REVENUE (LAND RECORDS AND SETTLEMENT) DEPARTMENT

3.5   Audit of Computerisation of Land Records

To overcome the problems inherent in the manual system of maintenance and updating of land records, Government of India initiated a scheme for Computerisation of Land Records in 1988-89. It was launched in Tripura on a pilot project basis in the North Tripura District in 1991-92. Thereafter, the project was taken up in other districts in 1993-94 with the help of National Informatics Centre, Agartala. Even after 15 years, the scheme had not become fully functional and the benefits of computerisation were not fully available to public or the Department.

Highlights

Lack of definite time frame and effective monitoring led to indefinite delay in the implementation of the scheme. Tardy implementation was evident from the fact that the scheme, which commenced in 1991, was not yet complete even in the pilot district.

(Paragraphs 3.5.6 and 3.5.7)

Due to lack of validation controls, program error, lack of interrelation among various tables and faulty data type description, the consistency, integrity and reliability of the data had been compromised.

(Paragraphs 3.5.9 and 3.5.11)

Due to non-feeding of data in crucial fields, database was incomplete and would be of limited use to the Department.

(Paragraph 3.5.9.4)

Mouja-wise total area of land available in manual records did not tally with Khatian-wise total area of land and plot-wise total area of land available in the database.

(Paragraph 3.5.12.1)

Due to non-adoption of any business continuity policy, no back-up was being taken for mutation orders and the offsite storing of monthly database back-up was not regular. No testing procedure to check the back -up data had been adopted.

(Paragraph 3.5.8.2)

Due to non-utilisaiton of computers, generators and other peripherals expenditure of Rs. 1.14 crore remained idle.

(Paragraph 3.5.16.2)

3.5.1   Introduction

Government of India, (GOI) Ministry of Rural Development, Department of Land Resources, initiated (1988-89) a scheme for "Computerisation of Land Records" (CLR), as 100 *per cent* grants-in-aid scheme, to be executed by the respective State Governments on a district-wise project basis through their Revenue Department. Accordingly, the CLR scheme was launched in North Tripura District on a pilot project basis in 1991-92. Subsequently the scheme was extended to other districts of Tripura in 1993-94.

The software was developed by National Informatics Centre (NIC) initially on Unix platform with FoxBASE. Subsequently, in January 2000, NIC developed new software "JAMI" version 2 on Windows platform and database in MS Access with C-DAC GIST SDK (Indian script tool) and the data entry module was also modified accordingly. The application software was further updated (August 2004) by JAMI Version 3.0 on Windows platform and database in SQL Server with C-DAC GIST SDK.

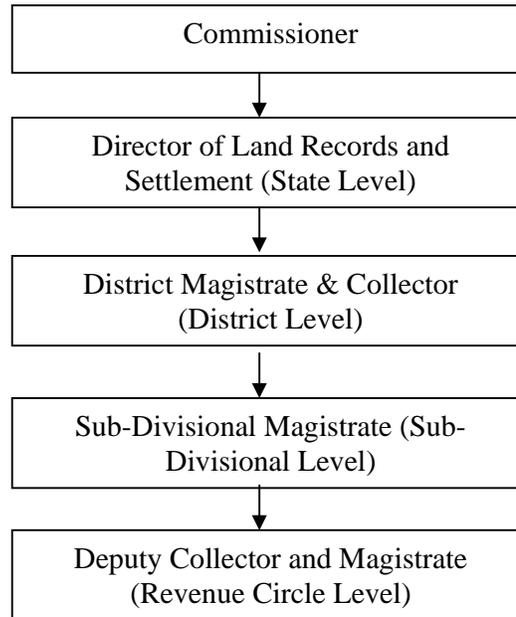### 3.5.2   Objectives of the scheme

The objectives of the scheme were to:

- facilitate easy maintenance and updating of the changes in the land database.

- provide comprehensive security to make the land records tamper proof which is expected to reduce litigation and social conflicts associated with land disputes.

- provide the required support for implementation of developmental programmes for which data about distribution of land holdings is vital.

- facilitate preparation of annual set of records in the mechanised process and thereby producing accurate documents for recording details such as collection of land revenue, cropping pattern etc.

- provide database for Agricultural Census.

- issue updated copy of Record of Rights of land holders quickly.

3.5.3   Organisational set up

Revenue Department (Land Records and Settlement), Government of Tripura is responsible for implementation of the scheme in the State. Commissioner, Revenue Department is assisted by the Director of Land Records and Settlement (DLRS) at the State level, District Magistrate and Collector at the District level, Sub-Divisional Magistrate (SDM) at the Sub-Divisional level and Deputy Collector and Magistrate (DCM) at the Revenue Circle level.

Organisational Chart

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┌─────────────────────────────────────┐
│            Commissioner              │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│      Director of Land Records and    │
│         Settlement (State Level)      │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│      District Magistrate & Collector  │
│            (District Level)           │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│      Sub-Divisional Magistrate (Sub-  │
│            Divisional Level)          │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────┐
│      Deputy Collector and Magistrate  │
│         (Revenue Circle Level)        │
└─────────────────────────────────────┘
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3.5.4 Audit objectives

The audit objectives were to verify whether:

- IT system meets the objectives of the Scheme

- IT Security and Business Continuity Planning is adequate

- There is any deficiency in the Application Software

- The database is accurate and reliable

- There is any discrepancy in procurement of Computer Hardware and Software.

- Funds provided by the Government of India are being utilized economically and efficiently.

3.5.5 Scope and Methodology of Audit

The data of 15 Revenue Circle offices (out of 19 Revenue Circles where computerisation of land records had been declared operational as of the date of audit) were examined in audit using IDEA software and the IT system of 7 Revenue Circles were physically verified. Planning and implementation related documents in the office of the Director of Land Records and Settlement, Tripura, Agartala were scrutinised to see the efficiency and effectiveness of planning and implementation. The documents relating to purchase of computer hardware and software worth Rs. 2.87 crore were also seen. The application software was examined for its correctness, suitability

and availability of controls. The replies of the Department received (September 2007) have been incorporated where appropriate, in the review.

Audit findings

3.5.6   Implementation

Initially, the Government of India set March 1992 for completion of the pilot project but subsequently revised it to December 1994. The State Government, however, did not frame any time bound action plan, which led to indefinite delay in implementation of the scheme. The CLR, which commenced in 1991, was still under implementation and the State Government had failed to implement the computerisation of land records in all the Revenue Circles. The computerisation was not complete even in the pilot district of North Tripura. The Department stated (September 2007) that the computerisation had been implemented in 22 Revenue Circles and would be implemented shortly in four Revenue Circles. The funds for six Circles had not yet been provided by the GOI.

3.5.7   Delay in capturing of pre-computerised data

The initial capturing of pre-computerised data was started (1993) by engaging departmental staff in North Tripura District. But in other three districts no data entry was done up to November 1999 due to want of Windows-based data entry software. Subsequently, software was developed (JAMI version 2) by NIC in January 2000 but the work of data entry was very slow. As of August 2007, only 7.77 lakh out of 9.77 lakh records of rights (RORs) in the State had been entered, which included 6 lakh RORs in the office of the DLRS through an outside agency (at a cost of Rs. 21.98 lakh) and 1.77 lakh RORs at the DM and Collector's offices in North and South Tripura districts. Departmental staff/ private parties were engaged to recheck/validate the data; as of August 2007, only 7.51 lakh RORs had been validated. Data entry of 2,00,000 RORs was yet to be completed (August 2007).

The Department stated (September 2007) that scarcity of trained staff was affecting the project.

3.5.8   General Controls
3.5.8.1   Lack of documentation

National Informatics Centre (NIC) had been involved in the CLR scheme right from its inception in 1991 as the technical partner and developer of software. The district units of NIC were in charge of assisting/supervising the implementation of the CLR in various Revenue Circles. The Department had not taken any initiative to get the documentation like data organisation, data flow diagram, structural design, modular structures etc from NIC and was totally dependent on NIC for System support and updating.

3.5.8.2   Business Continuity Planning

A well Business Continuity and Disaster Recovery planning ensures recovery of key business process following a disaster. The objective is to reduce downtime and hence loss to the business.

As per operational guideline of DSLR all Revenue Circles have to take daily and monthly backup, on both tape and CD and a copy of the monthly backup (in CD) is to be kept with the DCM and SDM concerned.

Scrutiny of the records / information furnished by the DCM of 7 Revenue Circles revealed that daily database back-up was being taken only on tape. The monthly database back-up in CDs was not being stores offsite as prescribed, but was being sent to the DSLR office though not regularly. Further, the Department had not adopted any testing procedure to check the back-up data by restoration at periodic intervals.

The Department stated (September 2007) that two persons had been selected for the restoration of back-up data.

3.5.8.3   Environment controls

Environmental controls are necessary to reduce the risk of damage and unauthorised access. It was observed that while AC machines were installed in all the Revenue Circles, no other precautionary measures like fire alarms, extinguishers etc were in place. Computers infected with viruses or malicious code jeoparadise information security. Antivirus software had not been installed / updated in all the seven Revenue Circles inspected.

The Department stated (September 2007) that Antivirus software had now been installed.

3.5.9   Data accuracy/ completeness (Input Controls / Validation)

3.5.9.1   Deficiency in JAMI 3.0 Application Software

3.5.9.2   Allowing of Null value

One of the shortcomings of the Application software attributable to lack of validation checks at the data entry level, is that it allows null values for some crucial and mandatory fields like Total Area of land, Khatian Type, Status of land, Name of owner etc due to which the system would not be able to generate accurate MIS reports or queries from the database.

3.5.9.3 Lack of validation control led to duplicate records in the database

As per Rule 61 of The Tripura Land Revenue and Land Reforms Rules, 1961, a separate number (hereinafter called the plot number) shall be allotted to every plot i.e. a piece of land within one periphery which is possessed by one person or a set of persons jointly, which is held under one title and which consists of one class of land.

During analysis of the databases of 15 out of 19 Revenue Circles, it was seen that:

(a)   113 Khatian numbers were entered twice under the same mouja,
(b)   23,026 plot numbers were entered 2-26 times under different Khatians of the same mouja,

(c)   70 occupiers' names were entered 2-4 times under the same plot number of same Khatian and same mouja and

(d)   111 possessors' names were entered 2-12 times under the same Khatian and same mouja. Revenue Circle-wise details of duplicate records are shown in **Appendix 3.11**.

These errors occurred due to lack of appropriate check/ validation controls at the time of creation of tables.

The Department stated (September 2007) that the matter is to be looked after by the NIC

3.5.9.4   Lack of validation controls led to incomplete data

As per Rule 53(1) of Tripura Land Revenue and Land Reforms Rules, 1961, the record of rights shall consist of a statement in Form-7 referred to as Khatian, in the prescribed format.

Analysis of the databases of 15 Revenue Circles revealed that data entries pertaining to mandatory fields of Khatian such as type of Khatian, Act under which the land (plot) was allotted to the possessor(s), status of possessor(s), North Plot number, Possessor of North Plot, possessor's last name, possessor's Father/Husband's name, possessor(s) address, caste were not being done in many cases (**Appendix 3.12**), although the fields were available in the software.

This was due to lack of appropriate validation controls at the time of creation of the tables. Any analysis and generation of reports based on incomplete database is likely to generate incomplete information. Thus, non-capturing of data in crucial fields made the database incomplete and unreliable.

3.5.9.5   Incorrect updatings due to programme error

When a part of the land owned by an individual is sold to other person, a new record should be created with new Khatian number exhibiting the area of land purchased. The area of land in original Khatian should be reduced by the area of land sold accordingly.

It was observed that when a piece of land is sold, a new record was being created with the area of land purchased but the system was not reducing the area from the original piece of land correctly which is a serious deficiency in the software. Mouja-wise illustrative examples are given below.

Table No. 3.5.1

Sl. No.	Mouja name	No. of Khatian		No. of Khatian increase/ decrease (d-c)	Total area of land (in acres)		
		December 2006	March 2007		December 2006	March 2007	Area increase (g-f)
a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
Udaipur Revenue Circle							
1	Rajarbagh	3278	3308	30	523.32	528.64	5.32
2	Jamjuri	984	993	9	135.98	164.58	28.60
Teliamura Revenue Circle							
1	Teliamura	3446	3589	143	1809.66	1946.43	136.77
2	Moharcherra	2465	2482	17	2196.50	2199.92	3.42
Jirania Revenue Circle							
1	Bankim Nagar	2867	2897	30	1945.56	1985.49	39.93
2	Purba Debendranagar	1837	1841	4	3749.79	3796.45	46.66

The above table shows that in all the cases (revenue moujas) the total area of the land also increased with the increase in the number of Khatians. Had the area in the original Khatian been reduced proportionately, these anomalous situations would not have arisen. The Senior System Analyst of NIC stated (July 2007) that this happened due to misuse of 'EDIT MODE' provided in the front-end for making certain corrections.

3.5.9.6   No facility to view the history of ownership

The Revenue Department alone is authorised to certify (to a court or any other agency) the Record of Rights in respect of land. In the manual system, the records being permanent, the history of ownership of any piece of land was not lost in the process of updating. However, in the computerised environment, the history of the ownership of any land is available in the log files, but no facility had been provided in the software to retrieve the earlier ownerships of land. The absence of this essential facility, available in the manual system, reflects a serious deficiency in the application.

The Department stated (September 2007) that it would consult NIC for providing the facility in the software.

3.5.9.7   No facility to view the existing Khatian details on mutation screen

With the implementation of the computerised system in the Revenue Circles, the issue of manually written ROR was totally stopped. The mutation DATA ENTRY screen does not have the option to view the original Khatian, which could reduce the processing time and possibility of entering incorrect data.

3.5.10   Security
3.5.10.1   Physical access controls

Physical access controls are specifically aimed at ensuring that only the persons authorised by management have physical access to computer systems especially in the server room. No record was maintained, except in Bishalgarh Revenue Circle, of the persons having access to the server room.

The Department stated (September 2007) that installation had been issued to Revenue Circles to maintain the records.

3.5.10.2 Logical access controls

Logical access controls are aimed at protecting computer resources (data, programmes and terminals) against unauthorised access attempts. It was observed that the software provides role-based password for restricting unauthorised users. Bio-metric device was being used for approval of mutation cases. The Department did not have adequate password policy for maintaining IT security which is evident from the following shortcomings:

(i) Shortcomings attributable to User (Land Revenue) Department

- No password had been provided in the CLR Database.
- More than one Administrative user was created in some Revenue Circles.
- In most of the cases, designation in abbreviated form was used as User ID. Details of the user such as, user name, address, phone number, etc had not been entered against the User ID due to which the authorities may not be able to identify the user of any particular entry in case required.
- Default password given at the time of installation of the software was being used in most of the Revenue Circles till date. Even the Administrator password had not been changed. As such the possibility of unauthorised persons becoming aware of the password was high.

(ii) Shortcomings attributable to software developer (NIC)

- No facility was provided in the application software for changing/updating the password by users themselves.
- Passwords were not encrypted (violation of primary criteria of logical access control).

3.5.11   System Design

On scrutiny of database design, it was noticed that the basic characteristics were not defined carefully at the time of creation of tables to establish and enforce data integrity and reduce redundancy and also to enable faster searches in the database. The following characteristics were not taken into account while designing the database:

(i)   Entity inter-relationship

The SQL Server used in CLR project is a Relational Database model. The data should be stored in the form of inter-related tables, which would automatically reduce the redundancy of data as well as the storage space. It was found that no such relationship had been created among the Master tables and the Transactions tables, which had led to many discrepancies in the database (illustration is given in **Appendix 3.13**).

(ii)   Data-Type

Some fields like owner code, mouja code etc were specified as character and not as numeric, which may slow down the searches in the database and generation of reports. The Department stated (September 2007) that the matter had been discussed with the NIC for further modification.

3.5.12   Irregularities in CLR database
3.5.12.1   Total area of land-difference between manual records and database

Analysis of the databases of six Revenue Circles[42] showed that mouja-wise total area of land available in manual records did not tally with Khatian-wise total area of land and plot-wise total area of land available in the databases as detailed below:

Table No. 3.5.2

(in acres)

Revenue Circles	Area of land as per manual records	Land area as per database		Difference between manual and database (Khatian-wise) (*b-c*)	Difference between manual and database (Plot-wise) (*b-d*)
		Khatian-wise	Plot-wise		
a	*b*	*c*	*d*	*e*	*f*
Khowai	87,250.891	88,458.696	86,687.970	-1,207.805	+562.921
Teliamura	100,917.825	102,549.083	102,216.049	-1,631.258	-1,298.224
Mohanpur	91,352.090	534,848.828	93,325.976	-443,496.738	-1,973.886
Bishalgarh	89,537.792	449,425.180	90,883.015	-359,887.388	-1,345.223
Melaghar	49,913.890	529,408.526	50,702.962	-479,494.636	-789.072
Sonamura	67,863.138	190,254.658	69,554.234	-122,391.520	-1,691.096
Total	**486,835.626**	**1,894,944.971**	**493,370.206**	**-1,408,109.345**	**-6,534.58**

These differences needed to be reconciled for correct record of land.

3.5.13   Mutation orders not stored in computers

Mutation orders are required to be stored in the computer for providing evidence in case of land dispute in future. For this purpose scanners have been provided to all Revenue Circles. During audit of 7 Revenue Circles, it was seen that the mutation orders were not being stored (scanned) regularly in the computer. In Jirania and Sonamura Revenue Circles, the scanning of mutation orders was not being done at all. In Teliamura, Mohanpur and Melaghar Revenue Circles, scanning of mutation orders was not done for 3, 4 and 6 months respectively.

It was also observed that the scanned images of the mutation orders were being saved in the hard disk of client machine instead of in the server database and there was no provision in the software to browse the mutation orders stored in the system. Due to non storing of scanned mutation orders in the server the back-ups of the scanned mutation orders were left out of the database backup.

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[42] Bishalgarh, Melaghar, Mohanpur, Sonamura, Teliamura and Khowai

The Department stated (September 2007) that the software had been modified and would be implemented.

3.5.14   Irregular issuance of notices and pendency of mutation cases

For new mutation cases the notice has to be issued through the system so that the application date can be stored in the system to monitor the settlement of mutation cases. Despite Government instructions to issue computerised notices for new mutation cases, the Revenue Circles were not issuing computerised notices regularly. Jirania Revenue Circle had not yet started issuing computerised notices. There was no provision in the software to capture the actual date of application and the reasons for pendency.
The Department agreed (September 2007) to adopt the provision.

3.5.15   Non-existence of MIS report module

Initially there was no provision/report module in the software to generate MIS reports. Despite a decision by the Department (August 2005) for incorporating such provision to generate 29 queries/reports, NIC had not modified the software accordingly. Even if it is done, the following seven out of 29 reports would not be accurate due to null values in the mandatory fields/columns e.g Khatian Type, Class of land, status of land, caste of owner etc in important tables.

Table No. 3.5.3

Sl. No.	Reports/Queries
1.	Total area under tribal ownership/ ownership based evaluation
2.	Total area under rubber plantation/based on a particular crop
3	Retrieved scanned documents against a particular mutation case
4	Land class based plot evaluation
5	Revenue Status (Collection of revenue)
6	Total Rayati Land Holding
7	Violation of allotment Rules u/s 14(1),14(2),187

Further, the generation of the following reports would not possible at all as the relevant fields/columns based on which report would be generated, were absent.

- Total ADC/ Non ADC lands
- Total number of RoRs printed during a period
- Khatians against which legal proceedings are on

The Department stated (September 2007) that generation of required MIS report in conformity with the data available in the database would be adopted shortly.

3.5.16   Other points of interest

3.5.16.1 Non-revision of input sheet as per requirement of the computerised system

Mutation cases are done mainly in two ways. One is full transfer i.e. transfer of the ownership of any particular Khatian, and the other by opening a new

Khatian in case of transfer of a part of the land from existing Khatian. For this purpose, the data entry operator has to know whether it is a full transfer or part transfer case.

In 7 Revenue Circles, it was seen that the format of order sheet (input sheet) in mutation cases was the same as used before computerisation, and there was no provision for mentioning whether it was full or part transfer case. As a result, sometimes this information was not being recorded in the order sheet by the RI/DCM. Due to this, the chances of creation of new Khatian instead of transferring the ownership were high.

The Department stated (September 2007) that the input sheet would be designed as per requirement of the computerised system.

3.5.16.2 Non-utilisation of computers, generators and other peripherals valued Rs. 1.14 crore

Government of India released Rs. 6.10 crore for Computerisation of Land Records of the State. Of this, Rs. 2.87 crore was spent for purchase of server, computers, printers, UPS, generators etc while Rs. 2 crore was spent on creation of infrastructure, data entry works etc leaving an unspent balance of Rs. 1.23 crore (March 2007).

Scrutiny of the records of the Director of Land Records and Settlement, revealed that computers, servers and other peripherals worth Rs. 112.50 lakh[43] had not yet been put to use for the purpose for which they were purchased. During discussion, the Department stated that the un-utilised computers (Pentium-I) were not compatible with the latest version of software (August 2004). It was also noticed that 24 generators purchased at a cost of Rs. 13.14 lakh were provided to 24 Revenue Circles for supplying power to UPS, but the generators valuing Rs. 1.70 lakh were not being used in Jirania, Mohanpur, Melaghar, Sonamura and Teliamura Revenue Circles due to non availability of operator.

Thus, due to non-utilisation of the computers, generators and other peripherals expenditure of Rs. 114.20 lakh remained idle.

The Department stated (September 2007) that steps would be taken to replace the 50 computers out of funds (Rs. 118.70 lakh) provided (January 2007) by the GOI for Computerisation of Land Records.

3.5.16.3 Under-utilisation of Touch Screen Kiosks

The Department decided to install touch screen kiosks in each Revenue Circle for people to view Khatian/ RoR of their choice and incurred an expenditure of Rs. 24.87 lakh for this purpose. However, in Bishalgarh, Jirania, Mohanpur, Melaghar, Sonamura, and Teliamura, most of the kiosks were lying idle due to ignorance of the users (public) or lack of connectivity with the software. The DCMs of the Revenue Circles stated that the number of average users was not

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[43] Server- 6 nos., Computer-80 nos., Printer-80 Nos., UPS-18 Nos., Modem- 15 nos.

even 50 per month, which may partly be due to inadequate publicity and partly due to the fact that the kiosks provided only details of Khatians available in the system which is of limited use. As has been pointed out in the preceding paragraphs, the database was not accurate, complete and reliable and so the successful use of the kiosks was doubtful.

The Department stated (September 2007) that awareness programme/ campaign would be organized.

3.5.17 Complete switch over to Computerised System before stabilisation

Before complete switch over to the computerised system completeness, accuracy and reliability of data as well as IT security should be ensured. As detailed in the preceding paragraphs, the data was incomplete, inaccurate and unreliable and IT security concerns had not been addressed. Complete switch over to the computerised system, before stabilisation of the database and the system and the resultant problems may hamper the scheme objective of reducing the litigation and social conflicts associated with land disputes.

The Department stated (September 2007) that steps would be taken for further checking of the computerised RORs.

3.5.18 Lack of Monitoring System

A proper monitoring system is required for better and effective implementation of any IT system. The CLR scheme, started in 1991, was still under implementation and had not been completed even in the pilot district of North Tripura (August 2007). The Department did not fix any targets or milestones to complete the scheme. The data entry (started in 1993) and the data validation were still going on (August 2007). This clearly indicated lack of effective monitoring and control by the Department.

The Department stated (September 2007) that the reasons for delay in implementation of CLR scheme were (i) initial data entry started in DOS environment which was very slow; (ii) revisional survey in various moujas were not complete; and (iii) changing of software from DOS to Windows platform. But the Department did not indicate the action taken to put in place an effective monitoring system.

3.5.19 Conclusion

More than 15 years after its commencement and after expenditure of Rs.4.87 crore (March 2007), the scheme was yet to reach a functional stage where the intended benefits of computerisation could be made available to the general public or even the Department. A host of factors like defective planning, inadequate monitoring and control, and deficiencies in the software design contributed to the tardy implementations.

3.5.20 Recommendations

- The Application package needs to be improved by incorporating necessary input and processing controls.

- The Department may adopt an appropriate password policy, back-up and disaster recovery plan and establish appropriate security environment.

- A comprehensive user manual detailing duties and responsibilities of the System Administrator, Database Administrator and Data Entry Operator should be prepared.

- Time bound programme for completion of the Project, with appropriate monitoring system and accountability should be established.