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INITIAL ENVIRONMENTAL EXAMINATION
of the
PROPOSED INDUSTRIAL ESTATE AT
URAGASMANHANDIYA (YATAGALA)

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

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**URAGASMANHANDIYA (YATAGALA)
PROPOSED INDUSTRIAL ESTATE
INITIAL ENVIRONMENTAL EXAMINATION**

I. GENERAL SITE DESCRIPTION

This proposed industrial site is located in the Yatagala Grama Sevaka Division (GSD) of the Karadeniya Divisional Secretary Division of the Galle District. The site, approximately 20 hectares (50 acres) of highly undulating land, is bounded by the Elpitiya-Aluthgama road on the South and by the Urugasmanhandiya-Meegaspitiya road on the North. The site is primarily grassland and scrub vegetation with a few scattered trees. The main land uses of the surrounding area are paddy and cinnamon; some rubber cultivation also exists in the area. See Annex A for regional and site maps of the area.

II. PHYSICAL ENVIRONMENT

A. Weather

The site is situated within the wet zone of Sri Lanka. Temperature in the region, based on data from Colombo and Gallé meteorological stations, appears to vary little throughout the year (22-32°C). Mean annual rainfall measured near the site (at Balapitiya) is 2678.0mm. Most rainfall (an average of 1418 mm) is received during the Yala season from April to September; the average Maha season rainfall from October to March amounts to 1260mm. Wind direction is predominantly SW from May to September and NE from December to February. The closest available wind speed data (at the Colombo meteorological station) shows the average wind speed to be 8.5 km/hr.

B. Topography, Soils, Groundwater

The proposed site is almost rectangular, with an area of 20.24 ha (50 ac). The elevation of the land is approximately 30m msl (above mean sea level). The topography is highly undulating and consists of numerous hillocks, with slopes of up to 30%. The hillocks separate the land into two main slopes, which causes surface water to drain due north and due southeast. The drainage from both slopes is towards the Bentota Ganga.

The soils on the hillocks are gravelly; in the valleys the top soil is clayey with laterite soils underneath. See Annex B for more detailed soil analysis.

There are numerous wells located inside and at the boundaries of the site. In the valleys, ground water is present within 0.5 - 1.5m of the surface; this water has been used for the Urugasmanhandiya Town water supply. Two wells located at a house on the eastern boundary of the site appear to tap from two different aquifers. The deep aquifer appears to contain hard water. No specific on-site ground-water measurements were made during this study.

C. Surface Water Hydrology

There are no flowing streams within the site; however the site is quite wet in the valleys which drain to the paddy fields at the boundaries.

Surface water bodies close to the site are Bentara Ganga (7.5 km), Magala Ela-North (3.5 km) and Kaluga Ela (2 km).

Flow measurements done during the study indicated a flow of 5.75 m³/s (14.9 MCM/month) at the Bentota Ganga ferry site and a flow of 0.45 m³/s (1.2 MCM/month) at Magala Ela Bridge along the Urugasmanhandiya-Borakanda Road. The stream flows estimated using available rainfall data and information indicated that the average flow of Bentara Ganga amounts to 87.0 MCM/month without considering any water uses in the catchment.

Average estimated flow for Magala Ela at the measurement points using available information indicated that the monthly maximum, minimum, and average discharges would be 2.6, 1.14 and 1.6 MCM/month respectively.

No measurements could be taken for Kaluga Ela because the flow at the causeway (Urubokka) appeared to be within a back-water regime due to being joined by another branch at a point immediately downstream. Flow estimates done using the available data indicated that the maximum, minimum and average flows of Kaluga Ela at Urubokka would be 1.87, 0.83 and 1.16 MCM/month respectively.

Downstream water uses of Bentota Ganga are mainly recreation and transportation, while in the other two above-mentioned water bodies agricultural and domestic uses are dominant.

D. Water Quality

In order to assess the quality of water from the surrounding water bodies of the proposed site, water samples were obtained from the following locations. More detailed water quality analysis is presented in Annex C.

- (1) A well within the proposed site located near the old water tower. Both the well and the water tower are not in use now;
- (2) Bentota Ganga, about 1 km upstream of the ferry point;
- (3) Kosgoda estuary, at the bridge on the Galle road very near to the access road to Kosgoda Beach Resort;
- (4) Kaluga Ela, a surface water drainage canal running to the north of the proposed site. The sample was taken over the bridge on the Aluthgama-Elpitiya Road.

- (5) Magala Ela, a surface water drainage canal running to the south of the proposed site. The sample was taken over the bridge on the Uragasmanhandiya-Ambalangoda road.

The water quality of the tested waters (except for Kosgoda estuary) appears to be of a satisfactory level except for fluorides which are in excess of the proposed minimum ambient quality (BKH, 1992). Kosgoda estuary water is very high in salinity and hardness, and also contains appreciable levels of ammonia nitrogen.

E. Air Quality and Noise

No site-specific air quality data were available. There are no major emission sources at or near the site at present. A small wood-working unit is operating inside the site in one building. Adjacent to the temple (located centrally within the proposed site) there is a workshop/garage, which emanates some oil fumes, spray and noise. With this exception, the site is very attractive with regard to existing air quality and noise.

III. CURRENT AND PLANNED FACILITIES AND SERVICES

A. Water Supply and Wastewater Disposal Options

The Karadeniya Divisional Secretary's preliminary proposal for this industrial estate identifies ground water as the source of water. Although ground water had been used to provide water to the hospital and security camps that previously existed within this proposed site (suggesting the potential feasibility of this option), no reliable quantitative study of ground water at this site has been made. Thus a detailed hydro-geological survey to assess the volume and reliability of this potential water source should be completed before any final decision is taken.

If ground water extraction is found to be infeasible, the option of extracting water from Bentota Ganga (6-7 km north of the proposed site) may be considered. In this regard, the fact that Bentota Ganga already provides potable water to Bentota-Aluthgama area should be taken into account.

The Divisional Secretary's proposal for siting an industrial estate at this location identifies Kosgoda estuary as the receiving water body for treated effluent generated within this site. The alternative of using either Kaluga Ela (2-3 km north of the proposed site) or Magala Ela (2-3 km south of the proposed site) should also be considered. These canals receive surface and sub-surface drainage water from the surrounding areas (including irrigation drainage) and are used for small-scale fisheries and contact recreation (bathing, washing etc.) purposes. It should be noted that water in the Kaluga Ela appeared to be stagnant, with no flow during the time of observation by the study team.

B. Infrastructure

1. Power: A 33KV power line crosses the site. There is another power line running parallel to the site on the West side (by the garment factory). The garment factory uses its own transformer; the closest CEB substation is about 60 km away at Galle.
2. Telecommunications: A telephone line goes along the Uragasmanhandiya-Meegaspitiya road. Kosgoda, 5 km from the site, has a telecom exchange facility, which needs to increase its capacity. An additional telecom tower at is proposed at Madakubura (≈ 5 miles from the site). Land has been already approved for this purpose, according to information from the local Divisional Secretary's office.
3. Transportation: The site is 0.5 km from the Uragasmanhandiya town. Two main roads that could be used to reach the site are the Kosgoda-Elpitiya road and the Aluthgama-Elpitiya Rd. The site is 5 km and 9 km respectively from Kosgoda and Aluthgama towns. The site is accessible by public bus service. (from Uragaha and Ambalangoda). The proposed southern highway extension programme could benefit the site as the highway would likely go past Uragasmanhandiya. The nearest railway access points are the stations at Kosgoda (5 km) and Bentota (9 km). The ocean port at Galle harbour is 64 km from the site.
4. Other public services: Uragasmanhandiya town includes a police station and a rural hospital; there is also a hospital (peripheral unit) at Borakanda. Nearby schools include the Yatagala Maha Vidyalaya (adjacent to the site) and the Meegaspitiya Junior School. The nearest fire brigade is at Galle.

C. Existing Structures and Industrial Activities

The site has several buildings. A government-operated Juki machine training unit is currently using the old paddy marketing board stores unit; an abandoned (partially completed) textile factory building is also on the site. A temple (Sri Sudarshanaramaya) and meditation center function within the site; a mini-garage is located adjacent to the temple. The site also contains a government-constructed well and water tower that was used to supply water to the town. Numerous shallow wells located within the proposed sites meet the water requirements of the temple, garage and the juki training unit. There is an open waste dump area within the site, and also some sand mining activity.

There have been several inquiries about the site from potential industrial developers. The existing buildings are not suitable for industrial purposes unless the scale is quite small and labor intensive. Nevertheless, if properly planned and developed, including landscaping to provide a buffer, etc. this site has promise as an industrial estate. According to the Divisional Secretary, there is also a government proposal to develop a housing estate on land adjacent to the industrial estate. The proposal is for an estate of about 50 acres.

IV. BIOLOGICAL ENVIRONMENT AND NATURAL RESOURCES

A. Significant Flora

A small area of the site is covered with cinnamon trees. The remainder of the site is grassland and scattered trees. Principal tree species identified include *Syzygium* spp. (Ma-Dan), *Macaranga peltrata* (Kanda), *Usbekiya* spp. (Bowitiya).

B. Significant Fauna

No large wild mammals are known to occupy the site except *Sus Scorfa* spp. (Wild Boar). According to local villagers, several small mammals are present, including Grey Mongoose, Indian Civet Cat, and Hare. Several bird species were observed during the site visit, including the Green Imperial Pigeon, Bronze winged Pigeon, Grey Tit, Tailor bird, Purple Sunbird and a few other common birds. Among the reptiles, the Green Garden Lizard (*Calotes calotes*) was recorded; a few snakes are also present in the site according to villagers, namely the Cobra (*Naja naja*) and the Russel's Viper (*Vipera russli*).

C. Sensitive Habitat

There are two small streams and paddy lands adjacent to the site that could be adversely affected by any effluent discharge.

V. SOCIAL AND CULTURAL ENVIRONMENT

A. Human Settlements

The site is located in the Yatagala Grama Sevaka Division (GSD) of the Karandeniya Division of the Galle District. The adjoining Grama Sevaka Divisions and their demographic features are as follows:

Table 1: Regional Demographic Information

GS DIVISION	POP- ULAT	HOUSE- HOLDS	LABOUR FORCE	EMPLOYMENT.			UN- EMP	JV/S
				GOVT	G/AFL	PVT		
Yatagala	1140	237	895	120	2	22	126	83
Meegaspitiya	1270	354	1156	24	32	28	162	119
Urugasman-(S)	1156	325	715	57	43	24	126	71
Urugasman-(E)	1526	364	1169	12	6	-	82	83
Lenagalpalata	1563	364	1156	33	-	9	226	102

Key: G/AFL = Govt.-Affiliated; JV/S = Janasaviya & food stamps

Source: Divisional Secretariat, Karandeniya

Inadequate housing is prevalent in all GSDs. Temporary housing is conspicuous; the highest number of temporary structures are 81 in Lenagalpalata and 15 in Urugasmanhandiya (S). Yatagala has 61 temporary units; ten acres Adjacent to the proposed industrial estate are earmarked for housing allocation.

The local standard of education has declined due to unstable economic conditions in the area, particularly at the Yatagala Maha Vidyalaya. In the surrounding areas good educational facilities are not available beyond the level of junior schools. Admission to Karandeniya Central College is difficult. Health care is available at Morakande District Hospital (6 km) and the Rural Hospital in Urugasmanhandiya. Karapitiya Grade 1 Hospital is 24 km from the site.

B. Labour Force

Large families and limited engagement of the local labour force in permanent employment has resulted in self-employment or in hiring out as labour for cinnamon peeling/baling, other agriculture, or in the unorganized informal sector. The numbers of unemployed persons in each of the area's GSDs are given in the above table. Many females from this area are employed as domestic workers in the Middle-East.

C. Local Economic Activity

The buildings at the site are part of a former Leprosy hospital which were subsequently used by the Urugasmanhandiya Police and abandoned after the JVP insurrection in 1971. The Handicraft Board and the Textile Ministry subsequently built two separate buildings for a handicraft training centre and handloom textile weaving. These facilities are still being operated although they appear to be economically unsound. Both centers have a workforces not exceeding 10 individuals. Workers are remunerated 90 percent of the value of products sold. The Paddy Marketing Board's storage building, constructed in the 1970s, was operative for only two seasons. The buildings now house a Juki machine operation training program conducted by the National Apprentice Board. A few of the original hospital buildings are currently used for a pre-school/meditation centre and woodworking training centre; a partly-completed garment factory building has been abandoned. Other significant local economic activities include three rice mills (close to the proposed estate) and a cinnamon oil extracting facility (in Urugasmanhandiya town).

D. Religious and Cultural Features

There are no archaeological sites in the vicinity. At the summit of the proposed site is a Buddhist temple; the incumbent priest is the defacto custodian of the site. A shrine to a Hindu god is located in a small primary forest area of Meegaspitiya approximately 2.5 km from the site. Protection of these sites should be assured as part of any industrial development.

E. Aesthetic and Recreational Features

The area's principal aesthetic values are in the beauty of the rural agricultural landscape; there are no organised local recreational activities.

F. Local Customs and Aspirations

The local populace has subsisted primarily on an agricultural economy with chronic underemployment for decades. The nucleus of the 1971 insurrection was in this area. The people are looking forward to better living conditions from economic development.

VI. MAJOR ENVIRONMENTAL AND REGULATORY ISSUES

A. Sensitivity of the Affected Environment

There appear to be no native species or natural features on the site worthy of special protection. However, adjacent streams and paddy fields could be adversely affected by sedimentation during site development and by effluent discharged from industrial operations at the site. The site development plan should include measures to avoid or minimize such off-site impacts, and also a monitoring plan to evaluate and maintain the effectiveness of such measures.

B. Regional Water Resource Limitations

There is a proposal to use ground water as the primary water supply for this site. However it is not supported by quantitative analysis of the sustainable quantity and quality of ground water that may be obtainable at this site. The availability of water may be the principal factor limiting development of this site. Effects of discharging wastewater into the Kosgoda estuary or other receiving waters are also uncertain, and deserve further study. **It is essential that a detailed hydro-geological study to assess the volume and reliability of this potential water source, and of any feasible surface water alternatives, be completed before any final decision is made to develop this site as an industrial estate.** Such an analysis should include consideration of possible effects of lowering the local water table or reducing downstream flows as a result of water withdrawals to supply this site.

C. Regulatory Issues

Plans for either surface or ground-water withdrawals to supply water to this site should be based on further analysis, and should be reviewed and approved by the Water Supply and Drainage Board, the C.E.A., the Irrigation Department, and local authorities.

To avoid significant adverse secondary effects from unplanned development of lands adjacent to this site as a result of its development, M/ID should involve local and regional authorities in preparing and administering an area land-use plan before allowing industries to use this site. This plan should designate approved locations for roads, utilities, housing, commercial development, and cultural/recreational activities.

VII. GENERAL CONCLUSIONS AND RECOMMENDATIONS

This site was rated by the study team as having medium pollution assimilative capacity and medium to high local resource availability. The site is considered to be generally suitable for a variety of industries having medium pollution potential and medium to high resource consumption levels. The site has already been partially developed, and has adequate access to transport and infrastructure, and a large available pool of unskilled to semi-skilled labour. The site also appears to be large enough to accommodate a central wastewater treatment plant, and to have the potential for further expansion.

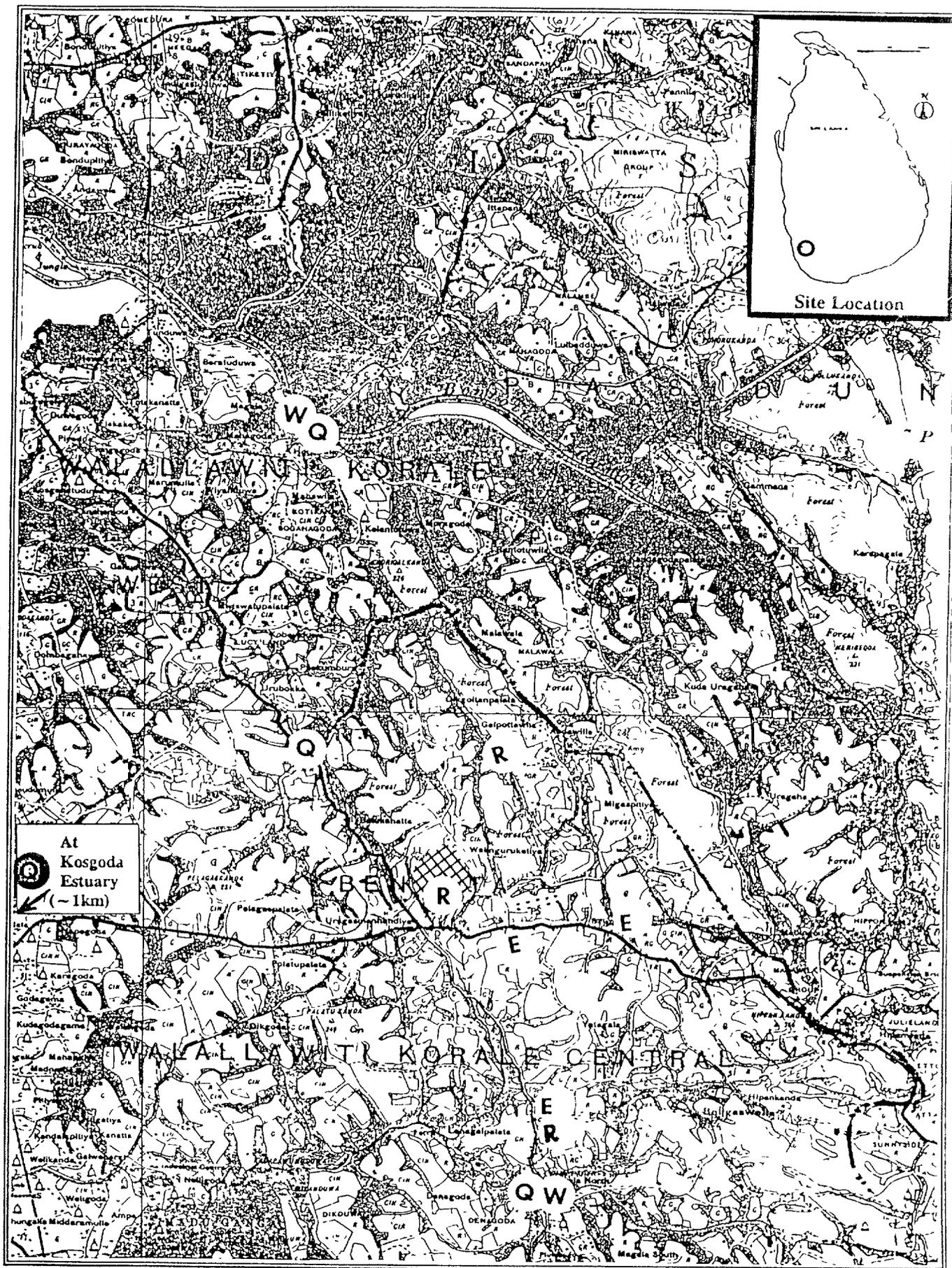
The principal environmental constraints on the use of this site by heavier industry (industry with high resource needs and/or pollution potential) are:

- Uncertainty about the quantity and quality of ground or surface water available to the site on a sustainable basis;
- Limited availability of local skilled labour;
- Lack of an existing solid-waste disposal facility.

If the hydro-geological study recommended above determines that adequate ground and/or surface water resources are available on a sustainable basis, and that off-site effects of water withdrawals and discharges can be minimized or mitigated, this site could be very suitable for development as an industrial estate, even for some potentially high-polluting industries.

References

BKH Consulting Engineers, "Environmental Quality Standards and Designation of Water Use in Sri Lanka", Report prepared for Central Environmental Authority, 1992.

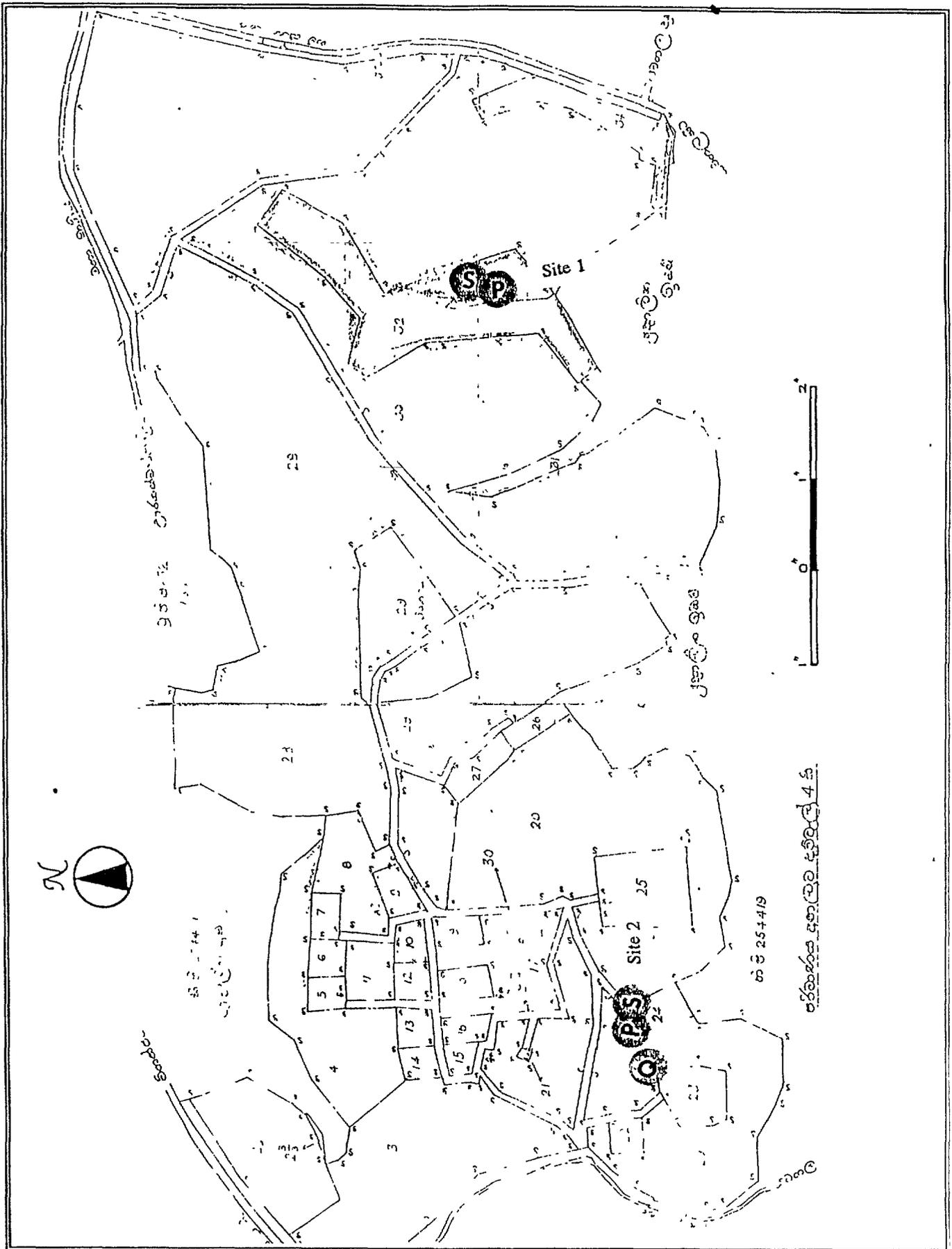


Location Map of Proposed Industrial Estate - Uragasmanhandiya

Scale : Produced using 1 63,360
Topographic Map

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

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Perimeter Survey Map - Proposed Industrial Estate - Urugasmanhandiya

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



A. Proposed Industrial Estate site at Uragasmanhandiya in Karadeniya (Yatagala)



B. Small-scale sand mining taking place within the proposed site.

URAGASMANHANDIYA

ANNEX A-III: SITE PHOTOGRAPHS - URAGASMANHANDIYA

A. Proposed Industrial Estate site at Uragasmanhandiya in Karandeniya (Yatagala)

B. Small-scale sand mining taking place within the proposed site

URAGASMANHANDIYA

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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 Yatagala

Description	Unit	Site 1	Site 2
Sampling Depth	mm	250	250
Moisture Content	%	14.10	12.71
Organic Matter	%	3.69	5.66
Classification		SP	SP
Chloride Cl ⁻	mg/gr	0.40	0.30
Nitrates No ₃ ⁻ -N	mg/gr	0.00	0.00
Fluoride Fl ⁻	mg/gr	0.05	0.03
Phosphate PO ₄ ³⁻ - P	mg/gr	N/D	N/D
pH		6.35	6.15
Hydraulic Conductivity (saturated)	cm/hr	0.43	6.61
Sorptivity	cm/(hr ^{1/2})	1.52	1.50

N/D = Not detected

ANNEX C: DETAILED WATER QUALITY ANALYSIS

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 ⁺	Selective ion electrode	0.01
Cl ⁻	mg/l	Titrimetry	-
SO ₄ ²⁻	mg/l	Gravimetry	-
F ⁻	mg/l	Colorimetry	0.1
NH ₄ ⁺ - N	mg/l	Colourization/Spectrophotometer	0.01
NO ₃ ⁻ - N	mg/l	Colourization/Spectrophotometer	0.01
PO ₄ ³⁻ - P	mg/l	Colorimetry	2.0
Alkalinity	mg CaCO ₃ /l	Titrimetry	-
Hardness	mg CaCO ₃ /l	Titrimetry	-

WATER QUALITY ANALYSIS :

GALLE DISTRICT

PROPOSED SITE AT URAGASMANHANDIYA (YATAGALA)

Location	Date of Sample	TSS	TDS	DO	BOD ₅	COD	BOD/COD	pH	Temp.	Cl ⁻	SO ₄ ²⁻	F ⁻	NH ₃ -N	NO ₃ -N	PO ₄ ³⁻ - P	Carb. Alk.	Bicarb. Alk.	Carb. Hard.	Non-Carb. Hard.	Flow rate
	Aug 22 - 23, 1995	6.0	50	4.5	2.0	40	0.05	6.3	28	12	33	1.4	0.28	0.28	ND	Nil	20	20	Nil	-
Yatagala	-do-	11.0	120	7.0	2.0	40	0.05	6.7	30	47	11.5	2.8	0.16	0.01	ND	Nil	10	10	5	5.75 m ³ /S
Yatagala Primary	-do-	5.1	11040	8.4	2.0	400*	-	7.5	30	5033	635	2.0	1.0	0.01	ND	Nil	10	10	890	-
Yatagala Ela	-do-	3.0	60	5.4	2.0	40	0.05	6.4	29	18	13.9	3.0	0.08	0.08	ND	Nil	10	10	5	ND
Yatagala Ela	-do-	13.0	50	8.3	2.0	48	0.04	6.7	28	17	17.2	3.0	0.56	0.50	ND	Nil	20	15	Nil	0.45 m ³ /S
Proposed community		-	-	3.0	4.0	-	-	5-8.5	-	1200	400	1.5	4.0	5.0	0.7	-	-	600		

* Unreliable reading, due to high chlorinity

ND = Not Detected