



LAND USE PLAN

MANNAR DISTRICT

**Prepared on the recommendations given by the
Lessons Learnt and Reconciliation Commission (LLRC)**



Land Use Policy Planning Department

Ministry of Lands

2016

Secretary's Message

Lessons Learnt and Reconciliation Commission (LLRC) made several recommendations for the Northern and Eastern Provinces of Sri Lanka so as to address the issues faced by the people in those areas due to the civil war. The responsibility of implementing some of these recommendations were assigned to the different institutions coming under the purview of the Ministry of Lands i.e. Land Commissioner General Department, Land Settlement Department, Survey General Department and Land Use Policy Planning Department.

One of the recommendations made by the LLRC was to prepare Land Use Plans for the Districts in the Northern and Eastern Provinces. This responsibility assigned to the Land Use Policy Planning Department. The task was completed by May 2016. I would like to thank all, the National Level Experts, District Secretary and Divisional Secretaries in Mannar District Land Use Planning Officers, Development Officers (Land Use) of Mannar District and the District staff who assisted in preparing this plan. I also would like to thank Director General of the Land Use Policy Planning Department and the staff at the Head Office for their continuous guiding given to complete this important task.

I have a great pleasure in presenting the Land Use Plan for the Mannar District.

Dr. I.H.K. Mahanama

Secretary,

Ministry of Lands.

Director General's Message

I have a great pleasure in presenting the Land Use Plan for the Mannar District prepared by the officers of the Land Use Policy Planning Department. This task was commenced with limited resources in the Department, but subsequently, the much required resources for field work were provided by the Ministry of Lands.

I would like to take this opportunity to thank the many individuals who helped us in preparing the plan. I wish to thank in particular the Secretary, Ministry of Lands; the Government Agent/District Secretary and the Divisional Secretaries of the Mannar District; members of the National Expert Group (NEG); the District Expert Group (DEG); the Divisional Level Officers; the members of the farmer organizations.

Finally my thanks go to the staff at the Head Office of the Land Use Policy Planning Department and the Land Use Planning Officers ,Development Officers (Land Use) of Mannar District and District staff for their commitment despite the many hardships faced by them, particularly in conducting the required field studies.

I trust this plan will be used as a decision making tool for promoting better land use in Mannar District.

P.M. Shanthi Fernando

Director General

ABBREVIATIONS

ACAD-Assistant Commissioner of Agrarian Development

CCB - Coconut Cultivation Board

CCD - Coast Conservation Department

CEA - Central Environmental Authority

DAS - Department of Agrarian Services

DEG - District Expert Group

DMC - Disaster Management Centre

DSD - Divisional Secretary Division

DWLC - Department of Wild Life Conservation

FD - Forest Department

GND – Grama Niladari Division

GSMB - Geological Survey and Mines Bureau

ID - Irrigation Department

LLRC - Lessons Learnt and Reconciliation Commission

LUPPD - Land Use Policy Planning Department

NEG - National Expert Group

NPPD - National Physical Planning Department

PDOA - Provincial Department of Agriculture

PDOI - Provincial Department of Irrigation

PLCD - Provincial Land Commissioner's Department

SLCC - Sri Lanka Cashew Corporation

UDA - Urban Development Authority

WD - Wildlife Department

WRDB - Water Resource Development Board

MEMBERS OF THE FIELD TEAM

The Team was guided and coordinated by Mrs.M.S.Kumudini, Land Use Planning Officer, District Land Use Planning Office, Mannar according to the directions given by the staff at the Head Office. In addition, the Team was technically assisted by Mrs. Ruchira Wikramaratne, Assistant Director (District Land Use), Hambanthota and Matara Districts and Mrs. C. Senavirathne Assistant Director (District Land Use), Kegalle and Gampaha Districts. Land Use Plan has been compiled by Mrs.Ruchira Wickramaratne and Mrs. C. Senavirathne.

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TABLE OF CONTENTS

	PAGE
SECRETARY'S MESSAGE	i
DIRECTOR GENERAL'S MESSAGE	ii
ABBREVIATIONS	iii
MEMBERS OF THE FIELD TEAM	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF PHOTOGRAPHS	ix
PART I - BACKGROUND	
1. INTRODUCTION	1
2. DISTRICT PROFILE	2
2.1 Introduction	2
2.2 Administrative Structure	2
2.3 Physical Environment	4
2.3.1 Topography	4
2.3.2 Soils	4
2.3.3 Climate	6
2.3.4 Water	8
2.4 Demographic structure	10
2.4.1 Population	10
2.4.2 Labour Force	13
2.4.3 Occupational structure	13
2.5 Infrastructure	13
2.5.1 Roads	13
2.5.2 Communication facilities	16
2.6 Land Use	16
2.7 Existing Spatial Plans	17
2.7.1 National Level Plans	17
2.7.2 Regional and Sub Regional Level Plans	19
2.7.3 Need for a Land Use Plan	19

PART II – LAND USE PLAN	
3. PLANNING APPROACH	20
3.1 Study the present situation	21
3.2 Identification of land use issues	21
3.3 Formulation and validation of recommendations to address the issues	21
3.4 Preparation of the land use plan	22
4. LAND USE/LAND COVER OF THE DISTRICT	23
4.1 Introduction	23
4.2 Land Use and Land Cover	23
5. PROPOSED LAND USE PLAN	28
5.1 Introduction	28
5.2 Major Land Use Issues	29
5.3 Recommendations	33
Protected Areas	34
Areas where present use can be continued	34
Areas where changes or improvements are required	37
Additional areas recommended for protection	37
Underutilized home gardens	39
Underutilized paddy lands	42
Underutilized other agricultural lands	44
Abandoned Agricultural lands	48
Abandoned settlements	50
Unutilized lands	52
Other issues related to land use	55
6. PROPOSED IMPLEMENTATIONSTRATERGY	57
List of references	58
ANNEXES	
Annex I – Index map of 1:10,000 sheets	59
Annex II Grama Niladari Boundary Map and Name List	60
Annex III - National level Expert Group	65
Annex IV- District level Expert Group	66
Annex V –Data Tables	67
Annex VI – Photographs of the Land Use Issues	76
Annex VII – Criteria used to determine the land suitability for different uses	79

LIST OF TABLES

	PAGE
1. Mannar District-Administrative Divisions	2
2. Brackish water resources in Mannar District	8
3. Main aquifer types in Mannar District	8
4. Population of Mannar District by Divisional Secretariat Divisions before and after resettlements	10
5. Population by ethnicity and religion	11
6. Population by Urban, Rural, Sex and Age	11
7. Details of C &D class roads	14
8. Land Use-Mannar District	16
9. Land Use 2015	24
10. Major Land Use Issues	32
11. Approximate extents of the presently protected areas in the District	35
12. Additional Areas Recommended for Protection and their approximate extents in the District	37
13. Major reasons for underutilization of home gardens and proposed recommendations	39
14. Underutilized Home gardens and their total extents in the District	40
15. Reasons for the underutilization of paddy lands and recommendations	42
16. Underutilized Paddy lands and their extents in the District	42
17. Reasons for the underutilization of other agricultural lands and recommendations	44
18. Underutilized lands devoted for field crops, Palmyra, coconut and cashew and their extents in the District	45
19. Abandoned Paddy lands and their extents in the District	48
20. Distribution of Abandoned Settlements	50
21. Unutilized lands and their suitability for different uses	52
22. Other Issues related to Land Use	55

LIST OF FIGURES

	PAGE
1. Location and administrative boundaries	3
2. Soil map	5
3. Agro-ecological regions	7
4. Water bodies	9
5. Population Density	12
6. Road Network	15
7. Land Use 2015	27
8. Major Land Use Issues	33
9. Presently Protected Areas	36
10. Additional Areas Recommended for Protection	38
11. Areas with high proportion of Underutilized Home gardens	41
12. Underutilized Paddy lands	43
13. Areas with high proportion of Underutilized lands devoted to field crops	46
14. Areas with high proportion of Underutilized lands devoted to plantation crops	47
15. Abandoned Paddy lands	49
16. Abandoned Settlements	51
17. Unutilized lands	54
18. Proposed Land Use Plan	56

LIST OF PHOTOGRAPHS

	PAGE
1. Low productive paddy lands in the District	30
2. Abandoned Settlement	31
3. Unutilized Lands	32

PART I-BACKGROUND

1. INTRODUCTION

The Lessons Learnt and Reconciliation Commission (LLRC) of 2011 recommended that “a land use plan for each District in the North and East should be developed with the participation of district and national experts drawn from various relevant disciplines to guide the district administration in land conservation and alienation in order to ensure protection of environment and bio-diversity; sustainable economic development; leisure and recreational standards; religious, cultural and archeological sites with a view to improving the quality of life of the present and future generations”.

The preparation of the plans was entrusted to the Land Use Policy Planning Department (LUPPD). The LUPPD started the planning process by establishing two expert groups, one at the National Level and other at the District Level. Field work of the planning process was commenced in 2013. Initially the available land use maps were updated to study the current patterns of land use and subsequently major land use issues were identified based on the field investigations. Recommendations to address the land use issues were formulated and these were presented to the Expert Groups and stakeholders for their views and comments. The plan for the district has been prepared by incorporating the views and comments of the Expert Groups and the stakeholders.

The Plan is mainly divided into two parts. Part I provides the background for the plan. Part II gives the land use plan.

2. DISTRICT PROFILE

2.1 Introduction

Mannar District is one of the 25 districts in Sri Lanka and it is located between 08°52'Northern coordinate and 80°04' Eastern coordinate. It is situated in the North-Western part of Sri Lanka and in the Western side of the Northern Province. This district is surrounded by Kilinochchi District from the North, Puttalam District from the South, Vavuniya District from the East, and the Western part of the District by the Indian Ocean. (Figure 1). It covers 2021Sq.km, approximately 3% of the total land area of the country. This district consists of two parts; one is Island and other one is Main Land. Capital of the district is situated in the island. This island is located in the Gulf of Mannar. 80% of the land is in the Main Land. Island and the main land are connected by 4.5 km long causeway and a bridge.

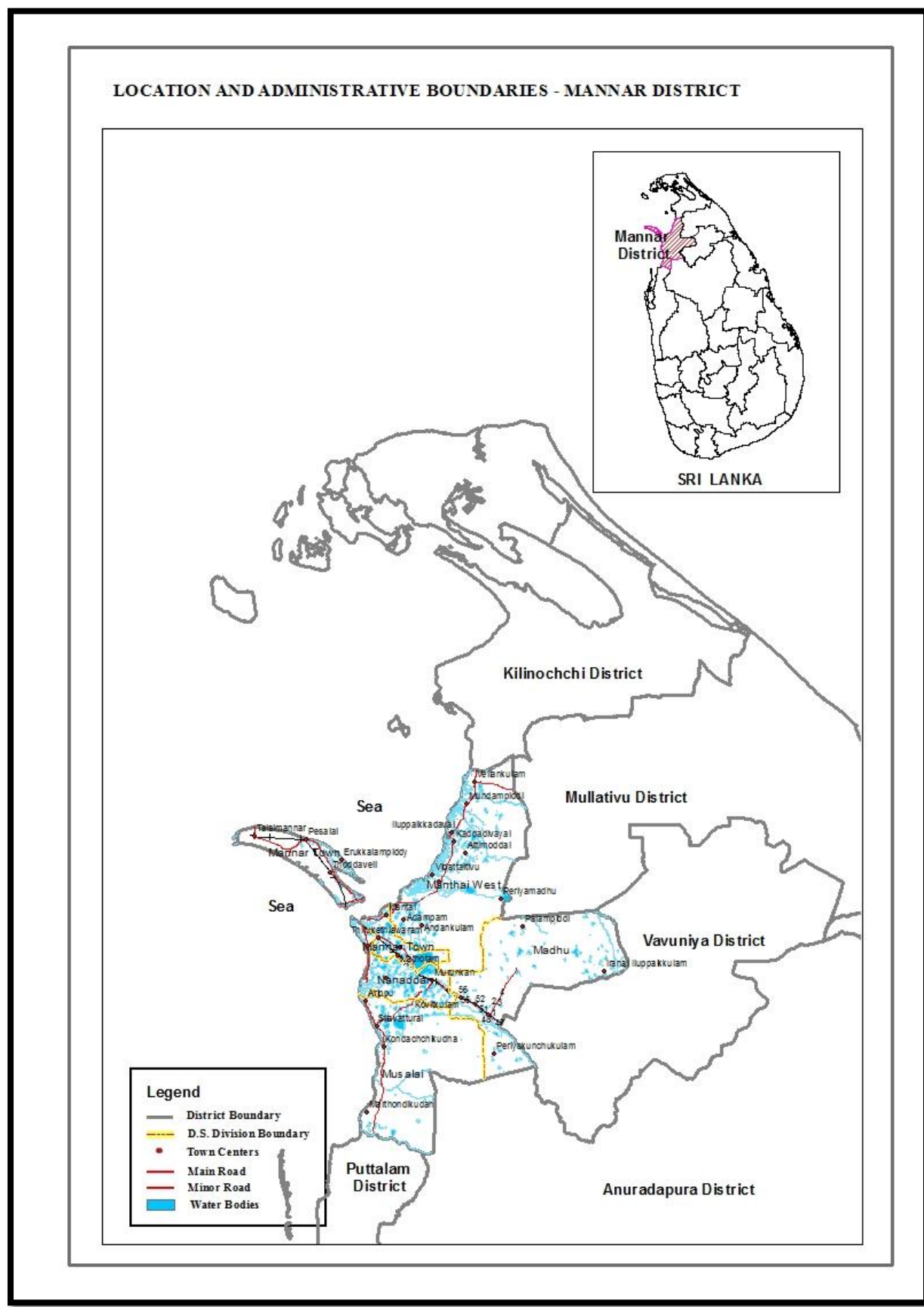
2.2 Administrative Structure

Administratively this district is divided into five Divisional Secretary's Divisions namely MannarTown, Nanattan, Musali, Manthai West, and Madhu and each headed by a Divisional Secretary. There are four Pradeshiya Sabhas and one Urban Council in Mannar District. Predesiya Sabhas are Mannar, Nanattan, Musali, and Manthai West and Mannar Town is upgraded as an Urban Council. The district consists of 153 Grama Niladhai divisions and 587 villages. (Figure 1 & Table 1)

Table 1. Mannar District-Administrative Divisions

	D.S.Division	Number of G.N.Divisions
01	Mannar Town	49
02	Nanattan	31
03	Musali	20
04	Manthai West	36
05	Madhu	17
Total		153

Figure 1. LOCATION AND ADMINISTRATIVE BOUNDARIES-MANNAR DISTRICT



2.3 Physical Environment

2.3.1 Topography

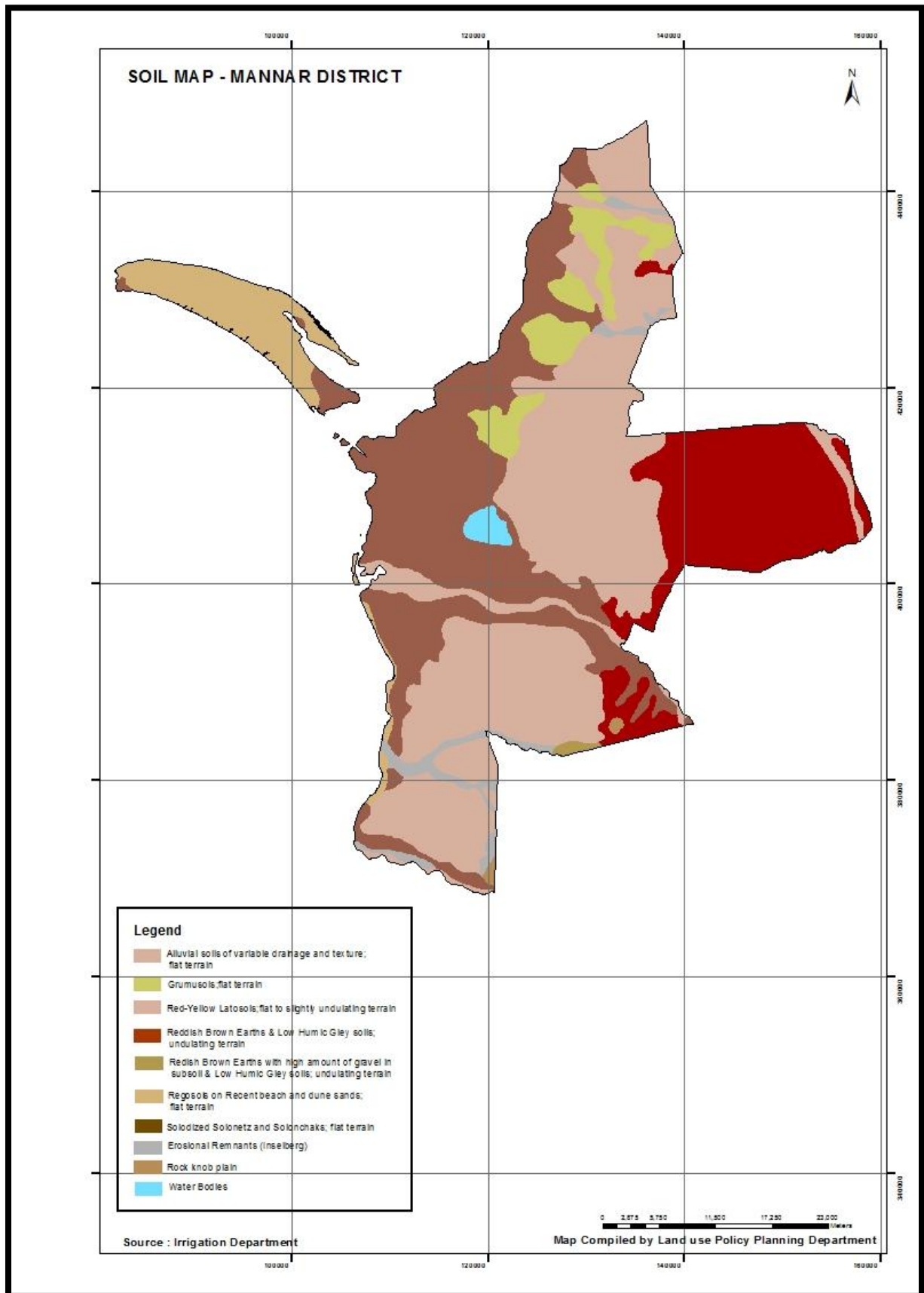
Geographically, majority of the extent of the Mannar District lies on the mainland of Sri Lanka. The land area is relatively flat and is of low elevation. Towards the interior the land is gently undulating favoring the storage of rain water in several small tanks.

2.3.2 Soils

The major soil types and their distribution in the District are shown in the Figure 2. Six major soil groups have been identified in the District. Mannar Island and the area along the coast have Sandy soils (Regosols) while saline and marshy lands are seen in the low line areas. In the center of the district, there is dark clay (Grumusols) which are ideally suited for paddy cultivation. Towards the interior there is the well- drained deep Red Yellow Latosols and Reddish Brown Earths. These are suitable for perennial crops as well as for the seasonal crops. Soil Types and their extents are given below.

Soil Type	Extent (ha)
Alluvial soils of variable drainage and texture; flat terrain	34015.2
Eroded land	28286.9
Grumusols; flat terrain	9748.1
Red-Yellow Latosols; flat to slightly undulating terrain	91373.5
Reddish Brown Earths & Low Humic Gley soils; undulating terrain	1207285.3
Reddish Brown Earths with high amount of gravel in subsoil & Low Humic Gley soils; undulating terrain	9652.9
Regosols on Recent beach and dune sands; flat terrain	13251.9
Rock knob plain	1989.1
Solodized Solonetz and Solonchaks; flat terrain	53512.5

Figure 2. SOIL MAP – MANNAR DISTRICT



2.3.3 Climate

Rainfall

Mannar District lies in the arid zone and the Dry Zone characterized by low rainfall and it is divided into 4 Agro- Ecological Regions namely DL_{1b} (Low Country Dry Zone _{1b}), DL_{1f} (Low Country Dry Zone _{1f}), DL₃ (Low Country Dry Zone ₃) and DL₄ (Low Country Dry Zone ₄). Agro – Ecological Zones and their extents as a percentage of the total extent are given below

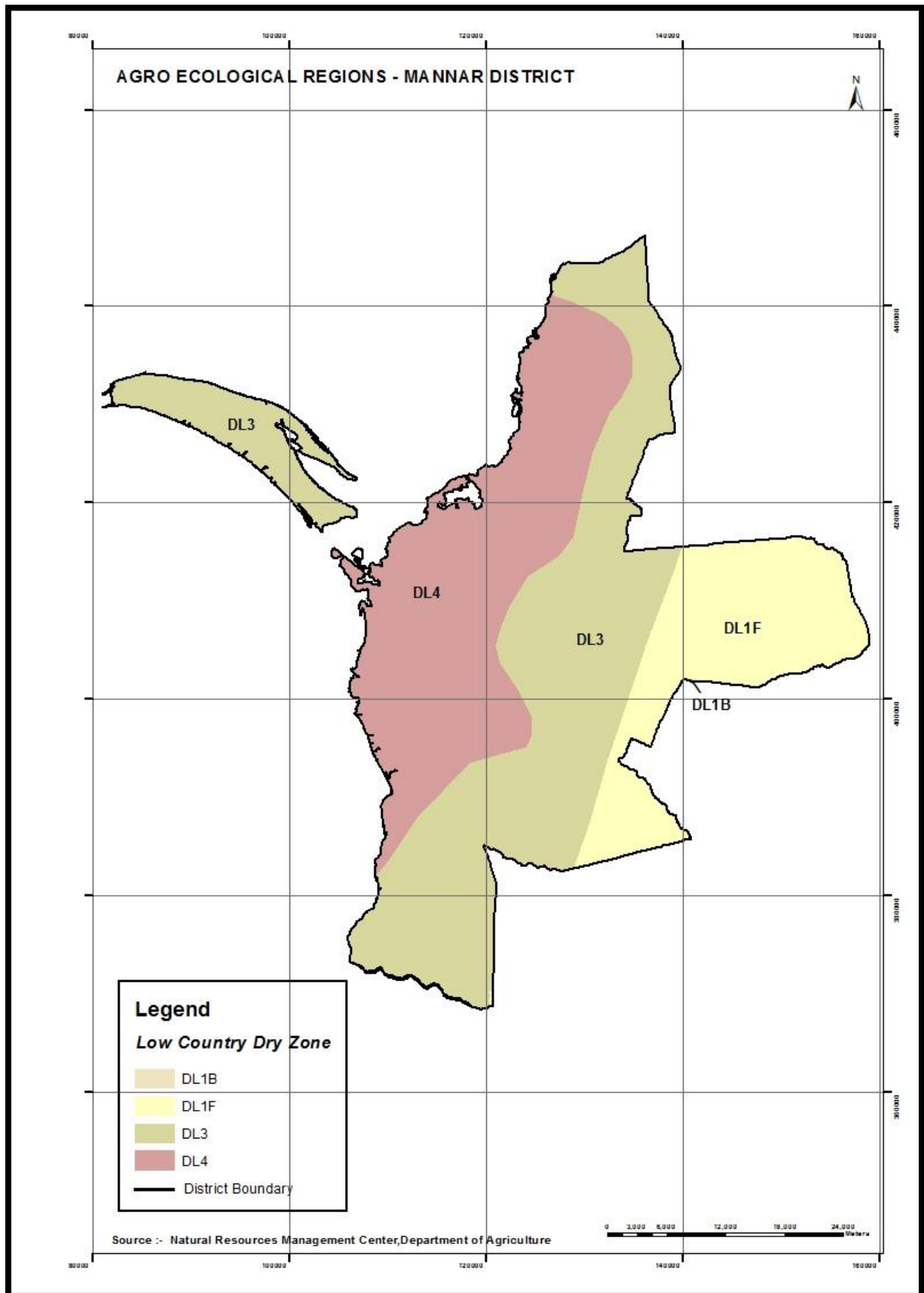
Agro Ecological Zone	As a Percentage of the Total Extent
DL1B.....	0.11
DL1F.....	18.79
DL3.....	47.07
DL4.....	34.01

The average humidity is about 75%, due to the reason that this is a District situated in the Arid Zone. Mannar District receives rainfall mainly by North-East monsoon. In addition to the monsoon, Mannar District receives rainfall from conventional rains during the month of April. The average rainfall is from 74mm to 104 mm.

Temperature

The climate of the District is characterized by high temperature. The temperature ranges from 28°C to 33°C .There is a variation in temperature between day and night times due to the ocean winds, as this District is surrounded by the Indian Ocean.

Figure 3. AGRO-ECOLOGICAL REGIONS-MANNAR DISTRICT



2.3.4 Water

Rivers and streams are the major sources of fresh water and nutrient supply to the shallow coastal basin and the lagoons and estuaries in the Gulf of Mannar area. There are nine major rivers apart from seasonal, minor streams that flow to the coast. The availability of ground water is limited and most of the water requirements are fulfilled by the National Water Supply & Drainage Board and Irrigation Department, with great difficulty. The total area under inland waters is 116 sq.km. Brackish water resources of the district are given below in Table 2.

Table 2. Brackish water resources in Mannar District

Mangroves(ha)	Salt marshes(ha)	Lagoons(ha)	Total Brackish water resources(ha)
1261	5179	3828	10268

There are some aquifer types also available in Mannar District. Table 3. Shows the main aquifer types in the District.

Table 3. Main aquifer types in Mannar District

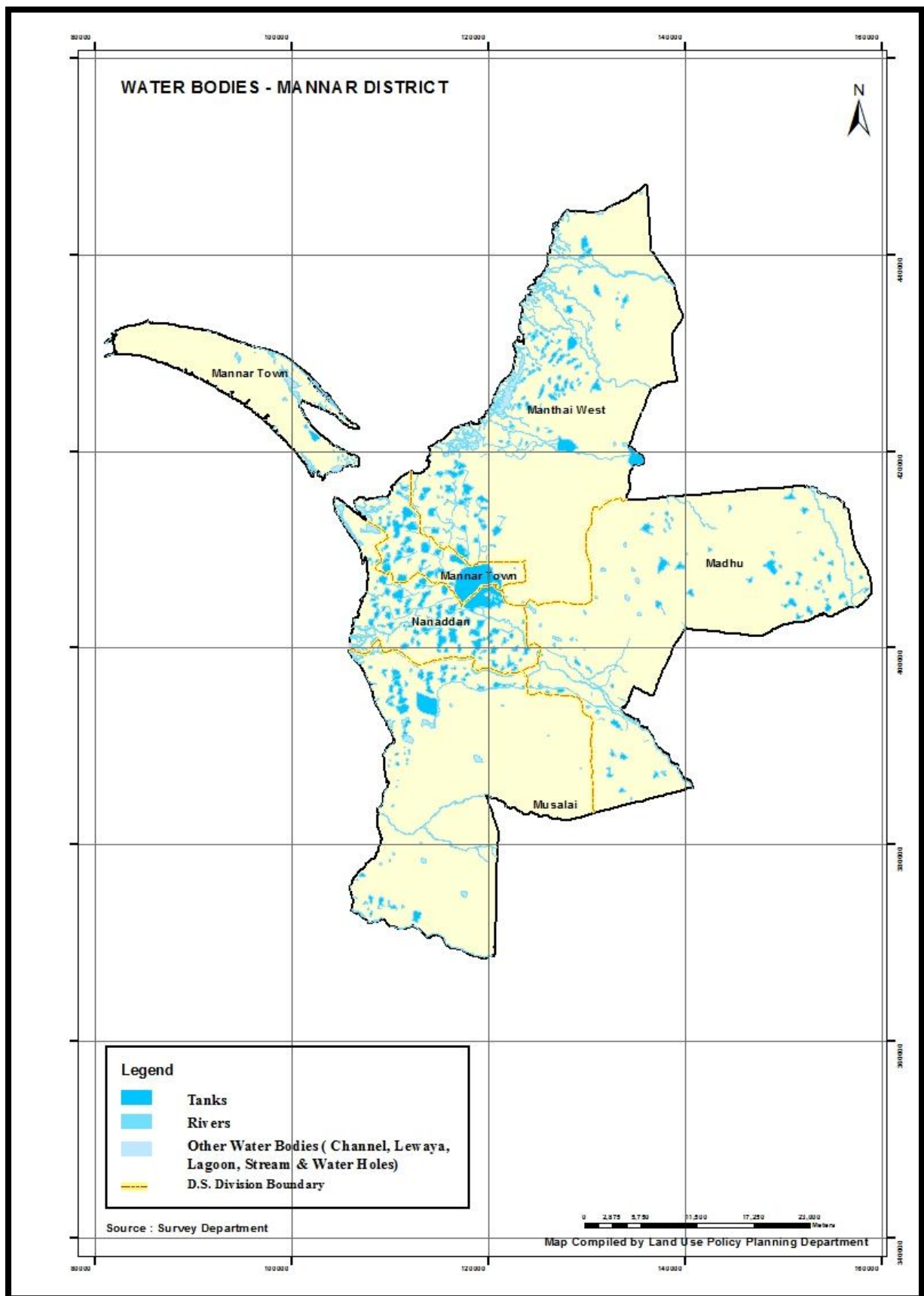
Aquifer type	Location
Deep confined aquifers	Mannar-Coastal Plain
Shallow to moderately deep aquifers on unconsolidated coastal sands	Mannar Island

Source: Water Resources Board

The major man-made water sources are Giant tank which has a capacity of 31,500 acre feet of water and the present extent of paddy land under this tank is 12,000 hectares; Thekkam anicut scheme, which was built across Malwattu Oya at Thekkam village; Viyadikulam, the main reservoir fed by the in-let channel of Moderagama Aru anicut scheme and the Akaththimurippu in-let channel and tank.

The water resources of the District are shown in Figure 4.

Figure 4. WATER BODIES – MANNAR DISTRICT



2.4 Demographic structure

2.4.1 Population

Population of Mannar District was 155,556 in 2013 and the total number of families is 42,169. The main ethnic group is Sri Lankan Tamil.

Population of Mannar District by Divisional Secretariat Divisions before and after resettlements is given below in Table 4.

Table 4. Population of Mannar District by Divisional Secretariat Divisions before and after resettlements

D.S.Division	Re-settled before 2009		Re-settled after 2009		Total	
	Families	Persons	Families	Persons	Families	Persons
Mannar Town	12229	45059	5909	22974	18138	68033
Nanattan	5034	16679	1227	4486	6261	21165
Musali	-	-	7295	2911	7295	29011
Manthai West	-	-	6880	24827	6880	24827
Madhu	785	2640	2810	9880	3595	12520
Total	18048	64378	24121	91178	42169	155156

Source: District Planning Secretariat-Mannar (2013)

According to the population by Divisional Secretariat Divisions, Mannar Town has the highest population and the lowest population is in Madhu. Population Density is given in Figure 5.

Population by ethnicity and religion is given below in Table 5.

Table 5. Population by ethnicity and religion

D.S.Division	Total population	Ethnicity				Religion			
		Sinhalese	Tamil	Muslim	Others	Buddhist	Christian	Hindu	Islam
Mannar Town	68033	58	42819	25157	-	58	32528	10291	25157
Nanattan	21165	197	18015	2947	-	197	14392	3629	2947
Musali	29011	67	4686	24258	-	41	4396	316	24258
Manthai West	24827	04	15218	9605	-	-	7689	7533	9605
Madhu	12520	537	8825	3158	-	527	3856	4978	3158
Total	155156	863	89563	65125	-	823	62861	26747	65125

Source: Census and Statistics Department

According to the ethnicity about 57.7% from the total population of Mannar District are Tamils and about 40.5% are Christians.

Population by Urban, Rural, Sex and Age is given below in Table 6.

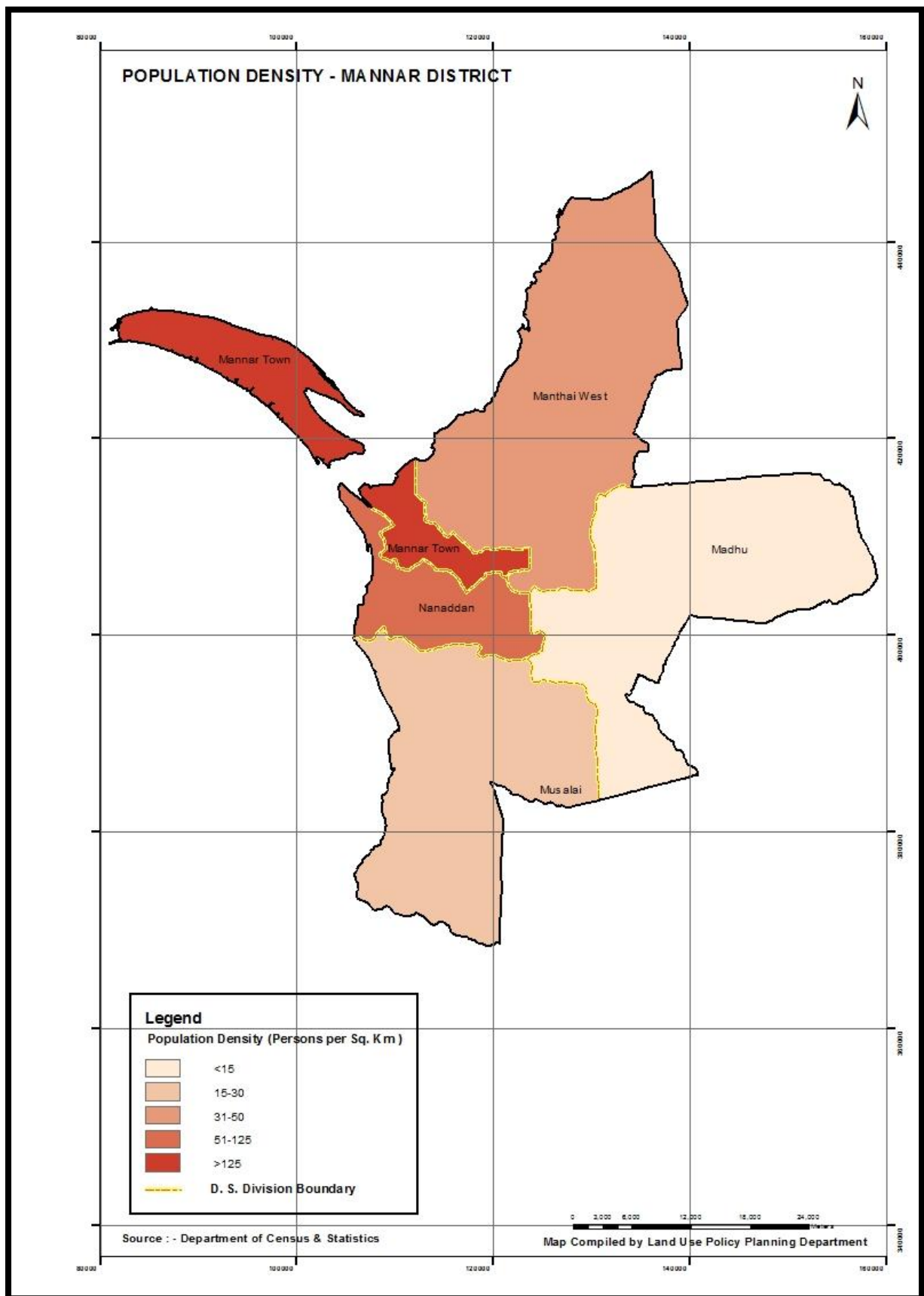
Table 6. Population by Urban, Rural, Sex and Age

D.S.Division	Total population	Urban	Rural	Sex		Age group				
				Male	Female	0-5	6-17	18-44	45-60	Over 60
Mannar Town	68033	25318	42716	32885	35149	7610	15891	26870	12409	5254
Nanattan	21165	-	21165	10420	10745	1600	4930	9045	3397	2193
Musali	29011	-	29011	14639	14372	2013	11613	8302	5676	1407
Manthai West	24827	-	24827	12280	12547	2019	6999	8801	4915	2093
Madhu	12520	-	12520	6238	6281	1481	3474	3754	3067	743
Total	155156	25318	130238	76462	79094	14723	42007	56772	29464	11690

Source: District Secretariat-Mannar (2013)

According to the above data only Mannar town D.S.Division has urban population and the rural population is about 83.9% from the total. Females are about 50.9% from the total population. Population in the 18-44 age groups is the highest and it is about 36.5% from the total population.

Figure 5. POPULATION DENSITY – MANNAR DISTRICT



2.4.2 Labour Force

Labour force comprises of people ages 15 and above who meet the International Labour Organization definition on the economically active population. The economically active population is called as labour force comprises all persons of working age either employed or unemployed during the reference period. The percentage of labour force in Mannar District is about 55.5% from the total population.

2.4.3 Occupational Structure

The labour force of Mannar District is engaged in different sectors, such as agriculture, fishing, and business sectors. More than 75% of labour force is engaged in agriculture and fisheries sectors, which are the major occupations of the District. The agriculture includes the paddy cultivation, commercial crop cultivation and other field crop cultivation and the fisheries sector mainly include sea fishing.

The educated professionals are mostly engaged in government service sector such as education, health, administration, engineering, technical sector, transport, electricity and construction services. There are 2466 teachers engaged in the education service.

In private sector the business and transport services play a major role. A small part of Labour force is engaged in self-employment in the district.

2.5 Infrastructure

2.5.1 Roads and Railways

The roads in the District are classified as A, B, C & D class roads.

Class A- All trunk roads connecting the relevant capital with Provincial and District capitals.

Class B – Main roads connecting important towns and providing important links to the trunk Roads.

Class C – Local roads

Class D – Local roads with 250- 300 km wide surface

There are about 205km of A & B class roads and 278.75km of C & D class roads in the Mannar District. Class A & B roads known as the national highways are designed, constructed and maintained by the Road Development Authority (RDA). The Road Development

Authority of the Northern Province is responsible for all works connected with class C & D roads, In addition there are rural roads maintained by the Predeshiya Sabhas and Agrarian Services Department. Details of the C& D class roads are given below in Table 7 and Figure 6. Shows the Road Network of the District.

Table 7. Details of the C& D class roads-Mannar District

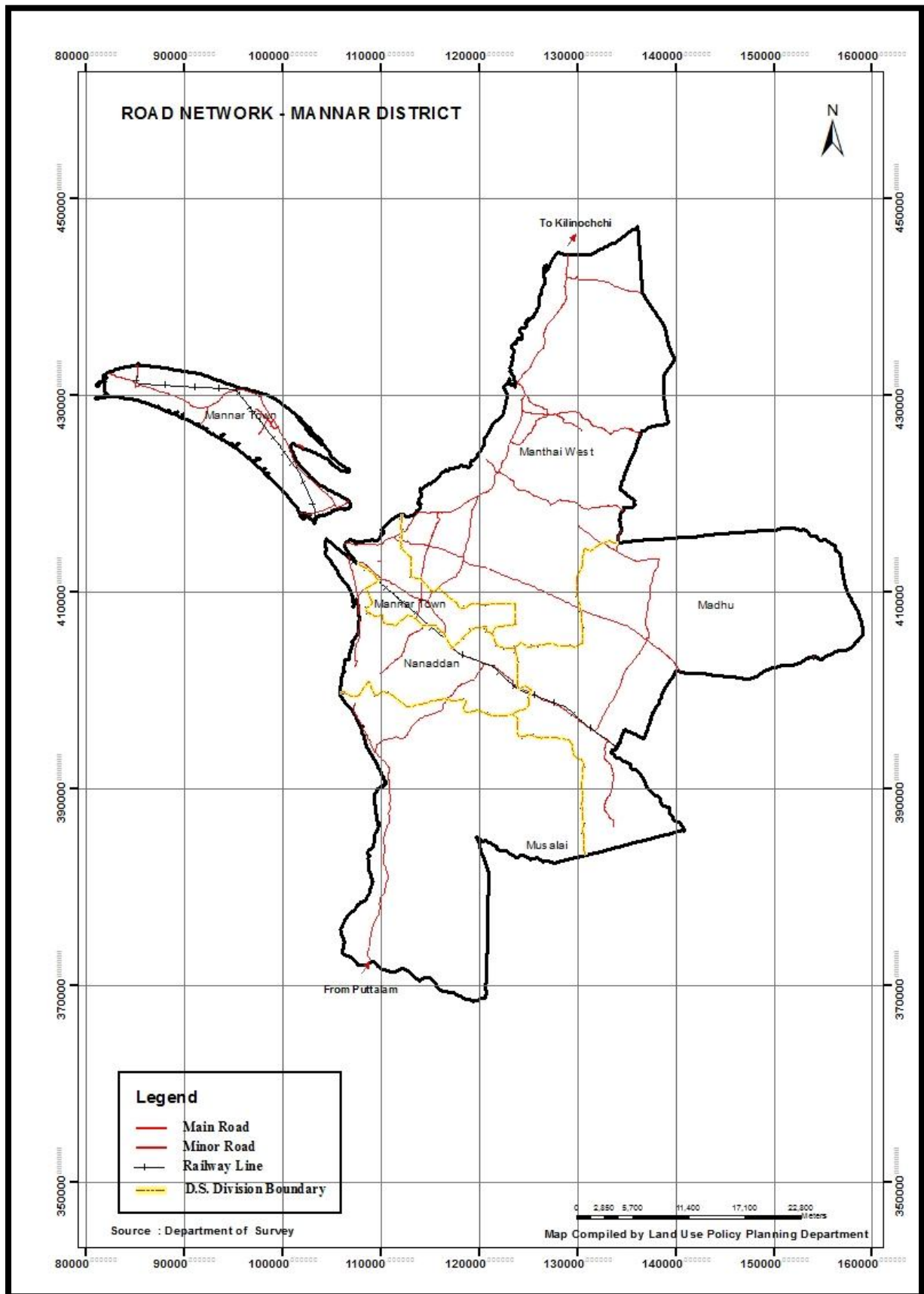
D.S.Division	Class		
	C(km)	D(km)	Total(km)
Mannar Town	95.1	16.2	111.3
Nanattan	20.7	6.0	26.7
Musali	32.9	3.5	36.4
Manthai West	65.2	0.0	65.2
Madhu	95.1	0.0	95.1
Total	309.0	25.7	334.7

Source: District Planning Unit-Mannar

There are about 309km of C class roads and 25.7km of D class roads in the Mannar District. The Northern Region Transport Board (NRTB) is in charge of the buses and passenger transport in the district. This is a profitable institution. The bus service in Mannar is functioning well.

Railway transport service is available from Colombo to Talaimannar now. It serves to transport passengers and cargo to Mannar town and up to Talaimannar. Earlier the railways also served to transport passengers travelling to and from India when boat services were operating from Talaimannar to Rameswaram. After the conflict began, the train services were suspended and later discontinued. At present all tracks were rehabilitated and rebuilt and train service was started.

Figure 6. ROAD NETWORK – MANNAR DISTRICT



2.5.2 Communication facilities

Sri Lanka Telecom Private Limited (SLT) is providing all telecommunication facilities including connections with ADSL & PEO TV facilities to many areas. Additionally facilitate the communication between the land and the fishing vessels, messaging and information dissemination about the climate and provide recommendations to issue communication license are done by the Department of Fisheries. Rescuing the fishermen who are falling to in the distress conditions at sea are one of the main communication facilities provided by this department.

The Postal Department provides the postal services including telemail and courier services in the District. Also, some private companies are engaged in telecommunication and courier services.

2.6 Land Use and Land Cover

Mannar district is divided into an Island and Mainland. The total land area of Mannar district is 202156ha, and nearly 88% of the total land area is in the Mainland. Land use is depending mainly on the soil types and agro –ecological zones. Summary of Land Use Data is given below in Table 8.

Table 8. Land Use-Mannar District

Land Use Type	Extent(ha)
Built up land	483.4
Non-agricultural lands	490.1
Homesteads	11076.9
Coconut	1465.3
Cashew	3328.3
Palmyra	5743.8
Paddy	31060.2
Field Crops	2828.1
Forest	98291.5
Forest Plantations	180.5
Scrub	13531.8
Marsh	3937.4
Mangroves	2050.6
Grass lands	4809.1
Water bodies	13567.9
Other	9311.4
Total	202156.3

Source: District Land Use Planning Office, Mannar

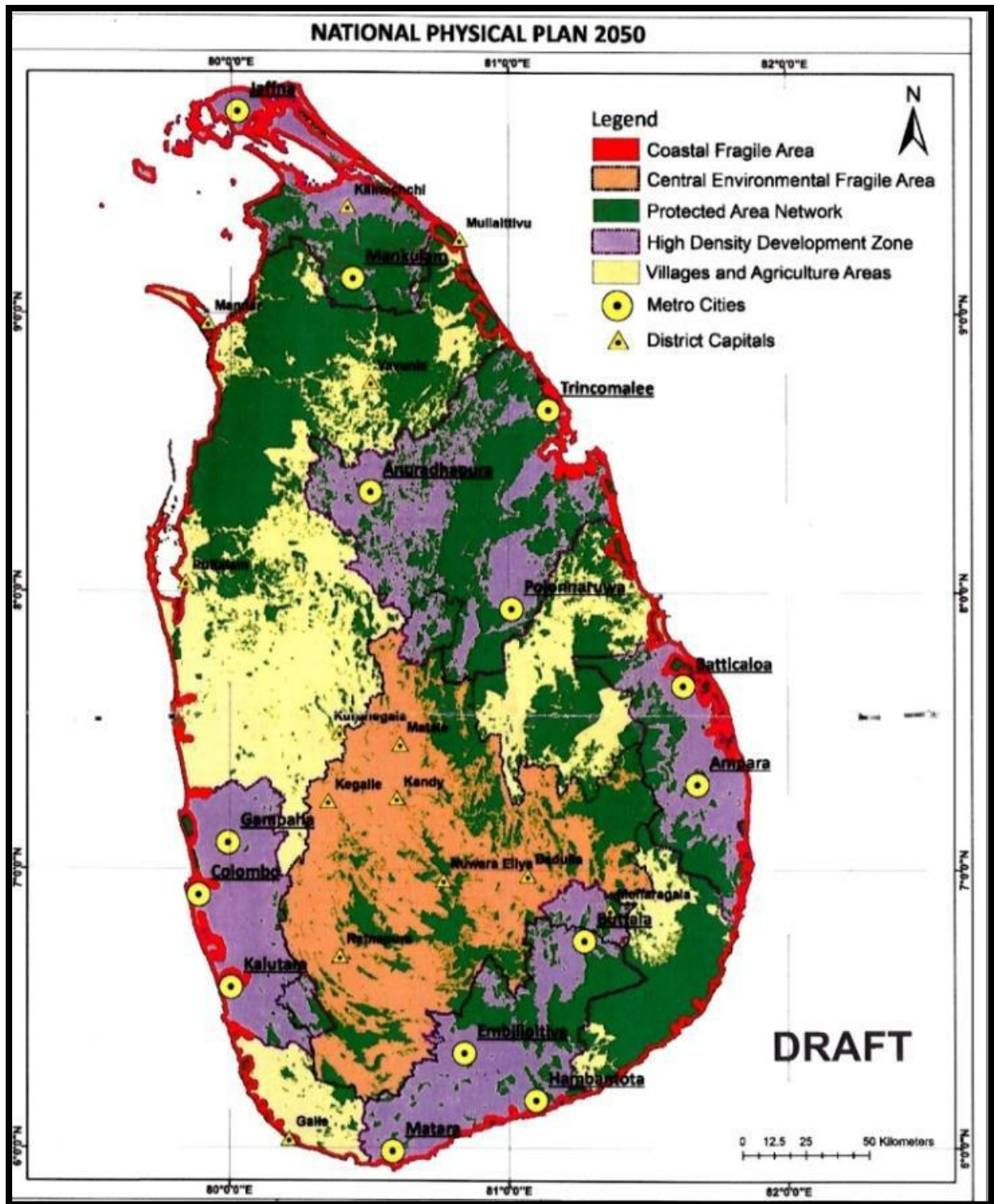
Forest (48.6%), paddy (15.3%), water bodies (6.7%), scrublands (6.6%) and homesteads (5.4%) are the major land use types in Mannar District. Non-Agricultural lands include aquaculture and gravel extraction areas. Palmyra, cashew and coconut are the major plantation crops. Waterbodies include major tanks, minor tanks, rivers, streams, lagoons and natural ponds.

2.7 Existing Spatial Plans

2.7.1 National Level Plans

The National Physical Plan prepared by the National Physical Planning Department (NPPD) provides a broad frame work for the national development of the country. It is also the strategic document that outlines the vision of Sri Lanka in 2050. Its role is to promote and regulate the integrated planning of economic, social, physical and environmental aspects of land and territorial waters of Sri Lanka. The main objectives of the National Physical Planning Policy and the Plan are to achieve economic development through the use of available resources of the country including agriculture, realizing a higher living standard for the people and the establishment of an independence economic status internationally⁴.

Major themes of the revised draft National Physical Plan – 2050 (shown below) are; (1) Fragile areas, (2) Protected Areas, (3) High density development zones, (4) Metro cities and (5) Village and service center networks (NPPD, 2015). Since it is a National Plan it does not adequately address the land use issues at the grass root levels.



Source: Anon, 2015- National Physical Plan as the Framework for City of Tomorrow-World Cities Day 2015, Consultative Forum, NPPD, Ministry of Mega polis and Western Development

2.7.2 Regional and Sub Regional Level Plans

Under the Government's Regional and Sub Regional Level development plans, there are programs on providing all infrastructure and livelihood facilities to Mannar District. Under Departmental Work funded by the Provincial Specific Development Grant (PSDG) road development works are carried out. Ministry of Economic Development has completed some primary schools development programs, projects on minor irrigation, medium irrigation, land development, water supply and sanitation, roads and strengthening of the District administration. The Mannar District Chamber of Commerce Industrial and Agriculture (MDCCIA) is conducting technical skill development programs such as business idea generation to develop young entrepreneurs and to provide training on Palmyra handicraft training with the objective of providing employment. Under the Consolidated District Annual Implementation Program (CDAIP) is implementing some regional plans.

2.7.3 Need for a Land Use Plan

Although there are some National, Regional and Sub Regional Level Plans, they are mainly focused on infrastructure development, metro city regions, industrial export zones, energy development projects, tourism, agriculture and fisheries sector developments etc.

But, according to the District profile of Mannar District, there are many issues pertaining to land use and there is a need for a scientific guidance to the district administration in land conservation and alienation in order to;

- ensure the protection of environment and bio-diversity;
- recommend uses for unused lands on the basis of land evaluation which may be utilized for future development activities;
- present proposals for enhancing the productivity of home gardens, paddy lands and other agricultural lands(Plantation crops and Field crops);
- present proposals for currently abandoned areas that could be utilized for their earlier use(Abandoned settlements, Abandoned paddy lands and abandoned other agricultural lands)

PART II-LAND USE PLAN

3. PLANNING APPROACH

Approaches to spatial planning vary considerably throughout the world, reflecting historical and cultural developments as well as geographical and economic conditions. There are four major approaches can be identified¹. They are;

a) Regional economic planning approach

In this approach spatial planning is used as a policy tool to pursue wide social and economic objectives, especially in relation to disparities in wealth, employment and social conditions among different regions of the country.

b) Comprehensive integrated approach

A comprehensive integrated approach, where spatial planning is conducted through a systematic and formal hierarchy of plans. In this approach plans at lower levels will not contradict with the planning decisions at higher levels.

c) Land use management approach

In this approach, planning is a more technical discipline in relation to the control of land use. The recommendations or regulations will ensure the sustainable development.

d) Urbanism approach

In this approach key focus is on architectural and urban design through rigid zoning and land use codes and a wide range of laws and regulations.

In the preparation of District Land Use Plan, basically land use management approach was adopted using the guidelines developed for land use planning by Food and Agricultural Organization (FAO).

FAO has stated that Land use planning is the systematic assessment of land and water potential, alternatives for land use and economic and social conditions in order to select and adopt the best land-use options. Its purpose is to select and put into practice those land uses that will best meet the needs of the people while safeguarding resources for the future. The driving force in planning is the need for change, the need for improved management or the need for a quite different pattern of land use dictated changing circumstances.

FAO has indicated that several steps have to be followed in preparing a land use plan. The steps that are followed for the preparation of the plan are given below;

3.1 Study the present situation

Since the existing land use maps for the district were outdated they did not provide the basis to identify the current land use issues in the district. The land use updating process was commenced in 2013 and completed in 2015. Identification of land use issues was done simultaneously. Digital layers of 1:10,000 scale maps were used as base maps which were provided by the Survey Department. Since the existing land use legend was inadequate for the preparation updated land use map a new land use legend was prepared for the updating. The classification of the present land use is given in the Table 9.

There are 82 map sheets (1:10,000 scale) available to cover the entire District (Figure 7.). The land use maps were initially updated using recent satellite images. These maps were subjected to field verification.

3.2 Identification of land use issues

Field investigations revealed that the land uses could be divided into two broad categories i.e. (i) areas where changes are not required and existing land uses can be continued, (ii) areas where the land use changes or land use improvements are desirable. Plan mainly focuses on the second category. Areas where the land use changes or improvements are desirable because there are several land use issues pertaining to major land uses. These land use issues were identified and mapped by visual observations and by consulting land users. Land use issues are briefed in the section 5.2. The issues provide the basis for the preparation of the land use plan.

3.3 Formulation and Validation of recommendations to address the issues

Initially the recommendations were formulated by the LUPPD Staff by considering physical, technical and socio-economic factors to address the land use issues. The desirable land use changes or improvements that were identified were discussed with the divisional level stakeholders, District Level Expert Group (DEG) and the National Level Expert Group (NEG) (The composition of these expert groups is given in the annex III & IV). The recommendations for land use changes or improvements validated by the above groups.

3.4 Preparation of the land use plan

The land use plan was prepared based on the information and data gathered from the field and considering the views, comments and recommendations made by the divisional level stakeholders, DEG and NEG.

4. LAND USE/LAND COVER OF THE DISTRICT

4.1 Introduction

Details of the present land use and land cover of the district are briefed in this section. In addition past situation of some of the major land use categories are given for more information. Present land use map were used to identify the land use issues and used as a base for the land use plan.

4.2 Land Use/Land Cover

Land use of the district (2015) is shown in the Figure 7 and approximate extents of different land use categories are given in the Table 9. Approximately 48% of the total land area is covered by forest. Second dominant land use is paddy that covers about 15%.

Table 9. Land Use-2015

Main Land Use category	Sub category I	Sub category II	Extent (ha)	As of the Total Land Area
Built -up Lands	Urban Residential areas		6.3	0.01
	Industrial areas		140.9	0.06
	Recreational areas		81.9	0.04
	Institutional areas		2.8	0.01
	Service areas		248.4	0.12
	Play grounds		3.1	0.01
Non-agricultural Lands	Aquaculture areas		66.5	0.03
	Gravel Extraction areas		423.6	0.21
Homesteads/Home gardens	Homesteads		6905.7	3.42
	Home gardens		4171.2	2.06
Agricultural Lands	Perennial Crops	Coconut	1465.3	0.72
		Cashew	3328.3	1.65
		Palmyra	5743.8	2.84
	Seasonal crops	Paddy	31060.2	15.36
		Field Crops	2828.1	1.40
Forest Lands	Forest		98291.5	48.62
	Forest Plantations		180.5	0.09
	Scrub		13531.8	6.69

Wet Lands	Marsh		3937.4	1.95
	Mangroves		2050.6	1.01
Grass Lands			4809.1	2.38
Water bodies	Tanks	Major Tanks	2588.7	1.28
		Minor Tanks	8313.7	4.11
	Rivers and Streams		1288.4	0.64
	Lagoons		648.6	0.32
	Natural Ponds		728.5	0.36
	Other Lands	Unproductive lands		1646.9
Sandy areas			1528.5	0.76
Sand dunes			89.5	0.04
Sandy beaches			2.8	0.01
Vacant Lands			743.7	0.37
Water logged areas			391.9	0.19
Other Lands			4908.1	2.43
Total(ha)			202156.3	100.00

Source: Updated Land Use Map

Nearly 50% from the total land area of the District is covered by Natural Forest. In Madhu 40%, Musali 33% and Manthai West 25% of the total land area is covered by Natural Forest. In Mannar District, there are two types of Forests; Tropical Dry – Mixed Evergreen Forest and Tropical Thorn Forest.

Paddy as second major category of land use in the District, there are paddy lands in all 05 D.S.Divisions and in Madhu Division 58.9% of the total land area is under paddy cultivation.

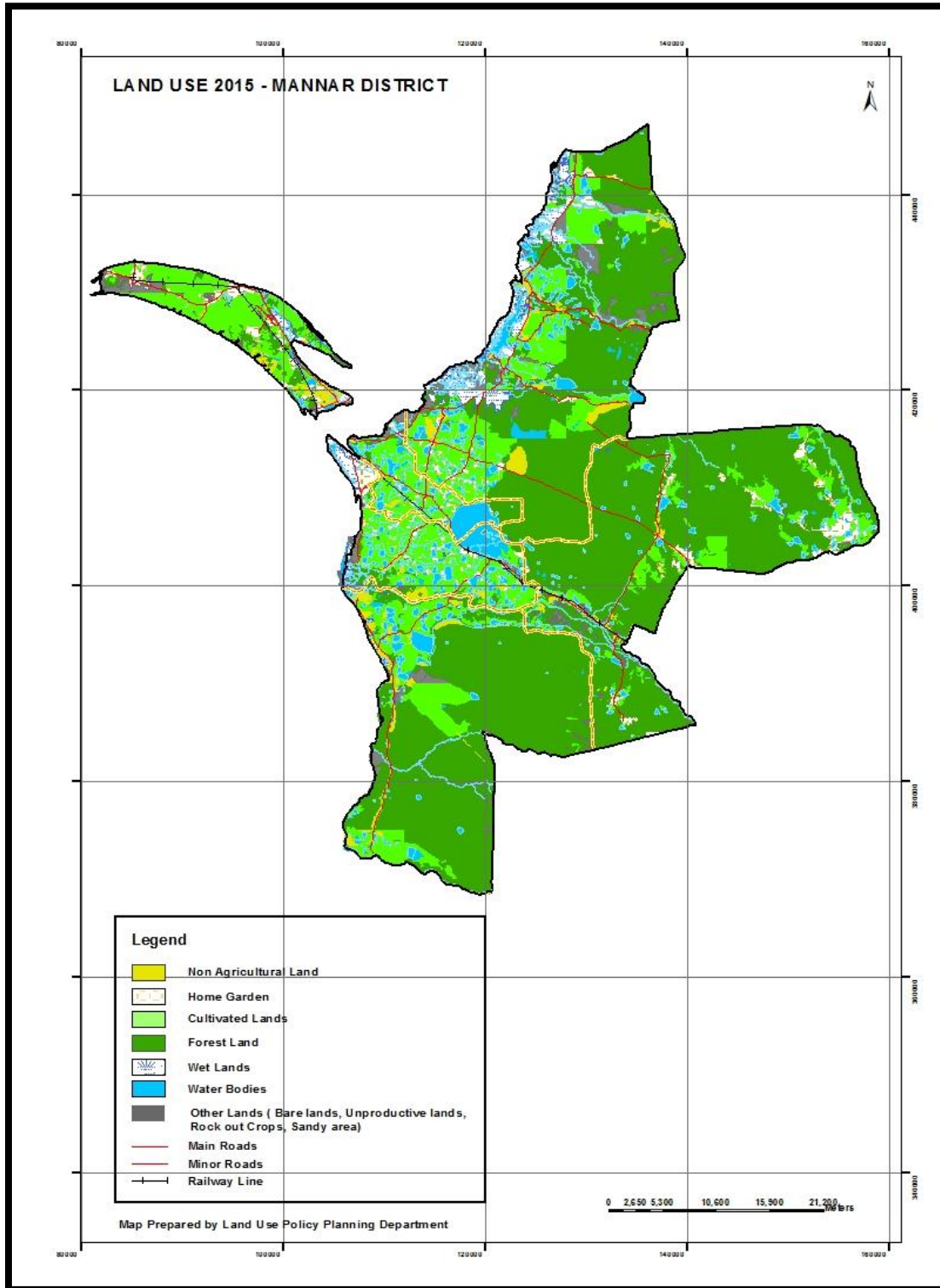
Third major land use category is scrub land and it is nearly 7% from the total land area of the District. Except Nanattan D.S.Division, there are scrub lands in the other 04 D.S.Divisions.

Home garden means an area having a house with a garden. The size of the garden is varying. In the garden there are various types of crops including perennials. In most of the cases perennials are dominant. Sometimes animal husbandry is also integrated; depend on the size of the garden. In the Manthai West Divisional Secretariat Division, vast area is covered by home gardens. Homestead means a House with a limited land area including housing complexes (flats). The land area varies but it is not sufficient for gardening.

Other significant Land Use of the District is Plantation Crops, especially in Mannar district Coconut; Palmyra and Cashew are the major Plantation Crops.

In Mannar District Grass Land is an important land cover for the livestock production, and most of the Grass Lands are found in Manthai West, Musali, Mannar Town and Nanattan Divisions and it is nearly 2.38% from the total land area of the District.

Figure 7. LAND USE 2015 – MANNAR DISTRICT



5. PROPOSED LAND USE PLAN

5.1 Introduction

Proposed land use plan has two broad categories i.e. (i) areas where changes are not required and existing land uses can be continued because of these areas do not have major land use issues, (ii) areas where the changes or improvements are desirable. The proposed land use plan indicates the changes or improvements that are desirable. The major categories of the proposed plan are given below;

Areas where the present use can be continued

- Presently protected/conserved areas
- Other areas where there are no major land use issues (Home gardens, Agricultural Areas, Built-up areas etc.)

Areas where changes or improvements are required

Additional areas recommended for protection

Unutilized lands (Proposed areas for future development)

- Suitable lands for housing
- Suitable lands for agriculture
- Suitable lands for expansion of service areas
- Suitable lands for tourism

Abandoned Paddy Lands

- Proposed for re-cultivation of paddy/appropriate uses

Abandoned settlements

- Proposed for resettlements

Underutilized Lands (where land use improvements are needed)

- Home garden
- Paddy
- Field crops
- Plantation crops

All abandoned lands shown in the proposed plan cannot be changed to previous use due to several reasons associated with these lands. These reasons may either be economic or social or environmental. However, some of the abandoned lands can be used to establish the previous use. The possible recommendations for the abandoned lands are given in Table.

5.2 Major Land Use Issues

Number of land use issues mainly related to the protection of the environment and land productivity can be identified in the district.

Six major land use issues were identified. These issues are given below;

a) Presence of “additional areas that need to be protected”

Some areas in the district are protected by gazette notifications. The protected area network includes Forest, Wild life reserves and corridors, other state forest lands, Grass Lands, Archeologically and Historically significant places, Areas of natural beauty and natural features of exceptional value; Water bodies/Wet lands, Coastal Natural Habitats and Urban Forests/Urban Parks. However, there are areas or sites that are not presently protected in the district. They have to be protected in order to conserve the bio-diversity, environment and ensure the protection of the religious, cultural and archeological sites.

Therefore, presence of additional areas that needs to be protected is considered as one of the land use issues.

b) Presence of low productivity agricultural lands

Low productivity agricultural lands (underutilized lands) include areas given over to highland crops (plantation crops (Palmyra, cashew and coconut) and field crops) and paddy.

Underutilized lands devoted to plantation crops include

- (1) Crop lands where the proportion of land used is 70% or less,
- (2) Crop lands where intercropping is not practiced,
- (3) Crop lands where animal husbandry is not practiced though this is possible and
- (4) Crop lands where yield is below the average yield recommended by the research institutions and other relevant agencies.

Underutilized lands devoted to field crops include

- (1) Crop land where the proportion of land used is 70% or less and
- (2) Crop land where yield is below the average yield recommended by the research institutions and other relevant agencies.



Photograph 1. Low productive paddy lands in the District.

Low productivity paddy lands are categorized as

- (1) Lands where the yield per hectare is below the average of the district,
- (2) Lands that are cultivated only during one season.

c) Presence of low productivity home gardens

A home garden is the cultivated area surrounding the dwelling. The size of the home garden could vary from area to area and production is often for domestic consumption. The low productivity home gardens (underutilized) were identified using two criteria.

- (1) Home gardens where the proportion of land being used was 50% or less and
- (2) Home gardens where the Animal Husbandry is not practiced though this is possible.

d) Presence of abandoned settlements

There are settlements that were abandoned due to conflicts. These areas were identified and mapped.



Photograph 2. Abandoned settlement

e) Presence of abandoned agricultural areas.

These lands were classified according to the previous use. This category includes both paddy and high land crops. However, in the district under the abandoned agricultural lands category only paddy lands were identified. These lands were abandoned mainly due to sea water intrusion.

f) Presence of unutilized lands

These lands are idle state lands coming under the jurisdiction of different institutions.e.g, Forest Department and other government institutions. However, utilizing these lands for future development activities depends on the decision taken by the respective managing agencies to release these lands.



Photograph 3. Unutilized lands

Table 10 and Figure 8 show the Major Land Use Issues in Mannar District.

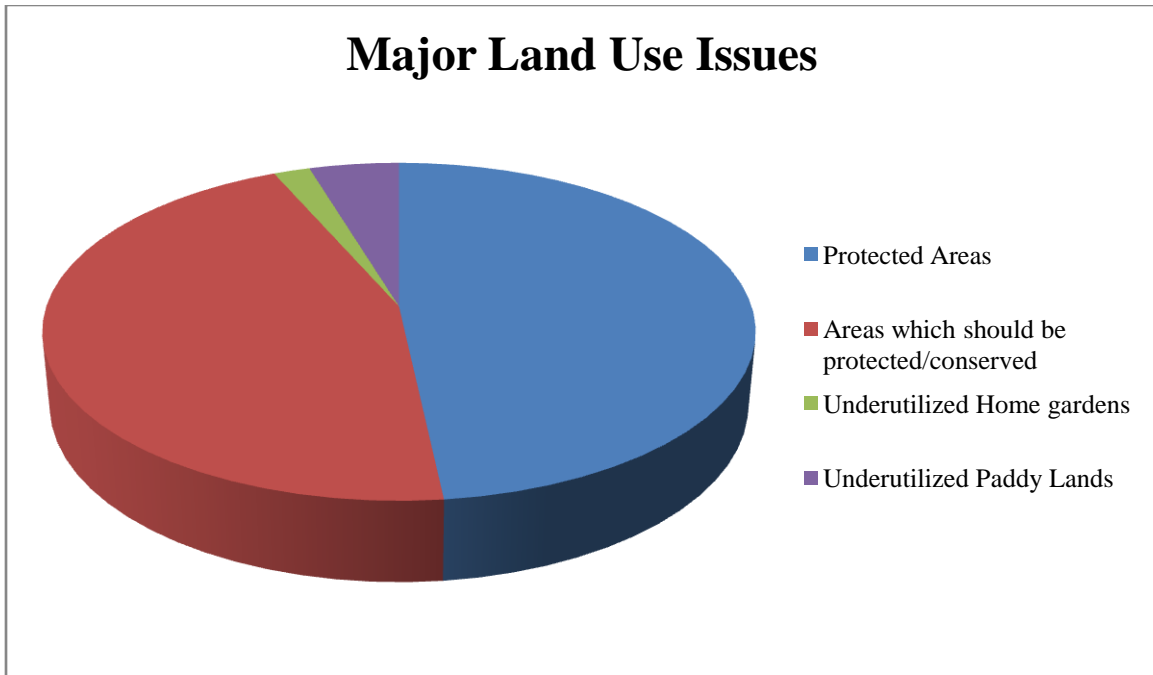
Table 10 Major Land Use Issues

Category		Land Extent (ha)	Percentage
Areas with issues	Protected Areas	77420.3	38.4
	Areas which should be protected/conserved	72391.7	35.9
	Underutilized Home gardens	3049.0	1.6
	Underutilized Paddy Lands	7537.3	3.4
	Underutilized Field Crop Lands	1262.0	0.7
	Underutilized Plantation Crop Lands	4787.2	2.4
	Abandoned Paddy Lands	2967.2	1.4
	Abandoned Settlements	604.2	0.3
	Unutilized Lands	12459.6	6.1
Areas without any major issues	Areas Currently Utilized but with no major Land Use Issues at present	19677.8	9.8
Total		202156.3	100.0

Source: District Land Use Planning Office-Mannar

Protected areas (38.4%), Areas which should be protected/conserved (35.9%), unutilized lands (6.1%) and underutilized Paddy lands (3.4%) are the major land use issues in Mannar District. Only 9.8% from the total land area is currently utilized but with no major Land Use issues at present.

Figure 8 Major Land Use Issues



The details of the above issues are presented with the recommendations in the section below

5.3 Recommendations

Basically there are two areas were identified and presented in the plan (see Figure 18). They are;

1. Areas where the present use can be continued
2. Areas where changes or improvements are required

1. Areas where the present use can be continued

These lands include presently protected areas, productive home gardens, productive cultivated lands, and built-up areas etc. where land use changes or improvements are not required. Existing land use of these lands can be continued without major changes or improvements.

(a) Protected Areas

Basically two categories of protected areas were identified on the field. They are

- (1) Presently protected areas,
- (2) Additional areas recommended for protection.

Presently protected areas are gazetted and managed by several agencies and the issues in these areas should be addressed by a “protected area management plan” prepared by the respective agencies. The distribution of the presently protected areas is shown in Fig. 9. Approximate extents of the presently protected areas are given in the Table 11. More information (managing agencies, present issues in the areas and recommendations) regarding the presently protected areas is given in the Table 1 in the Annex V.

Additional areas recommended for protection comes under second category where changes or improvements are required.

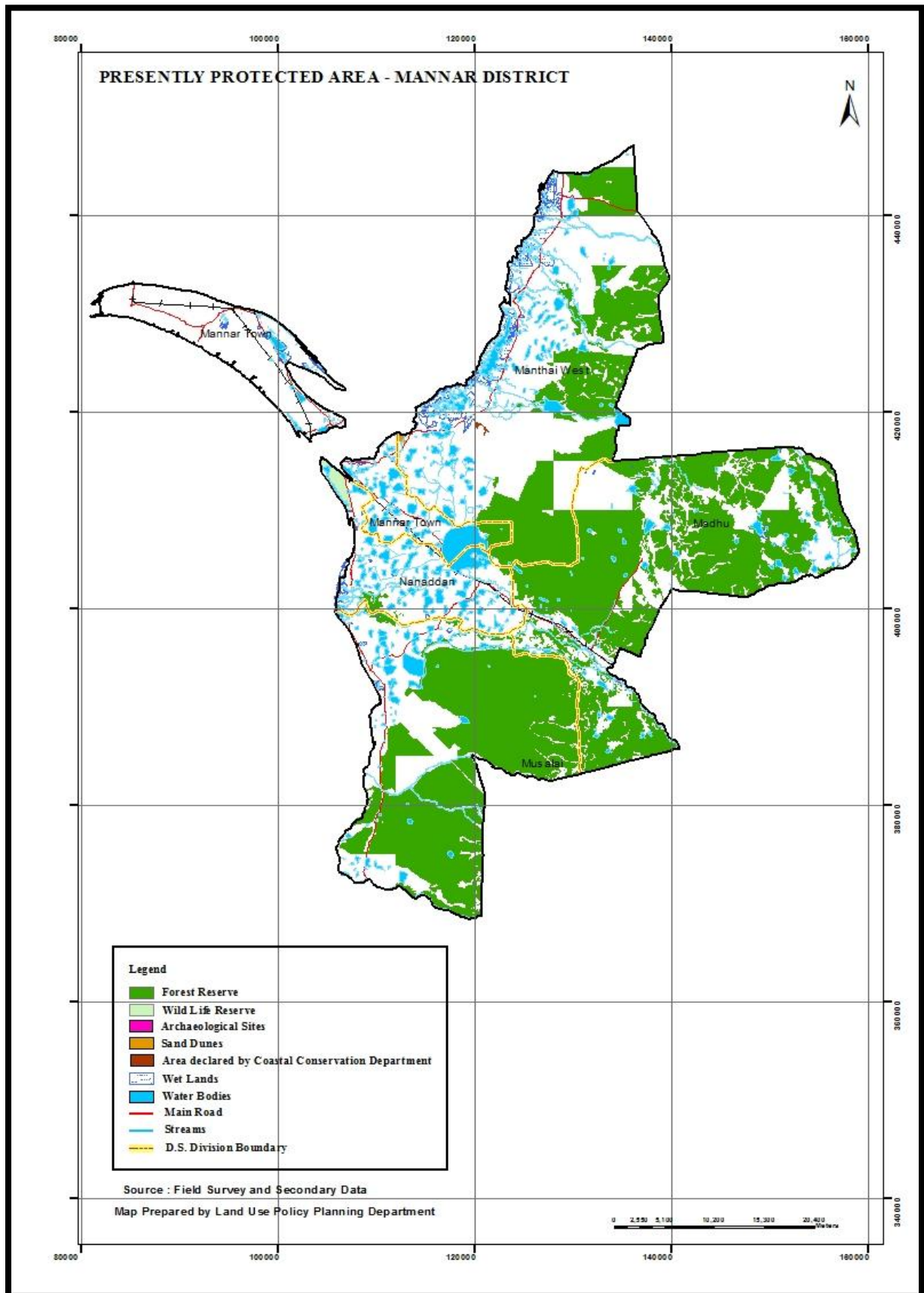
(b) Other areas/uses located outside of the protected areas that can be continued

There are some other areas located outside the protected area network where the uses of those areas can also be continued without any changes or improvements. Because minimum land use issues are available in these areas. These uses include productive home gardens, productive agricultural lands, service areas etc... The percentage of the extent of these areas is 33.4% (excluding the presently protected area) of the total land area of the district. Rest of the areas needs some changes or improvements.

Table 11. Approximate extents of the presently protected areas in the District.

D.S.Division	Approximate Extents(ha)				
	Wild Life Reserves	Archaeological Reserves	Wet lands	Coastal Reserves	Forest Reserves
Mannar Town	13.2	9.3	4.0	819.0	-
Nanattan	4839.0	-	-	-	-
Musali	-	2.6	88.2	329.0	32947.0
Manthai West	-	4.1	3495.0	439.0	24807.0
Madhu	26673.0	12.2	4.1	-	40031.0
Total(ha)	31525.20	28.20	3591.30	1587.00	97785.00

Figure 9. PRESENTLY PROTECTED AREAS – MANNAR DISTRICT



2. Areas where changes or improvements are required

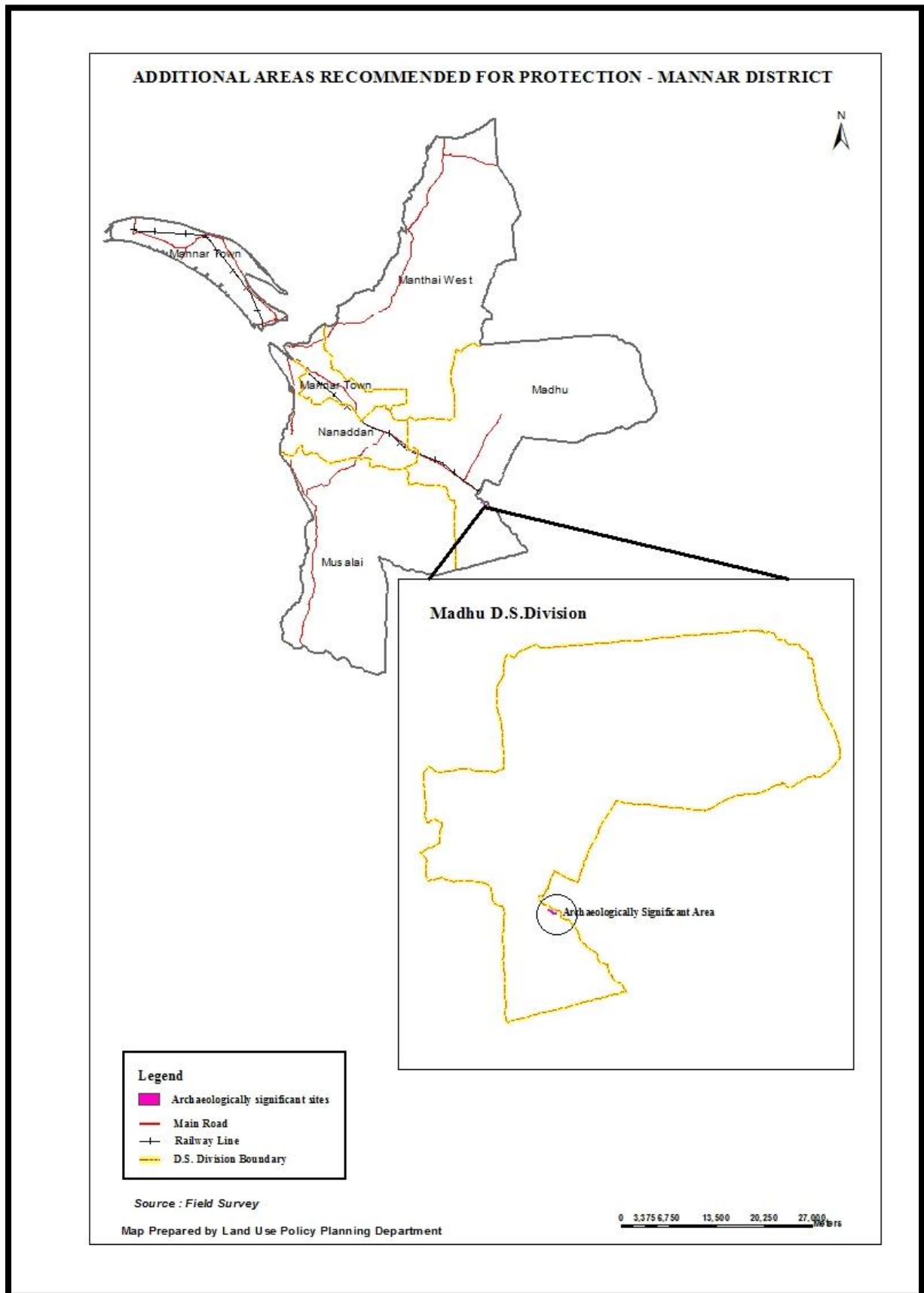
(a) Additional areas recommended for protection

There are other areas besides the currently protected areas that need to be protected. These areas have to be protected to ensure the protection of religious, cultural, archeological sites and the protection of environment. The relevant institutions need to confirm the recommendations given in this plan. The approximate extents of the additional areas that need to be protected are given in the Table 12 and their locations are given in the Figure 10. Details are given in the Table 2 in the Annex V.

Table 12. Additional areas recommended for protection and their approximate extents in the District.

D.S.Division	Approximate Extents(ha)		
	Areas of Archaeological and Historical value	Areas of Beauty (Sand dunes & Wet Lands)	Areas of Natural and Recreational value
Mannar Town	0.4	-	-
Nanattan	0.5	-	-
Musali	0.6	328.9	-
Manthai West	-	3495.3	-
Madhu	-	-	2.1
Total(ha)	1.5	3824.2	2.1

Figure 10. ADDITIONAL AREAS RECOMMENDED FOR PROTECTION– MANNAR DISTRICT



(b) Underutilized Home gardens

The home gardens in the District include

- (1) Properly utilized home gardens where no major changes are required and
- (2) Underutilized home gardens where improvements are recommended.

There are several reasons why these home gardens are underutilized. The major reasons were;

- a) Lack of capital
- b) Inadequate Technical know-how
- c) Presence of degraded lands/areas (poor soil quality)
- D) Unreliable rainfall.
- e) Damage to crops from wild animals

In general, majority of the home gardens are underutilized due to one or more of the above reasons. The recommendations for the above issues are given below.

Table 13. Major reasons for underutilization of home gardens and proposed recommendations.

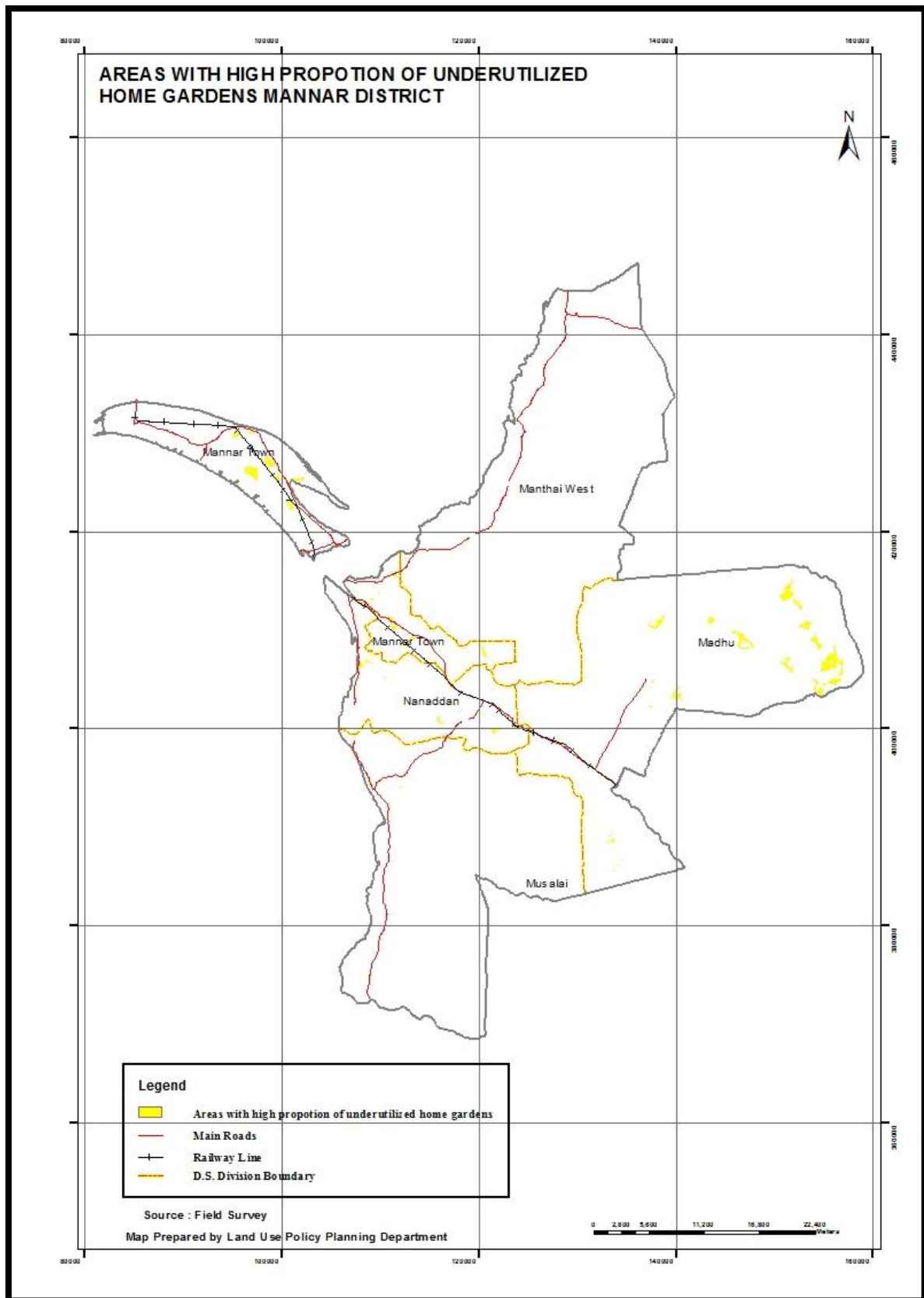
Major Reasons for underutilization	Recommendations
Lack of capital	-Awareness creation on agricultural loans or subsidy schemes
Inadequate Technical know-how	-Awareness creation and training
Presence of degraded lands/areas (poor soil quality)	-Introduction of conservation farming practices and provide necessary inputs
Unreliable rainfall.	-Carry out a study to explore the possibility of using ground water by constructing agro-wells. - Introduction of soil and water conservation technique. - Introduction of drought tolerant crops.
Damage to crops from wild animals	-Establish a new electric fence or extending the present fence

The extents of the home gardens are varying from one area to other. The areas where the high proportion of underutilized home gardens is available were identified and mapped. The divisions in which these home gardens are found and total extents are given in the Table 14 and their distribution are given in the Figure 12.

Table 14. Underutilized Home gardens and their total extents in the District

D.S.Division	G.N.Divisions	Extent (ha)
Mannar Town	Thalaimannar Pier West;Thalaimannar Village South;Thalaimannar Pier East;Kaddukarankudiyirippu;Thullukudiyirippu;Pesalai South;Siruthoppu;Puthukudiyirippu;Erukkalampiddy North;TharapuramWest;Eluthoor;Chavatkatu;Nagathalavu; Thiruketheeswaram;Kallikaddalkadu;Puthukamam; Uyllankum;Vannamoddai;Parapankandal;Uyitharasankulam	675.0
Nanattan		97.5
Musali		11.1
Manthai West	Vellankulam;Thevanpitty;Paliyaru;Illuppaikadavai;Anthoniya puram;Koorai;Aththimodai;Kovilkulam;Kayanagar; Periyamadhu	1176.7
Madhu	Madhu;Periyapandiviruchchan West;Palampiddy;Keerisuddan;Iranai Illupaikulam;Vilaththikulam;Parasankulam;Kakayankulam West;Kakayankulam East;Kalmadhu;Poomalathan;Thekkam;Matha Gramam;Periyamurippu	1088.7
Total(ha)		3049.0

Figure 11. AREAS WITH HIGH PROPOTION OF UNDERUTILIZED HOME GARDENS-MANNAR DISTRICT



(c) Underutilized Agricultural Lands

Some of the agricultural lands in the District are underutilized due to various reasons.

Underutilized Paddy Lands

Underutilized paddy lands are cultivated only during one season. The reasons for underutilization and the recommendations are given in the Table 15. The divisions where the underutilized paddy lands are available and their total extents are given in the Table 16. Distribution of these lands is shown on the Figure 12. The reasons will vary from one land to another.

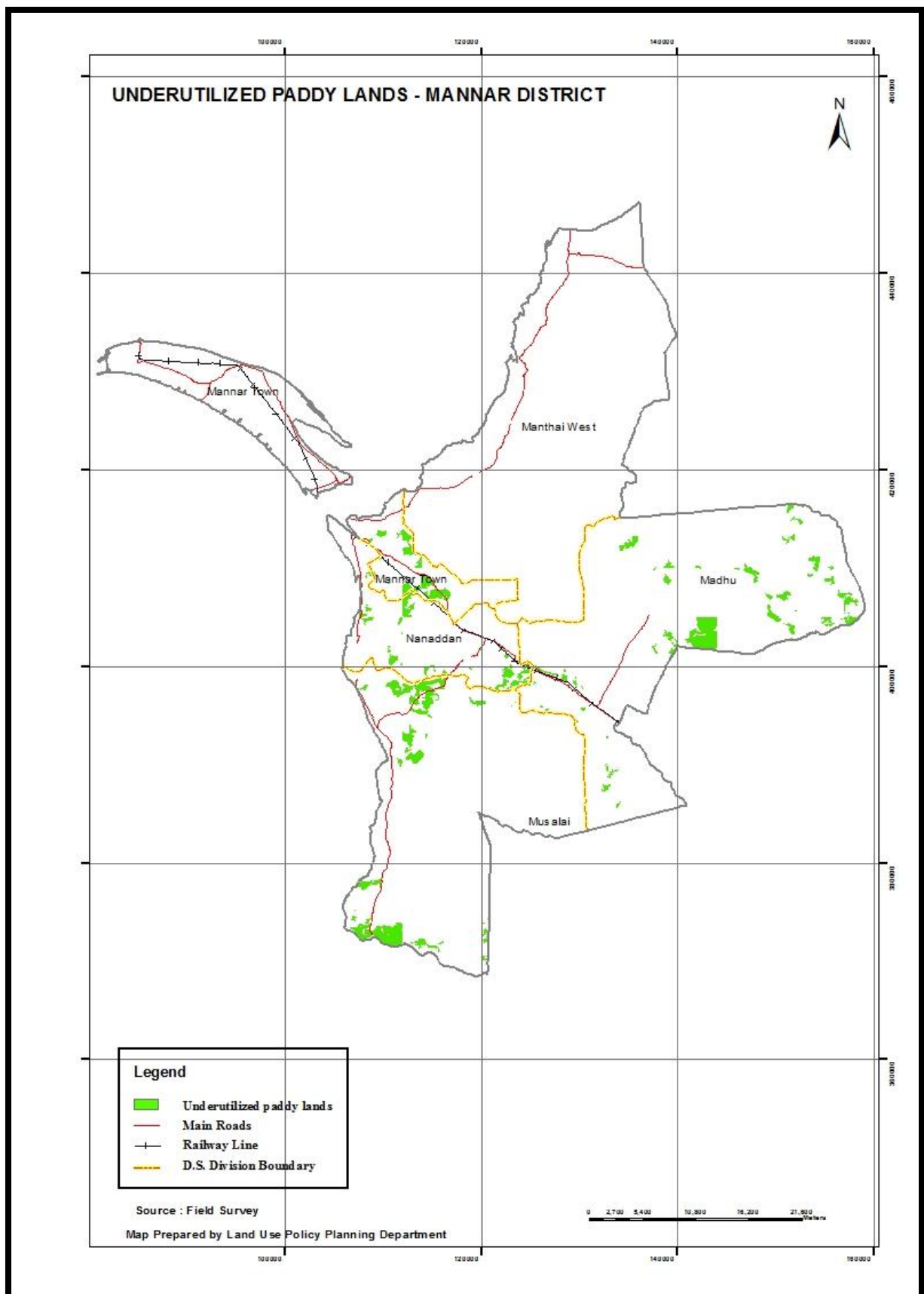
Table 15. Reasons for the underutilization of paddy lands and recommendations

Reasons	Recommendations
Lack of water	Rehabilitation of irrigation structures
Lack of capital	Facilitate to obtain cultivation loans
Inundation	Carry out a feasibility study for drainage improvement
Presence of degraded areas	Provide training on use of organic matter for degraded areas Explore other land use options

Table 16. Underutilized paddy lands and their extents in the District

D.S.Division	G.N.Divisions	Extent (ha)
Mannar Town	Thiruketheeswaram;Nagathalvu;Pe riyanavatkulam; Puthukamam;Uyilnkulam;Mathodd am;Vannamoddai; Neelasenai;Kallikaddaikadu;Uyirth arasankulam;	781.8
Nanattan		861.8
Musali	Arippu West;Methaveli;Maruthamadhu; Veppankulam;Ahathimurippu;Poo nochchikulam;Pandaraveli;Kokkup adayan;S.P.Potkerny;P.P.Potkerny; Kondachchi;Marichchikaddy;Karadi kuly;Palaikkuli;	2378.1
Manthai West		989.0
Madhu		2526.6
Total		7537.3

Figure 12. UNDERUTILIZED PADDY LANDS – MANNAR DISTRICT



Underutilized Other Agricultural Lands

The underutilized other agricultural lands include lands devoted to field crops and plantation crops such as palmyra, coconut and cashew. The reasons for underutilization and recommendations are given in the Table 17. The underutilized other agricultural lands and their extents are given in the Table 18 and their distribution are shown on the Figure 13 and 14.

Table 17. Reasons for underutilization of other agricultural lands and the recommendations.

Reasons	Recommendations
Lack of capital	-Awareness creation on loans and subsidy schemes
Water scarcity	-Carry out a feasibility study to use the ground water by constructing agricultural wells. -Introduce soil and water conservation measures.
Wild life threat	-Extension of the existing electric fence or establishment of new fence to keep away wild animals.
Presence of degraded lands	-Introduce conservation farming
Land tenure/ownership issues	-Resolve the issues by studying the cases separately

Table 18. Underutilized lands devoted for field crops, palmyra, coconut and cashew and their extents in the District.

Type of crop	D.S.Division	Extent(ha)
Plantation Crops (Palmyra,Cashew,Coconut)	Mannar Town	2848.5
	Musali	1938.7
Field Crops (Blackgram,Cowpea,Greengram,Groundnut,Sesame)	Nanattan	149.9
	Musali	297.2
	Manthai West	282.2
	Madhu	532.7
Total(ha)		6049.2

Figure 13. AREAS WITH HIGH PROPOTION OF UNDERUTILIZED LANDS DEVOTED TO FIELD CROPS-MANNAR DISTRICT

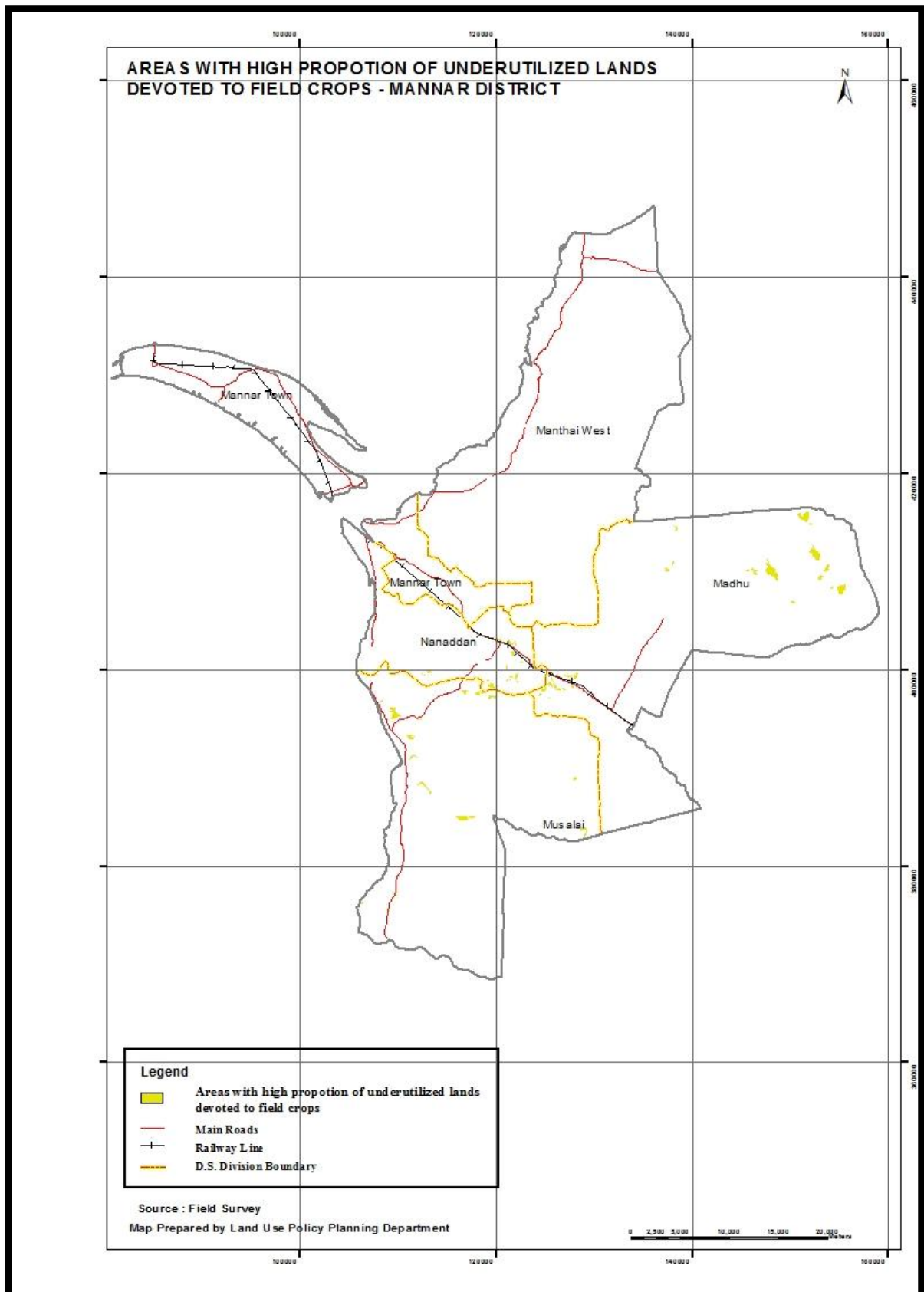
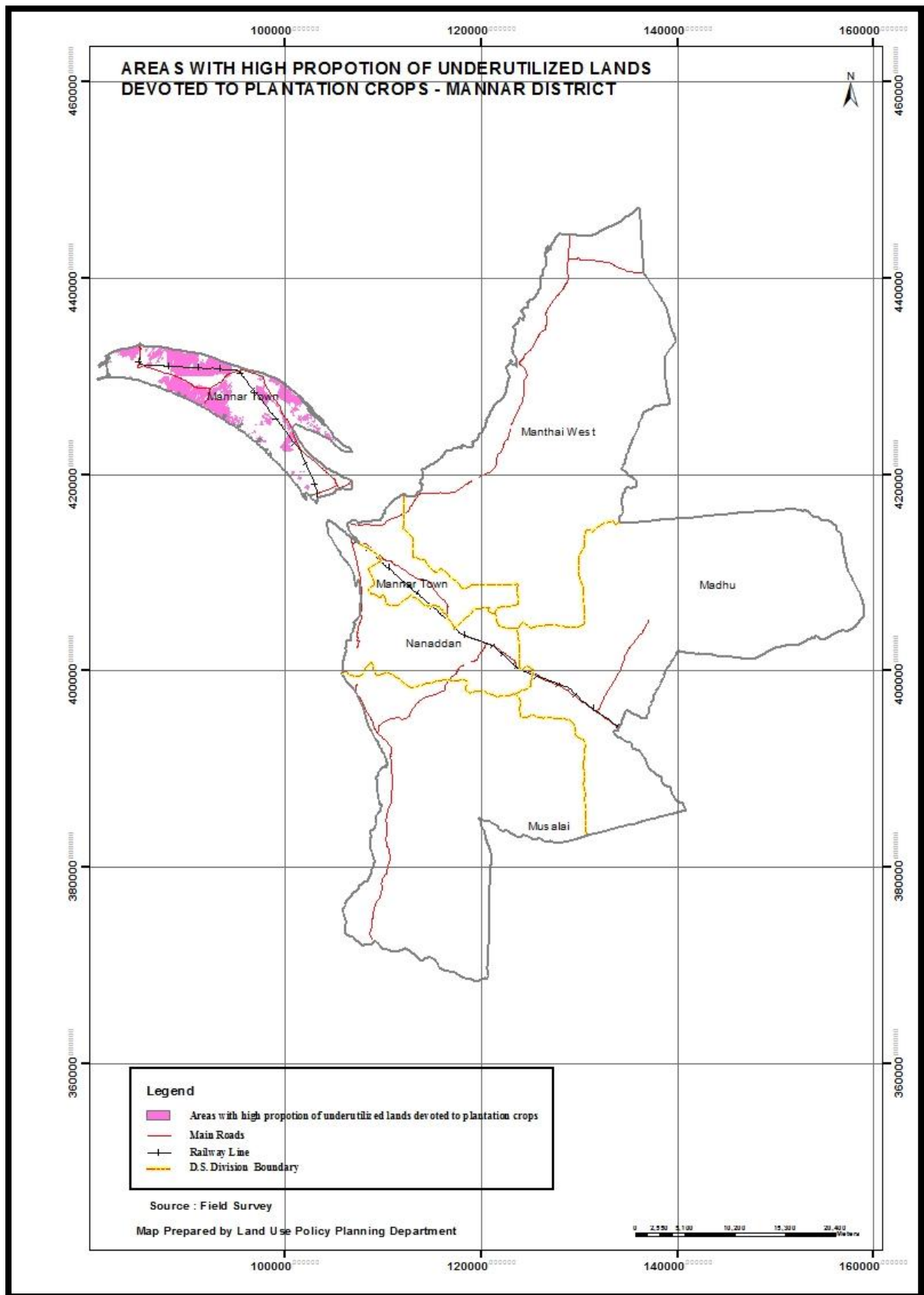


Figure 14. AREAS WITH HIGH PROPOTION OF UNDERUTILIZED LANDS DEVOTED TO PLANTATION CROPS-MANNAR DISTRICT



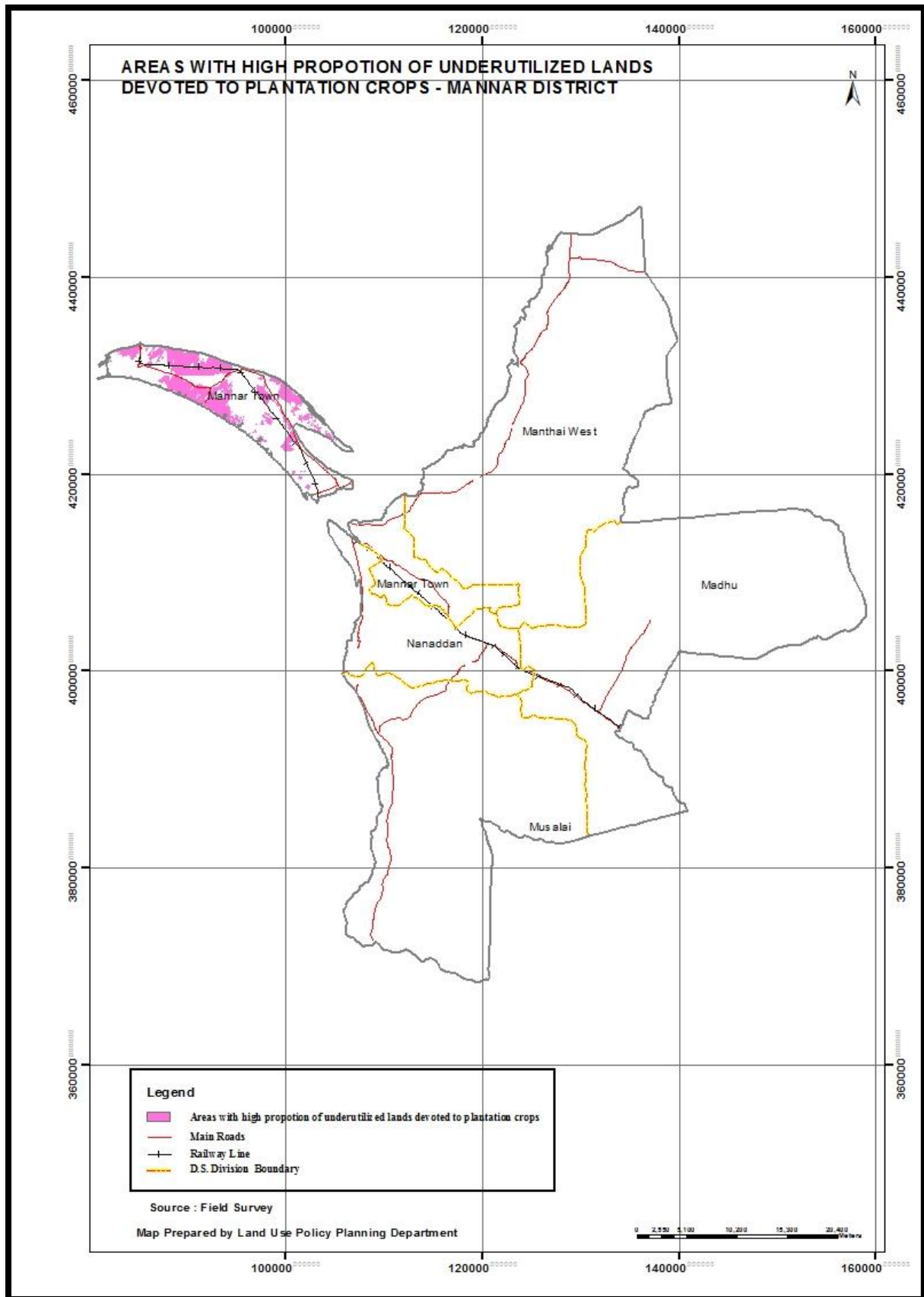
(d) Abandoned Agricultural lands

Some of the paddy lands in the district have been abandoned due to physical limitations. The approximate extents and reasons for abandonment are given in the Table 19 and their locations are shown in the Figure 15. To resolve the issue, further studies are needed. However, some suggestions were made at the stakeholder discussions but economic feasibility has to be studied.

Table 19. Abandoned paddy lands and their extents in the District.

Type	D.S.Division	Extent(ha)	Reasons for abandonment
Abandoned Paddy (Rainfed)	Mannar Town	36.7	Water shortage
	Nanattan	43.3	Water shortage
	Musali	1591.3	Water shortage
	Madhu	492.0	Previous conflict situation Water shortage
Abandoned Paddy (Irrigated)	Nanattan	171.3	Previous conflict situation
	Musali	418.0	Previous conflict situation Land ownership problems Damage from wild animals
	Madhu	214.6	Previous conflict situation Water shortage Absentee of land owner

Figure 15. ABANDONED PADDY LANDS – MANNAR DISTRICT



(e) Abandoned Settlements

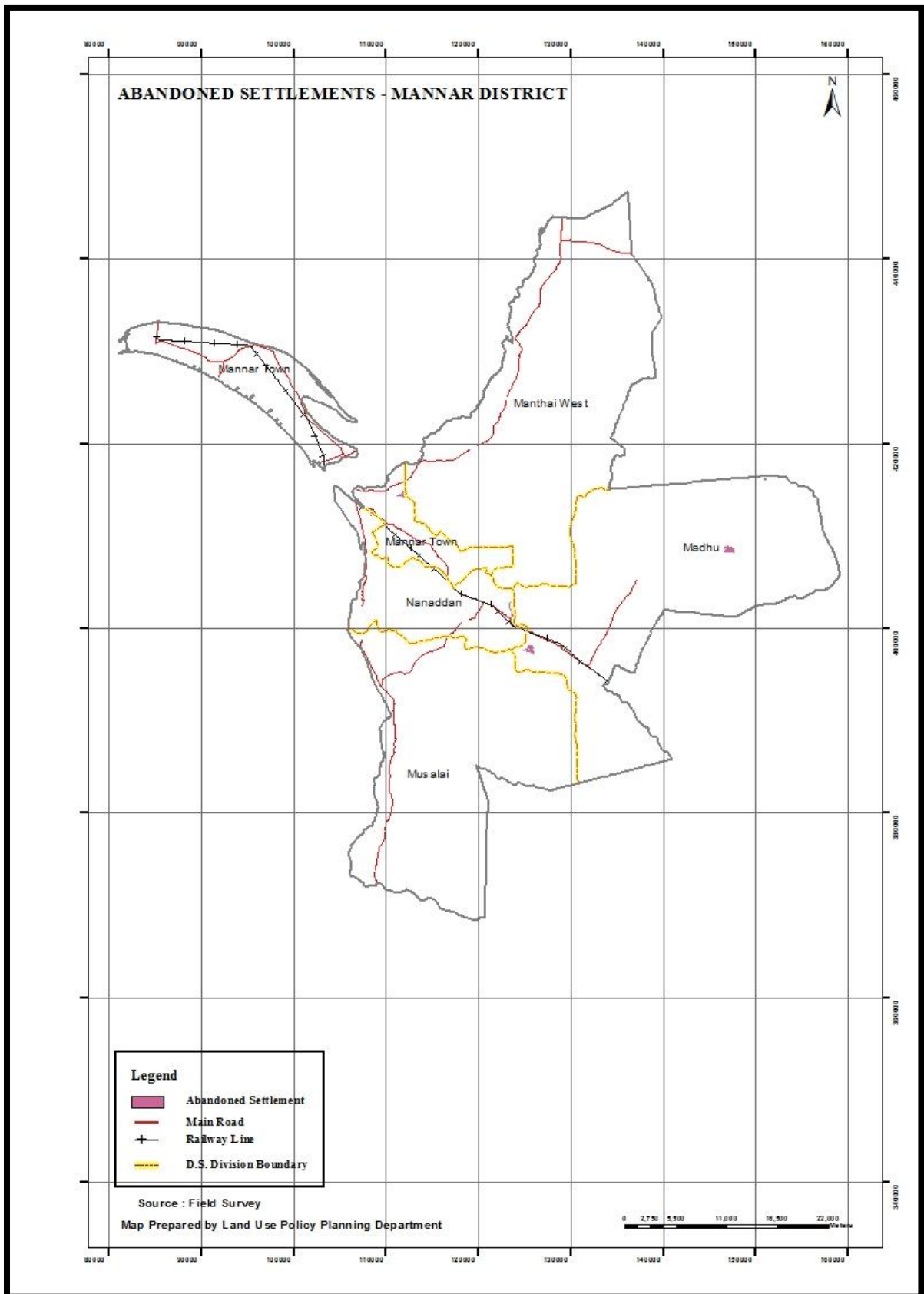
There are several settlements abandoned mainly due to conflict situation in the past. The information about these settlements is given in the Table 20 and the distribution of abandoned settlements are shown in Figure 16.

Resettling in some of the areas are in progress. since some areas are under forest, negotiations with relevant Institutions are needed to release them for the resettlement.

Table 20. Distribution of the abandoned settlements

Name of the settlement/village	D.S Division	Reasons for abandonment	Abandoned period	Number of families	Present Land Use/Present Land Cover	Recommendations
Thirukketheeswaram	Mannar Town	Conflict situation	30 years	25	Forest	Resettling is possible. Some Original settlers are back. *Resettling process is ongoing
Umanagary- Pasikulam	Nanattan	Conflict situation	30 years	10	Palmyra	Resettling is possible.
Parappakadhan East	Manthai West	Conflict situation	30 years	75	Forest	Resettling is possible, if only the real owners come back.
Mullikulam	Musali	Conflict situation	30 Years	50	High security zone	Resettling is possible.
Pannavedduvan Thekkam	Madhu	Conflict situation	30 years	Data not available	Scrub	Resettling is possible *Resettling process is ongoing
Madhu Keerisuddan Irraniilluppaikulam Parsanalayankulam Maluvarayar– Kaddaiyadampan	Madhu	Conflict situation	30 years	Data Not available	Scrub	Resettling is possible. Some Original settlers are back. *Resettling process is ongoing

Figure 16. ABANDONED SETTLEMENTS-MANNAR DISTRICT



(f) Unutilized lands

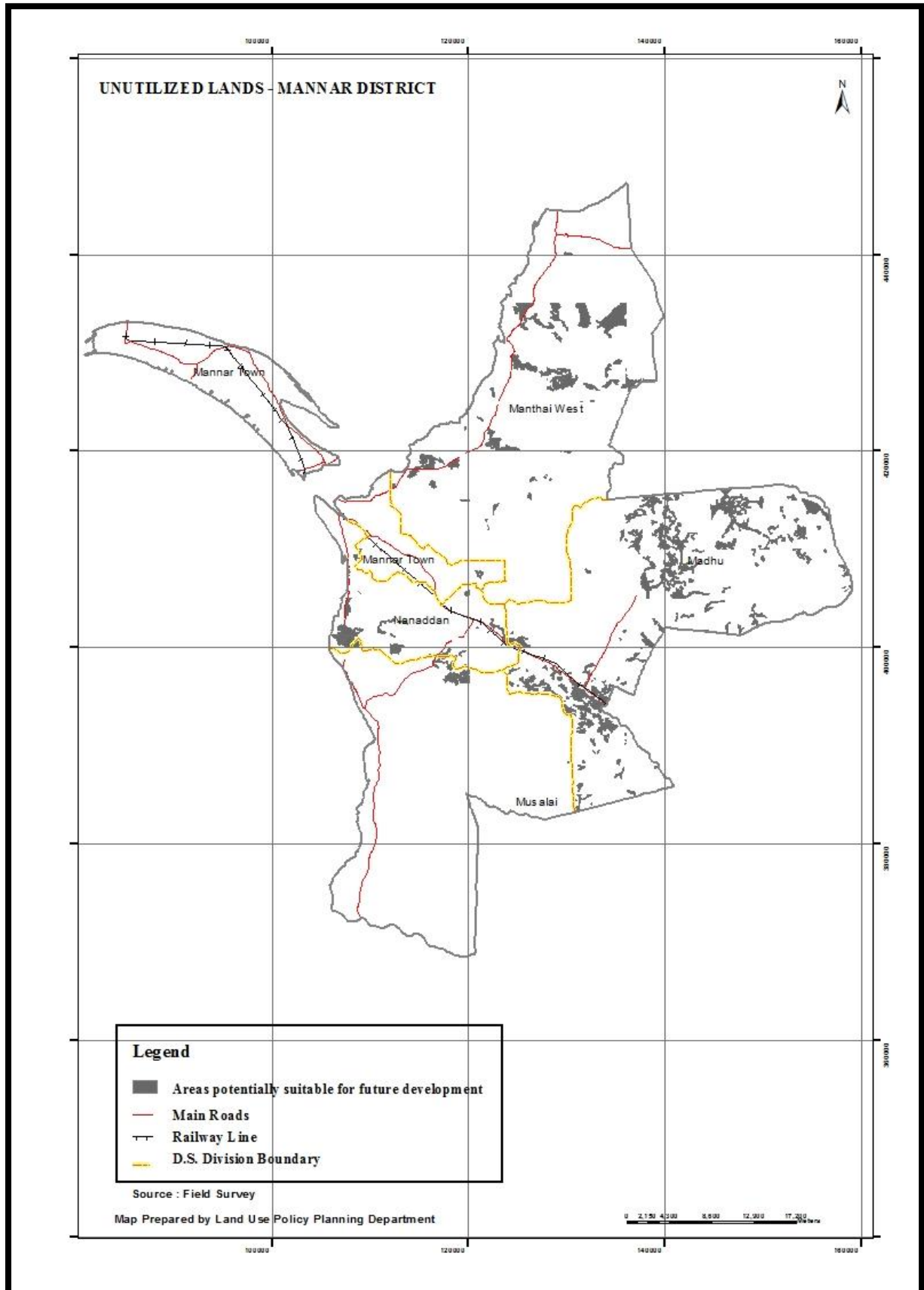
The unutilized state lands were identified and site assessments were done to determine their suitability for different purposes such as housing, agriculture, tourism and service centers. The criteria used to determine the suitability for different uses are given in the Annex VI. The extents and their suitability for different uses are given in the Table 21 and their distribution is shown in the Figure 17.

Table 21. Unutilized lands and their suitability for different uses

D.S.Division	Name of the Area	Extent (Ha)	Recommended Use	Remarks
Mannar town	Erukalampitty South	16.3	Tourism	Since those are other state forest lands, consent of the Forest Department is needed.
	Tharapuram East	16.5	Agriculture – Mainly highland crops (Coconut, Cashew)	
	South Bar	4.1	Industries-mainly salt industry	
	Thiruketheswaram	52.7	Agriculture	
	Nakathalvu	29.6	Agriculture	
	Puthukamam	24.3	Agriculture	
	Parapakandal	45.5	Agriculture	
Madhu	Periyapandiverichan East	937.9	Agriculture & Other	
	Periyamurippu	85.4	Forestry	
	Poomalanthan	4.6	Agriculture	
	Thekkam	179.9	Agriculture	
	Velathikkulam	136.0	Agriculture	
	Iranai Illupaikulam	235.4	Forestry and Agriculture	
	Kakkayankulam East	24.7	Agriculture	
	Kalmadu	12.8	Agriculture	
	Keerisuddan	354.7	Agriculture	
	Madhu	400.3	Agriculture, Forestry & Other	
	Maluvarayarkaddayadampam	184.4	Agriculture, Forestry & Other	
	Matha Kiramam	130.8	Forestry	
	Palampiddy	341.8	Settlement & Agriculture	
	Pannavedduvan	931.7	Settlement, Agriculture, Forestry & Other	
	Parasankulam	854.2	Settlement, Agriculture, Forestry & Other	
Periyapandiverichan East	85.3	Settlement, Agriculture, Forestry & Other		
Manthai West	Kannady	109.2	Agriculture	
	Anthonyarpuram	213.2	Agriculture	
	Pallamadu	264.3	Agriculture	
	Illuppaikkadavay	540.3	Agriculture	

	ParappukkadntanWest	20.1	Agriculture	
	Vellamkulam	9.8	Agriculture	
	Malikaitthedal	243.0	Agriculture	
	Vedathaltivu Center	57.9	Settlement	
	Paliyaru	1733.0	Agriculture	
	Papamottai	359.0	Eco Tourism	
	Thevanpitty	157.0	Eco Tourism	
	Vedathaltivu North	8.0	Settlement	
	Attaimottai	199.0	Agriculture	
	Parapukkadanthan East	73.0	Settlement	
	ParapukkadanthanWest	20.0	Agriculture	
	Koorai	500.0	Agriculture	
	Palliyadiputhukulam	22.0	Agriculture	
	Periyamadu East	356.0	Settlement	
	Periyamadu West	54.0	Agriculture	
	Veddiyamurippu	58.0	Settlement	
	Kayanagar	220.0	Agriculture	
	Alkaddyvely	9.7	Agriculture	
Musali	Arippu East	95.0	Agriculture	Since those are other state forest lands, consent of the Forest Department is needed. High security Zone
	Methaveli	84.9	Settlement	
	Poonohikulam	73	Agriculture	
	Maruthamadu	312.7	Agriculture	
	Veppamkulam	217.0	Agriculture	
	Chilavathurai	10.0	Settlement	
	Ahathimurippu	6.5	Agriculture/Settlement	
	Saveriyapuram	8.6	Settlement	
	Kokkupudiyam	271.3	Settlement	
	SP Potkeney	92.0	Agriculture	
	Kollamkulam	9.3	Agriculture	
	Kondachi	603.9	Agriculture	
	Maricukaddy	8.9	Settlement	
	Karadikui	30.9	Settlement	
	Palikkuli	397.9	Agriculture	
	Mullikulam	12.3	Settlement	

Figure 18. Unutilized Lands – Mannar District



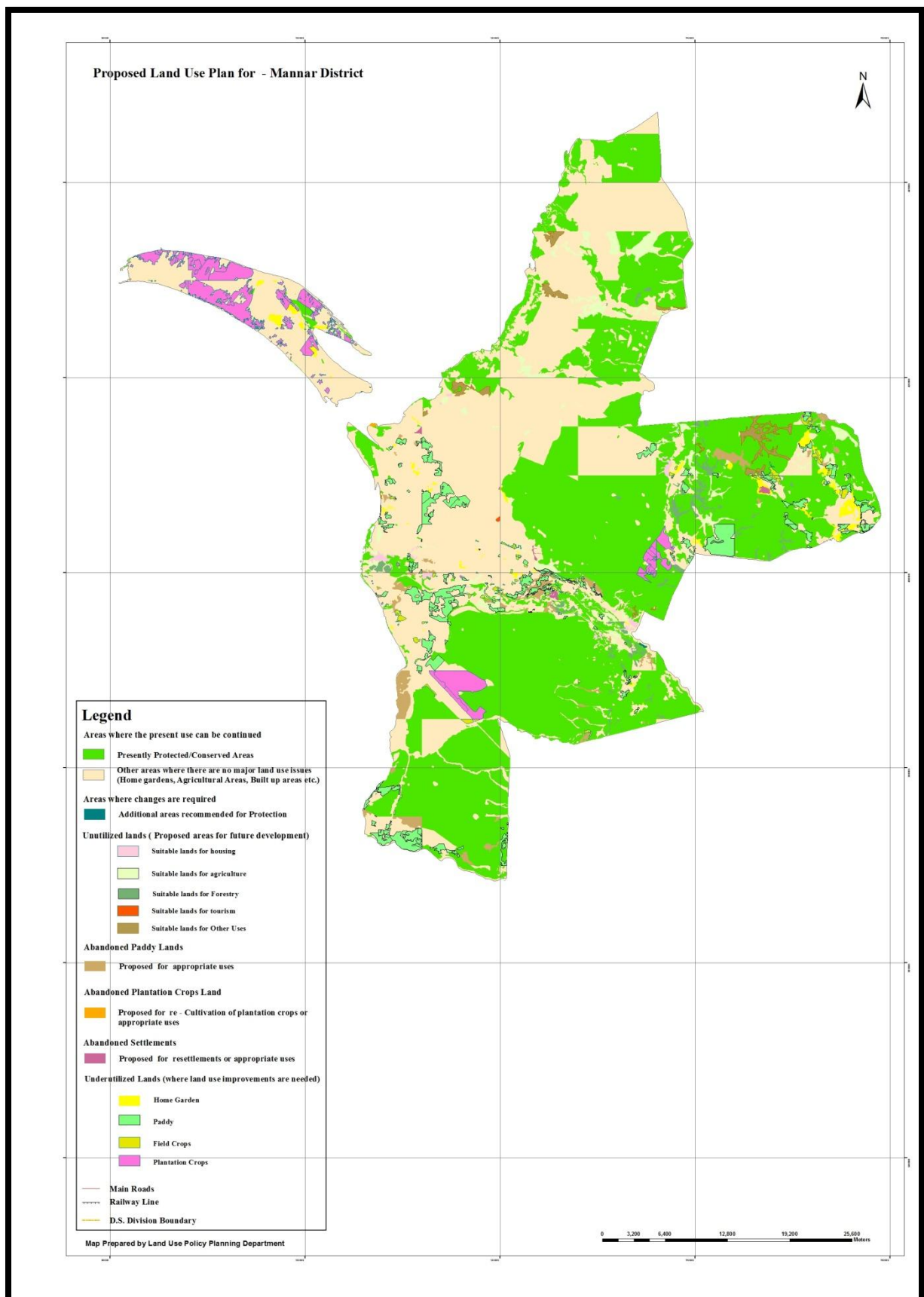
(g) Other issues related to Land Use

Illegal Gravel and Rock mining, deforestation ,illegal Sand extraction on river beds, Tank beds encroachment are some of the other issues in the District. In Table 22 the other land related issues are given.

Table 22. Other issues related to Land Use

Division	Type of Issue	GN Division and Village	Recommendation
Mannar Town	Improper Land Use (Settlements in water logged areas) Encroachments on minor tanks in UC Areas Over Sand Mining at Mannar Island	Eluthur Uppukulam	Relocate to suitable place Enforcement of law
Madhu	Illegal Gravel Mining	Madhu Mathakiramam Periyapandiverichan West Periyamurippu Poomalanthan Thekkam	Enforcement of law
Madhu	Abandoned Tanks	Irraniilluppaikuum Kalmadu Kakayankulam Velathikulam Parasankulam Keerisuttan Palampitty Panavedduvan Madhu	Renovation
Nanattan	Improper land use (Settlements in water logged areas) Illegal Sand Mining	Achamkulam, Madukarai, Rasamadu, Olumadu Kovamkulam Umanagari Vankalieast	Relocate to suitable place Enforcement of law
Manthai west	Illegal Gravel Mining Illegal sand mining	Parapukadanthan Koorai	Enforcement of law
Musali	Illegal sand mining Coastal erosion Flood Hazard areas	Poonochi kulam Kondachi Karadikuly Maruthamadu Arippu west	Enforcement of law

Figure 18. PROPOSED LAND USE PLAN –MANNAR DISTRICT



6. Suggested Implementation Strategy

Implementation strategy can be defined as methods or techniques used to enhance the adoption, implementation and sustainability of the Proposed Land Use Plan. In order to guarantee the effective implementation of the Land Use Plan, there should be an integrated approach and interrelationship between all intervening government and non-government organizations in the District.

In implementing the recommendations given in the plan to address the issues two approaches could be adopted.

- (1) Parallel approach where all the issues could be addressed simultaneously.
- (2) Step wise approach based on the priorities.

The approach to be adopted would of course depend on the available financial and other resources.

At the district level there is no central agency that could undertake the implementation of the recommendations of the plan. Hence, the implementation of the recommendations will have to be shared by several agencies. These agencies could be categorized as main responsible agencies and as supportive agencies. Each agency should incorporate the implementation activities in their annual action plans. The funds to implement these activities should be obtained either from routing government funds or from other external sources.

Implementation programme for the entire district will be monitored by the different level committees such as District Coordinating Committee (DCC), District Agricultural Committee (DAC), and District Land Use Planning Committee (DLUPC). Entire implementation programme will be coordinated by Government Agent/District Secretary.

The time frame for the implementation of each recommendation will vary depending on the nature of the activity and it may be short term, medium term and long term.

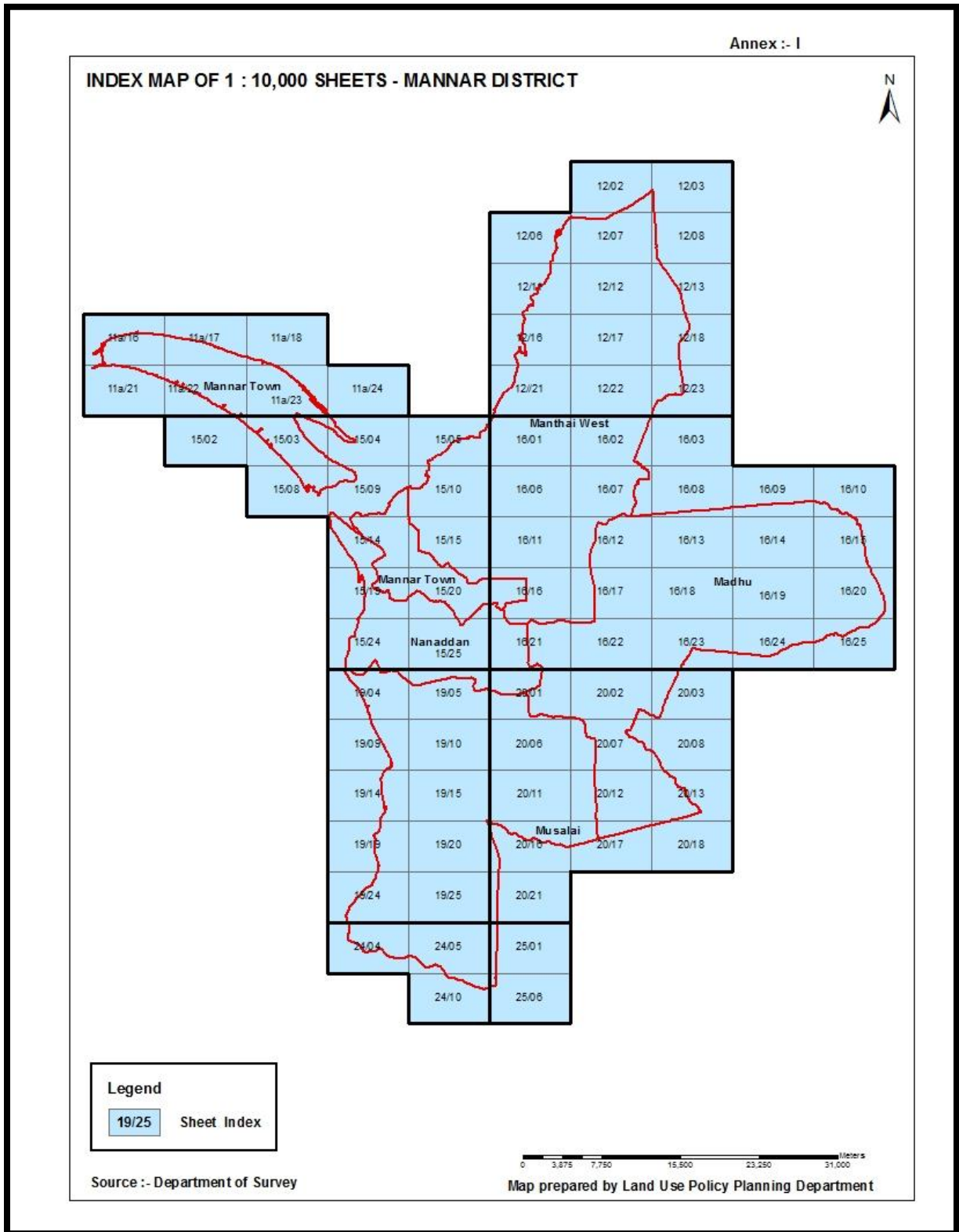
Planning projects should stimulate this implementation and support it technically, e.g. financing concepts and process monitoring systems. This is a step-by-step as well as participatory process.

LIST OF REFERENCES

1. Official Web site of District Secretariat-Mannar
2. Publications of Census and Statistics Department
3. Publications of Land and Water Use Division-Irrigation Department
4. Publications of Land Use Policy Planning Department
5. Publications of Metrological Department
6. Publications of National Physical Planning Department

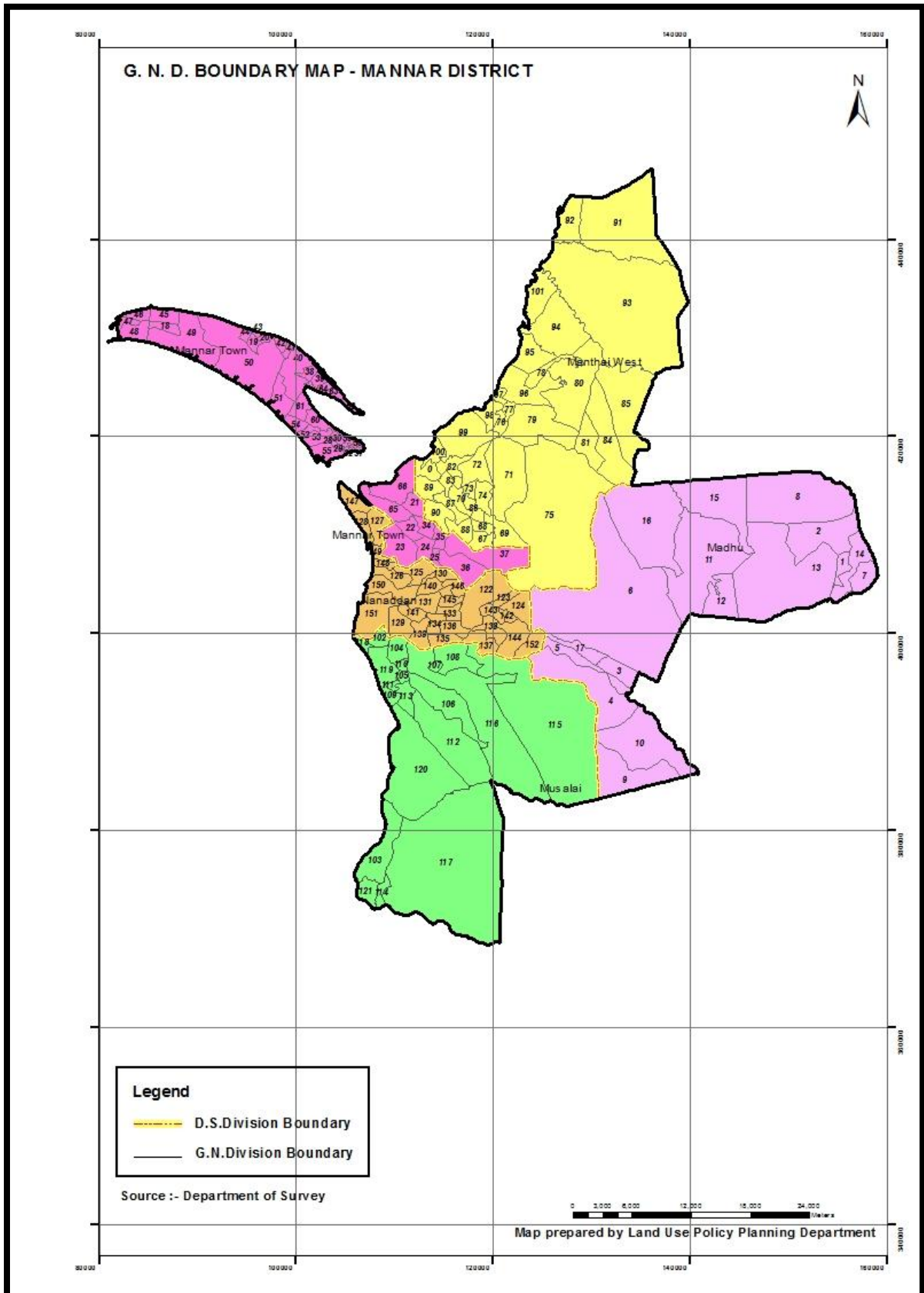
Annex I.

INDEX MAP OF 1:10,000 SHEETS



Annex II.

G.N.BOUNDARY MAP AND NAME LIST



ID	D.S.Division	G.N.Division Number	G.N.Division Name
1	Madhu	MNR/45	Kakkayankulam West
2	Madhu	MNR/43	Vilaththikulam
3	Madhu	MNR/128	Maluvarayarkaddayadampan
4	Madhu	MNR/129	Pannavedduvan
5	Madhu	MNR/131	Thekkam
6	Madhu	MNR/37	Madhu
7	Madhu	MNR/47	Kalmadu
8	Madhu	MNR/44	Parasankulam
9	Madhu	MNR/133	Periyamurippu
10	Madhu	MNR/132	Matha Kiramam
11	Madhu	MNR/38	Periya-Pandivirichchan West
12	Madhu	MNR/39	Periya-Pandivirichchan East
13	Madhu	MNR/42	Iranai Illupaikulam
14	Madhu	MNR/46	Kakkayankulam East
15	Madhu	MNR/41	Keerisuddan
16	Madhu	MNR/40	Palampiddy
17	Madhu	MNR/130	Poomalarathan
18	Mannar Town	MNR/52	Taliannannar
19	Mannar Town	MNR/56	Pesalai South
20	Mannar Town	MNR/58	Siruthoppu
21	Mannar Town	MNR/87	Periyanavatkulam
22	Mannar Town	MNR/90	Kallikaddaikkadu
23	Mannar Town	MNR/91	Puthukamam
24	Mannar Town	MNR/92	Uyilankulam
25	Mannar Town	MNR/93	Mathoddam
26	Mannar Town	MNR/83	Uppukulam South
27	Mannar Town	MNR/81	Moor Street
28	Mannar Town	MNR/74	Emil Nagar
29	Mannar Town	MNR/76	Panankaddikoddu West
30	Mannar Town	MNR/75	Savatkaddu
31	Mannar Town	MNR/82	Uppukulam North
32	Mannar Town	MNR/79	Pettah
33	Mannar Town	MNR/80	Periyakadai
34	Mannar Town	MNR/89	Neelasenai
35	Mannar Town	MNR/94	Vannamoddai
36	Mannar Town	MNR/95	Uyirtharayankulam
37	Mannar Town	MNR/96	Parappankandal
38	Mannar Town	MNR/63	Erukkalampiddy West
39	Mannar Town	MNR/64	Erukkalampiddy North
40	Mannar Town	MNR/61	Puthukudiyiruppu
41	Mannar Town	MNR/60	Olaithoduwai
42	Mannar Town	MNR/59	Periyakaraisal
43	Mannar Town	MNR/57	Pesalai North

44	Mannar Town	MNR/55	Pesalai West
45	Mannar Town	MNR/51	Talaimannar Pier East
46	Mannar Town	MNR/50	Talaimannar Pier West
47	Mannar Town	MNR/48	Talaimannar North
48	Mannar Town	MNR/49	Talaimannar South
49	Mannar Town	MNR/53	Kaddukarankudiyiruppu
50	Mannar Town	MNR/54	Thullukudiyiruppu
51	Mannar Town	MNR/62	Thoddaveli
52	Mannar Town	MNR/71	Pattithoddam
53	Mannar Town	MNR/72	Eluthur
54	Mannar Town	MNR/70	Thalvupadu
55	Mannar Town	MNR/73	South Bar
56	Mannar Town	MNR/77	Panankaddikoddu East
57	Mannar Town	MNR/84	Pallimunai East
58	Mannar Town	MNR/85	Pallimunai West
59	Mannar Town	MNR/78	Sinnakadai
60	Mannar Town	MNR/69	Tharapuram East
61	Mannar Town	MNR/68	Tharapuram West
62	Mannar Town	MNR/67	Erukkalampiddy Central
63	Mannar Town	MNR/66	Erukkalampiddy South
64	Mannar Town	MNR/65	Erukkalampiddy East
65	Mannar Town	MNR/88	Nagathalvu
66	Mannar Town	MNR/86	Thiruketheeswaram
67	Manthai West	MNR/33	Palaiperumalkaddu
68	Manthai West	MNR/32	Vaddakandal
69	Manthai West	MNR/34	Palaiyadiputhukulam
70	Manthai West	MNR/26	Karunkandal
71	Manthai West	MNR/35	Parappukadanthan West
72	Manthai West	MNR/28	Kannady
73	Manthai West	MNR/27	Andakulam
74	Manthai West	MNR/29	Alkaddiveli
75	Manthai West	MNR/36	Parappukadanthan East
76	Manthai West	MNR/12	Vidalaiteevu Central
77	Manthai West	MNR/13	Vidalaiteevu East
78	Manthai West	MNR/08	Aththimoddai
79	Manthai West	MNR/14	Pallamadhu
80	Manthai West	MNR/07	Koorai
81	Manthai West	MNR/15	Kayanagar
82	Manthai West	MNR/20	Minukkan
83	Manthai West	MNR/24	Nedunkandal
84	Manthai West	MNR/16	Periyamadhu West
85	Manthai West	MNR/17	Periyamadhu East
86	Manthai West	MNR/30	Karunkandal Vannakulam
87	Manthai West	MNR/25	Sornapuri

88	Manthai West	MNR/31	Kaththankulam
89	Manthai West	MNR/22	Adampan
90	Manthai West	MNR/23	Palikuli
91	Manthai West	MNR/01	Vellankulam
92	Manthai West	MNR/02	Thevampiddy
93	Manthai West	MNR/03	Pali Aru
94	Manthai West	MNR/04	Illupaikadavai
95	Manthai West	MNR/06	Kalliyadi
96	Manthai West	MNR/09	Kovilkulam
97	Manthai West	MNR/11	Vidalaiteevu North
98	Manthai West	MNR/10	Vidalaiteevu West
99	Manthai West	MNR/18	Pappamoddai
100	Manthai West	MNR/21	Maligaithidal
0	Manthai West	MNR/19	Veddayarmurippu
101	Manthai West	MNR/05	Anthonyarpuram
102	Musalai	MNR/135	Arippu East
103	Musalai	MNR/150	Karadikkuli
104	Musalai	MNR/138	Poonochchikulam
105	Musalai	MNR/146	Puthuveli
106	Musalai	MNR/143	Ahakkimurippu
107	Musalai	MNR/141	Periyapullachchi Potkerni
108	Musalai	MNR/140	Veppankulam
109	Musalai	MNR/144	Chilavathurai
110	Musalai	MNR/137	Pandaraveli
111	Musalai	MNR/145	Severiyarpuram
112	Musalai	MNR/148	Kokkupadayan
113	Musalai	MNR/147	Kollankulam
114	Musalai	MNR/151	Marichchukaddi
115	Musalai	MNR/139	Maruthamadhu
116	Musalai	MNR/142	Sinnapullachchi Potkerni
117	Musalai	MNR/152	Palaikuli
118	Musalai	MNR/134	Arippu West
119	Musalai	MNR/136	Methanveli
120	Musalai	MNR/149	Kondachchi
121	Musalai	MNR/153	Mullikkulam
122	Nanaddan	MNR/117	Chemmantheevu
123	Nanattan	MNR/118	Murunkan
124	Nanattan	MNR/126	Cheddiyar Mahankaddai Adampan
125	Nanattan	MNR/111	Ilahadipiddy
126	Nanattan	MNR/102	Vanchiankulam
127	Nanattan	MNR/99	Vankalai East
128	Nanattan	MNR/98	Vankalai West
129	Nanattan	MNR/105	Rasamadhu
130	Nanattan	MNR/112	Ilantaimoddai

131	Nanattan	MNR/107	Nanaddan
132	Nanattan	MNR/116	Aththikkuli
133	Nanattan	MNR/113	Puttirarkandan
134	Nanattan	MNR/109	Valkaipaddankandal
135	Nanattan	MNR/122	Kalimoddai Puliyankulam
136	Nanattan	MNR/121	Pontheevukandal
137	Nanattan	MNR/123	Pariyarikandal
138	Nanattan	MNR/120	Sirukandal
139	Nanattan	MNR/108	Pallankodai
140	Nanattan	MNR/110	Periyakkaddaikadu
141	Nanattan	MNR/106	Moddaikadai
142	Nanattan	MNR/125	Iraddaikulam
143	Nanattan	MNR/119	Chundikkuli
144	Nanattan	MNR/124	Katkadanthakulam
145	Nanattan	MNR/114	Razoolputhuveli
146	Nanattan	MNR/115	Kanchithalvu
147	Nanattan	MNR/97	Vankalai North
148	Nanattan	MNR/101	Naruvilikkulam
149	Nanattan	MNR/100	Thomaspuri
150	Nanattan	MNR/103	Umanagiri
151	Nanattan	MNR/104	Achchankulam
152	Nanattan	MNR/127	Issaimalaithalvu

Annex III.

NATIONAL LEVEL EXPERT GROUP-MEMBERS LIST

1. Secretary, Ministry of Lands (Chair Person)
2. Director General, Land Use Policy Planning Department (Coordinator)
3. Secretary, Ministry of Economic Development
4. Secretary, Ministry of Religious and Cultural Affairs
5. Secretary, Ministry of Defense
6. Secretary, Ministry of Tourism
7. Secretary, Ministry of Environment
8. Government Agent/ District Secretary, Jaffna District
9. Government Agent/ District Secretary, Mannar District
10. Government Agent/ District Secretary, Vavuniya District
11. Government Agent/ District Secretary, Mullativu District
12. Government Agent/ District Secretary, Kilinochchi District
13. Government Agent/ District Secretary, Batticaloa District
14. Government Agent/ District Secretary, Ampara District
15. Government Agent/ District Secretary, Trincomalee District
16. Conservator General, Department of Forest Conservation
17. Commissioner General, Land Commissioner General's Department
18. Director General, Department of Agriculture
19. Director General, Coast Conservation Department
20. Commissioner General, Department of Archeology
21. Director General, Department of Wild Life Conservation
22. Survey General, Survey Department
23. Director General, National Physical Planning Department
24. Director General, Department of Irrigation.
25. Commissioner General, Land Settlement Department
26. Director General, Central Environmental Authority
27. Director General, Disaster Management Center
28. Director General, Geological Survey and Mines Bureau
29. Director General, Urban Development Authority
30. Director General, Road Development Authority
32. Commissioner, Department of Agrarian Services

Annex IV

DISTRICT LEVEL EXPERT GROUP – MEMBERS LIST

1. Government Agent/District Secretary (Chair Person)
2. Land Use Planning Officer (Secretary)
3. Provincial Land Commissioner
4. Divisional Secretaries
5. Director of Irrigation, Department of Irrigation
6. Director, Urban Development Authority
7. Deputy Director Agriculture, Provincial Department of Agriculture
8. District Forest Officer, Department of Forest Conservation
9. Senior Superintendent of Survey, Survey Department
10. District Engineer, Road Development Authority
11. District Engineer, Water Supply and Drainage Board
12. District Manager, Water Resource Board
13. District Manager, National Housing Development Authority
14. General Manager, Palmyra Development Board
15. Deputy General Manager, Ceylon Electricity Board
16. Deputy Director, Industrial Development Board
17. Deputy Director, Board of Investment
18. Assistant Commissioner, Department of Agrarian Development
19. Assistant Commissioner, Local Government
20. District Archeological Officer, Department of Archeology
21. Regional Manager, Coconut Cultivation Board
22. Assistant Director, Central Environmental Authority
23. Regional Mining Engineer, Geological Survey and Mines Bureau
24. Assistant Director, Coast Conservation Department
25. Assistant Director, Department of Wild Life Conservation

Annex V.

DATA TABLES

Table 1. PROTECTED AREAS

Type	Name of the area	D.S.Division	G.N.Division Name/ Number	Geo coordinates	Extent(ha)
Wildlife Reserves and Bird Sanctuaries	Vankalai Bird Sanctuary	Mannar Town	Thiruketheeswaram and Pallimunai	110203 416119	13.2
		Nanattan			4839.0
	Wildlife Reserve	Madhu	Iraniillupaikulam, Keerisudan, Palampiddy, Madhu		26673.0
Forest Reserves		Madhu	Parasankulam	132018 402779	40031.1
			Keerisuddan	142124 407734	
			Periyapandivirichchan West	135539 414124	
			Irranaiilluppaikulam	142385 413928	
			Palampiddy	148709 405974	
			Madhu	149101 414189	
			Thekkam	130714 398150	
				Musali	
	Karadikkuli	115922 377275			
	Marichchikaddy	111617 386589			
	Kondachci	111617 386295			
	S.P.Potkerny	115687 395355			
	Maruthamadhu	120033 397294			
	Kokkupadyan	111257 383896			
		Manthai West	Vellankulam	125449 407657	25055.8
			Paliyaru	127034 412134	
			Illupaikadavai	121345 416891	
			Koorai	132680	

				436570	
			Kayanagar/Periyamadhu West	134309 442726	
			Periyamadhu East	132537 416611	
			Palaiyadiputhukulam	137853 431254	
			Parappukadanthan West	129179 425844	
Archaeological and Historical Reserves	Mannar Fort	Mannar Town	Mannar Town	105784 418514	1.0
	Baobab Tree		Mannar Town		
	Thiruketheeswaram Kovil			97359 428722	7.1
	Kappa Kovil(Old Portuguese Church)			97359 428722	1.0
	Narapadu(Old Dutch Security Point)			99491 428857	0.1
	Viranapadu(Old Dutch Church)			96956 424133	0.2
	Ahaththimurippu(Paththini Devalaya)				0.1
	Maruthamadhu(Puthayalpidy)	Madhu			0.1
	Mullikkulam(South Son Mohan Land)				0.1
	Allirani Fort	Musali	Arippu East	107541 398482	2.1
	Doric Fort		Arippu East		0.1
		Manthai West	Paliyaru	121158 426497	3.5
			Anthonyapuram	125262 433959	
			Kovilkulam	123956 435358	
	Vidatnaltheevu North		120506 424072		
	Madhu	Thekkam	137557 405102	1.5	
		Madhu	132814 394205	0.7	
Wetlands		Mannar Town	Thalaimannar Village	817889 431504	489.0
			Thilukudirippu	945803 428906	

			Puthukudirippu	998397 426633	
			Erukalampiddy West	100229 426244	
			Erukalampiddy East	103475 425529	
			Erukalampiddy South	104190 424620	
			Thiruketheeswaram	107956 414621	
			Nagathalavu	107566 414231	
			Puthukamam	108930 409946	
		Manthai West	Thevanpitty	128247 444218	3495.3
			Paliyaru	126941 442073	
			Illuppaikadawal	125729 437876	
			Anthonyapuram	124609 434477	
			Kalliyady	123863 432653	
			Vidathalathivu West/Nort/Central	122837 428736	
			Vidathalathivu Central	121345 426404	
			Pappamoddai	117055 421927	
			Veddayanmurippu	115376 418663	
		Madhu	Iranailuppaikulam	149279 407591	50.0
			Palampiddy	136050 414418	10.1
			Madhu	131198 413375	0.6
			Parsamkulam	150973 416111	3.3
Sand Dunes/Sandy Areas/Beaches		Mannar Town	Thalaimannar Village North	82080 430670	
			Thalaimannar Village South	83444 430587	
			Thalaimannar Pier East	86756 435002	
			Thalaimannar	84772 430839	
			Kaddukarankudirippu	85977 430547	

			Pesalai North	96198 430660	
			Siruthoppu	69900 430472	
			Periyakaraisal	98233 430037	
			Erukalampiddy South	104740 424253	
			Erukalampiddy Central	105310 23480	
			Thalvupadu	99107 421259	
			Thiruketheeswaram	109050 414576	
		Manthai West	Thevanpitty	132584 429018	439.0
			Paliyaru	126517 440624	
			Koorai	135461 428162	
			Periyamadhu West	128900 425658	
			Veddayanmurippu	130858 419969	
			Minikun	115376 417170	

Table 2. ADDITIONAL AREAS RECOMMENDED FOR PROTECTION AND CONSERVATION

Name of the area	D.S.Division	G.N.Division	Ownership	Geo coordinates	Extent(ha)
Urumalei Light House	Mannar Town	Thalaimannar	State	110673 416079	0.1
Urumalei Adam's Cemetery		Thalaimannar South		88723 401626	0.1
Thalaimannar Old Jetty		Thalaimannar		82814 429947	0.2
Arippu Light House	Musali	Arippu East		107541 398482	0.01
Matha Havi		Kondachchi		106111 375247	0.01
Wet Lands		Mullikkulam		108402	0.01

			374573	
		Arippu East	107541	0.01
			398482	
		Arippu East	105904	4.0
			399276	
		Meththenveli	107942	4.2
			396580	
		Palaikkuli	120401	12.7
			372905	
		Arippu East	110099	16.0
			399168	
		Arippu West	110559	43.8
			398609	
		Kondachchi	109014	14.8
			382382	
		Chilawatthurai	108525	15.9
			394860	
		Meththanveli	110559	50.5
			398609	
		Maruthamadhu	121914	153.8
			397010	
		Karadikkuli	111617	12.7
			386589	
		Palaikkuli	116326	
			370777	
Bird Watching Area	Manthai West	Thevanpitty	128247	3495.3
			444218	
		Paliyaru	126941	
			442073	
		Illuppaikadavai	125729	
			437876	

		Anthonyapuram		124609 434477	
		Kalliyady		123863 432653	
		Koorai		122837 428736	
		Vidathaltivu West; Vidathaltivu North; Vidathaltivu Central		121345 426404	
		Pappamodai		117055 421927	
		Veddayamirippu		115376 418663	
Recreational Area	Madhu	Thekkam			2.0
Hanging Bridge					150m

Table 3. UNDERUTILIZED HOME GARDENS

D.S.Division	G.N.Division	Geo coordinates	Extent(ha)
Mannar Town	Thalaimannar Pier West; Thalaimannar Village South		104.4
	Thalaimannar Pier East		33.8
	Kaddukarankudiyirippu		11.7
	Thullukudiyirippu		199.4
	Pesalai South		35.6
	Siruthoppu		7.0
	Puthukudiyirippu		144.3
	Erukkalampiddy North		189.1
	Tharapuram West		53.0
	Eluthoor		12.6

	Chavatkatu		4.1
	Nagathalavu		10.6
	Thiruketheeswaram		63.0
	Kalikkaddalkadu		48.0
	Puthukamam		6.1
	Uyilankulam		45.0
	Vannamodai		4.0
	Parapankandal		33.5
	Uyitharasankulam		1.7
Musali			9.7
Manthai West	Vellankulam	130387	1176.7
		442865	
	Thevanpitty	130489	
		442152	
	Paliyaru	131508	
		435735	
	Illuppaikadavai	128147	
		435124	
	Anthonyapuram	135277	
		426771	
	Koorai	133240	
425447			
Aththimodai	127739		
	419335		
Kovilkulam	114293		
	412205		
Kayanagar	116534		
	411390		
Periyamadhu	118062		
	412001		
Madhu	Madhu	137425	6.0
		402153	
	Periyapandiviruchchan west	140269	95.4
		403396	
	Palampiddy	138289	75.0
		410858	
	Keerisuddan	146455	6.0
		408314	
Iranai Illupaikulam	146738	223.2	
	409232		
Vilaththikulam	153300	86.8	
	410375		
Parasankulam	151427	165.0	
	413661		
Kakayankulam west	155131	156.0	
	406570		

	Kakayankulam east	156639 406835	171.9
	Kalmadhu	156850 405618	44.6
	Poomalarthan	126823 399062	3.5
	Thekkam	132865 394935	6.4
	Matha Gramam	133591 388590	19.8
	Periyamurippu	133710 385661	4.0

Table 4. UNDERUTILIZED PADDY LANDS

Type	D.S.Division	G.N.Division	Geo coordinates	Extent(ha)
Rainfed	Mannar Town	Thiruketheeswaram	110033 413587	41.9
		Nagathalvu	108763 41284	12.8
		Periyanavatkulam	112319 413227	16.7
		Puthukamam	109017 409396	28.0
		Uyilnkulam/Mathoddam/Vannamoddai	112065 407766 112658 408211	306.4
		Neelasenai/Kallikaddaikadu	114415 408994 112531 410751	149.6
		Uyirtharasankulam	115642 407322	140.2
	Musali	Arippu West	105990 399276	5.0
		Methanveli	110241 395416	27.7
		Maruthamadhu	116411 397627	577.5
		Veppankulam	119840 397421	565.1
		Ahathimurippu	113600 381618	429.0
		Poonochchikulam	110559 398609	145.3
		Pandaraveli	108648 398609	145.3
		Kokkupadayan	118576 387666	162.0
		S.P.Potkerny	115687 395355	808.0

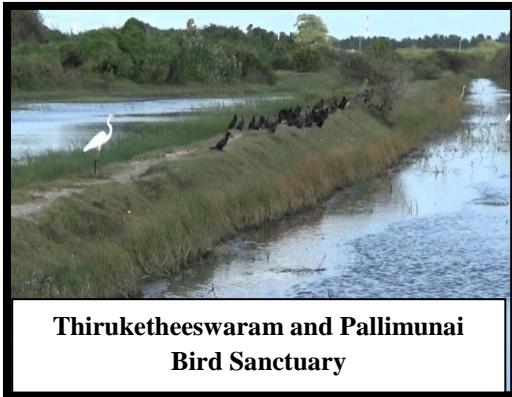
	P.P.Potkerny	111706 398521	365.6
	Kondachchi	113600 381618	51.6
	Marichchikaddy	111617 386589	15.1
	Karadikuly	108971 379645	159.1
	Palaikkuli	120401 372905	634.8

Annex VI.

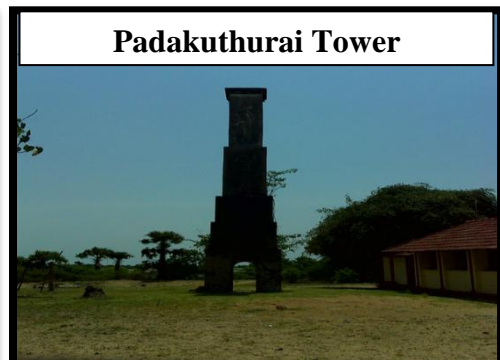
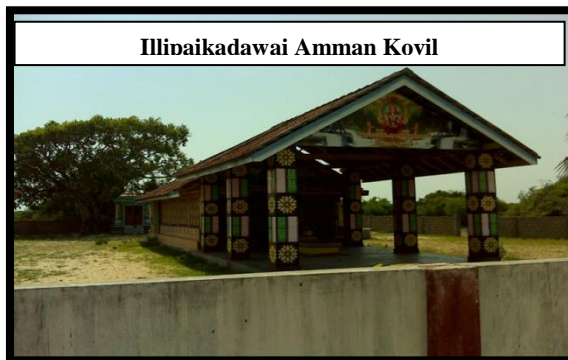
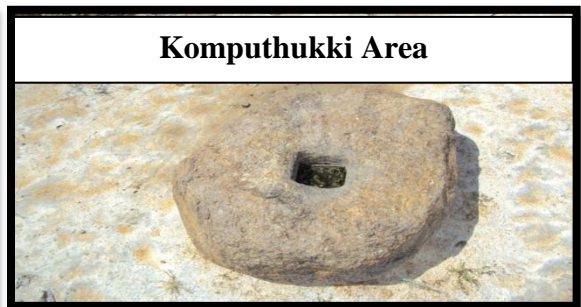
PHOTOGRAPHS OF THE LAND USE ISSUES

PROTECTED AREAS

WILDLIFE SANCTUARIES



ARCHAEOLOGICAL AND HISTORICAL SITES



Munrampiddi Madam



Madhu Church



Thiruketheeswaram Kovil



Musali-Allirani Fort



ADDITIONAL AREAS RECOMMENDED FOR PROTECTION

Thalaimannar Keramam Light House



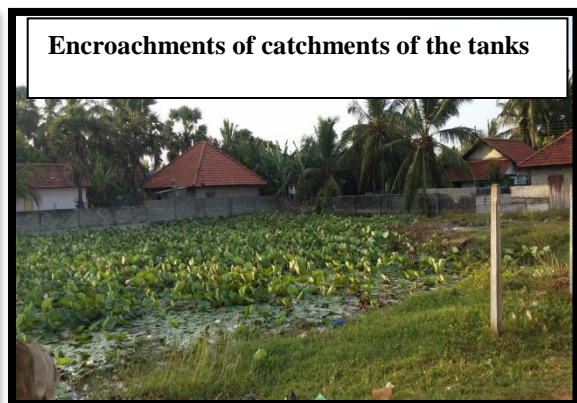
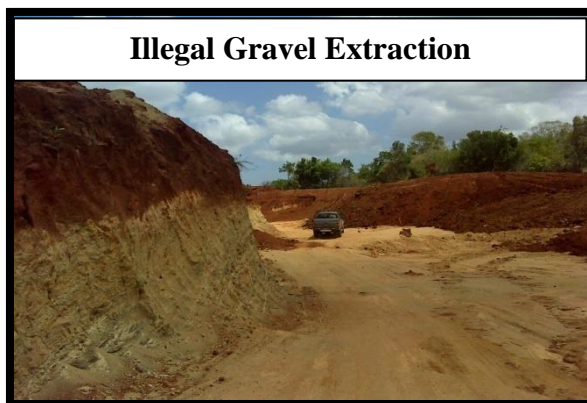
Thalaimannar Old Jetty



Thekkam Hanging Bridge



OTHER ISSUES RELATED TO LAND USE



Annex VI .

CRITERIA USED TO DETERMINE THE LAND SUITABILITY FOR DIFFERENT USES

1. The factors that were considered to assess the lands for agriculture

Parameter	Level 1	Level 2	Level 3	Level 4
1. Slope	0-30%	30-40%	40-60% >60 %	>60 %
2. Soil depth	Very deep > 120 cm	Deep (120 – 60) cm	Moderately Deep (60 – 30) cm	Shallow < 30cm
3. Soil erosion hazard	Nil	Slight	Moderate	High
4. Soil texture	Loam	Sandy loam	Sand	Sand with stones
5. Drainage	Well drained	Moderately well Drained	Manageable	Poorly Drained
6. Rockiness	Nil	Few	Significant	High
7. Water availability for cultivation	Water sources available within the land	Sources available close to the land	Sources available within manageable distance	Difficult to obtain water supply
8. Road Accessibility	Available to the land	Available close to the land	Available within manageable distance	Difficult to get

Based on the above parameters matrix, the land should be evaluated based for its suitability for Agriculture under appropriate category as follows:

Symbol	Category	Parameters
S1	Highly Suitable	If 1-6 parameters are at level - 1, 7-8 parameters are at level - 3 or below
S2	Suitable	If 1-6 parameters are at level -2 or below and 7 -8 parameters at level -3 or below
S3	Moderately Suitable	If 1-8 parameters are at level -3 or below
N	Not suitable	If any of the parameters are at level -4

2. The Factors that were considered to assess the lands for Housing

Parameter	Level -1	Level -2	Level -3	Level -4
1. Water availability	Water sources available within the land	Sources available close to the land	Sources available within manageable distance	Difficult to obtain water supply
2. Electricity	Electricity available	Electricity about to be supplied	Possible to get electricity	Difficult to get electricity
3. Telephone	Facilities are available	Facilities about to be supplied	Only Mobile coverage available	No coverage area
4. Transport facilities	Transport available to the land	Available closer to the land	Not available but can be developed	Very difficult to obtain transport
5. Environmental impact	Not significant	Mild problem could be expected	Could be overcome by planning	Very sensitive environmental issues will arise
6. Social impact	Very slight	Slight	Moderate	High
7. Drainage	Manageable	Unmanageable		
8. Rockiness	Possible to construct building	Impossible to construct building		
9. Slope	<45%	> 45%		

Based on the above parameters matrix, the land should be evaluated based for its suitability for Housing under appropriate category as follows:

Symbol	Category	Parameters
S1	Highly Suitable	If all (1-9) Parameters are at level -1
S2	Suitable	If 1-7 parameters are at level -2 or below and 8-9 parameters at level -1
S3	Moderately Suitable	If 1-7 parameters are at level -3 or below and 8-9 parameters at level -1
N	Not suitable	If any of 1-7 parameters are at level -4 or any 8-9 at level -2

3. The Factors that were considered to assess the lands for Industries

Parameter	Level -1	Level -2	Level -3	Level -4
1. Water availability	Water sources available within the land	Sources available close to the land	Sources available within manageable distance	Difficult to obtain water supply
2. Electricity	Electricity available	Electricity about to be supplied	Possible to get electricity	Difficult to get electricity
3. Telephone	Facilities are available	Facilities about to be supplied	Only Mobile coverage available	No coverage area
4. Transport facilities	Transport available to the land	Available closer to the land	Not available but can be developed	Very difficult to obtain transport
5.Environmental impact	Not significant	Mild problem could be expected	Could be overcome by planning	Very sensitive environmental issues will arise
6.Population in surrounding area	Surrounding area is not populated	Surrounding area is slightly populated	Surrounding area Moderately populated	Heavily populated
7. Availability of urban facilities for employees	Available within 1 Km	Available within 5 Km	Available within 15 Km	Available > 15 Km
8. Slope	<45%	> 45%		
9. Drainage	Manageable	Unmanageable		
10. Rockiness	Possible to construct building	Impossible to construct building		

Based on the above parameters matrix, the land should be evaluated based for its suitability for Industry under appropriate category as follows:

Symbol	Category	Parameters
S1	Highly Suitable	If all (1-10) Parameters are at level -1
S2	Suitable	If 1-7 parameters are at level -2 or below and 8-10 parameters at level -1
S3	Moderately Suitable	If 1-7 parameters are at level -3 or below and 8-10 parameters at level -1
N	Not suitable	If any of 1-7 parameters are at level -4 or any 8-10 at level -2at level -2

4. Factors considered in assessing the lands for Tourism development

- 1) Quality of beach /Beauty of the View
- 2) Condition for Swimming
- 3) Condition for Surfing
- 4) Proximity to Historical or Archeological Sites
- 5) Availability of infrastructure facilities
- 6) Social acceptance
- 7) Possible Environmental impact (Low, Moderate, High)
- 8) Closeness to the natural habitats