APPENDICES

APPENDIX A

INVESTMENT DEMAND SURVEY

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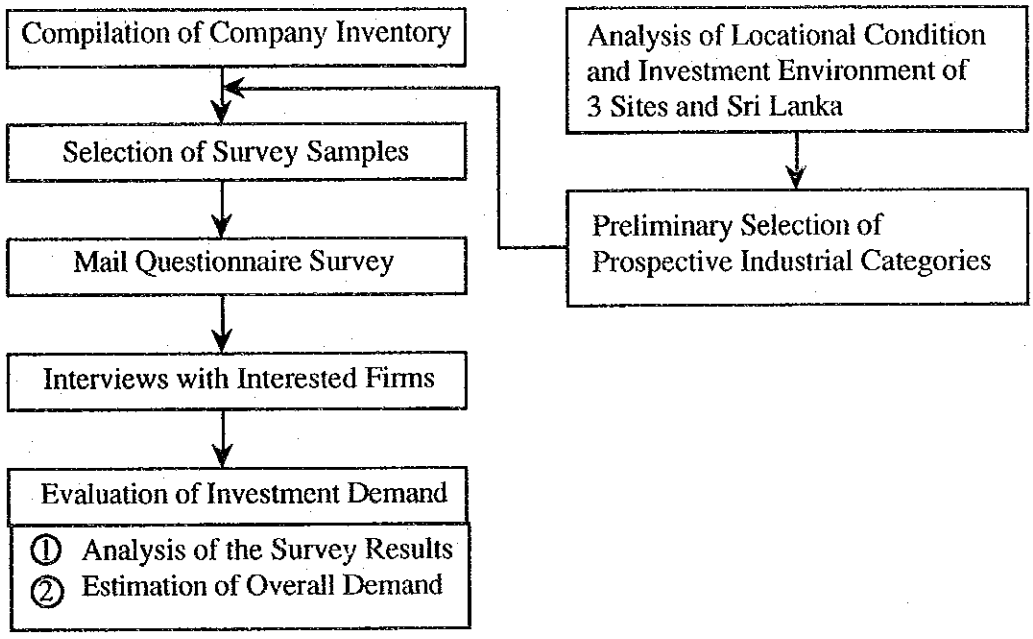
APPENDIX A INVESTMENT DEMAND SURVEY

A.1 Methodology of Investment Demand Survey

A.1.1 Methodology

The work flow of the investment demand survey and its evaluation is shown below.



In regard to the survey in Sri Lanka, direct interviews were conducted, instead of mail questionnaire survey, after considering the low response to the mail questionnaires among the Sri Lanka enterprises.

In regard to the survey in Japan, mail questionnaires were sent to selected firms and, interviews were conducted with the enterprises who responded positively.

A.1.2 Preliminary Selection of Prospective Industrial Categories

Prospective industrial categories were preliminarily selected for the purpose of the investment demand survey. Categories were adopted on the basis of the "International Standard Industrial Classification of All Economic Activities (2 digits / 3 digits)."

Selection was made, by giving priority to the following types of industries:

(a) Labor - intensive type ..... (Refer to Table A-1)

(b) Export - oriented type
(c) Local resources utilization type
(d) Low pollution type ..... (Refer to Table A-2)
(e) Low water use type ..... (Refer to Table A-2)
(f) Low energy use type ..... (Refer to Table A-2)

In addition to above categories, specific categories expected by the Government of Sri Lanka were considered.

Chances for selection has been determined, by giving 1 mark for meeting each one of the (a)~(c) conditions above and minus 1 mark for not meeting each one of the (d)~(f) conditions above. Chances were set based on the total scores as follows:

Total Score	Chances
5, 4	2
3, 2, 1	1
$\leqq 0$	0

Preliminarily selected categories for questionnaire survey are shown in Table A-3.

A.2 Investment Demand Survey in Sri Lanka

A.2.1 Selection of Samples

Samples for the interview survey in Sri Lanka have been selected from the following list, by referring to the preliminarily selected categories as noted in Table A-3:

(a) BOI approved company list
(b) Inventories of industries registered at MIST and EDB

A total of 287 enterprises have been selected for the interview survey.

In addition, the interview survey for the study on Export and Investment Promotion has been utilized to examine whether the enterprises in this sub-sector is interested in locating their factories in the industrial estates. Samples in this sub-sector have been selected from the following lists:

(a) List of export-oriented enterprises prepared by EDB
(b) Companies currently located in EPZs

A total of 99 enterprises in garment/apparel industry, 57 enterprises in gem/jewellery industry, and 49 enterprises in rubber-based product industry have been selected in this respect.

Further, the interview survey for the study on Metalworking Industry has also been utilized to examine the extent of their interest in locating their factories in the industrial estate. A total of 70 samples have been selected from the company inventory of MIST.

In total, 562 samples have been selected for interview survey on potential investment demand for the industrial estates, as shown below.

	Number of Samples	Registered in Inventory	Sampling Ratio
Export/Investment Promotion			
Garment/approval	99	450	0.22
Gem/jewellery	57	248	0.23
Rubber-based product	49	109	0.45
Metalworking industry	70	100	0.70
Industrial Estate Interview	287	2,208	0.13
Total	562	3,115	0.18

A.2.2 Design of Questionnaire

The major items in the questionnaire used for the interview survey with Sri Lanka enterprises are summarized as follows:

(1) Outline of the interviewed firm

(2) Current production
- Kinds of products
- Ratio of exports
- Number of employees

- Factory lot area

(3) Degree of interest in the export-oriented industrial estates and preferences for alternative estate sites

- Degree of interest
- Preferences and reasons for selecting the sites
- Expected products
- Ratio of exports
- Interest in teaming up with foreign partners
- Expected factory lot area and number of employees

A.2.3 Enterprises Interested in Industrial Estates

The filled-out questionnaire has been first analysed to know the number of enterprises interested in the industrial estates. In Table A-4, the number of samples and the number of interested enterprises are tabulated. In brief, the number of interested enterprises by category of industry is summarized hereunder.

Type/Category	Number of Samples (1)	Number Interested (2)	Ratio (%): (2)÷(1)
Garment/apparel	99	16	16.2
Gem/jewellery	57	2	3.5
Rubber-based products	49	13	26.5
Metalworking products	70	8	11.4
Other prospective categories	287	27	9.4
Total	562	66	11.7

The industrial estate sites selected by the enterprises interested in locating their factories in the estates have been analysed as shown in Table A-5. In brief, the number of interested enterprises by alternative sites and by industrial categories is summarized as follows:

Type/Category	Atherfield	Martin	Sirigampola	Total	
Garment/apparel	12	4	2	18	(16)
Gem/jewellery	2	0	0	2	(2)
Rubber-based products	11	3	0	14	(13)
Metalworking products	5	4	2	11	(8)
Other prospective categories	15	12	1	28	(27)
Total	47	23	5	73	(66)

N.B. Plural answers. Figures in parentheses signify the net number of firms.

A.2.4 Reasons for Preference

Reasons for selecting the industrial estates sites have been replied by 66 interested enterprises, as shown in Table A-6. Enterprises interested in locating their factories in Atherfield site indicated that the cheap labor force in the region, availability of local resources and relative closeness to Colombo port are major reasons for selecting the site.

Reasons for preference in selecting the estate site are different by categories of industries, as shown in Table A-7. The garment and apparel industries attach importance to cheap labour and transportation to port and airport. The rubber-based product industries take a more serious view of availability of local resources or raw materials. For metalworking industries, closeness to Colombo port is more important than other conditions in selecting the industrial estate sites.

A.3 Investment Demand Survey in Japan

A.3.1 Selection of Samples

For mail questionnaire survey, a total of 2,000 samples have been selected from the enterprise inventories, as follows.

	Inventory List	Samples
a)	Potential Investors Overseas JETRO, 1992	434
b)	List of Firms with Direct Investment Experiences overseas, Toyo Keizai, 1992	758
c)	Attendants to Investment Seminar by Sri Lanka Embassy, 1991	98
d)	Company Data Base, Shoko Research Center, 1992	710
	Total	2,000

A.3.2 Design of Questionnaire

The major items of the questionnaire used for mailing survey of the Japanese enterprises are summarized as follows:

(1) Outline of the Company

(2) Investment Plan Overseas

- Achievements of direct investment overseas in the past
- Existing plans for investment overseas
- Target countries
- Objectives/motives for investment
- Type of investment (own factory, processing on commission,etc.)

(3) Investment Plan in Sri Lanka

- Existence of investment plan in Sri Lanka
- Merits and demerits of Sri Lanka for direct investment
- Knowledge of the investment environment/condition in Sri Lanka

(4) Interest in the Export-Oriented Industrial Estates

- Degree of interest
- Reasons for interest
- Type of investment
- Willingness to make a joint venture with local capital
- Required factory lot area, number of employees
- Targeted markets

A.3.3 Effective Replies

Out of 2,000 enterprises, 282 firms replied by filling out the questionnaire, of which 279 were found to be effective. The response rate was 14%. The effective reply by categories of industry is shown in Table A-8. characteristics of the effectively replied enterprises are indicated in Table A-9. It is noted that nearly a half of the effectively replied enterprises have plans for investment overseas.

Target region for investment overseas has been indicated by effectively replier enterprises who have plan on possibility for investment, as shown in Table A-10. It is noted that ASEAN countries and China draw much attention of the Japanese potential investors, and that the Southwest Asian countries, including Sri Lanka, draw attention of 7.7% of the potential investors.

A.3.4 Knowledge about Sri Lanka

Out of effectively replied enterprises (279 enterprises), 179 firms have plan or possibility for investment overseas. Majority of these firms have not studied on investment in Sri Lanka, as shown in Table A-11. They are not acquainted with the incentives offered in Sri Lanka.

Although the investment climate in Sri Lanka has not been well studied, the potential investors indicated some advantages and disadvantages in investment in Sri Lanka, as shown in Table A-12. The potential investors noted that the low wage rates are major advantage, and that the insufficient infrastructure, inadequate supporting industries and socio-political situation are major hindrances for investment in Sri Lanka.

A.3.5 Interest in Investing in Industrial Estates in Sri Lanka

Out of 279 effectively replied enterprises, no firm indicated that he has strong intention for investment. However, 33 enterprises or 12% of effectively replied enterprises replied that the investment in the industrial estates in Sri Lanka was "worth studying". Categories of 33 enterprises are shown in Table A-13. They include

electrical machinery, machinery, chemicals, rubber-based product, pottery, other manufacturing, etc.

Reasons for indicating the investment in the industrial estates as "worth studying" have been revealed as shown in Table A-14. Likewise, reasons for not-having interest in investment in Sri Lanka have also been indicated.

For the enterprises who indicated the investment in the industrial estates as "worth studying", priority factors for investment decision making have been indicated as shown in Table A-15.

A.3.6 Follow-up Interview Survey

For 33 enterprises who indicated the investment in the industrial estate as "worth studying", the follow-up interview survey has been conducted to verify the degree of their interest. The results of interview survey are summarized as follows:

Degree of Interest		Definition	Nos. of Firms
A	-	Likely to invest	1
B	-	Depending on recovery of economy in Japan	7
	-	Subject to detailed study	
C	-	After investing in higher priority countries	25
	-	Possible to invest in the long run	
Total			33

Table A-1 EVALUATION OF LABOR INTENSIVE INDUSTRY (1/3)

	Classification	Plot (ha)	Employee (/ha)	Ranking
311-312	Food manufacturing			
3111	Slaughtering,preserving meat	1.9	54	B
3112	Daily products	2.0	45	C
3113	Canning of fruit,vegetable	0.9	83	B
3114	Canning of fish,crustacea	0.6	120	A
3115	Vegetable,animal oil	4.1	27	C
3116	Grain mill products	1.7	42	C
3117	Bakery products	0.8	147	A
3118	Sugar factories & refineries	10.6	10	C
3119	Cocoa,chocolate	1.0	77	B
3121	Not elsewhere classified	0.5	128	A
3122	Prepared animal feeds	2.1	6	C
313	Beverage industries			
3131	Distilling,blending spirits	4.2	25	C
3132	Wine industries	2.5	23	C
3133	Malt liquors and malt	6.2	15	C
3134	Soft drinks and water	3.2	34	C
314	Tobacco manufactures	7.9	42	C
321	Textile			
3211	Spinning,weaving of textiles	5.3	35	C
3212	Made-up textile goods	0.8	70	B
3213	Knitting mills	0.5	139	A
3214	Carpets & rugs	1.9	38	C
3215	Cordage,rope & twine	1.6	46	C
3219	Not elsewhere classified	1.8	49	C
322	Wearing apparel	0.3	213	A
323	Leather products			
3231	Tanneries & leather finishing	1.5	63	B
3232	Fur dressing & dyeing	1.6	58	B
3233	Products of leather	0.5	110	A
324	Footwear	0.5	187	A
331	Wood & cork products			
3311	Sawmills & wood product	2.0	27	C
3312	Wooden & cane containers	0.8	70	B
3319	Not elsewhere classified	1.1	49	C
332	Furniture & fixtures	1.2	63	B
341	Paper & paper products			
3411	Pulp,paper board	15.5	9	C
3412	Containers & boxes	1.2	54	B
3419	Not elsewhere classified	1.4	62	B
342	Printing,publishing	0.3	319	A
351	Chemicals			
3511	Basic industrial chemicals	7.1	16	C
3512	Fertilizers & pesticides	7.9	11	C
3513	Synthetic resins,plastic	23.2	18	C

Table A-1 EVALUATION OF LABOR INTENSIVE INDUSTRY (2/3)

	Classification	Plot (ha)	Employee (/ha)	Ranking
352	Other chemical products			
3521	Paints,varnishes & lacquers	2.3	48	C
3522	Drug & medicines	4.3	39	C
3523	Soap,perfumes,toilet goods	2.4	46	C
3529	Not elsewhere classified	4.3	30	C
353	Petroleum refineries	92.7	4	C
354	Miscellaneous products of petroleum & coal	3.4	24	C
355	Rubber products			
3551	Tyre & tube	13.3	45	C
3559	Not elsewhere classified	1.5	60	B
356	Plastic products not elsewhere classified	1.6	58	B
361	Pottery,china & earth ware	1.8	64	B
362	Glass & glass products	3.1	50	B
369	Other non-metal mineral			
3691	Structural clay products	6.4	22	C
3692	Cement,lime & plaster	3.9	16	C
3699	Not elsewhere classified	3.9	22	C
371	Iron & steel	13.0	16	C
372	Non-ferrous metal	5.7	27	C
381	Fabricated metal products			
3811	Cutlery,hand tools	1.0	77	B
3812	Furniture & fixtures	1.3	70	B
3813	Structural metal	2.4	39	C
3819	Not elsewhere classified	1.5	58	B
382	Machinery			
3821	Engines & turbines	13.1	40	C
3822	Agricultural machinery	2.1	57	B
3823	Metal & wood working	1.7	68	B
3824	Special industrial machinery	1.7	62	B
3825	Office machinery	1.5	103	A
3829	Not elsewhere classified	1.3	81	B
383	Electrical machinery,apparatus			
3831	Industrial machinery	1.3	106	A
3832	Radio,television,etc.	1.0	157	A
3833	Electrical housewares	1.1	120	A
3839	Not elsewhere classified	1.2	134	A
384	Transport equipment			
3841	Ship building & repairing	7.2	25	C
3842	Railroad equipment	2.2	70	B
3843	Motor vehicles & parts	3.9	67	B
3844	Motor cycles & bicycles	1.3	74	B
3845	Aircraft	6.0	76	B
3849	Not elsewhere classified	1.9	55	B

Table A-1 EVALUATION OF LABOR INTENSIVE INDUSTRY (3/3)

	Classification	Plot (ha)	Employee (/ha)	Ranking
385	Professional equipment			
3851	Not elsewhere classified	1.0	136	A
3852	Photographic & optical goods	1.0	145	A
3853	Watches & clocks	1.0	147	A
390	Other manufacturing industries			
3901	Jewellery & related articles	0.3	219	A
3902	Musical instruments	1.6	111	A
3903	Sporting & atheletic goods	0.9	89	B
3909	Not elsewhere classified	0.8	77	B
Total average		2.3	53	

Labor intensity: A: more than 100 employees/ha
B: 50-99 employees/ha
C: less than 49 employees/ha

Table A-2 CHECK LIST BY WATER, ENERGY CONSUMPTION AND ENVIRONMENT (1/3)

Classification	Water consumption	Energy consumption	Pollution industry
311 Food manufacturing			
3111 Meat	M	M	H
3112 Daily products	H	M	L
3113 Canning of fruit, vegetable	H	L	L
3114 Canning of fish, crustaceans	H	L	L
3115 Vegetable, animal oil	H	H	L
3116 Grain mill products	L	H	L
3117 Bakery products	M	M	L
3118 Sugar factories, refineries	H	H	L
3119 Cocoa, chocolate	-	-	L
3121 Not classified (tea, spice)	M	M	L
3122 Prepared animal feeds	L	M	L
313 Beverage industries			
3131 Distilling, blending spirit	M	L	L
3132 Wine industries	H	L	L
3133 Malt liquors and malt	M	L	L
3134 Soft drinks and water	H	M	L
314 Tobacco manufacturers	L	M	L
321 Textile			
3211 Weaving of textiles	H	M	L
3212 Made-up textile goods	M	M	L
3213 Knitting mills	M	M	L
3214 Carpets & rugs	L	M	L
3215 Cordage, rope & twine	L	L	L
3219 Not elsewhere classified	M	M	L
322 Wearing apparel	L	L	L
323 Leather products			
3231 Tanneries & leather	H	M	H
3232 Fur dressing & dyeing	M	M	L
3233 Products of leather	L	L	L
324 Footwear	L	L	L
331 Wood & cork products			
3311 Sawmills & wood product	L	L	L
3312 Wooden & cane containers	L	L	L
3319 Not elsewhere classified	L	L	L
332 Furniture & fixtures	L	L	L

Remarks:
Water consumption (m3/day/1000m2: site area): H: 30~, M: 10~30, L: ~10
Electric consumption : H: High consumption, M: Medium consumption, L: Low consumption
Pollution (Air & Water): H: Heavy pollution, L: Low/non pollution

Table A-2 CHECK LIST BY WATER, ENERGY CONSUMPTION AND ENVIRONMENT (2/3)

Classification	Water consumption	Energy consumption	Pollution industry
341 Paper			
3411 Pulp, paper board	H	M	H
3412 Containers & boxes	L	L	L
3419 Not classified	H	H	L
342 Printing	M	H	L
351 Chemicals			
3511 Basic chemicals	H	H	H
3512 Fertilizers	H	M	L
3513 Resins, plastic	H	M	L
352 Other chemical			
3521 Paints,varnishes	L	L	L
3522 Drugs & medichines	H	L	L
3523 Soap,perfumes	H	M	L
3529 Not classified	M	M	L
353 Petrileum refineries	M	L	H
354 Miscellaneous products of petroleum & coal	L	L	H
355 Rubber products			
3551 Tyre & tube	M	H	L
3559 Not classified	M	M	L
356 Plastic products not elsewhere classified	M	H	L
361 Pottery, china ware	L	M	L
362 Glass & glass products	M	H	L
369 Other non-metal mineral			
3691 Structural products	L	L	H
3692 Cement, lime & plaster	L	M	H
3699 Not classified	M	M	L
371 Iron & steel	M	M	H
372 Non-ferrous metal	M	M	H

Remarks:
Water consumption (m3/day/1000m2: site area): H: 30~, M: 10~30, L: ~10
Electric consumption : H: High consumption, M: Medium consumption, L: Low consumption
Pollution (Air & Water): H: Heavy pollution, L: Low/non pollution

Table A-2 CHECK LIST BY WATER, ENERGY CONSUMPTION AND ENVIRONMENT (3/3)

Classification	Water consumption	Energy consumption	Pollution industry
381 Fabricated metal			
3811 Cutlery, hand tools	L	M	L
3812 Furniture	L	M	L
3813 Structural metal	L	L	L
3819 Not classified	L	M	L
382 Machinery			
3811 Engines	L	L	L
3812 Agri. machinery	L	L	L
3813 Metal & wood	L	L	L
3819 Special	L	L	L
3819 Office machinery	L	M	L
3819 Not classified	L	M	L
383 Electrical machinery			
3811 Indus. machinery	L	M	L
3812 Radio, television	L	M	L
3813 Elect. housewares	M	M	L
3819 Not classified	M	H	L
384 Transport equipment			
3841 Ship building	L	L	L
3842 Railroad	L	L	L
3843 Motor vehicles	L	M	L
3844 Bicycles	L	L	L
3845 Aircraft	L	L	L
3849 Not classified	L	L	L
385 Professional equipment			
3851 Not classified	L	M	L
3852 Photographic	M	M	L
3853 Watches & clock	M	M	L
390 Other manufacturing			
3901 Jewellery	L	M	L
3902 Musical instruments	M	M	L
3903 Sporting goods	L	L	L
3909 Not classified	M	M	L

Remarks:
Water consumption (m3/day/1000m2: site area): H: 30~, M: 10~30, L: ~10
Electric consumption : H: High consumption, M: Medium consumption, L: Low consumption
Pollution (Air & Water): H: Heavy pollution, L: Low/non pollution

Table A-3 PRELIMINARY SELECTION OF INDUSTRIAL CATEGORY (1/3)

Classification (ISIC)	EXPECTATION			CONSTRAINTS				
	Labor Int.	Ex-pect	Ex-port	Re-sorce	Low Wat.	Low Ene.	Non Pol.	Total Eval.
311-312 Food manufacturing								
3111 Meat	B	P		P			M	2
3112 Daily products		P	P	P	M			2
3113 Canning of fruit, vegetable	A	P	P	P	M			3
3114 Canning of fish, crustaceans	A	P	P	P	M			4
3115 Vegetable, animal oil		P	P	P	M			2
3116 Grain mill products		P	P	P	M	M		1
3117 Bakery products	A	P	P	P				5
3118 Sugar factories, refineries		P		P	M			1
3119 Cocoa, chocolate	B		P	P				3
3121 Not classified (tea, spice)	A	P	P	P				5
3122 Prepared animal feeds				P				1
313 Beverage industries								
3131 Distilling, blending spirit								0
3132 Wine industries						M		-1
3133 Malt liquors and malt								0
3134 Soft drinks and water				P	P	M		1
314 Tobacco manufacturers				P	P			2
321 Textile								
3211 Weaving of textiles		P				M		3
3212 Made-up textile goods	B	P						2
3213 Knitting mills	A	P						3
3214 Carpets & rugs		P	P					2
3215 Cordage, rope & twine		P	P					2
3219 Not elsewhere classified		P						1
322 Wearing apparel	A	P	P					4
323 Leather products								
3231 Tanneries & leather	B	P		P	M		M	1
3232 Fur dressing & dyeing	B							1
3233 Products of leather (bag, etc.)	A	P	P					4
324 Footwear	A		P					3
331 Wood & cork products								
3311 Sawmills & wood product		P		P				2
3312 Wooden & cane containers	B	P						2
3319 Not elsewhere classified		P	P	P				3
332 Furniture & fixtures	B		P	P				3

Table A-3 PRELIMINARY SELECTION OF INDUSTRIAL CATEGORY (2/3)

Classification (ISIC)	EXPECTATION				CONSTRAINTS			
	Labor Int.	Ex-pect	Ex-port	Re-sorce	Low Wat.	Low Ene.	Non Pol.	Total Eval.
341 Paper & paper products								
3411 Pulp, paper board					M		M	-2
3412 Containers & boxes	B							1
3419 Not elsewhere classified	B				M	M		-1
342 Printing, publishing	A					M		2
351 Chemicals								
3511 Basic industrial chemicals				P	M	M	M	-2
3512 Fertilizers & pesticides		P		P	M			1
3513 Synthetic resins, plastic			P		M			0
352 Other chemical products								
3521 Paints, varnishes & lacquers								0
3522 Drug & medicines			P	P	M			1
3523 Soap, perfumes, toilet goods			P	P	M			1
3529 Not elsewhere classified			P	P				2
353 Petroleum refineries							M	-1
354 Miscellaneous products of petroleum & coal							M	-1
355 Rubber products								
3551 Tyre & tube		P	P	P		M		2
3559 Not elsewhere classified (gloves, mats, sponges, etc.)	B	P	P	P				4
356 Plastic products not elsewhere classified (plastics toy, cup, mats, etc.)	B		P			M		1
361 Pottery, china & earth ware	B	P	P	P				4
362 Glass & glass products	B			P		M		1
369 Other non-metal mineral								
3691 Structural clay products				P			M	-1
3692 Cement, lime & plaster				P			M	0
3699 Not elsewhere classified				P				1
371 Iron & steel								0
372 Non-ferrous metal								0
381 Fabricated metal products								
3811 Cutlery, hand tools	B	P						2
3812 Furniture & fixtures	B	P						2
3813 Structural metal								0
3819 Not elsewhere classified (metal cans, steel springs, etc.)	B	P	P					3

Table A-3 PRELIMINARY SELECTION OF INDUSTRIAL CATEGORY (3/3)

Classification (ISIC)	EXPECTATION			CONSTRAINTS			Total Eval.
	Labor Int.	Ex-pect	Ex-port	Re-sorce	Low Wat.	Low Ene.	Non Pol.	
382 Machinery								
3821 Engines & turbines								0
3822 Agricultural machinery	B		P					3
3823 Metal & wood working mach.	B							1
3824 Special machinery	B							1
3825 Office machinery	A		P					3
3829 Not elsewhere classified (pump, air conditioning machine, etc.)	B		P					2
383 Electrical machinery								
3831 Industrial machinery	A		P					3
3832 Radio, television, etc.	A		P					3
3833 Electrical housewares	A		P					3
3839 Not elsewhere classified (insulated wire, batteries, etc.)	A		P			M		2
384 Transport equipment								
3841 Ship building & repairing		P	P					2
3842 Railroad equipment	B							1
3843 Motor vehicles & parts	B	P						2
3844 Motor cycles & bicycles	B	P						2
3845 Aircraft								0
3849 Not elsewhere classified	B							1
385 Professional equipment								
3851 Not elsewhere classified	A							2
3852 Photographic goods	A							2
3853 Watches & clocks	A							2
390 Other manufacturing industries								
3901 Jewellery & articles	A	P	P	P				5
3902 Musical instruments	A							2
3903 Sporting & athletic goods	B		P					2
3909 Not elsewhere classified (toys, pen, costume jewellery, umbrellas, etc.)	B		P					2

Remarks: Cumulative points are counted in total evaluation according to the following manner.

1) Labor intensive industry: A : Strong intensity — (+2 points)
   B : Medium intensity — (+1 point)
2) Expected industry by the Government — (+1 point)
3) Export oriented industry — (+1 point)
4) Local resources utilization — (+1 point)
5) Water consumption : M — (-1 point)
6) Energy consumption : M — (-1 point)
7) Pollution : M — (-1 point)

Table A-4 NUMBERS OF INTERESTED FIRMS AND TOTAL SAMPLES BY CATEGORY AND BY PROVINCE (1/2)

	INDUSTRIAL CLASSIFICATIONS	WEST	SABARA	SOUTH	CENTRAL	NWP	TOTAL
311	Food Manufacture						
	3111	1 / 3	0 / 0	0 / 0	0 / 0	0 / 0	1 / 3
	3112	0 / 9	0 / 0	0 / 0	0 / 0	0 / 0	0 / 9
	3113	0 / 11	0 / 0	0 / 0	0 / 0	0 / 0	0 / 11
	3115	0 / 1	0 / 0	0 / 1	0 / 0	0 / 0	0 / 2
	3116	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
	3117	1 / 15	0 / 0	0 / 2	0 / 0	0 / 0	1 / 17
	3119	1 / 7	0 / 0	0 / 1	0 / 0	0 / 0	1 / 8
	3121	0 / 14	0 / 0	0 / 1	0 / 0	0 / 0	0 / 15
313	Beverage Industry						
	3134	0 / 2	0 / 0	0 / 0	0 / 0	0 / 0	0 / 2
314	Tobacco						
	3140	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
321	Textiles						
	3211	0 / 4	0 / 0	0 / 0	0 / 0	0 / 0	0 / 4
322	Wearing Apparels						
	3220	14 / 87	0 / 1	0 / 1	0 / 1	2 / 8	16 / 99
323	Leather Products						
	3231	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
	3233	2 / 19	0 / 0	0 / 0	0 / 0	0 / 0	2 / 19
324	Footwear						
	3240	2 / 8	0 / 0	0 / 0	0 / 0	0 / 0	2 / 8
331	Woodwork						
	3311	2 / 3	0 / 0	0 / 0	0 / 0	0 / 0	2 / 3
	3312	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
	3319	0 / 3	0 / 0	0 / 0	0 / 0	0 / 0	0 / 3
341	Paper						
	3411	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
	3412	1 / 7	0 / 0	0 / 0	0 / 0	0 / 0	1 / 7
	3419	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
342	Printing						
	3420	0 / 6	0 / 0	0 / 0	0 / 0	0 / 0	0 / 6
351	Chemicals						
	3512	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
352	Other Chemicals						
	3522	0 / 5	0 / 0	0 / 0	0 / 0	0 / 0	0 / 5
	3523	2 / 18	0 / 0	0 / 1	0 / 0	0 / 0	2 / 19
	3529	0 / 2	0 / 0	0 / 0	0 / 0	0 / 0	0 / 2

Table A-4 NUMBERS OF INTERESTED FIRMS AND TOTAL SAMPLES BY CATEGORY AND BY PROVINCE (2/2)

	INDUSTRIAL CLASSIFICATIONS	WEST	SABARA	SOUTH	CENTRAL	NWP	TOTAL
311	Rubber						
	3551	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
	3559	12 / 53	0 / 1	0 / 0	0 / 1	0 / 1	12 / 56
356	Plastic						
	3560	6 / 28	0 / 0	0 / 0	0 / 0	0 / 0	6 / 28
361	Pottery						
	3610	0 / 2	0 / 0	0 / 0	0 / 0	0 / 0	0 / 2
	3611	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
362	Glass Products						
	3620	1 / 1	0 / 0	0 / 0	0 / 0	0 / 0	1 / 1
369	Other No.						
	3699	3 / 33	0 / 0	0 / 0	0 / 0	0 / 6	3 / 39
381	Fab. Metal						
	3811	3 / 7	0 / 0	0 / 0	0 / 0	0 / 0	3 / 7
	3812	1 / 10	0 / 0	0 / 0	0 / 0	0 / 0	1 / 11
	3813	0 / 2	0 / 0	0 / 0	0 / 0	0 / 0	0 / 2
	3819	2 / 13	0 / 0	0 / 0	0 / 0	0 / 0	2 / 13
382	Machinery						
	3822	1 / 9	0 / 0	0 / 0	0 / 0	0 / 1	1 / 10
	3823	0 / 3	0 / 0	0 / 1	0 / 0	0 / 0	0 / 4
	3824	0 / 7	0 / 0	0 / 0	0 / 0	0 / 0	0 / 7
	3829	3 / 19	0 / 0	0 / 1	0 / 0	0 / 0	3 / 20
383	Electrical						
	3831	0 / 4	0 / 0	0 / 0	0 / 0	0 / 0	0 / 4
	3832	0 / 5	0 / 0	0 / 1	0 / 0	0 / 0	0 / 6
	3833	2 / 10	0 / 0	0 / 0	0 / 0	0 / 0	2 / 10
384	Transport Equip						
	3841	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
	3842	0 / 3	0 / 0	0 / 0	0 / 0	0 / 0	0 / 3
	3843	0 / 7	0 / 0	0 / 0	0 / 0	0 / 0	0 / 7
	3844	2 / 6	0 / 0	0 / 0	0 / 0	0 / 0	2 / 6
	3849	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
390	Other Man.						
	3901	2 / 51	0 / 0	0 / 3	0 / 4	0 / 0	2 / 58
	3902	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 1
	3909	0 / 7	0 / 0	0 / 0	0 / 0	0 / 1	0 / 8
385	Profess.						
	3852	0 / 3	0 / 0	0 / 0	0 / 0	0 / 0	0 / 3
	3853	0 / 3	0 / 0	0 / 0	0 / 0	0 / 0	0 / 3
		20 / 226	0 / 0	0 / 7	0 / 4	0 / 8	66 / 562

Table A-5 SITES PREFERRED BY INTERESTED FIRMS BY CATEGORY OF INDUSTRY

Site	Garments No. of Firms	%	Rubber No. of Firms	%	Gems No. of Firms	%	Metal No. of Firms	%	Other No. of Firms	%	Total No. of Firms	%
Atherfield	12	29.3	11	57.9	2	20.0	5	19.2	15	30.0	45	30.8
Martin	4	9.8	3	15.8	-	-	4	15.4	12	24.0	23	15.8
Sirigampola	2	4.9	-	-	-	-	2	7.7	1	2.0	5	3.4
SubTotal	18	44.0	14	73.7	2	20.0	11	42.3	28	56.0	73	50.0
Kalutara	8	19.5	-	-	1	10.0	5	19.2	14	28.0	28	19.2
Koggala	5	12.2	-	-	2	20.0	2	7.7	4	8.0	13	8.9
Others	8	19.5	4	21.0	2	20.0	3	11.6	4	8.0	21	14.4
Not Given	2	4.9	1	5.3	3	30.0	5	19.2	-	-	11	7.5
Total	41	100.0	19	100.0	10	100.0	26	100.0	50	100.0	146	100.0

Table A-6 REASONS FOR PREFERENCE

Site	Closeness to Colombo Port	Closeness to Katunayake Airport	Cheap Labor	Local Resources	Other
(All Firms)					
Atherfield	23	8	25	15	1
Martin	18	14	6	4	-
Sirigampola	3	3	1	-	-
Total	44	25	32	19	-
(Garment/Apparel)					
Atherfield	10	4	9	1	-
Martin	3	2	3	-	-
Sirigampola	2	2	1	-	-
Total	15	8	13	1	-
(Rubber Products)					
Atherfield	3	2	4	9	-
Martin	3	2	-	1	-
Sirigampola	-	-	-	-	-
Total	6	4	4	10	-
(Gem/Jewellery)					
Atherfield	-	1	1	1	-
Martin	-	-	-	-	-
Sirigampola	-	-	-	-	-
Total	-	1	1	1	-
(Metalworking)					
Atherfield	3	-	3	-	1
Martin	2	-	1	-	-
Sirigampola	-	-	-	-	-
Total	5	-	4	-	1
(Others)					
Atherfield	7	1	8	4	-
Martin	10	10	2	3	-
Sirigampola	1	1	-	-	-
Total	18	12	10	7	-

Table A-7 REASONS FOR PREFERENCE IN SITE SELECTION

Unit: % in Total Plural Answers

	Closeness to Colombo Port	Closeness to Katunayake Air Port	Cheap Labour	Availability of Resources	Others	Total
Garments	40.5	21.6	35.2	2.7	-	100.0
Rubber Products	24.9	16.7	16.7	41.7	-	100.0
Gem & Jewellery	-	33.3	33.3	33.4	-	100.0
Metalworking	50.0	-	40.0	-	10.0	100.0
Other Industries	38.3	25.5	21.3	14.9	-	100.0
All Interested Enterprises	36.4	20.7	26.4	15.7	0.8	100.0

Table A-8 EFFECTIVE REPLY TO QUESTIONNAIRE SURVEY IN JAPAN

Category	Sample		Effective Reply	
	Nos.	(%)	Nos. of Companies	(%)
1. Manufacturing industry				
Food manufacturing	213	11	17	6
Beverage industries	3	0	3	1
Tabacco	0	0	0	0
Textile/Apparel	119	6	9	3
Leather products	5	0	3	1
Footwear	0	0	0	0
Wood & Cork	14	1	1	0
Furniture	2	0	2	1
Paper	20	1	1	0
Printing	7	0	1	0
Chemicals	44	2	12	4
Other chemical	126	6	14	5
Petroleum refineries	0	0	0	0
Miscellaneous products	0	0	0	0
Rubber products	51	3	6	3
Plastic products	4	0	4	1
Pottery, china ware	20	1	3	1
Glass & glass products	47	2	5	2
Other non-metal mineral	7	0	6	2
Iron & steel	46	2	9	3
Non-ferrous metal	30	2	3	1
Structural products	9	0	1	0
Machinery	190	10	44	16
Electrical machinery	355	18	37	13
Transport equipment	139	7	35	12
Professional equipment	26	1	0	0
Other manufacturing	361	18	44	16
2. Mining	56	3	2	1
3. Agriculture and forestry, marine products industry	47	2	1	0
4. Information and software industry	49	2	6	2
5. Others	10	1	10	4
Total	2,000	100	279	100

Table A-9 CHARACTERISTICS OF EFFECTIVELY REPLIED ENTERPRISES

	Nos. of Company	%
1. SIZE OF CAPITAL (10^6 Yen)		
More than 5,000	81	30
1,000 - 5,000	44	16
100 - 1,000	71	26
50 - 100	38	14
Less than 50	39	14
No answer	6	-
Total	279	100
2. NUMBER OF EMPLOYEES		
More than 10,000	14	5
5,000 - 10,000	19	7
1,000 - 5,000	85	31
500 - 1,000	34	12
100 - 500	79	29
Less than 100	42	15
No answer	6	-
Total	279	100
3. OVERSEAS INVESTMENT PLAN		
Have concrete plans	59	21
Issue under discussion	71	26
Possibility to be studied	49	17
(Sub-Total)	(179)	(64)
No possibility	60	22
Already finished	39	14
No answer	1	-
Total	279	100

Table A-10 TARGET REGION FOR INVESTMENT

Region	Number of Companies	%
North America (USA, Canada)	35	9.9
Central/South America	5	1.4
Europe	43	12.2
East Europe	12	3.4
NIES (Korea,Taiwan,Hong Kong, Singapore)	40	11.4
ASEAN (Indonesia, Philippines, Singapore, Thailand, Malaysia)	96	27.3
China	63	17.9
Southwest Asia (Sri Lanka, India, Pakistan, Bangladesh, Nepal)	27	7.7
Australia, New Zealand	5	1.4
Middle East	2	0.6
Africa	1	0.3
Other regions	9	2.6
Not decided	14	3.9
Total	352	100.0

* Number of answers totals 172 (Plural answers).

Table A-11 KNOWLEDGE ABOUT SRI LANKA

	Nos. of Company	%
1. Study on Investment in Sri Lanka		
Have studied before	21	12
Not studied yet	155	87
No answer	3	1
Total	179	100
2. Knowledge on Incentives Offered in Sri Lanka		
Known	27	15
Not known	146	82
No answer	6	3
Total	179	100

Table A-12 ADVANTAGE AND HINDRANCE FOR INVESTMENT IN SRI LANKA

	Number of Companies	%
1. ADVANTAGES		
Procurement of materials	17	14
Availability of abundant labor	17	14
Low personnel expenses	85	68
Sales in domestic market (Sri Lanka)	12	10
Establishment of manufacturing base for export	35	28
Others	19	15
Total Number of answers totals 125 (Plural answers).	185	-
2. HINDRANCES		
Shortage of engineers and technicians	58	40
Difficulty in acquisition of domestically available raw materials of high quality and expensive import materials	52	36
Inadequate supporting industries	77	53
Insufficient infrastructure including electric power and roads	78	53
Insufficient institutions and facilities for inspection, standards and laboratories	24	16
Political and social situation	65	45
Others	23	16
Total Number of answers totals 146 (Plural answers).	377	-

Table A-13 FIRMS INTERESTED IN INVESTMENT IN INDUSTRIAL ESTATES

	Category of Industry	Source A	Source B	Source C	Source D		Total	
						Expansion* factor		Expansion* factor
311	Food manufacturing				1	43	1	43
313	Beverage industries							
314	Tabacco							
321/ 322	Textile/Apparel				1	75	1	75
323	Leather products	1					1	1
324	Footwear							
331	Wood & cork							
332	Furniture							
341	Paper							
342	Printing							
351	Chemicals	1	1				2	2
352	Other chemical	1	2				3	3
353	Petroleum refineries							
354	Miscellaneous products of petroleum & coal							
355	Rubber products	1	1				2	2
356	Plastic products not elsewhere classified	1		1			2	2
361	Pottery, china ware				2	64	2	64
362	Class & glass products							
369	Other non-metal mineral							
371	Iron & steel	1					1	1
372	Non-ferrous metal							
381	Fabricated metal							
382	Machinery	2	1	1			4	4
383	Electrical machinery	2	1	1	1	26	5	30
384	Transport equipment			1			1	1
385	Professional equipment							
390	Other manufacturing	2	1	1	2	22	6	26
	Others		1	1			2	2
	Total	12	8	6	7	230	33	256

Note: Source A : Potential Investors
Source B : Toyo Keizai
Source C : Sri Lankan Seminar
Source D : Shoko Research

*: 1 + Sampling ratio

Table A-14 INTEREST IN INVESTING IN INDUSTRIAL ESTATES

	Number of Companies	%
1. LIKELIHOOD OF INVESTMENT		
Strong intention of investment	0	0
Worth studying	33	18
No possibilities	138	77
No answer	8	5
Total	179	100
2. REASONS FOR "WORTH STUDYING"		
Low wage level (¥7,000/month)	24	27
Diligent workers	13	15
Skillful workers	10	11
High literacy rate (86%)	12	13
Many English speakers	14	16
Many Buddhists	9	10
Appropriate transit trade base between Japan and Middle East	5	6
Others	2	2
Total (33 interested firms, Plural answer)	89	100
3. REASONS FOR NOT-HAVING INTEREST		
Political and social situation	53	29
Insufficient information about investment environment in Sri Lanka	63	34
No plan for overseas investment	22	12
Others	45	25
Total (151 firms, Plural answer)	183	100

Table A-15 PRIORITY FACTORS FOR INVESTMENT DECISION MAKING

		High Priority	Medium Priority	Low Priority	Total
(1)	Land price	4	23	2	29
		(14)	(79)	(7)	(100)
(2)	Wage level	11	17	1	29
		(38)	(59)	(3)	(100)
(3)	Quality of labor	16	12	1	29
		(55)	(41)	(3)	(100)
(4)	Utility prices	6	20	3	29
		(21)	(69)	(10)	(100)
(5)	Adequacy of infrastructures	14	12	3	29
		(48)	(41)	(10)	(100)
(6)	Existence of cultural and resort facilities	1	11	17	29
		(3)	(38)	(59)	(100)
(7)	Exemption/reduction of taxes	10	17	2	29
		(34)	(59)	(7)	(100)
(8)	Support for marketing for export	4	17	7	28
		(14)	(61)	(25)	(100)
(9)	Availability of qualified local partners	12	12	5	29
		(41)	(41)	(17)	(100)
(10)	Social and political stability	15	12	2	29
		(52)	(41)	(7)	(100)
(11)	Others	1	-	-	1
		(100)	-	-	(100)

APPENDIX B

NATURAL CONDITIONS

APPENDIX B NATURAL CONDITIONS

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APPENDIX B NATURAL CONDITIONS

B.1 Topography

B.1.1 Overview

The proposed alternative sites for the industrial estates, except for Atherfield estate, are generally flat with ground levels ranging from +4 m to +10 m above mean sea level (AMSL). Atherfield estate, approximately 60 km from Colombo, is located in the hilly land ranging from +20 m to +100 m AMSL.

Atherfield estate partially contains steep slopes, and a number of outcrops of hard rock are observed. The land is presently utilized for rubber and tea plantations, as well as for paddy fields. The Kelani river and tributaries run along the northern corner of the estate.

Martin estate is flat with ground levels of above + 4 m AMSL as a whole. The land is presently utilized as a coconut plantation. The site is located in the low-lying flood area downstream of the Deduru river near its estuary.

Sirigampola estate, 60 km from Colombo city, is located in a flat and low-lying area. The land is presently utilized as a coconut plantation. The west end of the site is bordered by marsh land and small streams.

Ekala estate is located in a flat and low-lying area. The site is a marsh land, partially used for paddy fields. The site is surrounded by the Dandugam and the Attanagalu rivers, and it is functioning as a flood retention pond in the rainy seasons.

Katana estate, located at about 4 km east of Negombo city, is generally flat in topography with some depressions along the streams running in the central part of the estate. Due to poor drainability of the streams, the low lying land is mainly used for paddy fields. The elevated lands are used for coconut plantation.

B.1.2 Available Topographic Maps

The Study areas are covered, fully or partially, by the following topographic maps:

(1) 1:50,000 in color, Survey Department, First Edition in 1989, with counter interval of 20 m.

(2) 1:10,000 in color, Survey Department, Prepared in 1989, with counter interval of 10 m.

(3) 1:5,000, Survey Department, Prepared at the request of the Ministry of Industry for execution of the study.

The 1:50,000 scaled topographic maps for each estate contains updated information on topography and land use. The maps help to obtain an overall picture of the topographic conditions of the Study areas. The 1:10,000 scaled topographic maps were compiled in 1989 on the basis of a field survey in 1986 by the Survey Department. Availability of the maps on the scale of 1:5,000 are, however, limited only to Atherfield estate site.

The 1:5,000 scaled topographic maps for Atherfield site were compiled by Survey Department in 1992, at the request of the Ministry of Industry particularly for the development planning of the industrial estate.

B.2 Geology

B.2.1 Rocks and Soils

The Greater Colombo and surrounding areas are geologically characterized by strata underlain by crystalline rocks which outcrop in many locations, capped by lateritic hillocks and ridges. Most of the rock types are composed of metamorphic rocks. These rocks are found in the project areas in various forms of gneisses, such as quartzitic gneiss, charnockitic gneiss, biotite gneiss, granitic gneiss, and garnetiferous gneiss.

Some of the engineering properties of these rocks are given are follows:

Specific Gravity = 2.63
Porosity = 0.57%
Crushing Strength

(1) Parallel to gneissic foliation = 1,240 kg/cm2
(2) Perpendicular to gneissic foliation = 2,100 kg/cm2

The depth of rock is relatively shallow with the depth to sound rock varying from 10m to 30 m, with an average of 15 m to 20 m. The overburden soil consists of one or more of the following:

(1) littoral soils which have been deposited by the sea;

(2) alluvial soils which have been deposited by flooding of rivers and waterways;

(3) peat which is the general term applied to partly decomposed, and more or less disintegrated vegetable matter found in areas where the normal process of decay has been retarded as a result of the long term submersion in water under conditions of absence of oxygen; and

(4) residual soils which have been formed by the in-situ weathering of the parent rock. The laterites belong to this category.

B.2.2 Groundwater Resources

The groundwater potential is moderate in quantity in the coastal sand belt producing 45,000 to 90,000 liters per day, according to the Water Resources Board. Exploitable water is limited depending on the permeability of the laterite formation and the fracture intensity around the contact zone with the hard rock basement. The groundwater in low-lying marshy areas tend to contain organic material. In the lateritic regions and the coastal sand belt, water quality is generally good.

B.3 Meteorology and Hydrology

B.3.1 Overview

The climate in Sri Lanka is classified as tropical monsoon, a wet season and a dry season. The annual precipitation in Sri Lanka is characterized by four distinct seasons, which are caused by two monsoons:- Northeast and Southwest.

- First Inter-monsoonal; March through April
- Southwest Monsoon; May through September
- Second Inter-monsoonal; October through November

- Northwest Monsoon; December through February

B.3.2 Meteorology in Study Area

The Study areas are located in the southwestern part of the Island, which is classified as the " Wet Zone ". At the Colombo Meteorological Observatory operated by the Department of Meteorology, the average annual rainfall in the last 30 years was 2,396 mm. The monthly rainfall is as high as 353 mm for May, the first month of the Southwest Monsoon season. In the Second Inter-monsoon season, the monthly rainfalls are 354 mm for October and 324 mm for November.

The mean daily maximum temperature is above 30°C for December through May, and it is between 29°C and 30°C for the rest of the year. The mean daily minimum temperature ranges from 25°C during the Southwest Monsoon season from May through September to 22°C during the Northeast Monsoon season from December through February. The sunshine hours at Colombo are around 6.3 hours per day in the Southwest Monsoon season, and 7.5 hours/day during the Northeast Monsoon season. The number of rainy days are around 19 days per month during the Southwest Monsoon season; 20 days per month in the Second Inter-monsoon; 15 days per month in the First Inter-monsoon; and 9 days per month during the Northeast Monsoon season.

Atherfield estate is located in the area with heaviest rainfall (5,000 - 6,000 mm/year). Sirigampola, Ekala and Katana are located in the area with annual rainfall of 2,000 - 2,500 mm/year. During the period from May to September, south-west wind is predominant. In this season, rainfall of 3,000 - 4,000 mm is concentrated in Atherfield, 350 - 500 mm in Martin and 500 - 1,000 mm in Sirigampola, Ekala and Katana. Dry season is from December to February and rainfall in this season is 500 - 1,000 mm in Atherfield, less than 250 mm in Martin and Sirigampola, and 250 - 500 mm in Ekala and Katana (Refer to Table B-1).

B.3.3 Hydrology in Study Area

The Kelani river is the second largest river in Sri Lanka. It originates in the central hill country and flows in a westerly direction until it debouches into the sea on the northern boundary of Colombo. The river basin has an area of 2,084 km2, with the annual rainfall ranging from 2,500 mm around Colombo plains to 3,800 mm in the hill country.

Hydrological analysis of the Kelani river, Maha river and Deduru river is discussed in Appendix E.1.2 hereinafter.

B.4 Vegetation

Almost all of the south-western part of Sri Lanka is cultivated with paddy fields and tea, rubber and coconut plantations, though some forest areas are reserved in the northern and south-eastern part.

Five alternative industrial estate areas are all categorized as non-forested area. Atherfield is located in the inland area and the adjoining area is mostly covered with rubber and tea plantation. There are some moist deciduous forest scattered in the area some distance away from Atherfield. Further, these alternative industrial estate areas are not located within the areas designated as National Parks and Natural Environment Conservation Area (Refer to Figure B-1, Table B-2 and B-3). However, it is noted that Negombo Lagoon is located about 20 km south of Sirigampola and 3 km west of Katana, and Mathurajawela marshaland is located abour 5 km west of Ekala. Especially in Mathurajawera marshland, there is an extensive distribution of mangrove forests, and attention should be paid to preserve the existing mangrove areas.

Table B-1 Meteorological Features

	Average Annual Temperature (°C)	Average Annual Rainfall (mm)	Wind Direction	
			Dec. – Feb.	May – Sep.
Atherfield	25 – 27.5	5,000 – 6,000	north-east	south-west
St.Martin	25 – 27.5	1,000 – 1,500	north-east	south-west
Sirigampola	25 – 27.5	1,500 – 2,000	north-east	south-west
Ekala	25 – 27.5	2,500 – 3,000	north-east	south-west
Katana	25 - 27.5	2,500 - 3,000	north-east	south-west

	Average Seasonal Rainfall (mm)	
	Dec. – Feb.(North-east monsoon)	May – Sep.(South-west monsoon)
Atherfield	500 – 1,000	3,000 – 4,000
St.Martin	– 250	250 – 500
Sirigampola	– 250	500 – 1,000
Ekala	250 – 500	500 – 1,000
Katana	250 – 500	500 – 1,000

Source : The National Atlas of Sri Lanka, Survey Department, 1988

Table B-2 List of legally constituted protected areas, including classified as 'natural', protection and conservation forests.

	National designation Map ref/Name of area	Management category 1	Area (ha)	Year notified
DEPARTMENT OF WILDLIFE CONSERVATION				
National Parks				
1	Flood Plains	T	17,350	1984
2	Gal Oya	T	25,900	1954
3	Horton Plains	T	3,160	1988
4	Lahugala Kitulana	T	1,554	1980
5	Madura Oya	T	58,850	1983
6	Ruhuna (Yala)	T	97,878	1938
7	Somawathiya Chaitiya	T	37,762	1986
8	Uda Walawe	T	30,821	1972
9	Wasgomuwa	T	37,063	1980
10	Wilpattu	T	131,693	1938
11	Yala East	T	18,149	1969
Strict Natural Reserves				
12	Hakgala	T	1,142	1938
13	Ritigala	T	1,528	1941
14	Yala	T	28,904	1938
Nature Reserves				
15	Minneriya-Giritale	P	7,529	1988
16	Tirikonamadu	P	25,019	1986
Jungle Corridors				
18	Nilgala	P	10,360	1970
Sanctuaries				
19	Anuradhapura (W)	P	3,501	1938
20	Buddhangala	P	1,841	1974
21	Bundala	P	6,216	1969
22	Chundikulam	P	11,150	1938
23	Gal Oya Valley North-East	P	12,432	1954
24	Gal Oya Valley Sourth-West	P	15,281	1954
25	Galway's Lands	P	57	1938
26	Giant's Tank	P	3,941	1954
27	Great Sober Island	P	65	1963
28	Hikkaduwa Marine	P	45	1979
29	Honduwa Island	P	8	1973
30	Horagolla	P	13	1973
31	Kalametiya Kalapuwa	P	712	1984
32	Katagamuwa	P	1,004	1938
33	Kataragama	P	838	1938
34	Kegalle	P	113	1941
35	Kimbulwanoya	P	492	1963
36	Kokilai	P	2,995	1951
37	Kudumbigala	P	4,403	1973
38	Little Sober Island	P	6	1963

39	Madhu Road	P	26,677	1968
40	Mahakandrawewa	P		1966
41	Maimbulkande-Nittambuwa	P	23	1972
42	Mihintale	P	1,000	1938
43	Minneriya-Giritale	P	6,693	1938
44	Padaviya Tank	P	6,475	1963
45	Pallekele-Kahalla-Balaluwewa	P	21,690	1989
46	Pallemalala	P	14	1942
47	Parapuduwa Nuns Island	P	190	1988
48	Parititivu Island	P	18	1973
49	Peak Wilderness	P	22,380	1940
50	Pigeon Island	P	5	1974
51	Polonnaruwa (W)	P	1,523	1938
52	Ravana Ella	P	1,932	1979
53	Rocky Islets (Ambalagoda)	P	1	1940
54	Sagamam	P	616	1963
55	Senanayake Samudra	P	9,324	1954
56	Seruwila-Allai	P	15,540	1970
57	Sigiriya (W)	P	5,099	1990
58	Sri Jayewardenepura	P	449	1985
59	Tangamalai (Adhisham)	P	132	1938
60	Telwatte	P	1,424	1938
61	Tricomalee Naval Headworks	P	18,130	1963
62	Udawattekele	P	111	1938
63	Vavunikulam	P	4,856	1963
64	Victoria-Randenigala-Rantambe	P	42,087	1987
65	Welhella-Katagille	P	134	1949
66	Wilpattu North	P	624	1947
67	Wirawila-Tissa	P	4,164	1938

Proposed

21	Bundala National Park	6,216	
118	Lunugamvihira National Park	21,500	
119	Riverine Nature Reserve	921	
120	Bellanwila-Attidiya Marshes Sanctuary	60	
121	Dutch Bay (+ Portugal Bay)		

FOREST DEPARTMENT

National Heritage Wilderness Areas

17	Sinharaja bw	T	7,648	1988

Forest Reserves (National MAB Reserves) 2

68	Agra-Bopats	P	4,251	
69	Anaulandewa (proposed 3)	P	24,990	
70	Badagamuwa	P	20	
71	Bahirawakanda (proposed)	P	3	
72	Baron's Cap (proposed)	P	1,012	
73	Boranjamuwa (proposed)	P	810	
74	Daragoda	P	374	
75	Diyadawa	P	405	
76	Doluwakanda (proposed)	P	401	
77	Dotalugala (proposed)	P	1,619	
78	Gilimale (proposed)	P	40	
79	Habarakade (proposed)	P	202	
80	Haycock	P	364	
81	Harulu b	P	25,522	

82	Iranaimadu	P	1,417
83	Issembessawewa	P	300
84	Kanamuldeniya	P	20
85	Kandapola Sita Eliya	P	20
86	Kankaniyamulla	P	162
87	Kanneliya	P	40
88	Kikilimana (proposed)	P	810
89	Kilinochchi	P	1,417
90	Kottawa-Kombala (proposed)	P	202
91	Madhu Road (proposed)	P	1,417
92	Masmulla	P	20
93	Minneriya (proposed)	P	810
94	Mulatiyana	P	405
95	Nagacholai	P	1,417
96	Nellikele (proposed)	P	1,134
97	Nuwaragala	P	6,073
98	Nuwaragam	P	2,100
99	Ohiya (proposed)	P	(part of No. 68)
101	Oliyagankele	P	20
102	Omunugala	P	2,024
103	Panikkankulam	P	1,417
104	Pattipola	P	(part of No. 105)
105	Pattipola-Ambewela (proposed)	P	1,215
106	Peak Wildorness	P	4,858
107	Pidurutalagala (proposed)	P	6,883
108	Puwakpele (proposed)	P	202
109	Rammalakanda	P	405
110	Sita Eliya (proposed)	P	1,215
111	Sundapola	P	10
112	Tammannawetiya	P	67
113	Teldeniya-Ambekote (proposed)	P	13
114	Teravil Oddusudan	P	2,024
115	Udawattekele	P	102
116	Wedihitikanda (proposed)	P	1,344
117	Yakadawela (proposed)	P	20

b Biosphere reserve r Ramsar wetland W World Heritage site - natural
(W) World Heritage site - cultural

1 T Total protection (no extractive uses)
P Partial protection (local, sustainable extractive uses)

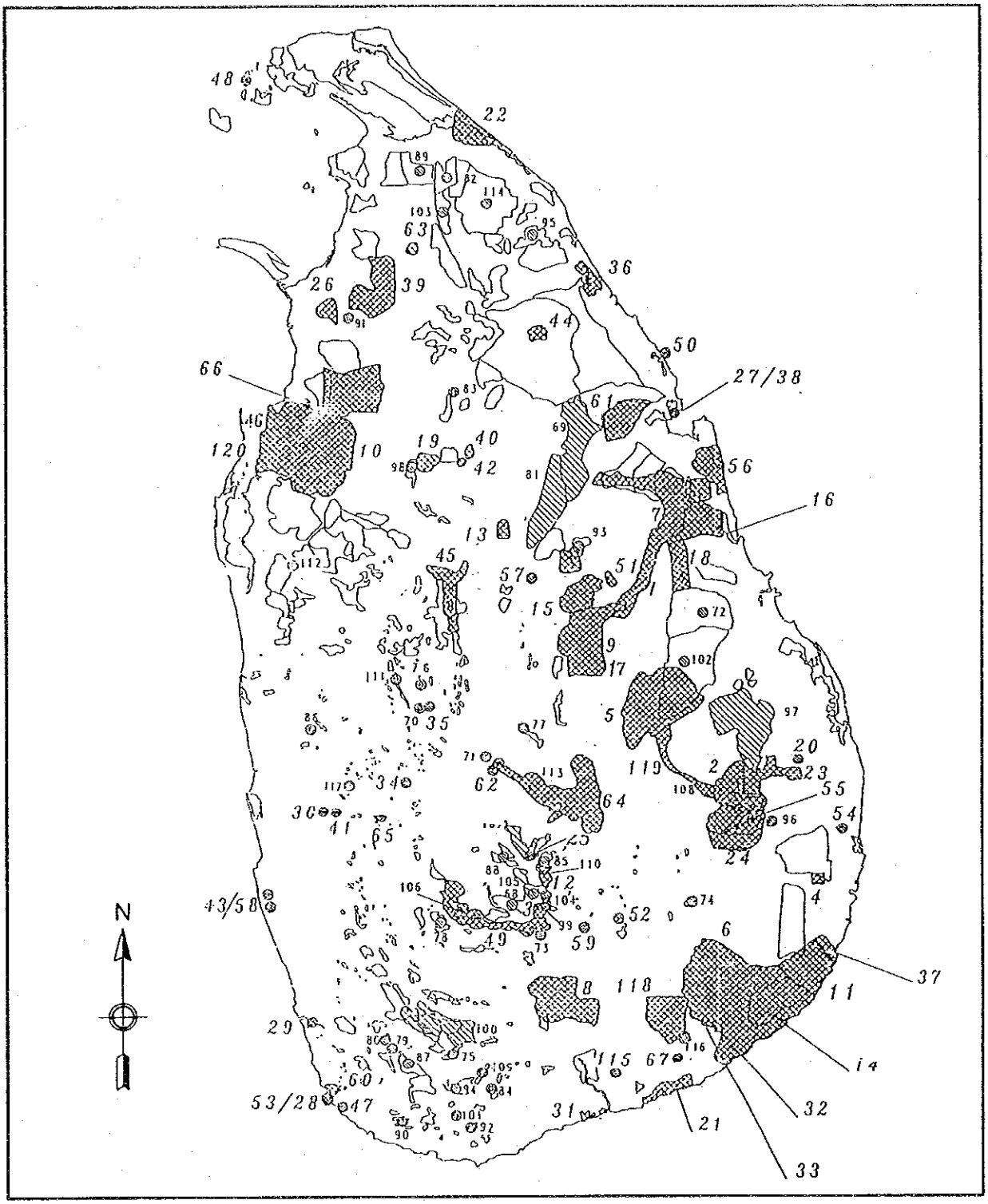
2 All forest reserves listed here have been designated in part or wholly national reserves. There are a total of 47 national MAB reserves, of which Anaulandewa and Hurulu, Agra-Bopats and Ohiya, and Pattipola and Pattipola-Ambewela constitute single sites. Included in this total are Hurulu and Sinharaja (listed elsewhere in Annex 2 as a national heritage wilderness area), which have also been designated as biosphere reserves at the international level.

3 Although awaiting notification, proposed forest reserves are subject to the provisions of the Forest Ordinance and, therefore, are treated as existing protected areas.

Table B-3 Legally Constituted Protected Areas as of 1988

Classification	Area (ha)	Area protection(Total/Partial)
Under control of Wildlife Conservation Department		
National Parks	460,180	Total
Strict Natural Reserves	31,574	Total
Nature Reserves	32,548	Partial
Jungle Corridor	10,360	Partial
Sanctuaries	256,424	Partial
Proposed Area	28,697	-
Sub-total	819,783	
Under control of Forest Department		
National Heritage	7,648	Total
Wilderness Areas	-	
Forest Reserves	99,596	Partial
Sub-total	107,244	
Total	927,027	14.1% of Sri Lanka (6,561,000 ha)

Source : Based on the data obtained from Department of Wildlife Conservation



Conservation Areas

- Under control of Department of Wildlife Conservation
- Under control of Forest Department

Commercially Beneficial Areas

- Under control of Forest Department

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF INDUSTRY, SCIENCE AND TECHNOLOGY

THE STUDY ON INDUSTRIAL SECTOR DEVELOPMENT IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

Figure B-1

Natural Environment Conservation Area

Nippon Koei Co., Ltd. in association with
Unico International Corporation and Japan External Trade Organization (JETRO)

APPENDIX C

ENVIRONMENTAL CONDITION

APPENDIX C ENVIRONMENTAL CONDITION

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APPENDIX C ENVIRONMENTAL CONDITION

C.1 Environmental Protection

C.1.1 Prevention of Water Pollution

It is considered that treated water effluent will not reach significant levels of degradation if and when wastewater is treated properly by the treatment facilities proposed at each alternative industrial estate site. However, it is quite difficult to predict the extent of environmental degradation over a long period of time. Accordingly, it is essential to carry out a periodical and continuous monitoring of effluent into the rivers and the concentration of substances in the fish and shellfish in and around these rivers and estuaries, as well as the changes in the bio-sphere of the marsh and wet land.

Wastewater from Atherfield estate is planned to be discharged into the Kelani river after treatment. On this Kelani river downstream, there exists a water intake and purification plant at Ambatale where potable water for Colombo city is supplied from this purification plant. Therefore, water pollution type industries should not be invited to Atherfield estate. The quality of sewerage water treated at the estate, as well as the water of the Kelani river downstream, should be continuously monitored by Atherfield estate and CEA.

At Martin site, people fish and reside in and around the estuary of the Deduru river, where treated sewer is planned to be discharged. In Martin estate, tanneries, leather goods manufacturing factories and metal plating factories are planned to be located. In the event that poisonous heavy metals such as Cu, Ni, Zn and Cr are to be used in the estate, they should be totally eliminated through sewage treatment plant in the estate. It is suggestible to conduct further detailed environmental assessment on the location of such pollution types of industries in Martin estate. In any case, it is recommended that periodical monitoring be executed on the contamination of fish and shellfish in this area. The change in aquatic biosphere over a long period of time is also conceivable, and it is recommended that periodical investigation on individual groups of aquatic biosphere be carried out at the same time.

Sirigampola site is comparatively located in the proximity of coastal wetlands which are ecologically quite important for bio-diversity and natural by purifying the environment. Further, these is no perennial river flow around the proposed estate, except for some creeks. Consequently, disposal of the treated water, should be carefully managed, and monitoring of water discharge around the estate should be continuously executed by the estate. When monitoring it will be useful to refer to the records on the environment in the marshlands of the Negombo Lagoon which have been compiled by BOI.

Ekala estate is located in marshland between two rivers; the Dandugam river and Attalagalu river. Water drained from the estate and wastewater treated at the sewerage plant in the estate will be discharged into the rivers which debouch into the Negombo Lagoon located about 5 km to the west. Consequently, continuous monitoring of water quality of the discharged wastewater and water of the rivers running into Negombo Lagoon should be carried out.

Katana site is located along the stream, called the Kimbulapitia Ela, which flows down into the Negombo Lagoon. Disposal of effluent treated at the sewage treatment plant in the estate should therefore be managed carefully and monitored constantly by the estate. Guidance for prevention of water pollution in these area is provided by the Environmental Department of BOI, and it should be strictly followed by industries and the estate.

C.1.2 Prevention of Air Pollution

In Sri Lanka, only available criteria for emission of air pollution are "Tolerance Limits for Emissions from Sulfuric Acid Plants" of SLSI and "New Source Air Emission Norms" of BOI's Environmental Norms. The CEA is now studying to establish its own criteria based on information they have collected from various other countries (Refer to Table C-1).

In the five estate sites, there has been no recognition of the existence of any air pollution. When implementing the industrial estate, some incinerators for solid waste disposal are planned to be provided in the estates. These incinerators could be a source of air pollution. Judging from the type of industries to be located in each industrial estate, there will be no implication that the factories located in the estate would cause air pollution, such as SOx, NOx, SPN, Carbon monoxide, and other poisonous gases, at such a level that will cause a serious environmental problem.

In the case of Atherfield estate, it is planned to locate such manufacturing industries as garment and apparel, rubber-based products, jewellery and toys. In Martin estate, leather products, footwears, chemical industry product and rubber-based products will be located in the estate. All the combustible waste will be incinerated. After incineration, the remaining ash and incombustible waste will be transported to the adjacent final disposal area for sanitary filling. The final disposal area should be located in such a place that it will not cause any problems, such as offensive odor, flies and other insects.

C.1.3 Solid Waste Disposal

1) Volume of Solid Waste to be Generated

Volume of solid waste to be generated from each industrial estate has been estimated and summarized below hereunder. These estimates have been worked out by using "Standard Unit of Waste by Different Industries" (Refer to Table C-2).

(Unit: Ton/Day)

	Combustible Solid Waste	Incombustible Solid Waste
Atherfield	9.4	6.1
Martin	25.0	8.9
Sirigampola	5.9	10.7
Ekala	18.3	18.9
Katana	7.5	13.6

For reference purposes, data have been collected from the existing Biyagama EPZ and Katunayake EPZ regarding the type and volume of waste, as shown in Table C-3 and C-4.

2) Method of Solid Waste Collection

Segregated collection of combustible waste and incombustible waste is strongly recommended. Each industrial estate should follow this segregated collection method. Desirably, recyclable waste such as waste from garment and textile factories will further be segregated.

3) Method of Solid Waste Disposal

Two methods of solid waste disposal have been comparatively studied in each alternative site. The first method is to have both combustible and incombustible waste to be collected and transported into a service area within the industrial estate and then the collected waste is to be transported out to a final disposal area located outside the industrial estate. The second method is to have both an incinerator and a final disposal area within the industrial estate.

As a result of the comparative studies, it is recommended that the second method be adopted for the following reasons; firstly it will be less influential to be inhabitants who reside

near the estate sites, and secondly, it may be a problem if all recyclable waste is transported out of the estate for reprocessing and sales.

In the case of Katana estate, it is noted that it might be possible to utilize the facilities of salid waste disposal available at Katunayake EPZ.

4) Method of Disposal in Detail

An incinerator and its ancillary facilities will be installed within the estate and all the combustible waste will be incinerated. After the incineration, remaining ash and incombustible waste will be transported to the adjacent final disposal area for sanitary filling. The filling will be 3m in thickness, and it will be covered by 50cm of earth. Bulldozers will be used for spreading and rolling both waste and earth material.

5) Incinerator and Final Disposal Area

The NERD Center, which is supervised fully by MIST, has manufactured and supplied an incinerator with a capacity of 2 tons/day to KEPZ. The NERD Center is to shortly supply another incinerator equipped with a device capable of eliminating SPN to be emitted from burning of waste rubber and waste plastic. In consideration of the maintenance and after-services of the machineries, it is recommendable to procure incinerators manufactured and produced in Sri Lanka as far as possible.

The incinerator will be located in due consideration of the wind direction so as not to give adverse affects to the inhabitants within and outside the estate. The final disposal area will also be selected, taking into consideration the similar conditions so as to avoid any problems that may be caused by offensive odor, flies and other insects. Desirably, the final disposal area will be located adjacent to the incinerator.

(a) As for the final disposal area, the following land will be required:

	Area (ha)	
Atherfield	1.4	
Martin	1.6	
Sirigampola	8.2	(inclusive of all utilities such as water purification plant, sewage treatment plant)
Ekala	1.8	
Katana	0.2	

(b) The final disposal area will be desirably located at the site of constructing the incinerator and also for and adjacent to the sanitary filling area of ash and incombustible waste.

(c) The bottom of the disposal area should be impervious, by laying vinyl sheets or other materials so that any seepage from the filling can be restricted from seeping underground and to protect groundwater contamination. At the same time, drainage pipes or some kind of drainage system should be provided to drain out any seepage water which should be collected into a wastewater treatment plant within the estate.

(d) The periphery of the final disposal area should be surrounded by a drainage ditch to catch all rain water and guide it to the sewerage treatment plant.

With respect to the solid waste disposal, technology and references are obtainable from KEPZ and BEPZ of BOI. There are incinerators and final disposal areas provided in both of these zones. In KEPZ, incineration of solid waste was done in the open in the beginning. It was originally planned at the planning stage of KEPZ that approximately 80% of the total solid waste would be recyclable waste. However, waste has not been recycled at all up to the present and, therefore, the final disposal area has been filled to its maximum capacity. Because of open fire incineration of the waste, black smoke emitted from burning waste rubber and waste plastic covered the sky over the international airport and BOI was faced with claims by the airport control authority. Further, complaints and protests against the offensive odor and black smoke were made to BOI by the inhabitants in the neighborhood. As a result, BOI installed an incinerator in KEPZ in 1991. The capacity of this incinerator, however, was too small to cope with the present volume of solid waste, because recyclable waste is disposed of as it is taxable if it is to be brought out of the EPZ. The same type of difficulties could occur in the sale of recyclable waste from the proposed industrial estates. It is, therefore, recommended that improvement in the taxation system be implemented for recyclable waste to be generated in the industrial estates.

C.2 Natural and Social Environmental Evaluation

C.2.1 Impact on Natural Environment

1) Impact by Construction Works

The five alternative estate sites are not located in the National Environment Conservation Areas, and they are located some distance away from residential areas. Judging from the

ecological conditions in and around the alternative sites, there are no specific endangered animals or plants living on the sites that should be protected in constructing the industrial estate.

Construction works may cause contamination of river water from sedimentation if cutting and filling are drained into rivers and streams. When executing earthworks along the river side, therefore, attention should be paid to prevent erosion and landslides. Special attention should be paid in reclaiming mashland on Ekala site because water, if contaminated, will be drained to Mathurajawela where mangrove forests exist. Before the implementation of Ekala industrial estate, it is recommended to carry out further assessment of environment impacts around the proposed site.

Impacts such as air polluction, noise pollution, and vibration caused by the use of construction equipment and machinery are conceivable. These impacts may be caused during the construction period, as well as at the time of hauling equipment and machinery to and from the construction sites. However, since the residential areas are located away from the construction sites, the impact of air pollution, noise pollution and vibration by construction work can be considered as negligible.

2) Impact by Operation of Industries

Wastewater and solid waste from the industrial factories have been designed to be treated by proper facilities to such a standard so as to satisfy all the requirements stipulated under the criteria for effluent and regulations for environment protection. Further, in the case of the Atherfield estate, no water pollution type industries should be invited. To prevent any illegal disposal of dangerous materials, it is considered essential and effective to set up periodical monitoring systems and continue monitoring of the quality of wastewater and solid waste.

It is also noted that contamination of soil and groundwater may be caused if wastewater and solid waste are improperly disposed of around the factories. The monitoring systems should include a thorough guidance so that wastewater and solid waste are properly disposed of at the proposed sewerage treatment plant and incinerator.

With respect to offensive odor due to solid waste disposal, proper operation and management of the proposed incinerator and sanitary-filling at the final disposal area are indispensable. Offensive odor can be mitigated by proper management of these facilities. In the selection of the location of the incinerator and other disposal facilities, as well as in locating factories susceptible to create offensive odor, the direction of sea wind, land wind and seasonal

wind should be taken into consideration especially in the coastal zone as in the case of Martin estate.

C.2.2 Impact on Social Environment

An interview survey was conducted with respect to the social environment on the alternative estate sites. The major findings are summarized in Table C-6 and discussed hereunder.

1) Factors related to Income

The average annual income in Avissawella (near Atherfield estate) and Negombo (near Katana and Sirigampola estates) is lower than the national average. Through establishment of the industrial estates, opportunities for employment will increase, and it is expected that the annual income in these areas would be substantially improved.

2) Factors related to Labor

The average unemployment rate in Sri Lanka is reported to be as high as 15.9 %. According to the interview survey, the unemployment rate was much higher in the principal urban areas near the proposed alternative estate sites. For instance, the unemployment rate was 43.4 % in Avissawella, 24.3 % in Negombo and 16.6 % in Chilaw. Particularly, creation of employment opportunity is imminently required in Avissawella.

It is preliminary estimated that the employment opportunities created by establishing the industrial estates will reach 20,000 persons in Atherfield, 9,000 persons in Martin, 3,600 persons in Sirigampola, 12,000 persons in Ekala and 4,700 persons in Katana. Consequently, the employment situation in Avissawella, Negombo and Chilaw would be greatly improved through implementation of the industrial estates.

3) Other Factors

Other social environment factors related to the establishment of industrial estates are discussed hereunder.

a) Inflow of Labor

Judging from the estimated number of employment opportunities created by the estate and the available labor force in the urban areas nearby, there could be a shortage of laborers, and workers may have to be recruited from outside. In this context, a residential area in and around the estates and recreational facilities would be required and they have been envisaged in the proposed land use plan and facility plan. In addition, it would be desirable that the investors and the estate

management agency will jointly set up a counselling system for the workers in the estates.

b) Women in Development

Through introduction of labor-intensive types of industries in the proposed industrial estates, it is predicted that a substantial number of women workers will be employed in the estates. Creation of employment opportunities will be welcomed, but it should be emphasized that the laws and regulation applicable to work hours and other working conditions for women workers should be strictly observed by factories under the guidance of the estate management agency.

It is desirable that the factories in the estates have dormitories for women workers in accordance with their requirements. Construction of the dormitories will be favorable for both factories and women workers in maintaining comfortable working conditions in the estates. It is for this reason that some areas have been designed for residential use in the estates. Women workers who reside in areas outside the proper residential areas would be exposed to danger, particularly at night when they return home after public transportation services cease. In this context, it is desirable that the estate management agency coordinate with the factories to provide transportation facilities such as bus services for workers who reside in outside areas.

Table C-1 NEW SOURCE AIR EMISSION NORMS (BOI)

SOURCE	MAXIMUM TOLERANCE LIMIT
A. Fossil fuel fired steam generator	
(a) Particulate matter/10^6BTU 2.5 x 10^3K.Cal) heat input	0.7 lbs (320 g)
(b) Sulphur dioxide/10^6BTU 2.5 x 10^3K.Cal) heat input	2.0 lbs (910 g)
(c) Visible emissions (as determined by percentage opacity)	20 (Occasionally up to 40 percent may be permitted for 2 minutes)
B. Any Source	
Smoke	Not to discharge smoke of a dark shade (No. 2 of the Ringleman Chart may be exceeded for a short period, of 5 to 10 minutes during start up or shut down.)

Source : ENVIRONMENTAL NORMS, BOI

TABLE C-2 GENERATION OF SOLID WASTE

		Unit Load /1		Atherfield			Martin			Sirigampola			Ekala			Katana		
		Combustible (Ton/ha)	Incombustible (Ton/ha)	Lot (ha)	Combus. (Ton)	Incombus. (Ton)	Lot (ha)	Combus. (Ton)	Incombus. (Ton)	Lot (ha)	Combus. (Ton)	Incombus. (Ton)	Lot (ha)	Combus. (Ton)	Incombus. (Ton)	Lot (ha)	Combus. (Ton)	Incombus. (Ton)
311	Food	0.40	0.09	2.67	1.068	0.240	10.59	4.236	0.953									
321,2	Textile, Apparel	0.08	0.01	22.24	1.779	0.222	6.35	0.508	0.064									
323,4	Leather, Footwear	0.40	0.09				26.47	10.588	2.382									
33	Wood products	0.34	0.03															
34	Paper products	0.43	0.04	1.78	0.765	0.071												
35	Chemical products	0.29	0.07				24.88	7.215	1.742									
355	Rubber products	0.12	0.02	18.23	2.188	0.365	4.23	0.508	0.085									
36	Non metal mineral products	0.05	1.01	1.78	0.089	1.798	0.26	0.013	0.263									
381	Fabricated metal products	0.17	0.31				11.12	1.904	3.447				4.03	0.685	1.249	10.0	1.7	3.1
382-9	Machinery	0.17	0.31							34.5	5.865	10.695	41.06	6.980	12.729	34.0	5.8	10.5
3901	Gems	(0.03)	(0.19)	14.23	0.427	2.704							12.88	0.386	2.447			
3902-9	Toy, etc.	(0.29)	(0.07)	10.67	3.094	0.747							35.43	(10.275)	(2.480)			
	Total			(71.6)	9.41	6.147	(83.9)	24.972	8.936	(34.5)	5.865	10.695	93.4	18.326	18.905	44.0	7.5	13.6

Incinerator to be applied : Capacity ····· 2t/day(25/kg/hr)
Price(1991) ····· Rs.862,500

- 5 sets for Atherfield : 5 x Rs.862,500 = Rs. 4,312,500
- 13 sets for Martin : 13 x Rs.862,500 = Rs.11,212,500
- 3 sets for Sirigampola : 3 x Rs.862,500 = Rs. 2,587,500
- 10 sets for Ekala : 10 x Rs.862,500 = Rs 8,625,000

Remark : /1 Unit load is assumed based on the demand survey and data from the Japanese industrial design standard.

Table C-3 TYPE OF WASTE DUMPED AT BOI DUMPING YARD BEPZ

NON COMBUSTIBLE ITEMS | COMBUSTIBLE

	Name of Enterprises	Metal/ Month	Clay	Ceramic Scraps	Granite Off-Cuts	Empty Barrels	Tins	Damaged Plaster Moulds	Cloth	Timber	Cartoon	Paper	Rubber Waste	Tobacco Stumps	Leather Off-Cuts	Synthetic Off-Cuts	Plastic Cuts/ Turnings	Thread Cones	Empty Barrels	Corrugated Cartoons	Cashew Husk Dust	Cotton Waste	Ash	Ink	Others	Bags & Sacks	Yarn Waste	Slurry	Yarn Off-Cuts	Sludge	Mode of Transport
1	Lanka S S (Pvt) Ltd.					1	25								50kg	275kg		25Nos	1												Lorry
2	Young An Lanka (Pvt) Ltd.								90kg									1746		6kg											Lorry
3	Ranmalu Fashions (Pvt) Ltd.								80kg		200kg																				Tractor
4	Ceramic World (Pvt) Ltd.		5Cwt	40Cwt				150cwt			20Cwt																				Tractor
5	Far East Eng. Co. (Pvt) Ltd.																														Fork Lift
6	La Cajou Allied Products (Pvt) Ltd.										100kg										50kg										Wheel Barrow
7	Sewco Lanka (Pvt) Ltd.	2tons									50kg									50kg											Pvt Tractor & own Van
8	Agio Tobacco Procs. Co. (Pvt) Ltd.										300kg			50Cwt																Tractor
9	Rainwear (Pvt) Ltd.								20kg									10													Head Tractor
10	Golden Lanka (Pvt) Ltd.										2Cwt	2Cwt																			Vehicle
11	Bradbury Wilkinson Lanka (Pvt) Ltd.	10kg							30kg		80kg						5kg						30kg	125kg	200kg						
12	Textilnen (Pvt) Ltd.								40Wt	10wt	6Cwt							10								2Cwt	2Cwt				Hand Tractor
13	Superba Inds. (Pvt) Ltd.										5kg																				Cart
14	Morvt Lanka (Pvt) Ltd.																														
15	Free Lanka Granite & Marble Export				2 Cu'sM						2Cwt					30Cwt		5kg										10000			
16	C & H Lanka (Pvt) Ltd.										2Cwt					30Cwt		5kg													Tractor
17	Alitex (Pvt) Ltd.					1or 2			10lb	20lb	50lb				5lb		1 or 2	400lt	2	2 or 3		150lbs							15lbs		Lorry or Tractor
18	Sees Lanka (Pvt) Ltd.								70kg		15kg				10kg			5kg		5kg											Lorry
19	Gertex (Pvt) Ltd.								60wt		12Cwt																				Hand Tractor
20	Lanka World (Pvt) Ltd.								140kg		160kg																				Tractor
21	Lanka Queen Intr. (Pvt) Ltd.																													30cubes	Tractor
22	Terrycelyon (Pvt) Ltd.										100kg									100kg		200kg									Tractor
23	Ansel Lanka (Pvt) Ltd.		1016kg								400kg		3048kg						10	200kg											
	Total	12kg	1270	2031.15	546.03	3	25	7619.05	942.48	59.86	3086.01	101.59	3048 kg	2539.68	12.27	1523.81		22.5	13	666.00	50	268	30	125 kg	200 kg	101.2	101.2		6.8		
	Monthly	48	5080	8127.00	2185	12 Nos	25 Nos	30476.20	3769.92	239.44	12344.04	406.36	9192	10158.80	49.08	6095.24	20.00	90.00	52	2664	200	1072.08	120	500	800	404.8	404.8	40,000lts	24.3		
	Daily	1.34	170	270.90				1015.87	125.67	8.00	411.47	13.55	306.4	339.00	1.64	203.18		3.00		88.8	6.6	35.74	4	17	27	13.5	13.5	40,000lts	0.81		

1. Approx. Qty. of Non-Combustible Items per month = 20.86 Tons
2. Approx. Qty. of Combustible Items per month = 22.02 Tons
42.88 Tons

Total Approx. : 45 Tons/month = 2 tons/day

Table C-4 TYPE OF WASTE DUMPED AT THE BOI DUMPING YARD

K E P Z

TYPE	WEIGHT IN KG/DAY (AVERAGE)	%
1. TEXTILE	3278	82
2. CANTEEN WASTE	335	8
3. RUBBER	74	2
4. PAPER	64	2
5. IRON	71	2
6. PLASTIC	24	<1
7. LEATHER	50	1
8. CARDBOARD	53	1
9. SAW DUST	14	<1
10. COIR	7	<1
11. CASHEW SHELLS	17	<1
TOTAL	3987	100

Source: BOI

Table C-5 NOISE LEVEL CRITERIA (BOI)

Area	Sound level dB (A)	
	Day	Night
Rural (residential)	50	40
Suburban (residential), hospital, places of worship etc.	55	45
Urban (residential)	60	50
Urban (residential) with some commercial activity or light industry	63	55
Commercial	67	58
Predominantly industrial	70	60
Heavy Industrial	75	65

Note 1:
Noise generated from machinery and processes should be controlled as far as possible at the source by one or more of the following methods:
(a) Vibration isolation
(b) Noise Insulation
(c) Noise absorption
(d) Damping

Attempts should be made to maintain noise levels as low as practicable within the working environment. However, in the event noise level exceeds 85 dB (A), suitable ear protection devices should be provided to all workers exposed to such noise levels. Wearing of these devices should be ensured during working times.

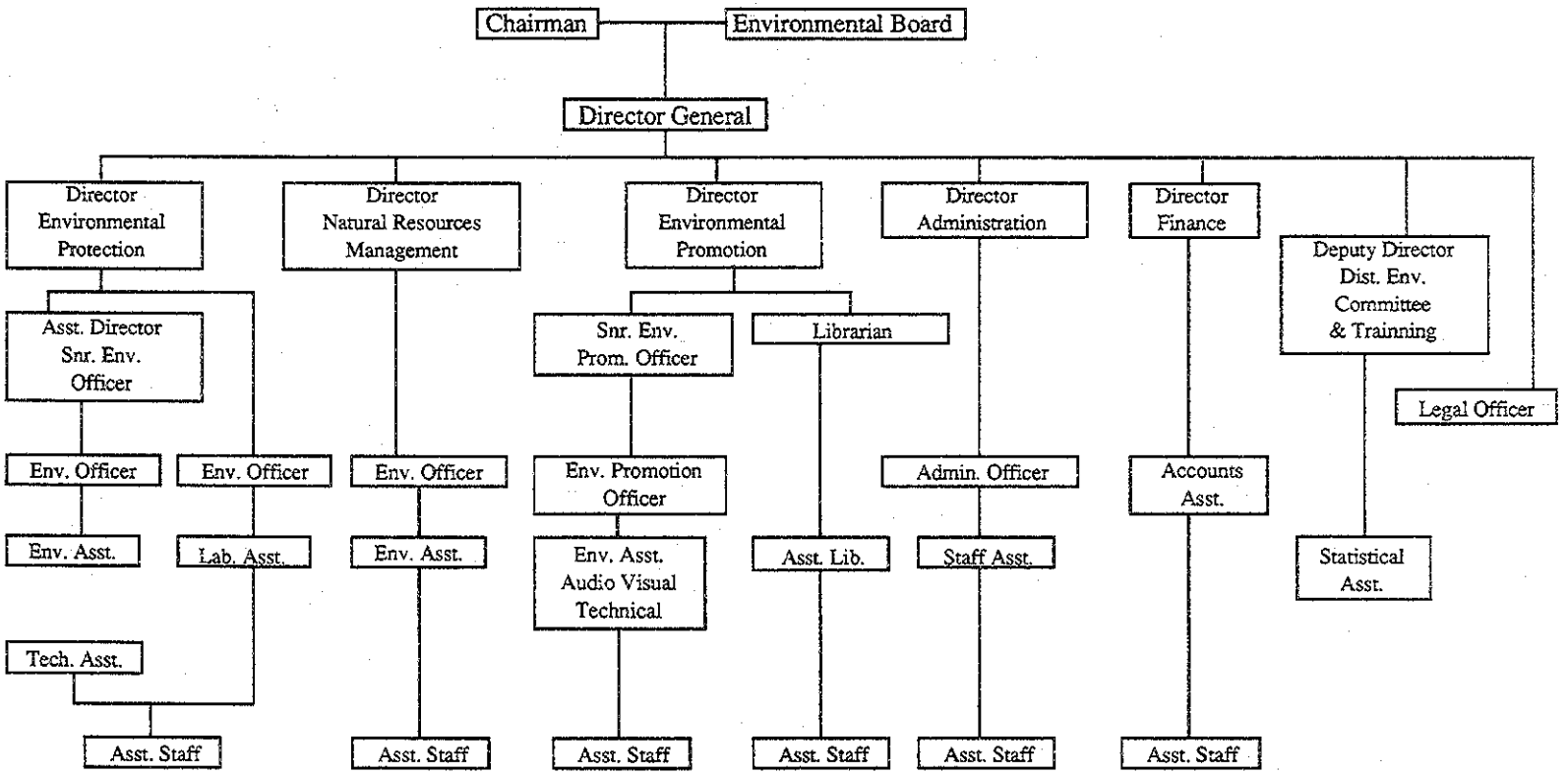
Source : ENVIRONMENTAL NORMS, BOI

Note 2:
Export Processing Zones fall within the heavy industrial area.

Table C-6 RESULTS OF INTERVIEW SURVEY

	Site			
	Atherfield	Marin	Singampola	Ratana
1. Location				
(1) Distance from Colombo	Approx. 57 km to the east	Approx. 80 km to the north	Approx. 55 km to the north	Approx. 30 km to the north
(2) Distance from the Airport	Approx. 45 km to the southeast	Approx. 50 km to the north	Approx. 25 km to the north	Approx. 4 km to the north
(3) Project Area	167.6 ha	136.6 ha	244.8 ha (for the 1st stage)	44.0 ha
2. Nearest Major Town	Avissawella	Chilaw	Negombo	Negombo
(1) Area	19.4 km²	4.9 km²	240 km²	240 km²
(2) Population	20,870	24,163	139,102	139,102
a. Employed	4,984	6,773	62,500	62,500
b. Unemployed	3,801	1,350	20,000	20,000
c. Unemployment Rate	43.3 %	16.6 %	24.2 %	24.2 %
(3) Average Number of People in a Family	4.6	-	3.2	3.2
(4) Monthly Basic Salary				
a. Agricultural Estate Workers	Rs. 1,320	NA	NA	NA
b. Factory Workers				
i) Unskilled Workers	Rs. 1,100	NA	Rs. 900	Rs. 900
ii) Skilled Workers	Rs. 1,430	NA	Rs. 1,600	Rs. 1,600
iii) Manager Class	Rs. 2,500	NA	Rs. 3,500	Rs. 3,500
(5) Annual Income /1				
a. Family Income	US$. 2,143	US$ 429 – 571	US$. 571	US$. 571
b. Income per capita	US$. 348	NA	US$. 178	US$. 178
(6) Population per Bed of Medical Facilities	57	60	248	248
(7) Population per Market				
a. Agricultural Products	3,478	24,163	15,600	15,600
b. Fish Market	10,435	24,163	28,000	28,000
c. Industrial Products	725	24,163	70,000	70,000
(8) Number of Students per Teacher	35	32	31	31
(9)Population per Police Official	149	97	NA	NA
(10) Population per Communication Facilities				
a. Post Office	6,957	24,163	8,000	8,000
b. Telegram Office	10,435	24,163	8,000	8,000
c. Telephone Office	6,957	24,163	8,000	8,000
d. Public Telephone	10,435	NA	NA	NA
e. Agency Post Office	NA	NA	15,000	15,000
(11) Daily Transportation Used				
a. Railway	1.5 %	1.6 %	1.9 %	1.9 %
b. Bus	93.0 %	96.7 %	97.9 %	97.9 %
c. Taxi including tutu (three-wheel taxi)	5.5 %	1.7 %	0.2 %	0.2 %
3. Site				
(1) Land Tenure	State Owned	State Owned	Private (Hindu Religeous Trust)	State owned
(2) Wildlife Conservation Area	not included	not included	not included	not included
(3) Land Use				
a. Housing Lots	15.4 %	2.4 %	0.7 %	n.a.
b. Agricultural Land	84.6 %	97.6 %	78.6 %	n.a.
c. Others	0.0 %	0.0 %	20.7 % (mostly forest)	n.a.
(4) Land Acquisition	seemed to be easy	seemed to be easy	seemed to be difficult	seemed to be easy

emarks: /1 US$ 1.00 = Rs.42.00
/2 Source : Human Development Report 1991, UNDP



JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF INDUSTRY, SCIENCE AND TECHNOLOGY

THE STUDY ON INDUSTRIAL SECTOR DEVELOPMENT IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

Figure C-1 Central Environmental Authority Organization Chart

Nippon Koei Co., Ltd. in association with
Unico International Corporation and Japan External Trade Organization (JETRO)