.	10	BN – 1, BN – 4
FN - 10	Scan. Documents	Revenue Office staff member scans deed document and supporting documents and these are linked to the deed record	10	BN – 1, BN – 4 BN - 7

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
FN - 11	Request. Parcel Changes	Revenue Office staff member initiates Survey Office request to action change to parcel in cadastral map	10	BN – 1, BN – 4
Change Ownership (or Tenants)				
FN - 12	Identify. Share_Interest To Be Changed_ Transfered	Revenue Office staff member identifies parcel and system displays a list of Owners and a list of Tenants. User selects owner (or tenant) to be changed and likewise share to be changed if owner has more than 1 share	10	BN – 1, BN – 4
FN - 13	Record. New_ Changed OwnerDetails	System to present Revenue Office staff member with a series of linked screens and, where practical, selection of values from a list of controlled values and default values to capture all the details describing the changed or new owner/tenant.	10	BN – 1, BN – 4
FN - 14	Scan.Owner Photo	Revenue Office staff member scans and associates photo with owner/tenant record	10	BN – 1, BN – 4
FN - 15	Scan.Owner Fingerprints	Revenue Office staff member scans and associates fingerprints with owner/tenant record	10	BN – 1, BN – 4
Consider Transaction				
FN - 16	Consider.Vie w Transaction	Chief of Revenue Office staff member initiates approval and system displays view of transaction (eg deed registration)	10	BN – 1, BN – 4
FN - 17	Consider.Edit Transaction	System to present Chief of Revenue Office with a series of linked screens and, where practical, selection of values from a list of controlled values and default values to edit any details describing the transaction.	10	BN – 1, BN – 4
FN - 18	Consider. Cancel Transaction	Chief of Revenue Office can select option to cancel transaction and system records change in status and removes transaction from "work in progress"	10	BN – 1, BN – 4
FN - 19	Consider. Re-assign Transaction	Chief of Revenue Office can select option to re-assign transaction to staff member	10	BN – 1, BN – 4

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
FN - 20	Consider. Approve Transaction	Chief of Revenue Office can select option to approve transaction and system records change in status	10	BN – 1, BN – 4
FN - 21	Consider. Approve Cancellation	Chief of Revenue Office can select option to approve the cancellation of a previous transaction (eg. Restriction)	10	BN – 1, BN – 4
Change Parcel in Cadastral Map				
FN - 22	Confirm. Current Parcel	System to present Survey Office staff member with a map window highlighting the current parcel as specified in deed. User to confirm or select another parcel which corrects parcel identification as entered in deeds details window.	10	BN – 1, BN – 4
FN - 23	Define.New Parcels	System to provide a spatial window and series of GIS layers and tools to record new boundaries and other map features RELATIVE to existing parcel boundaries and to define new parcel polygons, allocate new parcel numbers and calculate areas of new parcels. (refer to functionality provided in existing SAEx software)	10	BN - 3
FN - 24	Record.Check NewParcels	Survey Office staff member to initiate system check for topological correctness and report on any gaps, overlaps or other issues.	10	BN – 3
FN - 25	Generate.New TracingPlot	Survey Office staff member to initiate generation of image file tracing plots for all new parcels and to attach them as supporting documents to the deed record	10	BN – 1, BN – 4
FN - 26	Approve. ParcelChanges	Chief of Survey Office to check and approve changes to parcel. Once approved system notifies Revenue Office parcel changes are now complete	10	BN – 1, BN – 3, BN - 4
Supply Information				
FN - 27	Search. RevenueOffic e Registers	System to present user with a sequence of search criteria and then a list of all records meeting the search criteria, a list of the scanned images of any supporting documents	10	BN – 1 BN – 2

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
		and finally a full display of the search target record with links to the corresponding view of the cadastral map		
FN - 28	Search. RevenueOffice Documents	System to present user with a sequence of search criteria and then a list of all records meeting the search criteria, a list of the scanned images of any supporting documents and finally a full display of the search target record with links to the corresponding view of the cadastral map for the parcel associated with the document	10	BN – 1 BN – 2
FN - 29	Search. Survey Office Records	System to present user with a sequence of search criteria and then a list of all records meeting the search criteria, a list of the scanned images of any supporting documents and finally a full display of the search target record with links to the corresponding view of the cadastral map for the parcel associated with the survey office record	10	BN – 1 BN – 2
FN - 30	Search. Map	System to present user with a sequence of search criteria and then displaying a list of records meeting the search criteria and in the map window, a full display of the area of cadastral map zoomed into to display all parcel records meeting the search criteria. In this Map Display screen there should be the ability to select parcel features and display the Ownership & Tenants form, the Restrictions Form or Parcel form (attribute data) and also to print a copy of the screen map display.	10	BN – 1 BN – 2
FN - 31	Print. ResultList	System to print the list of all records meeting the specified criteria	10	BN – 1 BN – 2
FN - 32	View.Selected SearchResult	System to display the full range of attribute data associated with the selected row of the results list	10	BN – 1 BN – 2
FN - 33	Print. SelectedSearch Result	User to initiate a print of the data displayed in Selected Search Result		BN – 1 BN – 2

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
Prepare Certificate				
FN - 34	View. Certificate	Revenue Office staff member is able to select type of certificate for a specific parcel and view layout and completeness of data for a certificate	10	BN – 1 BN - 2
FN - 35	Print. Certificate	Revenue Office staff member generates a print of the title certificate	10	BN – 1 BN - 2
FN - 36	Scan.Certificate	Revenue Office staff member is able to scan the signed certificate and store it as a record associated with the relevant parcel and owner	10	BN – 1 BN - 2
FN - 37	Certify.Scan	Revenue Office staff member takes print of the title certificate (Computer Folio Certificate) signed by Registrar and scans signed certificate. System links this to the applicable title record.	10	BN – 1 BN - 2
Monitor Work				
FN - 38	Note.Actions	System to note the time and date, action completed and actioning user automatically on the completion of a system enabled action. User is also able to manually note that the user has completed a specific action (selected from a list of controlled values) with the current date and time being the default but editable value for the date time field.	10	BN –5 BN – 6
FN - 39	View.WorkIn Progress	System to generate a listing of all work – in – progress (Current Work Workspace). Each row to represent a dealing (including survey plan and power of attorney).	10	BN –5 BN – 6
FN - 40	View.WorkIn Progress. Workspace Listings	System to enable user to sort the Current Work Workspace on any column heading and filter by record type and transaction type	10	BN –5 BN – 6
FN - 41	View.WorkIn Progress. transaction	Revenue Office staff member to select a specific row in the Current Work Workspace and request the system to display the full details of the selected record	10	BN – 1 BN –5

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
				BN – 6
Audit Transaction				
FN - 42	Audit.Process Trace	Internal Auditor and chief of office to request system to list all processes undertaken on a specified dealing (including changes to the cadastral map) including dates and staff member responsible for each process step	10	BN –5 BN – 6
FN - 43	Audit.KeyData FieldTrace (UC – 5)	Internal Auditor and chief of office to request system to list all changes made to any key data field on a specified dealing, title, survey plan or map parcel polygon including dates and staff member responsible for each change to a key data field.	10	BN –5 BN – 6
FN - 44	Registrars Correction. Initiate (UC – 5)	Chief of office to be able to initiate a Record Correction transaction and assign it to a Revenue Office staff member for action	10	BN – 3 BN –5 BN – 6
Report on Performance				
FN - 45	Report. Performance	Chief of office to request system to compile a standard format performance statistical report for a user specified period of time	10	BN – 5
FN - 46	Report Performance. Review	System to display results of a request for a performance statistical report and prompt the user as to whether a hardcopy version is required.	10	BN – 5
FN - 47	Report Performance. Print	Revenue Office staff member to request printout of Performance Statistical Report	10	BN – 5
FN - 48	Report. FeesCollected	Accounts Section to request system to one or a series of financial reports for a specified period of time concerning the fees collected (future requirement)	1	BN – 5
FN - 49	ReportFees Collected. Review	System to display results of a request for the fees report and prompt the user as to whether a hardcopy version is required.	1	BN – 5

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
		(future requirement)		
FN - 50	Report Financial. Print	Cashier to request printout of Fees Reports. (future requirement)	1	BN – 5
Scanned Images				
FN - 51	View.Scanned Image	Revenue Office staff member must be able to view scanned image (and potentially print the scanned image) from the associated database record when displayed in a form or as a link from a list of associated records (such as supporting documents).	10	BN - 2
FN - 52	Link.Scanned Image.Add	Revenue Office staff member must be able to store and link a scanned image with the appropriate dealing, title or survey plan.	10	BN - 7
FN - 53	Link.Scanned Image.Update	Revenue Office staff member must be able to replace the scanned image and update the link where this applicable	10	BN - 7
FN - 54	Link.Scanned Image.Remove	Revenue Office staff member must be able to delete a scanned image and the link where this is applicable	10	BN - 7
Workflow & Business Rule Definition				
FN - 55	Modify. Workflow	Central Office System Administrator to add, delete or re-order a process step in a workflow sequence.	10	BN – 1 BN - 4
FN - 56	Add.Workflow	Central Office System Administrator to be able to add new workflow sequence	10	BN – 1 BN - 4
FN - 57	Add. Business Rule	Central Office System Administrator to be able to add new business rule	1	BN – 1 BN - 3 BN - 4
FN - 58	Delete. Business Rule	Central Office System Administrator to be able to delete an existing business rule	1	BN – 1 BN - 3

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
				BN - 4
System Administration				
FN - 59	Manage.User. Privileges	Local System Administrator (any user for password change) to be able to change system settlings such as controlled value lists (codelists) and user privileges.	10	BN – 58
FN - 60	Manage.User. Change Password	Any user to be able to change their own password to a new value. New password to be double entered to validate its correctness	10	BN – 8
FN - 61	Manage.User. Privileges.Roles	Local System Administrator to be able to add, modify or delete different roles and associate certain permitted actions with each role.	10	BN – 8
FN - 62	Manage.User. Privileges. Accounts	Local System Administrator to be able to add, modify, suspend or delete individual user accounts for the system	10	BN – 8
FN - 63	Manage.SystemSettings	Local System Administrator to be able to add, modify or retire values in lists of controlled values (codelists)	10	BN – 8
Backup				
FN - 64	Backup. Database	Local System Administrator is able to schedule automated database backups. System is able to perform these automated backups and to report on all database backup, restore and maintenance tasks undertaken.	10	BN – 7 BN - 8
FN - 65	Backup.Server	Local System Administrator (or deputy) is able to initiate both automatic and manual backups of all active folders on the server required to restore the system in the event of a disaster. Backups to be made to media that can be stored in a safe location away from the system itself.	10	BN – 7 BN - 8
FN - 66	Restore.System	System is able to be restored from backup media (software and data)	10	BN – 7 BN - 8

Identifier	Capability	Feature	Priority 1 – Neutral 10 - Vital	Traces To[4]
Accept New Cadastral Mapping				
FN - 67	Identify. Unmapped Polygon	Local System Administrator identifies the polygon (in a Map Window) where the import file is to be located	1	BN – 1 BN - 4
FN - 68	Identify.Import File	Local System Administrator identifies the file to be imported	1	BN – 1 BN - 4
FN - 69	Validate. ImportFile Internal	Local System Administrator initiates validation of the import dataset including topological checks. System reports on any records failing checks	1	BN – 1 BN - 4
FN - 70	Validate. Periphery Import Dataset	Local System Administrator initiates validation of the periphery boundaries of the import dataset and sequentially displays in Map Window for resolution any points on the periphery boundaries that cannot be automatically linked to the points on the existing unmapped polygon, for the system administrator to resolve. System to provide System Administrator with the ability to manually link points or to add or delete nodes on the unmapped polygon where required	1	BN – 1 BN - 4
FN - 71	Load.Import File	System Administrator to initiate loading of import dataset once Periphery Validation is completely resolved. Any unresolved serious internal validation issues will be skipped and reported on in the load log file and a file of unloaded records.	1	BN – 1 BN - 4

5.4 Non-functional Requirements

5.4.1 Quality Ranges

Identifier	Feature	Priority
Performance		
QL – 1	The system is available 8am – 5 pm on every work day	9

Identifier	Feature	Priority
QL – 2	The system is available only within the selected district survey office and revenue office where up to 25 users may be connected in the MLRM Development Bank of Nepal main office.	9
QL – 3	The system has a maximum response time of 5 seconds on a client desktop workstation	6
Reliability		
QL – 4	The mean time between failures is more than 4 months in a year of operating	9
QL – 5	Mean time to repair is 2 working days	7
Usability		
QL – 10	A trained user shall be able to complete a dealing lodgement in a maximum of 5 minutes (Revenue Office staff member); make a typical update to the cadastral map in a maximum of 15 minutes (Survey Office staff member) and create a new user in 5 minutes (System Administrator)	7
QL – 11	Where Exceptions occur, these should be logged (Event Log) and reported to the user in a constructive and understandable way	8
QL – 12	On-line help including user documentation must be available to users	8
QL - 13	Context sensitive help should be available to users	4

5.4.2 Other Requirements

Identifier	Feature	Priority
Workstation Requirements		
WK - 1	OSCAR software should be able to run on desktop workstations running Windows Vista operating system	10
WK - 3	All client workstations to have access (direct or through network) to at least one laser printer that can print both A4 and A3 size formats.	10
WK - 4	All client workstations to have access (direct or through network) to a desktop scanner (with ADF functionality) capable of scanning multi-page A3 sized documents	10
Solution		

Identifier	Feature	Priority
SO - 1	The system to support Nepali language	11
System Administration		
SA - 1	The system keeps a log of any changes to key data fields (to be identified during design)	6
SA - 2	The system to keep the log of changes for at least 6 months and then archived	6
SA - 3	No user can change the log of changes, not even the System Administrator	9
SA - 4	Minimal overhead for database administration and maintenance	6

5.5 System Architecture Constraints

This section describes the requirement and risks that will influence the architectural mechanisms to be specified in design:

5.5.1 Architectural Requirement

	Requirement	Category	Priority
1	Maximum 5 second response time	Performance	H
2	User Accounts with passwords to access system	Security	H
3	System available 10 am – 5 pm working week	Availability	H
4	CRUD operations logged	Audit ability	H
5	Maximum downtime	Availability	H
6	GIS Data Viewer (cadastral mapping) integration	Interface	M
7	Immediate printing of completed ownership and restriction (rokka) certificates	Functionality / Performance	H
8	Workflow Management	Functionality / Configurability	H
9	Scanning of key land records	Interface	H
10	PC workstations in LAN configuration	Constraint	H
11	the system shall provide context-sensitive online Help	Usability	M
12	Ability to bulk load re-survey and Village block adjudication data	Interface	H
13	Open Source-like development (eg technical documentation) to facilitate future enhancement and re-use in other countries	Implementation	M
14	Registration process driven business rules	Configurability	H
15	User roles	Security	H
16	Error trapping and messages	Functionality	H
17	Email Error reporting	Interface / Functionality	L
18	All components available through open source licences and no fees	Licensing	M

	Requirement	Category	Priority
19	Multilingual (Nepali and English) – in particular compatibility with UNICODE 3.0 to facilitate Devnagari script support	Localization	H
20	Minimise complexity and maximise integration of development environment (including DBMS)	Implementation / Maintainability	H
21	Windows Vista "Look and Feel"	Consistency	H
22	Currency values rounded to nearest cent, Shares to total to "1"	Accuracy	H
23	Down time no more than 2 working days	Recoverability	H
24	Ability to handle 5-10X current transaction loads	Scalibility	M
25	Ability to run on workstations with Windows Browsers	Implementation / Interface	H
26	Screen resolution should assume current (2009) standard workstation monitor	Interface	H
27	Multi-page Scanning of documents	Implementation	H
28	Spatial editing operations (subdivide parcel, merge parcel, attribute input and editing and parcel topology corrections) to be controlled by wizards where possible	Implementation	H
29	Discretionary Spatial operations to be limited to spatial searching, viewing (zooming, set scale, layer on-off control, with-without standard feature labeling control), printing and image file extract	Implementation	H

5.5.2 Architectural Risks

	Risk	Impact 0 – 10	Likelihood 0 – 10	Overall Exposure	Category	Confidence in Resolution	Notes
1	Un-authorised access to sensitive data (malicious)	10	1	10	Low	High	
2	Inappropriate sharing of user ids and passwords	4	5	20	Moderate	High	Require logins for key processes
3	Unable to maintain data integrity in the case of power outage	10	6	60	High	High	Use of UPS
4	Scanned documents can be tampered with	10	1	10	Low	High	Use PDF format
5	Cannot handle multi-page scans satisfactorily	10	2	20	Moderate	Moderate	Network scanners with images saved to user specific network folder
6	Cannot meet response time requirements	10	1	10	Low	High	
7	Unable to implement configurable workflow system	2	5	10	Low	Moderate	Alternative is to incorporate within application software
8	Unable to implement system with configurable business rules	2	5	10	Low	Moderate	Alternative is to incorporate within application software

	Risk	Impact 0 – 10	Likelihood 0 – 10	Overall Exposure	Category	Confidence in Resolution	Notes
9	Unable to scale to projected transaction throughput whilst retaining satisfactory response times.	8	2	16	Moderate	Low	
10	Software support requires "international" expertise	10	4	40	Moderate	Moderate	

6 Pilot Implementation

6.1 Critical Issues

A number of issues need to be addressed in the planning of the OSCAR pilot in Nepal:

6.1.1 ADB Land Records Management Information System Initiative

A major ADB supported project (Information Technology and Communications Development Project) is now under way. One of the software applications proposed under the e-Applications component of this project is the Land Records Management Information System (LRMIS) within the Department of Land Reform and Management (of MLRM). Although a RFP for consultant services to develop this application has been prepared (November 2008), this has yet to be advertised and so the timing of this initiative is unknown.

Although the LRMIS development is at an advanced stage of preparation, no procurement has been advertised and there is a good opportunity to align both the OSCAR pilot and the LRMIS development to achieve more than what has been proposed in either initiative. LRMIS (as currently described) identifies only 10 district revenue offices for implementation, does not attempt to integrate data and registration/cadastral work processes that involve the district survey office, deals with the cadastral map in a very cursory way (a digital photo of each parcel representation from the cadastral map), provides limited support for office business processes (major focus appears to be on building an information system) envisages using commercial software development environment and utilizing a commercial database management system, ORACLE. Although the OSCAR pilot looks at the wider registration and cadastral business processes (ie revenue office and survey office as an integrated entity) and will incorporate best practice land administration practices, its focus is on producing land registration and cadastral software and hence any project support for implementation is limited to one district (to pilot the software).

The LRMIS development has been delayed and there is uncertainty over its timing.

It is recommended that the ideal solution would involve both initiatives proceeding but with further clarification concerning the scope and timing of both initiatives. There are different ways the scope could be "divided" between the two initiatives. The OSCAR pilot could continue its emphasis on software to support district office business processes and its trial in one district office. The LRMIS initiative could assume responsibility for the rollout of the OSCAR district office system to at least the 10 districts it has identified and also develop the central (ultimately, national) information system. It has been suggested that the OSCAR pilot confine itself to survey office cadastral map based processes but this is not seen as ideal as it would see a high degree of unnecessary duplication in computing infrastructure (one commercial the other open source) and the rather optimistic view that linking and integration of revenue office and survey office records and business processes will just happen.

The alignment of the two initiatives also needs to happen from a technical perspective. The LRMIS technical specifications as currently described in the draft RFP reveal considerable overlap with the functionality proposed in the OSCAR pilot for Nepal and there are some significant incompatibilities with the OSCAR pilot that need to be resolved. The most significant are:

- functionality is largely focused on Revenue Office (including land reform) functions and not Survey Office functions

- required functionality includes support for central Department of Land Reform and Management planning and analysis functions not covered in the proposed initial implementation of the OSCAR pilot (but could be included in future enhancements of the OSCAR software)

- required functionality includes support for the provision of online web based services not covered in the proposed initial implementation of the OSCAR pilot (but could be included in future enhancements of the OSCAR software)

- the LRMIS RFP specifies the use of the commercial ORACLE database management system

- LRMIS is to be implemented in 10 specified districts and successful company must supply all necessary hardware

- spatial view to parcels is to be provided by linked images of the relevant part of the cadastral map (images to be created using digital camera)

- the RFP asks for bidding companies to specify a software development methodology but describes the consultancy more in terms of a traditional "waterfall" methodology with a distinct staged approach (Requirements/Design/Development/Implementation)

All these apparent incompatibilities with the OSCAR pilot are resolvable providing the LRMIS RFP can be modified to align the objectives of LRMIS with OSCAR. Ideally this would see the LRMIS initiative focused on the national implementation of the OSCAR pilot across all districts and/or the LRMIS initiative extending OSCAR to include the central planning and analysis functions and online web based services.

With respect to the planning of both the OSCAR pilot and the LRMIS initiative, the most important considerations now are :

- to ascertain the willingness and ability of the Government of Nepal to change the LRMIS RFP to align it with the plans for the OSCAR pilot in Nepal; and in particular

- to confirm with some certainty when key outputs from both initiatives will be completed (in particular, the OSCAR pilot milestone for the completion of the initial implementation of OSCAR customized for use in Nepal)

6.1.2 Outsourcing of OSCAR Software Development Customisation

The current practice in MLRM with respect to software development has been to outsource their most significant software development work. The DLIS and SAEx applications and their subsequent updates have all been outsourced. These initiatives appear to have been well managed by a group within DOLIA who have the long term responsibility for user support.

Two GIS companies with software development capabilities were visited and these were well managed companies with very well qualified and experienced staff who could point to a number of operational applications they had developed that they could feel justifiably proud about. One company was routinely using open source components in their applications. Indicative monthly charge out rates for senior software developers/engineers were less than US$1,000 /month.

Computer science graduates employed by government ministries are paid US$200 / month and so once they have experience they are usually leave for private sector employment or are transferred to another ministry (typically every two years).

In Nepal, the option of engaging software developers through the project in the hope that MLRM would employ them when the project finishes would seem to be a little optimistic. The companies who are currently serving MLRM for software development work have been in business and working with MLRM much longer than most of the current MLRM staff.

For this reason, the apparently modest cost of engaging a company (for the OSCAR software development customization) and that there is a proven ability of MLRM (through its departments) to manage software development work, I have no hesitation in recommending the customization work is out-sourced.

6.1.3 District Office Staff Acceptance of Computerised System

In most survey offices and revenue offices visited, there were only a limited number of computers and no total stations (except with the Digital Cadastre pilot at Banepa). Within the DLIS data entry teams there was obvious confidence and competence but this was not obviously shared by the rest of the staff. The most worrying observation was in the Baktapur survey office where a digital mapping system had been installed with the SAEx software (cadastral map update) and training given but for two years only limited use had been made of this system and no cadastral map updates had occurred for that period of time.

Given the lack of exposure to technology and in particular computerized systems, it would be unwise to assume that district office staff will automatically accept a new computerized system and teach themselves. Not only must comprehensive training be provided starting at a very low level, but in-office support must be provided to these staff when the OSCAR pilot software is implemented. The same will apply with the introduction of total stations and new cadastral mapping procedures and that support will have to be in-the-field.

6.1.4 District Office Environment for Computer Equipment

Many of the revenue offices and survey offices visited were in a very poor state with offices not secure from the weather resulting damp and dirty conditions. Electrical cabling was make-shift and barely sufficient for lighting purposes and completely unsuitable for computers. Despite these unsatisfactory arrangements, computers were found but it was obvious that this harsh environment was affecting them.

In such an environment it is not appropriate to install the optimum network complete with server, laser printer and scanners. A limited number of stand-alone workstations, ink jet printers and A4 scanners would be the limit that you should install until the office environment was improved. For these office conditions, the OSCAR based software would need to operate in a stand-alone mode and data updates done through the proposed Central Registration and Cadastral Map Update Centre.

6.1.5 Survey Office and Revenue Office Relative Location

Only two districts were identified where the survey office and revenue office were located close and in the same compound.

There were also a large number of offices that were rented on short term leases and were not government buildings. This means that the office layouts were poor and the cost of making modifications to improve the layout or for computerization are just too high to consider given the short term nature of the survey office or revenue office in that accommodation. This issue seemed to be particularly prevalent with survey offices.

Modifications required for computerization would typically require upgrading the power cabling, local area network cabling, a server room and some provision for alternative power supply. In addition modifications were required to make the offices more suited for the people seeking information and services from the office and for the staff serving these people.

The co-location of both survey office and revenue office in the same compound is a good starting point but ideally there should be a unified office for both the survey office and revenue office in each district with one single "customer service" area. The need for significant office space for archive purposes should be seen as a temporary requirement. Ideally all infrequently accessed records or records in a critical condition should be transferred to a single central archive for all districts (and a simple document retrieval system put in place).

6.1.6 Central Registration and Cadastral Map Data Update Centre

6.1.7 Digitisation of Cadastral Maps

The first tender for the digitization of cadastral maps will be let and completed in the current financial year. This tender is for 7 districts. Although there is an approved budget for this work, the estimates behind this budget have yet to be tested in the commercial marketplace. The effort required to digitize a complete district is not known as previous digitization work within MLRM has only been for municipalities or (municipal) wards within a district.

The digitization of cadastral maps district by district is essential if an integrated (revenue office and survey office) district level information system is to become a reality. A realistic timeframe for the national implementation of an integrated system is 5 years but this timeframe will undoubtedly be constrained by the time it takes to complete the digitization of the cadastral maps.

Concerns have been expressed by MLRM experts about the quality of the cadastral maps and hence the quality of the digital cadastral maps. Sometimes this concern is used to justify the re-survey of map sheets but this is not considered a valid justification except in exceptional circumstances. Primary quality concerns are the (absolute) spatial accuracy and the timeliness (how up-to-date) of the cadastral maps.

While the absolute spatial accuracy of these maps will affect their ability to be overlaid other themes of spatial data, the primary concern from a registration and cadastral record and process perspective is the relative accuracy and the assurance that there are no gaps or overlaps in the cadastral boundaries defining parcels of land. The (topological) checks to ensure there are no gaps or overlaps is an automated process once the cadastral map data is in a digital (vector) format. As well once in a digital vector based formats, it is possible to systematically improve the spatial accuracy of the cadastral boundaries with a minimum of field work using computer based adjustment methods as are used routinely for geodetic surveys.

The approach to ensure the cadastral map is up-to-date can be achieved, in most cases, by referring to auxiliary survey office records such as the Plot Register, Parcel Maps and File Maps.

A digital cadastral map should be considered "without map scale" and continuous (not based on map sheets). In such an environment quality and information about how the map was compiled is important and these details are recorded as metadata. The international standard for geospatial metadata is ISO 19115.

For all these reasons, it is proposed that the digitization of cadastral maps should:

- be completed for all districts as quickly as possible (ideally in less than 5 years)
- be a continuous map for a district (no parcels split artificially into several polygons because of map sheet boundaries)
- be concerned with topological correctness, not absolute spatial accuracy
- note situations where there are concerns about absolute spatial accuracy or the map not being up to date (for inclusion into the metadata and for subsequent data improvement work)

6.1.8 "Island / Free" (graphical) Cadastral Maps

The issue of these graphical cadastral maps is another issue that is well identified as a problem in Nepal. The solution for these maps will be in the digitization of these maps and should follow the solution used by private GIS companies when they have digitized cadastral maps (typically in support of municipality based GIS applications). This solution involves using orthophotos or other imagery that has been geo-referenced (spatially referenced) to the national map projection to geo-reference any graphical cadastral maps. More than 3 points spread over the whole map sheet should be chosen so that the validity of the geo-referencing can be assessed (and noted for metadata).

Other proposed solutions to geo-referencing these cadastral maps that are not recommended are:

1. Re-survey

2. Geo-referencing these graphical cadastral maps to a false origin (does not allow for a continuous map in

6.1.9 Complete coverage of Cadastral Mapping and Re-surveys

The process of cadastral mapping in Nepal includes the identification, recording and adjudication of owners and tenants associated with the parcel. Until now the mapping has used plane table methods.

Recently the Survey Department has acquired a large number of total stations and, as a result, has initiated a "Digital Cadastre" pilot at Banepa (1 municipality, 680 hectares). This pilot has now completed 4 out of the 7 wards and is now well placed to report on its experience and to document guidelines for future cadastral mapping utilizing total stations and GIS tools and other software tools to complete the office side of the mapping process.

The implementation of an integrated system in the districts (survey office and revenue office) will necessitate further changes in these cadastral mapping guidelines including:

- the definition of 1 polygon for each parcel independent of the map sheetlines

- map prints will be generated by the computer on-demand and with the map scale specified by the user (there will be no need to produce map sheets at standard scales)

- owner and tenant information will be captured digitally as part of the cadastral mapping process

- in the future cadastral mapping may be supported by a special version of the integrated system implemented in the districts with a digital export / import to transfer the completed cadastral mapping data into the district integrated database.

It would be appropriate for the new cadastral mapping guidelines (based on the Digital Cadastre pilot) to be further refined to reflect some of the changes that will be required when the integrated system is implemented in districts.

6.1.10 District Office Archive Records

The condition of many documents stored in district revenue offices and survey offices is very poor and in a significant proportion of records, they are no longer easily readable. This has been brought about by poor office environments, uncontrolled access to the records and poor document handling practices. The worse case examples seen were the cadastral maps (although in most cases these can be re-drawn assisted by auxiliary

records that have survived in better condition than the maps) and the deeds documents that have been stored bundled together in cotton material bundles ("bukka").

For these documents to have any future value they must be stored in a better more controlled environment and handled in a more controlled manner. This must occur in the immediate future or the deterioration of these records will continue to the point where they will be completely unreadable. It would not appear cost effective to upgrade all district office archives or to expect all district office staff to become proficient in the appropriate record archive practices required for these records to "survive".

For this reason it is recommended that a central record archive for the original copies of all documents in all district offices be established together with a document retrieval system so that districts can quickly access copies of these documents when required. The transfer of district office archive documents to this central archive should be staged in parallel with the introduction of a computerized system in the district office which will include a digital archive (initially of all new deeds and certificates etc).

6.2 Issues for initial OSCAR Shell Development

6.2.1 Business Process

The cadastral and registration business processes were compared with similar processes in Samoa (where it is also proposed to pilot OSCAR).

Despite there being quite a different framework for registration and cadastral mapping, many of the business processes are quite similar. The main differences are:

- Nepal has a deed registration system, Samoa now has a title registration system (since early 2009)
- The system of parcel identification and parcel number allocation are different and in Nepal are based on the map sheet the parcel falls within
- In Nepal there are processes for systematic surveys of areas containing several hundred parcels. This includes both Re-survey work and also the survey of previously unmapped areas (primarily Village Blocks). These surveys include an adjudication requirement to identify land owners and tenants
- the business processes associated with fee payment – both whether the "cashier" function is supported within the computerised system and at what stage in the process payments occur (OSCAR shell will need to have the ability to configure work flow sequencing)
- each business process step potentially has business rules associated with it (potentially different for each country) and in particular the different supporting documents that must be present before progressing to the next business process step
- there may be additional business process steps (and / or associated business rules) required to identify and correct potential deficiencies in the existing records before registration or cadastral processes can be concluded. The deficiencies in the existing records will be different for each country.
- In Nepal, the format of deeds presented for registration is not standardized in form, content or in document size
- In Nepal, there are doubts about land owner acceptability of computer generated Ownership Certificates because of the different look and feel of certificates produced by computer

- In Nepal, the differing sizes of deeds and supporting documents and their poor quality make scanning of these documents more difficult

- In Nepal digital cadastral mapping is a recent innovation and there are serious concerns regarding the accuracy and timeliness of the original paper based cadastral map sheets

- In Nepal the OSCAR system will be initially implemented on a district by district basis and the volume of data involved and the volume of transactions (for a district) is considerably more than in the (national) Samoa implementation of OSCAR

6.2.2 Legacy Software Applications

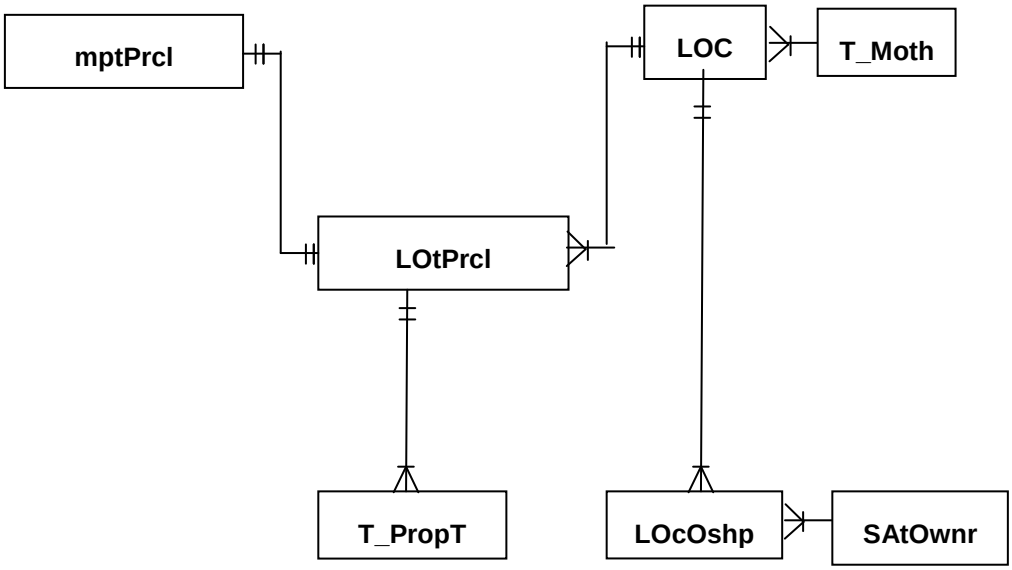
6.2.2.1 District Land Information System (DLIS)

The DLIS has been fully implemented (data conversion and update transaction processing) in 7 districts to date and it is planned to implement DLIS across all 75 districts by the end of 2011. Currently the DLIS application is implemented through Microsoft Access.

The DLIS database schema is described in Appendix 5. It was not possible to gather further information on how the software was organized within this application. In observing the operation of this software in different district revenue offices, the forms are logically organized and accessed through menus. There was frequent use of drop down lists for controlled values although there was some suggestion from the ADB "Strengthening Land Administration" consultancy that as local (district level) administrators had the authority to add new and modify existing controlled values and this had resulted in some variations between districts.

The limitations of Microsoft Access to support a multi-user application such as DLIS are well understood by MLRM and a procurement to migrate DLIS to a Microsoft SQL Server environment is currently underway. Fortunately, it seems as if all except possibly one of the current district implementations of DLIS will be able to use the Express version of Microsoft SQL Server (as the database size will be less than 4GB) and so it will not require a large, or possibly any, purchase of any further Microsoft software licences. The migration from Microsoft SQL Server (with respect to the data) to the OSCAR Postgre SQL database management system is easier than from Microsoft Access and so this current migration procurement is compatible with plans for the OSCAR pilot in Nepal.

The following diagram represents the main tables in the current District Land Information System:



ER Diagram of DLIS Master Database

District Land Information System Tables

Table Name	Description
Loc	This is an intermediate table that joins Owner with the Parcel Record. Land Ownership Certificate is used in the meaning to represent pages of sole or joint ownership.
LOCOshp	This is also an intermediate table that joins Owner with the Parcel Record. More clearly this table links LOC table with the Owner's table (SAtOwnr).
MPTPRCLLINK	This table contains parcel's important information. All the information stored in this table is validated while entering information into LOtPrcl table. Most of the fields in this table are left blank and the information stored in this table seems to be redundant. This table is especially used to link spatial database into attribute database.
LotPrcl	This table stores the Parcel Record. All the necessary information that appears in moth shrestha are stored into this table.

Table Name	Description
SAtOwnr	This table stores the information about legal owner. An owner may be a person, group of person and government and private institutions.
T_FLR	This table stores the information about Floor. All the necessary floor information that appears in moth shrestha are stored into this table.
T_FLROwnd	This table stores the information about Floor Ownership.
T_FLROwndDup	This table stores the information about Floor Ownership if it contains dual ownership.
T_Moth	This table stores the information of the moth. For every moth a system generated MOTH_SID was generated.
T_PropTnt	This table stores the information about tenant. T_PropTnt holds only the relationship between LOtPrcl and SAtOwnr table i.e. parcel information and tenant
T_FLROwnd	This table stores the information about Floor Ownership.

6.2.2.2 Spatial Application Extension to ArcGIS

The technical specification for the digitization of cadastral mapping for 7 districts in the current 2009/2010 financial year is based on the feature definition documented for the ArcGIS "Spatial Application Extension" (SAEx)[5].

Table Name	Description
Parcel Feature Class	Defines and describes the current parcel polygons
Construction Feature Class	Defines and describes the construction items over the parcel polygons
Segments Feature Class	Defines the boundary polylines making up parcel polygons
Parcel History Feature Class	Defines and describes the historic parcel polygons that have been split or merged and are now superseded.
Vertical Parcel Feature Class	Defines and describes strata parcels over a land

[5] For further details on the SAEx application refer to the User Manual and Reference Manual for this application.

Table Name	Description
	parcel (defined in Parcel Feature Class)
Parcel Segments Relationship Class	Defines the relationship between parcel polygon and its segments
Parcel Construction Relationship Class	Defines the relationship between parcel polygon and its construction items

6.2.3 Database Schema Considerations

Decisions on the data model and database schema to be used by OSCAR have yet to be finalized. However, it is safe to assume that the OSCAR data model will be influenced by both the international data models supported by FIG; the Land Administration Data Model (Draft version of ISO 19152 and the Social Tenure Domain Model (that is also supported by UN Habitat). The Social Tenure Domain Model is a specialization of the Land Administration Data Model.

Both the DLIS database and the spatial data schema defined by SAEx for cadastral mapping can be mapped to the Land Administration Data Model but there are some tables in the DLIS database that contain additional details which will require some special treatment to be mapped to the Land Administration Data Model:

1. The association of land tenants to a parcel of land in addition to land owners
2. The practice of including father's and grandfather's name to identify an individual
3. The practice of recording finger prints and photos to identify each land owner of a parcel

These details are important in Nepal and will need to be accommodated in the OSCAR database schema for Nepal and where applicable, the associated database migration scripts.

Other items that are distinct to Nepal such as the general location fields and some parcel will need to be also accommodated presumably by simple specializations in the data model of the generic Parcel and Administrative Unit objects.

6.3 Software Development Methodology

Although there is no standard software development methodology within MLRM, reference is made in the draft ADB RFP for Consultant Services for the development of a Land Record Management Information System to the need for the prospective consultants to specify a methodology and mention is made of the Rational Unified Process (RUP) methodology.

For this reason there appears to be no reason why RUP should not be adopted for the OSCAR customisation work in Nepal.

RUP training would be required for those who will be responsible for the planning and management of the OSCAR customisation work in Nepal.

6.4 Project Organization

6.4.1 Project Management Arrangements

Once the implementation of the OSCAR pilot studies gets underway, the following items will need to be prepared and approved by both MLRM and UN FAO:

1. Detailed Project Plan
2. Nepal Pilot Risk and Issues Log

3. Progress Report template
4. Software Test Plan
5. Software Quality Plan

6.4.2 Roles and Responsibilities

6.4.2.1 Project Steering Committee

Assuming it is possible to align the scope, timing and technical specifications of the LRMIS development with the OSCAR pilot (refer to Section 6.1.1), there should be a joint project steering committee for both initiatives involving senior representatives from MLRM, DRLM, SD, DOLIA and other stakeholders (to be identified by the OPCM as part of the decisions made concerning the alignment of the two initiatives).

The role of the Joint Project Steering Committee is to monitor progress towards the achievement of milestones and deliverables, to resolve any issues that could impact on the success of the project (including resourcing and funding).

6.4.2.2 Project Coordinator

A senior manager from within the MLRM or SD, DOLIA or DLRM who can monitor and manage the OSCAR Pilot on a day to day basis, liaise with the FAO (both locally in Nepal and with the Rome based OSCAR project team) and with the proposed outsourced software development company on relationship and contract related issues.

6.4.2.3 Project Coordination Team

The OSCAR pilot coordination team consisting of representatives from each of the (central) MLRM departments, the survey office and district office of the district selected for the initial implementation of the OSCAR pilot and the OSCAR project consultant (land administration).

The role of the Project Coordination Team is to monitor progress towards the achievement of milestones and deliverables, to resolve within MLRM any issues that could impact on the success of the project and in particular issues associated with the implementation of OSCAR in a district

6.4.2.4 OSCAR Software Technical Coordinator

The OSCAR Software Technical Coordinator should be appointed from within the DOLIA Spatial Application Development Group (or alternatively the NGIIP).

The role of this person(s) is ultimately to assume responsibility for the user support for the OSCAR software/support. In order for them to take on these responsibilities they will be involved in the technical review and discussion of the requirements definition, design, development, implementation and training of the OSCAR customisation work proposed to be undertaken under contract by a local Nepal software development company.

This person will be the main point of contact and liaison between the outsourced software development team and MLRM (and its departments) for day-to-day technical issues.

6.4.2.5 Outsourced Software Development Team

It is proposed that the OSCAR customisation work be outsourced to a local Nepal software company.

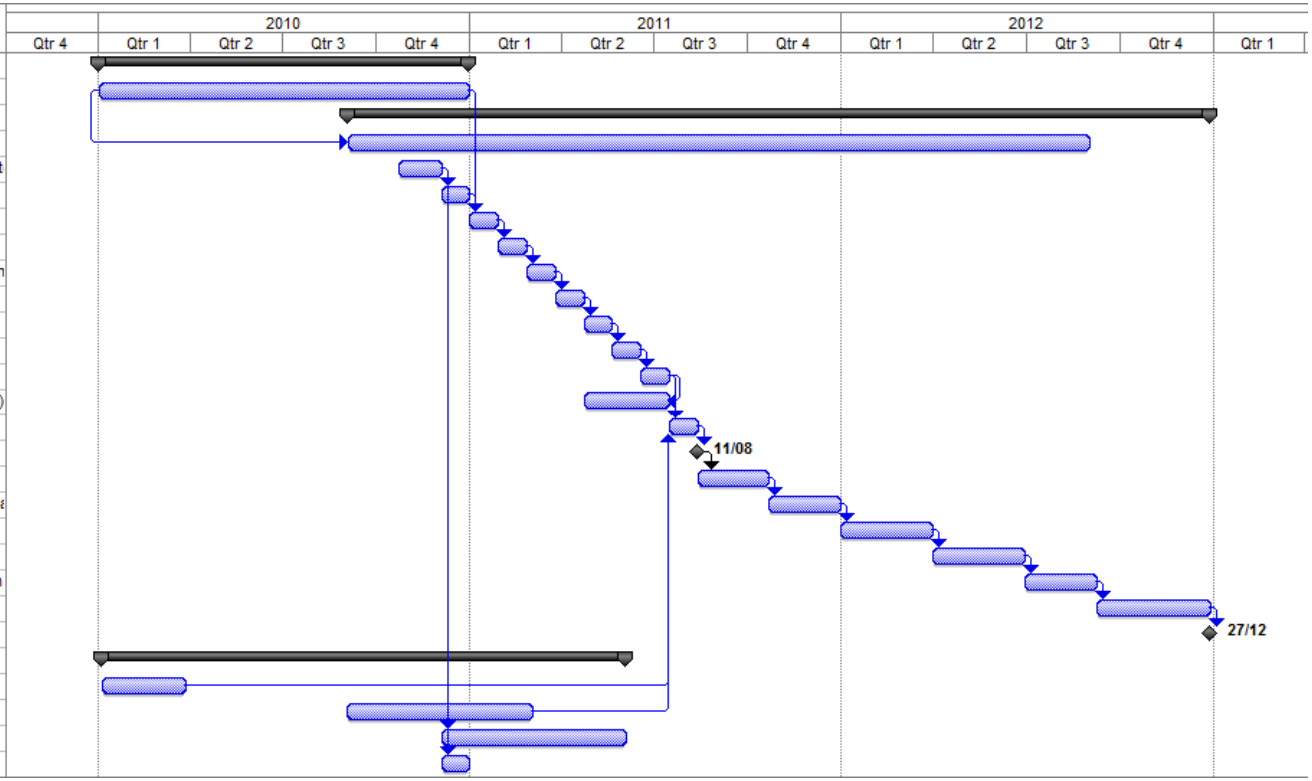
6.5 Pilot Project Plan

6.5.1 Timeline

The following timeline is aligned to the OSCAR Project Document and focuses on the pre-requisite and preparatory tasks that need to be completed before the Nepal OSCAR software customization work begins. Although the preference for any early start to the customization work has been noted, this timeline has not rescheduled this work and has remained consistent with the timeline in the OSCAR Project Document.

As has been noted, a Detailed Project Plan will need to be prepared for the Nepal OSCAR Pilot but it is considered a little early to attempt such a project plan.

ID	Task Name
1	**OSCAR - Central**
2	Core OSCAR Development
3	**OSCAR - Nepal**
4	Recruit Nepali Project Consultant (Land Administration)
5	Engage Nepali Software Development Company (for cust
6	Training in RUP Software Development Methodology
7	OSCAR Development Training
8	OSCAR Nepal Iteration 1A (DLIS Migration)
9	OSCAR Nepal Iteration 1B (Digital Cadastral Map Migration
10	OSCAR Nepal Iteration 1C (Digital Archive)
11	OSCAR Nepal Iteration 1D (Transaction Monitoring)
12	OSCAR Nepal Iteration 1E (Land Information Access incl.
13	OSCAR Nepal Iteration 1F(Integrated DLIS)
14	Procure Hardware & Equipment (for initial Implementation)
15	OSCAR Nepal IDLIS Implementation in 1 District
16	OSCAR Nepal IDLIS Operational in 1 District
17	OSCAR Nepal Iteration 2 (IDLIS GIS Viewer)
18	OSCAR Nepal Iteration 3 (District Office Data Synchronisa
19	OSCAR Nepal Iteration 4 (Project Cadastral Map System)
20	OSCAR Nepal Iteration 5 (Central Data Update Facility)
21	OSCAR Nepal Iteration 6 (District Data Update Notification
22	OSCAR Nepal Iteration 7 (Central Integrated LIS)
23	OSCAR Project Ends
24	**Nepal - OSCAR Prerequisites**
25	DLIS SQL Server Migration (for selected District)
26	Digitisation of Cadastral Maps (for selected District)
27	Open Source GIS tool training (NGIIP)
28	Basic OS Software Development Training for MLRM



6.5.2 Task Descriptions & Milestones

These Task Descriptions are in terms of the previous Project Timeline for the Nepal OSCAR Pilot. The "Critical Milestone" column in the following table represents the planned completion dates for each task which is on the "critical path" for the pilot. Of particular importance to the successful conclusion of the pilot is the completion of the Core OSCAR software by the central OSCAR development team. Within the scope of the Nepal OSCAR Pilot the completion of each "Iteration" of software development (each iteration including finalizing the definition of requirements, design, software coding and database modifications and software and system testing) are the critical milestones.

This description of what will constitute an Iteration within the Nepal OSCAR Pilot is an initial scoping and will need to be reviewed and refined particularly once the scope of the core OSCAR software is known.

ID	Task Name	Task Description	Critical Milestone
2	OSCAR Shell Development	Development of the generic OSCAR software (to be done centrally, not in Nepal)	**1 January 2011**
4	Recruit Nepal project consultant (land administration)	Recruit a local Nepal land administration project consultant for the duration of the OSCAR customization effort	-
5	Engage Nepal Software Development company (for software customization)	It is proposed to engage the services of a local company to undertake the customization work including software development, implementation and "training of the trainers" training	-
6	Training in RUP Software Development Methodology	Software development methodology training for software development team and those members of the OSCAR working group who are interested	-
7	OSCAR Development Training	Training for the software development team (and any MLRM staff members who are interested) in the development tools and the specific development standards that will be adopted for all the OSCAR pilots	-
8	OSCAR Nepal Iteration 1A (DLIS Migration)	The migration of the existing DLIS database and software application to an open source environment	28 February 2011
9	OSCAR Nepal Iteration 1B (Digital Cadastral Map Migration)	The storage of the digitized cadastral mapping for a district (in an open source environment) and an associated digital cadastral mapping update tool (with similar functionality to that included in the current tool - the ArcGIS Spatial Application Extension developed by	28 March 2011

ID	Task Name	Task Description	Critical Milestone
		DOLIA)	
10	OSCAR Nepal Iteration 1C (Digital Archive)	A digital archive of scanned images of all new documents presented for registration or new certificates generated by the system (once signed) and that these scanned images are accessible through the integrated land information system for the district	25 April 2011
11	OSCAR Nepal Iteration 1D (Transaction Monitoring)	The definition of MLRM workflow and business rules and the monitoring of all current (work-in-progress) transactions and reporting on office performance statistics	23 May 2011
12	OSCAR Nepal Iteration 1E (Land Information Access incl. GIS Viewer)	Access to all main records through the computerised system using a range of search keys (person name, parcel number, document number, by spatial selection from cadastral map display etc)	17 June 2011
13	OSCAR Nepal Iteration 1F (Integrated DLIS)	An integrated land information system for a district supporting both survey office and revenue office functions including updates, generating standard outputs, access to all main records using a range of search keys (person name, parcel number, document number, by spatial selection from cadastral map display etc), service request/transaction monitoring and reporting	15 July 2011
15	OSCAR Nepal IDLIS Implementation in 1 District	The implementation of the Nepal OSCAR IDLIS in 1 District	-
16	OSCAR Nepal IDLIS Operational in 1 District	The milestone when the Nepal OSCAR IDLIS is operational in 1 District	**12 August 2011**
17	OSCAR Nepal Iteration 2 (IDLIS GIS Viewer)	IDLIS GIS Viewer to provide simple read-only access to a stand-alone copy of the IDLIS database including a comprehensive range of search keys, a map viewer for the cadastral map, and a range of standard reports	21 October 2011
18	OSCAR Nepal Iteration 3 (District Office Data Synchronisation)	District Office Data Synchronisation where in a district it is not possible to provide a direct data connection between the survey office and revenue office in a district, there will be a need for regular	31 December 2011

ID	Task Name	Task Description	Critical Milestone
		synchronizing of the two versions of the IDLIS database	
19	OSCAR Nepal Iteration 4 (Project Cadastral Map System)	Project Cadastral Mapping System to support the cadastral mapping of unmapped areas (Village Blocks) and re-survey work. This system would accept digital input from total station data loggers and also ownership details and scanned images of documents collected as part of the adjudication phase of this work. When the cadastral mapping is completed for an area, an export file would be created that can be loaded into the district IDLIS database.	30 March 2012
20	OSCAR Nepal Iteration 5 (Central Data Update Facility)	Central Registration & Cadastral Map Update Centre where a copy of each district IDLIS database will be held (ideally copied at the end of each working day). Data update notifications can be actioned and copies of district IDLIS database can be copied back to the district when their system becomes operational again	29 June 2012
21	OSCAR Nepal Iteration 6 (District Data Update Notification)	District Registration & Cadastral Map Update Notification to allow Survey Offices and Revenue Offices to inform a central facility of data update details. This would support offices where it is not possible to implement IDLIS or where there has been a system failure which means that IDLIS is unable to operate for a significant period of time.	7 September 2012
22	OSCAR Nepal Iteration 7 (Central Integrated LIS)	Central Integrated Land Information System where nationwide searches can be performed and reports generated. Ultimately, when there is reliable and affordable data communication and in particular links to the internet are available from each district survey office and revenue office, then the IDLIS functionality could be provided by a web based application and the IDLIS database in each district "retired". At this stage it would also be possible to offer MLRM clients web based services including the online lodgement of new deeds to be registered.	31 December 2012

DRAFT

ID	Task Name	Task Description	Critical Milestone
23	Nepal OSCAR Pilot Ends		**31 December 2012**
28	Open Source GIS tool training	Training in an open source GIS tool so as to allow the adoption of an open source GIS tool in preference to the commercial ESRI GIS application currently used within MLRM	-
18	Basic Open Source Software Development Training for MLRM	Basic open source software development training for OSCAR customization coordination team members	-

DRAFT

6.6 Staff

6.6.1 Recruitment

The OSCAR Pilot project document identifies the need for two software developers to be recruited in each pilot country (funded by the project).

In Nepal, an alternative to this is proposed that is more in line with the MLRM's current practice regarding software development. It is proposed that the software development of the customization of OSCAR for Nepal be out-sourced and that the out-sourced work be over seen by a technical committee from MLRM and a computer engineer from DOLIA on a day-to-day basis. This is what has happened with the original development and subsequent upgrade versions of the DLIS application and the SAEx application. Both those existing MLRM applications were well received by MLRM who have provided user support and training.

Another difference that is proposed for Nepal is that the OSCAR project fund a local land administration project consultant who has district revenue office or district survey office experience, a familiarity with the technology especially the use and customization of GIS and a post graduate land administration qualification. This consultant, who should be confident both in district office procedures and the potential of comput.erized registration and cadastral computerized systems, would play a valuable role in documenting the extent of the customization work, feedback on user interface design, system testing and user training and support. It is proposed that this is a full time position for the two years of customization work in Nepal. A proposed terms of reference for this position can be found in Appendix 2.

6.6.2 Training

There is a need for considerable training delivered through the OSCAR pilot.

The proposed "Open Source" training will remedy skill deficiencies in the OSCAR software development team as well as providing mentoring like support to the software developers involved in the customization work. Also open source related training to a wider group of MLRM staff will assist the long term sustainability of OSCAR in Nepal by ensuring there are other MLRM staff who are competent in open source software development and also an even wider group who are competent and confident in the use of the same open source GIS tool to what will be incorporated into the OSCAR software.

Training Initiative	Training Target Group
Basic Open Source Software Development Training (development environment, tools, standards, approach/methodology)	MLRM OSCAR Working Group and any other MLRM staff who have an interest and some experience in simple application development
Open Source GIS tool training	Survey Department staff in the NGIIP unit
Rational Unified Process (RUP) Software Development Methodology training	Out-sourced (private company) OSCAR customization software development staff
OSCAR Open Source Software Development Training (development environment, tools, standards, OSCAR shell software)	MLRM OSCAR customization technical software development & software support team Interested members of OSCAR pilot working group

Training Initiative	Training Target Group
	Survey Department staff in the NGIIP unit
OSCAR Pilot in Nepal User Training	TO BE DESIGNED & ARRANGED

6.7 Risk Assessment

The following assessment was confirmed by the Working Group at the briefing of the key findings of the feasibility study on 28 August 2009.

6.7.1 Strengths

- Strong support for open source at senior levels in MLRM
- The success of NGIIP and DLIS within the MLRM
- The number of well qualified and well motivated staff in MLRM
- Central support for district office (Revenue Offices & Survey Offices)
- Recent completion of the ADB supported "Land Administration Services Strengthening" project

6.7.2 Weaknesses

- Not many survey offices and revenue offices are located near to each other and many are in rented accommodation
- Poor survey office and revenue offices conditions and many offices are not appropriate for introduction of IT
- Regularly interrupted power supply typically for more than 3 hours a day
- No IT communication links (between survey office and revenue office at district level and between district offices and central MLRM departments)
- Survey Office and Revenue Office staff lack confidence in the use of new technologies
- Funding not assured for post OSCAR pilot software support or software enhancement
- Supply/funding for computer consumables appears to be problematic
- Data quality issues may require special data improvement work
- Main source of software development remains outside of MLRM (but within Nepal) – if OSCAR customisation is outsourced to local company

6.7.3 Opportunities

- ADB project , "ITC Strengthening and e-Government" could support nationwide implementation of OSCAR system in all districts and also improve communication links so that OSCAR could become web based in the future
- Facilitate the move to open source DBMS (Postgre SQL / POSTGIS) and to open source GIS tools within MLRM
- Overseas training opportunities for MLRM technical staff
- Excellent private sector (spatial and non spatial) software development skills including in open source environment
- DOLIA is experienced in out-sourcing software development and data conversion work

6.7.4 Threats

- The loss of MLRM staff critical to the OSCAR pilot in Nepal
- Failure of hardware in district offices (critical for the operation of the OSCAR system)

DRAFT

- Time to complete cadastral mapping digitisation is too long
- District office staff do not accept the OSCAR system (or any other computerised system)
- MLRM clients do not accept computer generated certificates

DRAFT

6.7.5 Risk Mitigation Actions

Risk	Mitigating Action	Responsible Agency
Loss of MLRM staff critical to the OSCAR pilot in Nepal	Establish OSCAR customisation technical coordination team with MLRM	DOLIA MLRM
	Offer open source and other related training to involved staff (local and international training)	MLRM
	Encourage interested MLRM staff to acquire open source software development skills	NGIIP DOLIA
MLRM has an ongoing dependency on the private sector company undertaking the OSCAR customisation for future enhancement and software support	Standardise software development practices as far as is possible	DOLIA
	Promote the use of OSCAR based software for other land related applications undertaken by private sector companies in Nepal	MLRM DOLIA
	Plan a comprehensive training programme in open source software development skills within MLRM	MLRM
No IT communication links (between survey office and revenue office at district level and between district offices and central MLRM departments)	Identify this as a system architecture constraint (Nepal OSCAR pilot be a desktop or intranet web based application)	FAO OSCAR Development Team
Power supply is very unreliable	Independent power supply to allow computer operations for at least 4 hours UPS must be procured with any computer desktop or server procurement	FAO OSCAR Development Team DOLIA
Failure of critical hardware in district offices (critical for the operation of the OSCAR system)	Equipment procurement should plan for redundancy for all critical hardware items	FAO OSCAR Development Team DOLIA
	Establish Central Registration & Cadastral Update Centre	NGIIP DOLIA
ADB funded LRMIS e-Application and the OSCAR pilot plans are not aligned	LRMIS RFP for Consultancy Services and plans for OSCAR pilot in Nepal are	FAO OSCAR Development

DRAFT

Risk	Mitigating Action	Responsible Agency
	modified.	Team DLRM
Data quality issues may require special data improvement work	Schedule critical data improvement work to finish before Nepal OSCAR Pilot is implemented	DOLIA SD
Time to complete cadastral mapping digitisation is too long	Alternative cadastral mapping digitising strategies are identified	DOLIA
	Additional funding for cadastral mapping digitisation is found	MLRM
District office staff do not accept the OSCAR system (or any other computerised system)	Comprehensive training for district office staff	DOLIA
	Transfer data update function to Central Registration & Cadastral Data Update Centre	MLRM
MLRM clients do not accept computer generated certificates	Conduct public education campaign	DLRM SD
Inappropriate office conditions for the introduction for IT equipment (or where it is not appropriate to invest in IT infrastructure within rented office space)	Implement "Light Level" implementation of OSCAR in affected district offices AND Transfer data update function to Central Registration & Cadastral Data Update Centre	DOLIA
It is not possible to implement to an integrated (survey office and revenue office) OSCAR system because the two offices are not located close by.	Planning for future district offices should be for co-located survey and revenue offices	MLRM
Funding is not assured to ensure the sustainability of computerised systems (software support, software enhancement, computer consumables & IT equipment replacement	Future budget submissions by MLRM departments should identify the on-going funding requirements for computerised systems (such as the OSCAR system)	MLRM

DRAFT

Appendix 1

Acronyms

Acronym	Full Name
CRUD	Create Read Update Delete (database operations)
DBMS	Database Management System
DLIS	District Land Information System
DLRM	Department of Land Reform and Management
DOLIA	Department of Land Information & Archives
FAO	Food and Agriculture Organization
FIG	International Federation of Surveyors
FLOSS	Free / Libre Open Source Software
GIS	Geographic Information System
GUI	Graphic User Interface
ISO	International Standards Organisation
IT	Information Technology
MLRM	Ministry of Land Reform Management
NRLA	FAO Land Tenure and Management Unit
OPMCM	Office of Prime Minister & Council of Ministers
OSCAR	Open Source Cadastre and Registration
OSGEO	Open Source Geospatial Foundation
OSS	Open Source Software
SAEx	Spatial Application Extension (to ArcGIS)
SD	Survey Department
SIDA	Swedish International Development Agency
uDIG	User-friendly Desktop Internet GIS

DRAFT

Acronym	Full Name
UN	United Nations

DRAFT

Appendix 2

Terms of Reference – Project Land Administration Consultant (Nepal)

The Role

This role is to assist the design, development and implementation of a customised version of the generic Open Source Cadastral and Registration (OSCAR) software that has been developed for international use. The customised version of OSCAR will initially support the main functions of the district survey offices and revenue offices. The project consultant will be part of a team of MLRM staff from DOLIA, SD, DLRM and district survey offices and district revenue offices and the company engaged to undertake the design, development, implementation, user training (training of the trainers) and initial software support. This team will be supported by international consultants based in Rome who will visit Nepal from time to time during the project.

Required Skills & Expertise

It is essential that the project consultants have:

- A postgraduate degree in a land administration related subject
- Familiarity with GIS and land administration related technology
- Experience in either a district survey office or district revenue office
- Have excellent written and spoken English language
- Have managerial and leadership experience within the Nepali public service

Scope of Work and Tasks

The project consultants will report to the Project Coordinator (to be identified. Recommended that it be a senior staff member within MLRM)

The responsibilities of the project land administration consultant will be to provide district office operational experience inputs into the following tasks and outputs:

Specific Tasks and Outputs

- Document issues requiring the attention and decisions from MLRM (and its departments)
- Review and refine the specific system requirements for the OSCAR pilot in Nepal
- Participate in the review workshops to finalise the design of use cases
- Participate in the developer's software testing and also the user acceptance testing
- Review developers Quality Plan and review its implementation
- Review the user documentation (including online help)
- Review initial district implementation plan and assist in its implementation
- Plan, arrange and participate in the user training in the initial district
- Provide on-site user support for the first month of operation
- Participate in developer team meetings to discuss issues arising in the software development process

Duration

24 months full time effort

DRAFT

Appendix 3

Draft Technical Specification for Required Hardware and other Equipment

The OSCAR Pilot project document envisages the procurement of hardware to establish a development and testing environment within MLRM. However, it is proposed that for the Nepal OSCAR pilot, the development work be out-sourced thereby eliminating the need for a development environment. It is proposed that for testing purposes the out-sourced company provide a test environment as part of their contracted services or existing computing facilities at DOLIA be used for user acceptance testing.

However there will be a need for strengthening the computing environment in the district offices where the OSCAR pilot will be initially implemented. Currently in the two potential districts there is a simple peer to peer network of relatively newly acquired workstations. This network solely serves the needs of the DLIS data entry team. To provide an appropriate for the OSCAR pilot would mean the installation of 1 server and an additional 5 workstations in both the survey office and the revenue office (1 workstation for the chief of the survey office and the chief of the revenue office and 1 computer for each section in each office and 1 or 2 spare workstations in case of workstation failure and for the more intensive training that will be required in the first few months of operation). Alternative power supply (inverter and UPS) will be required to cater for at least a 4 hour power cut for all new and existing data entry workstations.

This is considered the optimal configuration for the initial district level implementation of the OSCAR software in Nepal. If OSCAR project funding and /or Government of Nepal funding (possibly using LRMIS project funds) cannot extend to this optimal district level configuration, an alternative “bare minimum” and no redundancy configuration has been identified through reducing the quantity of certain items. However, the risk in equipping on the basis of this lesser configuration is that a hardware failure will have a more serious implication on the operation of the OSCAR system as there will be no ability to rearrange equipment locally to provide cover to such a failure. The lesser configuration will also reduce operational flexibility with respect to district office staff not having immediate access to specialized hardware like scanners, fingerprint scanners and web cameras.

In addition to the computer hardware, there will need to be office renovation work to establish an air conditioned server room and for computer cabling throughout both the survey office and the revenue office. If Biratnagur is selected as the district for the initial implementation of OSCAR, there will also need to be a wireless connection established between the two offices (about 100 metres apart).

The current OSCAR Project Document identifies that there is a budget for equipment for the OSCAR Pilot in Nepal of US$15,000. The following specification for the optimum configuration for a district (survey office and revenue office) implementation of the Integrated DLIS has been estimated as costing US$64,800 or with an alternative minimal configuration (with no equipment redundancy) the estimated costing is reduced to US$34,175. There are alternative funding options which will need to be explored by the Government of Nepal including utilising ADB funding for the LRMIS.

It was not possible to discuss this funding issue during the feasibility study and so it will need to be dealt with in subsequent discussions between FAO and the Government of Nepal concerning the OSCAR pilot.

Specification & Cost Estimates

Item No.	Item	Description	Quantity	Estimated Cost in US Dollars	Quantity for "Bare Minimun / no redundancy" Implementation
1	**PC Workstation** **(District Office Server & User Workstation/ standby alternative server)**	- Brand Name Computer. - Minitower configuration - Processor : Intel Quad-Core (minimum) 2.3 GHz, (minimum) 8 MB L2 Cache, (minimum) 1 GHz FSB - Memory : minimum of 4 GB Quad-channel DDR2 - Hard drive controller: support for RAID 1 - Hard drive: 2 X 250GB SATA with 16MB Cache, 7200 (minimum) rpm - Duplicate Power Supply Unit (for built in redundancy) - Display : 17" Widescreen monitor (1280X1024 resolution) - Graphics : Integrated Controller with minimum of 16MB of SDRAM - Ports: 1 parallel, 1 serial - Minimum of 4 USB ports. - Single Port Gigabit NIC - CD-Rom : DVD RW 20X - Original A/E Keyboard. - PS2/USB2 Original Laser mouse. - Licensed Windows Server 2003?? (Version to be specified at time of procurement) R2	2	$13,000	1

DRAFT

Item No.	Item	Description	Quantity	Estimated Cost in US Dollars	Quantity for "Bare Minimun / no redundancy" Implementation
		Standard Edition for 10 CAL with latest service pack included. - At least 3 year full warranty.			
2	**Tape Backup Unit with software (& 8 backup cartridges)**	- 200 (native) /400 (compressed) GB (minimum) - LT02 or LT03 - Internal form - Compatible software (for automated scheduled backups) and cartridges (8)	1	$4,000	1
3	**UPS Power Supply** **(Server / standby Server)**	- 2700 watts / 3000 KVA - 230 Volts input & output - USB connectivity - Minimum 2 batteries	2	$2,000	1
4	**PC Workstations** **(User Workstations)**	- Brand Name Computer. - Minitower configuration - Processor : Intel Xeon based processor, (minimum) 2.3 GHz, (minimum) 4MB L2 Cache, (minimum) 1 GHz FSB - Memory : minimum of 1 GB Quad-channel DDR2 - Hard drive: 100 GB SATA with 16MB Cache, 7200 (minimum) rpm - Display : 17" Widescreen monitor (1280X1024 resolution) - One parallel Port ECP/EPP). - USB ports on front and back sides.	9	$15,000	6

DRAFT

Item No.	Item	Description	Quantity	Estimated Cost in US Dollars	Quantity for "Bare Minimun / no redundancy" Implementation
		- Fast Ethernet 10/100/1000 MBPS, PCI LAN adapter. (RJ-45) connector. - CD-Rom : DVD RW 20X - Original A/E Keyboard. - PS2/USB2 Original Laser mouse. - Licensed Windows XP/Vista/?? Professional (Version to be specified at time of procurement) with latest service pack included. - Microsoft Office Word & Excel - At least 3 year full warranty.			
5	**UPS/Power Surge Protection**	- 800 watts / 1000 KVA - 230 volts input & output - USB connectivity -	9	$12,000	6
6	**Antivirus Software including 3 year subscription for virus definition updates**	- Antivirus software for 1 server & 10 PC workstations (connected to server) - Automated virus definition updates	1	$500	1
7	**A3 B&W Laser Network Printer**	- Brand Name Printer. - Type: Laser - Black & White - Print rate : minimum 20 ppm (A4) - Ports: USB2 & Ethernet (for direct connection to network) - Maximum Print Resolution: at least 1200 X 600	1	$2,000	0

DRAFT

Item No.	Item	Description	Quantity	Estimated Cost in US Dollars	Quantity for "Bare Minimun / no redundancy" Implementation
		- Max paper size : A3 - At least 1 year full warranty.			
8	**A3 Colour Inkjet Network Printer**	- Brand Name Printer. - Type: Inkjet - Colour - Print rate : minimum 20 ppm (A4 colour) - Ports: USB2 & Ethernet (for direct connection to network) - Maximum Print Resolution: at least 1200 X 600 - Max paper size : A3 - At least 1 year full warranty.	2	$2,000	2
9	**A3 Scanner with Automatic Document Feeder**	- Optical Resolution (minimum) 600dpi X 600dpi - Scan Area: A3 - Interface: USB 2.0 - Scan speed for colour A4 (minimum) 10 ppm	2	$3,000	1
10	**Workstation Desk**	- 1.2 X 0.75 (0.75 high) with one locked drawer	11	$700	0
11	**Ergometric chair**	- Comprehensice ergometric adjustment - With arms	11	$7,000	0
12	**Airconditioner (for Server Room)**	-	1	??	
13	**Witeless Ethernet Bridge Kit** **(with point-to-point line-of-**	Including: - Wireless Ethernet Bridge unit - Weather proof externally mounted	2	$900	2

Item No.	Item	Description	Quantity	Estimated Cost in US Dollars	Quantity for "Bare Minimun / no redundancy" Implementation
	sight visibility approx 100 metres)	directional antennae - RF cables - Appropriate lightning arrestor - Capable of transmission speed of at least 54 Mbps - Minimum transmission speed at 100 metre separation of antennae of 20 Mbps - Supporting IEEE 802.11g or 802.11n - PoE power supply - Industry standard security including WEP, WPA 802.11i and MAC address filtering - Deployable or configurable for point-to-point bridge operational mode - Installation included in pricing			
14	**Fingerprint Scanner**	- Able to operate on workstations specified above in item 4 - Interface: USB 2.0 - Scanning Window size (minimum) 15 X 20 mm - Image resolution (minimum) 400 X 300 dpi - Size of unit (maximum) 60 X 75 X 50 mm	4	$2,600	1
15	**PC Web Camera**	- Able to operate on workstations specified	4	$100	1

DRAFT

Item No.	Item	Description	Quantity	Estimated Cost in US Dollars	Quantity for "Bare Minimun / no redundancy" Implementation
		above in item 4 - Maximum image 320 X 240 pixels - Maximum size of portrait image : 0.3 MB - Transfer method USB 2.0			

DRAFT

Appendix 4

Terms of Reference for Feasibility Study

1. INTRODUCTION

The project falls under the FAO NRLA's normative work, which supports the introduction of sustainable and affordable systems for land tenure security. Open source software (OSS) is seen as an alternative and arguably, in a scarce resources situation, a more sustainable alternative to proprietary software products, due to the initial and annual savings in costs as well as the high adaptability ensured by the open source code. FAO-NRLA has reviewed available OSS options for land administration systems and found several of the available database and GIS products to be of good value.[6] T be useful in settings with limited technical resources, open source GIS software for land administration systems must have the basic graphical (cadastral) functions that are needed for land administration systems. The general dearth of such tools has made it difficult for individual land administration agencies to opt for OSS-based land registration systems. Consequently the introduction of OSS for land administration systems requires a common, initial, effort.

As the next step, FAO intends to support an OSCAR OSS development project and associated community in the Web (more specifically most probably in OSGeo, which is the leading OSS community for geospatial applications). This will allow a peer production development effort of source code for the OSCAR software that is made available for public collaboration. The product will be tested through its real operational implementation (including appropriate customisation to meet local requirements) in three differing FAO member countries. The outcome, namely a fully functional OSCAR shell with an active user community, will lower the barriers for entry level of developing countries to use IT for improving land registration systems and the security of tenure.

FAO has prepared a project description for "Support to the Development and Piloting of the OSCAR Shell" (February 2009) and this document describes the framework for this consultancy to plan the proposed piloting of the OSCAR Shell in Ghana.

The land administration domain in Nepal falls under the Ministry of Land Reform and Management, which hosts the Survey Department, the Department of Land Reform and Management, the Department of Land Information and Archive, the Department of Land Revenue and the Land Management Training Centre as well as a separate trust, Guthi (Trust) Corporation.

Land recording history in Nepal is long, but the cadastral system dates back only a couple of decades. Land registration is based on a registration of deeds system, which is a document registration system. The land transactions solely depend on the landowners and there is no state guarantee over the records. The cadastral records (maps and textual document) are maintained by the District Survey Office and the register by the District Land Revenue Offices of the Department of Land Revenue. The cadastral records classify lands to: public, government, forest, private land and barren lands.

The land recording and administration system in Nepal is kept and operated paper-based. This in itself does not mean that the system could not be good, sufficient or efficient. However, it is reported that the records suffer from accuracy/coherence problems and that issues of distortion and duplication take place. Also, storage facilities and the organisation of the record keeping are inadequate. Land records are not properly kept and there is a risk that some of the data may be lost due to deterioration. There are also capacity

[6] See FAO Scoping paper on FLOSS for cadastre and land administration systems. See http://www.fig.net/commission7/news/2007-10-ScopingPaperFinal.pdf

problems. The personnel that operate land administration system in district offices often do not posses adequate technical and legal education or skills.

The Ministry of Land Reform and Management on Land Administration (MLRMLA) has attempted to address the problems of land administration for a long time. There have been efforts to modernize land administration, focusing on computerizing data managed at the district land revenue offices. Progress has been limited due to the lack of trained staff and due to the lack of funding. ADB has just provided a small grant for the Ministry to seek a step forward. The long term goal is to have an efficient, service-oriented and informative land administration system based on a modern technology.

The general task of the Consultant is to perform an initial identification study on how the FLOSS project could support the modernization of the land administration system in Nepal. The consultant will start from reading the DRAFT trust fund project document 'Support to the Development and Piloting of an Open Source Cadastre and Registration (OSCAR) Shell' and get aqcuainted with the FAO FLOSS initiative and outcomes.

Specifically the consultant will:

(i) Identify together with the (MLRM) the needs and immediate priorities for the modernization of the Land administration;

(ii) Subject to consent with (MLRMLA) analyze the possibility of computerization of the key land records in selected Terai land revenue offices as part of the 'Support to the Development and Piloting of an Open Source Cadastre and Registration (OSCAR) Shell' trust fund project.

(iii) Identify the associated data digitalization priorities and data quality issues and propose methodology for data digitalization;

(iv) Document any issues that need to be addressed during the phase of initial development of the "core" OSCAR software (as distinct to the customisation of the software in Nepal);

(v) Prepare a risk analysis, including the identification of any pre project work required;

(vi) Identify appropriate project management arrangements;

(vii) Prepare a draft implementation plan for the FLOSS OSCAR's Nepal part;

(viii) Propose amendments to the to the 'Support to the Development and Piloting of an Open Source Cadastre and Registration (OSCAR) Shell' trust fund project proposal to include Nepal (replacing the parts describing the participation of the Kyrgyz Republic).

2. PROJECT OBJECTIVES

To perform an initial assessment and prepare a detailed plan for the implementation of the Open Source Cadastre and Registration (OSCAR) Shell in Nepal.

3. SCOPE OF WORK

The international consultant will work closely with the beneficiary project coordinator and be ultimately responsible for delivery of the final products.

Specifically, the consultant will:

A) Review of **Existing Environment**:

- ✓ The DRAFT trust fund project document 'Support to the Development and Piloting of an Open Source Cadastre and Registration (OSCAR) Shell' and other background material on OSCAR and get acquainted with the FAO FLOSS initiative and outcomes;
- ✓ Report on the "Rapid Rural Land Tenure Assessment; Nepal, developed by Mika-Petteri Törhönen, Land Tenure Officer, FAO NRLA, 12 December 2008;
- ✓ Legal framework, related to the OSCAR system implementation in Nepal;
- ✓ Existing communication environment in Nepal;
- ✓ The government of Nepal's policies, plans and standards to do with land and ICT (with particular reference to any that might impact on the use of OSS products in land administration).

B) Develop a **Statement of Requirements** for the implementation of the OSCAR Shell in Nepal's MLRMLA, including:

- Identify together with the MLRMLA the needs and immediate priorities for the modernization of the Land administration;
- Subject to consent with the MLRMLA analyze the possibility of computerization of the key land records in selected Terai land revenue offices as part of the 'Support to the Development and Piloting of an Open Source Cadastre and Registration (OSCAR) Shell' trust fund project.
- Identify the associated data digitalization priorities and data quality issues and propose methodology for data digitalization;
- Document any issues that need to be addressed during the phase of initial development of the "core" OSCAR software (as distinct to the customisation of the software in Nepal);
- Describe future business processes (work flows) to be supported by the OSCAR shell;
- Document functional requirements and expected non-functional qualities and prioritise these needs;
- Describe system architecture constraints for the OSCAR shell (including technical platform definitions).

C) Develop **Implementation Recommendations** for the OSCAR Shell in Nepal including:

- Milestone plan and Indicative project plan, within the frame of the FAO Project plan;
- Appropriate project management mechanisms for the implementation of the OSCAR Shell in Nepal;
- Any skill and expertise shortcomings that will need to be addressed through training initiatives during the FAO project;
- Describe all pre project activities that need to be completed before the software developers are recruited and the FAO project begins in Nepal (including responsibility for activity, the nature of the task and the expected duration of the activity).

D) Develop **General Input Requirements for the design of the "core" OSCAR Shell Software**. In order to define the extent of the work involved in the OSCAR Shell implementation in Nepal, certain assumptions will need to be made in terms of the functionality of the "core" OSCAR Shell software. These assumptions will need to be documented and are likely to include:

- System architecture issues
- Generic cadastre and registration workflows that will be supported by OSCAR
- Generic data model required to support the "core" OSCAR Shell

- Software development methodology.

E) Develop **Implementation Plan for the OSCAR Shell in Nepal** within the frame of the FAO project plan;

F) Develop **Risk Analysis** of the implementation of the OSCAR Shell in Nepal's MLRMLA, including the identification of strategies to mitigate the impact of all significant risks;

G) Develop **Know-how transfer and training policy. Training requirements definition.**

H) Develop **Terms of Reference for Project Consultants (Nepal)** to be recruited through the FAO project for the OSCAR Shell implementation in Nepal and the identification of counterparts within the Nepal's MLRMLA. To date it is envisaged that the consultants will be software developers with knowledge of land registration systems, but in the case that additional expertise is recommended (from what was proposed in the FAO OSCAR project document) a proposal for these extra consultants will need to be made including terms of reference. In case additional expertise needed than the one envisaged in the FAO OSCAR project document a proposal has to be made.

I) Develop **Technical Specifications** for the required hardware and other equipment together with cost estimation.

J) Organize a **Work Shop** in Nepal at the end of the mission to Nepal to present the main findings, first draft of the work products, receive comments and agree with the beneficiary the frame of the final work products.

K) Propose amendments to the to the 'Support to the Development and Piloting of an Open Source Cadastre and Registration (OSCAR) Shell' trust fund project proposal to include Nepal (replacing the parts describing the participation of the Kyrgyz Republic).

4. WORK PRODUCTS

A) Review of Existing Environment

B) Statement of Requirements for the implementation of OSCAR Shell in Nepal's MLRMLA;

C) Implementation Recommendations

D) General Input Requirements

E) Implementation Plan for the OSCAR Shell in Nepal

F) Risk Analysis of the implementation of the OSCAR Shell in Nepal

G) Know-how transfer and training policy. Training requirements definition.

H) Terms of Reference for Project Consultants (Nepal)

I) Technical Specifications for the required hardware and other equipment together with cost estimation.

J) Propose amendments to the 'Support to the Development and Piloting of an Open Source Cadastre and Registration (OSCAR) Shell' trust fund project proposal to include Nepal (replacing the parts describing the participation of the Kyrgyz Republic).

5. PERIOD OF PERFORMANCE

The work will have to be completed with maximum 18 working days during the period July – August 2009, out of which 2 weeks will be spent in Nepal.

6. PROFESSIONAL EXPERTISE REQUIRED

Team Leader

- Experience in IT Project Management;
- Understanding at least one IT project management and development methodology;
- Knowledge of land administration and cadastre systems;
- Previous experience in Asia region;
- Good communication skills with fluency in English.

7. REPORTING REQUIREMENTS

The Consultant must submit the following management and technical reports and documentation:

The Consultant must submit the following management and technical reports and documentation:

1. **Final report**

   Draft final report must be submitted at least one week before the end of the period of execution of the contract in hard copies and electronic format. The Final Report shall include short description of all activities undertaken, major outputs and critical analyses of any major problems that may have arisen during the implementation of the modified OSCAR system, with recommendations regarding resolving potential problems and proposals for future actions. The Final Report shall include as annexes all previously approved technical reports and other documentation, requested in section 4. Work Products.

2. **Technical documentation.**

   All technical documentation, requested in section 3. Scope of work and in section 4. Work products, shall be submitted in hard copies and electronic format.

All reports have to be submitted in electronic form to the beneficiary project coordinator and to Mr. Mika-Petteri Törhönen, Land Tenure Officer, FAO NRLA for review, comments and approval. The final Report with all annexes has to be submitted in 3 hard copies (two for the beneficiary and one for the FAO) and in electronic format.

DATES OF SUBMISSION

The schedule of the submission of all required deliverables is as follows:

Work products	Version	No Later Than
Review of Existing Environment	Draft Version	At the end of the second week
	Final Version	Two weeks after the mission to Nepal
Statement of Requirements for OSCAR implementation in Nepal's MLRMLA	Draft Version	At the end of the mission to Nepal
	Final Version	Two weeks after the mission to Nepal
Implementation Recommendations	Draft Version	At the end of the mission to Nepal

Work products	Version	No Later Than
	Final Version	Two weeks after the mission to Nepal
General Input Requirements for the design of the "Core" OSCAR Shell	Draft Version Final Version	At the end of the mission to Nepal Two weeks after the mission to Nepal
Implementation Plan for OSCAR Shell in Nepal	Draft Version Final Version	At the end of the mission to Nepal Two weeks after the mission to Nepal
Risk Analysis	Draft Version Final Version	At the end of the mission to Nepal Two weeks after the mission to Nepal
Know-how transfer and training policy. Training requirements.	Draft Version Final Version	At the end of the mission to Nepal Two weeks after the mission to Nepal
Terms of Reference for the Project consultants and counterpart requirements.	Draft Version	Two weeks after the mission to Nepal
Technical Specifications for the required hardware and other equipment together with cost estimation	Draft Version	Two weeks after the mission to Nepal
Final Report	Draft Version	Two weeks after the mission to Nepal

Comments on the draft Work products will be provided to the consultant within maximum 20 days of their submission. Comments must be incorporated and submitted within 10 days of the date of completion of the work. The Final Work product is to be submitted in three hard copies (two for the beneficiary and one for the FAO) and in electronic format.

8. LANGUAGE

The official language shall be English. All documents and reports produced by the Consultant for this assignment shall be made available to the beneficiaries in English language.

DRAFT

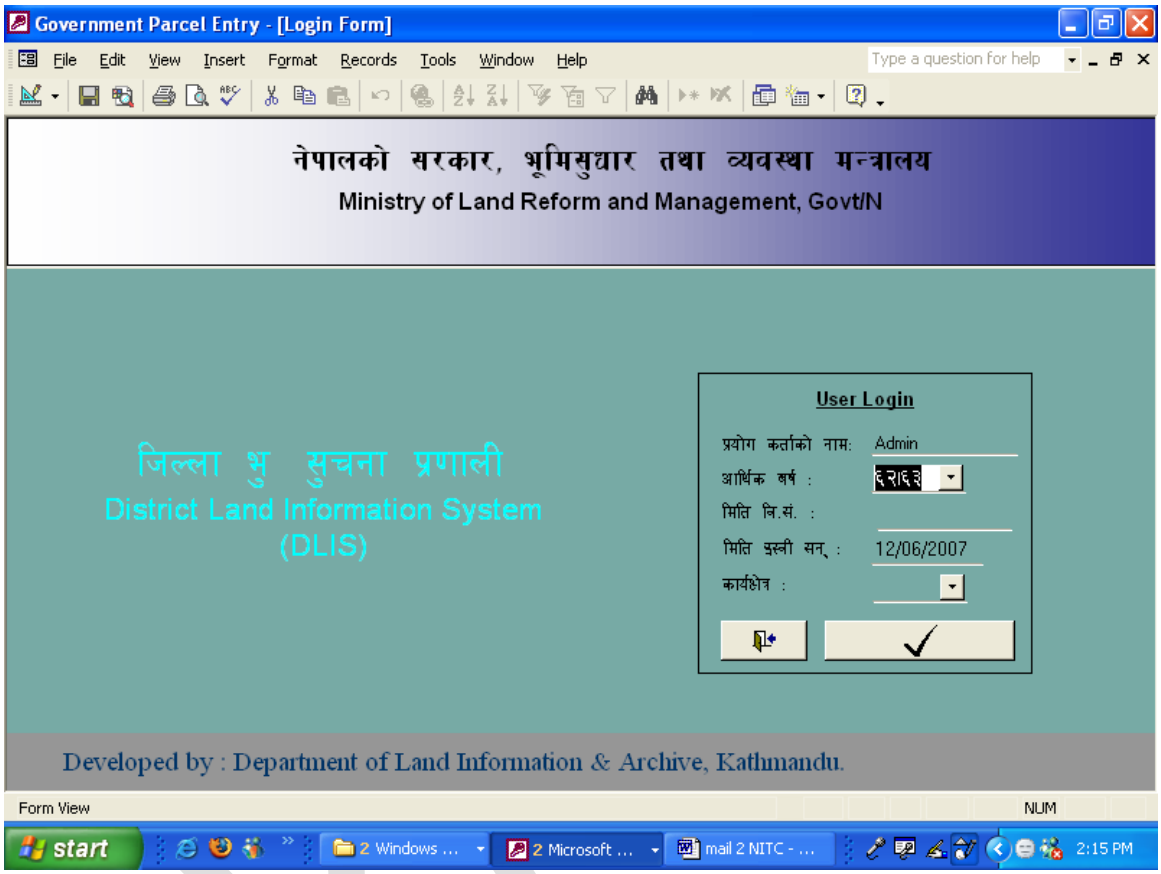
Appendix 5

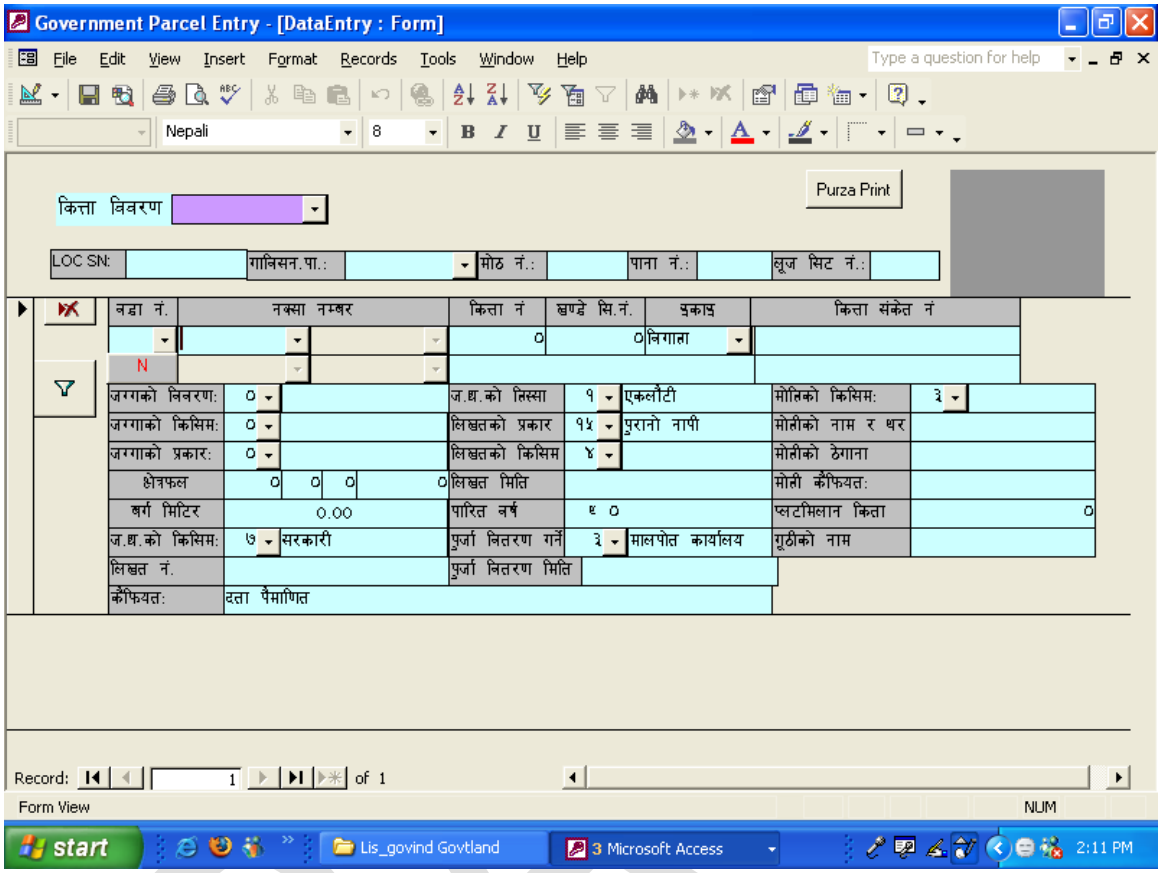
Legacy System Details

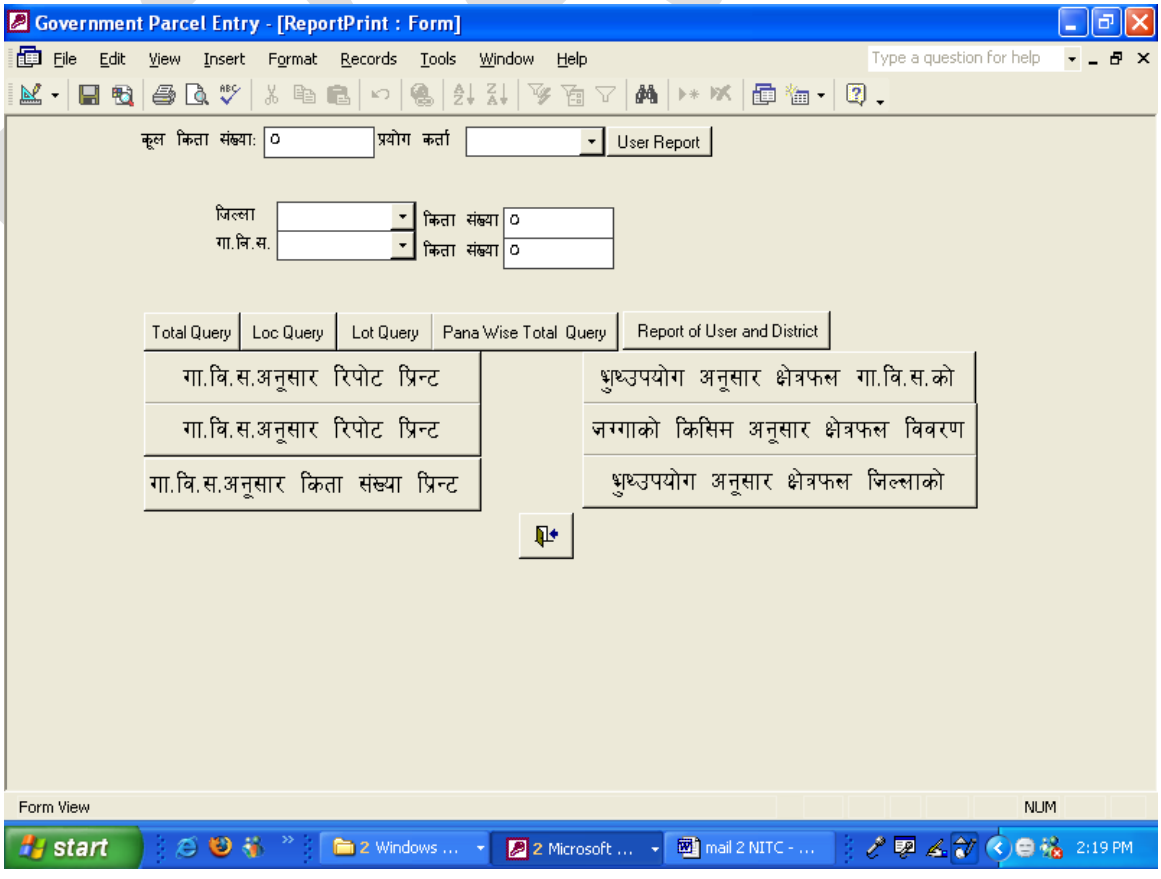
District Land Information System

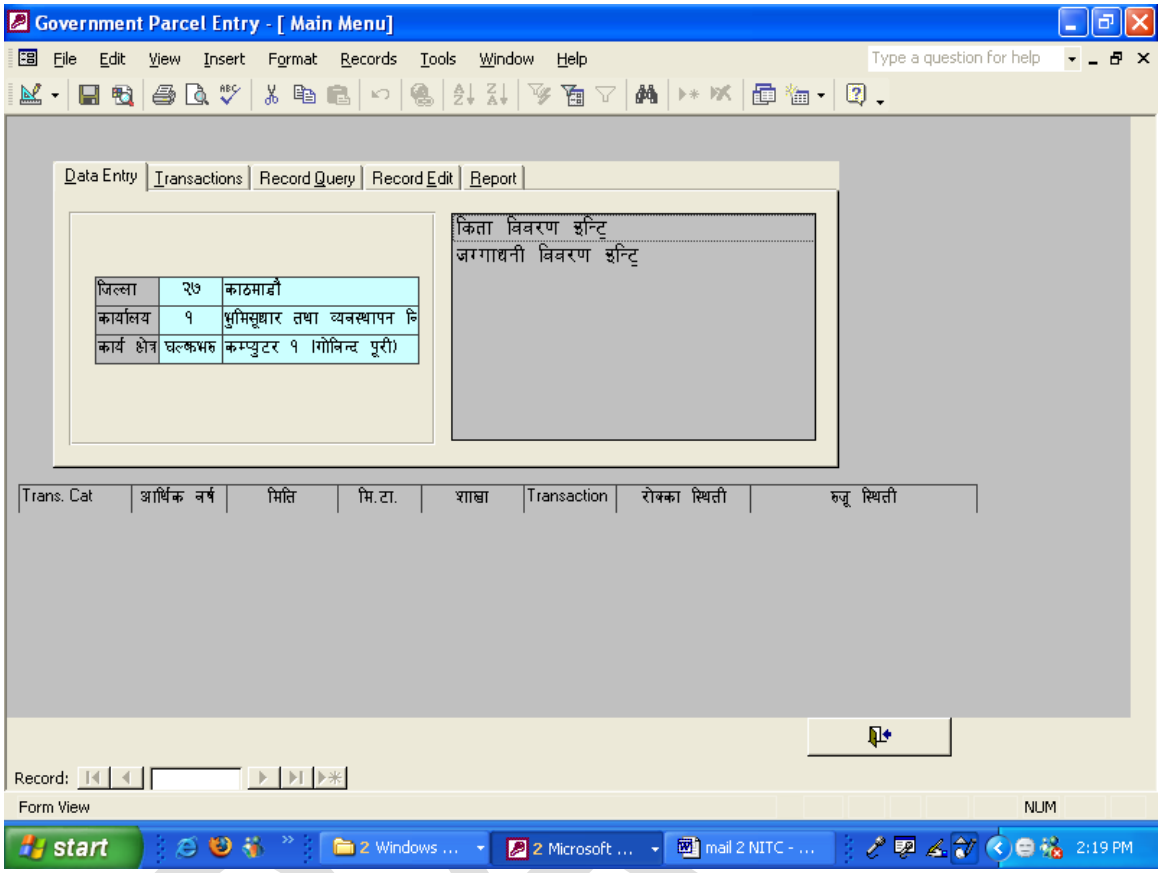
DLIS Main Menu

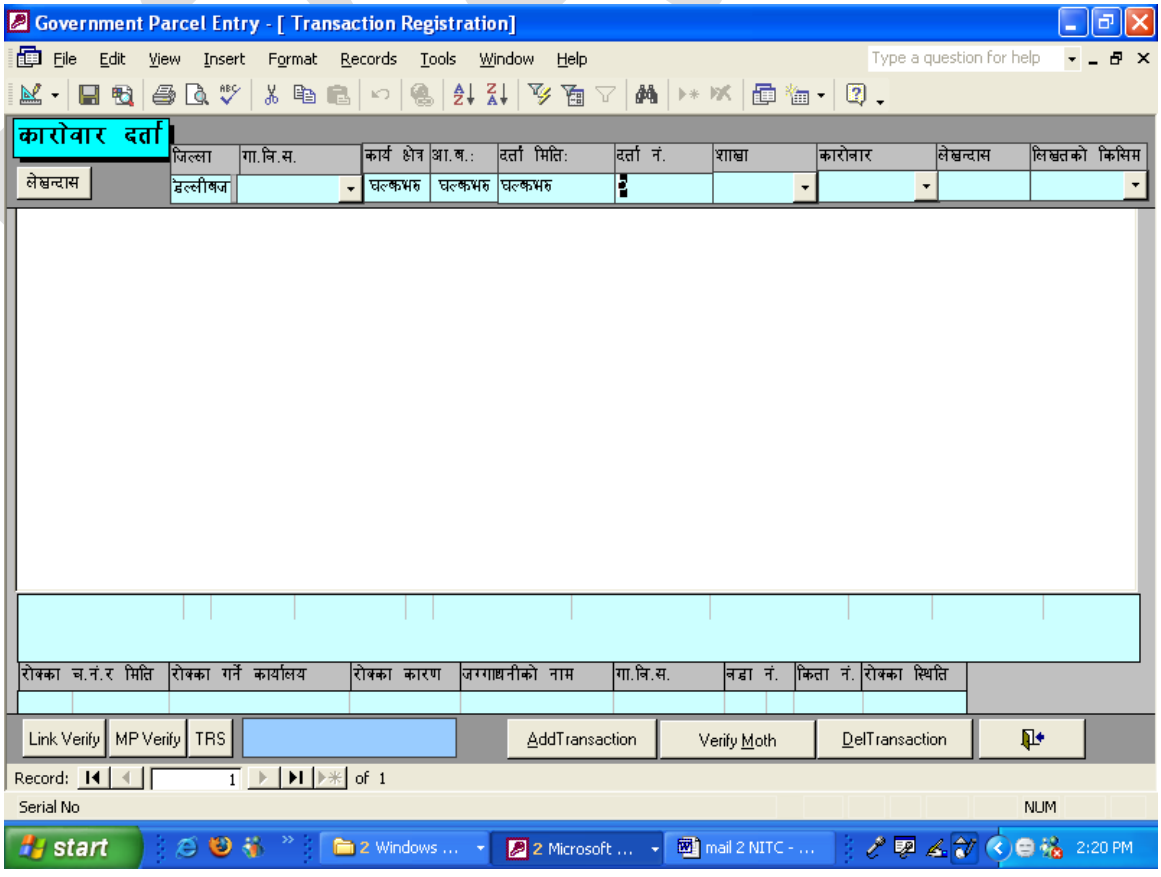
DLIS Main Forms




Government Parcel Entry - [DataEntry : Form]
File Edit View Insert Format Records Tools Window Help
Type a question for help
Nepali 8
Purza Print
LOC SN:
Record: 1 of 1
Form View
NUM
start
Lis_govind Govtland
3 Microsoft Access
2:11 PM


Government Parcel Entry - [ReportPrint : Form]
File Edit View Insert Format Records Tools Window Help
Type a question for help
User Report
Total Query
Loc Query
Lot Query
Pana Wise Total Query
Report of User and District
Form View
NUM
start
2 Windows ...
2 Microsoft ...
mail 2 NITC - ...
2:19 PM


Government Parcel Entry - [Main Menu]
File Edit View Insert Format Records Tools Window Help
Type a question for help
Data Entry
Transactions
Record Query
Record Edit
Report
किता विवरण इन्ट्रि
जग्गाधनी विवरण इन्ट्रि
जिल्ला २७ काठमाडौं
कार्यालय १ भुमिसुधार तथा व्यवस्थापन नि
कार्य क्षेत्र घल्कभरु कम्प्युटर १ (गोविन्द पुरी)
Trans. Cat
आर्थिक वर्ष
मिति
मि.टा.
शाखा
Transaction
रोक्का स्थिती
रुजु स्थिती
Record:
Form View
NUM
start
2 Windows ...
2 Microsoft ...
mail 2 NITC - ...
2:19 PM


Government Parcel Entry - [Transaction Registration]
File Edit View Insert Format Records Tools Window Help
Type a question for help
कारोबार दर्ता
जिल्ला
गा.वि.स.
कार्य क्षेत्र
आ.व.:
दर्ता मिति:
दर्ता नं.
शाखा
कारोबार
लेखन्दास
लिखतको किसिम
लेखन्दास
धल्सीखर्क
घल्कभरु
घल्कभरु
घल्कभरु
रोक्का च.नं.र मिति
रोक्का गर्ने कार्यालय
रोक्का कारण
जग्गाधनीको नाम
गा.वि.स.
वडा नं.
किता नं.
रोक्का स्थिति
Link Verify
MP Verify
TRS
AddTransaction
Verify Moth
DelTransaction
Record:
of 1
Serial No
NUM
start
2 Windows ...
2 Microsoft ...
mail 2 NITC - ...
2:20 PM

DLIS Table Descriptions

Table Structure

Table: LOC

Column Name	Type	Size
F_PO_SID	Double	8
F_Moth_SID	Long Integer	4
LOC_VDC	Integer	2
LOC_MothNo	Text	10
LOC_PanaNo	Text	15
F_Moth_LUJ	Text	1
F_PROP_TYP	Long Integer	4
F_OSHP_Typ	Long Integer	4
LOCHist	Yes/No	1
HistTCN	Double	8
AdjTCN	Double	8
F_Adjfy	Byte	1
F_AdjDTyp	Long Integer	4
F_AdjDocNo	Text	15
F_AdjDt	Long Integer	4
F_HistAdjfy	Byte	1
F_HistAdjDTyp	Long Integer	4
F_HistAdjDocNo	Text	15
F_HistAdjDt	Text	8
F_FY_ID	Byte	1
LMOCD	Integer	2
F_RecSts	Text	1
F_UpdUsr	Text	15
F_UpdDt	Date/Time	8

DRAFT

Column Name	Type	Size
F_UpdDtNep	Long Integer	4
LOC_LujSht	Text	15
LOC_SN	Long Integer	4

Table: LOCOSHP

Column Name	Type	Size
F_PO_SID	Double	8
F_PERS_SID	Double	8
F_HistTCN	Double	8
F_Adjfy	Byte	1
F_AdjDTyp	Long Integer	4
F_AdjDocNo	Text	15
F_AdjDt	Long Integer	4
F_Moth_SID	Long Integer	4
F_Pana_No	Text	15
F_PERS_Ownr	Double	8
F_HistAdjfy	Byte	1
F_HistAdjDTyp	Long Integer	4
F_HistAdjDocNo	Text	15
F_HistAdjDt	Long Integer	4
F_LOCOSHP_Hist	Yes/No	1
OwnrSID	Double	8
LOC_SN	Long Integer	4
OwnrVerified	Yes/No	1
OwnrUpdate	Text	10
Euser	Text	10
OwnrHist	Yes/No	1

DRAFT

Column Name	Type	Size
F_FY_ID	Byte	1
LMOCD	Integer	2
F_VDC_SID	Integer	2
F_Pers_Typ	Long Integer	4
F_PersID_Typ	Long Integer	4
F_Pers_IDNO	Text	27
F_Gender_Typ	Long Integer	4
F_RECSTS	Text	1
F_UpdDt	Date/Time	8
F_UpdUsr	Text	15
F_UpdDtNep	Long Integer	4

Table: LOTPRCL

Column Name	Type	Size
F_Prcl_SID	Double	8
F_PO_SID	Double	8
PrclVdccd	Integer	2
PrclWardno	Text	10
F_MpSht_SID	Long Integer	4
F_MpSht_SID2	Long Integer	4
F_MpSht_SID3	Long Integer	4
F_MpSht_SID4	Long Integer	4
PrclNo	Long Integer	4
PrclKhaSer	Text	5
PrclMothNo	Text	10
PrclPanaNo	Text	15

DRAFT

Column Name	Type	Size
PrclAunit	Long Integer	4
PrclArea1	Long Integer	4
PrclArea2	Byte	1
PrclArea3	Byte	1
PrclArea4	Single	4
PrclArsqm	Double	8
PrclLndtp	Long Integer	4
PrclLndcls	Long Integer	4
PrclLnduse	Long Integer	4
F_OshpShr	Integer	2
F_Own_Typ	Long Integer	4
PrclIssAut	Long Integer	4
PrclIssDt	Long Integer	4
UnReg	Yes/No	1
F_Adjfy	Byte	1
F_Trn_TYP	Long Integer	4
F_AdjDTyp	Long Integer	4
F_AdjDocNo	Text	15
F_AdjDt	Long Integer	4
PrclRem	Text	250
TntTyp	Long Integer	4
F_Tnt_Typ	Long Integer	4
F_Tnt_SID	Double	8
F_Guthi_Nm	Text	35
Khande	Yes/No	1

DRAFT

Column Name	Type	Size
Floor	Yes/No	1
DOEn	Yes/No	1
AdjTCN	Double	8
LOTPrclHist	Yes/No	1
HistTCN	Double	8
F_HistAdjfy	Byte	1
F_HistAdjDTyp	Long Integer	4
F_HistAdjDocNo	Text	15
F_HistAdjDt	Text	8
F_UpdUsr	Text	15
F_UpdDt	Date/Time	8
F_UpdDtNep	Long Integer	4
F_RecSts	Text	1
F_FY_ID	Byte	1
LMOCD	Integer	2
F_SignedBy	Text	15
remark	Text	250
PrclRFSts	Byte	1

Table: MPTPRCLLINK

Column Name	Type	Size
F_PRCL_SID	Double	8
F_MpSht_SID	Long Integer	4
F_MpSht_SID2	Long Integer	4
F_MpSht_SID3	Long Integer	4
F_MpSht_SID4	Long Integer	4

DRAFT

Column Name	Type	Size
F_SrcPrcl_SID	Double	8
F_Moth_SID	Long Integer	4
PrclMothNo	Text	10
F_Pana_No	Text	15
PrclVdccd	Integer	2
PrclWardno	Text	10
PrclNo	Long Integer	4
PrclAunit	Long Integer	4
PrclArea1	Long Integer	4
PrclArea2	Byte	1
PrclArea3	Single	4
PrclArea4	Single	4
PrclArsqm	Double	8
PrclLndtp	Long Integer	4
PrclLndcls	Long Integer	4
PrclLnduse	Long Integer	4
PrclVerified	Yes/No	1
PrclSrc	Byte	1
PrclDigSts	Long Integer	4
Khande	Yes/No	1
Floor	Yes/No	1
DoEn	Yes/No	1
UnReg	Yes/No	1
PrclHist	Yes/No	1
HistTCN	Double	8

DRAFT

Column Name	Type	Size
AdjTCN	Double	8
F_Adjfy	Byte	1
F_AdjDTyp	Long Integer	4
F_AdjDocNo	Text	15
F_AdjDt	Long Integer	4
F_HistAdjfy	Byte	1
F_HistAdjDTyp	Long Integer	4
F_HistAdjDocNo	Text	15
F_HistAdjDt	Long Integer	4
F_RecSts	Text	1
F_UpdDt	Date/Time	8
F_UpdUsr	Text	15
F_UpdDtNep	Long Integer	4
F_FY_ID	Byte	1
LMOCD	Integer	2

Table: SATOWNR

Column Name	Type	Size
F_PERS_SID	Double	8
LMOCD	Integer	2
F_FY_ID	Byte	1
F_PersID_Typ	Long Integer	4
F_GFL_Rel	Long Integer	4
F_FH_Rel	Long Integer	4
F_Age	Byte	1
F_UpdUsr	Text	10

DRAFT

Column Name	Type	Size
F_UpdDt	Date/Time	8
F_RECSTS	Text	1
OwnrSID	Double	8
OwnrIDNO	Text	27
OwnrClsCD	Long Integer	4
OwnrCcio	Long Integer	4
OwnrCCDist	Byte	1
OwnrCCNo	Text	20
OwnrCCYr	Integer	2
OwnrCCMo	Byte	1
OwnrCCDD	Byte	1
OwnrTypCod	Long Integer	4
OwnrFname	Text	50
OwnrName	Text	50
OwnrMname	Text	50
OwnrLname	Text	50
OwnrDistCod	Byte	1
OwnrVDCcod	Integer	2
OwnrWardNo	Text	10
OwnrLOC	Text	50
OwnGFL	Text	1
OwnrGRName	Text	50
OwnrGfname	Text	50
OwnrGmname	Text	50
OwnrGlname	Text	50

DRAFT

Column Name	Type	Size
OwnFH	Text	1
OwnrFHName	Text	50
OwnrFfname	Text	50
OwnrFmname	Text	50
OwnrFlname	Text	50
OwnGfrel	Text	2
OwnrFrel	Text	50
OwnrDob	Text	8
OwnrSex	Long Integer	4
OwnrRem	Text	250
OwnrUpdate	Text	10
OwnrC	Yes/No	1
F_Ward_NO	Text	2
F_Ward_Alpha	Text	5
F_UpdDtNep	Long Integer	4

Table: T_MOTH

Column Name	Type	Size
F_Moth_SID	Long Integer	4
F_MothLuj_No	Text	15
F_Moth_Alpha	Text	5
F_VDC_SID	Integer	2
F_Moth_LUJ	Text	1
F_FY_ID	Byte	1
LMOCD	Integer	2
HistTCN	Double	8

DRAFT

Column Name	Type	Size
AdjTCN	Double	8
F_Adjfy	Byte	1
F_AdjDTyp	Long Integer	4
F_AdjDocNo	Text	15
F_AdjDt	Text	8
F_RecSts	Text	1
F_UpdUsr	Text	15
F_UpdDt	Date/Time	8
F_UpdDtNep	Long Integer	4

Table: T_PROPTNT

Column Name	Type	Size
F_TNT_SID	Double	8
F_TNT_SN	Long Integer	4
F_Prcl_SID	Double	8
F_PO_SID	Double	8
F_Tnt_Cat	Long Integer	4
F_Mpsht_SID	Long Integer	4
F_PrclNo	Long Integer	4
F_MothNo	Text	10
F_panaNo	Text	10
OwnrSID	Double	8
OwnrIDNO	Text	27
OwnrClsCD	Long Integer	4
OwnrCcio	Long Integer	4
OwnrCCDist	Byte	1

DRAFT

Column Name	Type	Size
OwnrCCNo	Text	20
OwnrCCYr	Integer	2
OwnrCCMo	Byte	1
OwnrCCDD	Byte	1
OwnrSex	Long Integer	4
F_PersID_Typ	Long Integer	4
F_Off_SID	Long Integer	4
F_YrMnDy	Long Integer	4
F_Pers_IDNO	Text	15
F_Gender_Typ	Integer	2
F_Pers_NmNep	Text	35
F_Age	Byte	1
F_FH_NMNep	Text	35
F_FH_Rel	Long Integer	4
F_GFL_NmNep	Text	35
F_GFL_Rel	Long Integer	4
F_FY_ID	Byte	1
LMOCD	Integer	2
F_Dist_ID	Byte	1
F_VDC_SID	Integer	2
F_Ward_NO	Text	10
F_Loc	Text	50
F_Rem	Text	250
F_RecSts	Text	1
F_UpdUsr	Text	15

DRAFT

Column Name	Type	Size
F_UpdDt	Date/Time	8
F_UpdDtNep	Long Integer	4
TntHist	Yes/No	1

Spatial Application Extension (SAEx) to ArcGIS

SAEx Table Descriptions

Table Parcel Feature Class

Field Data	Type
OBJECTID	Object ID
SHAPE	Geometry
SHAPE_Length	Double
SHAPE_Area	Double
PARCELKEY	Text
PARCELNO	Short Integer
DISTRICT	Short
VDC	Short Integer
WARDNO	Text
GRIDS1	Text
PARCELTY	Short Integer

Table Construction Feature Class

Field Data	Type
OBJECTID	Object ID
SHAPE	Geometry
SHAPE_Length	Double
SHAPE_Area	Double

DRAFT

Field Data	Type
ParFID Long	Integer
ConsTy	Short Integer

Table Parcel Segments Feature Class

Field Data	Type
OBJECTID	Object
SHAPE	Geometry
SHAPE_Length	Double
SegNo	Short Integer
ParFID	Long Integer
Boundty	Short Integer
Aboundty	Short Integer
Mboundty	Short Integer

Table Parcel History Feature Class

Field Data	Type
OBJECTID	Object ID
SHAPE	Geometry
SHAPE_Length	Double
SHAPE_Area	Double
PARCELKEY	Text
PARCELNO	Short Integer
DISTRICT	Short Integer
VDC	Short Integer
WARDNO	Text
GRIDS1	Text
PARCELTY	Short Integer

DRAFT

Field Data	Type
BDate	Date
LINKFID	Long Integer

Table Parcel Vertical Parcel Feature Class

Field Data	Type
OBJECTID	Object ID
SHAPE	Geometry
SHAPE_Length	Double
SHAPE_Area	Double
ParFID	Long Integer
OwnerID	Short Integer

DRAFT

Appendix 6

Feasibility Study Activities

Date and Day	Time	Offices	Meeting Personnel
16th August / Sunday	12:00	Joint Secretary Ministry of Land Reform & Management	Mr Raja Ram Chatkuli Working Group
17th August / Monday	10:15	FAO	Mr. Laxman Gautam
	11:15	Ministry	Mr. Susheel Dangol
	2:30	DoLIA	Mr. Jeet Bahadur Thapa, Director Mr. Jay Prakash Mandal, Director
18th August / Tuesday	11:30	Digital Cadastral System Banepa,	Mr. Khil Raj Chauhan, Survey Officer
	1:30	Land Management Training Center, Dhulikhel	Mr. Rabin Kaji Sharma, Executive Director Mr. Giri Raj Khanal, Director
	2:30	Survey Office, Dhulikhel	Mr. Khil Raj Chauhan
	3:30	Land Revenue Office, Dhulikhel	Mr. Janardan Guragain, Chief Revenue Officer
19th August / Wednesday	11:00	Land Revenue Office, Dillibazaar	Mr. Prem Bahadur Khapung, Chief Revenue Officer
	1:00	Survey Office, Dillibazaar	Mr. Sansar Nath Pandey, Chief Survey Officer Mr. Kamal Ghimire, Survey Officer
	3:00	Department of Land Reform and Management, Babar Mahal	Mr. Rajendra Prasad Sharma, Director General Mr. Kapil Dev Shrestha, Director Mr. Govinda Shapkota, Director Mr. Narayan Adhikary, Director
20th August / Thursday	12:00	Land Revenue Office, Bhaktapur	Mr. Rohit Bhattarai, Chief Revenue Officer

DRAFT

Date and Day	Time	Offices	Meeting Personnel
	2:00	Survey Office, Bhaktapur	Mr. Balabhadra Jha, Survey Officer
21st August / Friday	9:30 – 11:30	UN (Security Briefing)	
	12:00	Survey Department	Mr. Hridaya Narayan Mishra, Director General Mr. Kalyan Gopal Shrestha, Chief Survey Officer, Mr. Suresh Man Shrestha, Project Director Mr. Jagat Raj Paudel, Chief Survey Officer Mr. Shijan Dhakal, Survey Officer
23th August / Sunday	10:30	Survey Office, Biratnagar	Mr. Ram Binod Mahaseth
	12:00	Land Revenue Office, Biratnagar	Mr. Madhusudhan Pokharel, Chief Revenue Officer
	2:30	Land Reform Office, Biratnagar	
24th August / Monday	11:00	Genesis	Mr Anis Joshi
	1:30	Geospatial	Mr Suresh Shrestha
	3:00	Survey Office & Land Revenue Office, Lalitpur	
25th August / Tuesday	11:30	DoLIA	Mr. Jay Prakash Mandal, Director Mr. Kapil Dev Shrestha, Director
26th August / Wednesday		Report Writing	
			Mr Babu Ram Acharya, Secretary, Ministry of Labour & Transport Management
26th August / Wednesday	11:00	Office of Prime Minister and Council of Ministers	Mr Lilamani Paydyal, Secretary (Economy, Infrastructure Development and Good Governance) OPMCM Mr Narayan Raj Timilsend, Under – Secretary (Foreign Affairs & Ceremony Mgmt. / Infrastructure Development Section) OPCM

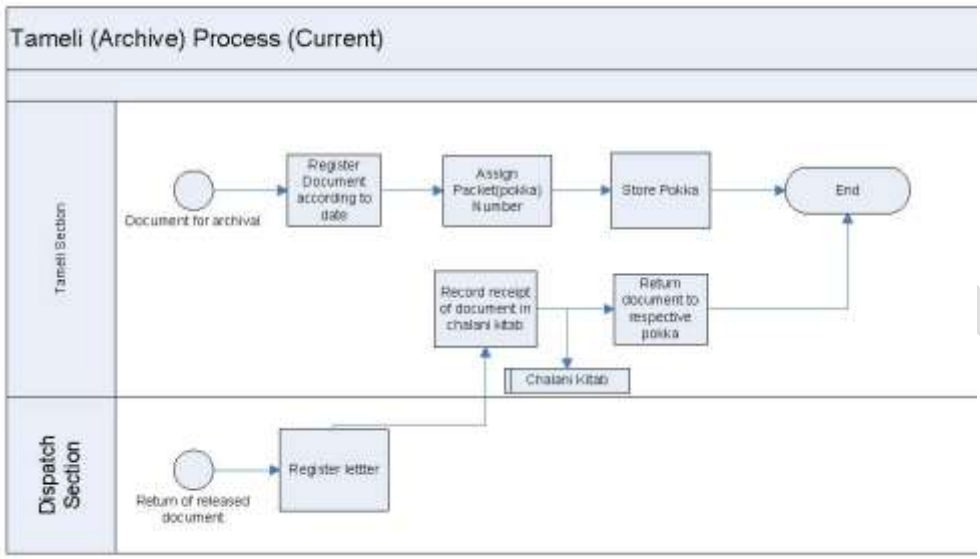
DRAFT

Date and Day	Time	Offices	Meeting Personnel
28th August / Friday	8:30	UN FAO	Mr. Laxman Gautam
	1:00	DOLIA	Presentation to OSCAR Working Group

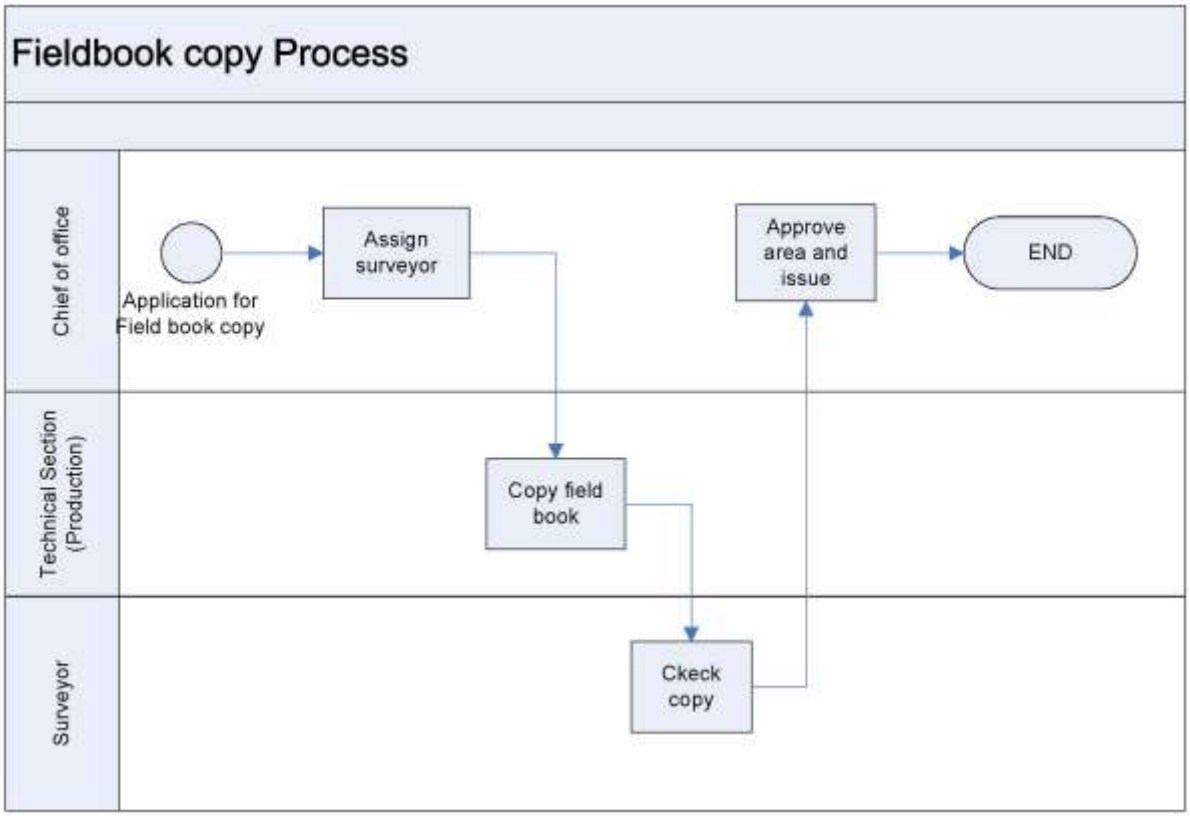
DRAFT

Appendix 7

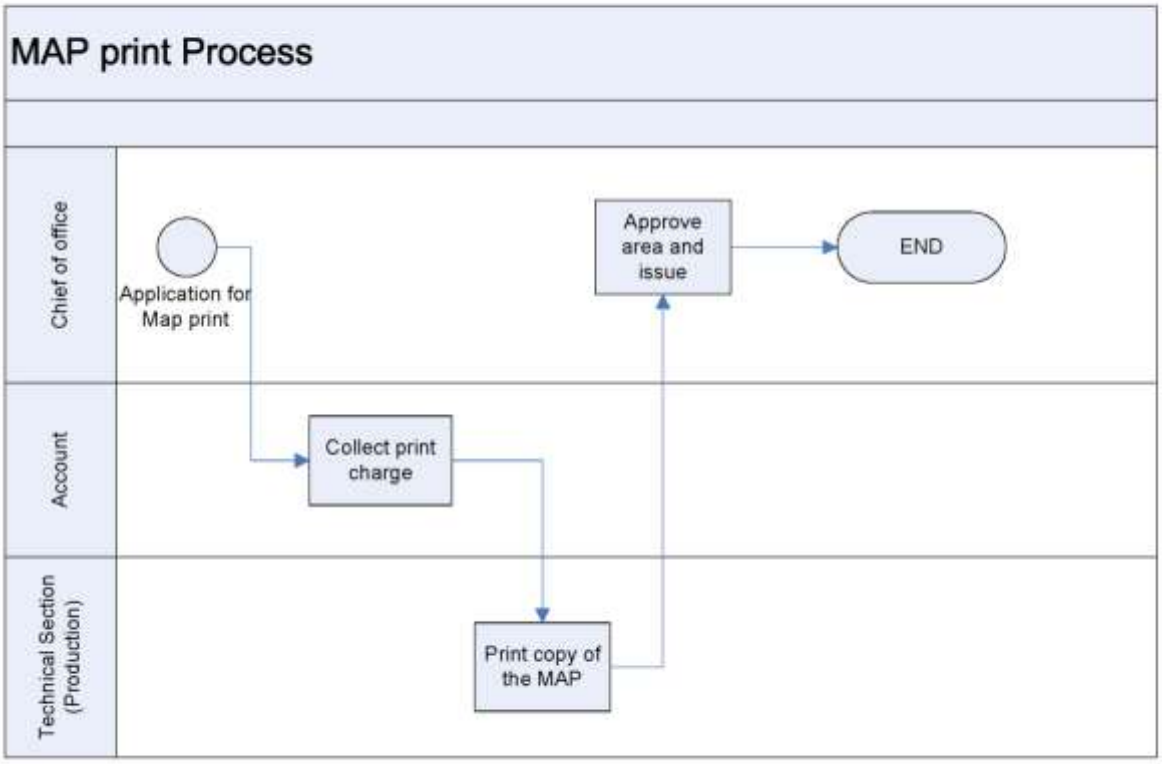
Current District Office Business Process Flow Charts[7]



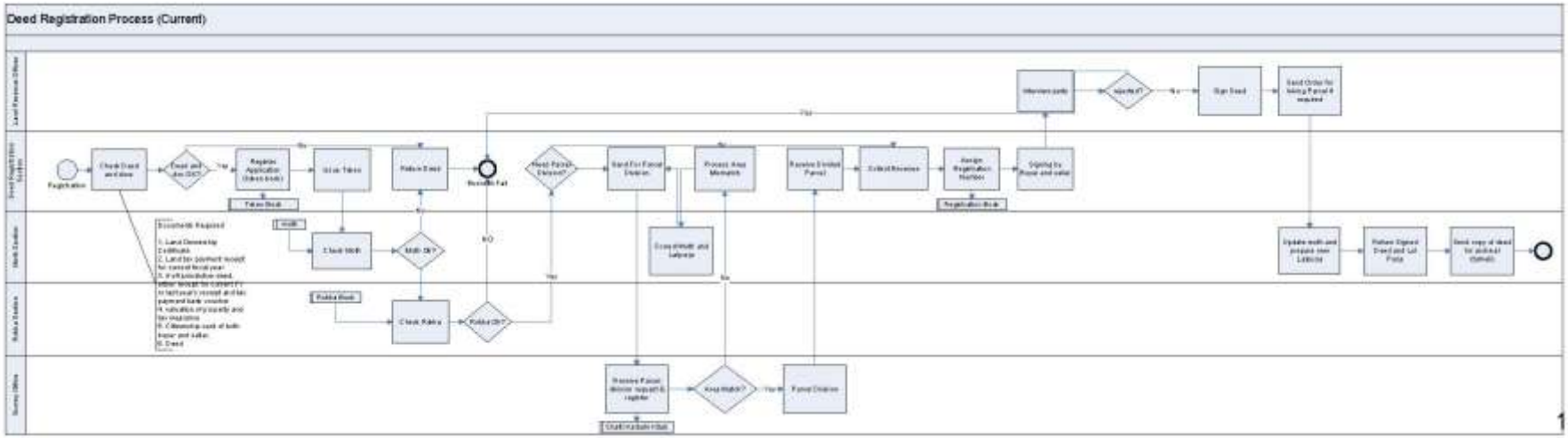
[7] Prepared by Finncom, the ADB consultants for the "Strengthening Land Administration Services" project (March 2009)

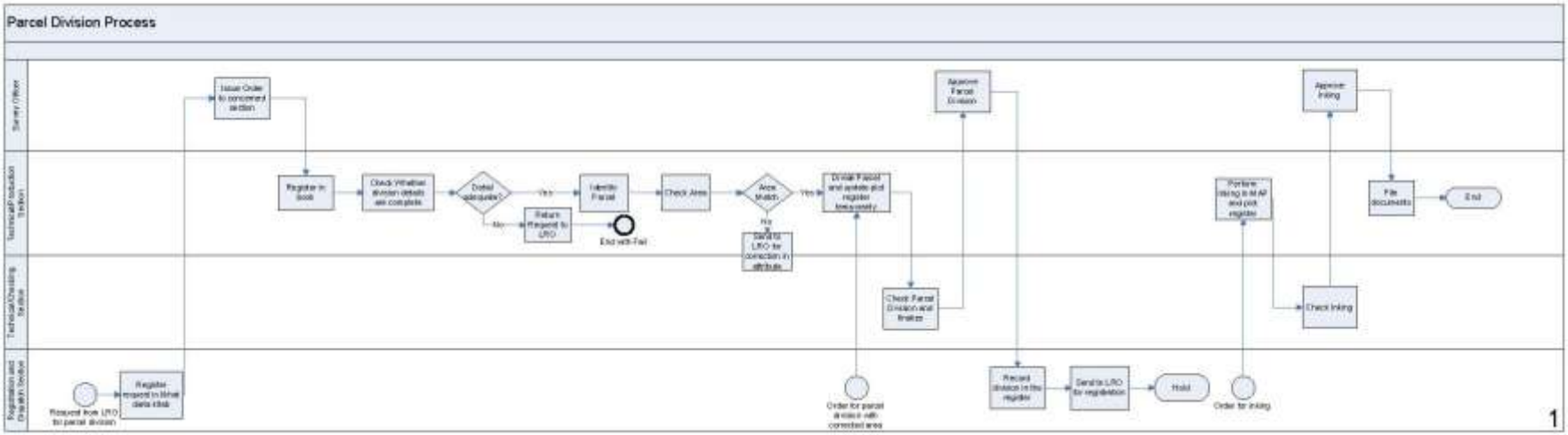

Fieldbook copy Process
Chief of office
Technical Section (Production)
Surveyor
Application for Field book copy
Assign surveyor
Approve area and issue
END
Copy field book
Ckeck copy

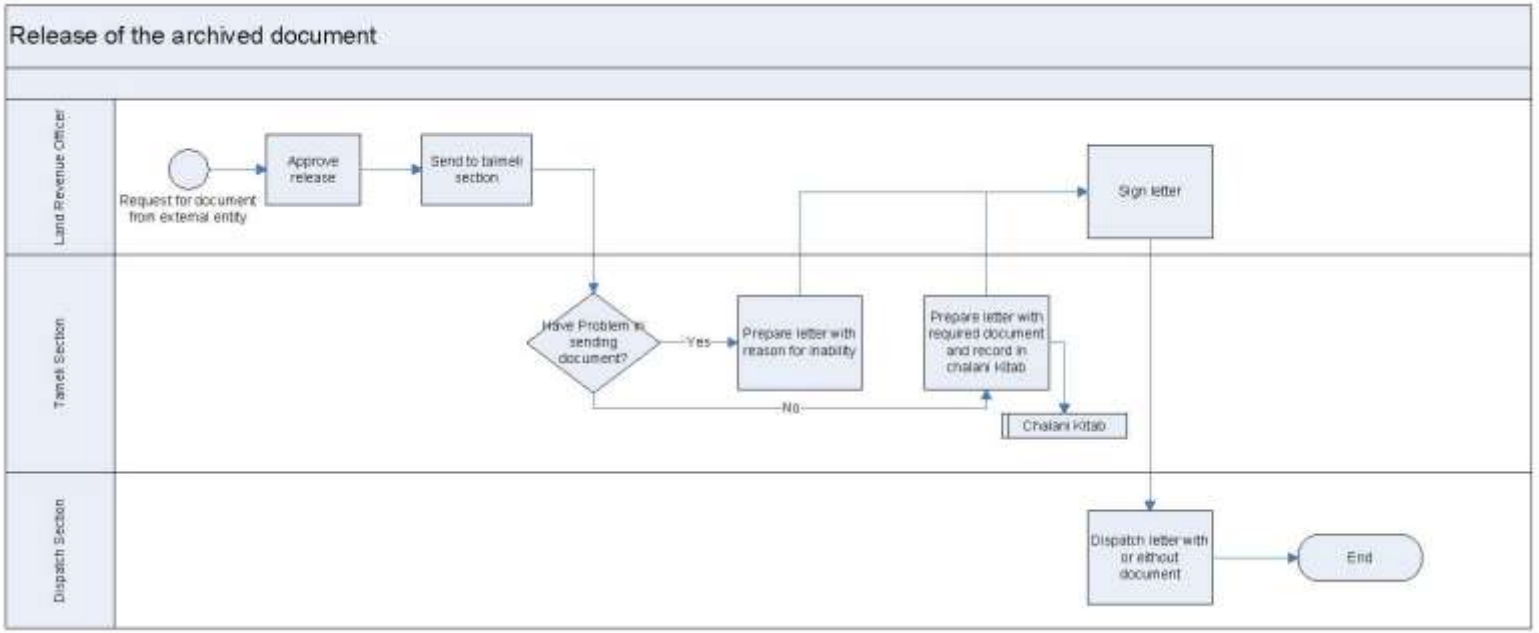
DRAFT

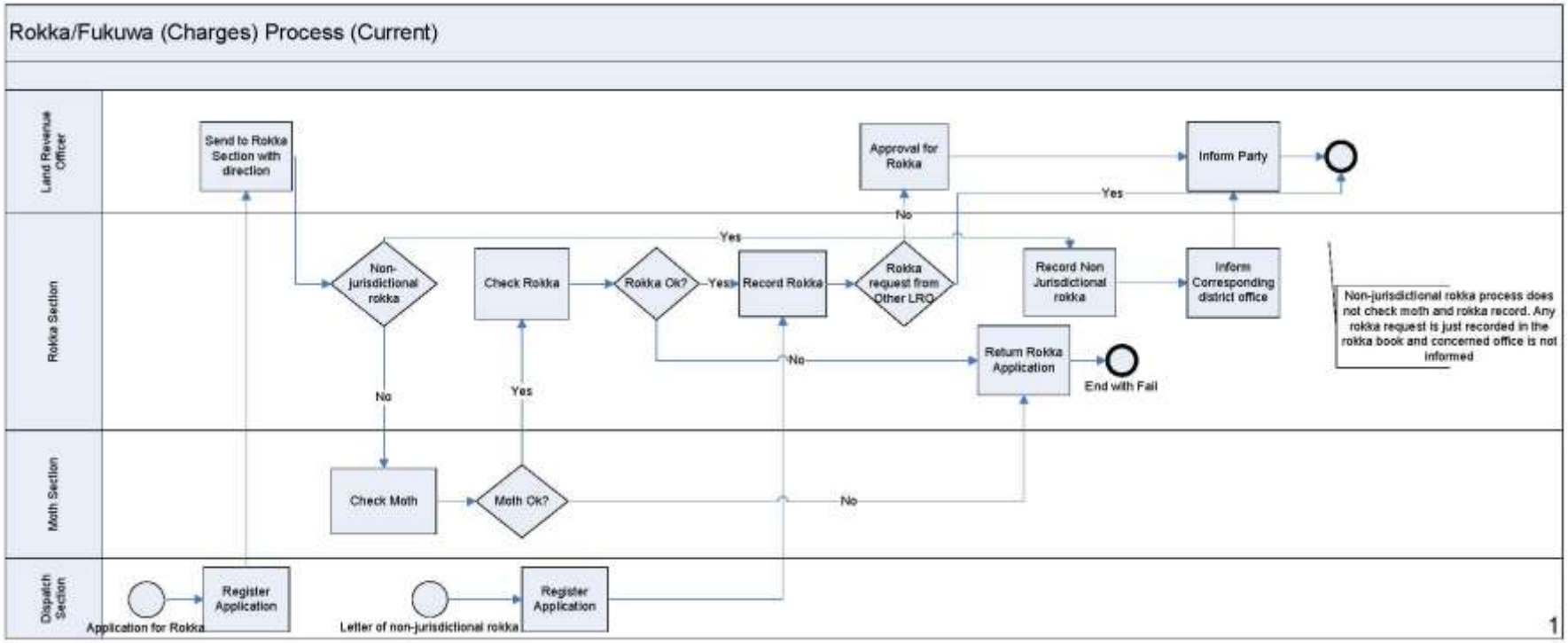

MAP print Process
Chief of office
Account
Technical Section (Production)
Application for Map print
Collect print charge
Print copy of the MAP
Approve area and issue
END

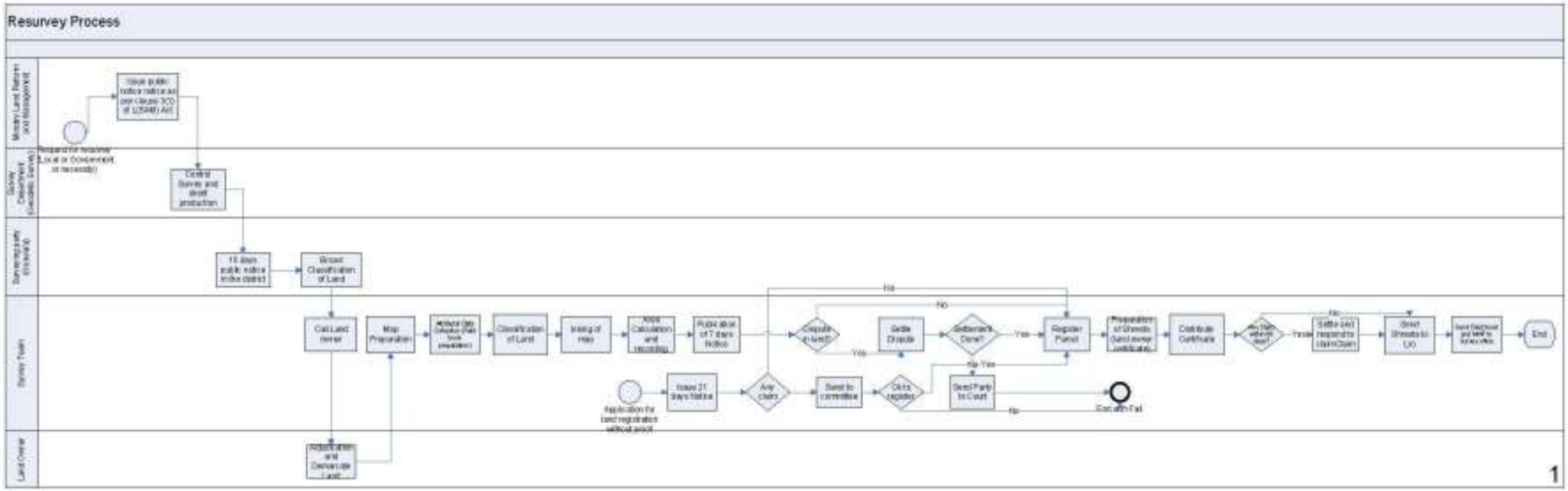
DR

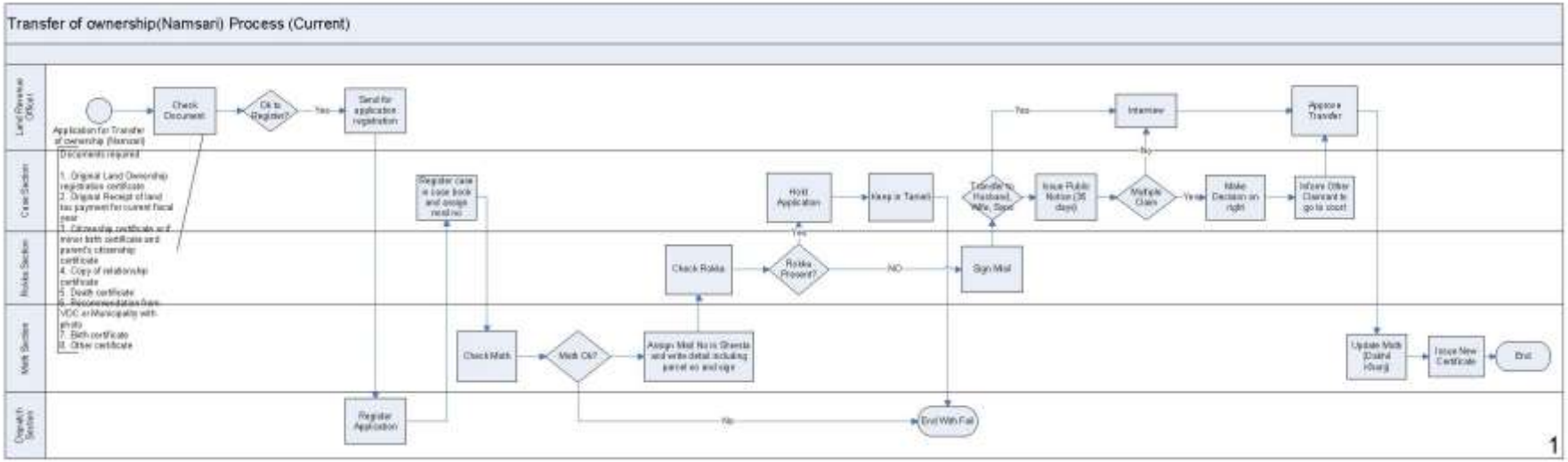

Deed Registration Process (Current)


Parcel Division Process

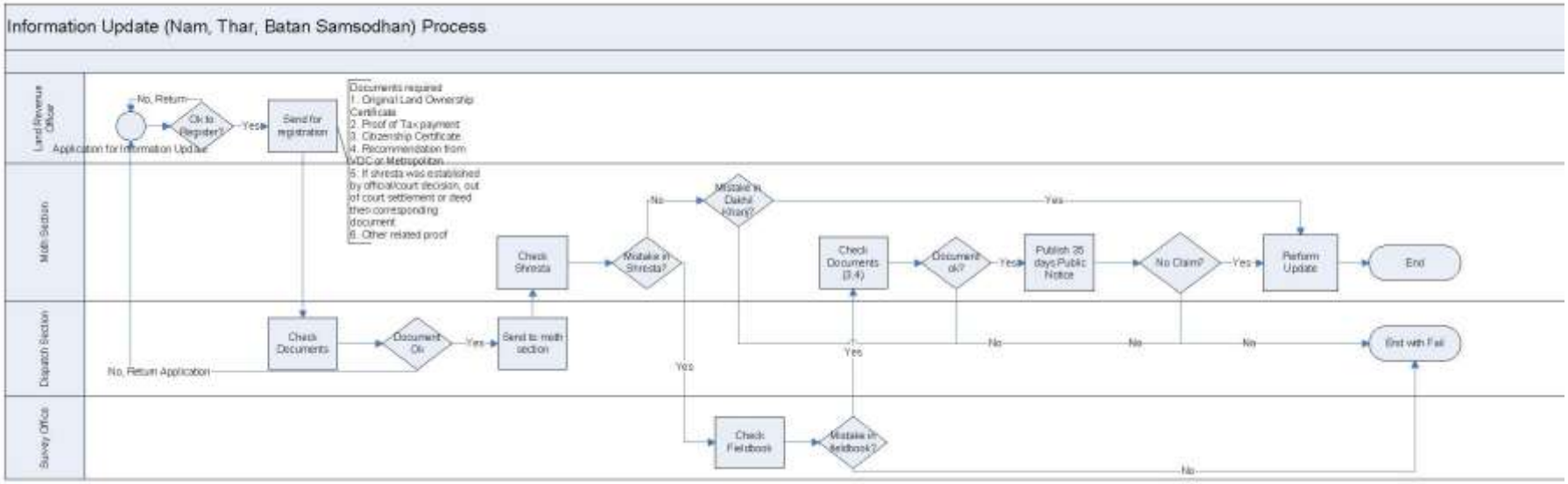

Release of the archived document
Land Revenue Officer
Request for document from external entity
Approve release
Send to talmeli section
Sign letter
Tameli Section
Have Problem in sending document?
Yes
No
Prepare letter with reason for inability
Prepare letter with required document and record in chalani kitab
Chalani Kitab
Dispatch Section
Dispatch letter with or without document
End

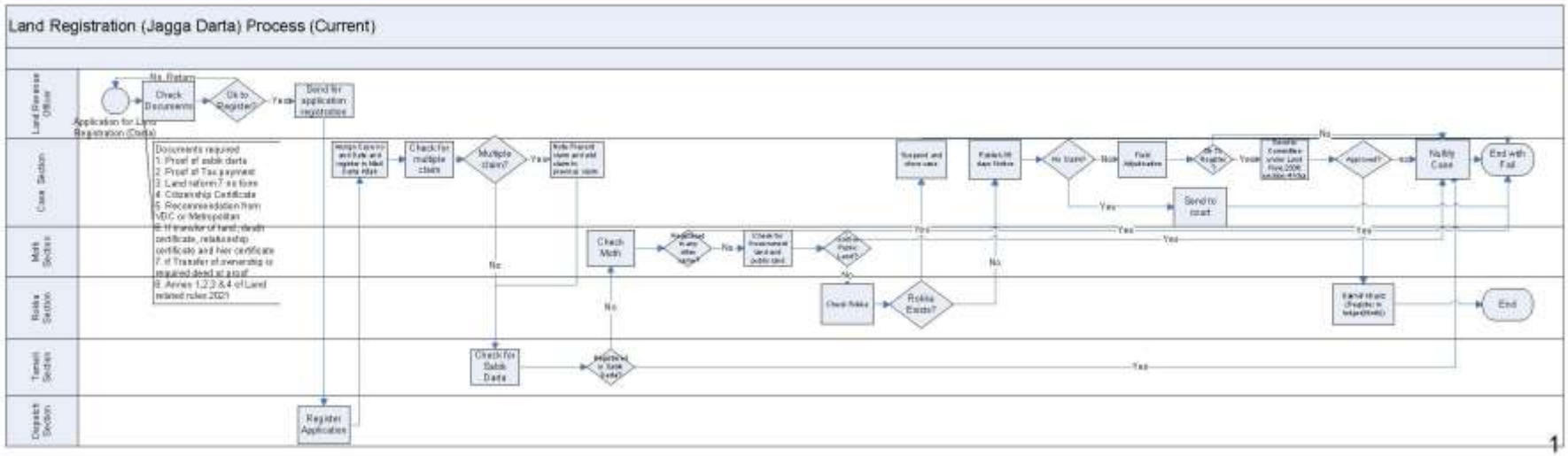

Rokka/Fukuwa (Charges) Process (Current)
Land Revenue Officer
Rokka Section
Moth Section
Dispatch Section
Send to Rokka Section with direction
Non-jurisdictional rokka
Check Rokka
Rokka Ok?
Record Rokka
Rokka request from Other LRO
Approval for Rokka
Record Non Jurisdictional rokka
Inform Party
Inform Corresponding district office
Return Rokka Application
End with Fail
Non-jurisdictional rokka process does not check moth and rokka record. Any rokka request is just recorded in the rokka book and concerned office is not informed
Check Moth
Moth Ok?
Register Application
Application for Rokka
Register Application
Letter of non-jurisdictional rokka
Yes
No
1

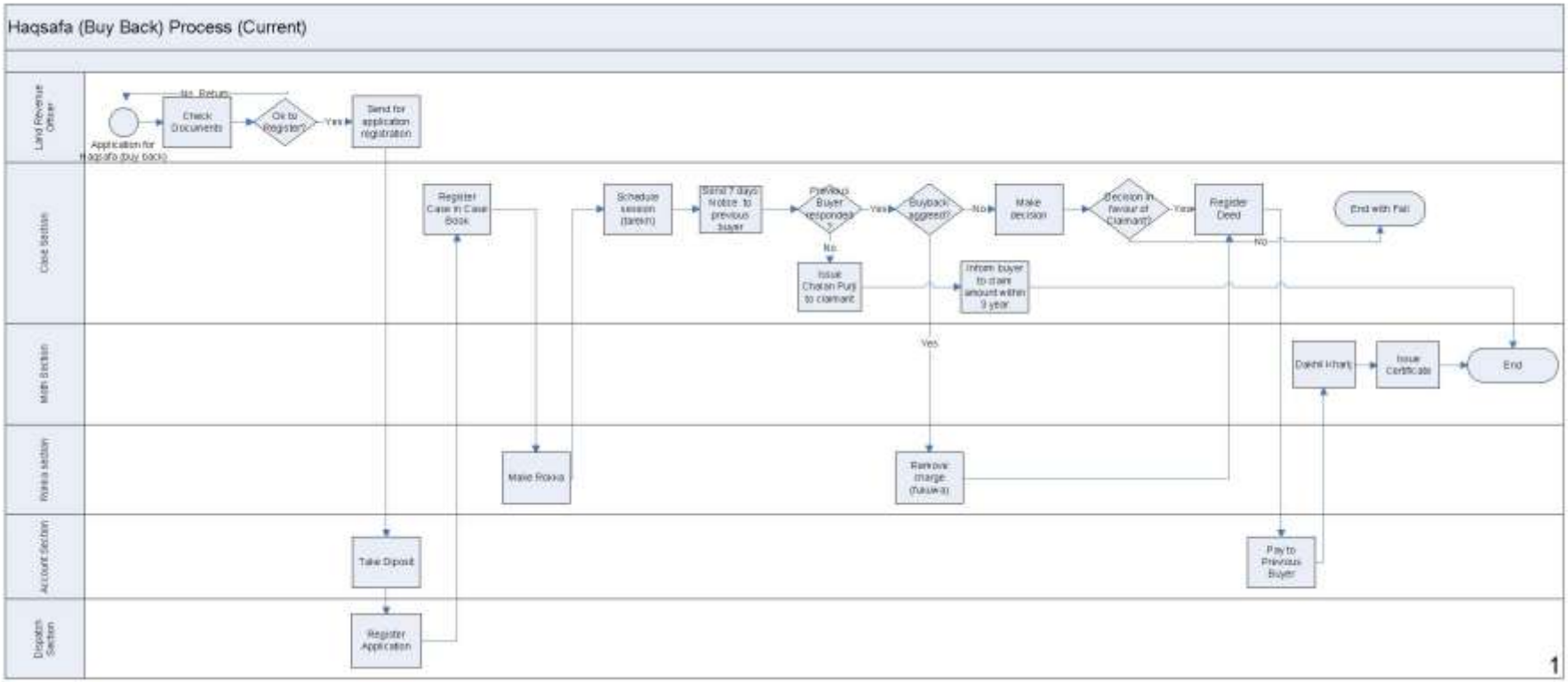

Resurvey Process
Survey Team
Land Owner
Call Land owner
Map Preparation
Classification of Land
Issuing of map
Publication of 7 days Notice
Settle Dispute
Register Parcel
Certificate Certificate
Send Sheets to LO
End
Issue 21 days Notice
Send to committee
Send Party to Court
Escalation Fail
No
Yes
1

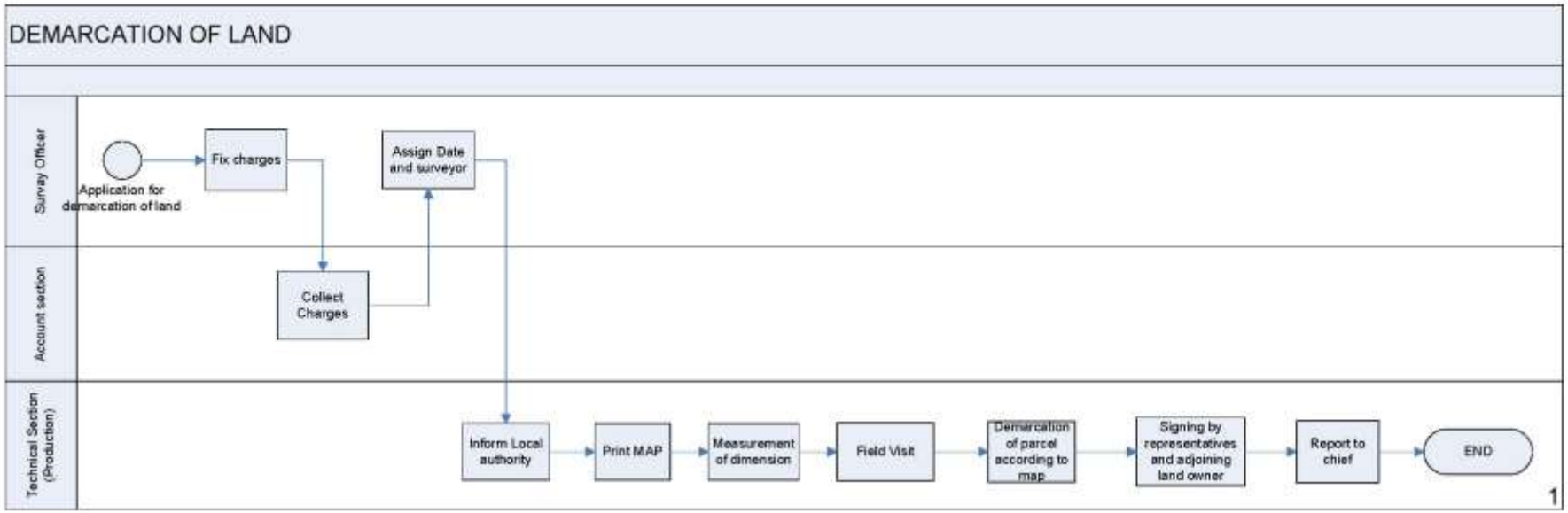

Transfer of ownership(Namsari) Process (Current)
Land Revenue Officer
Case Section
Rokka Section
Math Section
Dispatch Section
Application for Transfer of ownership (Namsari)
Check Document
Ok to Register?
Yes
Send for application registration
Register case in case book and assign need no
Register Application
Check Math
Math Ok?
Assign Mail No in Sheets and write detail including parcel no and sign
Check Rokka
Rokka Present?
NO
Yes
Hold Application
Keep in Tarneli
Sign Mail
Transfer to Husband, Wife, Sons
Issue Public Notice (35 days)
Multiple Claim
Yes
No
Make Decision on right
Inform Other Claimant to go to court
Interview
Approve Transfer
Update Math (Dakhil Khanj)
Issue New Certificate
End
End With Fail
1

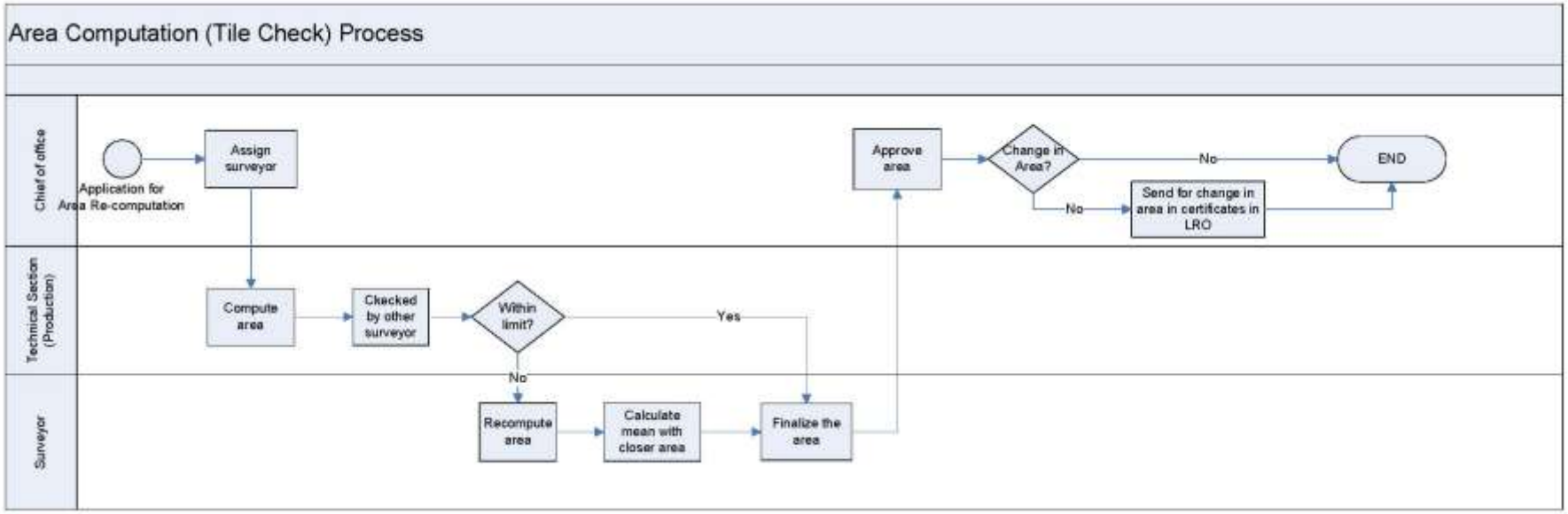
DRAFT


Information Update (Nam, Thar, Batan Samsodhan) Process
Land Revenue Officer
Moth Section
Dispatch Section
Survey Office
No, Return
Application for Information Update
Ok to Register?
Yes
Send for registration
Documents required
1. Original Land Ownership Certificate
2. Proof of Tax payment
3. Citizenship Certificate
4. Recommendation from VDC or Metropolitan
5. If shresta was established by official/court decision, out of court settlement or deed then corresponding document
6. Other related proof
Check Documents
Document Ok
Yes
Send to moth section
No, Return Application
Check Shresta
Mistake in Shresta?
No
Mistake in Dakhil Khani?
Yes
Check Fieldbook
Mistake in fieldbook?
Yes
No
Check Documents (3,4)
Document ok?
Yes
Publish 35 days Public Notice
No Claim?
Yes
Perform Update
End
No
No
No
End with Fail


Land Registration (Jagga Darta) Process (Current)
Land Revenue Office
Case Section
Math Section
Rokka Section
Tamali Section
Dispatch Section
Check Documents
Ok to Register?
Send for application registration
Check for multiple claim
Multiple claim?
Check Math
Check for Sabik Darta
Register Application
Rokka Exists?
Send to court
Nullify Case
End with Fail
End
Yes
No


Haqsafa (Buy Back) Process (Current)
Land Revenue Officer
Case Section
Math Section
Rokka section
Account Section
Dispatch Section
Application for Haqsafa (Buy back)
Check Documents
No Return
Ok to Register?
Yes
Send for application registration
Register Case in Case Book
Schedule session (Tarikh)
Send 7 days Notice to previous buyer
Previous Buyer responded ?
Yes
No
Buyback agreed?
No
Make decision
Decision in favour of Claimant?
Yes
No
Register Deed
End with Fail
Issue Chalan Purji to claimant
Inform buyer to claim amount within 3 year
Yes
Make Rokka
Remove charge (Tukuwa)
Dakhil kharij
Issue Certificate
End
Take Diposit
Register Application
Pay to Previous Buyer
1


DEMARCATION OF LAND
Survay Officer
Account section
Technical Section (Production)
Application for demarcation of land
Fix charges
Collect Charges
Assign Date and surveyor
Inform Local authority
Print MAP
Measurement of dimension
Field Visit
Demarcation of parcel according to map
Signing by representatives and adjoining land owner
Report to chief
END
1


Area Computation (Tile Check) Process
Chief of office
Technical Section (Production)
Surveyor
Application for Area Re-computation
Assign surveyor
Compute area
Checked by other surveyor
Within limit?
Yes
No
Recompute area
Calculate mean with closer area
Finalize the area
Approve area
Change in Area?
No
END
No
Send for change in area in certificates in LRO

Appendix 8

Suggested Changes to OSCAR Pilot project document

Section	Suggested Change
4.1 (Second paragraph)	In Nepal the implementing agency is the Ministry of Land Reform Management that has the responsibility for registration and cadastral mapping (through the district revenue offices and district survey offices). The Ministry of the Land Reform Management has just completed an ADB funded project to identify plans to strengthen land administration services
4.2.2 (third paragraph describing Component 2A)	Addition as shown in bold italics If the host organization does not have in-house IT staff with programming skills, external IT staff ***(or a private IT company)*** must be contracted to dedicate themselves to the customization and maintenance of the software in service of the cadastre authorities.
4.2.2 (insert a new paragraph (after the current third paragraph) describing Component 2A)	New paragraph Similarly, if the host organization cannot assign a senior well qualified staff member who is knowledgeable in land office and land administration modernization and has experience in land office cadastral and registration work processes with the ability to dedicate a significant proportion of their time to the OSCAR customization work, it may be necessary to recruit a suitably qualified and experienced person as a project consultant to fill this role.
4.2.2 (final paragraph describing Component 2A)	New sentence (at end of paragraph) (In Nepal the user manual will need to be made available to local users in Nepali language)
4.3.2 (addition to second paragraph)	New sentence (at end of second paragraph) Where no funding for the initial hardware equipment required to implement OSCAR operationally can be found, FAO will work with the recipient to find the necessary funding but if that is unsuccessful the pilot in that country may need to deferred or another country found to pilot OSCAR.
4.3.2 (replace final paragraph)	At the end of the project, the recipient government is expected to plan for the national implementation of the customized OSCAR system and to take measures that ensure the long term sustainability of the system including the retention of key staff responsible for the support of the system and appropriate funding arrangements so that hardware items can be replaced when they fail and there is an adequate supply of computer consumables.
Annex I Budget	New Item Local Experts – Nepal (and corresponding changes to existing Local Experts -3 Host Countries)

DRAFT

	Item	Year 1	Year 2	Year 3
	Local Experts - Nepal			
	1 Land Administration Consultant – 24mm ($2,000 / month)	$6,000	$24,000	$18,000
	Contract to IT company for Customisation of OSCAR to develop an Integrated DLIS & to provide second level software support		$70,000	$10,000
	Contract to IT company for customization of OSCAR to provide further district level and central functionality			$50,000
Annex I Budget	*The budget will need to be re-calculated incorporating the estimates supplied in the 3 feasibility studies.* *As well it is suggested that the initial development of the OSCAR shell software will require a greater effort than is possible from the currently identified team of international experts and the "contract academic partner". Possibly by way of an outsourced contract overseen by the international experts.*			
Annex 2	Add reference to "Country 3"			
Annex 3	Add reference to "Country 3"			

DRAFT

Appendix 9

Terms of Reference – Software Development to Customise OSCAR for Nepal

Introduction

The OSCAR Pilots Project is being undertaken under the FAO NRLA's normative work, which supports the introduction of sustainable and affordable systems for land tenure security. FAO-NRLA has reviewed available open source software applicable to land administration and found several of the available database and GIS products to be of good value. However, to be useful in settings with limited technical resources, open source GIS software supporting land administration must have the basic graphical (cadastral) functions and support for land registration functions.

As the next step, FAO is supporting an Open Source Cadastral and Registration (OSCAR) development project. This will allow a peer production development effort of source code for the OSCAR software that is made available for public collaboration. The product will be tested through its real operational implementation (including appropriate customisation to meet local requirements) in three differing FAO member countries. The outcome, namely a fully functional OSCAR system with an active user community, will lower the barriers for entry level of developing countries to use IT for improving land registration systems and the security of tenure.

FAO has prepared a project description for "Support to the Development and Piloting of the OSCAR Shell" (February 2009) and a report on the "Feasibility Study for an OSCAR Pilot in Nepal". These documents describe the framework for this assignment to undertake the software design, develop and test work required to customize and extend the core OSCAR software that will/has been developed. The objective of this customization work is so that the OSCAR system can be implemented in district revenue offices and district survey offices consultancy and support the day-to-day operations of those offices including the creation of an integrated district level land information system containing key land records from both offices including up-to-date cadastral mapping. The customized OSCAR system will be implemented in one district (both survey office and revenue office) during this assignment.

The assignment may be extended to include further customization and extension of the OSCAR system by adding functionality to provide further district level functionality and also central, national functionality.

With the OSCAR pilot in Nepal, FAO will work with the Ministry of Land Reform and Management (MLRM) and its departments; the Survey Department (SD), the Department of Land Reform and Management (DLRM) and the Department of Land Information and Archive (DOLIA).

Scope of Services

The FAO requires the services of a Nepali company providing software development services to develop a version of OSCAR that will be customised for use at the district level (in the revenue office and survey office) to support cadastral and registration functions and operate as an integrated district land information system. The core OSCAR software, developed by FAO will provide core libraries of software routines, a framework for the customisation work, design and development standards, a specified software development environment and the use of the Rational Uniform Process (RUP) software development methodology for the customisation work. Tasks to be completed as part of the OSCAR customisation in Nepal include:

- Clarification of documented requirements (with particular emphasis on the specific requirements of the district selected for the initial implementation of the system)
- Design of the OSCAR system for use in Nepal within the same design framework established for the core OSCAR system and meeting the stated requirements (including the customization of screens for Nepali language);
- Development of the OSCAR system for use in Nepal in compliance with all specified standards and in line with the approved design;
- Testing the OSCAR software in accordance with the OSCAR Test Plan
- Preparation of User Manual (and equivalent online Help) and Software Reference Guide
- Training of MLRM/DOLIA OSCAR technical support staff
- Support to MLRM user training leading up to and including the implementation of the OSCAR system in the first district
- (Second line) Technical support for the first 12 months the OSCAR system is operational in the first district (First line support to be provided by MLRM/DOLIA)
- Regular reporting on progress and updates on project risks and issues

Statement of System Requirements

This statement of requirements is an extract from the report of the "Feasibility Study for an OSCAR Pilot in Nepal".

It should be noted that the statement of requirements does not purport to be the design of the customised OSCAR system in Nepal but only to record requirements.

Functional System Features

EXTRACT SECTION 5.3 FROM FEASIBILITY STUDY (OR SUBSEQUENTLY UPDATED VERSION OF THE FUNCTIONAL REQUIREMENTS

Non Functional Features

EXTRACT SECTION 5.4 FROM FEASIBILITY STUDY (OR SUBSEQUENTLY UPDATED VERSION OF THE NON-FUNCTIONAL REQUIREMENTS

Proposed Iterations

It is planned to deliver the functionality in a series of 6 iterations over a 7 month period:

No.	Functionality	Description
1A	DLIS Migration	The migration of the existing DLIS database and software application to an open source environment
1B	Digital Cadastral Map Migration	The storage of the digitized cadastral mapping for a district (in an open source environment) and an associated digital cadastral mapping update tool (with similar functionality to that included in the current tool - the ArcGIS Spatial Application Extension developed by DOLIA)

No.	Functionality	Description
1C	Digital Archive	A digital archive of scanned images of all new documents presented for registration or new certificates generated by the system (once signed) and that these scanned images are accessible through the integrated land information system for the district
1D	Transaction Monitoring	The definition of MLRM workflow and business rules and the monitoring of all current (work-in-progress) transactions and reporting on office performance statistics
1E	Land Information Access including GIS Viewer	Access to all main records through the computerised system using a range of search keys (person name, parcel number, document number, by spatial selection from cadastral map display etc)
1F	Integrated DLIS	An integrated land information system for a district supporting both survey office and revenue office functions including updates, generating standard outputs, access to all main records using a range of search keys (person name, parcel number, document number, by spatial selection from cadastral map display etc), service request/transaction monitoring and reporting

Required Personnel

The software development company will need to identify a number of software developers (sufficient to complete the identified iterations of software development and meet the specified requirements by the given final delivery date) and to indicate what percentage of their time will be dedicated to the OSCAR customisation.

The OSCAR customisation software developers are expected to have the following required skills and expertise:

Required Skills & Expertise

It is essential that the software developers have:

- A minimum of a bachelor level degree with final year papers related to software development
- A minimum of 2 years practical workplace experience in software development using the java programming language
- Have excellent English language skills in a software development work environment where technical documentation will need to be written in English (and similarly reference material will be provided in English)

It is highly desirable that software developers have:

- experience in working within an open source development and customising open source components
- software development experience involving open source database management systems such as Postgre SQL and the POSTGIS spatial data extension

DRAFT

- some knowledge and familiarity of programming involving spatial data processing, GIS and database development (including the writing of stored procedures), preferably utilising open source software and tools
- some knowledge of cadastral land administration practices in Nepal
- experience in software development with a 3 tier system design (user interface, business processes and data access)
- experience in implementing appropriate levels of system security
- some knowledge of Microsoft .NET and experience with one of the languages available in the Microsoft Visual Studio software development enviornment
- experience in working as part of a software development team

Key Working Relationships

A project organization has been established for the OSCAR pilot in Nepal and the company undertaking the customization work will be expected to regularly report and liaise with key people within that project structure:

Key People	Interactions with Nepal OSCAR Customisation Developers
FAO central core OSCAR development team based in FAO headquarters, Rome	Training in the core OSCAR software, the OSCAR software development environment, OSCAR development standards, Test Plan, Quality Plan and Software Architecture Documents & the OSCAR version of the RUP software development methodology Review of the design, compliance with OSCAR development standards, test plan and quality plan (for each development iteration) Extensions to the functionality of the core OSCAR system Technical advice to pilot customisation teams
MLRM Project Coordinator	Review of customisation team reports (progress, risks and issues) Preparation of reports for Joint Steering Committee and FAO Manage contract with company undertaking OSCAR customisation work and the Project Consultant (land administration)
OSCAR (Nepal Pilot) Project Land Administration Consultant	Day-to-day clarification of technical issues Review and refinement of system requirements Participate in design workshops to finalise user interface design Review implementation of OSCAR Quality Plan Review User Manual Plan, arrange and deliver user training for first implementation Review implementation plan for the first implementation and

Key People	Interactions with Nepal OSCAR Customisation Developers
	assist in its implementation Participate in customisation team meetings Facilitate liaison between OSCAR customisation developers and MLRM personnel Make arrangements from the MLRM side for user acceptance testing Provide on-site user support for the first month of operation of the integrated DLIS
Project Coordination Team comprising representatives from MLRM, SD, DLRM, DOLIA and the district selected for the initial implementation	Provide technical sign-off for customisation development deliverables and also any critical advice to the customisation development company Facilitate any request made by the customisation development company for information or other assistance from the different MLRM departments and offices
DOLIA OSCAR Software Technical Coordinator	Provider of software support and system administration once the OSCAR system is operational (for this reason this person needs to be involved in the regular customisation team members and technical reviews of the deliverables from the customisation development team)

Final Delivery Date

The final delivery of the final version of the Integrated DLIS OSCAR software (having passed user acceptance testing with all specified functionality and complete with all documentation) is expected to be on or before 15 July 2011.

Technical Support

The company is expected to provide second line technical support for the OSCAR "Integrated DLIS" application software for 1 year following it becoming operational in 1 district (both survey office and revenue office). First line Technical Support will be provided through DOLIA.

Reporting Requirements

The Consultant will report to the Client on a fortnightly basis. This report will include:

1. progress made in terms of the approved Consultant's Implementation Plan,
2. the identification of any issues that require clarification or action by the Client, and
3. an update on any critical risks that could impact on the Consultant's ability to deliver a computerized property registration system that meets the specified requirements in the specified timeframes.

Hardware for the Integrated DLIS OSCAR System

Appendix 3 of the Report for the Feasibility Study of the OSCAR Pilot in Nepal describes the hardware and equipment to be procured for the initial implementation of the Integrated DLIS in one district. This procurement is quite separate to this proposed contract for software development for the customisation of OSCAR for Nepal.

Facilities Provided by FAO and MLRM

The FAO and MLRM will provide the OSCAR customisation software developer with:

1. Access to key staff members and technical advisors;
2. Access to all technical documentation and specifications for the existing DLIS and SAEx applications (including associated databases and geospatial feature class specifications and digital data)

Guidelines for Responses/Bids

Software development companies wanting to be considered for the work to customize OSCAR software for use in Nepal must submit a response that describes their ability to meet the conditions and requirements identified in this Terms of Reference.

The contract for this work will be in the form of a "lump sum" contract with payments made on the acceptance of deliverables. Payment deliverables will be made for each iteration and for each quarter of completed second level software support.

Companies are encouraged to submit an outline of a project plan describing all tasks and milestones and similarly an outline of a Risk Management Plan (identifying significant risks and risk mitigation strategies) appropriate for the OSCAR customisation work.

Companies are informed that intellectual property of all software developed in the OSCAR customisation resides with the FAO and not the software development company although the intention is to publish all OSCAR software as open source.

List of other Documentation

The following documents are available from FAO :

	Title	Date
1.	Feasibility Study for the OSCAR Pilot in Nepal	6 September 2009
2.	OSCAR Project Document	13 February 2009 (version 1.5)
3.	OSCAR Software Development Environment	To be prepared
4.	OSCAR Software Development Standards and Guidelines	To be prepared
5.	OSCAR Core Software Reference Guide	To be prepared

DRAFT