

GOVERNMENT OF KHYBER PAKHTUNKHWA

REVENUE & ESTATE DEPARTMENT



PC-1

SETTLEMENT OF LAND RECORDS IN DISTRICTS DIR LOWER,

DIR UPPER AND TEHSIL KALAM, SWAT

ESTIMATED COST: PKR 1,931.089 Million

ADP No: 172-190183

1	Name of the Project	Settlement of Land Records in Districts Dir Lower, Dir Upper and Tehsil Kalam, Swat		
2	Location	S.No	District	Sub division
		1.	Dir Lower	Timergara
		2.		Jandool / Samar
		3.		Adenzai / Chakdara
		4.		Lalqilla
		5.	Dir Upper	Dir
		6.		Wari
		7.		Sheringal
		8.	Swat	Kalam (Tehsil)
3	Authority Responsible for	Revenue and Estate Department, Khyber Pakhtunkhwa		
(i)	Sponsoring	Government of Khyber Pakhtunkhwa		
(ii)	Execution	Revenue and Estate Department Khyber Pakhtunkhwa		
(iii)	Operation and Maintenance	Revenue and Estate department, Khyber Pakhtunkhwa		
4	Plan Provision a) i. If the project is included in the medium term/five-year plan, specify actual allocation. ii. If not included in the current plan, how is it now			

	<p>proposed to be accommodated.</p> <p>iii. If the project is proposed to be financed out of block provision, indicate,</p> <ul style="list-style-type: none"> • Total Block provision • Amount already committed • Amount proposed for the project. <p>b) If the project is not the plan, what warrants its inclusion in the plan?</p>	
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5. Background

It is increasingly recognized that proper management of records of rights are very crucial for land owners, its tenants and also for Government to ensure public rights. Government of Khyber Pakhtunkhwa is committed to provide hassle free land transaction services to land owners in a systematic and transparent way. Computerization of Land Records, ongoing in all 19 settled districts is the key step in this regard.

Creation of land record is a very important process because it creates records for district collector to collect different type of government taxes (Agriculture Income Tax / Land Tax / Transactional Tax etc.). The land record is also used for identification of type of land (i.e. Agricultural, Commercial, and residential) and conducting different types of surveys for infrastructure development and land use planning. The settled districts also have Revenue Courts and need a proper land settlement mechanism for discharging their duties whilst the Civil Courts also require proper land settlement record to arbitrate in disputes many of which originate from land-related issues.

Land Settlement is the very basis of preparation of records of rights. It is a very extensive exercise which takes several years to complete. Several experienced revenue officials conduct

this operation and is led by Settlement Officer. During settlement operations, powers of the Collector are shifted to Settlement Officer which are ordinarily exercised by Deputy Commissioner.

The Revenue and Estate Department is designing its new settlement operations i.e. Dir Lower, Dir Upper, Kalam Tehsil (Swat) and Merged Areas (MA's) based on GIS technology. Main advantages of technology based land settlement are discussed below:

Time: In manual settlement operation, all the activities are carried out manually from writing Shajra Nasab to Misle Haqiat and from maintaining Field Book to measuring each and every dimension of a parcel of land. The most time taking process of settlement is measurements of individual parcels and calculating areas of parcels irregularly shaped. GIS based approach uses digital equipment to measure these parcels and parcel areas are determined automatically using software which saves a lot of precious time.

Speed: GIS based settlement speeds up the measurement process by using digital surveying equipment. These equipment are easy to handle and can speed up the survey process by several times of the manual process.

Accuracy: Accuracy is the most important aspect of measurements. It determines the area of a parcel. In manual measurement 2-3 karam (11-16 feet) is considered condonable error which definitely leads to incorrect area calculation. On the other hand accuracy of digital equipment is up to 8mm which is a considerable difference.

Live services: Live services of land transaction can only be provided to the public when all the records of rights are computerized. Settlement operation executed in technology based provides computerized records. These records will be ready for services to the public as soon as settlement of a single Mouza is completed.

6. Project Objectives and its relationship with Sectorial Objectives:

The project has mainly two objectives:

1. Complete settlement operation using GIS based technology
2. Provide computerized transactional services to land owners.

The first objective is to create a series of documents related to land, land owners and its tenants. This step includes survey of the entire area. Boundaries are determined of the basic revenue

unit called Mouza, Deh or Revenue Estate. Following are some of the important documents created during this process along with some other auxiliary records.

- a. Shajra Nasab (Pedigree/Family Tree)
- b. Khatoni (Records of Tenancy)
- c. Field Book (Measurement dimensions)
- d. Massavi (Cadastral Map)
- e. Misl e Haqiat (Record of Rights)
- f. Wajib ul Arz (Document of Customs) of mauza/village.

The second objective is to operationalize Service Delivery Center (SDC) to provide services to the public as soon as records of a mouza is completed. It will reduce the cost of computerization of manual records which is usually done in already settled districts.

Secondary objectives of the project are:

- Initiation of GIS based land settlement operation.
- Survey entire project area using advanced surveying equipment i.e. embedded with RTK and GNSS technology
- Data entry of records of rights and all other related data in the existing LRMIS software.
- Creation of digital Massavi Maps
- Creation of spatial database to store all GIS related data.
- Integration of MIS and GIS data in the existing LRMIS software.
- Provide scalable database solution to accommodate land transaction data both in spatial and non-spatial formats.

The major Long Term goals of the project:

- To maintain and update the existing digital records and prepare digitized Jamabandis from the computerized records.
- To mitigate land disputes on instant update of land records.
- To prepare scalable digital maps for multi sector and multipurpose uses.
- To determine the type of land, crop etc. from satellite imagery of the digitized Mauzas.
- To increase revenue for the Fard and Mutation services
- To reduce litigation by accurately maintaining the digital records of rights.
- To facilitate land owners and farmers for acquisition of bank loans.

- Land Services can be provided to related departments (e.g. P&D, Agriculture, C&W, Tourism)
- To provide online services to public to locate their land.

Relationship with Sectoral Objectives

The IT Sector development in the public sector is integral to present government initiatives. Building of efficiencies in back-office operations and effective public service delivery are part of the objectives to help the government's business vision of providing quality services to the citizens effectively and efficiently. Hassle-free service to citizens is an important objective of the government and it would partly be realized by this project.

Land is the most valuable possession of mankind. It is also an important asset of any country. Without land, there can be no county. Moreover, the wealth of a nation and its economic development are dependent on the state of the land and its usage. The availability of funds depends on tax collection. It is apparent, therefore, any information concerning land is valuable information which serves as a key to financial investment, commerce, industry and agriculture.

Therefore, making land right secure, reducing the potential for disputes and enabling an improved investment climate are urgent tasks for the Government and have been prioritized at the highest levels of the Government. One of the key elements of this agenda is to improve the revenue record system. There is a very keen political commitment in making hassle-free services available to the citizens and, at the same time, diminishing the scope for litigations and land-related disputes.

This project would, therefore, form an integral part of the overall strategy of the government for implementing the IT policy and good governance.

There is an increasing awareness in the government on use of information Technology to build efficiencies in administrative operations and delivery of public services. These objectives form an integral part of the overall e-governance policy of the government. Already in Provincial Government, a number of public sector services are being automated to provide speedy and hassle-free services to citizens.

7. Key Performance Indicators

The Key Performance Indicators (KPIs) for measuring project success are:

- Establishment of Settlement Offices
- Parcel survey of entire area using digital surveying equipment and/or satellite imagery.
- Creation of computerized records of rights and other related documents.
- Preparation of both digital and paper based Massavi Maps.
- Providing computerized land transaction services to public.
- Real time updation of records.

Result Based Matrix

Result Based Matrix of the project is given in below table.

Table 1: Result Based Matrix

Project Name	Settlement of Land Records in Districts Dir Lower, Dir Upper and Tehsil Kalam, Swat		
Goal	Indicator	Means of Verification	Assumptions
Mainstreaming target areas through sustainable socio- economic development	G1: % of respondents reporting better access to computerized land records and its associated services G2: % of respondents reporting improvement in livelihood conditions G3: % of respondents reporting that government is responsive to their needs.	Community feedback surveys; Baseline Mid Term and End line surveys.	Security situation is favorable for carrying out activities; communities are cooperating;
Outcome	Indicator	Means of Verification	Assumptions
Land records digitized to give owners access to land records, secure transactions of land titles and financial institutions	OC1: Hectares of lands mapped in the target areas. OC2: Number of owners provided with legal tenancy rights OC3: Number of land owners accessing financial institutions for loans OC4: Number of land owners successfully receiving loans from financial institutions.	Program data; financial institutions records; land records	Security situation is favorable for carrying out activities; communities are cooperating;
Output	Indicator	Means of Verification	Assumptions
1. Digitized land settlement records created	1.1 No. of Revenue Estates demarcated. (target and timeline) 1.2 Number of owners who have digitized land records.(target and timeline) 1.3 Number of districts that have digitized land records (target and timeline)	Misle-e-Hiqat documents; data base of land records;	Security situation is favorable for carrying out activities; communities are cooperating;
2. Land Records Complex and SDC established	2.1 Number of land record complexes built and operational 2.2 Number of service delivery centers established	Onsite verification; progress reports; monitoring reports; program data	funds are available for construction work;
3. Land revenue services provided in the target areas	3.1 Number of owners received digitized land numbering (fard mutation; correction gardawari etc.) 3.2 Number of owners benefiting from land revenue services	Project data;	Land owners are registering with Revenue authority; timely provision of land revenue services; cooperation on the part of land owners
4. Digital system put in place for land revenue collection	4.1 Number of sub-divisions where revenue is collected through digital system. 4.2 Number of land owners registered in the digital revenue collection system.	Project data;	Land owners are registering with Revenue authority; timely provision of land revenue services; cooperation on the part of land owners; timely creation of digitized system

Activities	Inputs	Means of Verification	Assumptions
1.1: Establishment of Projectized Offices 1.1a: Establishment of Project Office at Revenue Academy 1.1b: Establishment of Settlement Offices 1.1c: Procurements for operationalization of offices	Human Resource Project Core Team Formation Equipment and Furniture		Project is approved
1.2: Creation of digitized Land Settlement Records 1.2a: Awareness raising campaign for Land Settlement. 1.2b: Demarcation of Revenue Estate boundaries (Thak Bast) 1.2c: Preparation of digitized Shajra e Nasaab 1.2d: Preparation of digitized Khatoni 1.2e: Digital measurement of Parcels 1.2f: Generation of Misl e Haqiat 1.2g: Taqseem Parcha Khatoni 1.2h: Tasdeeq Akhir	Human Resource Equipment (GIS and IT) Logistics Support Land Settlement Module Training		1. National control network has been extended to each revenue estate. 2. Security situation is normal. 3. Land settlement module is developed.
2.1: Construction of Buildings 2.1a: Procurement of Land for Service Delivery Center (SDC) 2.1b: Construction of SDCs	Identification of Land Procurement of Land Approval of Designs		Land is identified and procured by the Government.
3.1: Establishment of Service Delivery Centers (SDCs) 3.1a: Hiring of regular staff 3.1b: Procurement of Paraphernalia 3.1c: Provision of live services in SDC building	Human Resource Equipment and Furniture for SDCs Training		
4.1: Land transactions in SDC			

8. Area Statistics

Settlement operation will be commenced in districts of Dir Lower, Dir Upper and Tehsil Kalam of district Swat. Statistics of the area is given below.

District	Area¹	Population²	No. Households
Dir Lower	1,597	1,435,917	155,338
Dir Upper	3,752	946,921	120,228
Kalam	2,103	84,484	9,810
Total	7,452	2,467,322	285,376

¹ Area is calculated from UNOCHA District/Tehsil Boundaries by using UTM 43N zone projected coordinate system.

² Population and No. of Households data is taken from Census 2017 district and block wise tables.

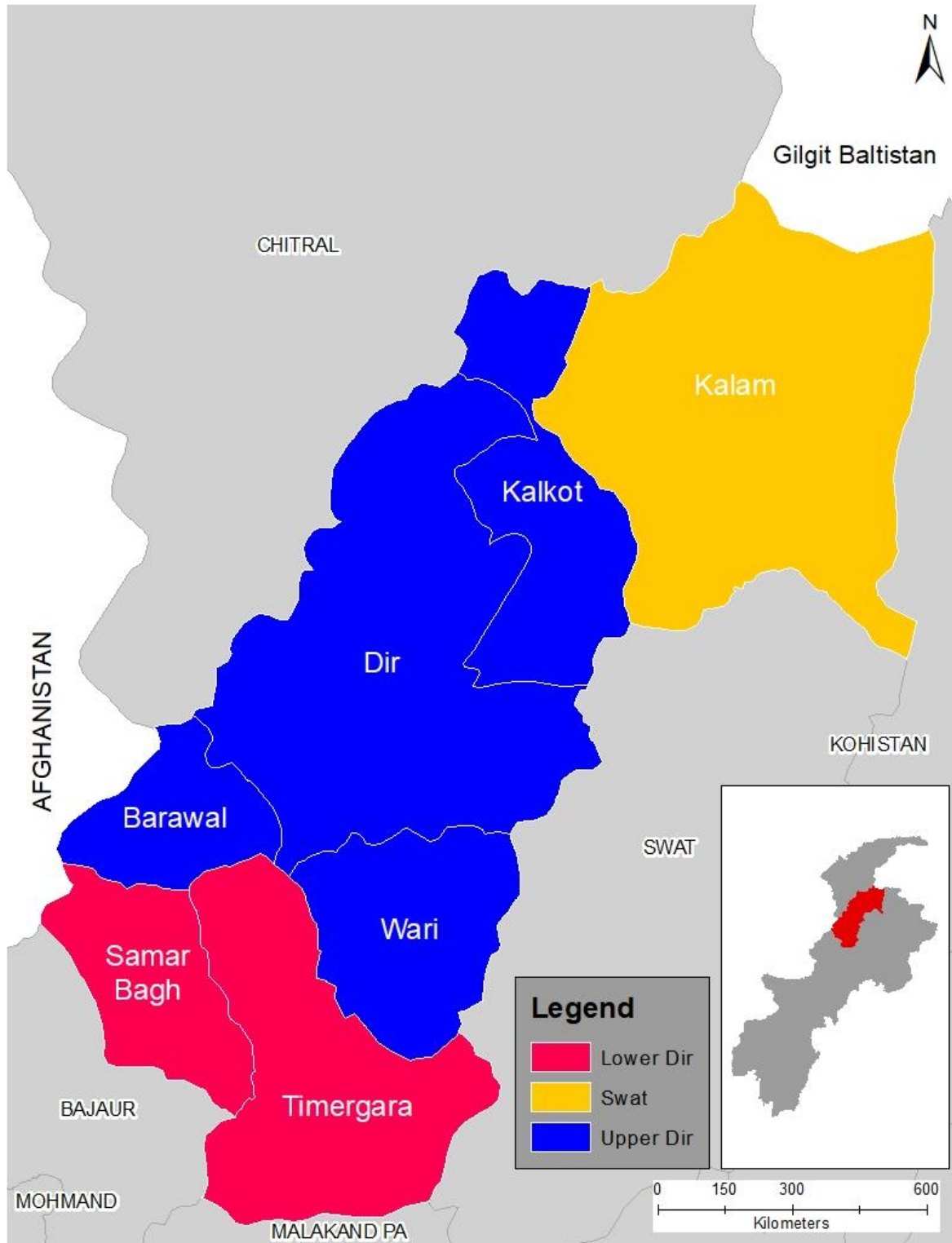


Figure 1: Location map of districts of settlement operation

9. Project Description and Justification of the project

The project is aimed to complete settlement operation in the area mentioned above. In order to facilitate the public, documenting their property rights is the main goal to achieve. Besides the regular revenue generation from land transactions and land use types, these areas have many tourists destination as well especially in Kalam, Kumrat, Laram Top and many others. Settlement operation will provide records of rights which will be very useful for land use planning and property leasing.

Land, which is a scarce natural resource, has been regarded as a measure of wealth, status and power, from times immemorial. Any developmental activity is nearly impossible to conceive without considering land. Now, it is being widely regarded that the efficiency in land management is one of the indices of a nation's developmental status. Hence, it can be said that the land plays the most crucial role for society's progress anywhere in the world.

It can also be said that the rights of the citizens to own private holdings and enjoy the wealth generated from the same, constitute a very important facet of public administration. This is particularly true for Pakistan, which is predominantly an agricultural economy.

As Pakistan is gradually transforming into an industrialized economy and, consequently, suffers from maladies like urban overcrowding and unplanned expansions, unlimited exploitation of precious natural resources like land are being put to enormous strain, screaming for proper management. Land administration in Pakistan, therefore, shall have to evolve procedures and methodologies consistent with the social dynamics of the day.

Issues

The present land records are generated by employing manual labor and making use of inexpensive, approximate and rudimentary, but friendly survey and mapping operations has taken even decades and by the time the maps and the land registers are put to maintenances, they were already outdated to a great extent. Major issues related to the land records management include:

Preservation

- Land records maintained on paper / cloth are in a very bad shape as they can be anywhere from 10 years to 150 years old.

- Duplication on similar media is cumbersome and will result in similar problems of maintenance after a few years.
- It will prevent loss of record from any natural calamity/catastrophe like floods, earthquake etc.

Updating

- Updating boundaries or title information by manual process is highly time-consuming and any error will get propagated to the village maps.
- Cross verification is required over records for a large period to ensure absence of inconsistencies after updating.

Retrieval

- Retrieval for redressal of any dispute is time consuming due to the large bulk of information.
- Every retrieval / use has an associated risk of further physical damage to the old records.
- Identification of any parcel of land is a cumbersome process which will be mitigated after implementation of GIS based land settlement.

Hence prime emphasize is being given to the computerization of the land records maintenance for the benefit of the public and to bring in e-governance into effect at the grass root levels. Evolving system architecture, educating the concerned officials and the public of the benefits and implementing it are the key areas that will be addressed under the proposed system.

In developed countries, the value of land registration systems has expanded from being primarily a mechanism to quiet titles, reduce disputes and support efficient land markets, to being an important source of land information essential for the support of good governance and sustainable development. The international standards for successful land administration projects take into account the global drivers i.e. sustainable development, globalization, urbanization, technology and micro-economic reforms. In order to ensure these standards and make a balance between environment and the pressure of human activities on land, the use of technology especially GIS is unavoidable.

This project will create all the revenue records based on GIS technology and will provide the basis for efficient land use planning. This will be the first ever technology based land settlement in Pakistan. The main theme is to complete this process in an efficient and timely manner and

integrating it with the existing architecture of land record system. Public will be benefitted by facilitating them in providing all the record in a single database where:

- Efficient record of rights is maintained
- Efficient mutation process is executed
- People can access their records easily

10. Implementation Modalities of the project

10.1 Project Structure

The project will be headed by Project Director who will be a grade 19 Govt. officer, appointed by Project Selection Committee / Establishment Department and will be reporting to Director Land Records (DLR), Revenue and Estate Department. Office of the Project Director will be established in Dir Lower. Offices established during the project are as under:

10.1.1 Project Office

The Project Office will be responsible to plan, implement and manage all project activities at the field level. The Project Director will be supported by Manager GIS, Manager Technical, Manager Operations and other support staff. In order to support the finance and accounts sections of the project, Account Officer will be posted from Finance Department/Account General Office.

Project Office will have the following staff members.

Table 2: List of staff of Project Office

S.No.	Designation	BPS	Mode of Engagement	No. of Posts
1	Project Director (PD)	19	Transfer posting/New Hiring	1
2	Manager (GIS)	18	Transfer posting/New Hiring	1
3	Manager (Operations)	18	Transfer posting/New Hiring	1
4	Senior Manager (Technical)	18	Transfer posting/New Hiring	1
5	Account Officer	17	Transfer posting/New Hiring	1
Sub Total (Government Officers)				5
6	Assistant Manager GIS	17	New Hiring	1
7	Admin/HR Officer	17	New Hiring	1
8	GIS Associate	SPP	New Hiring	2
9	Computer Operator	16	New Hiring	2

10	Accountant	16	New Hiring	1
11	Assistant	16	New Hiring	2
12	Driver	06	New Hiring	4
13	Naib Qasid	03	New Hiring	4
14	Sweeper	03	New Hiring	1
Sub Total (Contract basis)				18
Total Staff of Project Office				23

The overall project structure is shown in the following diagram

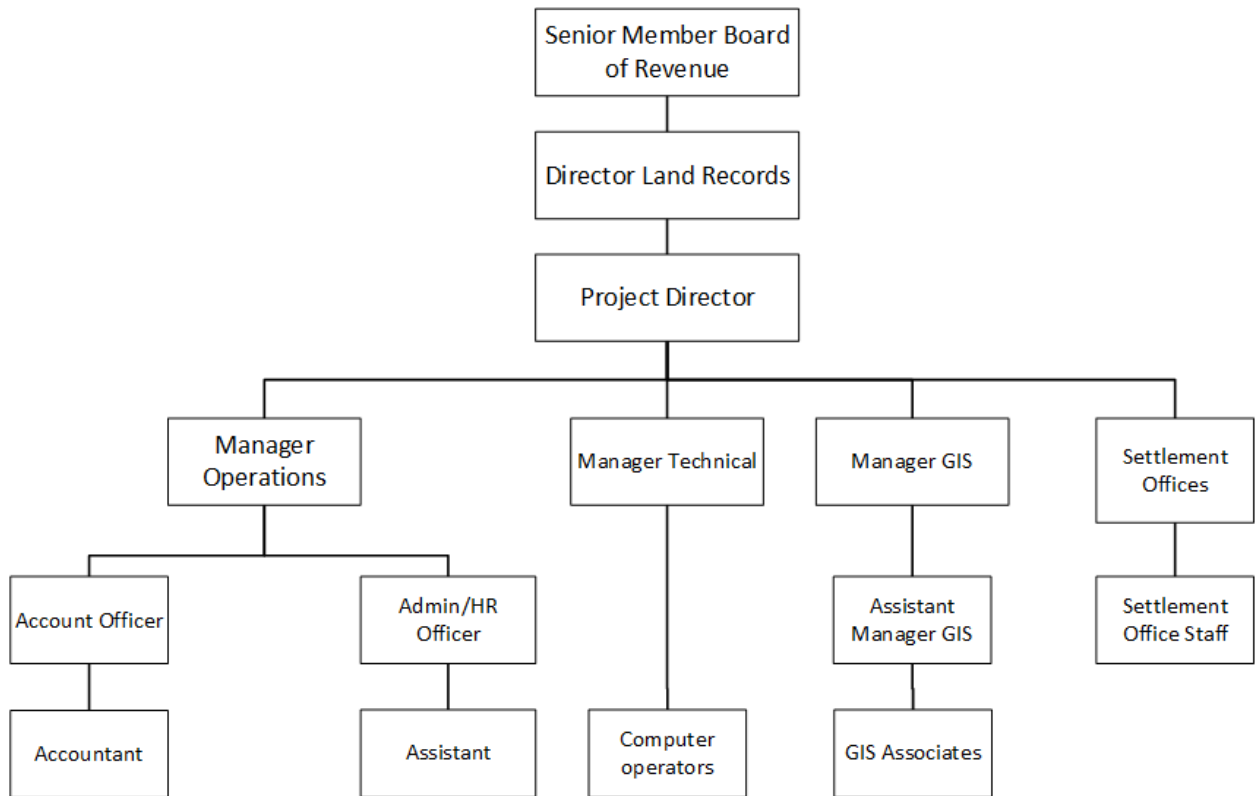


Figure 2: Overall Project Organogram

10.1.2 Settlement Office

Settlement Offices will be established in Dir Lower and Dir Upper and sub-teshil, Kalam, of district Swat to start settlement operations simultaneously. Settlement Officer will be in-charge of settlement operation in each district and will be stationed at Settlement Office. The Additional Deputy Commissioner (ADC-G) of the concerned district will be notified as Settlement Officer by the Revenue and Estate Department. Each Settlement Officer will be assisted by an Assistant Settlement Officer (ASO). All staff of Settlement Office will be hired from market on contract basis except Assistant Settlement Officer who will be appointed by Project Selection Committee / Establishment Department and will be Grade 17/18 Government Officer. However, if a government officer with relevant experience and skills is not available, then the ASO will be hired from market. List of staff of settlement office along with its aggregate are given as below:

Table 3: List of Staff of Settlement Offices

S #	Designation	BPS	Mode of Engagement	Dir Lower	Dir Upper	Kalam	Total No. of Posts
1	Settlement Officer	18	Addl. Charge ADC (G)				
2	Assistant Settlement Officer	17/18	Transfer posting/New Hiring	1	1	1	3
Sub Total (Government Officers)				1	1	1	3
3	Assistant Manager (GIS)	17	New Hiring	1	1	1	3
4	Tehsildar (Rtd.)	SPP	New Hiring	2	2	1	5
5	GIS Associates	SPP	New Hiring	12	9	3	24
6	Computer Operator	16	New Hiring	12	9	3	24
7	Accountant/Assistant	16	New Hiring	2	2	1	5
8	Girdawar	SPP	New Hiring	12	9	3	24
9	Surveyor	SPP	New Hiring	24	18	6	48
10	Patwari	SPP	New Hiring	60	45	15	120
11	Driver	6	New Hiring	7	5	3	15
12	Survey Helper	3	New Hiring	24	18	6	48
13	Chowkidar	3	New Hiring	2	2	2	6

14	Sweeper	3	New Hiring	1	1	1	3
15	Naib Qasid	3	New Hiring	2	2	1	5
Sub Total (Contract basis)				161	123	46	330
Total Staff of Settlement Offices				162	124	47	331

Settlement staff will be comprised of both Revenue and Technical staff. Tehsildar will be responsible to lead and guide Revenue Staff (i.e. Girdawar and Patwari) while Assistant Manager GIS will be responsible for GIS Associates, Computer Operators and Surveyors.

10.1.3. Service Delivery Center (SDC)

Service Delivery Center (SDC) is the facilitation center to provide services related to land record transactions. These SDCs will be established on the analogy of Computerization of Land Records Project, Khyber Pakhtunkhwa. In order to operationalize SDCs, permanent staff will be hired through proper channel. List of SDC staff are given below:

Table 4: List of Staff of Service Delivery Center

S.No.	Designation	BPS	Mode of Engagement	No. of Posts	No. of Offices	Total No. of Posts
1	Deputy Director Database	18	New Hiring	1	2	2
2	Assistant Director GIS	17	New Hiring	1	3	3
3	Assistant	16	New Hiring	1	7	7
4	Service Delivery Official	16	New Hiring	10	7	70
5	GIS Associates	16	New Hiring	1	7	7
6	Driver	6	New Hiring	2	7	9
7	Naib Qasid	3	New Hiring	4	7	28
8	Chowkidar	3	New Hiring	2	7	14
9	Sweeper	3	New Hiring	1	7	7
Total Staff of SDC				23		147

It is pertinent to note that Deputy Director Database (DD Database) will be hired for Headquarters SDC meaning there will be only one DD Database for a district and will be looking after multiple SDCs. Two DD Databases will be hired each for Dir Lower and Dir Upper. Keeping in view the large area, distributed population and less transactions of Tehsil Kalam, services in Kalam will be covered by using a Mobile Van. This Van will be visiting different areas on a set schedule to facilitate public in land records transactions. Staff of Bahrain SDC will be operating these mobile services.

Procurement of land and construction of SDCs are also included in this project. From the experience of Computerization of Land Records Project, Khyber Pakhtunkhwa, it has been noted that construction work takes more time than expected. That's why during the project's life, provision of rented building for SDCs have been allocated. Service Delivery Centers will be able to provide services to the public as soon as settlement operation is completed in a mouza.

10.1.4. Project Review Board (PRB)

Overall supervision and keeping the project on track will be ensured by Project Review Board (PRB). Project Review Board will consist of the following members:

S.No.	Designation	Status
1	Senior Member Board of Revenue	Chairman
2	Representative of Finance Dept.	Member
3	Representative of P&D Dept.	Member
4	Director Land Records (DLR)	Member
5	Project Director	Member/Secretary
6	Representative of ST&IT Department	Member

Frequency of Meeting: The Project Review Board (PRB) meeting will be organized at least once in a quarter to review the progress as per the project goals.

Justification for PRB: The Project of land settlement in Dir Upper, Dir Lower and Tehsil Kalam is the first of its kind based on GIS technology. PRB will act as major forum to give directions after carefully monitoring the progress of the project and help to solve the administrative and legal matters during project implementation.

Terms of Reference (TORs) of PRB

- Review and coordinate over-all progress and provide strategic direction to project implementation.
- Performance overview and consistency with the project goals.

- Support and solve the project objectives with the administrative and line departments for legal matters.
- Guidance for the KPIs progress and support any higher support to the project;
- Any other action / decision for smooth implementation of the project and achieving the objectives.

10.2. Project Execution

Land settlement operation is an extensive exercise of engaging people, surveying entire area, recording records of rights and preparing other records related to land and its access. Settlement operation will be initiated in all districts simultaneously. The overall timeline of the project is three (03) years.

To efficiently utilize staff of settlement operation, they have been organized teams. These teams are illustrated in the figure below.

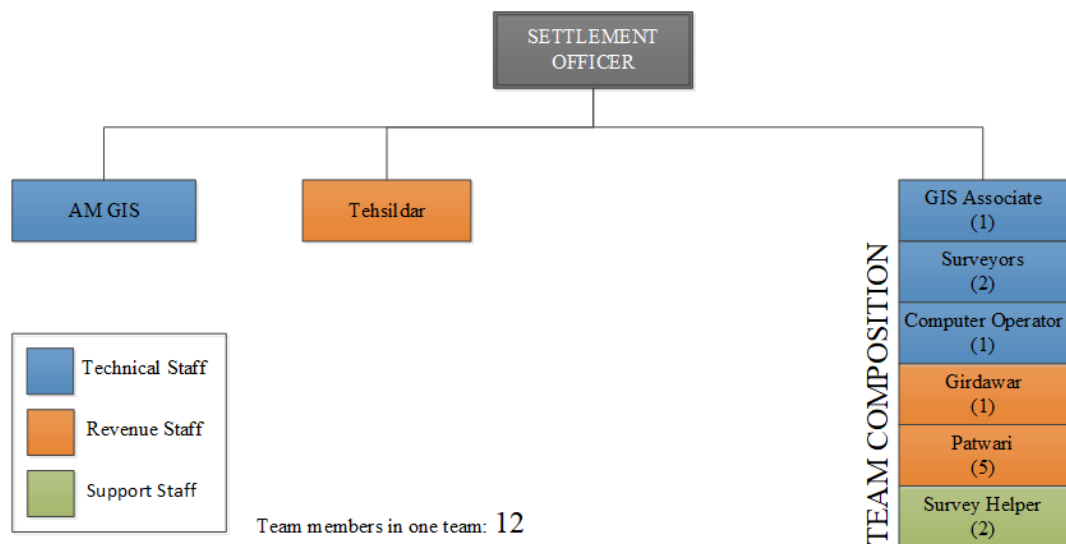


Figure 3: Team structure of Settlement Office

Each team will be comprised of both Revenue and Technical staff. Team composition is shown in below table.

Table 5 : Team Composition

S.No.	Designation	No.
1	GIS Associate	1
2	Surveyors	2
3	Computer Operator	1
4	Girdawar	1
5	Patwari	5
6	Survey Helper	2
No. of Staff in a team		12

Each team will be working in five mouzas simultaneously i.e. at a single time settlement operation will be ongoing in 60 mouzas in Dir Lower, 45 mouzas in Dir Upper and 15 mouzas in Kalam. After completing five mouzas by a single team, another group of five mouzas will be assigned to them by the Assistant Settlement Officer.

There will be five Patwaris working in a team. They will be preparing Shajra e Nasb, writing Khatoni, verifying field measurements, verifying field book, preparation of Misl e Haqiat and verification of all other revenue documents. He will be supervised and guided by Girdawar. Patwari will be working closely with Computer Operator to ensure data has been entered and with GIS staff to make sure measurements of parcels are correct.

As soon as the Patwari starts writing Shajra e Nasb and Khatoni, Surveyors with the help of GIS Associate will start Khasra Measurement. GIS Associate will be extending GIS support to the team and will be primarily responsible to demarcate mouza boundaries, manage and verify survey data, finalize Massavis and perform ground truthing where required.

Surveyors will be supporting GIS Associate and Patwari in field data collection and field verification. He will also be responsible to handle and use GNSS/RTK equipment. Computer Operator will perform the scanning and data entry of Shajra e Nasb and Khatoni received from Patwari on daily basis. Computer Operator will be a trained personnel to use Land Settlement Module and support the Revenue staff and Assistant Settlement Officer in performing verification of the data entered. Surveyors will be assisted by Survey Helpers in handling survey equipment and do the duty of attendants where Base (DGPS) is fixed.

Field work will be conducted by Patwari and Surveyors where GIS Associate and Computer Operator will do the desk work. In case of any verification needed, both the staff members will move with the field team. In order to facilitate the field staff i.e. Patwari, Surveyors and Survey Helpers, each team will be provided with a vehicle.

Once the record is finalized by Patwari, it will be verified by Girdawar, Tehsildar and finally by the Settlement Officer. After signing off the records, data will be available for live services.

10.3 Implementation Methodology

Settlement operation will be carried out in two different modalities i.e.

- a. Fresh Settlement
- b. Re-settlement

Both the processes are explained in detail as below.

10.3.1 Fresh Settlement

Most of the areas of Dir Lower, Dir Upper and Kalam (Swat) are lacking proper record of rights that's why Fresh Settlement process will be adopted. The use of GIS and IT has been illustrated in the figure below. Land Records Management Information System (LRMIS) which is already in use in Service Delivery Centers (SDCs) of District Peshawar, Mardan and Abbotabad. Land Settlement Module will be developed and integrated with current LRMIS software. Initial data entry of Shajra e Nasab and Khatoni will be stored in Settlement Module which after verification (Parthal) from concerned revenue staff will be updated to LRMIS database.

Khasra measurement and Field Book preparation will be done using GIS technology as illustrated in Figure 1. All the Khasra measurement will be done using Very High Resolution Satellite Stereo Imagery and using advanced surveying equipment i.e. DGPS + GNSS. This data will be stored in a Geo-database and then after verification from concerned revenue staff will be integrated with LRMIS database. After completing all the required processes of Settlement Operation, the data will be ready for live services.

The detail process is discussed below and is shown in Figure 3.

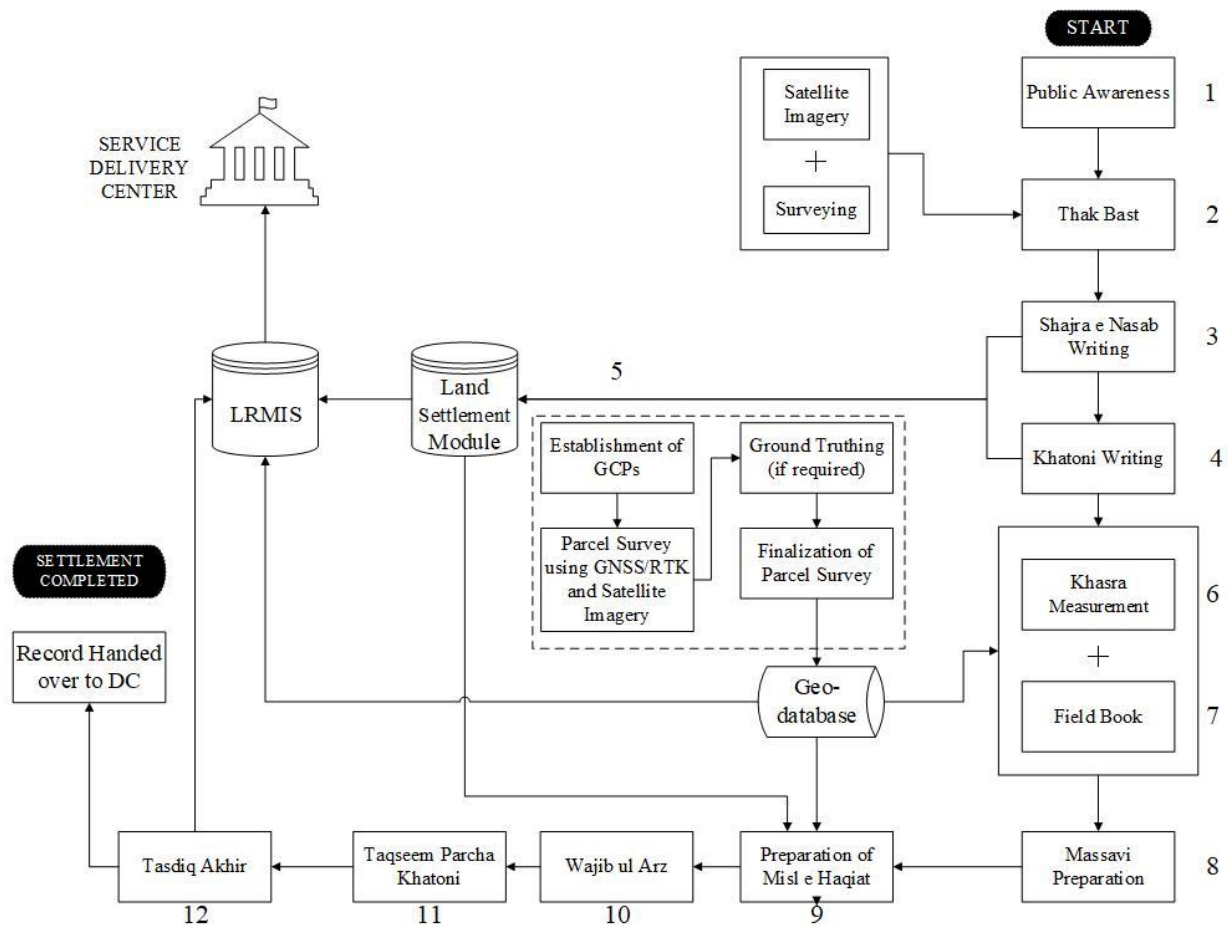


Figure 4: Settlement Methodology

1. Public Awareness

The department will initiate and coordinate mass awareness campaigns before the settlement process begins in each area separately. A range of tools and techniques will be developed to foster participation through elders and mass awareness campaigns. It will include posters and leaflets, mass media campaigns (radio, television), mobile display/announcements, public meetings, using social media campaigns, and school/college class awareness with the help of local administration. Keeping in view the importance of the project, the awareness campaign will be focused to develop a clear perception, understanding, and familiarity of how the target masses will get benefits out of the settlement operation. Assistant Settlement Officer will be looking after and coordinating this activity.

Objectives of Public awareness campaign are:

- Establishing the fact that settlement operation and land record management information system will offer services that will advantage land owners.
- Familiarizing the audiences with the use, and ease of the system.

- Educating the target audience on how to use the offered Services.
- Minimizing resistance among the target audience against the change of operation.
- To ensure that awareness campaign is reached to the maximum audience.

Public support and understanding are essential to educate potential landowners and other stakeholders. The campaign would involve information about benefits and obligations of registering title transactions, title alterations and the risks associated with unregistered interests.

Reach: The mass awareness campaign will be launched through village-based meetings, print and electronic media and also by arranging sessions in school and colleges.

Printing: Special awareness poster will be printed for describing land settlement process step by step and will be shared with local community and stakeholders etc.

Frequency: The message reaching the audiences should be received more than once. This ensures attendance and improves recall.

2. Thak Bast

Thak Bast is the first practical step of settlement operation. It is the process of drawing a sketch of revenue estate or in other words we can say it is the process of determining boundary line of that revenue estate. It is precisely determined with the help of community elders and land owners.

Role of Technology: This process will be supported by GIS by printing high resolution satellite imagery on paper. These maps will be presented and discussed in the community to determine boundary line of that revenue estate. If the boundary line is a natural feature like river, stream or hill/mountain or it's a manmade feature like road, canal etc. then physical survey may not be needed. But if the boundary line is within parcels and is not clear in satellite imagery then physical survey using advanced surveying equipment will be carried out.

In this process a number of staff will be involved. GIS Associate will be responsible to print satellite imagery on paper maps of that area on suitable scale. Tehsildar/Patwari will be responsible to determine the boundary line with the help of community and land owners while Surveyors will be responsible to survey that area if required. At the end GIS Associate will produce the final boundary of that revenue estate.

3. Chatta Shajra Nasb writing

Shajra Nasb writing (Pedigree/Family Tree) is the process of noting down list of all owners along with their ancestors. Owner list is written in the form of a tree through which relation between owners can be determined. It also provides the list of different tribes and clans residing in that area.

Writing Shajra Nasb is an ongoing process and it is usually not completed in a single sitting. It is completed towards record finalization stage. Shajra Nasb will be written by Patwari on prescribed form and that form will be handed over to Computer Operator.

Role of Technology: Computer Operator will scan the hand written Shajra e Nasb and will do data entry in settlement module of existing LRMIS software. Scanned record and data entry will be compared for verification purposes.

4. Khatoni Writing

Khatoni is the primary document to record information of cultivator of a piece of land. This information is collected for each and every parcel in a given revenue estate.

Role of Technology: Patwari will be responsible to write Khatoni in the field and then deliver it to respective Computer Operator. Computer Operator will scan it and will enter the data in exiting LRMIS software. At the completion of Khatoni writing, both the hand written and printed out records will be compared for verification and in case of any inconsistency, will be corrected at the field level.

5. Chanda Bandi/Establishment of Ground Control Points (GCPs)

In manual settlement process Chanda bandi is the process of setting base for measurement. In this process, points of equal distance are lay down in all over revenue estate. These points can be referred to as reference points. Khasra measurement is taken place using reference from these points and are used as a source of triangulation.

Role of Technology: In GIS based settlement Chanda Bandi will be replaced by using Ground Control Points (GCPs). GCPs are termed as permanent locations on ground which do not change over time. These points are very important for referencing location of land features. GCPs are usually established and managed by the National Surveying Agency i.e. Survey of Pakistan (SOP). SOP has already established network of GCPs/Benchmarks in all over Pakistan and they might be engaged to further increase the density of these points by traversing it, so that it may cover all the areas.

In revenue system “Seh Hada” which acts as GCP and are marked at the common/junction point of three Mouzas. A small rock is placed or cemented block is constructed at that point and its location is also marked on Massavi Map with a Red Dot. Seh Hada will also be referenced with GCPs of Survey of Pakistan.

6. *Khasra Measurement*

Khasra measurement is the most time taking process of manual settlement operation. In this process dimensions of each and every Khasra is measured.

Role of Technology: Khasra measurement will be done using GIS technology. A hybrid approach of both satellite imagery and surveying equipment will be used. Very High Resolution (VHR) satellite imagery will be used to digitize the entire area. As the settlement operation is going to take place mostly in hilly areas, it will be difficult to conduct survey in rough terrain, deep valleys and inaccessible areas. Such areas will be digitized and measured using VHR satellite imagery. Areas which are congested, will be surveyed using advanced surveying equipment.

In this process GIS Associates and Surveyors will play the vital role under the guidance of Assistant Manager GIS of each district. GIS Associates will be digitizing the areas while Surveyors will be doing ground survey where required.

7. *Field Book preparation*

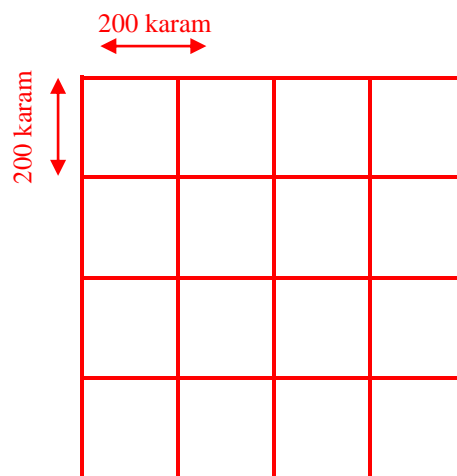
Field Book is also one of the most important record regarding Khasra measurement. This record is prepared while measurement is ongoing. Each of the Khasra is given a unique ID and lengths of each dimension is noted down in it. Area of each Khasra is also determined in Field Book. Khatoni No. of each Khasra is also recorded.

Role of Technology: Using GIS based technology, Field Book preparation will be much easier. Measurement of each dimension of a Khasra will be determined from VHR satellite imagery or advanced survey equipment (as discussed in the previous step). Area of each Khasra will also be determined automatically. Only Khatoni No. will be recorded from the field by Patwari which will provide the basis for cross verification of the data. Field Book and Khatoni will be verified by relevant revenue staff after its completion.

8. Massavi preparation

Plotting of Massavi using manual methods requires very high degree of skills. In manual system, it is plotted using Plane Table technique which is obsolete now in this era of technology.

Role of Technology: All the Khasra measurements of a given revenue estate will be organized in the form of Massavi. This Massavi will have the same scale which is used for manual one i.e. 1inch = 40 Karam or 220 feet. It will also have the 4x4 grid each of 200x200 Karam. This grid will initially be extended from settled districts to avoid any inconsistency on the borders of its neighboring districts.



GIS Associates will be responsible to create these Massavis. Massavis will be verified on ground by concerned revenue officials before it is finalized.

9. Writing of Misl e Haqiat

Misl e Haqiat is the primary document and final deliverable for records of rights. It is the combination of multiple documents which is written at the end of settlement operation.

Role of Technology: As Misl e Haqiat is written from multiple documents like Shajra e Nasab, Khatoni and Field Book, it will be generated automatically from the land settlement module of existing LRMIS software. After it is generated, it will be handed over to revenue staff for verification.

Computer Operator will be responsible to generate it from the system.

10. Wajib ul Araz

Wajib ul Araz is the document of common lands, its customs, accessibility for different tribes/clans and distribution of resources. This document is written by Patwari of the concern revenue estate.

Role of Technology: Once Patwari is finished writing it, it will be handed over to Computer Operator to scan and incorporate it with Misl e Haqiat in to the system.

11. Taqseem Parcha Khatoni

Taqseem Parcha Khatoni is the process of distributing owner's land information to respective owners to find out if there is any discrepancy in the data.

Role of Technology: Parcha Khatoni of each owner will be generated from the system by Computer Operator on its prescribed format and will be distributed by concerned Patwari. In case of any issues reported by the owner will be corrected accordingly.

12. Tasdeeq Akhir

Tasdeeq Akhir is the final process of verification done by Settlement Officer (SO). All the required documents will be generated from the system which will be verified by respective SO. In case of any discrepancy found in data will be corrected accordingly.

After the completion of Tasdeeq Akhir, data will be handed over to District Administration and will be ready to get live on Service Delivery Center (SDC).

10.3.2 Re-settlement

There are a few pockets in Tehsil Kalam where partial settlement has previously been done. In these areas Re-settlement operation will be carried out which has a few different steps from Fresh Settlement process which are explained below. Figure 4 shows the methodology of Re-settlement process.

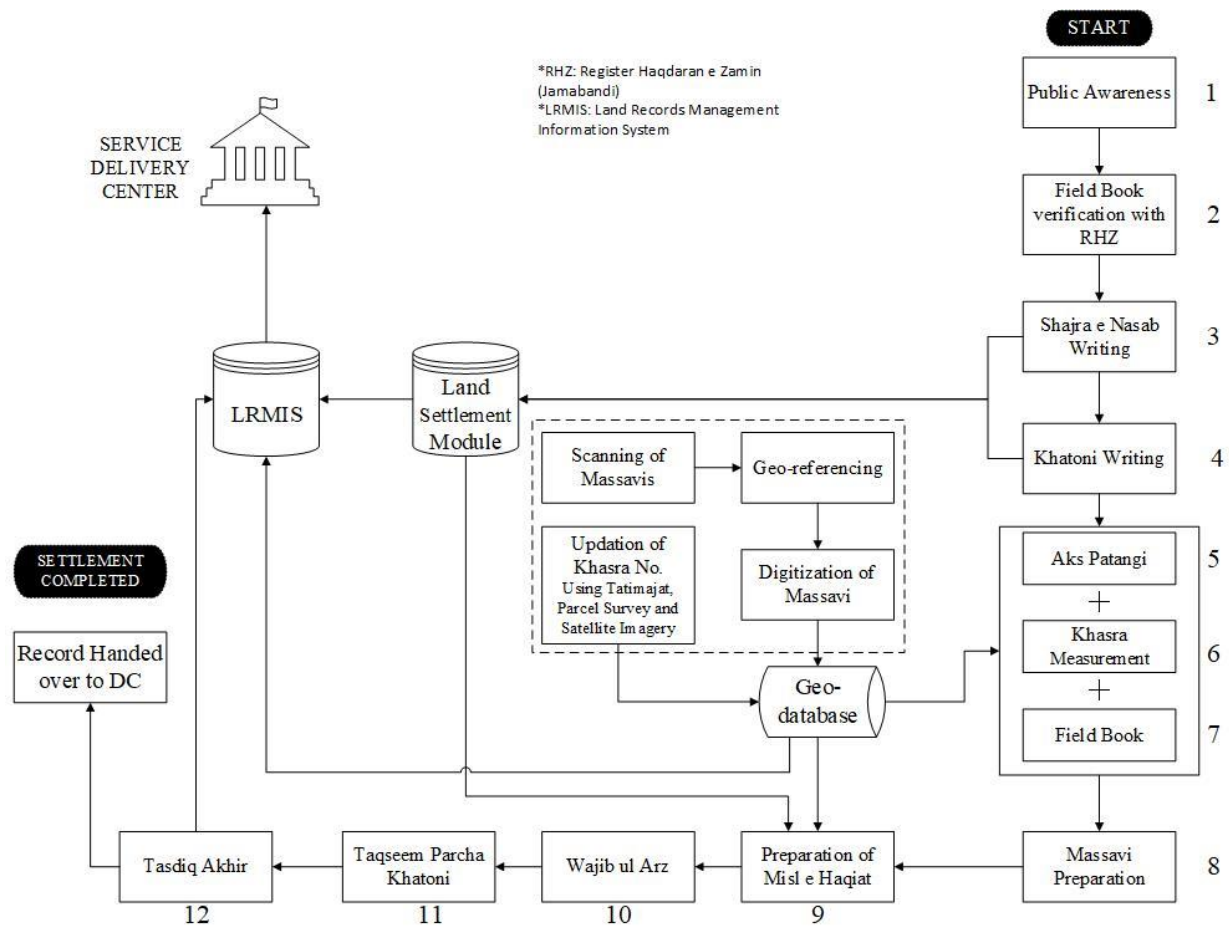


Figure 5: Re-settlement Methodology

1. Public Awareness

It has been explained under “Public Awareness” of section 10.3.1.

2. Field Book verification with Jamabandi (Field Book ba Jamabandi)

This process involves cross verification of *Field Book* with latest *Jamabandi*. This activity is done by revenue official and it is a desk review.

3. Chatta Shajra Nasb writing

Details of “Chatta Shajra Nasb writing” are given in section 10.3.1. In Re-settlement the previous Shajra Nasab is updated.

4. Khatoni Writing

In Re-settlement process, Khatoni writing has the same process as of Fresh settlement only the previous Khatoni Number is added in the record. Khatoni writing is explained in section 10.3.1.

5. Aks Patangi

Aks Patangi is the process of photocopying original Massavi manually. This process is carried out by placing tracing paper on Massavi and draw each and every Khasra on it. Aks Patangi is then plotted on new sheet and then is updated in the field by Patwari.

Role of Technology: This step will be skipped in GIS based land settlement as Massavis will be digitized from old ones. Once the digital copy is prepared, it can be printed as many times as required.

6. Khasra Measurement

Once the previous Massavi of a mouza is digitized, it will be printed out and the relevant Patwari will start updating it. Surveyor will conduct field surveys where required and the changes will be recorded accordingly including Khasra divisions, new features addition like roads, schools, health facilities and change in type of land.

Role of Technology: In digital mode, the previous Massavis will be scanned, geo-referenced, digitized and then will be updated according to the ground situation. This updation will be done using satellite imagery and mostly by ground survey. Updated Massavis will be prepared by GIS Associates and will be shared with concern Revenue officials for verification.

7. Field Book preparation

Field Book will also be prepared in parallel with Khasra measurement. Details of Field Book preparation is already discussed in section 10.3.1.

8. Massavi preparation

Massavi preparation is also discussed in section 10.3.1.

9. Writing of Misl e Haqiat

Preparation of Misl e Haqiat is discussed in section 10.3.1

10. Wajib ul Araz

Writing of Wajib ul Araz is discussed in section 10.3.1.

11. Taqseem Parcha Khatoni

Taqseem Parcha Khatoni is discussed in section 10.3.1.

12. Tasdeeq Akhir

Tasdeeq Akhir is discussed in section 10.3.1.

After the completion of Tasdeeq Akhir, data will be handed over to District Administration and will be ready to get live on Service Delivery Center (SDC).

10.4 Data Management

Data management is the compilation and storage of both spatial and non-spatial. All the data collected from field during survey will be compiled at the Settlement Office, which will also be transported to PMU (Computerization of Land Records) through secure Virtual Private Network for safe storage as shown in below figure. The data collected from the field may consist of semi digitized data i.e. data in digital form collected through GPS/GNSS devices and manual/textual records. The semi digitized data will be cleaned and post processed after correction of necessary errors and removal of unwanted attributes. This data will be locally stored at each Settlement Office in a work station, which will be accessed by the survey teams and digitizers on a local area network (LAN) for local processing. The Settlement Office will provide all the data processing facilities along with necessary hardware for printing, scanning and sending the final data to Project Management Unit Data Center. All the data transmission between the Settlement Offices and PMU will be protected by firewall at PMU and a Remote Ethernet Device (RED) connected to DSL to provided secure VPN over internet. The data from all the offices will be accumulated in PMU over a server and the backup copies of the same will also be created on a backup server. Figure 3 shows the data management and data flow between Settlement Offices and PMU.

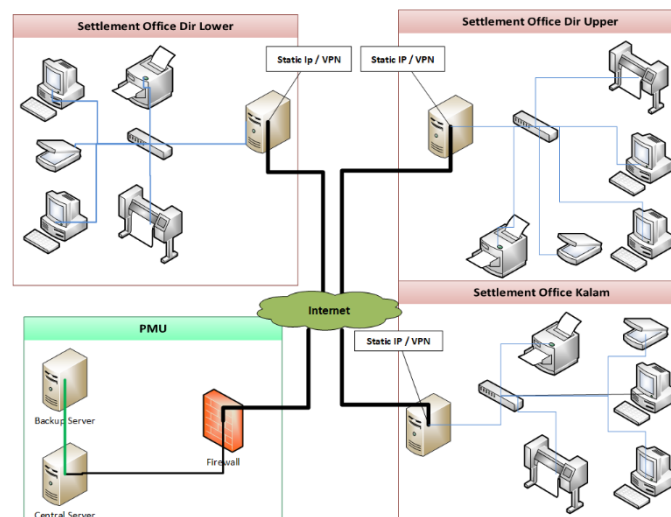


Figure 6: Data Management and Data Flow Diagram.

Survey data collected by surveyor will be handed over to GIS Associate and will be saved in a proper folder structure which is shown as below. This survey data will be post processed to

remove errors and will be plotted on respective Massavi. Processed data will be updated in respective spatial database.

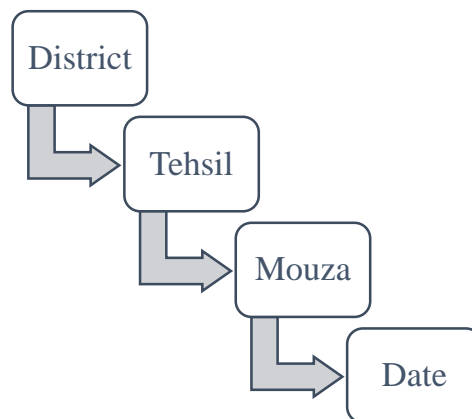


Figure 7: Folder structure for storing Survey Data.

10.5 Technical aspects of the project

Surveying equipment and software details are discussed below:

10.5.1. Surveying equipment

The technological development in the Information Technology is the major driving force in changing the face of the Digital information world. The DGPS equipment for land settlement preparation and scanning technologies for electronic land document management will revolutionize the traditional paper-based land document management. The database technologies for storage of large land records for data management, analysis and operation have had the greatest impact on the digital land archive information system. In recent times, the communication technologies have become the focus of attention for viewing and using digital land records. So, the Modern technology will be used for:

- Land title surveying
- Land parcel development and administration
- Survey database management
- GIS cadastral database management
- Automated electronic survey and database workflow tools for implementation
- Online publishing of Land records owners with integration of Geospatial data

To develop land parcels of each and individual land owner to the scale with precision by applying most modern available field data collection DGPS system to minimize human errors, by collecting data on ground by minimum Dual Frequency GNSS system.

Digital Map (Massavi) will be developed which will be compatible with native shape/format geo-database with separate layer for each and every feature with unique feature codes. Map will be having data but not limited to following:

- Land parcel as block with details (Area and Dimensions)
- Land use types
- Roads by identity
- Rivers/Nallah/Streams by identity
- Grave yards as blocks
- Health and School facilities
- Religion places Masjid's, Monument etc.,
- Houses as one block (built-up area)

10.5.2. About software

Settlement Module will be developed in existing LRMIS software by Deputy Director Database (PMU). This module will have the following functionalities:

- Shajra Nasab data entry
- Khatoni data entry
- Field Book data entry / generation
- Preparation / generation of Misl e Haqiat
- Reports of inconsistent Khata/Khatonis
- Generation of Parcha Khatoni for Taqseem Parcha Khatoni process

14. Project Benefit and Analysis:

Secure land tenancy and property rights are fundamental to shelter and livelihoods and serve as solid foundation for the realization of human rights and poverty reduction. It enables people in rural and urban areas to invest in improved livelihoods. Secure land rights are particularly important in helping reverse gender discrimination, social exclusion of vulnerable groups and wider social and economic inequalities linked to inequitable and insecure access to land. They also help to promote good environmental management, improve revenue collection, improve food security, and assist directly in the realization of human rights, including the elimination

of discrimination against women, the vulnerable, indigenous groups and minorities. It is vital for good governance at all levels as it promotes transparency and accountability in its service delivery in unequivocal terms.

The project is to improve the land records service delivery of the unsettled districts of Dir Lower, Dir Upper and Tehsil Kalam of district Swat, contributing to long-lasting tenure security and more efficient functioning of land markets, and to establish a basis for comprehensive integration of information associated with rights in land. Parcel information is comprised of the documents, maps and its related information that represents rights and interests in land. It includes ownership, legal description, location, nature and extent of a particular piece of land. Parcel information plays an important role in the economic development of individuals and communities. Parcel information provides a public record of who owns what, where and how much.

Each Government needs secure, accessible and authoritative land information to build a successful cadastral system. The benefits of land information systems (cadastral and geographic information systems) are many and varied. In analyzing the benefits, it is best to look at urban and rural areas separately, both of which have economic, social and environmental benefits.

Economic Benefits:

- To reduce time and cost of transaction
- To utilize digital land records data mining for planning and taxation.
- System will support government, private, commercial and civil departments in land revenue, land titles, land holdings, land mortgage and land leasing.

Social Benefits:

- Public access to records through Service Deliver Centre (SDC's) and eventually, the internet via web for basic information.
- Increased access to land records at lower transaction cost for the beneficiary, through a client-responsive service.
- Increased level of tenancy security of land-right holders.
- Definite and secure transactions at mutation.
- Central maintenance of electronic land records and instantly update and backup in secure terminal.

- E-Pass Book and Computerize Fard, Jamabandi and Massavi.
- Efficient and easy searching facilities.
- Land transfer within in a one window operation.
- Get “FARD” instantly without any delays.

Environmental:

- Mapping will help identification of forest areas precisely
- It will help identification of development projects.
- Tourism will be supported by implementation of this project
- No dispute and conflict of land records publicly.

The overall benefits of modern technology in Land Administration is to design a land system, which will facilitate the land administration process such as:

Land Valuation

- Determining values, objectives and the legal framework in relation to management of land as a legal, economic, and physical object.
- Basis for building sound land administration infrastructures.

Cadastral Systems

- Identification of land parcels and securing land rights.
- Facilitate land registration, land valuation, and land-use control.
- Underpin Sound Land Administration

Land Administration Systems

- Administration of land tenure, land value, land-use, and land development.
- Facilitate efficient land markets and effective land-use management.
- Underpin Sound Land Management

Land Management

- Management of processes by which land resources are put into good effect.
- Facilitates economic, social, environmental sustainability.
- Underpins and implements sound Land Policies

Mode of Payment

All payments would be made through assignment account for quick and efficient disposal of disbursements. Assignment account is proposed by keeping in view the following points:

1. Project duration is three (03) years and it would require quick disbursements.
2. There will be three Settlement Offices, and all the operations would be managed from one Project Office.

Project Work plan

Level	Code	Activities / Sub Activities	Land Records Settlement Project for Dir Lower, Dir Upper, Tehsil Kalam (Swat)															
			2020-2021 Quarters		2021-2022 Quarters				2022-2023 Quarters				2023-2024 Quarters					
			3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th		
2	1.1	Project Core Team Formation.																
3	1.1.1	Posting Transfer of Project Director																
3	1.1.2	Posting Transfer of Technical Staff																
3	1.1.3	Posting Transfer of Settlement Officers																
3	1.1.4	Orientation of newly posted staff on project activities.																
3	1.1.5	Project PC-I Review and common understanding of project objectives																
3	1.1.6	Hiring of Staff																
2	1.2	Establishment of Projectized Offices																
3	1.2.1	Establishment of Project Office (PO)																
	1.2.1.1	Procurement of paraphernalia for PO																
3	1.2.2	Establishment of Settlement Offices																
4	1.2.2.1	Procurement of paraphernalia for Settlement Offices																
3	1.2.3	Construction of Service Delivery Centers (SDCs)																
4	1.2.3.1	Procurement / Acquisition of Land for SDCs																
4	1.2.3.2	Construction of building for SDCs																
4	1.2.3.3	Procurement of Furniture and Fixture.																
3	1.2.4	Mass Awareness Campaigns																
4	1.2.4.1	Preparation of Mass Awareness contents (Text, Audio, Videos etc.)																
4	1.2.4.2	Meetings with local community																
3	1.2.5	Procurement of Satellite Imagery																
3	1.2.6	Coordination with third party for permanent Ground Control Points.																
4	1.2.6.1	Establishment of ground control points for all Tehsils.																
3	1.2.7	Team Formation for Land Settlement Operation																
4	1.2.7.1	Training / Orientation of the field staff																
3	1.2.8	Development of field visits Plans																
4	1.2.8.1	Approval of field visits and Schedule by Settlement Officer																

Level	Code	Land Records Settlement Project for Dir Lower, Dir Upper, Tehsil Kalam (Swat)													
	Activities / Sub Activities	2020-2021 Quarters		2021-2022 Quarters				2022-2023 Quarters				2023-2024 Quarters			
		3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
2	1.3	Execution of Field Operations of Land Record Settlement													
4	1.3.1	Thak Bast													
3	1.3.1.1	Monthly Status Review Meeting													
3	1.3.2	Preparation of Shajra Nasab													
4	1.3.2.1	Monthly Status Review Meeting													
3	1.3.3	Khatooni Writing													
4	1.3.3.1	Monthly Status Review Meeting													
3	1.3.4	Khasra Measurement with the help of GNSS Survey Equipment													
4	1.3.4.1	Monthly Status Review Meeting													
3	1.3.5	Generation of field book													
4	1.3.5.1	Monthly Status Review Meeting													
3	1.3.6	Preparation of Massavies													
4	1.3.6.1	Monthly Status Review Meeting													
3	1.3.7	Preparation of Misle –e – Haqit													
4	1.3.7.1	Monthly Status Review Meeting													
3	1.3.8	Preparation of Wajib ul Arz													
4	1.3.8.1	Monthly Status Review Meeting													
3	1.3.9	Taqseem Parcha Khatoni													
4	1.3.9.1	Monthly Status Review Meeting													
4	1.3.10	Tasdeeq Akhir													
3	1.3.11	Certificate of Completion													
3	1.3.12	Go Live													
2	1.4	Monitoring and Control													
3	1.4.1	Project Review Meeting (PRB) Meeting													
3	1.4.2	Monthly Status Review Meetings													
3	1.4.3	Bi-Weekly Review Meetings.													
3	1.4.4	Weekly updation of Progress on the M&C Dashboard for the KPI.													
2	1.5	Closeout													
3	1.5.1	Mauzas wise Completion Certificate by Settlement officer													
3	1.5.2	Handing over / taking over of all land settlement record by Settlement officer and District Administration.													
3	1.5.3	Live Services of Completed Services in Service Delivery Center.													
3	1.5.4	Update / Maintenance of the digital record.													
3	1.5.5	Formal Closure of project													
3	1.5.6	Release of project resources.													