



GEO PLANNING COMPANY

Final Report

FOR

Cadastral Surveying and Mapping- Jalalabad

By: GeoPlanning Survey and Designing Company (GPSDC)

24-hour Point of Contact:

Ph: +93 (0) 705168815 Zaher Sultani

Ph: +93(0) 787 872 000 Jawed Rahimi

E-mail: geoplanningcompany@gmail.com
mzahir_shaker@yahoo.com

Add:

Main office: Karte4, Third District, Uroj Computer Plaza, Fourth floor, Apartment No 80, Kabul Afghanistan.

Sub office: House # 96th, Street # 5, Phase# 1, Jalalabad City, Afghanistan

Table of content	pages
Cover page	1
Table of content.....	2
Introduction	3
Surveying and Mapping Procedures.....	4
Input of Imagery to Project Software and Map Preparation	4
Community education and sensitization program.....	5
Conducting Field Surveys and Parcel measurement	7
Establishing Permanent Control Points.....	7
Conduct door-to-door household interviews of occupants.....	8
Summary statistics about cadastral surveys Jalalabad	11
Technical and administrative problems during Cadastral Survey.....	14
Weather and location.....	14
Government institution partnership.....	14
Public awareness.....	15
Mapping Database.....	16
Measuring parcel boundary and corner of each property.....	16
Arial image	17
Recommendation for the solution of above problem.....	19
Annex 1, decree issued by President.....	21

1. Introduction

The purpose of this survey is to facilitate the creation of a robust land-based economy in Afghanistan, which is founded on secure land tenure supported by a transparent system for land transfer and mortgage lending. It is estimated that nearly 70% of the urban population in Afghanistan live in informal settlements. The term “security of tenure or title” refers to the degree of protection of a person’s rights against the claims or possible claims of others, including the threat of confiscation by the government. It is one of the basic purposes of government to secure and protect the rights of communities and individuals in land and support the safe and productive use of the land. Increased security of tenure will contribute to the health and welfare of local communities and create a positive environment for overall economic development.

To derive both the social and the economic benefits of secure land tenure there must be confidence in the system of substantive laws, the evidence of title, the record of that evidence, and public land administration. Afghanistan has developed a National Strategy that includes a land component, and is in the process of amending its laws and land administration mechanisms to better provide for security of tenure. But problems remain, particularly regarding land records, documentation of informal communities, and collection of the land tax.

In general term the purpose of this survey is to conduct a cadastral survey encompassing two informal settlements in Jalalabad, specifically Araban and Campoona. The data acquired during the conduct of this cadastral survey will serve as key evidence during the Tasfia process. Tasfia is the process of identifying and cataloging government, public, and private lands, as a result of which all the specifications of land such as location, taxation, type of ownership, and water rights are identified.

The primary purposes of the cadastral surveys in these informal settlements are as follows:

- To create an inventory of land parcels in each informal settlement, including boundary measurements of each property.
- To evaluate the extent to which the occupants of each property can produce evidence to support their ownership rights to the property.
- To test and validate our planned procedures to measure property boundaries, including the assignment of unique identifiers for each property.
- To test and validate our planned procedures to acquire evidence for the justification of ownership rights.
- To test and validate a method to determine the value of properties as a basis for equitable taxation.

2. Surveying and Mapping Procedures

This project will identify and record various types of ownership evidence for each parcel and then compile the information into a digital portfolio which is tagged to each parcel.

Considerable efforts are now on-going by GIROA agencies and development organizations to harmonize Afghan land management law, cadastral law, customary law, and administrative procedures aimed at improving land ownership. As such, one of the key objectives of the cadastral survey of Araban and Campoona is to identify the predictably diverse range of evidence which occupants either possess or may use to support their ownership claims to property. All necessary and available information concerning each property, its occupants and any related documents possessed by the occupants to support ownership claims have been recorded.

A Summary of all surveying and mapping procedures undertaken by the Geo Planning in this project is described below:

2.1 Input of Imagery to Project Software and Map Preparation

Digital Orthophotography have been used to update parcel maps of both informal settlements. Since the acquisition date of this image was 2007, new parcel have arisen. Also, it is important to understand that property boundaries which have been digitized from aerial imagery may not reflect the true extents of property ownership, Therefore Geo Planning provided a cadastral survey team to conduct field surveys, where necessary, to verify the digitized parcel boundaries as well as create a digital record of any new parcels which have arisen since the date when the imagery was captured. All parcels have been digitized, numbered and prepared in (ESRI) Shape file format (.shp) to enable the data to be imported into GIS mapping software, containing all necessary descriptive information regarding it such as datum, map projection, spheroid, reference meridian, shape file format, etc.



Digitized aerial imagery and parcel numbering

2.2 Community education and sensitization program

Since community outreach and public awareness campaigns is an important part of the cadastral surveys, each household has been notified in advance that a survey crew will visit them to collect land ownership information, verify land parcel boundaries and also measure some boundaries. In addition, each household received a brochure with all necessary information related to cadastral survey. Geo planning also used posters in public areas such mosques, schools and shops as public awareness campaigns. Geo Planning have also collaborated the public awareness campaigns with local *Wakils* or *Shura* members, who have good knowledge of the communities, thus the public awareness campaigns became easier and effective. In the case of absence of property owners during visiting the household, Geo Planning expect to encounter this problem and therefore prepare a contingency plan which anticipates the need for multiple visits to these households that could not be reached on the first, or even second, visits.



Public awareness campaigns with local *wakils* or *shura* members



Public awareness campaigns distributing brochures



Public awareness campaigns using a poster in a mosque

2.3 Conducting Field Surveys and Parcel measurement

2.3.1 Establishing Permanent Control Points:

The site survey is conducted in UTM projection and WGS 1984 datum. The units of measure for UTM projection is meters (metric units).

Geo Planning have established primary control points, within project site covering all the area. Control points have been established using DGPS (Differential Global Positioning System) with single frequency receivers. Four (4) primary control points have been established in each site, in total eight (8) control points have been established.

The corners of each property have been identified (measured and readings taken) using GPS RTK method. Real-time kinematic (RTK) surveys use a radio to broadcast signals from the base station to the rover. The rover then calculates its position in real time.



Measuring primary control points in Araban using DGPS



Measuring primary control points in Campoona using DGPS

RTK involves the use of 2 GPS receivers (stationary Base Station and a Rover) communicating together via a radio link. The precision of the Rover position relative to the Base station is dependent on baseline-length so it is desirable to keep the baseline as short as possible. Geo Planning tried to keep the baseline not longer than 3km, therefore the accuracy of each property corner measured in this method is less than 10cm.



Measuring the corners of each building using GPS-RTK

2.3.2 Conduct door-to-door household interviews of occupants:

During the cadastral survey, the occupants of each household have been interviewed. A list of question (prepared by TT LARA) has been used as a script to collect ownership information from each household. All the answers have been recorded during the interview and finally entered this information into the database. The teams consisted both men and women to be able to communicate with both local language (Dari and Pashto) during door-to-door household interviews.



Conducting door-to-door household interview of occupants



Conducting door-to-door household interview of occupants

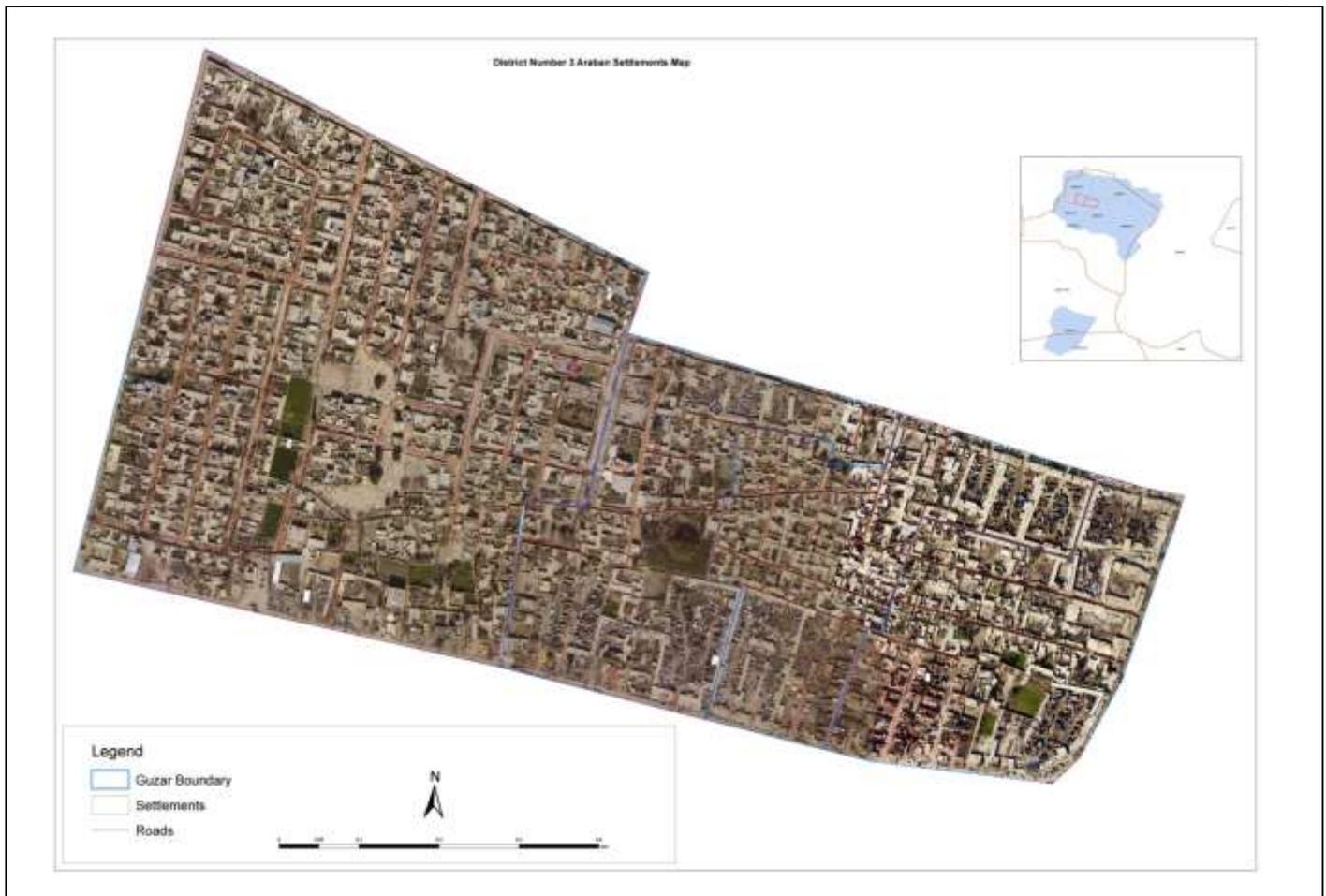
The following activities have been undertaken during door-to-door survey:

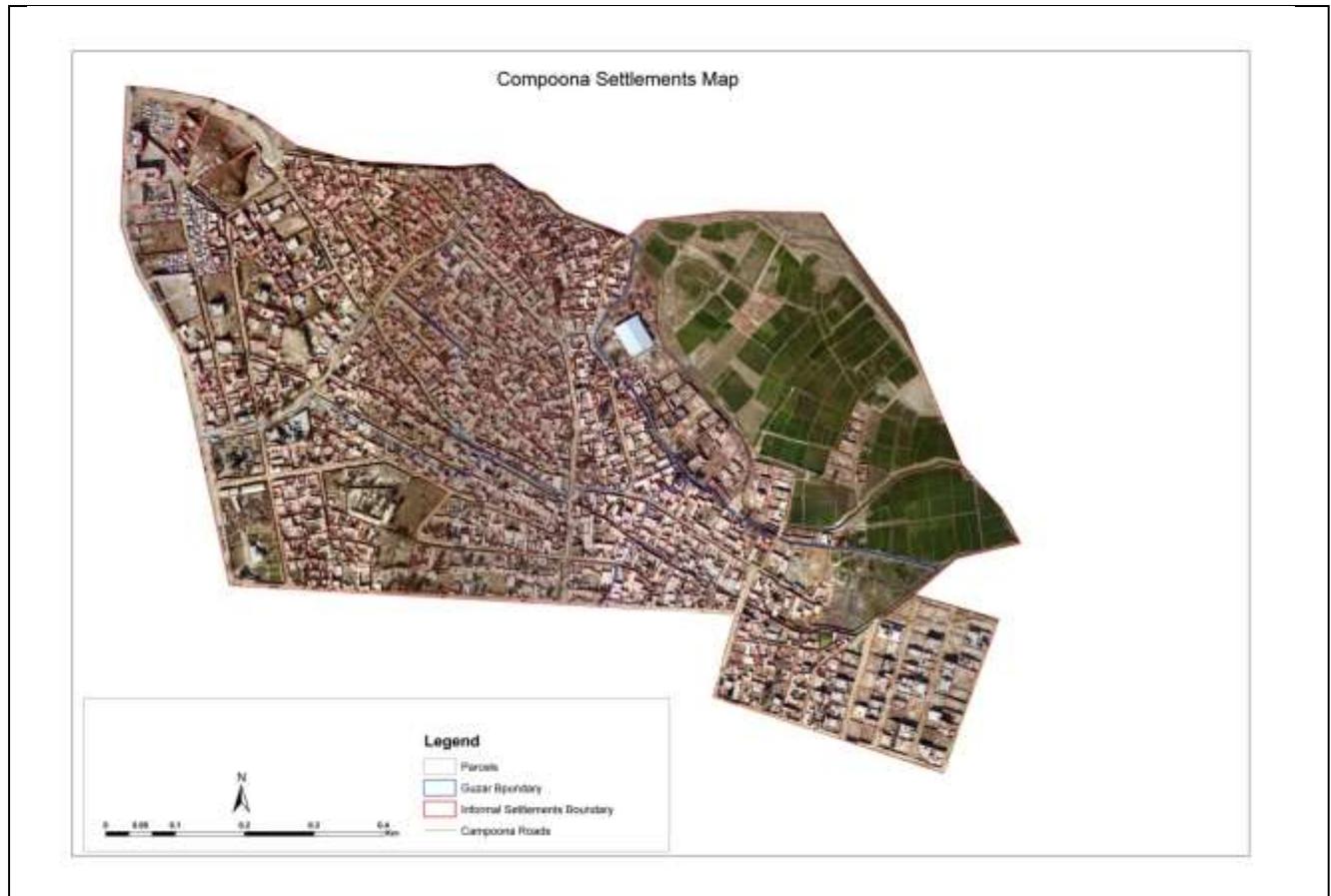
- 1- **Household notification:** Each household has been notified in advance that a survey crew will visit them to collect land ownership information, verify land parcel boundaries.
- 2- **Interview the occupants:** The occupants of each household have been interviewed; Geo Planning preferred to interview with the head of the household, this gave us a chance to gather all related information regarding the household. A list of questions prepared by TT LARA representative has been used as a script to conduct the interview of each household. All the answers have been recorded during the interview, and the information collected has been used to enter the respondents' information into the database.
- 3- **Record the Ownership and Tax Document:** A digital camera has been used to capture two photographs each of the ownership and tax documents for each parcel and other information associated with each parcel (if available). At the same time the photo of the head of household or person claiming the ownership of the property, identification evidence, where available, subject to the person's permission, have been taken.
- 4- **Measuring the parcel:** The corner location, dimension and boundaries of each parcel have been measured using GPS RTK. The areas measured have been computed and the vector data, parcel ownership information and digital versions of the ownership evidence documents have been entered into a GIS system database.
- 5- **Import the imagery into a GIS:** The imagery provided by TT LARA Representative has been imported into GIS and appropriate maps have been prepared of each informal settlement area to manage and plan the cadastral survey work program.
- 6- **Record of geo-referenced image and location of point:** Handheld GPS and digital camera have been used to record a geo-referenced image and location point for each parcel to establish point address database in a GIS and for subsequent planning/mapping activities.

3. Summary statistics about cadastral surveys Jalalabad

In this project two informal settlement Araban and Campoona have been surveyed. Both settlements located in Jalalabad city, the GPS coordinates of approximate centroids of settlements are below:

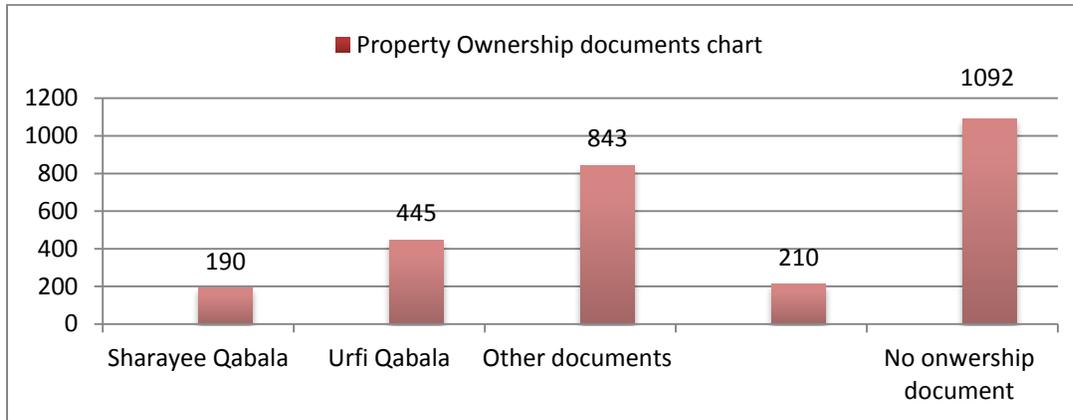
Araban:	34°25'46.11"N	70°26'37.53"E
Campoona:	34°26'20.53"N	70°28'0.46"E



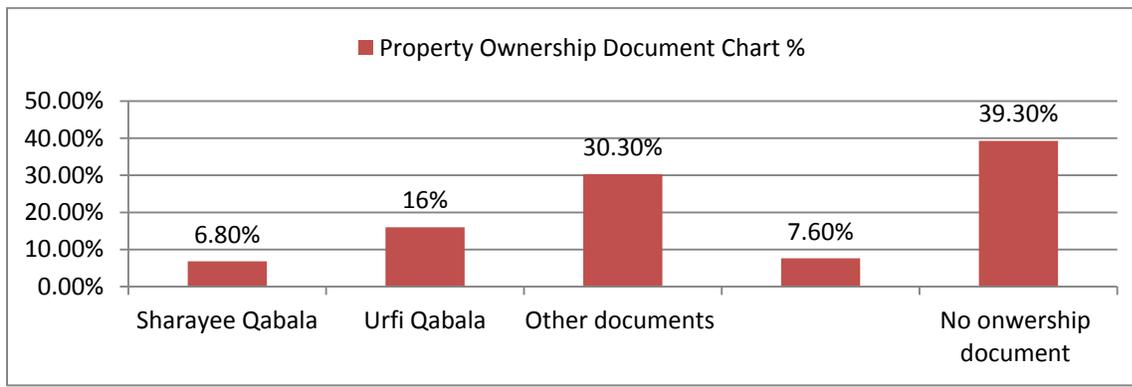


Campoona settlement map

Araban is located in the South and Campoona is located in North of Jalalabad City, in order to improve the cadastral survey, Araban settlement has been divided into 11 clusters and Campoona settlement has been divided into 14 clusters. The Total properties surveyed in both settlements are 2780, about 1478 of the properties able to provide variety of evidence to support their ownership claims to the property. Based on the survey data about 190 of the property owners were able to provide Legal Deed (*Sharayee Qabala*), about 445 of the properties were able to provide Customary Deed (*Urfi Qabala*) and 843 of the properties were able to provide other documents Tarif/Bank Awiz. Furthermore, 210 properties claimed that they have documents but were not able to provide them during the survey. In such case the survey teams tried to visit these properties for the second and third times but were not able to see their documents. In addition, there were 1092 of the property owners who still had no ownership documents.

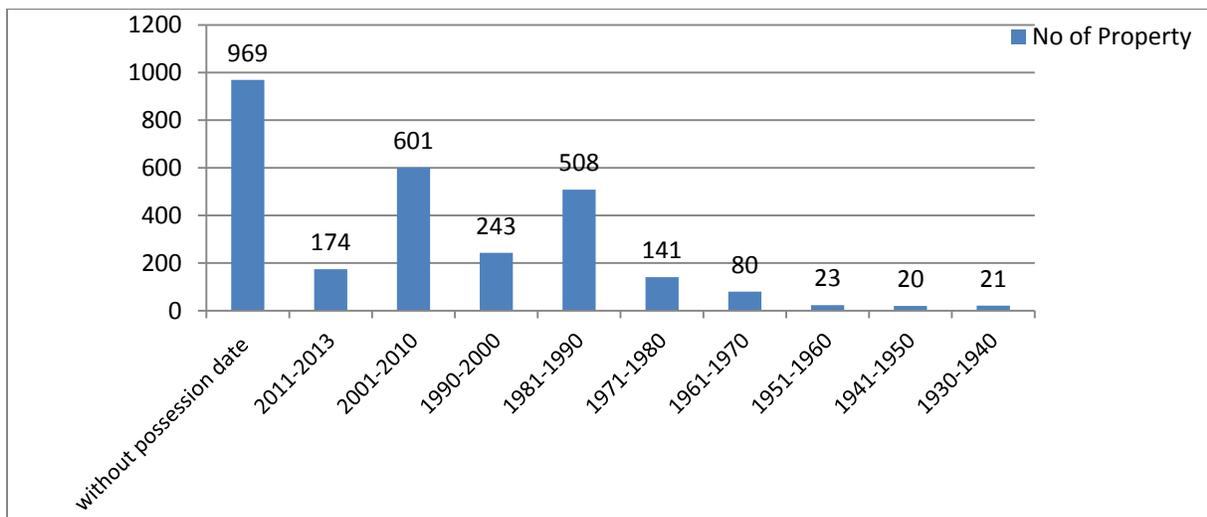


Property ownership document chart



Property ownership document chart in Percent (%)

Furthermore, during the survey it was founded that most of the owners possession their properties during 1980 to 2010 years . In addition about 969 owners couldn't able to mention their possession date, because most of these owners inherit the property. The following chart shows the duration of possession.



4. Technical and administrative problems during Cadastral Survey

This section describes and highlights some technical and administrative problems occurred during cadastral survey in Jalalabad. However, it does not recommend a uniform cadastre for every province in Afghanistan. It's also informing technical issues that need to be addressed and taken into consideration in the similar project in the future.

4.1 Weather and location:

Jalalabad is a city in eastern Afghanistan, with a population of nearly 900,000 people. It is the capital of Nangarhar province, located next to the Kabul and Kunar rivers, a short distance from the Khyber Pass. It is linked by approximately 90-miles highway with Kabul to the west and about the same distance with Peshawar in Pakistan to the east.

Over the course of a year, the temperature typically varies from 3°C to 40°C and is rarely below 1°C or above 43°C. The warm season lasts from May 8 to September 6 with an average daily high temperature above 40°C. The hottest day of the year is June 29, with an average high of 40°C and low of 27°C. The cold season lasts from December 6 to February 28 with an average daily high temperature below 20°C. At the same time the shortages of electricity is the main problem of Jalalabad residents where one Kilowatt of electricity is being sold for 60 Afghanis which is about 30 times more expensive than Kabul (one kilowatt =1.5-3 Afghanis). In addition, the survey was started during the holy month of Ramazan.

Regarding the above mentioned problems during the survey the team found that most of Jalalabad residents, who have facilities, are moving to Kabul or Peshawar during the summer season. As a result some of the property owners were not present during the cadastral survey. Therefore, weather condition, location of this city, and the problem of electricity during the season should be taken into consideration to avoid repeating them in future similar projects.

4.2 Government institution partnership: One of the main issues in this project was the inconspicuous involvement of institutions dealing with the land, principally the Afghan Land Authority (ARAZI), the Ministry of Urban Development Affairs (MUDA), the Independent Directorate of Local Governance (IDLG), the Afghan Geodesy, Cartography Head Office (AGCHO) and Department of Cadastral Survey. According to the law 1988, The Department of Cadastral Survey is responsible for the survey of private and state owned land through technical measurement of land surface, and preparation of cadastral maps. The Department is also responsible to organize relevant records to determine precise boundaries of land, identify the owner, quality and size of land and the types of rights attached to land. At present, surveying activities of the

Department of Cadastre at the national level has been suspended by a presidential decree. However, the Department of Cadastre may carry out local surveys based on specific governmental order.

Survey of urban land is linked with distribution of land by provincial municipalities. Surveying of urban land is normally initiated by a proposal made by municipalities to the Department of Municipalities and Election Affairs at the Ministry of Interior Affairs.

Since the department of Cadastral and Municipalities are the main institution related to this project and their partnership during the field work were essential, especially when some property owners didn't allow the survey team to collect data.

In this project the partnership of cadastral department and Cadastral and Municipalities were inconspicuous, The following are the main reasons that Geo Planning couldn't able to get the support of thee two government institutions :

- the main concern of government institution (especially cadastral department) was, that the local companies don't have the right of cadastral survey, however this problem was solved by a decree which issued by president(see annex 1).
- These institution was believed that local companies may not have the capacity of doing cadastral survey, however after the completion of first two cluster they understood that Geo Planning has the expertise and technology of doing such survey.
- Most employees of these institution are old generation and not familiar with new technology used for this surveys, also it was difficult for them to learn this new technology as a result it was not interesting for them to be involved in this survey.
- Most of these institution while working with NGOs or companies, they are asking some salary for their staff introduced to these NGOs or companies, if it's not paid, they will not paying attention to such work.

Therefore, in order to avoid such problem first these institutions need new technology, employees and training. Secondly creation of Cadastral School and train of new generation in this field could help to avoid such problem in future. Since KPU already completed the administrative affairs process of these two departments and needs some financial and material support in order to start these two departments.

4.3 Public awareness:

As community outreach and public awareness campaigns were an important part to the cadastral surveys and Geo Planning made a special program with the approval of TT LARA for more effective campaigns mentioned before. In the meantime, in 1966, the Cadastral department initiated the cadastral survey (CS) and surveyed almost 30% of the country by 1996. Since the mentioned date, people haven't seen such survey yet, so it's a new survey. In most places it was difficult for the team to satisfy property owner and collect field

data. To avoid this problem in the future it might be better to educate people using mass media like Television and Radio.

4.4 Mapping Database:

All data collected by the survey team from the field has been entered into database OpenTitle represented by TT LARA. Since the all responded information including 9 pages of questionnaire, the map of related property and many photos from the building, door, ownership evidence, responded information, etc were entered into database. At the same time a digital camera with minimum of 12 megapixel has been used to take photos. As a result the data volume has increased enormously and affected the speed of loading/unloading software during the data entry. Backups from the Opentitle were needed frequently because of the high volume of the data. So, digital camera with 12 megapixel could only be used on the field and the photos need to be resized when it's entered into OpenTitle. The below example shows that the quality of photos taken with the 12 megapixel camera could be the same, however the volume of photos decreases by 20 times.



Photos taken using 12 megapixel camera equal to 5.38MB

resized photo equal to 248 kb

4.5 Measuring parcel boundary and corner of each property

GPS RTK method have been used to measure the corner locations, boundaries and dimensions of each parcel, compute the area for each parcel, and enter the vector data and the parcel ownership information and digital versions of the ownership documents into a GIS and database. However, in this method the rover requires to be positioned on the field without potential disruption (trees, high story building, etc.) for better reception. Furthermore, in some places where high story buildings were present, the use of such method was difficult, poor PDOP, time consuming and given less accuracy data. In addition, if update and high resolution image were available and geo-referenced with control points taken by GPS in each settlement could give more

accurate and faster result. The corner location, boundaries and dimensions of each parcel could be taken from Geo-referenced image by using GIS.



4.5 Arial image

A digital Orthophotography referred to as Buckeye Color Orthophotography have been used as the basis to update the parcel for both informal settlements Araban and Campoona to update the parcel maps. However, acquisition date of buckeye imagery available to this project was 2007 and there were many places already developed which were shown in buckeye image as open space or agriculture land. So the digitization and update of parcels especially new parcels were more difficult and time consuming. Furthermore, using update and accurate image could help to update and digitize parcels more quickly and accurately.

Agriculture land changed to urban land



5. Recommendation for the solution of above problem

- 1- **Weather Condition:** As it's mentioned before that during the summer season, the temperature is above 40°C, also the shortage of electricity is another issues of Jalalabad residents, as a result who have facilities, are moving to Kabul or Peshawar. Therefore, to avoid these problem in the future similar projects, it might be essential that the weather condition should be taken into account. Since, the warm season lasts from May 8 to September 6 with an average daily high temperature above 40°C, therefore the cadastral survey should not be undertaken during this season.
- 2- **Government Institutions Involvement:** One of the main issues in this project was the inconspicuous involvement of institution dealing with the land. Since the department of Cadastral and Municipalities are the main institution related to this project and their partnership during the field work were essential, especially when some property owners didn't allow the survey team to collect the required data. However, both of these institutions, Municipality and Department of Cadastre, were involved in this project for learning modern cadastral survey. The employees introduced by these two institution were not familiar with new technology such us GPS, Total Station, GIS and even Computer. As a result their involvement was not effective. Therefore, to avoid such problems in the future, first these institutions need new technology, employees and training. Secondly creation of cadastral school and training of new generation in this field could help avoid such problems in future. As it's mentioned before, KPU already completed the administrative affairs process of Cadastral and GIS department and needs some financial and material support in order to start these two departments.
- 3- **Public Awareness Campaigns:** as it was mentioned it's a new survey and no one has seen such survey since 1996 and in some causes it was difficult for the team to satisfy property owner and collect field data. So, it might be effective to educate people using also Television, Radio and etc.
- 4- **Mapping Database:** All gathered information including 9 pages of questionnaire, the map of related property, many photos from the building, doors, ownership evidence; responded information, etc need to be entered into database. At the same time a digital camera with minimum of 12 migapixel has been used to take photos. As a result the data volume increased enormously that affected the speed of loading/unloading software during the data entry. Backups from the Opentitle were needed frequently because of the high volume of the data. So, digital camera with 12 megapixel could only be used in the field and the photos need to be resized when it's entered into OpenTitle.
- 5- **Measuring parcel boundary and corner of each property:** GPS RTK method has been used to measure the corner locations, boundaries and dimensions of each parcel, compute the area measurement of each parcel, however in this method the rover requires to be positioned on the field without potential disruption (trees, high story building, etc.) to get the GPS signal. Furthermore, in some places where high story building located the use of such method were difficult, poor PDOP,

time consuming and given less accurate data. Therefore, if updated and high resolution images were available and geo-referenced with control points taken by GPS in each settlement could give more accurate and better result. The corner location, boundaries and dimensions of each parcel could be taken from Geo-referenced image by using GIS.

- 6- **Arial image:** the buckeye imagery used in this project was 2007 and there were many places developed now which were shown as open space or agricultural land. So the digitization and update of parcels especially new parcels were more difficult and time consuming. Furthermore, using updated and accurate imagery could help to update and digitize parcels more quickly and accurately.

