Table A.4-24 Breakdown of Bill of Quantities of Trunk Sewers: Conceicao System

Unit : m

(A) Gravity Flow

Diameter of Pipe(mm)	Materrial	Excavation Depth				Total
		less than 2.0^{m}	2.1^{m}~4.0^{m}	4.1^{m}~6.0^{m}	more than 6.0^{m}	
ϕ 300	PVC	-	340	40	200	580
ϕ 400	PVC	870	820	-	350	2,040
ϕ 500	RC	1,480	390	1,160	30	3,060
ϕ 700	RC	380	-	400	-	780
Total		2,730	1,550	1,600	580	6,460

(B) Pressure Flow

Dimeter of Pipe(mm)	Materrial	Excavation Depth	Total
		less than 2.0^{m}	
ϕ 100	PVC	245	245
ϕ 200	PVC	720	720
ϕ 300	PVC	690	690
Total			1655

(C) Rehabilitation (Replacement)

Dimeter of Pipe(mm)	Materrial	Excavation Depth	Total
-		0	0

Table A.4-25 Breakdown of Bill of Quantities of Trunk Sewers: Janga System

Unit : m

(A) Gravity Flow

Diameter of Pipe(mm)	Material	Excavation Depth				Total
		less than 2.0m	2.1m~4.0m	4.1m~6.0m	more than 6.0m	
φ 300	PVC	435	892	675	-	2,002
φ 400	PVC	875	3,220	2,310	660	7,065
φ 500	RC	-	105	1,035	110	1,250
φ 600	RC	-	80	290	-	370
φ 700	RC	-	-	690	558	1,248
Total		1,310	4,297	5,000	1,328	11,935

(B) Pressure Flow

Diameter of Pipe(mm)	Material	Excavation Depth	Total
		less than 2.0m	
φ 150	PVC	300	300
φ 250	PVC	1,020	1,020
φ 500	CIP	5,480	5,480
φ 600	CIP	2,800	2,800
φ 700	CIP	7200	7,200
Total			16800

(C) Rehabilitation (Replacement)

Diameter of Pipe(mm)	Material	Excavation Depth	Total
		less than 2.0m	
φ 200	PVC	425	425
φ 300	PVC	3190	3190
Total			3615

Table A.4-26 Summary of Bill of Quantities of Trank Sewers (1/2)

(A) Gravity Flow

Unit; m

Diameter of Pipe(mm)	Material	Conceicac	Janga	Cabanga	Boa Viagem	Cordeiro	Prazeres	Curcurana	Total (m)
ϕ 300	PVC	580	2,002	1,645	4985	1,625	3,885	2,030	16,752
ϕ 400	PVC	2,040	7,065	835	2865	4,845	3,990	1,510	23,150
ϕ 500	RC	3060	1250		1880	920	1490	1495	10,095
ϕ 600	RC		370		1915	850	1240	785	5,160
ϕ 700	RC	780	1248		1040	300	230	2280	5,878
ϕ 800	RC				2835	100	680	1435	5,050
ϕ 1000	RC					40	835	925	1,800
ϕ 1200	RC				330		925	20	1,275
ϕ 1500	RC						600		600
Total		6,460	11,935	2,480	15850	8,680	13,875	10,480	69,760

(B) Pressure Flow

Diameter of Pipe(mm)	Material	Conceicac	Janga	Cabanga	Boa Viagem	Cordeiro	Prazeres	Curcurana	Total (m)
ϕ 100	PVC	245		250					495
ϕ 150	PVC		300	1055	780			455	2,590
ϕ 200	PVC	720		465	100			1515	2800
ϕ 250	PVC		1020	435				1770	3225
ϕ 300	PVC	690				1360	750	2190	4990
ϕ 350	CIP			1200	1090				2290
ϕ 400	CIP						500		500
ϕ 450	CIP					745		1515	2260
ϕ 500	CIP		5480	3350			3515		12345
ϕ 600	CIP		2800		2550				5350
ϕ 700	CIP		7200				2680		9880
Total		1655	16800	6755	4520	2105	7445	7445	46725

Table A.4-26 Summary of Bill of Quantities of Trank Sewers (2/2)

(C) Rehabilitation (Replacement)

Diameter of Pipe(mm)	Material	Conceicao	Janga	Cabanga	Boa Viagem	Cordeiro	Prazeres	Curcurana	Total (m)
ϕ 200	PVC		425						425
ϕ 300	PVC		3190						3190
ϕ 350	CIP						1760		1760
ϕ 500	CIP			630					630
ϕ 800	CIP			210					210
ϕ 1000	CIP			890					890
ϕ 1200	CIP			1095					1095
ϕ 1500	CIP			385					385
Total			3615	3210	0	0	1760	0	8585

Table A.4-27 Breakdown of Bill of Quantities of Trunk Sewers: Conceicao System

Unit : m

(A) Gravity Flow						
Diameter of Pipe(mm)	Materrial	Excavation Depth				Total
		less than 2.0^{m}	2.1^{m}~4.0^{m}	4.1^{m}~6.0^{m}	more than 6.0^{m}	
ϕ 300	PVC	-	340	40	200	580
ϕ 400	PVC	870	820	-	350	2,040
ϕ 500	RC	1,480	390	1,160	30	3,060
ϕ 700	RC	380	-	400	-	780
Total		2,730	1,550	1,600	580	6,460

(B) Pressure Flow			
Dimeter of Pipe(mm)	Materrial	Excavation Depth	Total
		less than 2.0^{m}	
ϕ 100	PVC	245	245
ϕ 200	PVC	720	720
ϕ 300	PVC	690	690
Total			1655

(C) Rehabilitation (Replacement)			
Dimeter of Pipe(mm)	Materrial	Excavation Depth	Total
-		0	0

Table A.4-28 Breakdown of Bill of Quantities of Trunk Sewers: Janga System

Unit : m

(A) Gravity Flow

Diameter of Pipe(mm)	Material	Excavation Depth				Total
		less than 2.0m	2.1m~4.0m	4.1m~6.0m	more than 6.0m	
ϕ 300	PVC	435	892	675	-	2,002
ϕ 400	PVC	875	3,220	2,310	660	7,065
ϕ 500	RC	-	105	1,035	110	1,250
ϕ 600	RC	-	80	290	-	370
ϕ 700	RC	-	-	690	558	1,248
Total		1,310	4,297	5,000	1,328	11,935

(B) Pressure Flow

Diameter of Pipe(mm)	Material	Excavation Depth	Total
		less than 2.0m	
ϕ 150	PVC	300	300
ϕ 250	PVC	1,020	1,020
ϕ 500	CIP	5,480	5,480
ϕ 600	CIP	2,800	2,800
ϕ 700	CIP	7200	7,200
Total			16800

(C) Rehabilitation (Replacement)

Diameter of Pipe(mm)	Material	Excavation Depth	Total
		less than 2.0m	
ϕ 200	PVC	425	425
ϕ 300	PVC	3190	3190
Total			3615

Table A.4-29 Breakdown of Bill of Quantities of Trunk Sewers: Cabanga System

Unit : m

(A) Gravity Flow

Diameter of Pipe(mm)	Material	Excavation Depth				Total (m)
		less than 2.0m	2.1m~4.0m	4.1m~6.0m	more than 6.0m	
φ 300	PVC	-	-	1,645	-	1,645
φ 400	PVC	-	-	775	60	835
Total		-	-	2,420	60	2,480

(B) Pressure Flow

Diameter of Pipe(mm)	Material	Excavation Depth	Total (m)
		less than 2.0m	
φ 100	PVC	250	250
φ 150	PVC	1,055	1,055
φ 200	PVC	465	465
φ 250	PVC	435	435
φ 350	CIP	1200	1,200
φ 500	CIP	3350	3,350
Total			6755

(C) Rehabilitation (Replacement)

Diameter of Pipe(mm)	Material	Excavation Depth				Total (m)
		less than 2.0m	2.1m~4.0m	4.1m~6.0m	more than 6.0m	
φ 500	CIP	630	0	0	0	630
φ 800	CIP	0	0	0	210	210
φ 1000	CIP	0	320	0	570	890
φ 1200	CIP	0	0	0	1095	1095
φ 1500	CIP	0	0	0	385	385
Total		630	320	0	2260	3210

Table A.4-30 Breakdown of Bill of Quantities of Trunk Sewers : Boa Viagem Systen

Unit : m

(A) Gravity Flow

Diameter of Pipe(mm)	Material	Excavation Depth				Total (m)
		less than 2.0m	2.1m~4.0m	4.1m~6.0m	more than 6.0m	
φ 300	PVC	1,340	2,040	1,605	-	4,985
φ 400	PVC	1,505	1,010	350	-	2,865
φ 500	RC	545	800	535	-	1,880
φ 600	RC	660	525	730	-	1,915
φ 700	RC	965	75	-	-	1,040
φ 800	RC	1,350	880	605	-	2,835
φ 1000		-	-	330	-	330
Total		6,365	5,330	4,155	0	15,850

(B) Pressure Flow

Diameter of Pipe(mm)	Material	Excavation Depth	Total (m)
		less than 2.0m	
φ 150	PVC	780	780
φ 200	PVC	100	100
φ 350	CIP	1,090	1,090
φ 600	CIP	2,550	2,550
Total			4520

(C) Rehabilitation (Replacement)

Diameter of Pipe(mm)	Material	Excavation Depth	Total (m)
		less than 2.0m	
-	-	-	-

Table A.4-31 Breakdown of Bill of Quantities of Trunk Sewers: Cordeiro System

Unit : m

(A) Gravity Flow

Diameter of Pipe(mm)	Material	Excavation Depth				Total (m)
		less than 2.0m	2.1m~4.0m	4.1m~6.0m	more than 6.0m	
φ 300	PVC	740	85	680	120	1,625
φ 400	PVC	2,220	450	1,935	240	4,845
φ 500	RC	300	280	280	60	920
φ 600	RC	600	-	-	250	850
φ 700	RC	-	300	-	-	300
φ 800	RC	-	-	100	-	100
φ 1000	RC	-	-	40	-	40
Total		3,860	1,115	3,035	670	8,680

(B) Pressure Flow

Dimeter of Pipe(mm)	Material	Excavation Depth	Total (m)
		less than 2.0m	
φ 300	PVC	1,360	1,360
φ 450	CIP	745	745
Total			2,105

(C) Rehabilitation (Replacement)

Diameter of Pipe(mm)	Material	Excavation Depth less than 2.0m	Total (m)
-	-	-	-

Table A.4-32 Breakdown of Bill of Quantities of Trunk Sewers: Prazeres System

Unit : m

(A) Gravity Flow

Diameter of Pipe(mm)	Material	Excavation Depth				Total
		less than 2.0m	2.1m~4.0m	4.1m~6.0m	more than 6.0m	
φ 300	PVC	1,655	1,130	1,100	-	3,885
φ 400	PVC	1,060	1,585	1,345	-	3,990
φ 500	RC	530	-	960	-	1,490
φ 600	RC	455	-	785	-	1,240
φ 700	RC	-	-	230	-	230
φ 800	RC	-	-	680	-	680
φ 1000	RC	-	785	50	-	835
φ 1200	RC	-	160	765	-	925
φ 1500	RC	-	-	600	-	600
Total		3,700	3,660	6,515	0	13,875

(B) Pressure Flow

Diameter of Pipe(mm)	Material	Excavation Depth	Total
		less than 2.0m	
φ 300	PVC	750	750
φ 400	CIP	500	500
φ 500	CIP	3,515	3,520
φ 700	CIP	2,680	2,680
Total			7450

(C) Rehabilitation (Replacement)

Diameter of Pipe(mm)	Material	Excavation Depth less than 2.0m	Total (m)
φ 350	PVC	1760	1760
Total			1760

Table A.4-33 Breakdown of Bill of Quantities of Trunk Sewers: Curcurana System

Unit : m

(A) Gravity Flow

Diameter of Pipe(mm)	Material	Excavation Depth				Total (m)
		less than 2.0m	2.1m~4.0m	4.1m~6.0m	more than 6.0m	
φ 300	PVC	615	815	600	-	2,030
φ 400	PVC	380	860	-	270	1,510
φ 500	RC	1,150	345	-	-	1,495
φ 600	RC	-	560	225	-	785
φ 700	RC	690	955	635	-	2,280
φ 800	RC	1,085	200	150	-	1,435
φ 1000	RC	925	-	-	-	925
φ 1200	RC	20	-	-	-	20
Total		4,865	3,735	1,610	270	10,480

(B) Pressure Flow

Diameter of Pipe(mm)	Material	Excavation Depth	Total (m)
		less than 2.0m	
φ 150	PVC	455	455
φ 200	PVC	1,515	1,515
φ 250	PVC	1,770	1,770
φ 300	PVC	2,190	2,190
φ 450	PVC	1,515	1,515
Total		7,445	7,445

(C) Rehabilitation (Replacement)

Diameter of Pipe(mm)	Material	Excavation Depth less than 2.0m	Total (m)
-	-	-	-

Table A.4-34 Summary of bill of quantities of Branch and Collector Sewers

Excavation Depth (m)		Total
Collector	150 PVC	251,842
	200 PVC	83,948
	250 PVC	83,949
Sub total		419,739
Branch	150 PVC	979,391
Total		1,399,130

Table A.4-35 Breakdown of Bill of Quantities of Branch and Collector Sewers (1/2)

Conceicao

Excavation Depth (m)		1.2	1.5	2.5	Total
Collector	150 PVC	9,980		9,980	19,960
	200 PVC		1,996	4,657	6,653
	250 PVC		1,331	5,323	6,654
Sub total		9,980	3,327	19,960	33,267
Branch	150 PVC	77,623			77,623
Total		87,603	3,327	19,960	110,890

Janga

Excavation Depth (m)		1.2	1.5	2.5	Total
Collector	150 PVC	38,376		38,376	76,752
	200 PVC		7,675	17,909	25,584
	250 PVC		5,117	20,467	25,584
Sub total		38,376	12,792	76,752	127,920
Branch	150 PVC	298,480			298,480
Total		336,856	12,792	76,752	426,400

Cabanga

Excavation Depth (m)		1.2	1.5	2.5		Total
Collector	150 PVC	16,934		16,934		33,868
	200 PVC		3,387	7,903		11,290
	250 PVC		2,258	9,032		11,290
Sub total		16,934	5,645	33,869		56,448
Branch	150 PVC	131,712				131,712
Total		148,646	5,645	33,869	0	188,160

Boa Viagem

Excavation Depth (m)		1.2	1.5	2.5		Total
Collector	150 PVC	15,158		15,158		30,316
	200 PVC		3,032	7,074		10,106
	250 PVC		2,021	8,084		10,105
Sub total		15,159	5,053	30,316		50,527
Branch	150 PVC	117,894				117,894
Total		133,053	5,053	30,316	0	168,421

Cordeiro

Excavation Depth (m)		1.2	1.5	2.5	Total
Collector	150 PVC	11,907		11,907	23,814
	200 PVC		2,381	5,557	7,938
	250 PVC		1,588	6,350	7,938
Sub total		11,907	3,969	23,814	39,690
Branch	150 PVC	92,610			92,610
Total		104,517	3969	23,814	132,300

Table A.4-35 Breakdown of Bill of Quantities of Branch and Collector Sewers (2/2)

Prazeres

Excavation Depth (m)		1.2	1.5	2.5	Total
Collector	150 PVC	19,429		19,429	38,858
	200 PVC		3,886	9,067	12,953
	250 PVC		2,591	10,362	12,953
Sub total		19,429	6,477	38,858	64,764
Branch	150 PVC	151,116			151,116
Total		170,545	6,477	38,858	215,880

Curcurana

Excavation Depth (m)		1.2	1.5	2.5	Total
Collector	150 PVC	14,137		14,137	28,274
	200 PVC		2,827	6,597	9,424
	250 PVC		1,885	7,540	9,425
Sub total		14,137	4,712	28,274	47,123
Branch	150 PVC	109,956			109,956
Total		124,093	4,712	28,274	157,079

Table A.4-36 Number of Pumping Station in each Sewerage System

Sewerage System	Quantities					
	Manhole Type P/S	Simplified Type(I) P/S	Simplified Type(II) P/S	Standard Type(I) P/S	Standard Type(II) P/S	Total
Conceicao	3	1	0	0	0	4
Janga	2	0	2	0	1	5
Cabanga	6	0	0	0	0	6
Boa Viagem	1	2	0	1	1	5
Cordeiro	3	2	1	0	0	6
Prazeres	2	0	2	0	1	5
Curcurana	11	0	1	0	0	12
Total	28	5	6	1	3	43

P/S : Pumping Station

Table A.4-37 Bill of Quantities of Pumping Stations (1/2)

Type 1: Manhole type

Item	Unit	Quantities	Remarks
(1) Civil work			
1) Excavation	m3	100	
2) Backfill	m3	74	
3) Sureplus soil	m3	27	
4) Reinforced Concrete	m3	9.8	
5) Leveling concrete	m3	1.4	
(2) Temporary work			
1) H pile 10"x4" 5/8	m	130	
2) Lumber 2"x10"	m2	110	
3) Installation of pump	set	2	
4) Well point period	month	3	

Type 2: Simplyfied type(1)

Item	Unit	Quantities	Remarks
(1) Civil work			
1) Excavation	m3	315	
2) Backfill	m3	202	
3) Sureplus soil	m3	113	
4) Reinforced Concrete	m3	47	
5) Leveling concrete	m3	3.7	
(2) Temporary work			
1) H pile 10"x4" 5/8	m	264	
2) Lumber 2"x10"	m2	218	
3) Installation of pump	set	3	
4) Well point period	month	3	

Type 3: Simplyfied type(2)

Item	Unit	Quantities	Remarks
(1) Civil work			
1) Excavation	m3	390	
2) Backfill	m3	230	
3) Sureplus soil	m3	160	
4) Reinforced Concrete	m3	60	
5) Leveling concrete	m3	4.5	
(2) Temporary work			
1) H pile 10"x4" 5/8	m	288	
2) Lumber 2"x10"	m2	245	
3) Installation of pump	set	4	
4) Well point period	month	3	

Table A.4-37 Bill of Quantities of Pumping Stations (2/2)

Type 4: Standard type(1)

Item	Unit	Quantities	Remarks
(1) Civil work			
1) Excavation	m3	790	
2) Backfill	m3	280	
3) Sureplus soil	m3	520	
4) Reinforced Concrete	m3	210	
5) Leveling concrete	m3	12.8	
(2) Temporary work			
1) H pile 10"x4" 5/8	m	522	
2) Lumber 2"x10"	m2	450	
3) Installation of pump	set	3	
4) Well point period	month	4	
(3) Building			
1) Pump Room	m2	40	RC

Type 5: Standard type(2)

Item	Unit	Quantities	Remarks
(1) Civil work			
1) Excavation	m3	869	
2) Backfill	m3	308	
3) Sureplus soil	m3	561	
4) Reinforced Concrete	m3	231	
5) Leveling concrete	m3	14	
(2) Temporary work			
1) H pile 10"x4" 5/8	m	580	
2) Lumber 2"x10"	m2	500	
3) Installation of pump	set	4	
4) Well point period	month	4	
(3) Building			
1) Pump Room	m2	60	RC

Table A.4-38 Specification of pumps for Pumping Station (Conceicao System)

	Name of Pumping Station	Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
Existing	EEJ-17	0.85	200	4,800		20.0		0.85m^3/min × 20.0m × 9.5HP	2		
		0.54	150	245	4.50	7.4	Submersible Pump	0.54m^3/min × 7.4m × 5HP	2	M	
New Construcion	EE-1/01	1.13	200	580	10.20	13.9	Submersible Pump	1.13m^3/min × 13.9m × 10HP	2	M	
	EE-2/02	2.32	200	140	7.39	11.6	Submersible Pump	2.32m^3/min × 11.6m × 15HP	2	M	
	EE-3/02	0.37	100	0	4.14	6.0	Submersible Pump	0.37m^3/min × 6.0m × 3HP	2	M	
	EE-1/03	3.63	300	690	7.69	12.4	Submersible Pump	1.82m^3/min × 12.4m × 15HP	3	Si(I)	

M : Manhole Type
Si(I) : Simplified Type (I) St(I) : Standard Type (I)
Si(II) : Simplified Type (II) St(II) : Standard Type (II)

Table A.4-39 Specification of Pumps for Pumping Station (Janga System : 1/2)

Name of Pumping Station		Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
Existing	EEJ-01	41.01	700	6,013		18.0		13.67m^3/min × 18.0m × 150HP	4		
		37.9	700	7,200	14.0	24.9	Centrifugal Vertical Pump	12.6m^3/min × 24.9m × 150HP	4	St (II)	
	EEJ-02	2.64	500	550		15.0		1.32m^3/min × 15.0m × 77HP	3		
		3.3	400	550	14.0	16.5	Submersible Pump	1.65m^3/min × 16.5m × 20HP	4	Si(I)	
	EEJ-03	14.46	350	30		15.0		7.23m^3/min × 15.0m × 32HP	3		
		23.4	300	30	6.0	11.3	Centrifugal Vertical Pump	7.8m^3/min × 11.3m × 50HP	4	St (II)	
	EEJ-05	17.5	450	1,115		4.0		8.75m^3/min × 4.0m × 77HP	3		
		6.7	350	1,115	5.0	12.6	Submersible Pump	2.23m^3/min × 12.6m × 20HP	4	Si (II)	
	EEJ-06	3	400	1,115		7.0		1.5m^3/min × 7.0m × 35HP	3		
		4.78	350	1,115	9.0	14.1	Submersible Pump	2.39m^3/min × 14.1m × 20HP	3	Si(I)	
	EEJ-08	1.32	250	260		20.0		1.32m^3/min × 20.0m × 9.4HP	3		
		1.21	150	260	5.0	10.4	Submersible Pump	1.21m^3/min × 10.4m × 7.5HP	2	M	
	EEJ-10	5.4	300	690		12.0		2.7m^3/min × 12.0m × 9.4HP	3		
		2.3	200	690	5.0	15.1	Submersible Pump	1.15m^3/min ×15.1m × 10HP	2	M	
	EEJ-11	2.1	250	700		22.0		2.1m^3/min × 22.0m × 18HP	3		
		1.53	300	1,950	14.0	17.9	Submersible Pump	1.53m^3/min × 17.9m × 20HP	2	M	
	EEJ-12	1.38	500	611		8.4		1.38m^3/min × 8.35m × 5HP	3		
		1.24	150	611	4.0	14.1	Submersible Pump	1.24m^3/min × 14.1m × 10HP	2	M	

Table A.4-39 Specification of Pumps for Pumping Station (Janga System : 2/2)

	Name of Pumping Station	Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
Existing	EEJ-13	1.38	200	1,220		14.0		1.38m^3/min × 14.0m × 5HP	3		
		3.44	300	1,240	5.5	12.3	Submersible Pump	1.72m^3/min × 12.3m × 15HP	3	Si(I)	
	EEJ-16	4.17	250	2,900		53.5		4.17m^3/min × 53.5m × 100HP	2		
		0.63	250	1,050	14.0	16.3	Submersible Pump	0.63m^3/min × 16.3m × 7.5HP	2	M	
	EEJ-18	2.42	200	3,500		10.0		2.42m^3/min × 10.0m × 75HP	2		
		0.36	150	800	12.0	16.9	Submersible Pump	0.36m^3/min × 16.9m × 5HP	2	M	
	EEJ-21	2.5	150	425		15.0		2.5m^3/min × 15.0m × 6HP	3		
		2.5	200	425	5.0	12.0	Submersible Pump	2.5m^3/min × 12.0m × 20HP	2	M	
New Construcion	EE-1/05	8.05	500	2,180	14.0	19.0	Submersible Pump	2.68m^3/min × 19.0m × 25HP	4	Si(II)	
	EE-2/05	2.39	250	1,020	8.0	14.0	Submersible Pump	2.39m^3/min × 14.0m × 20HP	2	M	
	EE-3/05	0.44	150	300	8.0	11.1	Submersible Pump	0.44m^3/min × 11.1m × 5HP	2	M	
	EE-4/05	14.3	600	2,800	14.0	20.3	Centrifugal Vertical Pump	4.77m^3/min × 20.3m × 50HP	4	St(II)	
	EE-1/04	9.3	500	3,300	5.0	12.8	Submersible Pump	3.11m^3/min × 12.8m × 20HP	3	Si(II)	

M : Manhole Type
Si(I) : Simplified Type (I)
Si(II) : Simplified Type (II)
St(I) : Standard Type (I)
St(II) : Standard Type (II)

Table A.4-40 Specification of Pumps for Pumping Station (Cabanga System : 1/3)

	Name of Pumping Station	Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
Existing	EEC-01	8.9	300	2,100		8.0		4.45m^3/min × 8.0m × 75HP	3		
		23.1	500	630	5.2	12.8	Centrifugal Vertical Pump	7.7m^3/min × 12.8m × 50HP	4	St(II)	
	EEC-02	5.14	400	650		10.0		2.57m^3/min × 10.0m × 50HP	3		
		8.94	400	650	7.9	11.7	Submersible Pump	2.98m^3/min × 13.0m × 20HP	4	Si(II)	
	EEC-03	7.22				13.0		3.61m^3/min × 10.0m × 50HP	3		
		10.14	500	3,350	6.0	14.6	Centrifugal Vertical Pump	5.07m^3/min × 14.6m × 50HP	3	St(I)	
	EEC-08	7.16	300	500		10.0		3.58m^3/min × 10.0m × 15HP	3		
		0.96	150	500	6.0	14.6	Submersible Pump	0.96m^3/min × 14.6m × 10HP	2	M	
	EEC-09	2.6	350	1,200		8.0		1.3m^3/min × 8.0m × 15HP	3		
		1.44	200	1,200	6.8	12.9	Submersible Pump	1.44m^3/min × 12.9m × 15HP	2	M	
	EEC-12	0.75	150	250		5.0		0.75m^3/min × 5.0m × 5HP	2		
		0.54	100	250	6.0	14.6	Submersible Pump	0.54m^3/min × 14.6m × 5HP	2	M	
	EEC-15	1.3	150	250		8.0		1.3m^3/min × 8.0m × 6HP	2		
		1.3	150	250	5.0	10.3	Submersible Pump	1.3m^3/min × 10.3m × 7.5HP	2	M	
	EEC-17	1.14	300	1,300		8.0		1.14m^3/min × 8.0m × 20HP	2		
		1.13	200	750	5.0	9.4	Submersible Pump	1.13m^3/min × 9.4m × 7.5HP	2	M	
	EEC-33	3.48	400	700		10.4		3.48m^3/min × 10.4m × 12HP	2		
		1.08	150	350	5.5	12.6	Submersible Pump	1.08m^3/min × 12.6m × 10HP	2	M	

Table A.4-40 Specification of Pumps for Pumping Station (Cabanga System : 2/3)

	Name of Pumping Station	Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
Existing	EEX-04	2.4	400	630		10.0		1.2m^3/min × 10.0m × 75HP	3		
		11.7	400	630	6.0	13.0	Centrifugal Vertical Pump	5.85m^3/min × 13.0m × 40HP	3	St(I)	
	EEX-06	2.5	300	1,000		7.0		1.25m^3/min × 7.0m × 20HP	3		
		4.74	300	510	6.0	11.0	Submersible Pump	2.37m^3/min × 11.0m × 40HP	3	Si(I)	
	EEX-07	2.66	400	500		10.0		1.33m^3/min × 10.0m × 40HP	3		
		8.46	350	500	6.0	11.9	Submersible Pump	2.82m^3/min × 11.9m × 20HP	4	Si(II)	
	EEX-08	6.66	350	660		15.0		3.33m^3/min × 15.0m × 25HP	3		
		4.5	300	660	5.5	11.9	Submersible Pump	2.25m^3/min × 11.9m × 20HP	3	Si(I)	
	EEX-10	0.67	350	620		15.0		0.67m^3/min × 15.0m × 10HP	2		
		1.5	150	340	6.0	17.5	Submersible Pump	1.23m^3/min × 17.5m × 15HP	2	M	
	EEX-19	0.2	250	200		6.0		0.195m^3/min × 6.0m × 6HP			
		0.45	100	200	6.0	13.3	Submersible Pump	0.45m^3/min × 13.3m × 5.0HP	2	M	
	Mustardinha										
		3.12	250	1,085	5.5	14.5	Submersible Pump	1.56m^3/min × 14.5m × 15HP	3	Si(I)	
	EE Pina										
		4.26	350	1,200	7.0	11.6	Submersible Pump	2.2m^3/min × 11.6m × 20HP	3	Si(I)	
	EE I - Ponte do Maduro										
		0.6	100	250	6.0	14.6	Submersible Pump	0.6m^3/min × 14.6m × 7.5HP	2	M	

Table A.4-40 Specification of Pumps for Pumping Station (Cabanga System : 3/3)

	Name of Pumping Station	Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
Existing	EE II - Ponte do Maduro										
		0.6	150	500	6.0	9.8	Submersible Pump	$0.6m^3$/min × 9.8m × 5.0HP	2	M	
	EE III - Ponte do Maduro							$8.2m^3$/min × 13.5m × 50HP			
		2.05	200	630	5.5	12.3	Submersible Pump	$2.05m^3$/min × 12.3m × 20HP	2	M	
New Construcion	EE-1/44	2.88	250	435	5.8	10.6	Submersible Pump	$2.88m^3$/min × 10.6m × 20HP	2	M	
	EE-1/45	0.96	200	315	8.5	12.7	Submersible Pump	$1.72m^3$/min × 12.7m × 15HP	2	M	
	EE-1/95	0.19	150	650	6.0	10.4	Submersible Pump	$0.19m^3$/min × 10.4m × 2HP	2	M	
	EE-2/95	0.95	150	405	6.0	13.3	Submersible Pump	$0.95m^3$/min × 13.3m × 10HP	2	M	
	EE-4/95	0.68	100	250	6.0	14.6	Submersible Pump	$0.68m^3$/min × 14.6m × 10HP	2	M	
	EE-1/D7	2.28	200	150	6.0	10.7	Submersible Pump	$2.28m^3$/min × 10.7m × 15HP	2	M	

M : Manhole Type
Si(I) : Simplified Type (I)
Si(II) : Simplified Type (II)
St(I) : Standard Type (I)
St(II) : Standard Type (II)

Table A.4-41 Specification of Pumps for Pumping Station (Boa Viagem System)

Name of Pumping Station		Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
New Construcion	EE-1/15	3.24	200	100	6.0	9.8	Submersible Pump	1.6m^3/min × 9.8m × 20HP	3	Si(I)	
	EE-1/82	14.71	600	2,550	6.5	13.2	Centrifugal Vertical Pump	4.9m^3/min × 13.2m × 40HP	4	St(II)	
	EE-1/84	5.34	350	650	9.0	13.2	Submersible Pump	2.67m^3/min × 13.2m × 5HP	2	Si(I)	
	EE-1/68	10.33	350	440	6.0	12.9	Centrifugal Vertical Pump	5.17m^3/min × 12.9m × 40HP	3	St(I)	
	EE-1/78	0.79	150	780	6.5	11.9	Submersible Pump	0.79m^3/min × 11.9m × 5HP	2	M	

Table A.4-42 Specification of Pumps for Pumping Station (Cordeiro System)

Name of Pumping Station		Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
Existing	EEC-05										
		1.76	150	270	6.0	15.5	Submersible Pump	1.76m^3/min × 15.5m × 20HP	2	M	
	EEC-23	2.7	300	1,500		10.0		2.7m^3/min × 10.0m × 9.4HP	2		
		0.62	150	400	6.0	9.5	Submersible Pump	0.62m^3/min × 9.5m × 5HP	2	M	
New Construcion	EE-2/40	1.85	-	0	6.0	8.0	Submersible Pump	1.85m^3/min × 8.0m × 7.5HP	2	M	
	EE-3/40	0.05	-	0	6.0	8.0	Submersible Pump	0.05m^3/min × 8.0m × 3HP	2	M	
	EE-1/41	9.34	450	745	6.0	10.2	Submersible Pump	3.11m^3/min × 10.2m × 20HP	4	Si(II)	
	EE-2/41	3.84	300	360	9.0	12.2	Submersible Pump	1.92m^3/min × 12.2m × 10HP	3	Si(I)	
	EE-1/42	6.15	300	315	4.5	9.8	Submersible Pump	3.08m^3/min × 9.8m × 15HP	3	Si(I)	
	EE-1/43	3.14	300	685	8.0	11.7	Submersible Pump	0.79m^3/min × 11.7m × 5HP	2	M	

M : Manhole Type
Si(I) : Simplified Type (I)
Si(II) : Simplified Type (II)
St(I) : Standard Type (I)
St(II) : Standard Type (II)

TableA.4-43 Specification of Pumps for Pumping Station (Prazeres System)

	Name of Pumping Station	Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
Existing	EEC-16	2.7	300	1,500		11.0		$2.7m^3$/min x 11.0m x 9.4HP	2		
		2.86	350	1,760	8.2	12.0	Submersible Pump	$2.86m^3$/min x 12.0m x 20HP	2	M	
	EEC-21										
		2.23	300	750	6.0	9.2	Submersible Pump	$2.23m^3$/min x 9.2m x 15HP	2	M	
New Construcion	EE-1/21	17.29	700	2,680	14.8	19.7	Centrifugal Vertical Pump	$5.76m^3$/min x 19.7m x 50HP	4	St(II)	
	EE-1/19	7.34	500	1,720	11.0	14.8	Submersible Pump	$2.45m^3$/min x 14.8m x 20HP	4	Si(II)	
	EE-2/19	2.82	500	1,795	15.0	17.4	Submersible Pump	$2.82m^3$/min x 17.4m x 25HP	2	M	
	EE-1/18	0.48	-	0	6.0	8.0	Submersible Pump	$0.48m^3$/min x 8.0m x 3HP	2	M	
	EE-2/16	7.44	400	500	7.5	11.5	Submersible Pump	$2.48m^3$/min x 11.5m x 15HP	4	Si(II)	

M : Manhole Type
Si(I) : Simplified Type (I)
Si(II) : Simplified Type (II)
St(I) : Standard Type (I)
St(II) : Standard Type (II)

TableA.4-44 Specification of Pumps for Pumping Station (Curcurana System)

	Name of Pumping Station	Hourly Maximum Flow(m^3/min)	Diameter of pipe(mm)	Pipie Length(m)	Actual Head(m)	Total Head(m)	Pump type	Pump specification	Number of pump	Type of P/S	Remarks
New Construcion	EE-1/22	9.9	450	1,515	5.0	12.0	Submersible Pump	3.3m^3/min × 12.0m × 20HP	4	Si(II)	
	EE-2/22	1.3	200	515	8.8	12.5	Submersible Pump	1.3m^3/min × 12.5m × 10HP	2	M	
	EE-3/22	1.3	200	540	8.0	11.8	Submersible Pump	1.3m^3/min × 11.8m × 10HP	2	M	
	EE-4/22	0.6	-	0	6.0	8.0	Submersible Pump	0.6m^3/min × 8.0m × 3HP	2	M	
	EE-2/23	0.8	-	0	6.0	8.0	Submersible Pump	0.8m^3/min × 8.0m × 5HP	2	M	
	EE-3/23	0.5	-	0	6.0	8.0	Submersible Pump	0.5m^3/min × 8.0m × 3HP	2	M	
	EE-4/23	2.4	250	825	6.0	11.3	Submersible Pump	2.4m^3/min × 11.3m × 20HP	2	M	
	EE-5/23	1.6	200	460	6.0	11.2	Submersible Pump	1.6m^3/min × 11.2m × 20HP	2	M	
	EE-6/23	0.7	150	455	6.0	9.7	Submersible Pump	0.7m^3/min × 9.7m × 5HP	2	M	
	EE-7/23	1.7	250	945	6.0	10.2	Submersible Pump	1.7m^3/min × 10.2m × 7.5HP	2	M	
	EE-8/23	2.3	300	1,790	6.0	10.9	Submersible Pump	2.3m^3/min × 10.9m × 15HP	2	M	
	EE-1/24	3.4	300	400	9.0	12.4	Submersible Pump	3.4m^3/min × 12.4m × 20HP	2	M	

M : Manhole Type
Si(I) : Simplified Type (I)
Si(II) : Simplified Type (II)
St(I) : Standard Type (I)
St(II) : Standard Type (II)

Table A.4-45 Required Area for Land Acquisition for Pumping Stations

	Types	Unit area (m2)	pcs	Total Area (m2)	Remarks
Conceicao	A	80	3	240	
	B	170	1	170	
	Sub total		4	410	
Janga	A	80	2	160	
	C	190	2	380	
	E	650	1	650	
	Sub total		5	1190	
Cabanga	A	80	6	480	
	Sub total		6	480	
Voa Viage	A	80	1	80	
	B	170	2	340	
	D	560	1	560	
	E	650	1	650	
	Sub total		5	1630	
Cordeiro	A	80	3	240	
	B	170	2	340	
	C	190	1	190	
	Sub total		6	770	
Prazeres	A	80	2	160	
	C	190	2	380	
	E	650	1	650	
	Sub total		5	1190	
Curcurana	A	80	11	880	
	C	190	1	190	
	Sub total		12	1070	
Total			43	6740	

Note
A; Manhole Type Pumping Station
B; Simplified (I) Type Pumping Station
C; Simplified (II) Type Pumping Station
D; Standard Type (I) Pumping Station
E; Standard Type (II) Pumping Station

Table A.4-46 Specifications of Pumps and Motors of Existing Pumping Stations

No.	Project Sewerage Sub-system	Name of Pumping Station	Type of Pump	Quantity	Specification			
					Pump		Motor (60Hz)	
					Q	H	3 Phase x 380V	
					m3/hr	m	HP	Pole
1	Conceicao	EEJ-16	C.H.	2	250	53.5	100	4
2	Janga	ETE Janga	-	-	-	-	-	-
3		EEJ-01	C.V.P	4	820	18	150	6
4		EEJ-02	Subm.P.	3	79	15	77	6
5		EEJ-03	Subm.P.	3	434	15	32	6
6		EEJ-05	Subm.P.	3	525	4	77	6
7		EEJ-06	Subm.P.	3	90	7	35	6
8		EEJ-08	Subm.P.	2	79	20	9.4	6
9		EEJ-10	Subm.P.	3	162	12	9.4	6
10		EEJ-11	Subm.P.	2	126	22	18	6
11		EEJ-12	Subm.P.	2	83	8.35	5	6
12		EEJ-13	Subm.P.	2	83	14	5	6
13		EEJ-17	Subm.P.	2	51	20	9.5	4
14		EEJ-18	C.H.P	2	145	10	75	4
15		EEJ-21	Subm.P.	2	150	15	6	4
16	Cabanga	ETE Cabanga	C.V.P	5	1260	9	75	6
17		EEC-01	C.V.P	3	266.7	8	75	4
18		EEC-02	C.H.P	3	154	10	50	6
19		EEC-03	C.H.P	3	216.3	10	50	6
20		EEC-08	C.H.P	3	215	10	15	6
21		EEC-09	C.H.P	3	78	8	15	4
22		EEC-12	Subm.P.	2	44.8	5	5	4
23		EEC-15	Subm.P.	2	28.8	8	6	2
24		EEC-17	Subm.P.	2	68.15	8	20	4
25		EEC-19	Subm.P.	2	11.7	6	5	4
26		EEC-33	Subm.P.	2	208.8	10.4	12	6
27		EEC-Pina	Subm.P.	Under Construction		-	-	-
28		EEX-04	C.V.P.	3	72	10	75	6
29		EEX-06	Subm.P.	3	75	7	20	4
30		EEX-07	C.H.P	3	80	10	40	6
31		EEX-08	C.H.P.	3	200	15	25	6
32		EEX-10	C.V.P	2	40	15	10	6
33		EEX-19	Subm.P.	2	27	11.5	2.2	4
34	Cordeiro	EEC-23	Subm.P.	2	162	10	9.4	4
35		EEC-28	C.H.P	3	38	13	3	2
36	Boa Viagem	EEC-20	Subm.P.	2	82	8	5	6
37	Prazeres	EEC-16	Subm.P.	2	162	11	9.4	4
38		EEC-29	Subm.P.	2	176.4	6	15	4
39	Curcurana	EEC-10	Subm.P.	3	80	10	9.4	4
40		EEC-11	Subm.P.	2	16	8	5	4

Note: Subm.P.= Submersible Pump, C.H.P.= Centrifugal Horizontal Pump
C.V.P.= Centrifugal Vertical Pump

Table A.4-47 Equipment Manufacutures of Existing Pumping Stations

No.	Project Sewerage Sub-system	Name of Pumping Station	Type of Pump	Name of Manufacturer		
				Pump	Motor	Electrical Panel
1	Conceicao	EEJ-16	C.H.	KSB	Bufalo	Siemens
2	Janga	ETE Janga	-	-	-	-
3		EEJ-01	C.V.P	Worthington	GE	Siemens
4		EEJ-02	Subm.P.	Flygt	Flygt	Siemens
5		EEJ-03	Subm.P.	Flygt	Flygt	Siemens
6		EEJ-05	Subm.P.	Flygt	Flygt	Siemens
7		EEJ-06	Subm.P.	Flygt	Flygt	Siemens
8		EEJ-08	Subm.P.	Flygt	Flygt	Siemens
9		EEJ-10	Subm.P.	Flygt	Flygt	Siemens
10		EEJ-11	Subm.P.	Flygt	Flygt	Siemens
11		EEJ-12	Subm.P.	Flygt	Flygt	Siemens
12		EEJ-13	Subm.P.	Flygt	Flygt	Siemens
13		EEJ-17	Subm.P.	Flygt	Flygt	Siemens
14		EEJ-18	C.H.P	KSB	Bufalo	Siemens
15		EEJ-21	Subm.P.	Flygt	Flygt	Siemens
16	Cabanga	ETE Cabanga	C.V.P	Worthington	GE	Siemens
17		EEC-01	C.V.P	Worthington	Arno	Siemens
18		EEC-02	C.H.P	Worthington	Bufalo	Siemens
19		EEC-03	C.H.P	Worthington	Arno	Siemens
20		EEC-08	C.H.P	Sulzer	WEG	Siemens
21		EEC-09	C.H.P	Worthington	GE	Siemens
22		EEC-12	Subm.P.	Flygt	Flygt	Siemens
23		EEC-15	Subm.P.	Flygt	Flygt	Siemens
24		EEC-17	Subm.P.	Flygt	Flygt	Siemens
25		EEC-19	Subm.P.	Flygt	Flygt	Siemens
26		EEC-33	Subm.P.	KSB	KSB	Siemens
27		EEC-Pina	Subm.P.	Under Construction	---	---
28		EEX-04	C.V.P.	Worthington	Arno	Siemens
				Ingersoll Dresser	WEG	Siemens
29		EEX-06	Subm.P.	Flygt	Flygt	Siemens
30		EEX-07	C.H.P	Worthington	Arno	Siemens
31		EEX-08	C.H.P.	KSB	WEG	Siemens
32		EEX-10	C.V.P	Worthington	Arno	Siemens
33		EEX-19	Subm.P.	ABS	ABS	Siemens
34	Cordeiro	EEC-23	Subm.P.	Flygt	Flygt	Siemens
35		EEC-28	C.H.P	Jacuzzi	WEG	Siemens
36	Boa Viagem	EEC-20	Subm.P.	Flygt	Flygt	Siemens
37	Prazeres	EEC-16	Subm.P.	Flygt	Flygt	Siemens
38		EEC-29	Subm.P.	ABS	ABS	Siemens
39	Curcurana	EEC-10	Subm.P.	Flygt	Flygt	Siemens
40		EEC-11	Subm.P.	Flygt	Flygt	Siemens

Note: Subm.P.= Submersible Pump, C.H.P.= Centrifugal Horizontal Pump
C.V.P.= Centrifugal Vertical Pump

Table A.4-48 Ancillary Equipment of Existing Pumping Stations

No.	Project Sewerage Sub-system	Name of Pumping Station	Type of Pumping Station	Type of Pump	Bar Screen	Grit Chamb -ber	Pumping Station	
							with Pump Well	without Pump Well
1	Conceicao	EEJ-16	Dry-1	C.H.	A	-	B2	-
2	Janga	ETE Janga	-	-	-	-	-	-
3		EEJ-01	Dry-2	C.V.P	C	C	B3	-
4		EEJ-02	Wet-2	Subm.P.	C	-	B3	-
5		EEJ-03	Wet-1	Subm.P.	C	-	-	B2
6		EEJ-05	Wet-2	Subm.P.	C	-	B2	-
7		EEJ-06	Wet-1	Subm.P.	C	-	-	-
8		EEJ-08	Wet-1	Subm.P.	C	-	-	-
9		EEJ-10	Wet-1	Subm.P.	C	-	-	-
10		EEJ-11	Wet-1	Subm.P.	-	-	-	-
11		EEJ-12	Wet-1	Subm.P.	-	-	-	-
12		EEJ-13	Wet-1	Subm.P.	C	-	-	-
13		EEJ-17	Wet-1	Subm.P.	-	-	-	-
14		EEJ-18	Dry-1	C.H.P	C	-	B3	-
15		EEJ-21	Wet-1	Subm.P.	-	-	-	-
16	Cabanga	ETE C-01	Dry-2	C.V.P	A	-	B1	-
17		EEC-01	Dry-2	C.V.P	C	-	B2	-
18		EEC-02	Dry-1	C.H.P	-	-	B3	-
19		EEC-03	Dry-1	C.H.P	C	-	B2	-
20		EEC-08	Dry-1	C.H.P	A	-	A	-
21		EEC-09	Dry-1	C.H.P	-	-	B3	-
22		EEC-12	Wet-1	Subm.P.	-	-	-	-
23		EEC-15	Wet-1	Subm.P.	-	-	-	-
24		EEC-17	Wet-1	Subm.P.	-	-	-	-
25		EEC-19	Wet-1	Subm.P.	-	-	-	-
26		EEC-33	Wet-1	Subm.P.	-	-	-	B1
27		EEC-Pina	Wet	Under Construction		---	---	---
28		EEX-04	Dry-2	C.V.P.	-	-	B1	-
29		EEX-06	Wet-1	Subm.P.	A	-	-	B1
30		EEX-07	Dry-1	C.H.P	-	-	B1	-
31		EEX-08	Dry-1	C.H.P.	A	-	B1	-
32		EEX-10	Dry-2	C.V.P	A	-	A	-
33		EEX-19	Wet-1	Subm.P.	-	-	-	-
34	Cordeiro	EEC-23	Wet-1	Subm.P.	-	-	-	B3
35		EEC-28	Dry-1	C.H.P	A	-	B3	-
36	Boa Viagem	EEC-20	Wet-2	Subm.P.	-	-	B3	-
37	Prazeres	EEC-16	Wet-1	Subm.P.	-	-	-	-
38		EEC-29	Wet-1	Subm.P.	C	-	-	B3
39	Curcurana	EEC-10	Wet-1	Subm.P.	C	-	-	B2
40		EEC-11	Wet-1	Subm.P.	-	-	-	B2
	Total Quantity				20	1	17	7

Note: A=Good in use, B=To be repaired B1(Light)/B2(Medium)/B3(Heavy), C= To be replace
- = Not applicable (Not exists on site), Type of pumping station to be referred Table 3-16
Type of pump to be referred to Table 3-17

Table A.4-49 Current Situation of and Rehabilitation Requirement for Valves and Gates of Existing Pumping Stations

No.	Project Sewerage Sub-system	Name of Pumping Station	Quantity of Valves			Quantity of Check Valves			Quantity of Gates		
			A	B	C	A	B	C	A	B	C
1	Conceicao	EEJ-16	4	0	0	2	0	0	-	-	-
2	Janga	ETE Janga	-	-		-	-	-	-	-	-
3		EEJ-01	2	0	6	1	0	3	1	0	3
4		EEJ-02	0	0	6	0	0	3	0	0	4
5		EEJ-03	0	0	6	0	0	3	0	0	2
6		EEJ-05	0	0	6	0	0	3	0	0	4
7		EEJ-06	2	0	4	1	0	2	0	0	4
8		EEJ-08	0	0	4	0	0	2	-	-	-
9		EEJ-10	6	0	0	3	0	0	-	-	-
10		EEJ-11	0	0	4	0	0	2	-	-	-
11		EEJ-12	0	0	4	0	0	2	-	-	-
12		EEJ-13	0	0	4	0	0	2	-	-	-
13		EEJ-17	4	0	0	2	0	0	-	-	-
14		EEJ-18	4	0	0	2	0	0	-	-	-
15		EEJ-21	0	0	4	0	0	2	-	-	-
16	Cabanga	ETE C-01	10	0	0	5	0	0	-	-	-
17		EEC-01	0	0	6	0	0	3	-	-	-
18		EEC-02	0	0	6	0	0	3	-	-	-
19		EEC-03	0	0	6	0	0	3	-	-	-
20		EEC-08	4	0	0	2	0	0	-	-	-
21		EEC-09	0	0	6	0	0	3	-	-	-
22		EEC-12	0	0	4	0	0	2	-	-	-
23		EEC-15	0	0	4	0	0	2	-	-	-
24		EEC-17	0	0	4	0	0	2	-	-	-
25		EEC-19	0	0	4	0	0	2	-	-	-
26		EEC-33	0	0	4	0	0	2	-	-	-
27		EEC-Pina	Under Construction			---	---	---	---	---	---
28		EEX-04	2	0	4	1	0	2	-	-	-
29		EEX-06	2	0	4	1	0	2	-	-	-
30		EEX-07	0	0	6	0	0	3	-	-	-
31		EEX-08	6	0	0	3	0	0	-	-	-
32		EEX-10	0	0	4	0	0	2	-	-	-
33		EEX-19	0	0	4	0	0	2	-	-	-
34	Cordeiro	EEC-23	0	0	4	0	0	2	-	-	-
35		EEC-28	6	0	0	3	0	0	2	0	0
36	Boa Viagem	EEC-20	1	0	1	1	0	1	-	-	-
37	Prazeres	EEC-16	0	0	4	0	0	2	-	-	-
38		EEC-29	0	0	4	0	0	2	0	0	1
39	Curcurana	EEC-10	0	0	6	0	0	3	-	-	-
40		EEC-11	0	0	4	0	0	2	-	-	-
	Total		53	0	137	27	0	69	3	0	18

Note A=Good in use, B=To be repaired, C=To be replaced,
- = Not applicable (Not exists on site)

Table A.4-50 Rehabilitation Requirement for Pumps, Motors and Electrical Panels of Existing PumpingStations

No.	Project Sewerage Sub-system	Name of Pumping Station	Type of Pumping Station	Type of pump	Quantity of Pumps & Motors				Elect -rical Panel
					A	B	C	Total	
1	Conceicao	EEJ-16	Dry-1	C.H.	2	0	0	2	C
2	Janga	ETE Janga	-	-	-	-	-	-	-
3		EEJ-01	Dry-2	C.V.P	2	0	2	4	B1
4		EEJ-02	Wet-2	Subm.P.	0	0	3	3	C
5		EEJ-03	Wet-1	Subm.P.	0	0	3	3	C
6		EEJ-05	Wet-2	Subm.P.	0	0	3	3	C
7		EEJ-06	Wet-1	Subm.P.	0	1	2	3	C
8		EEJ-08	Wet-1	Subm.P.	0	0	2	2	C
9		EEJ-10	Wet-1	Subm.P.	0	1	2	3	C
10		EEJ-11	Wet-1	Subm.P.	0	0	2	2	C
11		EEJ-12	Wet-1	Subm.P.	0	0	2	2	C
12		EEJ-13	Wet-1	Subm.P.	0	0	2	2	C
13		EEJ-17	Wet-1	Subm.P.	0	1	1	2	C
14		EEJ-18	Dry-1	C.H.P	0	0	2	2	A
15		EEJ-21	Wet-1	Subm.P.	0	1	1	2	C
16	Cabanga	ETEC-01	Dry-2	C.V.P	5	0	0	5	A
17		EEC-01	Dry-2	C.V.P	0	0	3	3	C
18		EEC-02	Dry-1	C.H.P	0	0	3	3	B2
19		EEC-03	Dry-1	C.H.P	0	0	3	3	B1
20		EEC-08	Dry-1	C.H.P	0	0	3	3	A
21		EEC-09	Dry-1	C.H.P	0	0	3	3	B1
22		EEC-12	Wet-1	Subm.P.	0	0	2	2	C
23		EEC-15	Wet-1	Subm.P.	0	0	2	2	C
24		EEC-17	Wet-1	Subm.P.	0	0	2	2	C
25		EEC-19	Wet-1	Subm.P.	0	0	2	2	C
26		EEC-33	Wet-1	Subm.P.	0	0	2	2	B1
27		EEC-Pina	Wet	Subm.P.	Under Construction			---	---
28		EEX-04	Dry-2	C.V.P.	0	0	3	3	B1
29		EEX-06	Wet-1	Subm.P.	0	1	2	3	B1
30		EEX-07	Dry-1	C.H.P	0	0	3	3	C
31		EEX-08	Dry-1	C.H.P.	2	0	1	3	A
32		EEX-10	Dry-2	C.V.P	0	0	2	2	B1
33		EEX-19	Wet-1	Subm.P.	0	1	1	2	A
34	Cordeiro	EEC-23	Wet-1	Subm.P.	0	0	2	2	C
35		EEC-28	Dry-1	C.H.P	3	0	0	3	A
36	Boa Viagem	EEC-20	Wet-2	Subm.P.	0	0	2	2	C
37	Prazeres	EEC-16	Wet-1	Subm.P.	0	0	2	2	C
38		EEC-29	Wet-1	Subm.P.	0	0	2	2	C
39	Curcurana	EEC-10	Wet-1	Subm.P.	1	0	2	3	C
40		EEC-11	Wet-1	Subm.P.	1	0	1	2	C
	Total Quantity				16	6	75	97	38

Note: A=Good in use, B=To be repaired B1(Light)/B2(Medium)/B3(Heavy), C= To be replaced
- = Not applicable (Not existed at site), Type of pumping station to be referred to Table 3-16
Type of pump to be referred to Table 3-17

Table A.4-51 Rehabilitation Requirement for Ancillary Equipment of Existing Pump Stations

No.	Project Sewerage Sub-system	Name of Pumping Station	Type of Pumping Station	Type of Pump	Bar Screen	Grit Chamb -ber	Pumping House	
							with Pump Well	without Pump Well
1	Conceicao	EEJ-16	Dry-1	C.H.	A	-	B2	-
2	Janga	ETE Janga	-	-	-	-	-	-
3		EEJ-01	Dry-2	C.V.P	C	C	B3	-
4		EEJ-02	Wet-2	Subm.P.	C	-	B3	-
5		EEJ-03	Wet-1	Subm.P.	C	-	-	B2
6		EEJ-05	Wet-2	Subm.P.	C	-	B2	-
7		EEJ-06	Wet-1	Subm.P.	C	-	-	-
8		EEJ-08	Wet-1	Subm.P.	C	-	-	-
9		EEJ-10	Wet-1	Subm.P.	C	-	-	-
10		EEJ-11	Wet-1	Subm.P.	N	-	-	-
11		EEJ-12	Wet-1	Subm.P.	-	-	-	-
12		EEJ-13	Wet-1	Subm.P.	C	-	-	-
13		EEJ-17	Wet-1	Subm.P.	N	-	-	-
14		EEJ-18	Dry-1	C.H.P	C	-	B3	-
15		EEJ-21	Wet-1	Subm.P.	N	-	-	-
16	Cabanga	ETE C-01	Dry-2	C.V.P	A	-	B1	-
17		EEC-01	Dry-2	C.V.P	C	-	B2	-
18		EEC-02	Dry-1	C.H.P	N	-	B3	-
19		EEC-03	Dry-1	C.H.P	C	-	B2	-
20		EEC-08	Dry-1	C.H.P	A	-	A	-
21		EEC-09	Dry-1	C.H.P	N	-	B3	-
22		EEC-12	Wet-1	Subm.P.	-	-	-	-
23		EEC-15	Wet-1	Subm.P.	N	-	-	-
24		EEC-17	Wet-1	Subm.P.	N	-	-	-
25		EEC-19	Wet-1	Subm.P.	-	-	-	-
26		EEC-33	Wet-1	Subm.P.	N	-	-	B1
27		EEC-Pina	Wet	Under Construction		---	---	---
28		EEX-04	Dry-2	C.V.P.	N	-	B1	-
29		EEX-06	Wet-1	Subm.P.	A	-	-	B1
30		EEX-07	Dry-1	C.H.P	N	-	B1	-
31		EEX-08	Dry-1	C.H.P.	A	-	B1	-
32		EEX-10	Dry-2	C.V.P	A	-	A	-
33		EEX-19	Wet-1	Subm.P.	N	-	-	-
34	Cordeiro	EEC-23	Wet-1	Subm.P.	N	-	-	B3
35		EEC-28	Dry-1	C.H.P	A	-	B3	-
36	Boa Viagem	EEC-20	Wet-2	Subm.P.	N	-	B3	-
37	Prazeres	EEC-16	Wet-1	Subm.P.	N	-	-	-
38		EEC-29	Wet-1	Subm.P.	C	-	-	B3
39	Curcurana	EEC-10	Wet-1	Subm.P.	C	-	-	B2
40		EEC-11	Wet-1	Subm.P.	-	-	-	B2
	Total Quantity				34	1	17	7

Note: A=Good in use, B=To be repaired B1(Light)/B2(Medium)/B3(Heavy), C= To be replaced, N=To be installed newly, - = Not applicable (Not exists on site), Type of pumping station to be referred to Table 3-16, Type of pump to be referred to Table 3-17

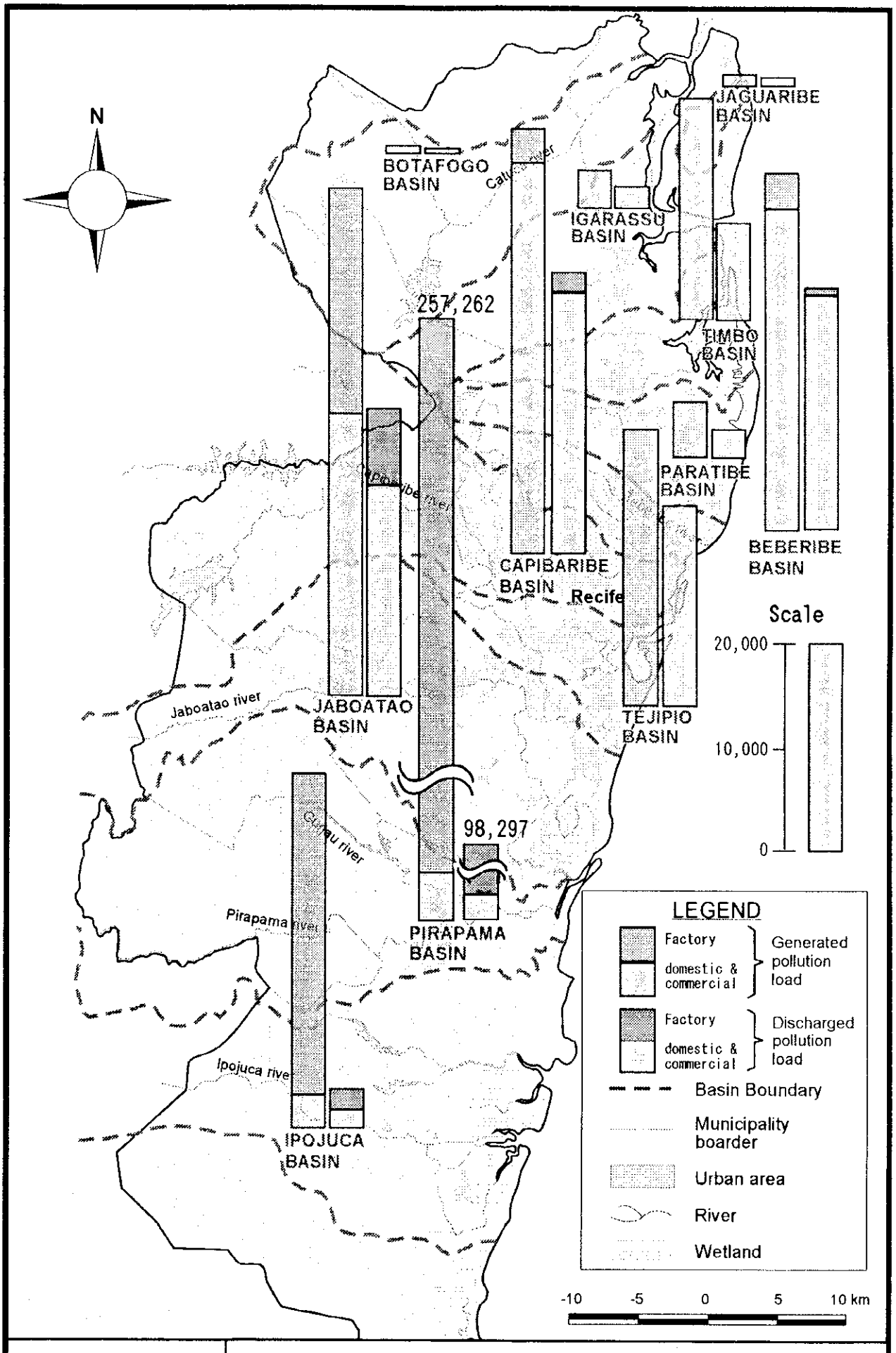


Fig. A.2-1 Present Distribution of Pollution Load in the RMR

THE STUDY ON STORMWATER DRAINAGE AND WASTEWATER MANAGEMENT PLAN FOR RMR

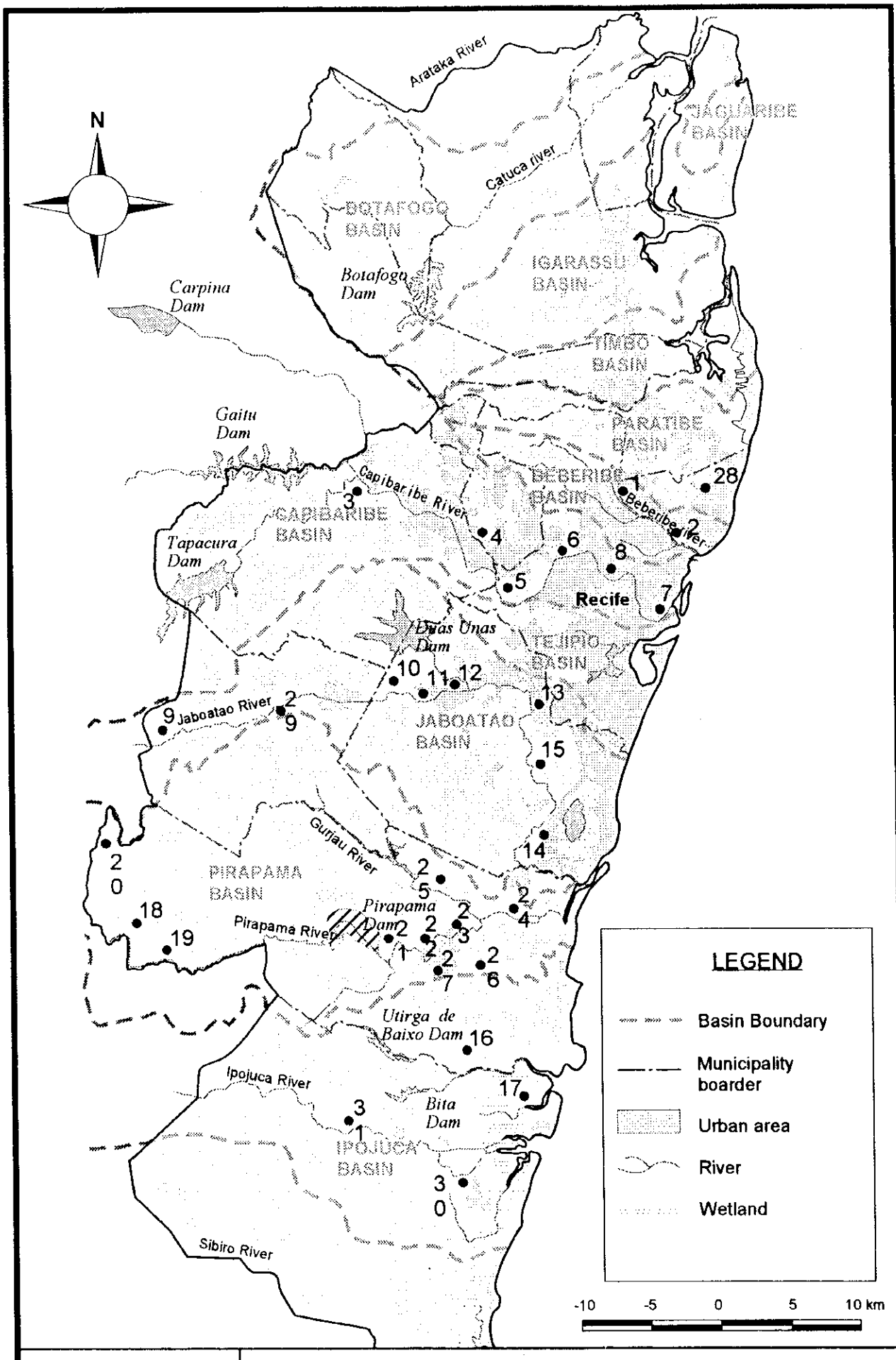


Fig. A.2-2	Location of Factories in the RMR

THE STUDY ON STORMWATER DRAINAGE AND WASTEWATER MANAGEMENT PLAN FOR RMR

Fig. A.3-1 Proposed Sewerage Areas (UE) in RMR (North)

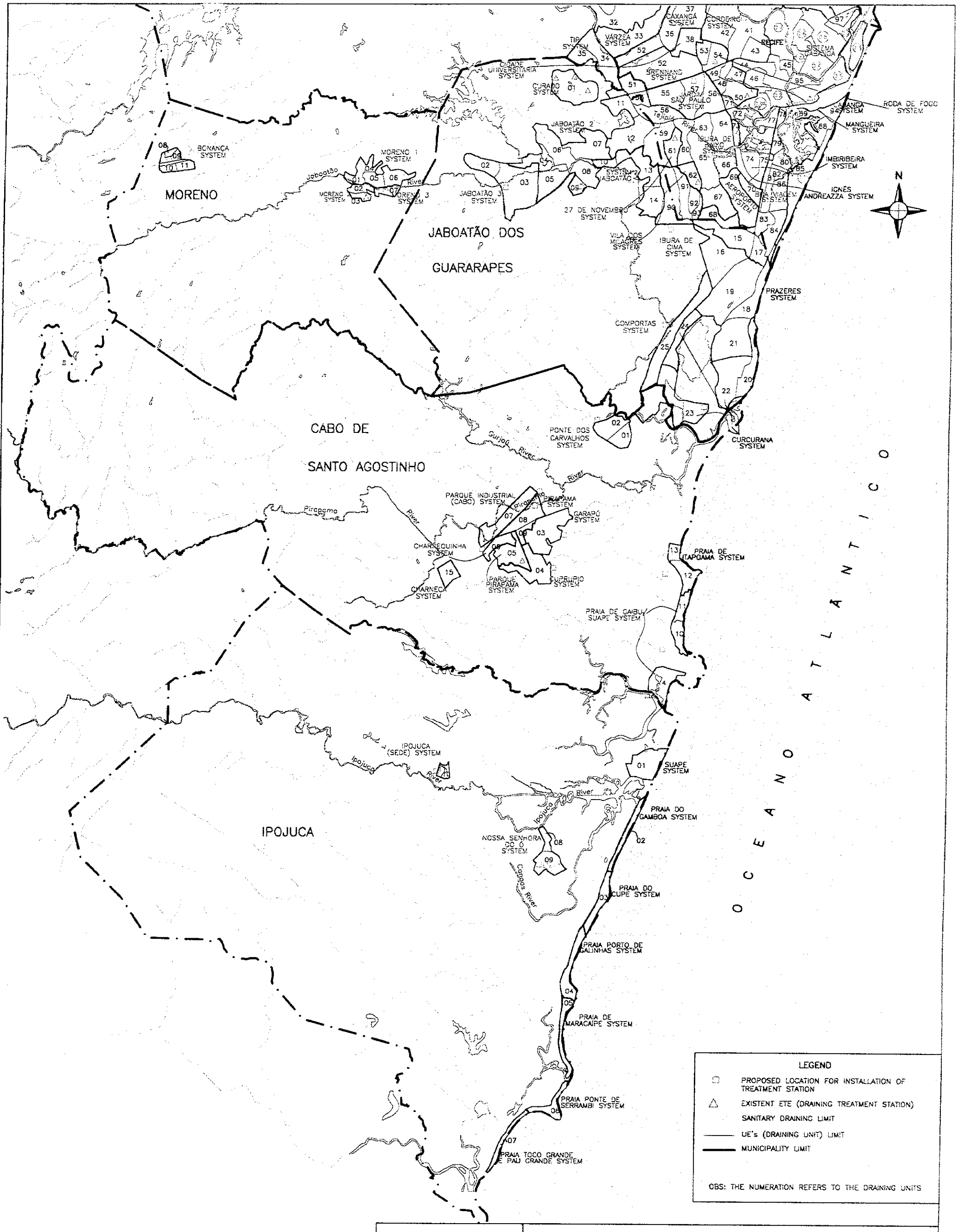
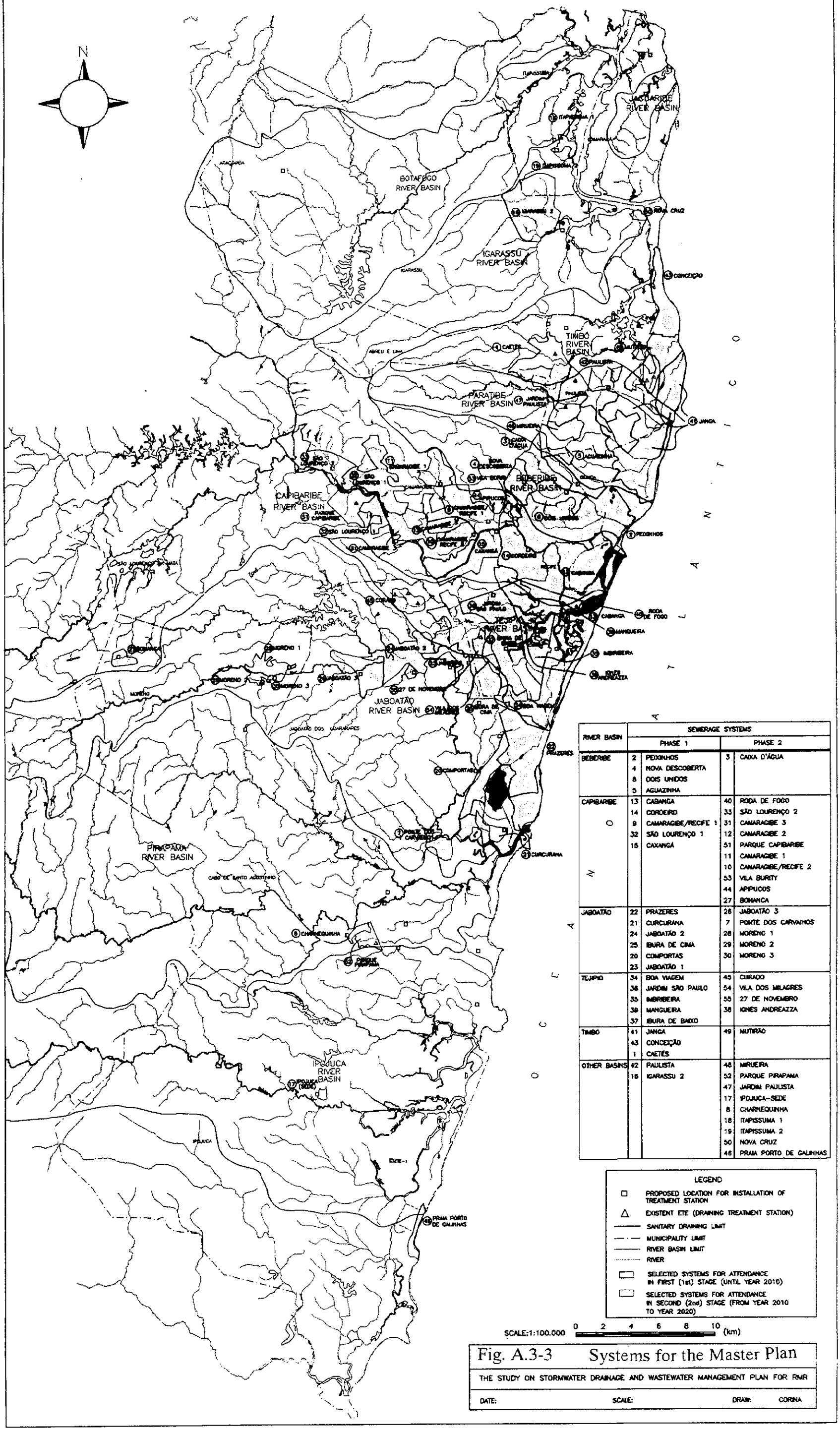


Fig. A.3-2 Proposed Sewerage Areas (UE) in RMR (South)

THE STUDY ON STORMWATER DRAINAGE AND SEWERAGE MANAGEMENT PLAN FOR RMR



RIVER BASIN	SEWERAGE SYSTEMS			
	PHASE 1		PHASE 2	
BEBERIBE	2	PEDRINHOS	3	CAIXA D'ÁGUA
	4	NOVA DESCOBERTA		
	8	DOIS UNIDOS		
	5	AGUAZINHA		
CAPIBARIBE	13	CABANGA	40	RODA DE FOGO
	14	CORDEIRO	33	SÃO LOURENÇO 2
	9	CAMARAGIBE/RECIFE 1	31	CAMARAGIBE 3
	32	SÃO LOURENÇO 1	12	CAMARAGIBE 2
	15	CAXANGÁ	51	PARQUE CAPIBARIBE
			11	CAMARAGIBE 1
			10	CAMARAGIBE/RECIFE 2
			53	VILA BURITY
			44	APIPUCOS
			27	BONANCA
JABOATÃO	22	PRAZERES	26	JABOATÃO 3
	21	CURCURANA	7	PONTE DOS CARVALHOS
	24	JABOATÃO 2	28	MORENO 1
	25	IBURA DE CIMA	29	MORENO 2
	20	COMPORTAS	30	MORENO 3
	23	JABOATÃO 1		
TEJIPIÓ	34	BOA VIAGEM	45	CURADO
	36	JARDIM SÃO PAULO	54	VILA DOS MILAGRES
	35	IMBIRIBEIRA	55	27 DE NOVEMBRO
	39	MANGUEIRA	38	IGNÊS ANDREAZZA
	37	IBURA DE BAIXO		
TIMBÓ	41	JANGA	49	MUTIRÃO
	43	CONCEIÇÃO		
	1	CAETÉS		
OTHER BASINS	42	PAULISTA	48	MIRUEIRA
	16	IGARASSU 2	52	PARQUE PIRAPAMA
			47	JARDIM PAULISTA
			17	IPOJUCA-SEDE
			8	CHARNEQUINHA
			18	ITAPISSUMA 1
			19	ITAPISSUMA 2
			50	NOVA CRUZ
			46	PRAIA PORTO DE GALINHAS

LEGEND

- PROPOSED LOCATION FOR INSTALLATION OF TREATMENT STATION
- EXISTENT ETE (DRAINING TREATMENT STATION)
- SANITARY DRAINING LIMIT
- MUNICIPALITY LIMIT
- RIVER BASIN LIMIT
- RIVER
- SELECTED SYSTEMS FOR ATTENDANCE IN FIRST (1st) STAGE (UNTIL YEAR 2010)
- SELECTED SYSTEMS FOR ATTENDANCE IN SECOND (2nd) STAGE (FROM YEAR 2010 TO YEAR 2020)

SCALE:1:100.000 0 2 4 6 8 10 (km)

Fig. A.3-3 Systems for the Master Plan

THE STUDY ON STORMWATER DRAINAGE AND WASTEWATER MANAGEMENT PLAN FOR RMR

DATE: SCALE: DRAW: CORINA

Fig. A.3-4 Relationship between the cities in nothern part of RMR and the related solid waste plant

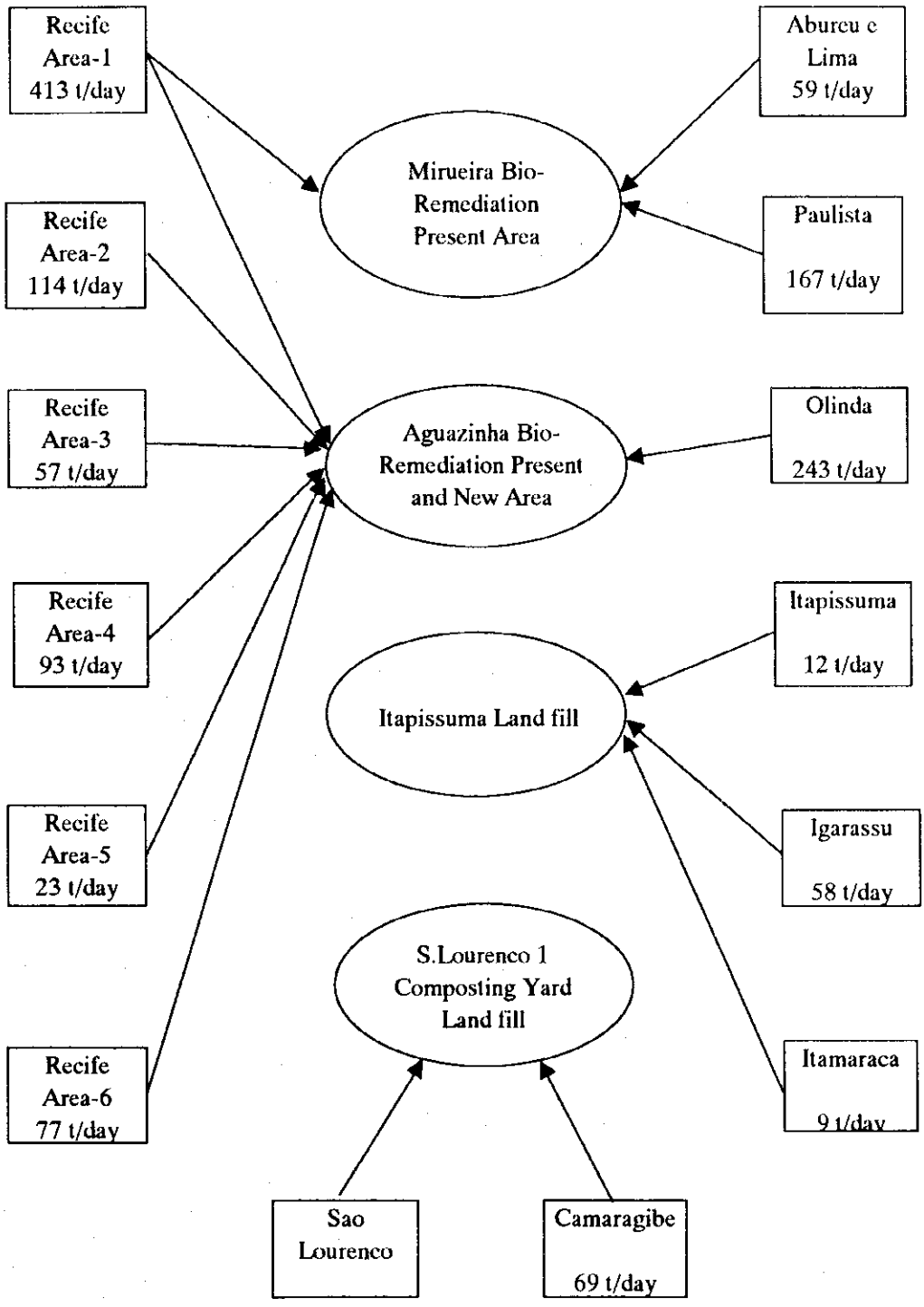
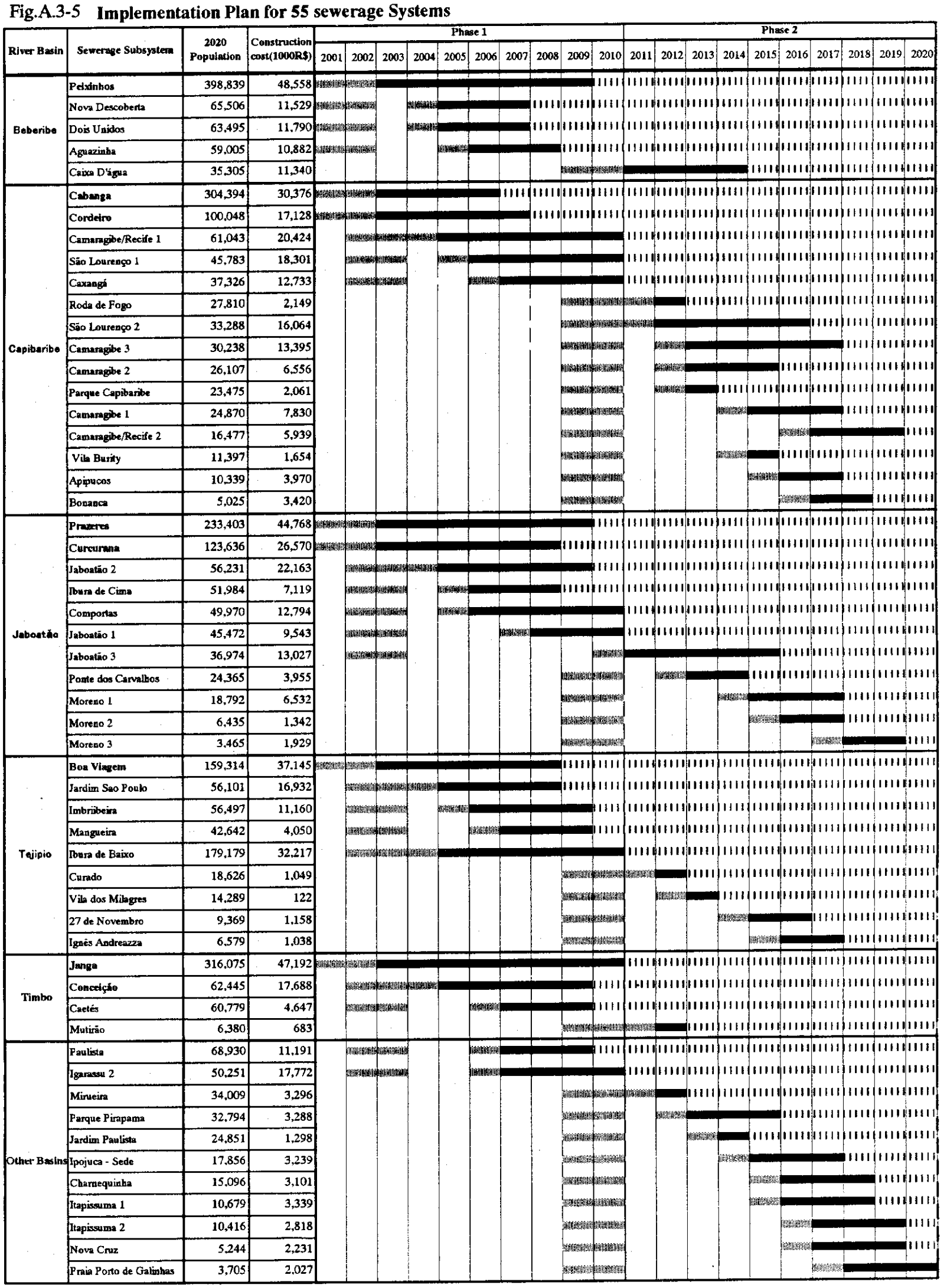


Fig.A.3-5 Implementation Plan for 55 sewerage Systems

River Basin	Sewerage Subsystem	2020 Population	Construction cost(1000R$)
Beberibe	Peixinhos	398,839	48,558
	Nova Descoberta	65,506	11,529
	Dois Unidos	63,495	11,790
	Aguazinha	59,005	10,882
	Caixa D'água	35,305	11,340
Capibaribe	Cabanga	304,394	30,376
	Cordeiro	100,048	17,128
	Camaragibe/Recife 1	61,043	20,424
	São Lourenço 1	45,783	18,301
	Caxangá	37,326	12,733
	Roda de Fogo	27,810	2,149
	São Lourenço 2	33,288	16,064
	Camaragibe 3	30,238	13,395
	Camaragibe 2	26,107	6,556
	Parque Capibaribe	23,475	2,061
	Camaragibe 1	24,870	7,830
	Camaragibe/Recife 2	16,477	5,939
	Vila Burity	11,397	1,654
	Apipucos	10,339	3,970
	Bonanca	5,025	3,420
Jaboatão	Prazeres	233,403	44,768
	Curcurana	123,636	26,570
	Jaboatão 2	56,231	22,163
	Ibura de Cima	51,984	7,119
	Comportas	49,970	12,794
	Jaboatão 1	45,472	9,543
	Jaboatão 3	36,974	13,027
	Ponte dos Carvalhos	24,365	3,955
	Moreno 1	18,792	6,532
	Moreno 2	6,435	1,342
	Moreno 3	3,465	1,929
Tejipio	Boa Viagem	159,314	37,145
	Jardim Sao Poulo	56,101	16,932
	Imbribeira	56,497	11,160
	Mangueira	42,642	4,050
	Ibura de Baixo	179,179	32,217
	Curado	18,626	1,049
	Vila dos Milagres	14,289	122
	27 de Novembro	9,369	1,158
	Ignês Andreazza	6,579	1,038
Timbo	Janga	316,075	47,192
	Conceição	62,445	17,688
	Caetés	60,779	4,647
	Mutirão	6,380	683
Other Basins	Paulista	68,930	11,191
	Igarassu 2	50,251	17,772
	Mirueira	34,009	3,296
	Parque Pirapama	32,794	3,288
	Jardim Paulista	24,851	1,298
	Ipojuca - Sede	17,856	3,239
	Charnequinha	15,096	3,101
	Itapissuma 1	10,679	3,339
	Itapissuma 2	10,416	2,818
	Nova Cruz	5,244	2,231
	Praia Porto de Galinhas	3,705	2,027



Note: Preparation

Execution

RIVER BASIN	NO	PRIORITY PROJECTS SYSTEM	SERVED AREA(HA)	POPULATION IN 2020
CAPIBARIBE	13	■	2,260	304,394
	14	■	675	100,048
		SUB-TOTAL	2,935	404,442
JABOATÃO	22	■	1,548	233,403
	21	■	910	123,636
		SUB-TOTAL	2,458	357,039
TEJIPIO	34	■	1,281	159,314
		SUB-TOTAL	1,281	159,314
TIMBO	41	■	2,879	316,075
	43	■	710	62,445
		SUB-TOTAL	3,589	378,520
OTHER BASINS				
		SUB-TOTAL	0	0
PRIORITY PROJECTS TOTAL			12,811	1,698,154

LEGEND

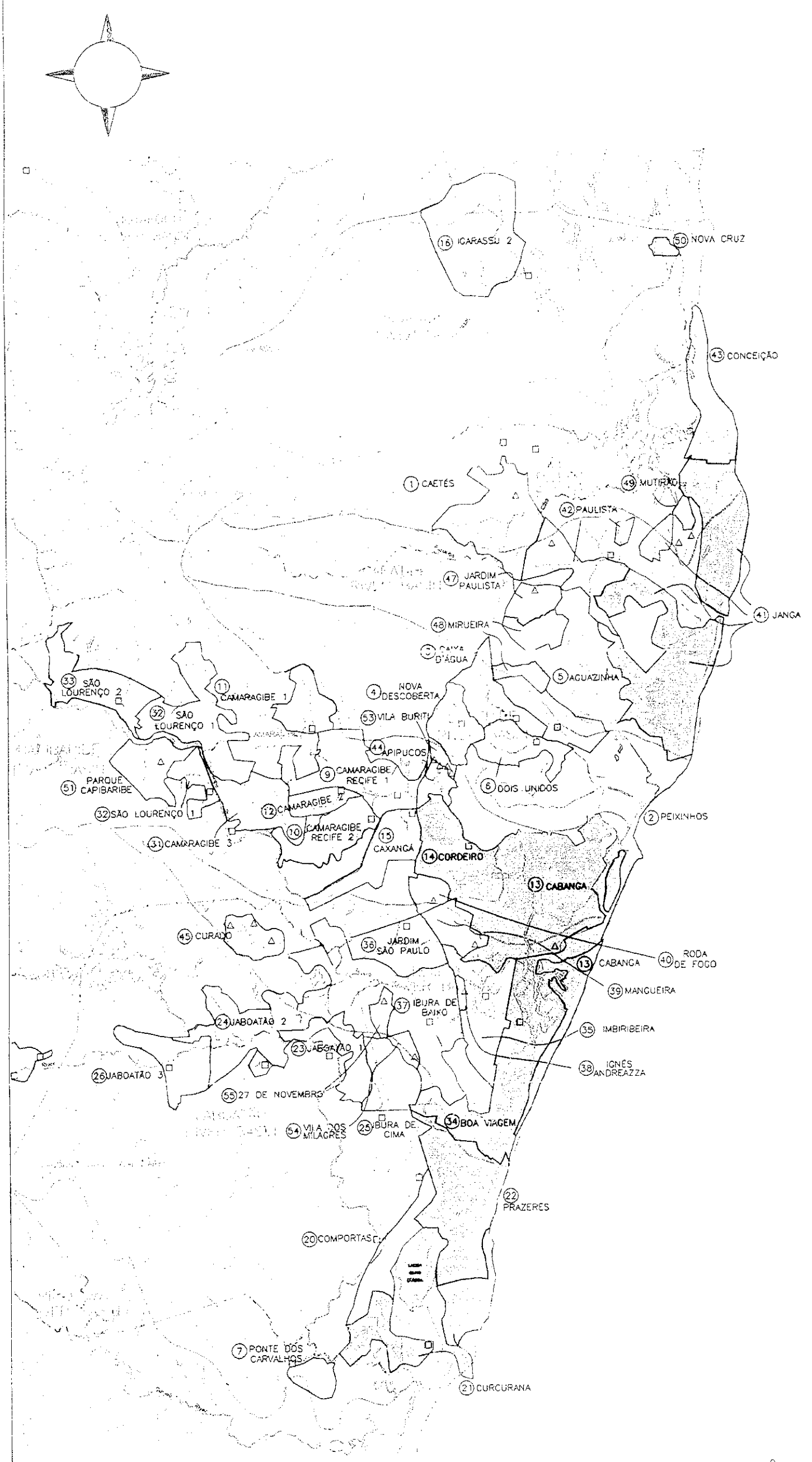
- □ PROPOSED LOCATION FOR INSTALLATION OF TREATMENT STATION
- △ EXISTENT ETE (DRAINING TREATMENT STATION)
- SANITARY DRAINING LIMIT
- MUNICIPALITY LIMIT
- RIVER BASIN LIMIT
- RIVER
- ■ Priority Projects

SCALE;1:100.000 0 2 4 6 8 10 (km)

Fig. A.3-6 Systems for Phase 1 and Priority Projects

THE STUDY ON STORMWATER DRAINAGE AND WASTEWATER MANAGEMENT PLAN FOR RMR

DATE: SCALE: DRAW: CORINA



RIVER BASIN	NO	PRIORITY PROJECTS SYSTEM	SERVED AREA(HA)	POPULATION IN 2020
CAPIBARIBE	13	CABANGA	2,260	304,394
	14	CORDEIRO	675	100,048
		SUB-TOTAL	2,935	404,442
JABOATÃO	22	PRAZERES	1,548	233,403
	21	CURCURANA	910	123,636
		SUB-TOTAL	2,458	357,039
TEJIPIO	34	BOA VIAGEM	1,281	159,314
		SUB-TOTAL	1,281	159,314
TIMBO	41	JANGA	2,879	316,075
	43	CONCEIÇÃO	710	62,445
		SUB-TOTAL	3,589	378,520
OTHER BASINS		SUB-TOTAL	0	0
PRIORITY PROJECTS TOTAL			12,811	1,698,154

LEGEND

- □ PROPOSED LOCATION FOR INSTALLATION OF TREATMENT STATION
- △ EXISTENT ETE (DRAINING TREATMENT STATION)
- SANITARY DRAINING LIMIT
- MUNICIPALITY LIMIT
- RIVER BASIN LIMIT
- RIVER
- Priority Projects

SCALE;1:100,000 0 2 4 6 8 10 (km)

Fig. A.3-6 Systems for Phase I and Priority Projects

THE STUDY ON STORMWATER DRAINAGE AND WASTEWATER MANAGEMENT PLAN FOR RMR

DATE: SCALE: DRAW. CHK'D

9130000

9120000

9110000

Conceicao System

Janga System

Cordeiro System

Cabanga System

Boa Viagem

ETE CONCEICAO

ETE JANGA

ETE CORDEIRO

ETE CABANGA

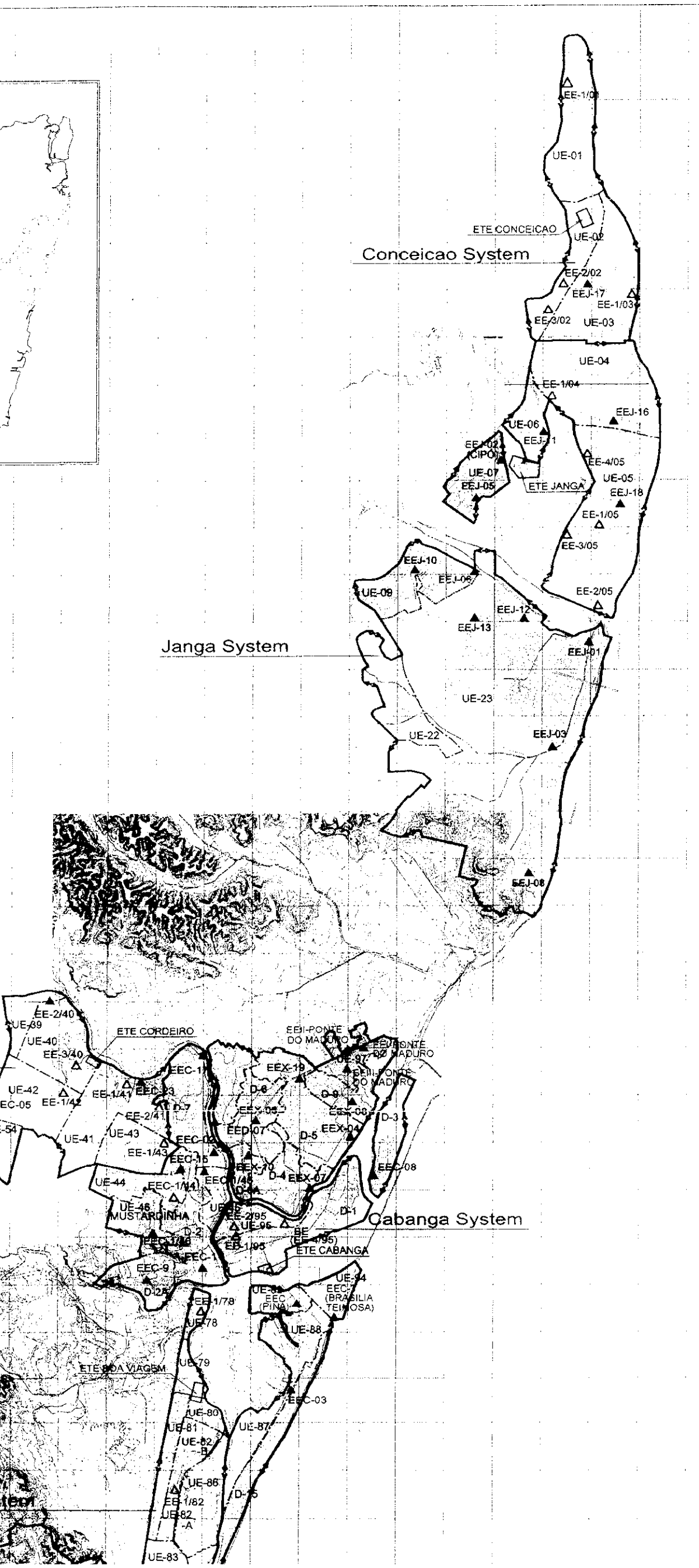
ETE BOA VIAGEM

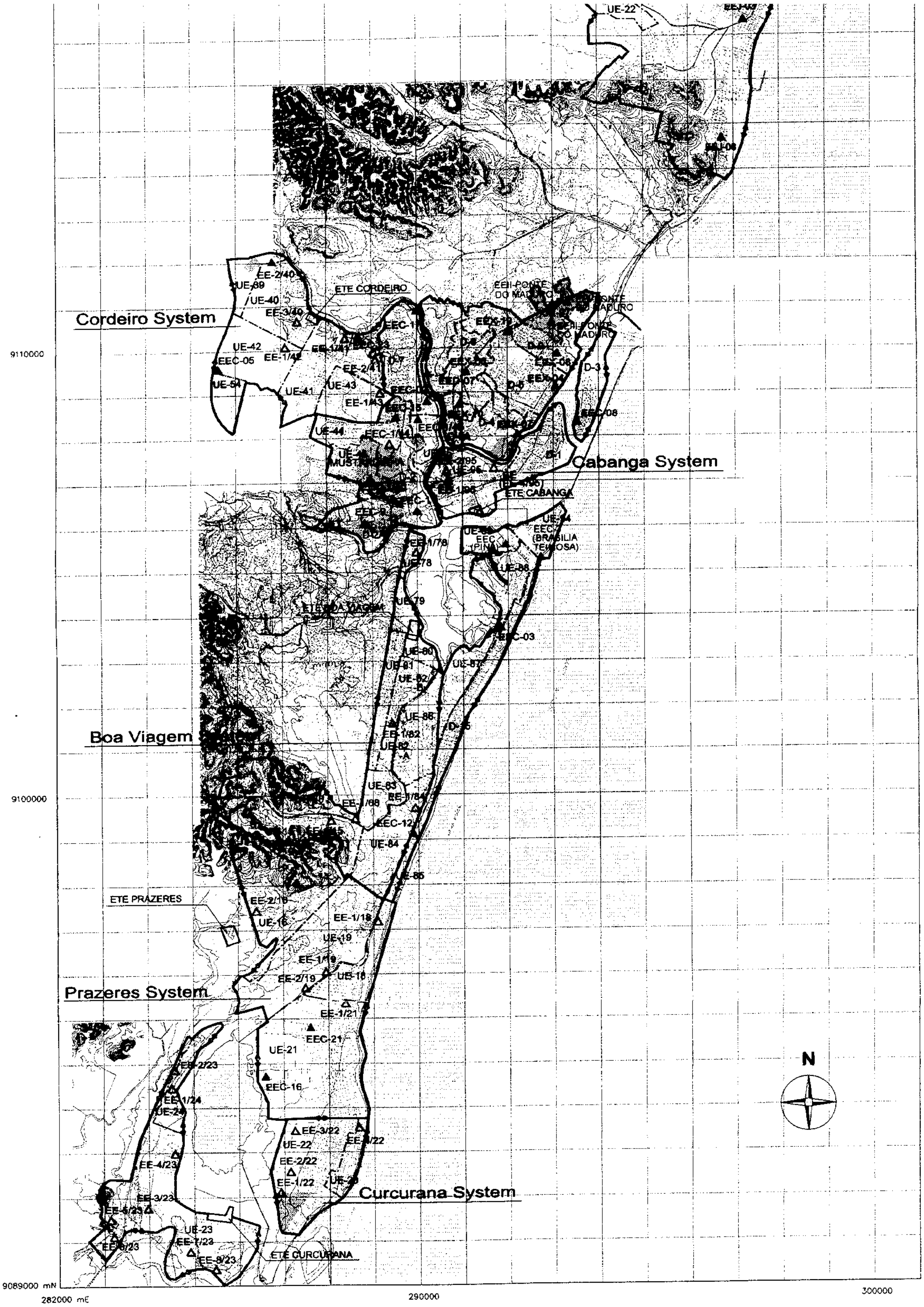
EE-1/01
UE-01
UE-02
EE-2/02
EEJ-17
EE-1/03
EE-3/02
UE-03
UE-04
EE-1/04
EEJ-16
UE-06
EEJ-11
EE-4/05
UE-07
EEJ-08
UE-05
EEJ-18
EE-1/05
EE-3/05
EEJ-10
EEJ-09
UE-09
EE-2/05
EEJ-12
EEJ-13
EEJ-01
UE-23
UE-22
EEJ-02
EEJ-14
EE-2/40
UE-39
UE-40
EE-3/40
EEC-1
UE-42
EEC-05
EE-1/42
EE-1/41
D-7
EE-2/41
UE-54
UE-41
UE-43
EEC-02
EE-1/43
EEC-03
UE-44
EEC-1/44
EEC-04
UE-45
MUSTARDINHA
UE-95
UE-96
EE-1/95
EEC-1
EEC-2
EE-1/78
UE-78
UE-79
UE-80
UE-81
UE-82
EE-1/82
UE-83
UE-85
UE-87
EEC-03
EEC (PINA)
EEC (BRASILIA TEIMOSA)
UE-86
UE-14
EEJ-15
EEJ-03
EEJ-04
EEJ-05
EEJ-06
EEJ-07
EEX-01
EEX-02
EEX-03
EEX-04
EEX-05
EEX-06
EEX-07
EEX-08
EEJ-PONTE DO MADURO
EEJ-PONTE DO MADURO
EEC-08
D-1
D-2
D-3
D-4
D-5
D-6

9130000

9120000

9110000

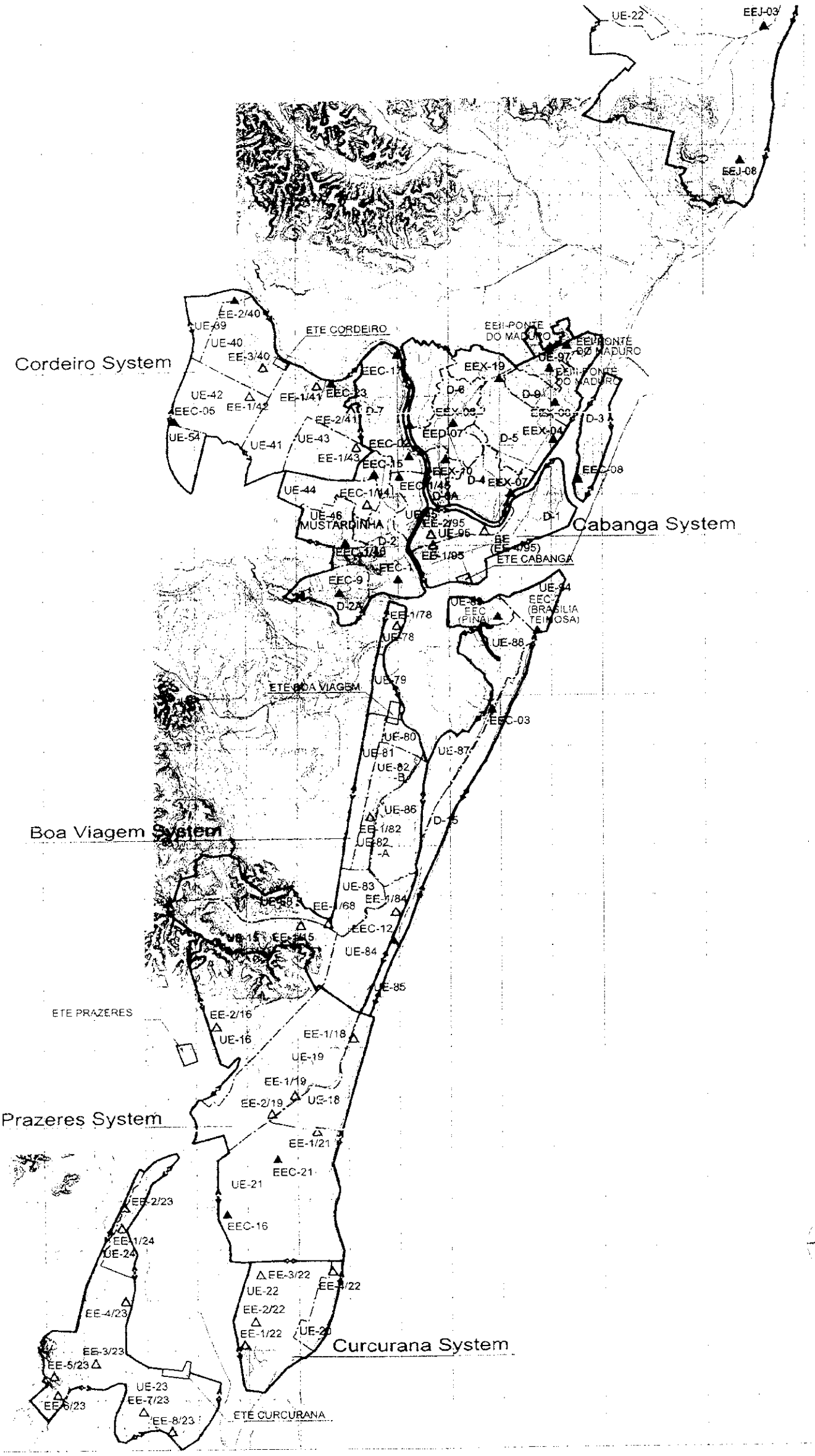




LEGEND

—<->—	SISTEM BOUNDARY
— - —	UE BOUNDARY
UE	SEWERAGE UNIT
EE	PUMP STATION
ETE	TREATMENT FACILITY
△	PLANNED PUMP STATION
▲	EXISTING PUMP STATION
(light shading)	EXISTING AREA (CONVENTIONAL)
(dark shading)	EXISTING AREA (CONDOMINIAL)

Fig.A.4-1	Layout Plan of 7 Systems
THE STUDY ON STORMWATER DRAINAGE AND SEWERAGE MANAGEMENT PLAN FOR RMR	



LEGEND

- SISTEM BOUNDARY
- UE BOUNDARY
- UE SEWERAGE UNIT
- EE PUMP STATION
- ETE TREATMENT FACILITY
- △ PLANNED PUMP STATION
- ▲ EXISTING PUMP STATION
- EXISTING AREA (CONVENTIONAL)
- EXISTING AREA (CONDOMINIAL)

Fig.A.4-1 Layout Plan of 7 Systems

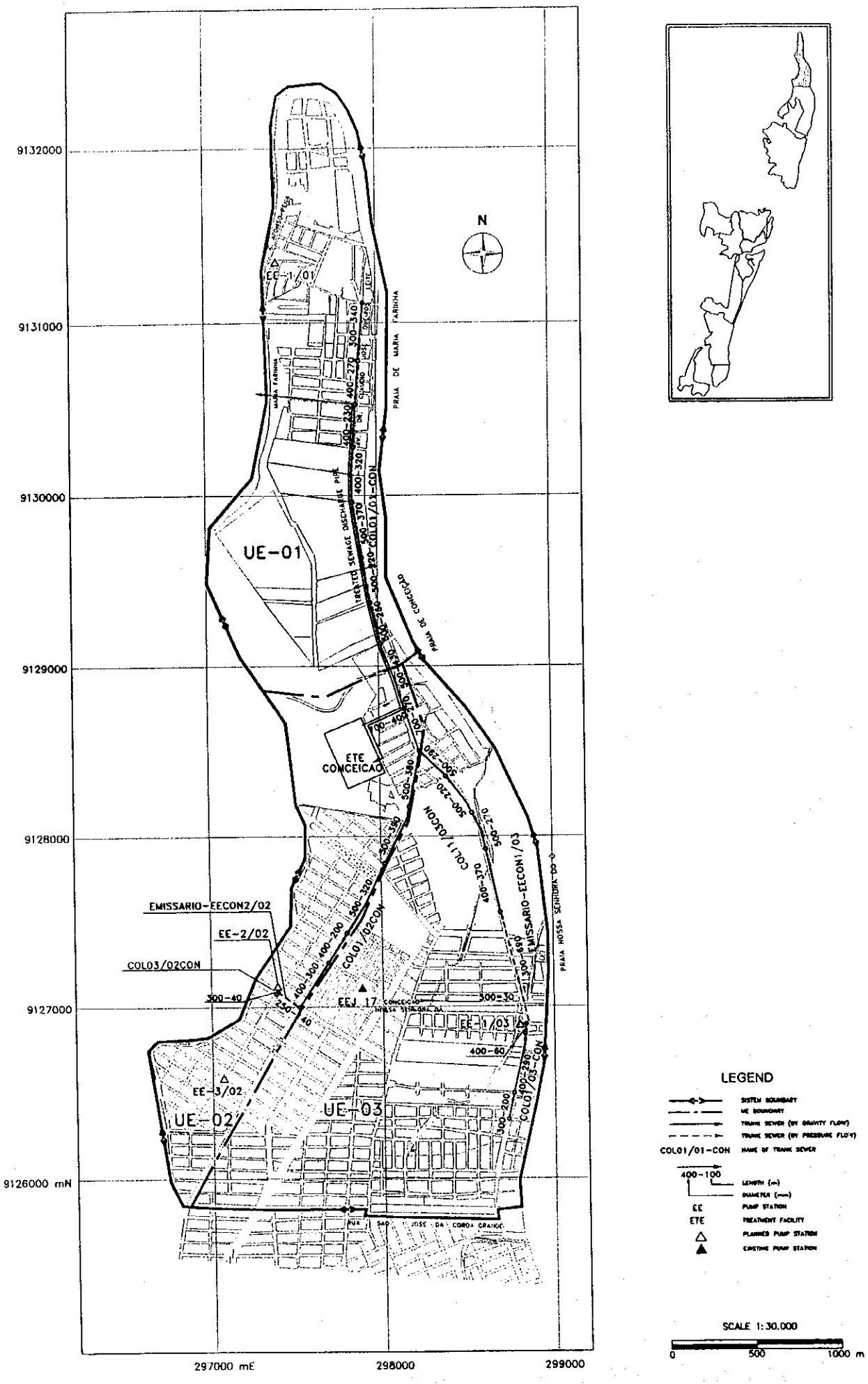


Fig. A.4-2 Layout Plan of Conceicao System

THE STUDY ON STORMWATER DRAINAGE AND SEWERAGE MANAGEMENT PLAN FOR RMR