

Amendment History				
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2.7 IMPLEMENTATION PLAN

2.7.1 Introduction

This section presents the implementation approach and high level implementation plan of the LandsD Data Dissemination System (LandsD DDS). LandsD DDS consists of two sub-systems namely, Computerised Land Information System Data Dissemination System (CLIS DDS) and Common Spatial Unit Data Dissemination System (CSU DDS). This implementation plan is based on the recommended options as described in Business System Options (BSO). The BSO recommended Option 2 for CLIS DDS and Option 3 for CSU DDS.

2.7.2 Implementation Services Consideration

The following three major areas should be considered as they might have potential impact on the commencement, progress or completion of the implementation of LandsD DDS:

1. Insourcing and Outsourcing
2. Procurement
3. Recurrent Support and Maintenance

2.7.2.1 Insourcing and Outsourcing

2.7.2.1.1 Insourcing

The internal management responsibility for the completion of the project components remains with both LandsD and the ITMU Project Team. Resources required to complete the project management component are sourced exclusively internally by the two parties concerned. This includes the engagement of individual contract staff by either LandsD or ITMU. The formation of teams and the definition and assignment of tasks are also the responsibilities of LandsD and the ITMU Project Team.

In general, as LandsD is the owner of the LandsD DDS, LandsD will be responsible for the overall procurement, end-user coordination, end-user testing and acceptance. Since the Information System Hosting Service (ISHS) is selected for the implementation of the LandsD DDS project, LandsD should follow the ISHS acquisition procedures to implement the system. ITMU Project Team will be responsible for providing technical advice to LandsD.

2.7.2.1.2 Outsourcing

The Government of Hong Kong Special Administrative Region (HKSARG) has established a policy to outsource the IT systems development as much as practicable. The potential benefits of outsourcing include:

- The ability to meet the increasing demand for a greater volume of IT services in a timely manner;

- Allowing suppliers to deliver services, in particular Web and GIS professional and technical expertise, more quickly and exploit their best approach with fewer constraints; and
- The chance of securing service cost reduction.

Therefore, in line with the Government policy, it is recommended that the outsourcing approach should be adopted on most, if not all, components of the project whenever applicable.

Outsourcing is recommended, and therefore under this approach, the project management, development and implementation responsibility for the completion of the project components should be contracted to an External Services Provider (ESP) by open tender or Information Technology Professional Services Agreement (ITPSA). Resources required to complete the project implementation component are to be supplied by the ESP concerned. The formation of teams and the definition and assignment of tasks are the responsibilities of the ESP.

LandsD will be responsible for project monitoring and reviewing the quality of products and services provided by ESP.

2.7.2.2 Procurement and Preparation

Strong composition of experienced professional and selected users shall be established for the tendering activities for the implementation of the proposed system.

There are 5 major time-critical tasks in the procurement stage affecting the earliest possible date of system roll out:

- Funding Process
- Tendering Process or Outsourcing with ITPSA
- Initiation of Project
- Site Requirement and ISHS Procurement
- Installation of Hardware and Software

2.7.2.2.1 Funding Process

The funding application is proposed to start in May 2004, on substantial completion of this FS project.

During this stage, LandsD will have to prepare funding paper with the assistance of ITMU.

2.7.2.2.2 Tendering Process or Outsourcing with ITPSA

The tendering process should follow a “Invitation-Response-Evaluate-Select-Negotiate” approach leading to an award of contract for the implementation service for LandsD DDS. It is expected to start as soon as funding is approved but some prior preparation would help speed up the process. It is suggested by LandsD that they will need about 7 months to complete the tendering procedure. The activities involved include the preparation of the "Invitation To Tender" and the Technical Specification to the level of detail required to support a fixed-price tender invitation with measurable objectives and acceptance criteria.

During this stage, LandsD will be involved in the following activities:

- Preparation of tendering document
- Evaluation of the tenders
- Finalisation of the tender result

Since the implementation of LandsD DDS will need to interface with DAM, outsourcing through ITPSA should be considered in order to speed up the overall plan.

If the ITPSA approach is selected, then LandsD will be involved in the following activities:

- Prepare the Work Assignment Brief to ITPSA contractors, and evaluate their proposals and issue the notice of acceptance. From scope and size of the system, these contractors should be listed in Service Category A Group 2.

2.7.2.2.3 Initiation of Project

As soon as the funding is approved and contract is awarded to the ESP, the implementation of the proposed system will be initiated by the ESP with the active participation of LandsD and ITMU. Preparation for the formation of the implementation project team will be arranged by the ESP as early as possible. The implementation project team should be ready to start the implementation work as soon as the funding is approved and contract awarded.

2.7.2.2.4 Site Requirement

Before the commencement of the project, the development site should be allocated. This site should be set up and equipped with the development and testing environment for the ESP contractor, to perform SA&D, program development and testing activities.

As ISHS is proposed in the Technical System Option, LandsD should prepare the Services Assignment Brief of the required services to ISHS SOA contractors, and evaluate their proposals and issue the notice of acceptance. The site requirement of the hardware equipment for production should be made available prior to delivery of the equipment. A new site should be allocated to accommodate the additional space for the new hardware equipment for the implementation of the proposed system.

It was recommended in the Last FS report that the DR site of LandsD DDS would be implemented at a later stage when required. As an interim measure, a Hot site backup arrangement would be made in a LandsD's District Survey Office as an interim DR site, on implementation of LandsD DDS. Sufficient space should be allocated for the hardware equipment for the implementation of the proposed DR arrangement. Details are in TSA.

For the long-term DR solution, if ECLIS implementation is approved on the next funding application, it is proposed that the LandsD DDS will share the DR site and other facilities of the future ECLIS with suitable arrangement, in order to reduce the overall cost for LandsD. This cost will be covered in the ECLIS project.

LandsD will need to involve in following activities:

- Prepare requirements and procure ISHS services
- Identify and allocate a suitable location for the development site, production site and DR site
- Acquire the necessary computer equipment to facilitate the activities in the initial stages of development and implementation (e.g. Project Initiation and SA&D)
- Coordinate with other related government departments to plan and schedule the detailed arrangement for production site and DR site
- Arrange ArchSD for the necessary site preparation work

2.7.2.2.5 Procurement and Installation of Hardware and Software

In order to reduce the procurement time, the required hardware, software and services should be drawn from the Government bulk contracts or SOA as far as possible. It is anticipated, however, that some items will not be available in the bulk contract and may need to purchase via other means, like tendering. LandsD should initiate the procurement process as soon as funding is available to ensure that they will be available before the end of the system analysis and design stage.

As ISHS is recommended as the Web hosting solution for LandsD DDS, the ISHS SOA contractor will be responsible for the provision of hardware and software for hosting services. The Contractor is responsible for delivering and installing the proposed hardware and software to the service requirements from LandsD DDS, but the titles for these hardware and software are remained with the Contractor.

2.7.2.3 Recurrent Support and Maintenance

With respect to resources required for on-going support for LandsD DDS, the maintenance team shall provide proactive user support and system maintenance services such as Application software bug fixing; Production support and Ad-hoc processing requests; Change management and application assurance, impact analysis of minor enhancement and system change, Implementation of minor enhancement and system change etc.

The maintenance team is split between LandsD and ISHS. The subscription to ISHS will include management services and associated IT services from the ISHS SOA contractor. Additional bandwidths for GNET and Internet access require additional charge (i.e. the ISHS excludes the maintenance of the application software).

LandsD shall continue to participate in the daily support and operation of LandsD DDS as well as on-going support of relevant system maintenance activities (e.g. maintenance of the digital data format conversion software).

2.7.3 Development and Implementation Stage

ESP is mainly responsible for the development and implementation of LandsD DDS, with the active participation of both LandsD and ITMU during the entire implementation process. The development and implementation of LandsD DDS will be divided into the following major stages:

1. Project Initiation
2. Procurement and Installation of Hardware and Software for Development Site
3. Coordinate data conversion of CSUs
4. System Analysis and Design (SA&D), Programming and Testing for CSU DDS
5. System Analysis and Design (SA&D), Programming and Testing for CLIS DDS
6. Procurement and Installation for Production Site and DR Site
7. Site Preparation
8. Load Test
9. User Acceptance Test (UAT)
10. User Training
 - i. Train the Trainers on LandsD DDS
 - ii. Train the End users by Trainers
 - iii. Web-Based Training (WBT) for PDs
11. Data Conversion for Customer and Sales Record Subsystem
12. CSU Data Conversion Dress Rehearsal
13. Prepare System Document
14. System Roll Out for Production and System Nursing
 - i. Stage 1 – CSU DDS for PDs
 - ii. Stage 2 – LandsD DDS
 - iii. System Nursing
15. Project Closure

2.7.3.1 Project Initiation

The project initiation will formally declare the commencement of the project. The Project Initiation Document (PID) will be prepared by the ESP to document the following:

- Business scope
- Detailed development and implementation schedule
- Project organisation structure
- Roles and responsibilities of all parties involved in the project

During this stage, LandsD will be involved in the following activities:

- Coordinate with ESP and identify user representative in the project
- Confirmation of the PID

This stage will be completed upon the endorsement of the PID.

2.7.3.2 Procurement and Installation of Hardware and Software for Development Site for LandsD DDS

In order to reduce the procurement time, the required hardware and software for development should be drawn from the Government bulk contracts as much as possible. During this stage, LandsD will be involved in the following activities:

- Initiate the procurement process as soon as the requirement is known in order to ensure that they will be installed and available for the programming and testing stage
- Confirm the Development Site location
- Coordinate with ESP for the procurement process

2.7.3.3 Coordinate Data Conversion of CSUs

Major tasks for the ESP are to coordinate with B/Ds the preparation of the XML schema for Building, Lot and Road Centreline CSUs conforming to the respective data model (for details of these CSUs, please refer to the 3.1.7 Data Conversion Exercise – Building CSU, 3.1.8 Data Conversion Exercise – Lot CSU and 3.1.9 Data Conversion Exercise – Road Centreline CSU), and coordinate the one-off data conversion of the Building, Lot and Road Centreline CSUs, which are to be performed by various Data Owners. The converted data will form the initial CSU datasets, to be stored in the Source Data Spatial Hub.

2.7.3.4 System Analysis & Design, Programming and Testing for CSU DDS

A development site should be ready and also set up with the proper equipment for the ESP to perform system analysis, design, development and testing activities. Testing activities include unit test, link test, function test, and integrated system test.

For the CSU DDS, the ESP will be responsible to coordinate with participating departments who are Data Owners and Data Users of the named CSU. Because the CSU DDS is specially designed for DAM operation, the CSU DDS will incorporate the CSU data structure (including Building CSU, Lot CSU and Road Centreline CSU) to the database of LandsD DDS; and data dissemination of the above three named CSUs defined in DAM include import and export programmes for data transfers between Data Owners and the CSU DDS, and between the CSU DDS and Data Users respectively. The following are the major points for ESP to focus on:

- Interface with DAMin/DAMout of LandsD
- CSU Data Provision from DO
- CSU Data Manipulation in Source Spatial Data Hub
- CSU Data Dissemination to DU

The requirements and functional details of above items have already been described in User Requirements and Function Specification.

The following areas should be considered during the CSU DDS System Analysis & Design (SA&D), programming and testing for the proposed system:

- a. During the stage of SA&D, CSU data (if available), the DAM CSU specification should be provided from LandsD for study and analysis by the ESP.
- b. The hardware and software required for development and programming must be identified and made available for the ESP.
- c. The parties involved including LandsD, ESP and vendors' support staff must be well coordinated.

2.7.3.4.1 CSU Data Handling – Provision, Manipulation, Verification and Dissemination

One of the critical development for CSU DDS is handling the CSU data provision from DO, CSU data manipulation. The data for the transferring process includes:

- Received CSU Data from DO
- Centralized CSU Database
- Extracted CSU Data
- CSU data dissemination

Consequently the development should involve the following:

- Interfacing with DAMin/DAMout of LandsD – an interface should be developed to link the DAMin/DAMout then maintain the Centralised CSU Database (spatial database) records in the Source Spatial Data Hub.
- Handle CSU Data Provision from Data Owner (DO) via web server.
- CSU Data Manipulation process will store the manipulated CSU data into Spatial Database Server in Source Spatial Data Hub.
- Extracting the CSU data into Extracted CSU Data files (E00, DGN) and store in Multi-format Spatial Data Hub. This extraction process will be performed on a user define schedule basis. It is recommended to run the extraction during off-peak hours. This extraction process will only extract the updated CSU data from Centralised CSU Data in Source Spatial Data Hub.

The initial set of CSU data will subsequently be used as the base data for the development of CSU data dissemination process in CSU DDS.

The CSU data dissemination functionality will be developed as a back-end activity, which will be automatically performed as a batch job (in a time period which is predetermined by users) to prepare for the dissemination of CSU data pertaining to all DU orders.

Packing verification process should be developed to verify all the CSU orders for which their corresponding user's order item list have been confirmed as positive before the data dissemination process is further proceeded. Compression utility will also be developed to compress the CSU data to be disseminated. Furthermore, automated

process for online dissemination (e.g. generate download hyperlink) and offline dissemination (e.g. notified the Data Agent writing data to various physical storage media such as CD-R and tape cartridge) will be developed at this stage.

2.7.3.5 System Analysis & Design, Programming and Testing for CLIS DDS

It is supposed that a development site also be ready for the System Analysis & Design (SA&D) of CLIS DDS at this stage. The same site used for CSU DDS could be shared to serve the same purpose for CLIS DDS.

During this stage, the main task of the ESP is to further elaborate the work already completed in the FS on LandsD DDS. The major task will involve a detail assessment of the following three major areas:

- Source Data Extraction and CLIS Data Format Conversion
The current process of CLIS data extraction and data format conversion will be reviewed so as to streamline the operation and minimize the manual effort required in preparing the required digital map products to customers.

(NB. In order to disseminate the updated CLIS data to customers, the LandsD DDS will require one initial data set loaded at start (i.e. one-off data extraction and data format conversion) and subsequently re-loaded on a regular basis (i.e. on-going data extraction and data format conversion).
- Customer and Sales Record Subsystem.
- Data Dissemination

Based on the requirements and functional details already described in the User Requirement and Function Specification, the ESP will elaborate with details and prepare the functional requirements, system specification and SA&D deliverables accordingly.

The following areas should be considered during the CLIS DDS SA&D, programming and testing for the proposed system:

- a. During the stage of SA&D, source CLIS data, format conversion routines and the corresponding program specification should be collected from LandsD for study and analysis by the ESP.
- b. The hardware and software required for development and programming must be identified and made available for the ESP.
- c. The parties involved including LandsD, ESP and vendors' support staff must be well coordinated.
- d. Active participation of LandsD is needed in the verification and validation process during the development of interface for digital map data extraction and format conversion routines. Therefore, resources allocation must be planned well in advance to ensure that the required personnel are available.
- e. The developed programs will be tested repeatedly during the unit test, integrated system test and UAT stage.

In summary, the activities involved in the CLIS DDS at this stage are listed as follows:

- Provide the source CLIS data, data format conversion routines and the corresponding program specification to the ESP for evaluation and subsequent development activities
- Review and confirm the detail CLIS DDS functional requirements
- Review and confirm the detail CLIS DDS system specification
- Review and accept the deliverable produced during the SA&D stage
- Plan the resource required for the verification and validation of the CLIS data during the data extraction and format conversion processes

(Note: For detail information on CLIS extraction, data format conversion and verification, Customer and Sales Order Subsystem as well as data dissemination, please refer to the sub-sections below.)

2.7.3.5.1 CLIS Data Extraction

One of the critical development for CLIS DDS is to transfer the CLIS data from the master set of current mapping libraries residing within CLIS to the Source Spatial Data Hub in CLIS DDS. The data for the transferring process shall at least include:

- Digital Topographic Map Database (i.e. B1000, B5000, B10000, B20000)
- Digital Land Boundary Database (i.e. C1000)
- Geo-Reference Database (i.e. BG1000, RG1000, SG1000)
- Geo-Community Data

Consequently the development should involve the following:

- Interfacing with existing CLIS – an interface should be developed in order to link the CLIS DDS with CLIS to facilitate the data extraction from CLIS to CLIS DDS.
- Extracting the digital map data into Source Spatial Data Hub - Initially, the whole set of digital map data will be copied from CLIS to Source Spatial Data Hub of CLIS DDS. Subsequently the extraction will be performed on a daily basis as a batch job during off-peak hours. This extraction process will only extract the updated digital map data from CLIS and update the respective digital map data in Source Spatial Data Hub.

The transferred digital map data will subsequently be used as the base data for the development of dissemination process in CLIS DDS.

2.7.3.5.2 Data Format Conversion and Verification for CLIS Data

Another major development for CLIS DDS is to streamline the LandsD CLIS data format conversion processes to convert the CLIS data from Source Spatial Data Hub into a number of commonly used formats. The converted data will then be stored in the Multi-format Spatial Hub together with digital orthophoto and data dictionaries (these data require no data conversion) for data dissemination. Customized programs should be developed to verify the converted data to ensure integrity of data checking.

2.7.3.5.2.1 Scope of Streamlining CLIS Data Format Conversion

The LandsD CLIS data format conversion routines will be automatically executed in batch mode on a daily basis for converting the extracted data from CLIS to a number of commonly used formats. For example, the CLIS data from CLIS in the ArcInfo native format (ArcInfo 6.x Coverage) can be automatically converted into the format of E00, ASCII, DGN, DWG, DXF and TIFF.

Since LandsD format conversion routines will be used, ESP is responsible to develop the interface that can automatically activate the format conversion routines and manage the converted digital map data. Details of the interface will be further studied in the implementation stage of CLIS DDS. LandsD will be responsible for maintaining the data format conversion routines, conduct enhancement or new development for the routines if required (including conversion of Chinese character sets between the EUC Code, Unicode and Big5 code).

Conversion of digital map data will be executed under two platforms, which are as follows.

1. Unix platform: The conversion of CLIS data into E00, ASCII and TIFF formats will be conducted on Unix platform using Unix based conversion routines. The conversion process will be invoked automatically by the interface program. In case of encountering a failure for a particular CLIS data at any point of the conversion process, an error will be logged for the failure.
2. Windows platform: The conversion of CLIS data into DGN, DWG and DXF formats will be conducted on Windows platform using Windows based conversion routines. The conversion process will be invoked automatically by the interface program. In case of encountering a failure for a particular CLIS data at any point of the conversion process, an error will be logged for the failure.

2.7.3.5.2.2 Verification of the CLIS Data Format Conversion

Verification programs should be developed to verify the converted CLIS data comparing with the source CLIS data in the following areas:

- number of data layers
- number of data items and attributes
- annotation
- symbology table
- other areas considered necessary by LandsD

The converted result will be listed out in the report to facilitate users to review the result of the format conversion.

2.7.3.5.2.3 Schedule for Streamlining CLIS Data Format Conversion

The estimated duration of the entire streamlining process of CLIS data format conversion is about 10 months. Below is the list of the fundamental activities and their estimated schedules:

Activities	Estimated Duration
Preparation, development and testing of Data Extraction and Streamlining process for Data Format Conversion of CLIS Data	6 months
Verification and Acceptance of the Data Extraction and Data Format Conversion of CLIS Data (to be performed at UAT)	3 months
Actual Data Extraction and Data Format Conversion of Digital Maps for production	0.25 month

2.7.3.5.3 Customer and Sales Record Subsystem

The Customer and Sales Record Subsystem will be developed at this stage. This subsystem covers the customer-oriented activities such as Registration, Login, Selection of maps, On-line Ordering, Licensing etc. The corresponding records of these customer-oriented activities will be stored in this subsystem.

As the existing customer records are being maintained in the Customer Profile and Sales Database in LandsD, data conversion is needed to migrate the required customer records from the Customer Profile and Sales Database to the proposed system. For details of this process, please refer to the section 2.7.3.11.

2.7.3.5.4 CLIS Data Dissemination

The CLIS data dissemination functionality will be developed as a back-end activity, which will be automatically performed as a batch job (in a time period which is predetermined by users) to prepare for the dissemination of digital map data pertaining to all accepted orders.

- Payment verification process should be developed to verify all the CLIS orders for which their corresponding payment status have been confirmed as positive before the data dissemination process is further proceeded. Compression utility will also be developed to compress the CLIS data to be disseminated. Furthermore, automated process for online dissemination (e.g. generate download hyperlink) and offline dissemination (e.g. writing data to various physical storage media such as CD-R and tape cartridge) will be developed at this stage. The existing offline dissemination facilities and material such as the sales counter, ordering forms and marketing material etc., will continue to be used with minimal modification.

2.7.3.6 Procurement and Installation of Hardware and Software for Production Site and DR Site

The required equipment, hardware and software for the Production site and Disaster Recovery (DR) site will be procured and installed in LandsD at this stage. Acquisition of ISH Services please refer to section 2.7.2.2.4 and 2.7.2.2.5 for details.

The ESP will be responsible for the following activities:

- Executing the procurement process on the required hardware, software and all related items
- Monitoring the installation and delivery of hardware and software
- Participating in system configuration and customisation
- Overall coordination with vendors

On the other hand, LandsD will be involved in the following activity:

- Coordinate with ESP for the procurement process
- Confirm the Production Site location
- Confirm the DR Site location

2.7.3.7 Site Preparation

The Production site should be finalised and made available prior to the delivery of the hardware and software. On commencement of programming of the CSU DDS, LandsD should also initiate the necessary site preparation work which include the following activities:

- Space Allocation
- Power Points Installation
- Fire Prevention Device (Fm200)
- 24-Hour air-conditioning
- Cabling and Trunking

For the interim DR site of LandsD DDS, which provides a Hotsite backup arrangement of the Transaction Server of LandsD DDS, LandsD should also initiate the necessary site preparation work which includes the following activities:

- Space Allocation
- Power Points Installation
- Cabling and Trunking

In conclusion, LandsD will be involved in the following activities:

- Confirm the location of development site, production site and DR site
- Initiate the necessary site preparation work
- Coordinate with other related Government department (e.g. Architectural Services Department) to plan and schedule the detailed arrangement for Production site and DR site
- Coordinate with ESP for the preparation of production site and DR site
- Prepare the Services Assignment Brief to ISHS SOA contractors
- Evaluate proposals which are submitted by ISHS contractors

- Prepare notice of acceptance for the selected Contractor
- Coordinate with ESP and ISHS Contractor for application software installation and system configuration

2.7.3.8 Load Test

The objective of the load test is to ensure that the proposed system, in terms of its hardware and network capacity, can work properly and efficiently under the maximum loading i.e. simulate the peak transaction volume, of the production environment. Under normal circumstances, fine-tuning the system will be required to ensure the system performance is optimised. In addition, important findings related to performance issues should be documented for future reference.

LandsD will involve in the following activities:

- Coordinate the load test with ESP
- Agree the testing records which are provided by ESP
- Accept the test results

2.7.3.9 User Acceptance Test (UAT)

During the course of UAT, users will perform on-line testing on the LandsD DDS application and verify the software capability of the proposed system. A user acceptance plan and quality control procedure should be devised to well address issues in relation to all the testing cycles and re-runs if necessary.

(Note: Upon completion of UAT and load test, the actual data extraction and data format conversion for production will be performed prior to the system cut-over (i.e. one-off data extraction and data format conversion). Thereafter the data extraction and data format conversion will be performed on a regular basis (i.e. on-going data extraction and data format conversion).

A pilot test will be carried out to examine the network performance via ISHS through Internet and/ or GNET - all PDs will participate in the pilot test.

The ESP should coordinate with users who would contribute to prepare the test cases to be carried out in the UAT and also the ESP should give users sufficient time to make themselves available to participate in the UAT. The ESP should coordinate with the DO/DU to participate the UAT.

2.7.3.9.1 UAT for CSU DDS

The following activities will be performed by LandsD with participation by relevant DOs and DUs when necessary:

- Approval UAT plan for CSU DDS prepared by ESP and oversee the execution of the UAT in relation to all the testing cycles and re-runs if necessary.
- Perform on-line testing of CSU DDS application in conjunction with the CSU data provision, data manipulation and data dissemination process

- ◇ Perform on-line testing of the CSU data provision from DOs. DO would be responsible for preparing the relevant CSU data (under their ownership jurisdiction, please refer to Current Environment Description Table 1.1.2.2-1) for testing.
- ◇ Review and verify the quality, integrity and completeness of the CSU data and the manipulation results of CSU data based on pre-defined acceptance criteria

For instance, the extracted CSU data need to be verified to ensure that the CSU data for dissemination in different formats match with the source CSU data

- ◇ Perform on-line testing of the CSU data dissemination to DUs. DU would be responsible for testing the relevant CSU data dissemination from the CSU DDS (please refer to Current Environment Description Table 1.1.2.2-1)
- Acceptance of the UAT for CSU DDS

2.7.3.9.2 UAT for LandsD DDS

The following activities will be performed by LandsD:

- Approve UAT plan prepared by ESP and oversee the execution of the UAT (UAT for integrated CSU DDS and CLIS DDS) in relation to all the testing cycles and re-runs if necessary.
- Perform on-line testing of LandsD DDS application in conjunction with the streamlined CLIS data extraction and data format conversion process.
 - ◇ Re-run the UAT test plan for CSU DDS
 - ◇ Perform on-line testing of the Customer and Sales Record Sub-system such as customer registration, on-line CLIS order, CLIS data dissemination etc.
 - ◇ Review and verify the quality, integrity and completeness of the extracted data and the converted results of CLIS data based on pre-defined acceptance criteria. For instance, the converted CLIS data need to be verified to ensure that the converted CLIS data in different formats match with the source CLIS data.
 - ◇ Perform appropriate remedial actions in case of exception records of CLIS data found. Where necessary, user may need to perform data fixing on the converted data if it cannot be converted by the format conversion routines
- Acceptance of the UAT for LandsD DDS

2.7.3.10 User Training

2.7.3.10.1 Train the Trainers on CSU DDS and LandsD DDS (after respective UAT)

The purpose of training in the context of LandsD DDS is to ensure that LandsD users are fully prepared for and be able to make efficient use of the enhanced and new functions.

Adequate training for user management, end users and system administrators should be provided before the implementation. To increase the cost effectiveness, training should be arranged with ESP and Vendors using a "train-the-trainer" approach. These trainees will become the trainers to train other LandsD users.

For user management, training is focused on the system overview. The training for end users should be focused on all the functions provided by the LandsD DDS, while the training for the system administrators should be focused on the fundamental knowledge on the new operating systems, hardware and software.

Vendor's training will also be included in the training process. For the vendor's training, it will mainly focus on the software packages proposed to be used in the LandsD DDS. The recommended training courses for different software packages include, but not are limited to, the following:

i. Data Format Conversion (after LandsD DDS UAT)

	Training Courses	Training Target	Officer	No. of Participant
1	Developing Microsoft .NET Application for Windows (Visual Basic .NET) – 18 hours	<ul style="list-style-type: none"> Have basic knowledge on VB Need to maintain the data format conversion routine after LandsD DDS production 	STO	1
			TO	1

ii. Database Administration and Operation (after CSU DDS UAT)

	Training Courses	Training Target	Officer	No. of Participant
1	Oracle9i Database Administration Fundamentals II - 5 days course	<ul style="list-style-type: none"> Need to perform database administration for the Customer and Sales Record Subsystem 	PTO	1
			STO	1

iii. Reporting (after LandsD DDS UAT)

	Training Courses	Training Target	Officer	No. of Participant
1	Crystal Reporting – Beginner (Part 1 & 2) – 24 hours	<ul style="list-style-type: none"> Have basic knowledge on Crystal Report Need to prepare ad-hoc report for LandsD DDS operation 	PTO	1
			STO	0

iv. System Administration (after CSU DDS UAT)

	Training Courses	Training Target	Officer	No. of Participant
1.	Intermediate System Administration for the Solaris 9 OE – 5 days course	<ul style="list-style-type: none"> Need to perform system administration for the UNIX server Knowledge on the operation environment of (Solaris 9) 	PTO	1
			STO	0
2.	Advanced System Administration for Solaris 9 OE – 5 days course	<ul style="list-style-type: none"> Need to perform system administration for the UNIX server Knowledge on the operation environment of (Solaris 9) 	PTO	1
			STO	0
3.	Network Administration for the Solaris 9 OE – 5 days course	<ul style="list-style-type: none"> Need to perform system administration for the UNIX server Knowledge on the LAN and Internet setting in (Solaris 9) 	PTO	1
			STO	1
4.	Oracle9i Database: Spatial – 3 days course	<ul style="list-style-type: none"> Need to perform system administration for the Spatial Database Server Knowledge on the Spatial Data import, export, query, maintenance and conversion 	PTO	1
			STO	1

v. System Operation

	Training Courses	Training Target	Officer	No. of Participant
1.	CSU DDS Operation – 1 day course	<ul style="list-style-type: none"> Knowledge on the operation environment and user interface. Need to perform system operation for CSU Data Provision. Need to perform system operation for CSU Data Dissemination. 	PTO	1
			STO	5
			Users from PDs	13
2.	CLIS DDS Operation – 1 day course	<ul style="list-style-type: none"> Knowledge on the operation environment and user interface. Need to perform system operation for CLIS ordering. Need to perform system operation for CLIS Data Dissemination. 	PTO	1
			STO	5
			Users from current subscribed Government departments	46

In conclusion, LandsD will need to involve in the following activities:

- Appoint the right staff to attend the appropriate training
- Make staff available to attend the appropriate training

2.7.3.10.2 Train the End users by Trainers

Before the system production, the trainer will start to train the relevant end users in LandsD in order to ensure the smooth operation of LandsD DDS before and after the system production. This will also allow the Trainers to have the opportunity to re-familiarise themselves with the functions of the proposed system.

In conclusion, LandsD will need to involve in the following activity:

- LandsD trainers needs to train the relevant end users in LandsD for the LandsD DDS operations

2.7.3.10.3 Web-Based Training (WBT) for PDs (after CSU UAT)

- Web-Based Training (WBT) that will provide a user-friendly learning environment for a broader audience. So it is recommended to provide a WBT programme for representative from DO and DU. It should contain an online user manual and demonstration video or slides. The WBT site also provide simulation interface for CSU Data Provision and CSU Data Dissemination process. The user interface of WBT site must provide all the features needed for the user to navigate the application. It is recommended to reuse the development site for this WBT purpose.

2.7.3.11 Data Conversion for Customer and Sales Record Subsystem

2.7.3.11.1 Scope of Data Conversion for Customer and Sales Record Subsystem

To facilitate the implementation of LandsD DDS, the required customer records from the Customer Profile and Sales Database (which is currently stored in SQL server) should be migrated to the customer records in Customer and Sales Record Subsystem (which is proposed to be Oracle) in order to ensure the smooth changeover during system production. The required scope of data conversion for Customer and Sales Record Subsystem should include the personal information and relevant company information of the existing customers.

The conversion plan described in this section is a preliminary plan. A detailed conversion plan should be prepared during the SA&D stage to ensure the success of the data conversion for Customer and Sales Record Subsystem.

2.7.3.11.2 Proposed Data Conversion Procedures for Customer and Sales Record Subsystem

2.7.3.11.2.1 Preparation and Development of Data Conversion for Customer and Sales Record Subsystem

The following areas should be considered during the preparation of the data conversion for Customer and Sales Record Subsystem:

- a. During the SA&D stage, a detailed conversion plan and schedule should be prepared to specify each activity with its estimated resources and the required timing. The cut-off date for data conversion should be also scheduled properly by taking the above into consideration.
- b. LandsD should provide sample snap shot of data from the Customer Profile and Sales Database to the ESP in order to facilitate the development of data conversion programs for Customer and Sales Record Subsystem.

- c. Active participation of LandsD is needed in the verification and validation process during data conversion for Customer and Sales Record Subsystem.

Data conversion programs for Customer and Sales Record Subsystem will be developed by the database utilities (e.g. Oracle importing utilities and PL/SQL program) as a batch process to facilitate the data conversion for Customer and Sales Record Subsystem. Apart from conversion of data, verification of data on predefined rules as well as checking of data integrity would also be performed by the customised programs, which will generate the control reports together with exception reports. However, for data that cannot be predefined due to one reason or another, it will need to be input manually through the proposed system.

In summary, LandsD will be involved in the following activities:

- Review and confirm the conversion plan for Customer and Sales Record Subsystem
- Plan the resource required for the verification and validation process during data conversion for Customer and Sales Record Subsystem
- Provide a snap shot of data from the Customer Profile and Sales Database to the ESP to assist their development and testing of data conversion programs for Customer and Sales Record Subsystem

2.7.3.11.2.2 Data Conversion Drill and Acceptance of Data Conversion for Customer and Sales Record Subsystem

A snap shot of the data from the Customer Profile and Sales Database will be used as the base data for testing of the LandsD DDS application and data conversion programs for Customer and Sales Record Subsystem.

After the stage of data conversion drill for Customer and Sales Record Subsystem, the data will be handed over for UAT and be used as the base data for UAT environment.

A user acceptance plan and quality control procedure for the data conversion for Customer and Sales Record Subsystem should be devised as part of UAT plan to address issues in relation to all the testing cycles and re-runs if necessary.

In summary, LandsD will involve in the following activities:

- Review and verify the quality, integrity and completeness of the converted data and the conversion result based on pre-defined acceptance criteria by the following means:
 - Review the control reports and exception reports
 - Manual checking of the converted data
- Perform data fixing on the existing data if the data cannot be converted
- Acceptance of the Data Conversion for Customer and Sales Record Subsystem

2.7.3.11.2.3 Data Conversion for Customer and Sales Record Subsystem

The actual data conversion of Customer and Sales Record Subsystem for production will be performed prior to the system production cut off date. Since two stages of system roll out and cut off will be proposed, data conversion for Customer and Sales Record Subsystem will be performed before the LandsD DDS roll out.

Stage of System Roll Out and Cut Off	Data Involved for Actual Data Conversion for Customer and Sales Record Subsystem
Stage 1 – CSU DDS for PDs	Not applicable
Stage 2 – LandsD DDS for all customers	All customers record includes Government departments, private sector and general public

During this actual data conversion for Customer and Sales Record Subsystem, LandsD have the following activities involved:

- Review and verify the quality, integrity and completeness of the converted data and the conversion result based on pre-defined acceptance criteria
- Perform data fixing on the data that cannot be converted by conversion programs and input the data via the LandsD DDS application manually, if required.

2.7.3.11.2.4 Data Conversion Schedule for Customer and Sales Record Subsystem

The estimated duration of the entire data conversion exercise is about 4 months. Below is the list of the fundamental activities and their estimated schedules in this conversion exercise.

Activities	Estimated Duration
Preparation and Development of Data Conversion for Customer and Sales Record Subsystem	2 months
Data Conversion Drill and Acceptance for Customer and Sales Record Subsystem	1.5 months
Actual Data Conversion of Customer and Sales Record Subsystem for System Rollout	0.25 month

2.7.3.12 CSU Data Conversion Dress Rehearsal

2.7.3.12.1 CSU Data Development and Management

DAM defined logical models for CSU data exchange between PDs'. It describes the logical structure of CSU data exchanged between the interfacing systems of PDs. LandsD is Data Agent of Building, Lot and Road Centreline CSU. Therefore LandsD

would assist to coordinate with B/Ds the three CSU Data Schema Design and Data development.

2.7.3.12.2 CSU Data Schema Design

The CSU Schema design should conform to DAM's specifications and be agreeable between all DO and DUs.

2.7.3.12.3 CSU Test Data Preparation

Respective test data sets (includes Building, Lot, Road Centreline) of the three CSU are required for system development and testing purpose. The suggested data volume of CSU Test Data is around 3% to 5% of the whole CSU data set. The CSU Test Data conversion time schedule also depends on DAMin/DAMout development progress as well as the data conversion scheduled in DAM which will be carried out by other PDs in parallel with this LandsD DDS.

2.7.3.12.4 Coordinate CSU Data Conversion and Activities

A working group should be assigned with representative from CSU DDS and DAM development teams during CSU DDS system development and implementation stage. The ESP would be responsible to coordinate the CSU Test Data preparation, CSU Pilot Run Data conversion and One-off CSU Data conversion as well as the DAMin/DAMout interface program development progress. The coordinator aligns the converted CSU data from PDs for CSU DDS as stated in section 3.1.7 of the DAM documents.

2.7.3.12.5 CSU Data Conversion Dress Rehearsal

Prior to launching of the CSU DDS, the full set of converted data after cut off date (to be defined by the Building, Lot and Road Centreline CSUs sub-working group members) from respective DO of each of the three CSU will be verified by each DO. Then the verified data will be imported to the CSU DDS. The data will be verified by the DA. Then the data will be disseminated to DO who will import to the systems. The imported data will be verified by DU.

2.7.3.13 Prepare System Document

The ESP should prepare documentation such as System Manual, Application Operation Manual and Application User Manual. For example,

- The System Manual should provide an overview of the system by listing out in brief the programs, data files, equipment, clerical procedure, computer operation procedure, etc. Reader interested in specific area may refer to the corresponding manuals (Data Manual, Program Manual, etc.).

- The Application Operation Manual (AOM) is to provide relevant information to the system operation staff of the system implemented. It should document in detail the instructions of all the work to be performed by the system operation staff in running the application system.
- The Application User Manual should contain detailed instructions in addition to an overall description of the procedures. The detailed instructions should be made up of a set of standard instructions, each part being complete in itself describing a logically distinct function (e.g. the procedures of Data Provision from DO).

2.7.3.14 System Rollout for Production and System Nursing

After the success of the scheduled UAT and data conversion, ESP will roll out the LandsD DDS in two production cut off stages as follows:

- Stage 1 – CSU DDS for PDs
- Stage 2 – LandsD DDS for all Customers

Prior to roll out of Stage 2, LandsD should retain resource to maintain the current process for the dissemination of CLIS data and the handling of purchase order and payment.

On completion of data conversion of Customer and Sales Record Subsystem, sufficient LandsD resource should be allocated to handle the delta purchasing order(s) placed by the customers from private sector. These orders and license records will need to be manually input in the LandsD DDS by LandsD. The payment process for the customers from private sector will need to be handled by LandsD manually. Only offline data dissemination will be offered to the customers from the private sector. Consequently the data extraction process of getting data from the Multi-format Spatial Data Hub to the requested physical media for dissemination will be activated by LandsD manually.

2.7.3.14.1 CSU DDS Commissioning Day (Stage 1 – Roll Out)

At this stage, the CSU DDS will be rolled out to serve all the customers from PDs. It is expected that the major issues on the application level and other problems such as system parameters setting should have been resolved by this stage. This can be tackled easily with the help of on-site support staff provided by the ESP as well as vendors providing full time system support during this period.

2.7.3.14.2 LandsD DDS Commissioning Day (Stage 2 – Roll Out)

On completion of UAT of LandsD DDS, the LandsD DDS (includes CSU DDS and CLIS DDS) will be rolled out to serve all the customers, which include private sector companies, Government departments and PD. It is suggested by LandsD that the stage 2 roll out also will be split into two periods. The first period of stage 2 roll out is aimed to serve Government departments only. The second period of stage 2 will be rolled out to serve Public, a month after the first one.

2.7.3.14.3 System Nursing

One critical factor for the successful implementation of LandsD DDS is the on-site support to be rendered by the ESP during the entire course of system nursing period. It is proposed that a 3 months system-nursing period will be provided after each stage of production rollout. Under the current proposed rollout arrangement, a total 3 months system-nursing period will be provided for production rollout stages 1 and stage 2. It is expected that ESP would provide round-the-clock service during this critical stage.

The ESP will provide the following major support during system nursing:

- a. Fire Fighting
- b. Problem Determination
- c. Production Support and Ad Hoc Processing Requests
- d. Assist LandsD to carry out the Disaster Recovery Drill and planning the frequency of drill after the system implemented.

2.7.3.14.4 Project Closure

Before the end of the project, the ESP should have delivered all products satisfactorily according to acceptance criteria, and any follow-on actions, if required, should be agreed with LandsD and relevant parties.

2.7.4 Implementation Schedule

Having taken the above factors into account, the high-level implementation plan for the Pre-Implementation stage and the Development and Implementation stage is stated below:

Activities	Estimated Duration	Scheduled Start month	Scheduled End month
Pre-Implementation Stage	8 months	M1	M8
Funding Application	2 months	M1	M2
Prepare Services Brief for SOA and Tendering Process	7 months	M1	M8
Development Site Preparation (by ArchSD)	3 months	M5	M8
Development and Implementation Stage	24 months	M8	M32
Commencement of LandsD DDS Implementation Project	milestone	M8	M8
Project Initiation	1 month	M8	M9
Procurement and Installation of Hardware and Software for Development Site	2 months	M9	M11
CSU DDS Development	15 months	M9	M23
CSU DDS SA&D	5 months	M9	M13
CSU DDS Programming and Testing	7 months	M14	M20
Procurement and Installation of Hardware and Software for Production Site and DR Site (Includes ISHS Acquisition)	3 months	M14	M17
Site Preparation (Includes ISHS Configuration)	3 months	M17	M20
Commencement of ISH Service	milestone	M20	M20
Load Test for CSU DDS	1 month	M20	M21
UAT for CSU DDS	2 months	M21	M23
CSU DDS User Training (Train the Trainers)	0.5 months	M23	M23

Activities	Estimated Duration	Scheduled Start month	Scheduled End month
CSU DDS User Training (By Trainers to end users and Web Based Training)	0.5 months	M23	M23
Data Conversion Dress Rehearsal (Building, Lot, Road Centre Line)	5 months	M19	M23
CSU DDS Commissioning Day (Stage 1 - Roll Out)	milestone	M23	M23
CLIS DDS Development	15 months	M9	M23
CLIS DDS SA&D	5 months	M9	M13
CLIS DDS Programming and Testing	4 months	M20	M23
Preparation and Development of Data Conversion for Customer and Sales Record Subsystem	2 months	M16	M18
Data Conversion Drill and Acceptance for Customer and Sales Record Subsystem	2 months	M18	M20
Integrated LandsD DDS Roll Out	8 months	M24	M32
Load Test for LandsD DDS	1 month	M24	M24
UAT for LandsD DDS	2 months	M24	M26
LandsD DDS User Training (Train the Trainers)	1 month	M26	M27
LandsD DDS User Training (By Trainers to end users and Web Based Training)	2 months	M27	M29
Prepare System Document	4 months	M24	M27
System Roll Out and Cut Off for Government Departments	1 month	M27	M28
System Roll Out and Cut Off for Public	1 month	M28	M29
LandsD DDS Commissioning Day (Stage 2 -Roll Out)	milestone	M29	M29
System Nursing	3 months	M29	M32
Project Closure	milestone	M32	M32
Coordinate CSU Schema Development and Data Conversion with B/Ds	16 months	M8	M23
CSUs Test Data Preparation for CSU DDS Development by ESP	10 months	M9	M18
CSU Test Data preparation (Building)	2 months	M9	M11
CSU Test Data preparation (Lot)	2 months	M10	M12
CSU Test Data preparation (Road Centreline)	2 months	M16	M18
CSUs Schema Development by HPLB and Data Conversion by B/Ds	23 months	M1	M23
CSU Data Schema Design	4 months	M1	M4
CSU Data Conversion Activities (Building)	15 months	M1	M14
Completion day of Building CSU Trial Run	milestone	M10	M10
CSU Data Conversion Activities (Lot)	14 months	M6	M19
Completion day of Lot CSU Stage 1 – Actual Run	milestone	M11	M11
CSU Data Conversion Activities (Road Centreline)	11 months	M13	M23
Completion day of Road CentreLine CSU Stage 1 – Actual Run	milestone	M16	M16

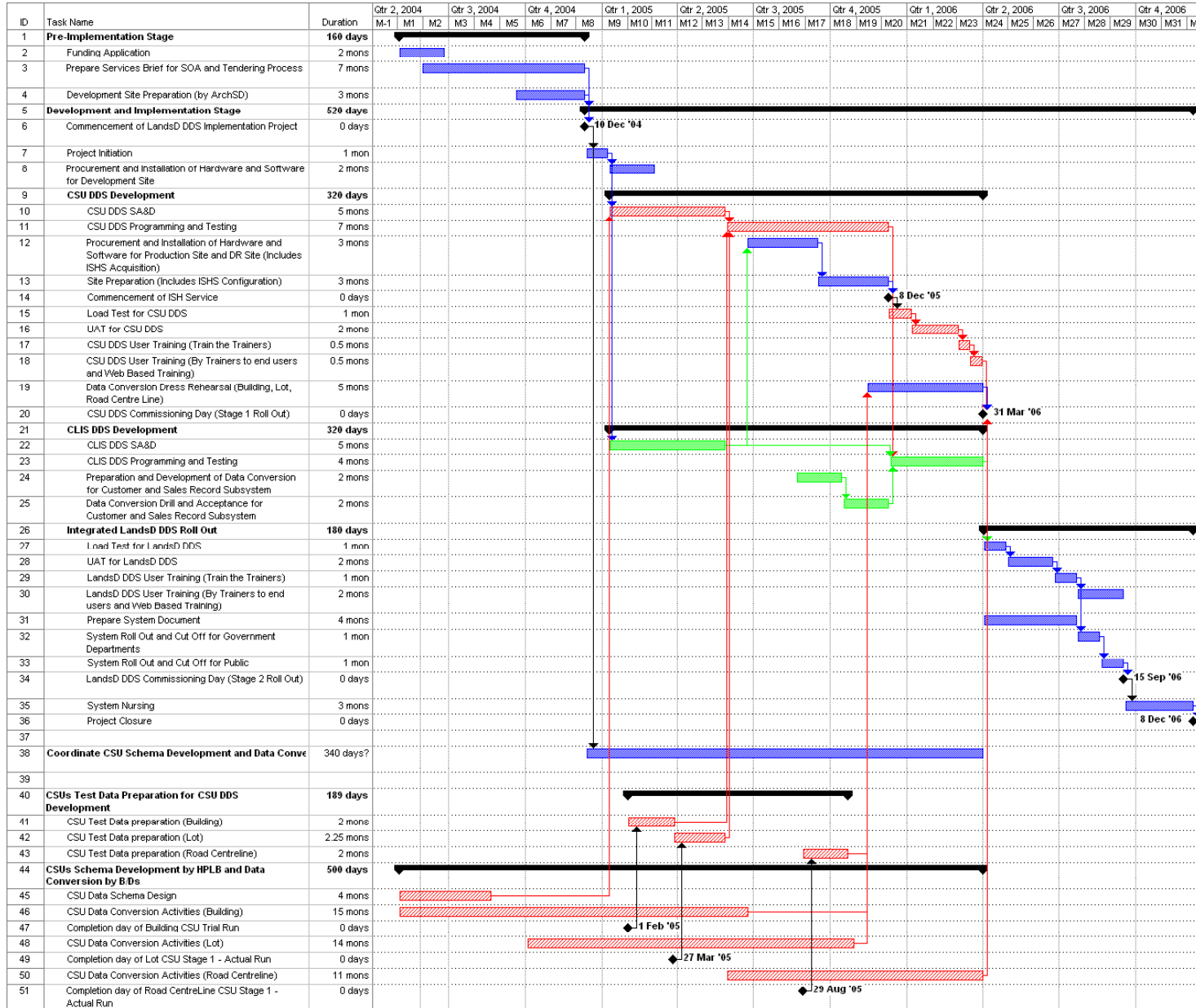
In the proposed implementation schedule, the Pre-Implementation stage will start from **May 2004 (M1)** and complete in **December 2004 (M8)**. It is assumed that the funding would have been approved and the External Services Provider has been appointed by that time. Then, the project initiation of LandsD DDS is estimated to commence in **December 2004 (M8)**, the estimated duration of the CSU DDS implementation is 15

months (**Stage 1 - Roll Out in M23**) and LandsD DDS implementation is 24 months (**Stage 2 - Roll Out in M29**). Full production rollout of LandsD DDS will be **September 2006 (M30)**.

The following Gantt chart illustrates the high level plan and their respective durations for the Pre-Implementation stage and the Development and Implementation stage:

**DDS OF LANDS DEPARTMENT
SUPPLEMENTARY FEASIBILITY STUDY REPORT**

IMPLEMENTATION PLAN



Note:

Assumed M1 = May, 2004

- CSU Related Tasks
- CLIS Related Tasks
- Common Tasks



2.7.6 Impact Analysis

2.7.6.1 Effects on Organization

With the implementation of the LandsD DDS, the efficiency of the service provided will be improved in the following areas:

- CSU DDS would become an infrastructure of DAM, it provides data collection function, centralized storage and dissemination channel for CSU data.
- Streamlining the CSU dissemination process.
- More convenient and improved efficiency in delivering the up-to-date digital map and land record information to the GIS community users.
- Enhanced mutual data sharing and accessibility of the land related information of LandsD.
- Timely supply of land relation information will facilitate other government departments, private developers etc. to speed up the land grant and land development process and directly contribute towards the Government's housing supply and transportation infrastructure development effort.
- The provision of management reports would enable more effective monitoring of license expiry situation. In addition, the provision of ad-hoc reporting tool would enable more efficient analysis on sales record (such as marketing need) and facilitate better management decision, etc.

2.7.6.2 Effects on Staff

With the improved digital map data conversion and data dissemination process, the workflow of digital map data conversion and data dissemination etc. will be streamlined after the implementation of the proposed system. Part of the staff resource that are currently responsible for the manual operation in handling map ordering, data conversion and data dissemination etc., would be saved for the purpose of implementation of CSU DDS, which in turn improves the utilization of resources.

Minimal LandsD resource is still required to provide off-line customer service (e.g. handling the ad-hoc customer order) via the map sales counter of LandsD.

As this is a new Internet-based system, it is anticipated that there will be an increase in the number of enquiries from existing and potential customers on launching of the new ordering service. As an interim measure, additional staff resource would be required for provision of customer support.

2.7.6.3 Effects on User Operating Procedures

New operational procedure will be required for system failure, backup, restore and data recovery of the proposed LandsD DDS. Automated batch processing will also be imposed for extracting the digital map data from CLIS and subsequent generation of digital map data in various format, generation of management reports, performing housekeeping tasks, etc. Appropriate training on the proposed LandsD DDS will also be provided to system administration staff.

2.7.6.4 Level of Services

The 24 Hour level of service, i.e. 24 hours a day, 7 days a week, will be provided by the LandsD DDS as it is an Intranet and Internet based system. However, as according to the LandsD, there might be no staff available to monitor the LandsD DDS after office hours. Consequently, the error logging facilities could be important for LandsD staff to trace and fix the error occurred during the non-office hours. After office hours, sequence of batch programs will be executed for LandsD DDS such as updating the digital map data from CLIS, Extract manipulated CSU data from Spatial Data Server, synchronize a copy of data to Web servers, converting the updated digital map data into a defined data format and store the converted data into the Multi-format Spatial Data Hub.

Based on the Hotsite Backup Strategy proposed in the Technical System Option, it is estimated that the system would be recovered within 1 - 2 days in case of severe system failure such as hardware breakdown. Relevant operational staff should follow the guideline as documented in the operational procedure in case of system failure.