## 3. Methodology

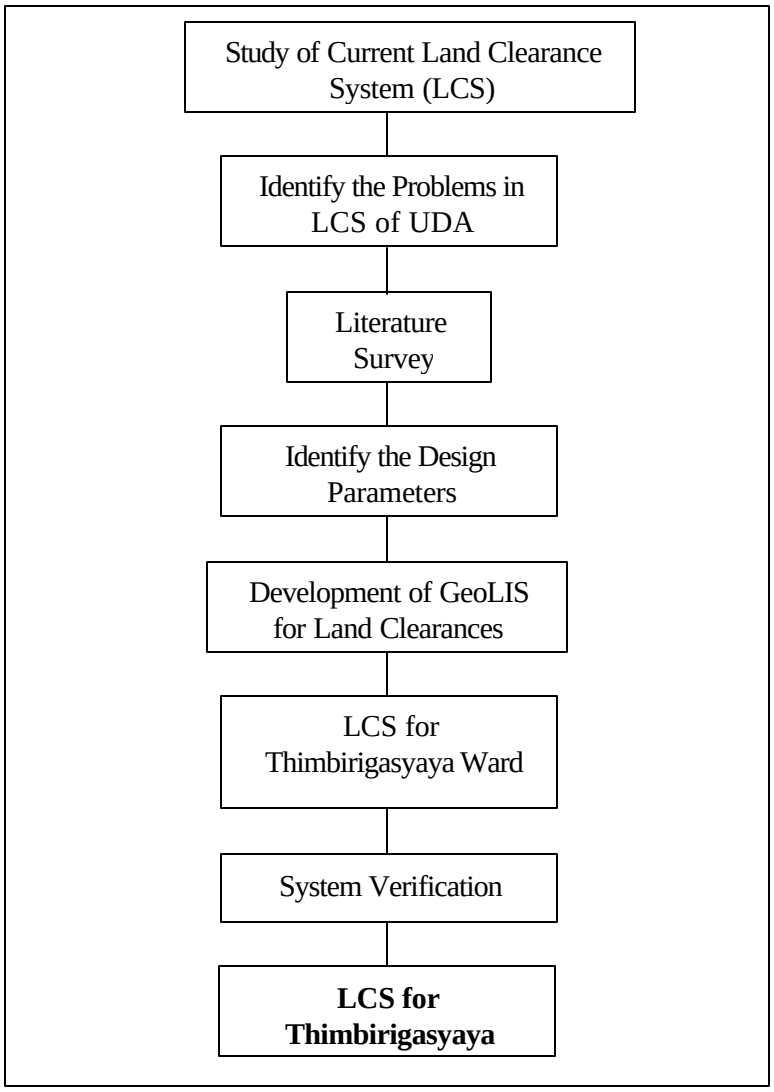


**Figure 3-1** Research Methodology adopted for the study

The sequence of research methodology (Figure 3-1) is as follows; (a.) Study the existing situation of land clearance system for the City of Colombo. (b.) The existing methods currently used for data collection and data processing, its shortcomings, information needs for each step in the planning process, data sources, and data types. (c.) Interviews and field surveys for user requirement analysis and data verification. (d.) Review of literature on LCS to identify related functions for the research problems. (e.) Designing of the LCS based on the findings of data analysis. (f.) Designing an information program for the sustainability of the proposed LCS.

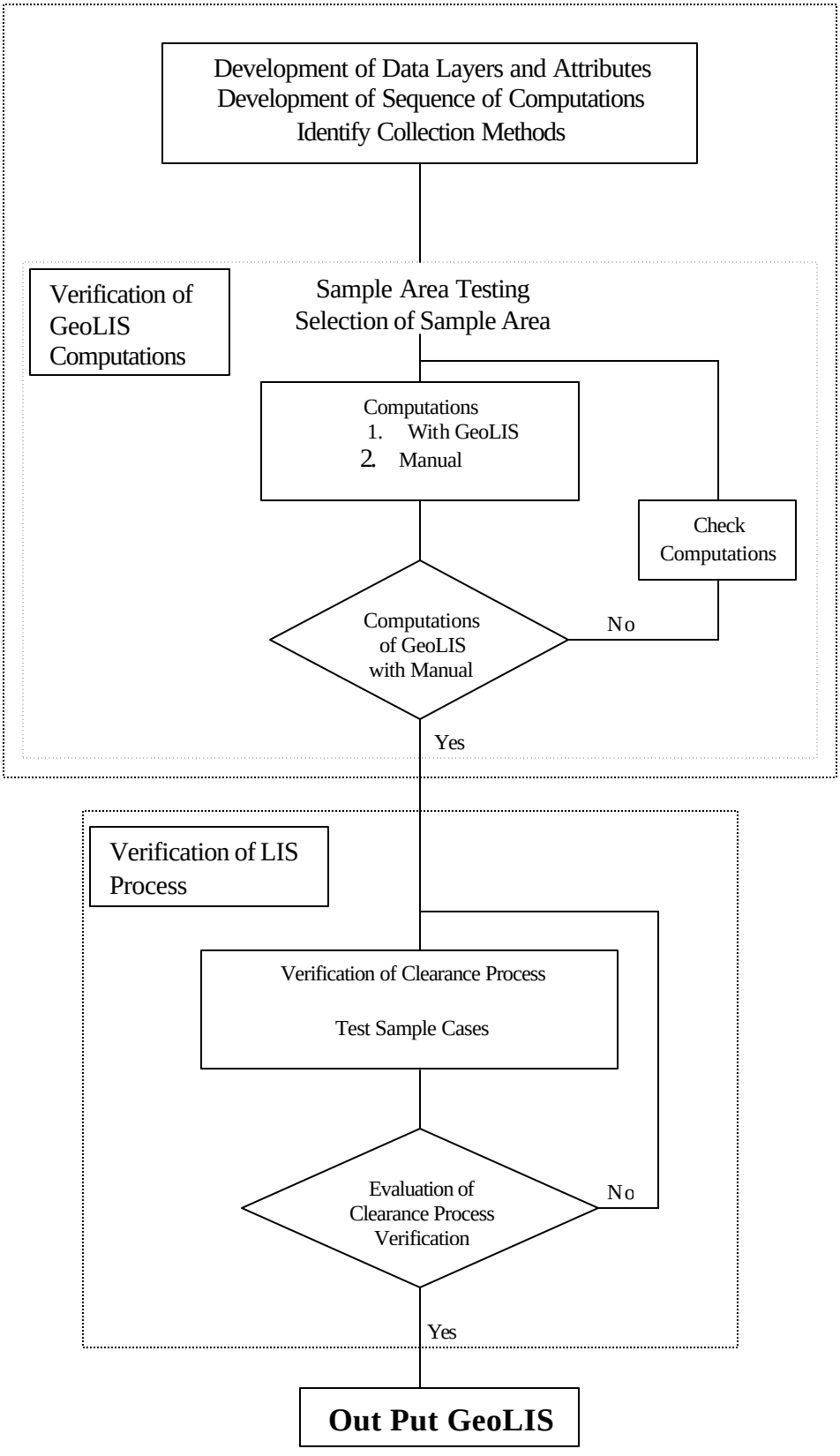


**Figure 3-2** Methodology for Development of GeoLIS for Land Clearances

### 3.1 Development of Data Layers and Attributes

Data involved in this study can be categorized in to two forms as Graphic al Data and Attribute Data. Data representing in map forms can be treated as graphical data. Statistical data and data obtain from texts are called attribute data. The graphical data, when converted into digital forms it represents data layer and attribute generate from statistical data (Figure 3-3).

Data gathering activities include document search, conduct of field surveys, monitoring the existing land clearance system of Urban Development Authority, and collection of sample datasets (Table 3-1). The following maps and regulations collected from different agencies have been used for this study. Collected Land Parcel maps adequately jointed together before it was digitized.

**Table 3-1** Data Acquired from different Authorities

| No | Data | Sources |
|---|---|---|
| **Thimbirigasyaya Ward** | | |
| 01 | Land Parcel Maps | 26 Land Parcel maps (Scale 1 inch: 1 Chain) revised in 2003 from Colombo Municipal Council. All property boundaries digitized using ArcView 3.2 Software. |
| 02 | Zoning Map 2010 | Digital Data (Scale 1:1000) from Urban Development Authority |
| 03 | Building Maps | Digital data from Urban Development Authority (Scale 1:1000) |
| **Colombo City** | | |
| 04 | Floor Area | Digital Data from Urban Development Authority (Scale 1:1000) |
| 05 | Plot Coverage | |
| 06 | Vacant Lots | |
| 07 | Slums & Shanty | |
| 08 | No of Buildings | |
| 09 | Population | |
| 08 | Zoning Regulations | Gazette No. 1090/13 dated 29th July 1999 Urban Development Authority |

### 3.2 Development of Sequence of Computations

- 24 Land parcel maps obtained from Colombo Municipal Council, photocopied and scanned.
- Scanned images georeferenced by using Register & Transform extension but after georeferenced maps did not join together.
- Then three image maps joined together using Image Assembler software and georeferenced using Image Analysis extension. The attempt was successful. The mosaic of scanned image of land parcel maps (Thimbirigasyaya Ward) was then able to create (Figure 3.4). After that the mosaic was digitized and saved as Land Parcels Theme.
- The relevant statistical data of land parcels from Assessment Registry maintained by the Assessment Department of CMC were written down and entered them into the computer as attribute data

### 3.3 Identification of Data Collection Methods

Three forms of data collection can be identified.

i. From Literature (rules and regulations, project limitations etc.)
ii. By scanning the analog maps
iii. Statistical data from analog form

Collected data from the above mentioned sources are used to form map layer (thematic layer) with attributes. Before developing the system by using GIS a verification of data that has been accumulated in map layers is needed to be verified. Following method is used in the task of verifying to data.

- Physical Calculation
- Field Inspection
- Field Measurements

Then the expected GIS database is developed by using the GIS techniques (GIS Tools).

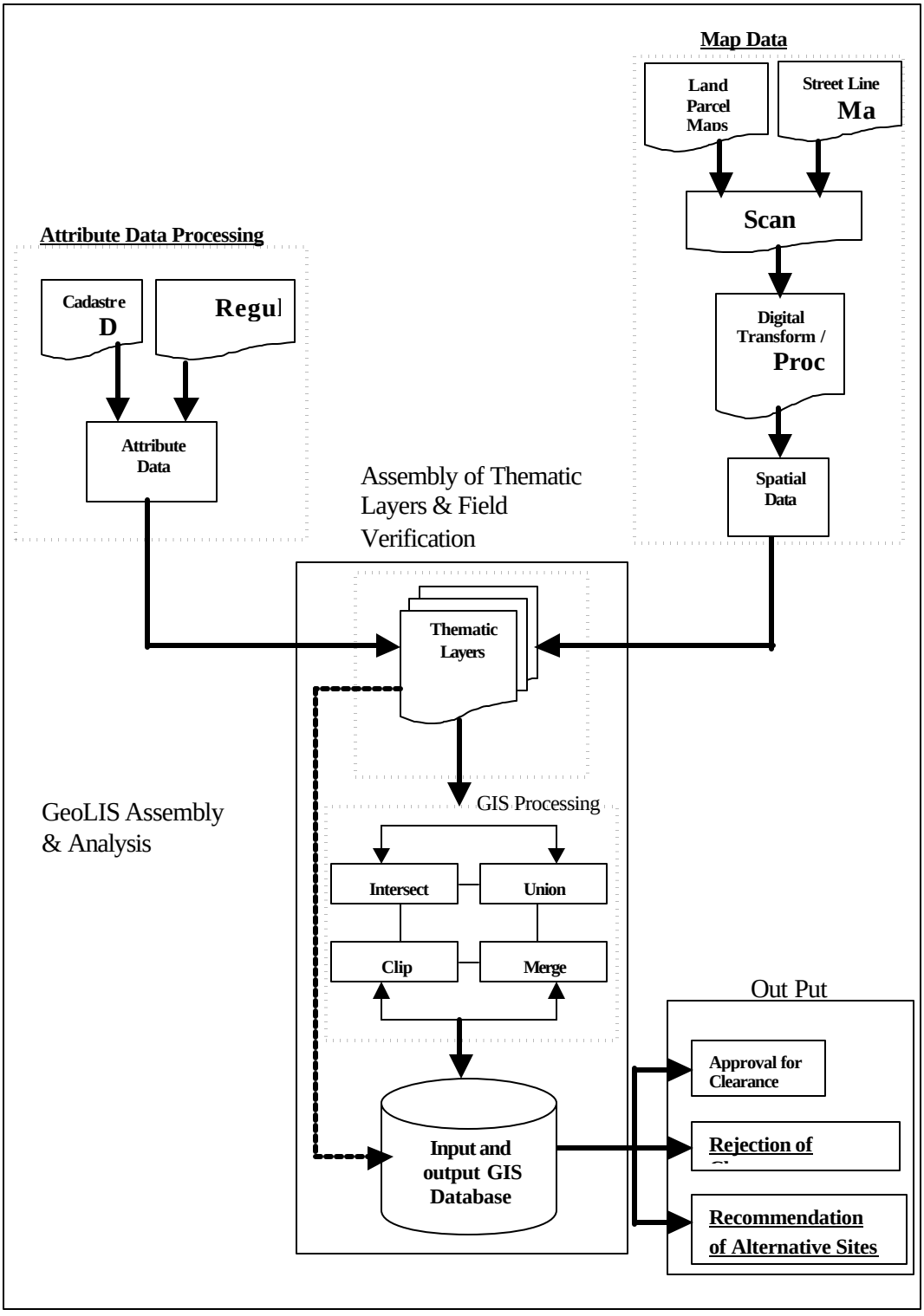


**Figure 3-3** Data Processing Methodology

**Figure 3-4** The MOSAIC of Scanned Images of Land Parcels map (Thimbirigasyaya Ward)

**Source:** Assessment Department, CMC

### 3.4 Sequence of Study Area Selection

For the administrative purposes, the CMC area has been divided into 47 numbers of wards. For planning purposes it has been identified with 8 numbers of zones, each has different regulations in order to maintain the developments.

Out of 47 wards, the ward 40 (Thimbirigasyaya Ward) was selected as the most suitable sample area for this study. Following methods were carried out to find its suitability.

i. When checked for the availability of maps and cadastre data records, relevant to each ward at the Assessment Department of CMC, it was observed that ward 40 has the most updated maps and cadastre data records (up to year 2003).

ii. The analysis carried out for selection of sample area by application of GIS to all the wards using five themes stated bellow, again proved the suitability of ward 40 for the study.

   a. Plot Coverage Theme
      Plot coverage is the ratio of the built area to the land extent.
   b. Floor Area Theme
      Floor area ratio is the ratio of floor area of the building to the land extent.
   c. Slums and Shanty Theme
      Slums and Shanty is the distribution pattern of slums and shanty (number of slums & shanty in a ward / Ha.)
   d. Population Density Theme
      Population Density is the distribution pattern of population density (number of persons in a ward / Ha.)
   e. Vacant Lots Theme
      Vacant Lots is the distribution pattern of vacant lots (number of lots in a ward / Ha.)

All the above Themes were classified into 2, **3**, 4, 5, 6…categories as "Low", .,.,.,.,.,"High". Then the analysis as explained in Figure 3-5 was carried out (Figure 3-5 gives the system of analysis with only 3 levels, "Low", "Middle" and "High") Results obtained (Output 4 of Figure 3-5) in each analysis consisted the ward 40 as given in Page 35 Table 4-1. This again proved the selection of ward 40 as the suitable for the study area. The category of "Low" is give with the notation of 3 while the "Middle" as 2 and 1 as "High" (Table 3-2) & (Figure 3-5).

**Table 3-2** Theme Classifications

| No | Theme | Range | Notation |
|---|---|---|---|
| 01 | Plot Coverage | Low buildable area | 3 |
| | | Medium buildable area | 2 |
| | | High buildable area | 1 |
| 02 | Floor Area Ratio | Low Floor Area | 3 |
| | | Medium Floor Area | 2 |
| | | High Floor Area | 1 |
| 03 | Population Density | Low Population Density | 3 |
| | | Medium Population Density | 2 |
| | | High Population Density | 1 |
| 04 | Slums & Shanty | Low Slums & Shanty Area | 3 |
| | | Medium Slums & Shanty Area | 2 |
| | | High Slums & Shanty Area | 1 |
| 05 | Vacant Lands | Low Vacant Areas | 3 |
| | | Medium Vacant Areas | 2 |
| | | High Vacant Areas | 1 |

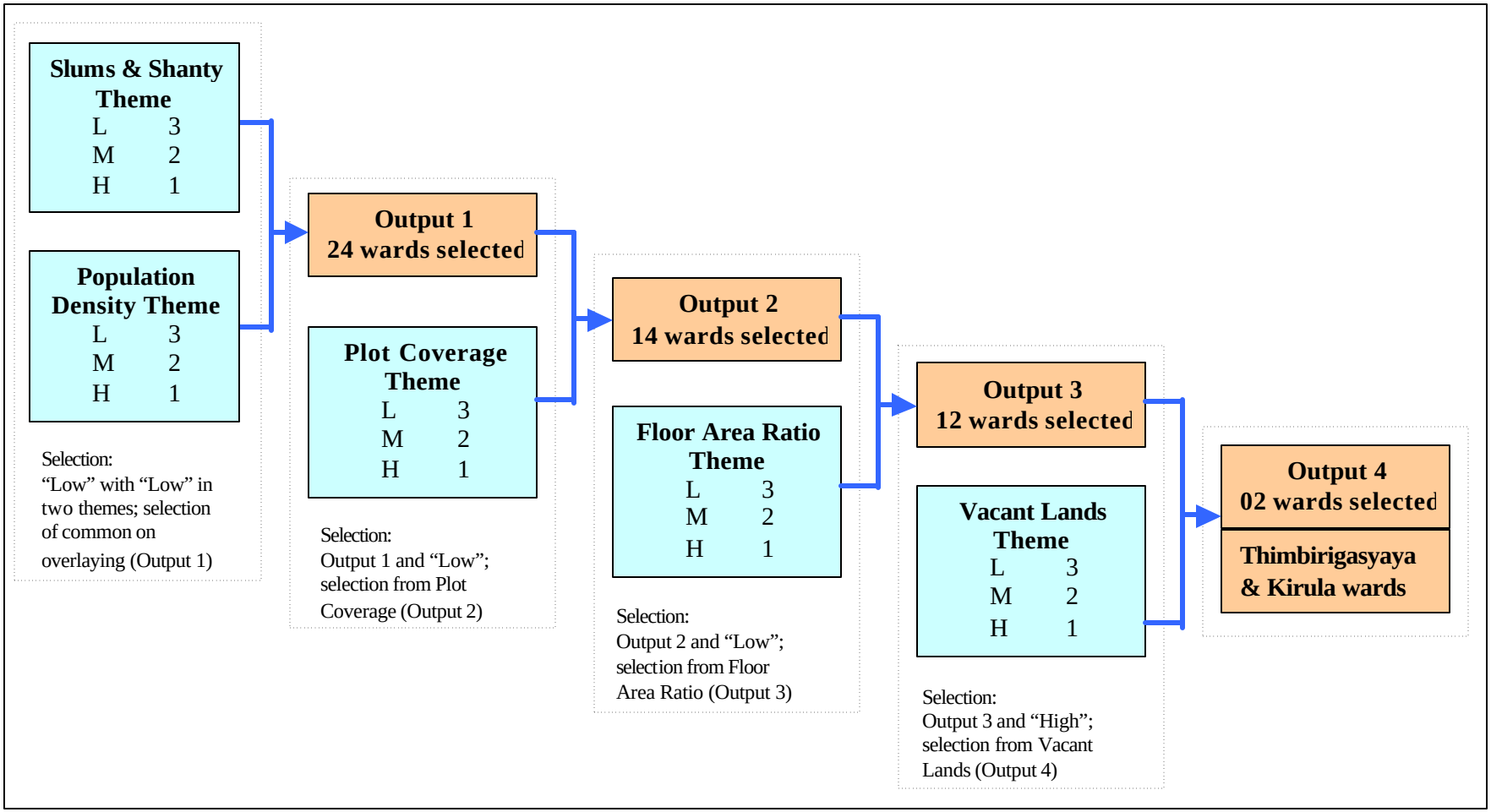


**Figure 3 -5** Selection Criteria using Themes