

SURVEY OF THE TRANSMISSION LINE

CONTENTS

CHAPTER 1: INTRODUCTION AND METHODOLOGY OF WORK

1.2	Methodology of Work	1
-----	---------------------	---

CHAPTER 2: GEOLOGY AND LAND STABILITY

2.1	Introduction	3
2.2	General Geology	3

CHAPTER 3: SURVEY OF FLORA ALONG THE TRANSMISSION LINE ROUTE

3.1	Introduction & Methodology	6
3.2	Description of the Site	6
3.3	Conclusion	14

CHAPTER 4: SURVEY OF THE FAUNA ALONG THE TRANSMISSION LINE ROUTE

4.1	Introduction	17
4.2	Description of the Habitat Types	17
4.3	Vertebrate Fauna	18
4.4	Invertebrate Fauna	19
4.5	Aquatic Fauna	20
4.6	Possible impacts by the Proposed Projects	20

CHAPTER 5: SURVEY OF HUMAN SETTLEMENT & LAND USE

5.1	Human Settlement	22
5.2	Land Use	26

CHAPTER 1: INTRODUCTION AND METHODOLOGY OF WORK

The Ceylon Electricity Board (CEB) proposes to establish a 150 mw Combined Cycle Power Plant at Kerawalapitiya in the Muthurajawela reclaimed area, about 10 km north of Colombo in the Wattala Divisional Secretary's Division, in the Gampaha District.

The power plant consisting of possibly two Combustion Turbine Generation (gas) and one steam turbine including the fuel storage system, cooling water system, electricity generating equipment and high voltage switch gear, water treatment plant and waste treatment plant are to be sited on a 30 ha reclaimed land-area.

The sea water intake and discharge pipelines and fuel pipes is to be sited on a 50 metre wide stretch of land located from between the two groynes on the beach, aligned in an easterly direction and turning south east towards the proposed head works.

The proposed 220 KVA Transmission Line would traverse north almost parallel to the old Dutch canal upto Ambalanmulla and proceed South of North East to the Kotugoda sub-station. The total length of the transmission line is estimated at 17.35 km.

1.2 Methodology of Work

The methodology work adopted was slightly different from what was proposed by the Consultants as 1:10,000 maps were not available. The Proposed Transmission Line traverses boggy swamps making access most difficult. Access was through minor side roads first identified in the 1:50,000 sheet, distance marked and reached by travelling in vehicle/boat or foot.

The procedure adopted is described below:

- i. Identifying on the field access points marked on the map.
- ii. Traverse the whole transmission route which is accessible identifying on ground important features, km points and turning points.
- iii. Traverse the transmission route with available land-use map (as far as is accessible) marking changes or additions in land-use, with distances for the purpose of preparing distribution sheets.
- iv. Identifying residential areas in addition to those specified in the TOR and prepare inventory of number of houses and valuable trees. Special note was made of any tall buildings, structures, railway line, roads, rivers/streams and power lines.

-
- v. The geologist inspect the transmission route after studying geological maps, in making observations and arriving at conclusions on the general geology and land stability along the route.
 - vi. The survey of fauna is conducted through line transect surveys and spot surveys. Two line transect surveys carried out along the corridor of the transmission line route between locations 7 -14 and 16-18. Spot surveys were carried out between locations 1-7 and 14-16, where short transects (approx. 100m) were carried out at 1 km intervals.
 - vii. Vegetation along the transmission line corridor was examined using transects wherever possible, and in some places the existing paths have been used to reach the location as close as possible. In compiling the report the existing data (Environmental Profile of Muthurajawela and Negombo Lagoon, 1991 and Master Plan of Muthurajawela and Negombo Lagoon, 1991) were used.

CHAPTER 2: GEOLOGY AND LAND STABILITY

2.1 Introduction

The Proposed Transmission Line traverses generally northwards, roughly parallel to the old Dutch Canal (Negombo Canal), crossing the Dandugan Oya near Kinigama and traversing north eastwards, crossing the Dandugan Oya again and passing close to Alawatupitiya Railway Station to reach the Kotugoda Sub-station.

2.2 General Geology

The Proposed Transmission Line which runs parallel to the old Dutch Canal passes through low lying, largely abandoned paddy tracts bordering the marsh upto the turning point at Ambalanmulla after the first crossing over Dandugan Oya.

The Muthurajawela marsh area including Negombo Lagoon in the northern part, was formed in the Holocene Era. It is indicated that the upper layer of the conventional marsh area includes 3 types of peat; red and sedge type peat, shrub and tree type peat, and humus type peat.

Environmental Profile of Muthurajawela and Negombo Lagoon (1991) indicates that soil in the Muthurajawela marsh area is basically classified into three types: poorly drained organic soil, bog soils; dark brown waterlogged mineral subsoil and mineral soil with large amount of organic matter, bog soils and humus soil.

Inspection of the site just south of the first Dandugan Oya crossing indicate a superficial layer of calcareous unconsolidated mud, overlying a peaty layer 1.0m to 2.0m thick, which overlies a 2.0m. to 3.0m. thick loose shelly soil which is overlying a red soil and had terminated in partially rounded white sandy soil over weathered micaceous gneiss. Fragments of these are available at the homestead near the location.

To the north from Alawatupitiya swamp area (photo no.18) are grey sands with patches of cinnamon sands quartz sands akin to glass sands and in higher elevated areas it changes typically to "Red Earth" or "Red Beds" cover (photo no.19). Whilst the grey to white sandy areas are low lying with a high water table appearing near surface the "Red Earth" assemblages are well drained. The higher relief area with spot heights ranging between 10m and 11m above sea level between Dambadure and Kotugoda area is largely composed of this material and would classify as a well drained sandy clay soil favourable for construction. The low lying area west of the Kotugoda substation forms part of the flood channels between the Dandugan and its head waters of Diyaella Oya which also connects with the Attanagalu Oya in their anastomosing network Bolanda area south of Kotugoda. So that power line area across Nekettagalla has strong erosive currents developed during flood times (photo no. 20).

In conclusion it may be stated that the transmission line route laid parallel to the old Dutch Canal is in unconsolidated, compressible, mobile, superficial strata to depths possibly greater than 3m. in most of the area between location 2 and location 14.

More stable superficial cover can be expected between location 14 and 17.

It is recommended that bore hole logs from test borings used in the Proposed Expressway be obtained from the relevant authority, as this will throw more light on the nature and the composition of strata along the Proposed Transmission Line route.

Location Map for Transmission Line Survey
Flora and Fauna Survey Area



Study area for the transmission line is
100m (50m either side from the centerline)
wide corridor along the line route.
S = 1:50,000

Figure

CHAPTER 3: SURVEY OF FLORA ALONG THE TRANSMISSION LINE ROUTE**3.1 Introduction & Methodology**

The objectives of the survey of flora along transmission line route is to examine transects at 1km intervals, to identify, classify and map the existing habitats, and to identify the endemic and threatened plants along the 100m corridor. Where adverse environmental impacts are foreseen, the study will propose outline mitigatory measures.

The survey has been carried out during the month of May 1998 through field visits. The vegetation along the transmission line corridor has been examined using transects wherever possible, and in some places sampling was carried out using the existing paths and reaching the locations as close as possible.

Locations 16 to 18 have been studied almost throughout the corridor. Locations 9 to 12 was covered by going through the old Dutch Canal by boat, and visiting the land as well.

In compiling this report, the existing data has also been used (Environmental Profile and Negombo Lagoon, 1991 and Master Plan of Muthurajawela, 1991). Especially data from plot no.3A to 3E (Heart, 1990) has been studied and incorporated. The list of Phytoplankton species present in Muthurajawela was prepared using the EIA report on Proposed LPG Import Terminal - Kerawalapitiya, 1996.

3.2 Description of the Site

The following three main vegetation types can be identified within the study area:

- i. Marsh vegetation
- ii. Aquatic vegetation
- iii. Inland vegetation

As the main concentration in this study is on habitats, the following habitats were identified within the different vegetation types based on the plant community characters.

- a. Marsh proper - a typical marsh wetland, poorly drained, temporarily flooded during the monsoon season and with a substrate mainly of peat. It can be considered as an unstable plant community (to a greater extent naturalized), representing one of the final stages of succession towards a dry land formation. The main species includes *Carex sp*, *Ishaemum sp*, *Typha sp* and patches of the fern *Achrosticum*.

- b. Disturbed marsh or Abandoned paddy fields - abandoned during the past few decades and are in close vicinity of home gardens. Most of the common paddy field weeds were found here. Access is possible and human interactions are still there.
- c. Disturbed Mangrove vegetation - Areas under this category were highly disturbed leaving one or two individual mangrove plants.
- d. Aquatic vegetation in open canals and streams (Irrigation and drainage canals) - Most of the canals examined were covered with free floating aquatic macrophytes such as *Salvinia*, *Lemna* etc. Apart from this some parts of the canals were filled and had vegetation similar to a marsh.
- e. Aquatic plants in ponds and pools, small deeper water bodies in the marsh had both free floating and rooted floating leaved species like *Nymphaea* and submerged species like *Aponogeton* and *Najas*
- f. Home gardens and other land filled sites - Apart from the common weed species found, the attention was also given to tree species as some of these might be removed during the construction processes.

With the limited access it is not possible to map the habitats very accurately, however table 3.1 indicate a fair representation of the habitats that have been encountered. A brief description of these localities is given in Table 3.2:

A list of all the shrub, herb and climbing species recorded are given in table 3.3. The species recorded during this survey are indicated with ** and the species recorded in the references are indicated with *.

In this table 81 species including five endemics and 3 introduced are listed. The endemic species listed here are, *Ardisia willisii*, *Eleocharis lankana*, *Fimbristylis zeylanica*, *Lucas zeylanica* and *Walidda antidysenterica*. None of these species are considered as threatened species. The introduced species are *Annona glabra* (a woody invasive species spreading very fast in the marsh) and *Mikania caudata* (an invasive climber found in disturbed land).

Since the project will affect the trees more than the shrubs and herbs, the tree species recorded are given separately in Table 3.4 (species that can grow over four meter in height.) Thirty tree species including four endemic and two introduced species are listed here. The endemic tree species recorded are *Bridelia moonii*, *Dillenia retusa*, *Garcinia quaesita* and *Phoenix zeylanica*. None of these are considered as threatened and as a whole, the area has a very low density of trees. Therefore the project does not seem to have much effect on trees.

Table 3.1 Different Habitats at Different Locations

Location	Marsh proper	Disturbed Marsh or Abandoned Paddy	Disturbed mangrove	Canals/streams	Pond/Pools	Home Gardens/ Land filled sites
1		+		+		+
2		+				+
3		+		+	+	+
4		+				+
5	+	+		+	+	+
6	+	+		+	+	+
7	+	+		+	+	+
8		+				
9		+		+	+	+
10		+		+		+
11		+	+	+		+
12		+	+	+		+
13		+		+	+	+
14		+		+		+
15		+		+		+
16		+		+		+
17		+		+		+
18		+				+

Table 3.2 Brief description of Location 1 to 18

Location	Description
1 & 2	Extends from the land filled site at Kerawalapitiya and the line goes across a disturbed marsh covered with <i>Panicum repens</i> , <i>Typha angustifolia</i> and other paddy field weeds such as <i>Ludwigia</i> sp, <i>Bacopa monnieri</i> etc. <i>Phragmites karka</i> <i>Acrosticum aurium</i> etc. are found along the nearby drainage canal.
3 & 4	Disturbed marsh with some land filled sites and home gardens. Access was not possible to some parts of the marsh. Extends towards a less disturbed marsh in Location 5
5	Line goes through the marsh with very little access. Therefore the marsh would have had time to develop into a marsh proper.
6	Transect at Madurupitiya. Goes through a land filled site with coconut plants. The nearby canal had aquatic species like <i>Pistia</i> , <i>Lemna</i> and also <i>Salvinia</i> . Marsh on either side of the road is disturbed. The main species found are <i>Thun hiriya</i> pan and <i>Polygonum</i> species.
7	Transect was taken at Kalaeliya. Disturbed marsh, home garden with coconut plants. In the ponding area <i>Olu</i> and <i>Najans</i> were found. However it must be noted that both locations, 6 & 7 partly go through the marsh proper.
8	Mainly disturbed marsh. On either side of the Dutch canal, <i>Annona glabra</i> was found (forming the land). Nearby ponding area had both <i>Nymphaea nauchali</i> and <i>N. pubescens</i> . The study area is in close vicinity of the marsh proper.
9 & 10	Disturbed areas with land filled sites and home gardens. Include a coconut plantation. Other tree species present are <i>Alstonia macrophylla</i> , <i>Alstonia scholaris</i> <i>Maduca longifolia</i> and <i>Mangifera indica</i> . Parts of the Old Dutch canal is covered with reeds and grasses. In more deeper places both species of <i>Nymphaea</i> and <i>Aponogeton</i> were found.
11 & 12	The area along the Old Dutch canal starting from the Muthurajawela study center towards the Dandugan oya was examined. The area is a disturbed mangrove area leaving behind few trees of <i>Bruguiera</i> , <i>Cerbera manghas</i> and planted coconut trees. Main grass species in this area is <i>Panicum repens</i> and <i>Eleocharis dulcis</i> . In the canal, species of <i>Nymphaea</i> , <i>Cabomba</i> and <i>Najans</i> were found.

Location	Description
13 & 14	Disturbed marsh, land filled sites and home gardens. Location 14 at Alawathupitiya station. The home gardens near this had common species like, Mango, Kashew and coconut. In addition a few trees of Lunumiddela were also found.
15 & 16	Abandoned paddy land with a <i>Laginandra</i> , <i>Ardesia</i> , <i>Osbekia</i> and <i>Syzygium</i> community. In this patch a population of <i>Utricularia</i> was found. Location 15 goes through a remnant patch of forest dominated by <i>Vitex altissima</i> , <i>Litsea glutinosa</i> etc. Although it is in the vicinity of home gardens ,if possible these trees should be saved.
17	Land filled site, Kurundu plantation and abandoned paddy field. Between 16 and 17 patches of <i>Calamus</i> sp was found. Although this project might not directly affect these plants, <i>Calamus</i> as a whole is a genus being threatened due to over exploitation. Therefore this can be used for buffer zone activities of Muthurajawela.
18	Land filled site with some common weeds and Bu-ambilla bushes.

Table 3.3 Shrub, Herb and climbing species recorded to be present along the transmission line				
Scientific Name	Common name	Endemic / Introduce	Reported in references	Reported in this survey
Acrosticum aurium	Karan Koku		*	**
Alternanthera sessilis				**
Annona glabra	Wel atha	In	*	**
Antidesma ghaesembilla	Bu-embilla			**
Ardisia willisii	Balu dan	En		**
Asparagus falcata	Hathawariya			**
Asteracantha longifolia				**
Bacopa monnieri	Lunuwila			**
Calamus sp.				**
Centella asiatica				**
Carex indica			*	**
Cassia alata				**
Cassia tora				**
Ceratopteris sp				**
Cinamomum verum	Kurundu			**
Coffea arabica.	Kopi			**
Coix sp.	Kikirindiya			**
Commelina diffusa	Gira Pala		*	**
Crinum sp.				**
Cuscuta chinensis			*	**
Cyperus pilosus				**
Cyperus spiralis			*	**
Derris uliginosa	Kala wel			**
Dolichandrone spathesia			*	**
Eclipta prostrata				**
Eleocharis geniculata	Kikirindiya			**
Eleocharis dulcis	Boru pan			**
Eleocharis lankana		En	*	**
Eriocaulon thwaitzii			*	**
Ericaulon sp				**
Eupatorium odoratum		In	*	**
Fimbristylis consanguinea			*	**
Fimbristylis zeylanica		En	*	**
Flagellaria indica			*	**
Fuirena sp				**
Hanguana malayana			*	**
Hygrophila spinosa	Neeramulli			**
Hyptis capitata				**
Impatiens sp.				**
Ipomoea aquatica	Kankun		*	**
Ipomoea triloba				**
Isachne globosa				**
Ischaemum rugosum	Kudu kadu			**
Ixora coccinea				**
Loranthus sp				**
Ludwigia decurrens			*	**
Ludwigia peruviana				**
Lagynandra thwaitzii			*	**
Lantana camera				**
Lepironia articulata	Elu pan			**
Limnophila repens				**

Table 3.4 Tree species recorded from the study area

Scientific name	Common name	Endemic/Introduced
<i>Alstonia macrophylla</i>	Hawarinuga	
<i>Alstonia scholaris</i>	Rukathhana	
<i>Anacardium occidentale</i>	Kadgu	
<i>Azadirachta indica</i>	Kohomba	
<i>Barringtonia racemosa</i>	Diya midella	
<i>Bridelia moonii</i>	Patkela	En
<i>Bruguiera sexangula</i>	Kuda Kadol	
<i>Callophyllum inophyllum</i>	Domba	
<i>Caralia bracteata</i>	Dawata	
<i>Cerbera manghas</i>	Kaduru	
<i>Cocos nucifera</i>	Pol	
<i>Dillenia retusa</i>	Goda para	En
<i>Ficus tsjahela</i>	Nuga	
<i>Garcinia quaesita</i>	Goraka	En
<i>Lagestromia speciosa</i>	Murutha	
<i>Litsea glutinosa</i>	Bomi	
<i>Mangifera indica</i>	Amba	
<i>Melia dubia</i>	Lunu midella	
<i>Maduca longifolia</i>	Mee	
<i>Musa x</i>	Banana	
<i>Nauclea orientalis</i>	Bakmi	
<i>Phoenix zeylanica</i>	Wal' indi	En
<i>Phyllanthus acidus</i>	Rata nelli	In
<i>Sterculia foetida</i>	Thelabu	
<i>Symplocos cochinchinensis</i>	Bombu	
<i>Syzygium cumini</i>	Ma-Dan	
<i>Tamarindus indicus</i>	Siyambala	
<i>Terminalia arjuna</i>	Kumbuk	
<i>Terminalia catappa</i>	Kottamba	In
<i>Vitex altissima</i>	Milla	

The open canals and ponds are rich in aquatic macrophytes as well as microscopic phytoplanktons. A list of Phytoplankton species recorded from Muthurajawela is given in Table 3.5. The aquatic plants (true aquatic species) found in this survey are listed in Table 3.6.

3.3 Conclusion

Although some parts of the transmission line pass through the marsh proper most of it goes through highly disturbed areas. Total of 7 endemic species have been recorded and none are considered as threatened. Prevention of habitat fragmentation and the preservation of micro habitat conditions can be achieved by not altering the existing soil formations and drainage conditions. For example if it is necessary to fill the land during the construction process, it should be carried out in a way so that it will not alter the existing drainage pattern especially in the marsh proper (The corridor runs along the boarder of the Muthurajawela conservation area).

Ecologically the following locations can be considered as important:

Location 5&6 which include part of marsh proper

Location 15 - although there are houses in this location, there are few trees of milla (*Vitex altissima*), *Litsea glutinosa*, *Walidda antidysenterica*, representing a remnant patch of a forest community. Although these are not threatened plants, leaving this patch intact will at least show the existence of such a community in this area (Provided there is no human interference !)

Table 3.5 PHYTOPLANKTON SPECIES RECORDED FROM
THE MUTHURAJAWELA AREA

BLUE GREEN ALGAE

Anabaena sp.
Chroococcus sp.
Lyngbya sp.
Merismopedia sp.
Microcystis sp.
Oscillatoria sp.
Rivularia sp.

GREEN ALGAE

Chlorella sp.
Chladophora sp.
Closterium sp.
Cosmerium sp.
Mougeotia sp.
Pediastrum sp.
Scenedesmus sp.
Spirogyra sp.
Volvox sp.

DIATOMS

Amphora sp.
Achnanthes sp.
Biddulphia sp.
Campylosira sp.
Coccinodiscus sp.
Cyclotella sp.
Cymbella sp.
Diatoma sp.
Diploneis sp.
Gramatophora sp.
Licmophora sp.
Melosida sp.
Navicula sp.
Nitzschia sp.
Pinnularia sp.
Pleurosigma sp.
Prorocentrum sp.
Surirella sp.
Tabellaria sp.

DINOFLAGELLATES

Ceratium sp.
Gymnodinium sp.
Peridinium sp.

Source: "Proposed LPG Import Terminal - Sri Lanka at Kerawalapitiya EIA Report" (1996)

Table 3.6 AQUATIC MACROPHYTES RECORDED FROM THE MUTURAJAWLA

SCIENTIFIC NAME	Common Name	Reported In References	Reported In This Survey	Endemic Introduced
Azolla pinnata			**	
Aponogeton crispes	Kekatiya	*	**	
Cabomba sp			**	
Eichhornia crassipes	Water hyacinth	*	**	In
Hydrilla verticillata	Hydrilla		**	In
Lemna sp.	Duckweed	*	**	
Limnocharis flava	Diya gova		**	
Monochoria vaginalis			**	
Najans sp			**	
Nymphaea pubescence	Otu		**	
Nymphaea nauchali	Manel		**	
Pistia stratiotes			**	
Salvinia molesta		*	**	In

CHAPTER 4: SURVEY OF THE FAUNA ALONG THE TRANSMISSION LINE ROUTE

4.1 Introduction

The objectives of the survey of terrestrial and aquatic fauna along transmission line route is to examine transects at 1km intervals, to identify, classify and map the existing habitats, and to identify the endemic and threatened faunal species along the 100m corridor. The second objective was to identify any possible environmental impacts due to the proposed transmission line, and to propose mitigation measures to overcome these problems.

The survey has been carried out during the month of May 1998 through field visits. The sampling techniques used for this purpose were, line transects along the transmission line corridor. Two line transects surveys were carried out along the corridor of the transmission line route, between locations 7 and 14, and 16 and 18. Spot surveys were carried out between locations 1 and 7, and 14 and 16, where short transects (approximately 100m) were carried out at 1 km intervals of the proposed transmission line route. The faunal species observed and their relative densities were recorded. As the actual survey was carried out during a short time interval, faunal species reordered from the study area during previous surveys were also taken into consideration when compiling the species list.

4.2 Description of the Habitat Types

Several habitat types were identified along the corridor of the transmission line route. The different habitat types found can be described as follows:

- Marsh proper: Typical marsh habitat with little or no human activity
- Disturbed marsh: Marsh area with high human activity including settlements
- Disturbed mangroves: Mangrove with high human activity including settlements
- Home gardens: Land associated with houses.
- Plantations: Large scale plantations. Two such plantations were encountered along the transmission line route. One was a coconut plantation (Location 9) and the other was a cinnamon plantation (Location 15).
- Land fills: Marsh area reclaimed by filling with soil or sand.
- Canals and waterways: The transmission line corridor are given in Table 4.1.

Table 4.1: Distribution of various habitat types along the Transmission line corridor

Location	MP	DM	DMan	HG	Plant	LF	CW
1						+	
2		+		+			
3		+					
4		+					+
5	+	+		+			+
6	+	+					+
7	+	+					+
8	+	+					+
9		+		+	+		+
10		+		+	+		+
11			+	+			+
12			+	+			+
13			+	+			+
14		+		+			
15		+		+	+		
16				+			
17		+					+
18		+				+	

MP: Marsh proper; DM: Disturbed marsh; Dman: Disturbed mangrove; HG: Home garden; Plant: Plantations; LF: Land fills; CW: Canals and Waterways.

4.3 Vertebrate Fauna:

More than 60% of the proposed transmission line corridor runs along the old Dutch canal through the Muthurajawela marsh. Muthurajawela marsh and the associated areas support a diverse group of vertebrates. This includes 31 species of mammals (1 endemic species), 86 species of birds, 37 species of reptiles (4 endemic species), 16 species of amphibians (3 endemic species), and 37 species of fish (2 endemic species). In addition it serves as an important habitat for the migrant birds. A total of 39 species of migrant birds have been recorded from the Muthurajawela-Negombo lagoon area which comprise 23% of the migrants birds that visit Sri Lanka. Although a number of endemic and threatened species occur in this area, none of these species are restricted to this habitat alone. The rest of the transmission line corridor runs through home gardens and disturbed marsh habitats.

A summary of the vertebrate species that have been recorded from the area coming under the proposed transmission line corridor and their conservation status is given in Table 2. A list of the vertebrate species that have been recorded from the study area is given in Annex 1.

Table 2. Summary of the vertebrate species recorded from the area coming under proposed transmission line corridor.

Group of Vertebrates	Island wide			At Muthurajawela		
	Total	Endemic	Threat.	Total	Endemic	Threat.
Mammals	122	14	39	31	1	6
Birds - Resident	227	23	51	86		4
Birds - Migrant	194		5	39		
Reptiles	173	82	113	37	4	13
Amphibians	53	31	29	16	3	4
Fish	116	29	25	37	2	2

4.4 Invertebrate fauna:

As in the case of vertebrates, the most number of invertebrates that occur within the proposed transmission line corridor are restricted to the Muthurajawela marsh. However, unlike the vertebrates these invertebrates are not being studied in detail except the butterflies and dragon flies. A total of 67 species of butterflies (9 endemic species) and 34 species of dragon flies (8 endemic species) have been recorded from Muthurajawela marsh area. Most important groups of invertebrates found in the Muthurajawela marsh includes, planktonic species, crustaceans, molluscs, worms, aquatic insects, butterflies, and dragon flies.

4.5 Aquatic fauna:

The proposed transmission line corridor runs along the old Dutch canal within the Muthurajawela marsh. Furthermore, it crosses two large waterways, namely, the Ja-Ela and Dandugam oya. In addition to these water ways the transmission line runs over several small canals and marshes. Therefore, a better part of the proposed transmission line is going to be located on habitats that are semi aquatic. These habitats have been shown to support a diverse fauna, both vertebrate and invertebrate. The vertebrate component includes fish, amphibians, water snakes, and water birds. The invertebrate fauna consists of planktonic species, molluscs, crustaceans, aquatic insects, and aquatic larval forms of many insects.

4.6 Possible impacts by the proposed project:

A major part of the proposed transmission line corridor runs along the Muthurajawela conservation area and the buffer zone of the Muthurajawela marsh. However, it is unlikely that the proposed transmission line will have a significant impact on the environment as it is restricted to a narrow corridor of 100 m along the periphery of the conservation zone. Furthermore, since it is a static body, once constructed it will have very little effect on the environment. The highest amount of impact is expected to occur during the construction phase, especially by the part of the corridor that runs through the Muthurajawela marsh area. However, it is difficult to comment on the nature and the extent of damage that will take place, as the details regarding the placement of the transmission towers and the mode of construction is not available at this time.

The following two mitigatory measures can be proposed to minimize the potential environmental impacts that may result due to the proposed transmission line corridor.

- Avoid any construction work within the Muthurajawela marsh area during the migration period (August-February) of birds.
- To place the transmission towers with minimum damage to the surrounding environment.

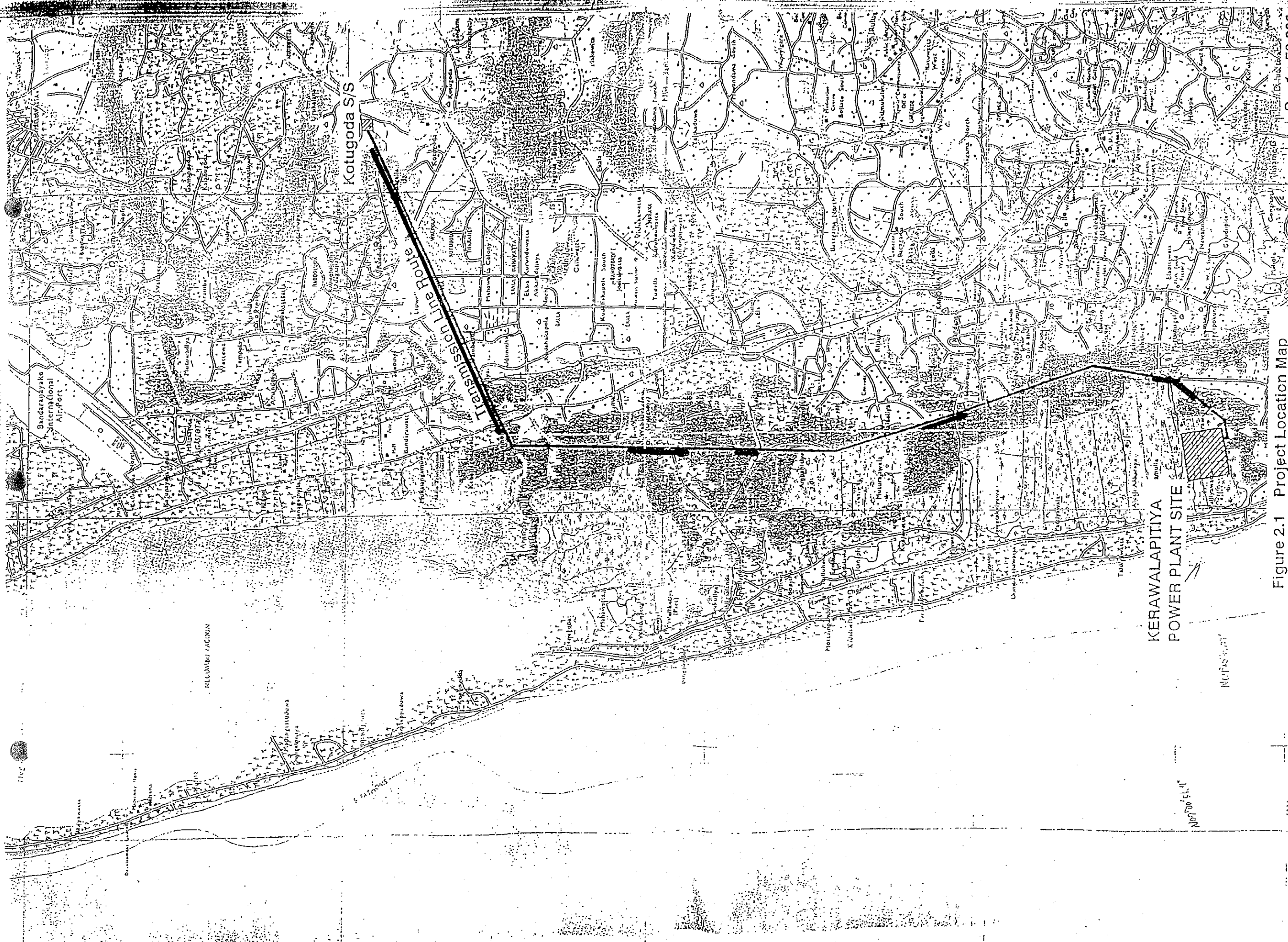


Figure 2.1 Project Location Map

Residential Areas

CHAPTER 5: SURVEY OF HUMAN SETTLEMENT & LAND USE**5.1 Human Settlement**

There are five areas along the transmission line corridor which could be considered as residential. The information of housing and valuable trees are illustrated in the Distribution Data Sheets on Housing and Valuable trees.

1st Residential Area:

This residential area extending from 0km 700m to 1km 430m along the transmission line route has 15 permanent houses (all single storey) and 50 coconut trees in the 100m wide corridor. This area was not indicated in the TOR.

2nd Residential Area:

The 2nd residential area is in the 6th km, from about 5km 60m to 5km 420m. This section has 16 no. temporary cadjan houses and 30 coconut trees in the 100m wide corridor.

3rd Residential Area:

The 3rd residential area is in the 9th km, from 8km 200m to 8km 330m. This section has 10 semi-permanent houses, 10 cadjan houses and 100 coconut trees.

4th Residential Area:

The 4th residential area is a small one in the 12th km from 11 km 500m to about 11km 650m. and has 1 semi-permanent house and 4 temporary houses together with 110 coconut trees, and is on either banks of Dandugan Oya.

5th Residential Area:

This is a long length from 12 km to 16km.

The 13th km has 15 permanent houses, and 100 coconut trees in 3 sections.

The 14th km has 30 permanent houses, 450 coconut trees, and valuable trees such as Milla, Nedum, Jack and Halmilla.

The 15th km has 20 permanent houses 550 coconut trees and valuable trees such as Nedum and Jack.

The 16th km has 20 permanent houses and 50 coconut trees with a few Nedum trees. After 15 km 800m there no houses or valuable trees on the route.

At approximately 12.6 km a temple is situated on the left side of the transmission line corridor, with the Chaiththaya out side the corridor.

At about 14.3 km the St. Sebestien's Church is situated on the edge of the corridor south of the center line.

Distribution Data sheet on Housing & Valuable Trees
along Transmisson Line.

SHEET 1.

2 km

4 km

6 km

1 km

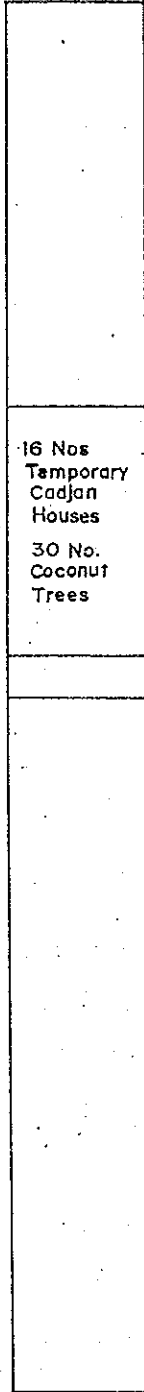
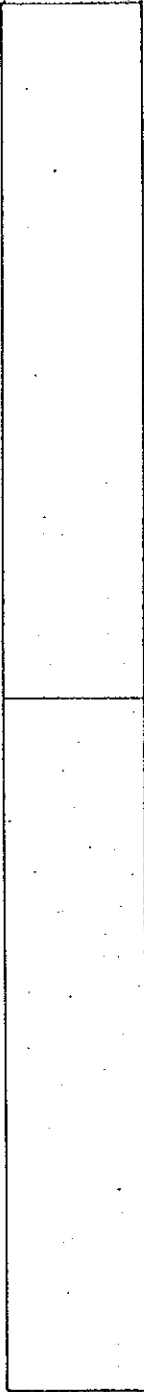
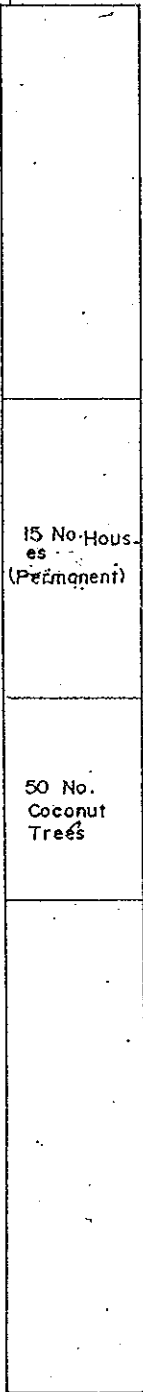
3 km

5 km

0 km

2 km

4 km



150 MW Combined Cycle
Power Plant-Kerawalapitiya

**Housing & Valuable Trees
in the Transmisson Line
Corridor**

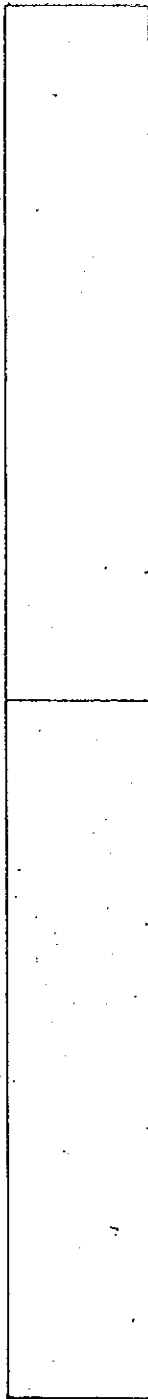
Scale : 1:10,100

DATE

Distribution Data sheet on Housing & Valuable Trees
along Transmission Line.

SHEET 2.

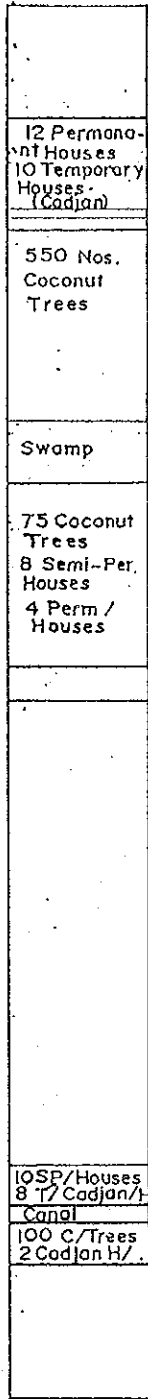
8 km



7 km

6 km

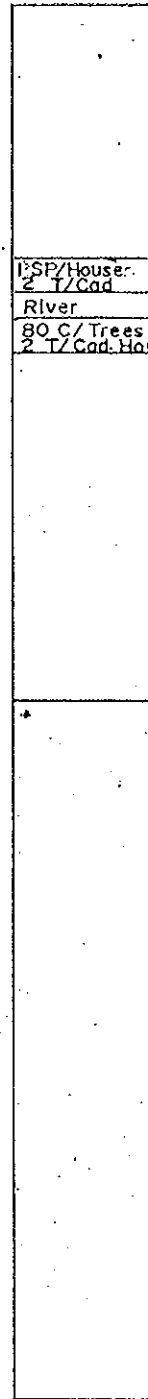
10 km



9 km

8 km

12 km



11 km

10 km

Road

10 SP/House.
2 T/Cad.
River
80 C/Trees
2 T/Cad. Houses

300/Trees
Dandugap Oya

150 MW Combined Cycle
Power Plant-Kerawalapitiya

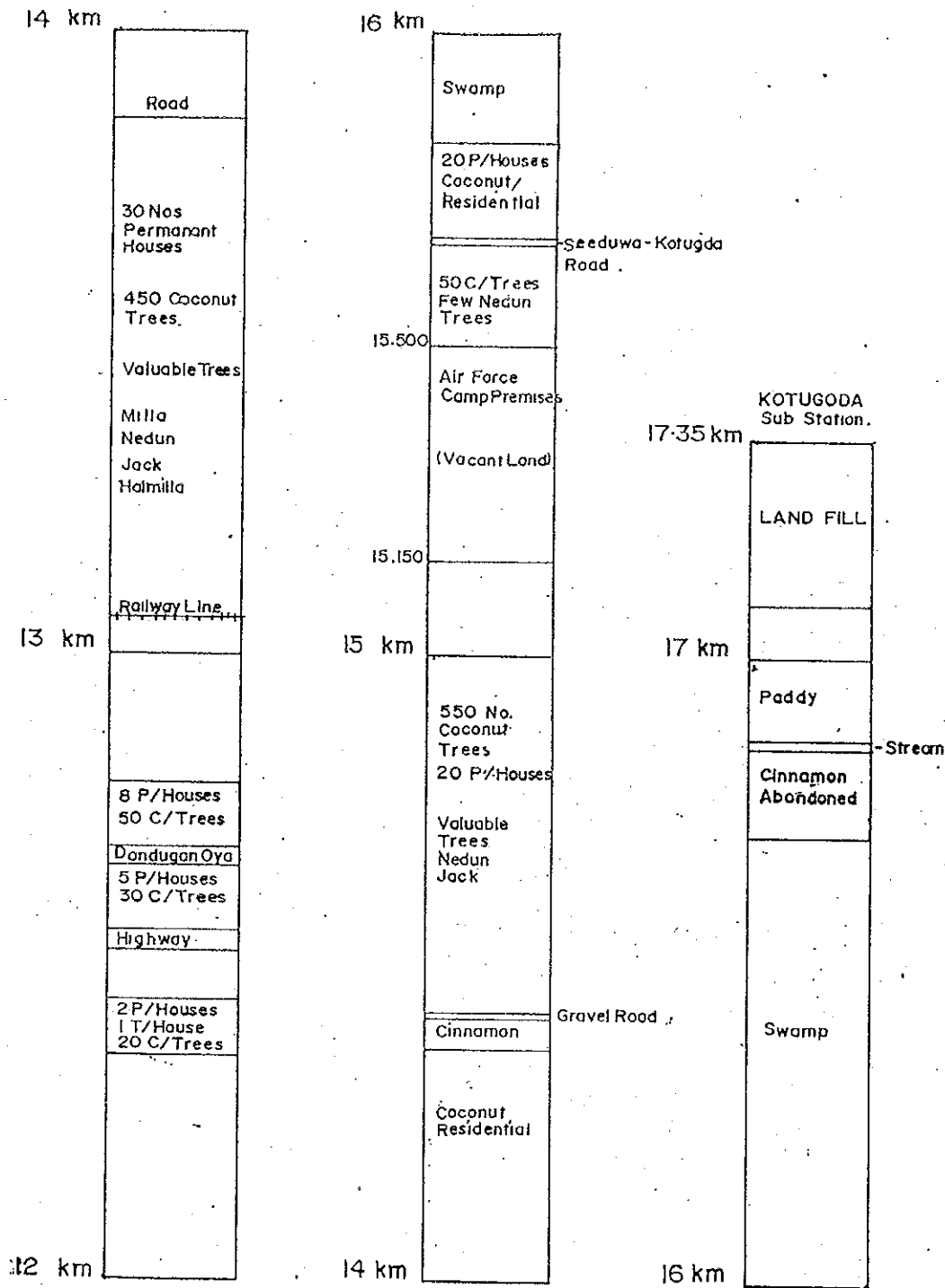
Housing & Valuable Trees
in the Transmission Line
Corridor

Scale: 1:10,000

DATE.

Distribution Data sheet on Housing & Valuable Trees along Transmission Line.

SHEET 3.



SUMMARY

Total Number of Houses

Permanent	116
Semi Permanent	19
Temporary	41
Total =	176

Valuable Trees

Coconut Trees - 2065

Milla, Halmitla,	
Nedun, Jack.	85
Other tall Trees	65

150 M W Combined Cycle Power Plant - Kerawalapitiya

Housing & Valuable Trees In the Transmission Line Corridor

Scale : 1:10,000

DATE

5.2 Land Use

The land use along the Transmission line route is illustrated in the "Distribution Data Sheet on Land Use for Transmission Line Survey" sheet 1, 2 and 3. Large portions of the transmission line route (5.3 km) is through marsh land.

In the first km, 0-400m is over the reclaimed sand fill, and the next 300m is through marsh before a stretch of home garden in Kerawelapitiya from 0km 700m to 2km 300m. The 2nd km is interspersed with short stretches of home garden developed within the marsh land.

From about 1km 830m to 5 km 60m. the transmission line traverses marshland running beside the Dutch canal. The proposed Katunayake Expressway runs parallel on the east of the Dutch canal.

In the 6th km from about 5km 6m. to 5km 420m there is a stretch of home garden with residential located on either side of the road to Pubudugama and Pinwatte from Kandana. Again the line passes continuously over marsh land from 5km 420m to 8km 160m approximately.

In the 9th, 10th, 11th and 12th km. there are short stretches of home garden interspersing mainly marsh land which ends at about 12km 150m.

The proposed transmission line turns North Eastwards at 12km and traverses a long stretch of built up area.

In the 13th km the marsh/swamp stretches upto about 12km 350m with the Dutch canal crossing at 12km 150m. There is coconut and residential housing from 12.35km to 12.80km with the Colombo - Negombo highway crossing at 12.55km and Dandugan Oya crossing at 12.7 km. There is a short stretch of marsh land from 12.8 km to 13 km.

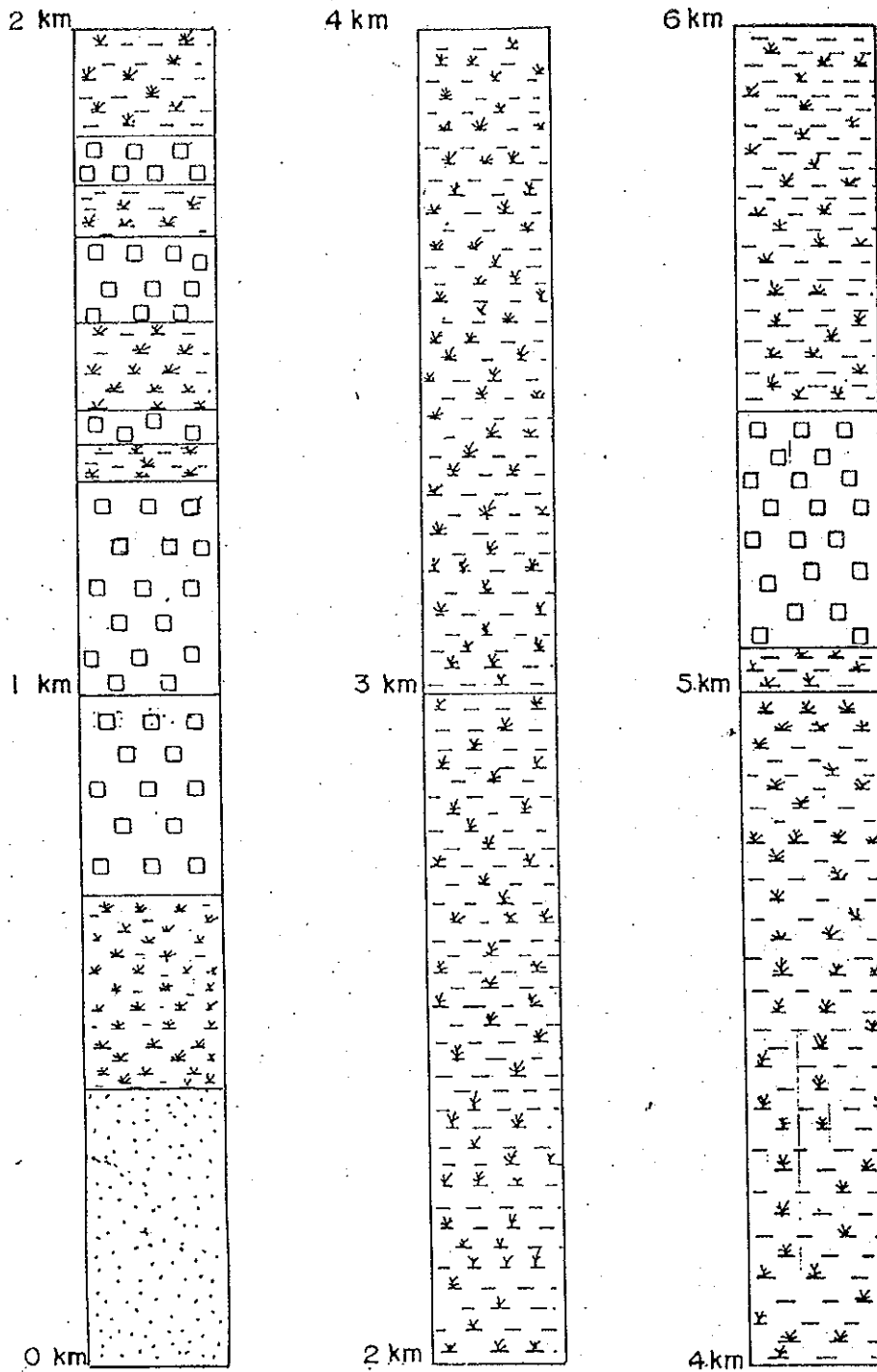
In the 14th km the railway line crosses at about 13.05km and the coconut and residential area stretches upto 15.15 km with a narrow strip of cinnamon at 14.375km.

The vacant land of the Air Force Camp lies from 15.15 km to 15.5km, and from 15.5 km to 15.82 km is a coconut and residential area.









Beyond 15.82km to 16.72km is swamp, from 16.72km to 16-86km is a abandoned cinnamon.

A stream crosses here, and there is abandoned paddy land from 6.87km to 17.10km. From 17.10km to 17.35km (end of line) is land fill area used for industrial development.

Distribution Data Sheet on Land Use for Transmission Line Survey



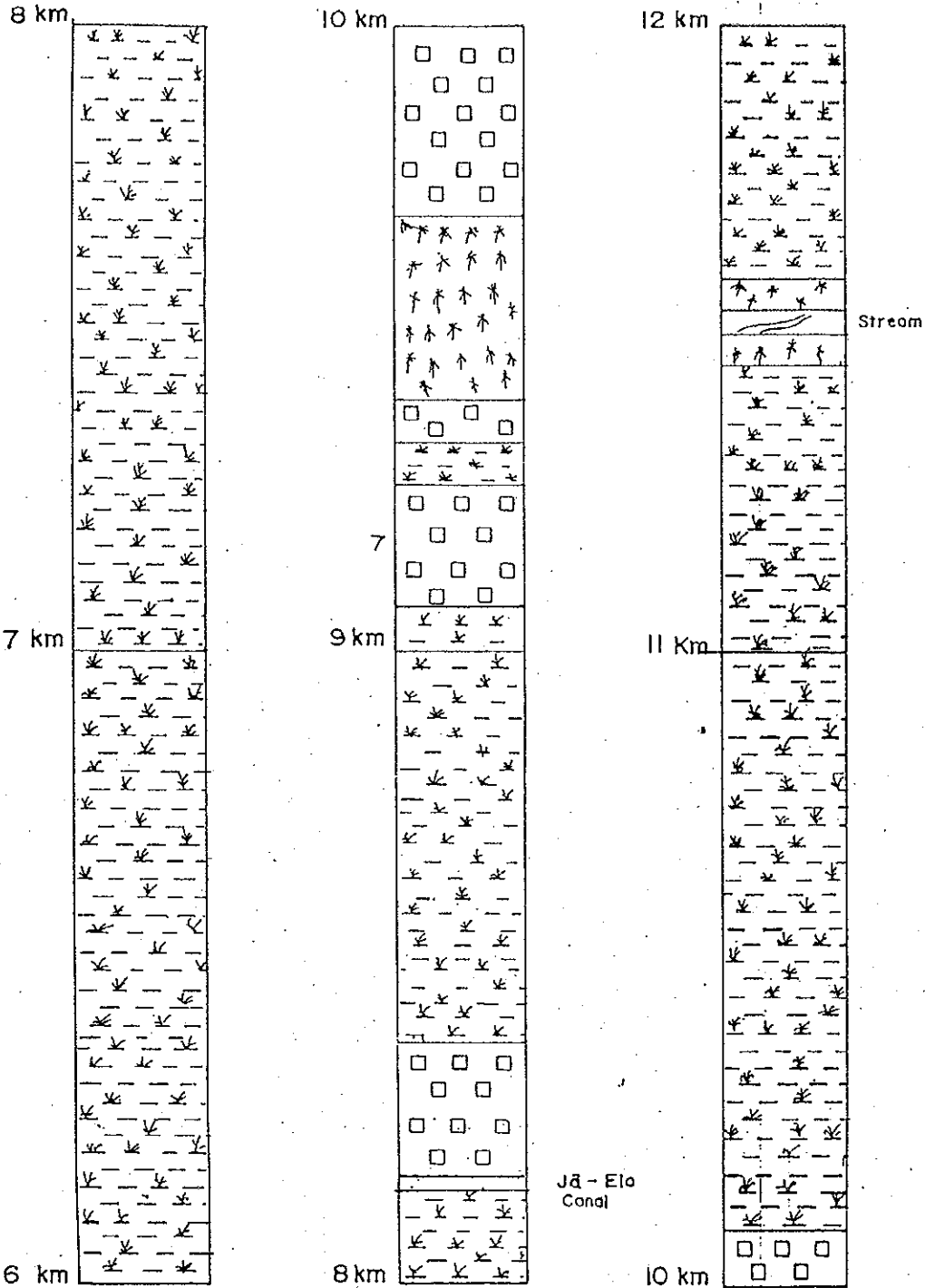
Legend

- | | | | |
|---|-----------------------------|---|---------------|
|  | Coconut |  | Scrib |
|  | Paddy |  | Marsh |
|  | Home Garden/
Residential |  | Stream/Lagoon |
|  | Coconut/
Residential |  | Cinnamon |

150 MW Combined Cycle
Power Plant - Kerawalapitiya

Land Use in the Transmission Line Corridor

Scale : 1: 10,000
Date :



Legend

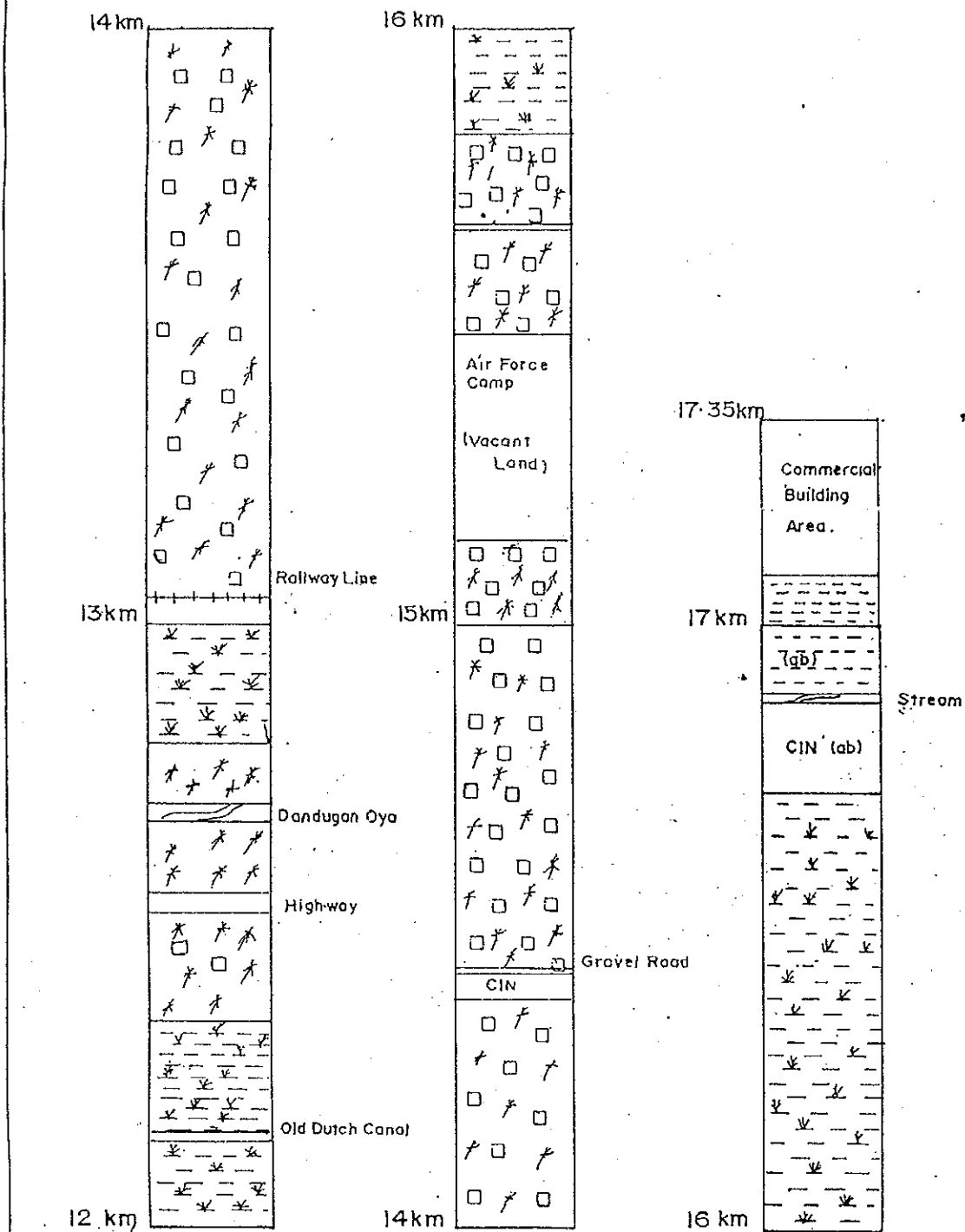
- | | | | |
|--|-----------------------------|--|---------------|
| | Coconut | | Scrub |
| | Paddy | | Marsh |
| | Home Garden/
Residential | | Stream/Lagoon |
| | Coconut/
Residential | | Cinnamon |

150 MW Combined Cycle
Power Plant - Kerawalapitiya

Land Use in the Transmission Line Corridor

Scale : 1: 10,000
Date :

Distribution Data Sheet on Land Use for Transmission Line Survey



Legend

- | | | | |
|--|-----------------------------|--|---------------|
| | Coconut | | Scrub |
| | Paddy | | Marsh |
| | Home Garden/
Residential | | Stream/Lagoon |
| | Coconut/
Residential | | Cinnamon |

150 MW Combined Cycle
Power Plant - Kerawalapitiya

Land Use in the Transmission Line Corridor

Scale : 1: 10,000
Date :

CHAPTER 6: COST RELATED TO COMPENSATION ON TRANSMISSION LINE

6.1 Present CEB Practices in Providing Compensation On Transmission Lines

It is the practice in the CEB to pay compensation only for valuable trees that are to be removed along the transmission line and for valuable land to site the transmission towers. The CEB, as a practice, does not pay compensation for sitting the towers in paddy lands or in land of low value such as those in non-residential areas. Even in residential areas CEB as a practice is not paying for land but pay for valuable trees that may be removed. Where owners refuse to give the land to install a tower, they would go through acquisition procedure.

6.2 Valuation of Land to be Used for Establishment of Transmission Line

One form of paying compensation for using land for the establishment of transmission line is by direct purchase from owners. The Board can deal directly with the owners and enter into negotiations for the purchase of their lands. For this purpose owners have to be identified and deeds perused.

The land area indicated as marshland from 0 to 12 km along the transmission line, is according to survey maps - abandoned paddy land now in a state of complete disuse.

The valuer's estimate of land costs are:

- i Cultivating Paddy Land - Rs. 500/- per perch (Rs. 19.00 per sq.m)
- ii Abandoned paddy land with very poor access - value nil
- iii Abandoned paddy land (near Kotugoda) filled for industrial/commercial purposes - Rs. 50,000.00 per perch. (Rs. 1,880/- per sq.m)
- iv Abandoned paddy land (near Kotugoda), unfilled, but with potential to fill and use for industry - Rs. 35,000.00 per perch (Rs. 1,315/- per sq. m)
- v Location 1 to 12 - identified residential cum coconut land within marshland - Rs. 20,000.00 per perch (Rs. 752/- per sq. m)
- vi Buildable land immediately after Colombo-Katunayaka Road - Rs. 60,000.00 (Rs. 2,255/- per sq.m)

- vii Swamp area before Railway Line - value nil.
- viii Residential cum Coconut land from Railway Line to Air Force Camp area - Rs. 30,000 per perch (Rs. 1127/- per sq. m)
- ix Air force Land - Divisional Secretary to be addressed to obtain land.
- x Residential area cum Coconut land from Air Force Camp are to Swamp - Rs. 30,000.00 per perch (Rs 1127/- per sq. m)
- xi Coconut Land - Rs. 10,000.00 per perch (Rs. 375/- per sq.m)

6.2 Acquiring Land Under Land Acquisition Act

If the required land is acquired under the Land Acquisition Act, value will be depressed as the lots are small, not buildable and is without access. Value would be around Rs. 10,000.00 per perch (Rs. 376/- sq.m) for lands valued at Rs. 30,000.00.

6.3 Compensation Cost on the Basis of Present CEB Procedure

i Cost of Valuable Trees Along Transmission Line

Estimated No. of Coconut Trees in 35 m Width of Strip

Location	1.&2	3+4+5	6+7+8	9	10	11	12	13	14	15	16	Total
No. of C'nut Trees	20	0	10	35	225	0	40	35	160	200	20	745

Approximate number of valuable trees such as Jak, Halmilla and Nedun in the 35 m strip is 30.

Estimate of Cost :

745 No. Coconut trees @ Rs.1200.00	Rs. 894,000.00
30 No. Valuable trees @ Rs. 15,000	Rs. 450,000.00
Compensation for land for tower footings	nil
	Rs.1,344,000.00

The approximate number of valuable trees in the 100 m corridor:

Coconut trees	2065
Jak, Halmilla, Nedun etc.	85
Other tall trees	65

Total Number of houses in the 100 m corridor:

Permanent	116
Semi-permanent	19
Temporary	41
Total	171

6.4 Compensation Cost On the Basis of CEB Purchasing the Required Piece of Land for Tower Footings

Distribution of Towers and Cost of Land

Location	1	2	3	4	5	6	7	8	9
No. of Towers	5	3	4	3	3	3	3	3	3
Land Use	2S,2M, 1R/C	2R/C, 1M	4M	3M	3M	1R/C, 2M	3M	3M	1R/C, 2M
Cost (Rs.)	147,392	294,784	nil	nil	nil	147,392	nil	nil	147,392

Location	10	11	12	13	14	15	16	17	18
No. of Towers	3	3	3	5	4	3	4	3	3
Land Use	2R/C, 1C	3M	3M	3C, 2M	4R/C	3R/C	2R/C, 1M,1V	2M, 1P	1Ind. 2(CEB)
Cost (Rs.)	368,284	nil	nil	220,500	883,568	662,676	441,784	257,740	362,600

Total Rs: 3,735,662.00

Legend:	R/C	=	Residential cum Coconut Land
	S	=	Sand Filled Reclaimed Land
	M	=	Marshland/Abandoned Paddy
	C	=	Coconut Land
	V	=	Air Force Camp - Vacant Land
	Ind.	=	Land Filled for Industrial Purposes
	(CEB)	=	Within Kotugoda Substation Premises

Estimate of Cost :

745 No. Coconut trees @ Rs.1200.00	Rs. 894,000.00
30 No. Valuable trees @ Rs. 15,000.00	Rs. 450,000.00
Cost of Purchase of Land for Tower footings	Rs.3,735,662.00
Total Cost	<u>Rs. 5,079,662.00</u>

6.5 Compensation Cost on the Basis of Acquiring the Land for Tower footings**Estimate Cost:**

745 No. Coconut trees @ Rs.1200.00	Rs. 894,000.00
30 No. valuable trees @ Rs. 15,000.00	Rs. 450,000.00
Tower footings in residential cum Coconut land within marshland (0 - 12 km) 7 Nos. @ Rs. 51,548.00	Rs. 360,836.00
Tower footings in residential cum Coconut land (12 to 17 km) 12 Nos. @ Rs. 73,500	Rs. 882,000.00
Tower footing in abandoned paddy land near Kotugoda	nil
Tower footing in land filled for industrial purposes 1 No.@ Rs.147,392.00	Rs.147,392.00
Total	<u>Rs. 2, 734,228.00</u>

JICA