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**INITIAL ENVIRONMENTAL EXAMINATION**

of the

**PROPOSED INDUSTRIAL ESTATE**

at

**MAPAKADA**

**(VIYANINI CAMP)**

**December 1995**

**Prepared for the Ministry of Industrial Development**

by

**NAREPP/IRG**

**Colombo, Sri Lanka**

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The findings and recommendations contained herein represent the best professional judgement of the study team only.

## TABLE OF CONTENTS

I.	GENERAL SITE DESCRIPTION	1
II.	PHYSICAL ENVIRONMENT	1
	Weather	1
	Topography, Soils, Ground water	1
	Surface Water Hydrology	2
	Water Quality	3
	Air Quality and Noise	3
III.	CURRENT AND PLANNED FACILITIES AND SERVICES	
	Water Supply	3
	Infrastructure	4
	Existing Structures and Industrial Activities	5
IV.	BIOLOGICAL ENVIRONMENT AND NATURAL RESOURCES	
	Significant Flora	6
	Significant Fauna	6
	Sensitive Habitat	6
V.	SOCIAL AND CULTURAL ENVIRONMENT	
	Human Settlements	6
	Labour Force	7
	Local Economic Activity	7
	Religious and Cultural Features	7
	Aesthetic and Recreational Features	7
	Local Customs, Aspirations, and Attitudes	7
VI.	MAJOR ENVIRONMENTAL AND REGULATORY ISSUES	
	Sensitivity of the Affected Environment	7
	Regional Water Resource Limitations	8
	Regulatory Issues	8
VII.	GENERAL CONCLUSIONS AND RECOMMENDATIONS	8
	REFERENCES	
	ANNEX A-I           Regional Map	
	ANNEX A-II         Site Map	
	ANNEX A-III       Site Photographs	
	ANNEX B:           Detailed Soil Analysis	
	ANNEX C:           Detailed Water Quality Analysis	

**MAPAKADA (VIYANI CAMP)  
PROPOSED INDUSTRIAL ESTATE  
INITIAL ENVIRONMENTAL EXAMINATION**

**I. GENERAL SITE DESCRIPTION**

The site proposed for this industrial estate is located in the Mahiyangana Divisional Secretary Division in the Badulla District along the Mahiyangana-Badulla (B46) road at the vicinity of Mapakada tank. The site, approximately 4.3 ha (11 acres) of high ground covered with scrub vegetation, had been the camping ground of a contractor involved in constructing the nearby Minipe Right Bank Transbasin canal. The old camp buildings have been demolished; only their debris remains. The site rises from southwest to northeast, encompassing the crest of a hill; the steepest slope within the site is approximately 20%. The boundary along the eastern edge is steeper and forms a deep valley. See Annex A for regional and site maps of the area.

**II. PHYSICAL ENVIRONMENT**

**A. Weather**

The site is situated in the intermediate zone of Sri Lanka. Meteorological observations at Batticaloa, approximately 100 km away can be considered representative of the region encompassing this site. Temperatures in the region vary from 22 to 34°C during the year. Mean annual rainfall at Mapakada Wewa (within 1 km of the site) is 2096.7 mm/yr (1992-1995 June). Most rainfall, averaging 1706.1mm, is received during the Maha season from October to March. The Yala season rainfall (from April to September) averages 390.6mm. Average wind velocity in the region is 9.5 km/hr. Wind direction is predominantly SE from May to September and N or NE from December to February.

**B. Topography, Soils, Groundwater**

The proposed site is roughly rectangular; a perimeter survey done in 1994 shows that the site area is 4.31 ha (10.8 ac). The proposed site had been the camping ground of a construction company and hence some landscaping and earth moving was done at the site. The western boundary is the government reforestation project; the eastern boundary is a steep valley. The elevation of the site is approximately 120m above msl; land within the site has slopes of up to 20%.

About half of the land drains to the northern side and the rest drains towards the east and the south. Most surface water from the site finally drains towards the Mapakada Wewa across the transbasin canal. Soils within the site are predominantly clay with gravel layers exposed as a consequence of earth-moving that took place during the camp construction. See Annex B for further soil analysis.

A well located on land adjacent to the site and close to the B46 road had ground water about 5.5m below the surface. The well had a water depth of about 1.2m. No other specific on-site measurements of ground water availability were done during this study.

### **C. Surface Water Hydrology**

There are no permanently-flowing water bodies within the site. The surface water bodies in close proximity are:

- (1) Minipe Right Bank Transbasin Canal
- (2) Mapakada Wewa
- (3) Hepola Oya Reservoir
- (4) Miriswaga Wewa
- (5) Transbasin Seepage Water Stream

**Minipe Right Bank Transbasin Canal** passes within 200m to the west of the site. The full flow in the canal is 64 m<sup>3</sup>/s. This water flows to the Ulhitiya Rathkinda Reservoir. Mahaweli Authority does not permit the tapping of water at intermittent points which have not been preplanned; however, at present the police training school and a local garment industry obtain water directly from this canal.

**Mapakada Wewa** (0.5 km southwest of the site) has a capacity of 9.5 x 10<sup>6</sup>m<sup>3</sup>. The Minipe Transbasin Canal releases an average of 0.216 MCM/day to this tank. Water uses are mainly for irrigation, domestic purposes, and fishing. Water depth at the outlet sluice at full capacity is 8.23m; at the time of the visited in august the depth was 4.11m.

**Hepola Oya Reservoir** is across the Hepola Oya which crosses the B46 road approximately 1.3 km southeast of the proposed site. This is also part of the Minipe Transbasin Canal and has a capacity of 12.6 x 10<sup>6</sup>m<sup>3</sup>. As Hepola Oya reservoir is a level crossing, this wewa is full when the water flows along the transbasin canal.

**Miriswaga Wewa** is located approximately 1.5km from the site to the northeast. This tank collects drainage water from the Nagadeepa Irrigation Scheme and had been built with the intention of using it as part of a lift irrigation scheme. Presently the tank is said to be close to spill level most of the year; some of this water is being used by a few farmers for gravity irrigation. Other main uses are for domestic purposes and bathing. The approximate capacity of the tank is 275,000 m<sup>3</sup>.

The **transbasin canal seepage water outlet** is located within about 500 meters of the site to the south upstream of the canal and to the west, draining to the Mapakada Wewa. This drain appears to collect seepage water from the transbasin canal, which comes to the Mapakada Wewa apart from the official release of 0.216 MCM/day. The flow in this stream was measured at 0.05 m<sup>3</sup>/s (0.004 MCM/day).

#### **D. Water Quality**

To assess the quality of water found in the vicinity of the proposed site, water samples were taken from the following locations for detailed laboratory analysis. (More detailed water quality analysis of these samples is presented in Annex C.)

- (1) Minipe Right Bank Transbasin Canal, at the bridge over the canal on highway B46 (Mahiyangana-Badulla);
- (2) Mapakada Wewa at the inlet sluice inlet;
- (3) Hepola Oya at the bridge on highway B46;
- (4) Miriswaga Wewa;
- (5) Well within the proposed site, between the land allotments made to Dissanayake and Sriyawathi.

Ammonia was found in the surface waters of the irrigation tanks at a higher level than that found in the samples from other water bodies. Fluoride was found in most of the water samples at a level that exceeds the proposed minimum ambient water quality standard (CEA and BKH, 1993). According to Dissanayake and Weerasooriya, the composition of rocks of the area coupled with climate conditions are the key factors for the abundance of fluoride in the dry zone (Eastern and Northcentral region) of the country (Dissanayake and Weerasooriya, 1985).

#### **E. Air Quality and Noise**

No site-specific air quality data were available or were measured for this site. No significant anthropogenic sources of air pollution were observed, although occasional smoke and other particulates are created from burning of nearby lands under chena cultivation. Blasting noises can be heard intermittently from a quarry at Alikumbura Reepagama, 4 km from the site.

### **III. CURRENT AND PLANNED FACILITIES AND SERVICES**

#### **A. Water Supply and Wastewater Disposal Options**

Possible industrial water supply options for this site include the following, although all are questionable:

1. Minipe R.B. Transbasin Canal: although this canal supplies water to the Police Training School (near the proposed site) and to Shadowline Garments (near the proposed Gemunupura site), the Mahaweli authorities have

opposed taking additional water from the canal or from Mapakada Wewa because of water shortages being experienced during dry periods.

2. Mapakada Wewa: water from this tank, which is fed by the Minipe Canal, was used to supply the construction camp that once existed at this proposed site; however, as noted above, at present this tank is not a likely or a reliable source of water.
3. Minipe Canal seepage water releases: some of the seepage occurring from the Transbasin Canal was released from the basin about 0.5 km to the south of the proposed site. At the time the team studied the site, a flow of 2.7 m<sup>3</sup>/in. was observed, but it is not known how consistent this flow is during the year.
4. Miriswaga Wewa: consists mainly of irrigation drainage water of poor quality. This water body is quite small (275,000 m<sup>3</sup>). Hence it is not suitable as a source of water supply.
5. Ground water: The ground water at this site may be in large part a consequence of subsurface seepage from the nearby canal, and therefore highly subject to seasonal fluctuations in canal water levels. Before reliance is placed on ground water to sustain industrial activities at this site, a detailed hydrogeological analysis should be conducted to determine the year-round quantity and quality of ground water at this site.

Possible disposal locations for treated effluent include the following two surface water bodies:

1. Miriswaga Wewa: This tank already receives drainage water from the Nagadeepa irrigation scheme. Water in this tank is largely unused after a lift irrigation scheme that was installed was abandoned. But the effluent should be treated to a level suitable for domestic uses such as bathing and washing.
2. Mapakada Wewa (via undercrossings to cross the Transbasin Canal). This water is currently used for fishing and domestic purposes; therefore, any effluent to be discharged into it should first be treated to completely remove any hazardous and refractory substances as well as excess salinity and hardness (to satisfy irrigation water quality) if this option is contemplated.

## **B. Infrastructure**

1. Power: 1 MVA could be provided from the existing 33KV system (a transformer is available on site). The cost to provide a 400 KVA supply (by augmenting the existing 100 KVA transformer to 400 KVA and connecting to a 3-phase LT line 1 km away) is estimated to be ≈Rs. 495,000 using 1993

data. The site is located 40 km from the Badulla grid substation. An alternative supply could be provided from the Randenigala switch yard.

2. Telecommunications: There are currently no telephone lines close to the site. The nearest telephone service is Mahiyangana town, 12 km away. According to the Badulla Telecom Engineer, the Mahiyangana area has only 455 phone lines, but expansion is planned up to 496.
3. Transportation: The site has two wide roads on two sides. The Mahiyangana-Bibile road along the north boundary is the main road; the other tarred road (Mahiyangana-Kehelpotta Road) runs along the Transbasin Canal on the west side of the site. The nearest railway access is at Badulla, approximately 40 km from the site.
4. Other public services: Medical care is available at Mahiyangana Hospital, about 12 km from the site; some health services are also provided at the Dambarawa Central Ayurvedic Dispensary (2 km away) and at the Mapakaduwewa Dental Surgery clinic, only 0.2 km away.

Nearby schools include Mapakada School (with classes up to A-Level), which is 4 km from the site, and Madayaya Junior School, approximately 5 km from the site.

All petroleum fuels for the local area must be obtained from the Ceylon Petroleum Corporation depot at Mahiyangana. Currently there are no local fire-fighting services available.

### C. Existing Structures and Industrial Activities

This is a small site containing a few vandalized structures, one of which is being renovated as a stores unit. Not a single existing structure can be utilized without renovation. Although foundation stones were laid within the site to build a food processing factory (a BOI project), construction has not progressed beyond that point for some time. There is a rock quarry nearby. The extraction of rock from this quarry is supposed to finish shortly. There is another rock quarry, now abandoned, near the Nagadeepa Wewa, which might have the potential to serve as a hazardous waste disposal site. In addition, a cottage scale fibre glass production facility operates near the site, on the Mahiyangana-Bibile road (see map). There is also a cottage industry in brick making in the area.

#### **IV. BIOLOGICAL ENVIRONMENT AND RESOURCES**

##### **A. Significant Flora**

The site contains a variety of highly disturbed and/or anthropogenic vegetation as a consequence of this land having been used for Viyanini Camp during the Transbasin Canal construction. On-site vegetation consists primarily of grasses and some scattered dry zone species such as Myla (*Barhinia racemosa*), Ma dam (*Syzygium sp.*), Burutha (*Chloroxylon swietenia*), Ehela (*Cassia tristule*), and Bo (*Ficus religiosa*).

##### **B. Significant Fauna**

Local people have observed several mammalian species in the area, including wild boar, Mouse deer, hare, Indian Civet Cat, and Grey Mongoose. Spotted deer have also been seen on a few occasions. Several species of waterfowl were observed at the Mapakada tank by the team during the site visit. Since the visit was done during non-migratory season, only resident bird species were found. These included Grey Heron, Median Egret, Common Kingfisher, Indian pied Kingfisher, White-breasted Kingfisher, and Red-wattled Lapwing. Several other birds, namely Spotted Dove, White-browed Bulbul, Purple Rumped Sunbird, Black Robin, Red-vented Bulbul, Bronze-winged Pigeon, and Tailor Bird were also noted at the site.

##### **C. Sensitive Habitat**

No endangered or threatened species are known to rely on this site for habitat. However, the adjacent Mapakada tank provides an ideal wetland habitat for a variety of species including migratory waterfowl.

#### **V. SOCIAL AND CULTURAL ENVIRONMENT**

##### **A. Human Settlements**

The site is within Medayaya GSD and is commonly known as the Viyanini Camp, which was the residential quarters of the Italian contractors involved with the Mahaweli transbasin canal from 1982 to 1985. The site reserved for the industrial estate has to be approved by the Land Commissioner. The Mapakada GSD has a population of 2251. There are 548 houses, occupied by 590 families. The number of houses lags behind the number of households, which is common with all colonisation schemes. Most houses are small, with a large proportion being non-permanent structures.

Basic health care is available at Tissapura (3.5 km from the site) and Uraniya (8.5 km) rural hospitals; Mahiyangana, 12 km from the site, has a well-equipped district hospital.

Local educational facilities are of regional standard, and include Mapakada Maha Vidyalaya (1085 children) and Medayaya Junior School (350 children). In 1993 there were 36 A-level passed students in the two divisions. Mapakada has a vocational training facility that has classes of approximately 50 students in radio and allied fields.

**B. Labour Force**

The local labour force, which varies between 50 and 60% of the population, is under-employed, as shown in Table 1 above. In Mapakada 461 people are unemployed out of a total labour force of 1351. Employment in the area is predominantly agricultural.

**C. Local Economic Activity**

The main occupation of the people is agriculture but a total of 65 families in Medayaya and 104 families in Mapakada are without agricultural land. There are some small scale cottage industries such as brick making and welding operations.

**D. Religious and Cultural Features**

There are no known local archaeological sites except at Nagadeepa. The hallowed Mahiyangana Temple is nearby. For meditation, Buddhist people attend Balagangala forest meditation centre and worship at the same temple. Residents of nearby villages attend a temple that is near the site.

**E. Aesthetic and Recreational Features**

There is currently no organised local recreation; however, workers and families could probably participate with the police trainees in volleyball and other sports at the Police Training Centre. Local aesthetic attractions include the transbasin canal with its rapid movement of water and the blue waters of Mapakada tank at a distance.

**F. Local Customs, Aspirations, and Attitudes**

The third-generation colonists Mapakada who are more articulate indicate that they prefer to see improved local employment, but within a sanctified Buddhist environment.

**VI. MAJOR ENVIRONMENTAL AND REGULATORY ISSUES**

**A. Sensitivity of the Affected Environment**

As stated above, although the site itself has no significant natural features, the adjacent Mapakada tank provides an important wetland habitat for a variety of species including migratory waterfowl. Therefore any withdrawals of water from this tank for use at the site should be controlled, especially in the dry season, to assure that this wetland

habitat is not damaged. Any effluent discharge to this tank will require careful prior treatment and monitoring to assure that there is adequate reduction of BOD and removal of any toxic chemicals.

#### **B. Regional Water Resource Limitations**

None of the potential water sources discussed in Section III-A above appears to be sufficient or reliable enough for year-round industrial uses. This situation could change if use of water from the Minipe Transbasin Canal were to be approved by the Mahaweli Authority. Ground water may be an alternate, or partial alternate source, but a quantitative study must be undertaken to assess the reliability of this option.

#### **C. Regulatory Issues**

Plans for either surface or ground-water withdrawals to supply water to this site for industrial uses should be developed only after further on-site analysis and discussions with the Mahaweli Authority, the Irrigation Department, the C.E.A, and local government authorities.

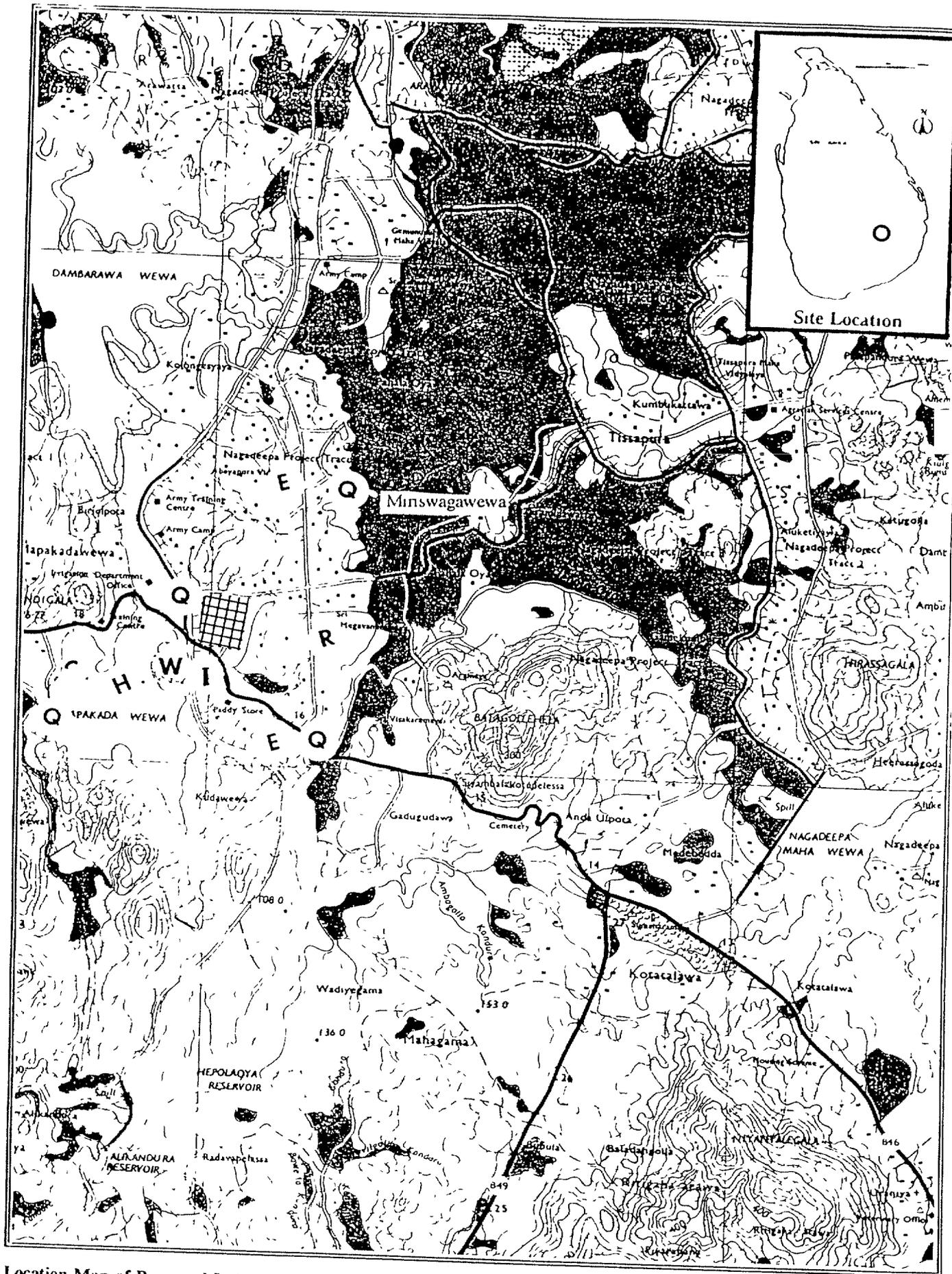
To avoid significant adverse secondary impacts on adjacent land and water resources from unplanned development, M/ID should involve local and regional authorities in preparing and administering an area land-use plan to establish where local housing, utilities, roads, and commercial facilities would be located if the site is developed as an industrial estate.

### **VII. GENERAL CONCLUSIONS AND RECOMMENDATIONS**

**This site was rated by the study team as having medium to high pollution assimilative capacity and medium to low local resource availability.** The proposed site is considered to be suitable only for a few small-scale industrial activities that do not need large tracts of land and do not require a large amount of water for industrial processes.

The principal constraints on the use of this site are its small size and limited expandability, and uncertainty about the availability and reliability of potential sources of water. The site also lacks significant community infrastructure, and has limited access to skilled labour. The site might, however, be utilized by facilities that process and/or package local agricultural products. It might also be suitable for some types of small-scale product manufacturing or assembly plants that are largely automated or otherwise require a small work force.

# MAP - MAPAKADA



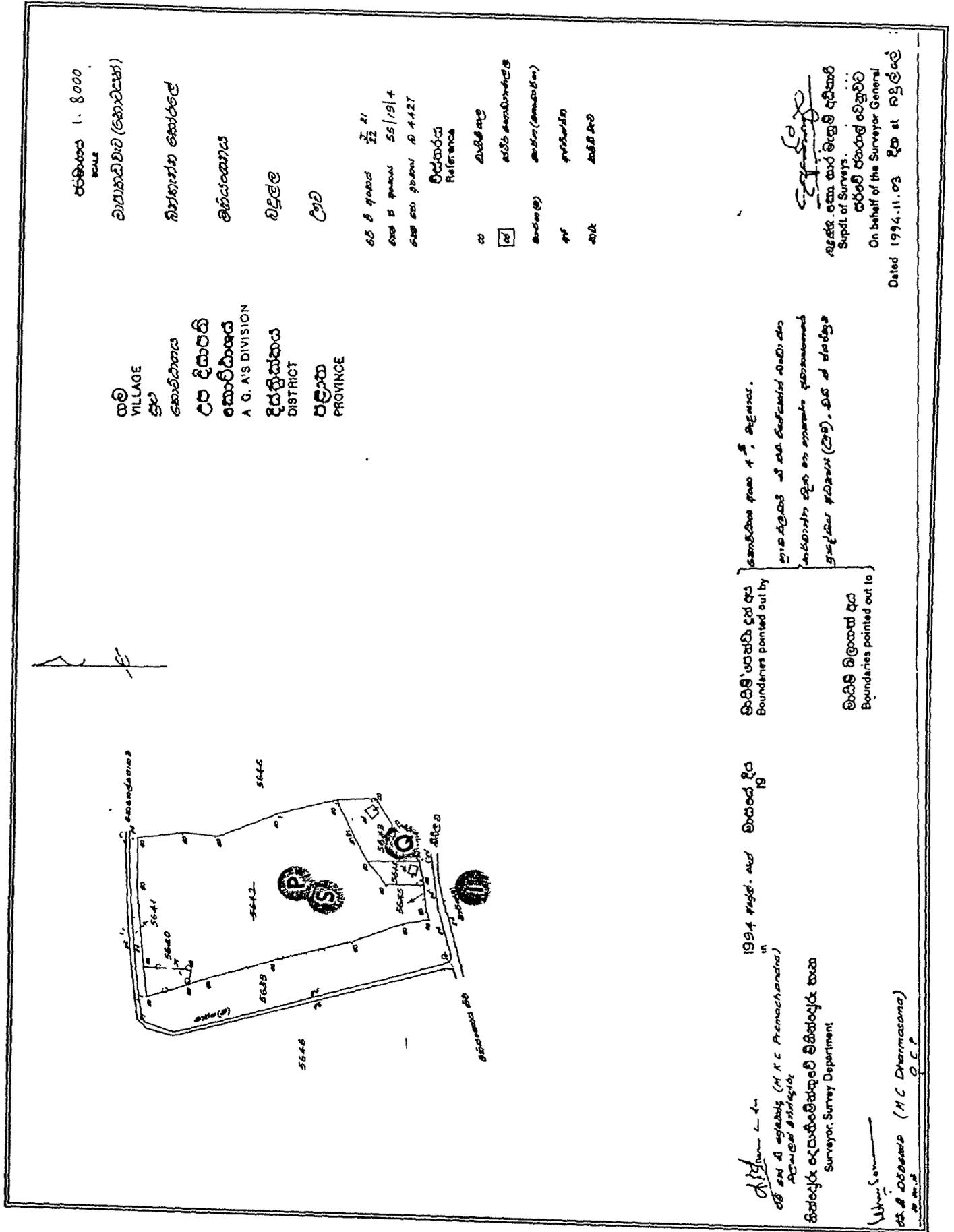
Location Map of Proposed Industrial Estate - Mapakada (Viyanini Camp)

Scale Produced using 1:50,000  
Topographic Map

- |                                 |  |
|---------------------------------|--|
| A - Archeological               | P - Percolation Measurement Point            |
| E - Schools                     | Q - Water Quality Sampling Point             |
| H - Important Habitats          | R - Religious (Temple, Church, Kovil/Mosque) |
| I - Industries                  | S - Soil Sampling Point                      |
| M - Medical Facility (Hospital) | W - Water (Well)                             |

9

E MAP - MAPAKADA



Perimeter Survey Map - Proposed Industrial Estate - Mapakada (Viyani Camp)

- A - Archeological
- E - Schools
- H - Important Habitats
- I - Industries
- P - Percolation Measurement Point
- Q - Water Quality Sampling Point
- R - Religious(Temple, Church, Kovil/Mosque)
- S - Soil Sampling Point

1994.11.03  
 M. K. C. Pramechamma  
 Surveyor, Survey Department  
 (M. C. Dharmasoma)  
 S. C. P.

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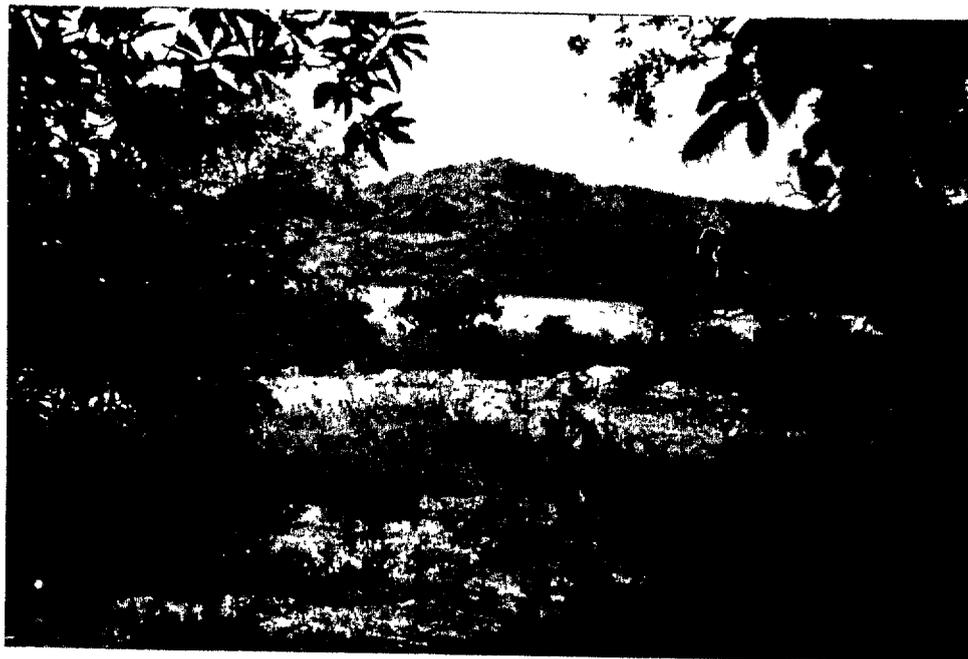
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A. Proposed site for Industrial Estate at Viyanini Camp (Medayaya) in Mahiyangana.



B. Foreground Viyanini Camp Site - background Mapakada Wewa, a potential water source.

## ANNEX B: DETAILED SOIL ANALYSIS

### SOIL AND SURFACE WATER : METHODS OF COMPUTATION

- ◆ Site Elevations in MSL are based on Survey Department Topographic Maps or available contour maps for the respective site.
- ◆ Maximum slope values are based on physical measurements during study.
- ◆ Reservoir capacity estimates other than from irrigation department are based on the average depths observed during site visits.
- ◆ Rainfall values are based on data collected from regional institutions during site visits and the historical data from hydrological annuals and Ceylon Electricity Board Water Resources Data Base (July 1987).
- ◆ Maximum, Minimum and Average river flows are based on the historical flow data. In cases where streamflow data were absent, representative runoff ratios from hydrological annuals were used with rainfall in respective regions and watersheds identified using topographic maps.
- ◆ Hydraulic Conductivity Data and Sorptivity data are based on Infiltrometer Tests done at each site fitted to infiltration curve by Philip (1957).
- ◆ Soil moisture contents and the organic matter contents by Gravimetry.
- ◆ Soil quality by liquid (water) extraction and relevant water quality methods.
- ◆ Wind and temperature estimates are based on the information in the National Atlas of Sri Lanka.
- ◆ Soil classification is according to the unified system.

**Soil Data for Proposed Industrial Estate at Viyanini Camp**

Description	Unit	Value
Sampling Depth	mm	250
Moisture Content	%	0.04
Organic Matter	%	4.97
Classification		SW
Chloride Cl <sup>-</sup>	mg/gr	0.30
Nitrates NO <sub>3</sub> <sup>-</sup> -N	mg/gr	0.0025
Fluoride F <sup>-</sup>	mg/gr	0.050
Phosphate PO <sub>4</sub> <sup>3-</sup> - P	mg/gr	N/D
pH		6.70
Hydraulic Conductivity (saturated)	cm/hr	0.26
Sorptivity	cm/(hr <sup>1/2</sup> )	1.5

N/D = Not detected

INDUSTRIAL ESTATES SITING STUDY, 1995

SUMMARY OF ANALYTICAL METHODS

PARAMETER	UNITS	METHOD	DETECTION LEVEL
TSS	mg/l	Gravimetry	-
TDS	mg/l	Gravimetry	-
DO	mg/l	Titrimetry	-
BOD	mg/l	Titrimetry	-
COD	mg/l	Open - Reflux, Titrimetry	-
pH	-log H <sup>+</sup>	Selective ion electrode	0.01
Cl <sup>-</sup>	mg/l	Titrimetry	-
SO <sub>4</sub> <sup>2-</sup>	mg/l	Gravimetry	-
F <sup>-</sup>	mg/l	Colorimetry	0.1
NH <sub>4</sub> <sup>+</sup> - N	mg/l	Colourization/Spectrophotometer	0.01
NO <sub>3</sub> <sup>-</sup> - N	mg/l	Colourization/Spectrophotometer	0.01
PO <sub>4</sub> <sup>3-</sup> - P	mg/l	Colorimetry	2.0
Alkalinity	mg CaCO <sub>3</sub> /l	Titrimetry	-
Hardness	mg CaCO <sub>3</sub> /l	Titrimetry	-

## WATER QUALITY ANALYSIS :

BADULLA DISTRICT

## PROPOSED SITE AT MAPAKADA (VIYANINI CAMP)

Location	Date of Sample	TSS	TDS	DO	BOD <sub>5</sub>	COD	<u>BOD</u> COD	pH	Temp.	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	F <sup>-</sup>	NH <sub>3</sub> -N	NO <sub>3</sub> <sup>-</sup> -N	PO <sub>4</sub> <sup>3-</sup> -P	Carb. Alk.	Bicarb. Alk.	Carb. Hard.	Non-Carb. Hard.	Flow rate
Minipe R/B Transbasin Canal	Aug 29 to Aug 30 1995	4.0	70	7.0	0.4	43	0.01	7.5	27	9.0	48.55	3.2	0.08	0.20	ND	Nil	50	50	Nil	2.7 m <sup>3</sup> /mun seepage release
Mapakada Wewa	-do-	7.0	160	8.8	1.6	36	0.04	8.5	28	14.0	8.23	3.2	0.16	0.05	ND	Nil	50	50	20	-
Hepola Oya	-do-	9.0	140	8.3	1.4	50	0.03	7.0	29	15.0	36.21	3.4	0.08	0.02	ND	Nil	80	80	40	-
Miriswaga Wewa	-do-	6.0	70	6.6	1.0	32	0.03	7.5	29	9.0	12.34	2.0	0.1	0.01	ND	Nil	90	80	Nil	-
Viyani Camp Well	-do-	4.0	120	6.8	0.4	43	0.01	6.0	27	42.0	21.39	3.2	0.2	0.2	ND	Nil	110	90	Nil	-
Proposed Minimum Ambient Quality	-do-	-	-	3.0	4.0	-	-	5-8.5	-	1200	400	1.5	4.0	5.0	0.7	-	-	600	-	-

ND = Not Detected