Attachment - I

Results of Soil Survey for the Other Project Areas

Table C-AI-1 General Description of Soil Profile in Other Project Areas

Location No.	Depth of Horizon	Color		Texture	Structure			Consistence	Mottling				Remarks
		wet (moist)	dry		grade	type	size		abundance	size	contrast	color	
W-1	0-15	10YR3/4	-	C. S	w	sbk	f	lo-vfr (moist)	-	-	-	-	
	15-40	10YR6/3	-	C. S	w	sbk	f	lo-vfr (moist)	-	-	-	-	
	40-60	7.5YR6/4	-	C. SL	w-m	sbk	f-m	ns, np (wet)	f	m	f	7.5YR5/6	
	60-83	7.5YR6/3	-	C. S	single grain			ns, np (wet)	m	f	f	7.5YR5/6	
	83+												water table
W-2	0-11	10YR3/2	-	C. SL	m	sbk	f	fr 8moist)	-	-	-	-	
	11-30	10YR3/3	10YR4/2	C. LS	m-s	sbk	f-m	fi (moist)	-	-	-	-	common fine flints (10%)
	30-45	10YR4/2 (50%), 10YR3/1 (50%)	-	C. S	m	sbk	f-m	ns, np (wet)	-	-	-	-	
	45-64	10YR7/6 (70%), 7.5YR5/8 (20%), 7.5YR2/1 (10%)		gravel. C. SL	w	sbk	f-m	ss, sp (wet)	f-c	m	f	7.5YR5/8	few Mn soft conc , few quartz gravels (0.5 cm)
	64-88	10YR7/3 (80%), 5YR5/8 (20%)	-	C. SL	w	sbk	m-c	ss, p (wet)	c	m	f	5YR5/3	few quartz gravels (0.5 cm)
	88-120+	10Y5/1 (40%), 10YR5/8 (60%)	-	C. SC		massive		s, p (wet)	c	m	f-d	10YR5/8	common fine flints (10%)
W-3	0-10	10YR3/2		C. SL	s	sbk	m-c	sh (dry)	-	-	-	-	
	10-20	10YR2.5/2	10YR3/2 (60%). 10YR2/2 (40%)	C. SL	s	sbk	m-c	vh (dry)	-	-	-	-	
	20-45	2.5Y4/2 (60%), 5YR4/8 (40%)		C. SL	w-m	sbk	f	h (dry)	c-m	m	f	5YR4/8	few Mn soft conc., few fine flints
	45-70	2 5Y5/3 (60%), 2.5Y7/3 (20%), 7.5YR5/8 (10%), 7.5YR3/1 (10%)		gravel, C. LS	m	sbk	m-c	vh (dry)	f	m	f	7.5YR5/8	few Fe & Mn soft conc . common fine flints
	70-92	2.5Y4/2 (40%), 2.5Y6/3 (30%), 10YR4/6 (30%)		gravel, C. SCL	w-m	sbk	m	vh (dry)	f-c	c	d	10YR4/6	few Fe & Mn conc., common few to coarse flints (0.1-5cm)
	92+			gravel, C. SCL	w-m	sbk	m	vh (dry)	f-c	c	d		same as IV th layer, more gravel layer
W-4	0-15	10YR3/2	10YR4/2	LS	w	cr	c	vr (moist)	-	-	-	-	
	15-27	7.5YR3/4 (80%), 10YR4/2 (20%)	-	LS	w	sbk	f-m	fr (moist)	f	f-m	f		
	27-40	10YR6/6	-	C. S	w	sbk	f-m	ns. np (wet)	f-c	m	f		few Mn soft conc.
	40-60	2.5Y5/2 (70%), 7.5YR5/8 (30%)	-	C. CL	m	sbk	f-m	s, p (wet)	c	f-m	d	7.5YR5/8	few fine flints, few Mn conc.
	60-100+	10Y5/1 (20%), 2.5Y7/3 (50%), 7.5YR5/8 (30%)		SC	m	sbk	m-c	s, p (wet)	f-c	m	d	7.5YR5/8	
W-5	0-20	10YR5/3 (70%). 10YR3/2 (40%)	10YR6/4	C. LS	m	sbk	m	fr (moist9	f	f-m	f	10YR6/6	including of gray layer at depth of 18-20cm (2.5Y5/1)
	20-35	10YR6/3 (80%). 10YR4/6 (20%)		C. LS	w	sbk	f-m	fr (moist)	c	m	f	10YR4/6	
	35-61	10YR6/3 (70%). 10YR4/6 (20%), 10YR3/1 (10%)		C. SL	m	sbk	f-m	ss, sp (wet)	c	m	f	10YR4/6	few Mn soft conc.
	61-90	10YR6/3, 10YR4/6		C. SC	m	sbk	f-m	ss, p (wet)	c	f	f	10YR4/6	common fine flints, common to many clay illu.
	90-120+	10YR6/3, 10YR4/6		C. SCL	w-m	sbk	f-m	ss, p (wet)	f	m-c	f	10YR6/8	few fine Mn conc., composing rocks from 120cm of depth
W-6	0-10	10YR3/2	10YR4/2	L-CL	m-s	sbk	m	fr (moist)	f	f	f	7.5YR4/6	few Fe conc.
	10-23	10YR3/2 (90%). 7.5YR4/6 (10%)	10YR3/2	CL	m	sbk	m	fr (moist)	c	f	f	7.5YR4/6	
	23-40	2.5Y5/2 (70%). 7.5YR4/6 (30%)		C	m	sbk-abk	m-c	s, p (wet)	c	f	f	7.5YR4/6	few to common Mn conc. (0.1-0.5cm : 10%), few fine flints
	40-54	5Y5/1.5 (80%), 7 5YR5/8 (20%)		C	w-m	sbk-abk	m-c	s, p (wet)	c	f	f	7.5YR5/8	few Mn conc. (0.1-0 5cm : less than 5%), common fine flints
	54-83	7.5Y5/1		C	m	sbk-abk	m	s. p (wet)	f	f	f	7.5YR6/8	common Mn conc. (10%), common fine flints, few clay illu.
	83-120+	5Y5/1 (50%), 10YR4/3 (50%)		C	m-s	sbk-abk	m	s, p (wet)	-	-	-	-	few to common Mn conc. (0.1cm : 10%), few clay illu ,
													few quartz
W-7	0-11	2.5Y3/2	2 5Y6/2 (90%). 7 5YR5/8 (10%)	CL	s	sbk	m-c	vh (dry)	c	f	f	7 5YR5/8	few Fe & Mn conc.
	11-31	2.5Y4.5/2	2.5Y5/2 (80%). 7 5YR4/6 (20%)	SiC	m	sbk	c	eh (dry)	m	m	f	7 5YR4/6	common to many Fe & Mn conc. (0.1-0.5cm : 10-20%)
	31-60	2 5Y4/2, 7 5YR6/8	-	SiC	s	sbk	m-c	eh (dry)	c-m	f	f	7.5YR6/8	few Mn soft conc
	60-80	2 5Y5/2. 2.5Y6/3, 7.5YR5/8	-	SC	s	sbk	c	eh (dry)	m	f-m	d	7.5YR5/8	few Mn conc, few fine flints, few Fe soft conc., transition layer
	80-120+	2 5Y5/3. 5YR4/8, 7.5YR5/8	-						m	m	d	7.5YTR5/8	decomposing rocks
												5YR4/8	
W-8	0-10	10YR3/2	10YR4/2	C. SL	w-m	cr	f-m	fr (moist)	-	-	-	-	
	10-24	10YR3/2		C. SL	m-s	sbk	m	vfi (moist)	-	-	-	-	common fine flints
	24-45	10YR4/4		C. SCL	w-m	sbk	m	ss, p (wet)	-	-	-	-	common fine flints
	45-68	10YR5/2 (70%), 10YR7/3 (20%), 7.5YR5/8 (10%)		C. SC	m	sbk	m	s, p (wet)	f-c	m	f	7.5YR5/8	few to common Mn soft conc., common to many fine flints
	68-120+												decomposing rocks
W-9	0-15	10YR3/2	10YR5/2	C. LS	w	sbk	f-m	h (dry)	-	-	-	-	common fine flints
	15-31	2.5Y6/3 (60%), 7.5YR5/8 (40%)	-	C. SCL	m-s	sbk	m	fr (moist)	m	f	d	7 5YR5/8	many soft Mn conc. (30%)
	31-43	2.5Y7/2 (80%), 7.5YR5/8 (20%)	-	C. SC	s	sbk	m	s, p (wet)	c	m	f	7.5YR5/8	few to common fine Mn conc.
	43-57	5Y6/3	-	C. SC	m	sbk	m	s, p (wet)	-	-	-	-	many fine Mn conc. (0.1cm : 20%),
	57-83	5Y5/3	-	C. SC	m	sbk-abk	m	s, p (wet)	-	-	-	-	
	83-120+	5Y6/4 (80%). 2.5Y6/6 (20%)	-	C. SC	m	abk	m	ss, p (wet)	f	f	f	2.5Y6/6	
W-10	0-15	10YR3/2	-	Fine LS	w-m	cr	f-m	vfr (moist)	-	-	-	-	few Fe & Mn conc., few quartz gravels
	15-34	10YR3/2 (80%), 7 5YR5/6 (20%)	-	Fine LS	w	sbk	f	fr (moist)	-	-	-	-	few Fe & Mn conc.
	34-54	7.5YR4/4 (80%). 7.5YR5/8 (20%)	-	Fine S	w-m	sbk	m	ns, sp (wet)	c	f-m	f	7.5YR5/8	
	54-82	7.5YR7/3 (80%), 7.5YR6/8 (20%)	-	gravel, LS	w-m	sbk	m	ns, sp (wet)	c	m	d	7 5YR6/8	common Fe & Mn conc. (0.1-0.5cm . 10%-i)
	82-100	7 5YR7/3 (30%), 7.5YR5/8 (70%)	-	LS	w-m	sbk	f-m	ns, sp (wet)	m	c	d	7.5YR5/8	few Fe & Mn conc. (0.1-0.5cm : 2%))
	100-120+	7.5YR7/2-5/2 (40%), 7.5YR6/8 (60%)	-	SCL		massive		ss, sp (wet)	m	c	d	7.5YR6/8	few Fe & Mn conc. (0 1-0 5cm : 2%))
Am-1	0-25	5YR4/3	5YR5/4	LS	w	sbk	f-m	h (dry)	-	-	-	-	
	25-45	2 5YR3/3.5	2.5YR4/6	LS-SL	s	sbk	f-m	h (dry)	-	-	-	-	
	45-80	2 5YR3/4	2.5YR4/6	SL-L	s	sbk	f-m	h-vh (dry)	-	-	-	-	
	80-120+	10R4/8		L	s	sbk	f-m	vh (dry)	-	-	-	-	
Am-2	0-15	10YR3/2.5	10YR4/3	gravel, CL	s	sbk	m-s	h (dry)	-	-	-	-	common fine-medium Fe & Mn conc. (0.1-0.3cm : 10%). few gravel
	15-37	5YR4/3	5YR4/3	gravel, C	single grain			lo (moist)	-	-	-	-	dominant gravel (90%); many Fe & Mn conc. + many flat rock pieces
	37-55	5YR4/6	5YR5/6	gravel. C	single grain			lo (moist)	-	-	-	-	dominant gravel (90%); Fe & Mn conc.(30%) + flat rock pieces (60%)
	55-85	5YR4/6	10YR5/6	gravel. C	single grain			lo (moist)	-	-	-	-	dominant gravel (90%); Fe & Mn conc.(30%) + flat rock pieces (60%)
	85-120+	-	-	-	-	-	-	-	-	-	-	-	devomposin rock
Am-3	0-26	5YR5/6	5YR5/6	C. S	single grain			lo (moist)	-	-	-	-	
	26-56	2 5Y6/4 (60%). 7.5YR5/8 (40%)	2 5Y7/4 (60%). 7.5YR5/8 (40%)	SL	m	sbk	m	fr (moist)	c	f-m	d	7.5YR5/8	
	56-85	2.5Y6/4 (30%), 5YR5/8 (70%)	-	SL	m	sbk	m	fr (moist)	f	f	d	7.5YR5/8	
	85-130+	2 5Y6/5 (30%), 5YR5/6 (70%)	-	L	m	sbk	f-m	fr (moist)	-	-	-	-	few O.M. deposition along root channel
Am-4	0-10	10YR2/2	10YR4/2	C. SL	s	cr	f-m	sh (dry)	-	-	-	-	
	10-25	7.5YR3/4	7.5YR5/4	C. SL	s	sbk	f-m	sh-h (dry)	-	-	-	-	
	25-58	5YR4/6	5YR5/6	C. SL	s	sbk	f-m	h (dry)	-	-	-	-	
	58-90	5YR4/6	5YR5/6	L	s	sbk	f-m	h (dry)	-	-	-	-	
	90-120+	5YR4/6	5YR5/8	L-SCL	m	sbk	f-m	fr (moist)	-	-	-	-	
Am-5	0-18	5YR2/3	5YR3/3	C. LS-SL	s	cr	f-m	sh (dry)	-	-	-	-	
	18-34	5YR3/3	5YR3/6	C, LS-SL	m	sbk	f-m	sh (dry)	-	-	-	-	
	34-60	2.5YR3/3	2.5YR4/6	SL-SCL	m-s	sbk	f-m	fr (moist)	-	-	-	-	
	60-105	2.5YR3/3	2.5YR4/6	SL-SCL	m	sbk	f-m	fr (moist)	-	-	-	-	few clay ill.
	105-120+	2.5YR4/6	2.5YR4/8	SL-SCL	m	sbk	f-m	fr (moist)	-	-	-	-	few clay ill.

Table C-AI-1 General Description of Soil Profile in Other Project Areas

Location No	Depth of Horizon	Color		Texture	Structure			Consistence	Mottling				Remarks
		wet (moist)	dry		grade	type	size		abundance	size	contrast	color	
Am-6	0-18	2.5YR3/2	2.5YR3/3	SL	m	cr	f-m	s (dry)	-	-	-	-	
	18-30	2.5YR3/3	2.5YR4/3	SL-SCL	s	sbk	f-m	fi (moist)	-	-	-	-	
	30-48	2.5YR3/6	2.5YR4/6	SCL	s	sbk	f-m	fi (moist)	-	-	-	-	few clay ill.
	48-80	2.5YR3/6	2.5YR4/6	SCL	s	sbk	f-m	fi (moist)	-	-	-	-	few clay ill.
	80-120+	2.5YR5/8	2.5YR4/8	SCL	s	sbk	f-m	fi-vfi (moist)	-	-	-	-	few clay ill
Am-7	0-15	5YR2/2	5YR3/2 (50%), 5YR3/4 (50%)	SL	m	cr-sbk	f-m	fr (moist)	-	-	-	-	
	15-36	2.5YR3/4	2.5YR4/4	CL	s	sbk	f-m	fr-fi (moist)	-	-	-	-	
	36-60	2.5YR3/6	2.5YR4/8	CL	s	sbk	f-m	fi (moist)	-	-	-	-	few clay ill.
	60-120+	2.5YR4/8	2.5YR5/8	CL	s	sbk	f-m	fi (moist)	-	-	-	-	
Am-8	0-15	7.5YR5/2	7.5YR4/2	S-LS	w-m	cr	f-m	sh (dry)	f	m	f	7.5YR4/6	
	15-52	7.5YR5/3	7.5YR6/3	S-LS	m	sbk	f-m	sh (dry)	-	-	-	-	
	52-100	7.5YR5/4	7.5YR6/4	LS	w	sbk	f-m	vfr-fr (moist)	f	f-m	d	7.5YR5/8	rare fine-medium Fe & Mn conc (less than 5%)
	100-120+	7.5YR7/3	-	LS-SL	w-m	sbk	f-m	vfr-fr (moist)	c	m-c	f	7.5YR5/8	few-common fine-medium Fe & Mn conc. (5-10%)
Af-1	0-18	10YR2/1		C	s	sbk	c-vc	vh (dry)	c	f	d	7.5YR6/8	crack (0.5 cm of width, 20cm of length)
	18-40	10YR1.7/1 (60%), 10YR3/2 (30%), 5YR2/4 (10%)		C	s	pr-co	c-vc	vfi (moist)	c	f	f	5YR2/4	abundant slickensides, predominant interesecting (10YR1.7/1)
	40-60	10YR1.7/1 (90%), 7.5YR5/8 (10%)		C	s	pr-co	c	vfi (moist)	c	f	f-d	7.5YR5/8	dominant slickensides, predominantly interesecting (10YR1.7/1)
	60-86	5Y5/1 (65%), 10YR6/8 (30%), 2.5YR4/6 (5%)		C	m	pr-co-abk	m	vs, vp (wet)	c-m	f-m	d	10YR6/8	many - abundant slickensides, predominantly interesecting
	86-111	5Y4/1 (50%), 10YR6/8 (40%), 7.5R3/6 (5%)		C	w-m	co-abk	f-m	vs, vp (wet)	m	m-c	d	10YR6/8	many slickensides, partly interesecting, common Fe & Mn soft conc.
	111-120+	5Y6/2 (70%), 2.5Y6/8 (30%)		C	w-m	abk	f-m	vs, vp (wet)	c-m	m	d	2.5Y6/8	many slickensides, partly interesecting
Af-2	0-19	10YR1.7/1 (80%), 5YR5/8 (20%)		C	s	sbk	c-vc	vfi (moist)	c-m	f	d	5YR5/8	
	19-40	10YR1.7/1 (70%), 10YR2/2 (20%), 7.5YR4/8 (10%)		C	s	pr-co	c	fi (moist)	c	f	f	7.5YR4/8	abundant slickensides, predominant interesecting (10YR1.7/1)
	40-64	2.5Y4/1 (40%), 2.5Y5/2 (40%), 7.5YR5/8 (20%)		C	m	pr-co	m	vs, vp (wet)	c	f-m	f	7.5YR5/8	dominant slickensides, predominantly interesecting
	64-83	5Y5/2 (30%), 5Y3.5/1 (50%), 2.5YR6/6 (10%), 5YR4/8 (10%)		C	m	co-abk	m	vs, vp (wet)	c & c	f & m	d & f	5YR4/8	dominant slickensides, predominantly interesecting
												2.5Y6/6	
	83-108	5Y5/2.5 (70%), 5Y3.5/1 (10%), 5YR5/8 (20%)		SC	m	co-abk	m	s, p (wet)	c	m	f-d	5YR5/8	many slickensides, partly interesecting, common fine Mn soft conc.
	108-120+	5Y6/2 (80%), 7.5Y5/8 (20%)		SC	m	abk	m	s, p (wet)	c	f-m	f	7.5YR5/8	many slickensides, partly interesecting
Af-3	0-15	2.5Y3/1 (70%), 2.5Y2/1 (20%), 7.5YR5/8 (10%)		C	s	sbk	c	vh (dry)	c	f	d	7.5YR5/8	
	15-34	2.5Y3/1 (40%), 2.5Y3/2 (35%), 7.5YR5/8 (5%), 7.5YR4/6 (10%)		C	s	pr-co-abk	m-c	vfi (moist)	f & c	m & f	d & d	7.5YR6/8	
												7.5YR4/6	
	34-55	2.5Y4/1 (80%), 7.5YR6/8 (5%), 7.5YR4/6 (5%)		C	m	pr	m-c	vs, vp (wet)	f & f	f & m	f & d	same as 2nd	dominant slickensides, predominantly interesecting
	55-80	7.5Y4/1 (80%), 7.5YR6/8 (10%), 7.5YR4/6 (10%)		C	m-s	pr	m-c-vc	vs, vp (wet)	c & c	f & m	d & d	same as 2nd	dominant slickensides, predominantly interesecting
	80-110	7.5Y6/1 (80%), 7.5YR6/8 (10%), 7.5YR4/6 (10%)		C	m-s	pr-co	m-c	vs, vp (wet)	c & c	m & d	d & d	same as 2nd	many slickensides, partly interesecting, few Mn soft conc.
	110-120+	7.5Y6/2 (60%), 7.5YR6/8 (10%), 7.5YR4/6 (30%)		C	m-s	pr-co	m-c	vs, vp (wet)	c & m	m & d	d & d	same as 2nd	many slickensides, partly interesecting
Af-4	0-20	10YR1.7/1		C	s	sbk	c-vc	vfi (moist)	c	f	f-d	7.5YR5/8	
	20-42	10YR1.7/1 (60%), 10YR3/2 (30%), 7.5YR5/8 (10%)		C	m	abk	m	vs, vp (wet)	c	f-m	f-d	7.5YR5/8	many slickensides, partly interesecting (10YR1.7/1)
	42-60	5Y4/1 (80%), 10YR5/8 (20%)		C	m	pr-co-abk	m	vs, vp (wet)	c	f-m	f	7.5YR5/8	abundant slickensides, predominantly interesecting
	60-100	5Y5/1 (80%), 7.5YR5/8 (20%)		C	m	pr-co-sbk	m	vs, vp (wet)	c	f-m	f-d	7.5YR5/8	abundant slickensides, predominantly interesecting, few fine Mn conc.
	100-120+	5Y4/1 (80%), 10R4/8 (20%)		C	m	pr-abk	m	vs, vp (wet)	c-m	m-c	d	10R4/8	dominant slickensides, partly interesecting
Af-5	0-19	10YR2/1 (70%), 7.5YR5/6 (30%)		C	s	sbk	f-m	fi (moist)	c-m	f	f	7.5YR5/6	
	19-35	10YR3/1 (70%), 7.5YR4/8 (30%)		C	m-s	abk-sbk	f-m	vs, vp (wet)	c	m	f	7.5YR4/8	many slickensides, partly interesecting
	35-70	2.5Y4/1 (70%), 10YR5/8 (20%)		C	m	pr-co	m-c	vs, vp (wet)	c-m	f-m	f	7.5YR4/8	abundant slickensides, predominantly interesecting
	70-110	5Y4/1 (80%), 10YR5/8 (10%), 10R4/6 (10%)		C	m	pr-co	m-c	vs, vp (wet)	c-m	f-m	f-d	10YR5/8	dominant slickensides, predominantly interesecting, few fine Mn conc.
	111-120+	5Y6/1 (90%), 2.5YR4/8 (10%)		C	w	abk	f-m	vs, vp (wet)	c	f-m	d	2.5YR4/8	many slickensides, partly interesecting
Af-6	0-15	10YR1.7/1 (90%), 7.5YR5/8 (10%)		C	s	sbk-abk	m-c	vfi (moist)	c	f	f-d	7.5YR5/8	
	15-35	10YR1.7/1 (50%), 10YR2/2 (15%), 7.5YR5/8 (5%)		C	s	abk	m-c	vfi (moist)	f	f	f	7.5YR5/8	abundant slickensides, predominant interesecting (10YR1.7/1)
	35-55	10YR1.7/1 (70%), 5YR3/6 (30%)		C	m	pr-abk	m-c	vfi (moist)	c-m	m-c	d	5YR3/6	dominant slickensides, predominantly interesecting (10YR1.7/1)
	55-105	5Y4/1 (70%), 2.5Y6/8 (30%)		C	w	abk	f-m	vs, vp (wet)	m	m-c	f-d	2.5Y6/8	many - abundant slickensides, predominantly interesecting
	105+120+	5Y6/2 (60%), 2.5Y6/8 (40%)		C	w	abk	f-m	vs, vp (wet)	m	m	f-d	2.5Y6/8	many slickensides, partly interesecting, few fine Mn conc.
Af-7	0-10	2.5Y2/1 (85%), 7.5YR5/8 (15%)	2.5Y3/1 (85%), 7.5YR5/8 (15%)	C	s	sbk	m	fi (moist)	c	f	d	7.5YR5/8	
	10-25	5Y2/1 (80%), 10YR5/8 (10%), 7.5YR5/8 (10%)		C	m	abk	m-c	vs, vp (wet)	c	m	f-d	7.5YR5/6	
	25-40	5Y3/1 (70%), 10YR5/8 (30%)		C	m	abk	m-c	vs, vp (wet)	c	m	f	10YR5/8	many slickensides, partly interesecting
	40-62	5Y5/1 (90%), 7.5YR4/6 (10%)		C	s	pr-abk	m-c	vs, vp (wet)	c	f	f	7.5YR4/6	abundant slickensides, predominantly interesecting
	62-100	5Y5/1 (20%), 2.5Y5/2 (50%), 10YR5/8 (15%), 10YR1.7/1 (5%)		C	m	co-abk	m-c	vs, vp (wet)	c	m	f	10YR5/8	abundant slickensides, partly interesecting, few soft Mn conc.(0.2-0.5cm)
	100-120+	7.5Y5/1 (80%), 7.5YR5/8 (20%)		C	m	abk	m-c	vs, vp (wet)	c	f-m	f	7.5YR5/8	many slickensides, partly interesecting, rare soft Mn conc.

Table C-AI-1 General Description of Soil Profile in Other Project Areas

ation o.	Depth of Horizon	Color		Texture	Structure			Consistence	Mottling				Remarks
		wet (moist)	dry		grade	type	size		abundance	size	contrast	color	
-8	0-14	10YR1.7/1 (40%), 10YR2/2 (40%), 7.5YR5/8 (20%)		C	s	stk	f-m	fi (moist)	c	f	f-d	7.5YR5/8	many slickensides, partly interesting
	14-32	10YR1.7/1 (50%), 10YR2/2 (40%), 7.5YR4/6 (10%)		C	s	sbk	f-m	vs, vp (wet)	c	f-m	f	7.5yr4/6	many slickensides, partly interesting
	32-60	5Y4/1 (60%), 10YR5/8 (20%), 7.5YR5/8 (20%)		C	s	abk-sbk	f-m	vs, vp (wet)	c-m	m-c	f	7.5-10YR5/8	abundant slickensides, predominantly interesting
	60-100	5Y3/1 (80%), 10YR5/8 (10%), 7.5YR4/6 (10%)		C	s	pr-co	m-c	vs, vp (wet)	c-m	f	f-d	7.5-10YR5/8	dominant slickensides, predominantly interesting
	100-120+	5Y4.5/1 (70%), 2.5Y6/8 (20%), 10YR4/8 (10%)		C	m	abk	m-c	vs, vp (wet)	c-m	m-c	d	2.5Y6/8 10R4/6	dominant slickensides, partly interesting, many fine crystal common -many soft Fe & Mn conc.
-9	0-20	10YR1.7/1 (80%), 7.5YR5/8 (20%)		C	m-s	sbk	m	vs, vp (wet)	c	f	f	7.5YR5/8	
	20-40	2.5Y3/1 (80%), 10YR4/6 (20%)		C	m-s	abk	m-c	vs, vp (wet)	c-m	m-c	f	10YR4/6	many slickensides, partly interesting
	40-90	7.5Y2.5/1 (80%), 10YR4/8 (20%)		C	s	co-abk	c	vs, vp (wet)	c-m	m-c	f	10YR4/6	abundant slickensides, predominantly interesting
	90-120+	7.5Y4/1 (70%), 2.5Y5/6(30%)		C	m-s	pr-co	c	vs, vp (wet)	m	m-c	f	2.5Y5/6	abundant slickensides, partly interesting, few Fe & Mn conc
-10	0-19	10YR1.7/1 (85%), 7.5YR5/8 (15%)		C	s	sbk	m-c	vfi (moist)	c	f	f	7.5YR5/8	
	19-55	5Y2.5/1 (80%), 7.5YR4/8 (20%)		C	s	pr-abk	m-c	vs, vp (wet)	c-m	f-m	f	7.5YR4/8	many slickensides, partly interesting
	55-105	7.5Y2.5/1 (80%), 7.5YR4/8 (20%)		C	s	pr-abk	m-c	vs, vp (wet)	c-m	m-c	f	7.5YR4/8	abundant slickensides, predominantly interesting
	105-120+	5Y4/1 (85%), 7.5YR5/8 (15%)		C	m	pr-abk	m	vs, vp (wet)	c	m-c	f-d	7.5YR5/8	dominant slickensides, partly interesting, few-common Mn conc.
-11	0-20	10YR1.7/1 (90%), 7.5YR5/8 (10%)		C	m-s	sbk	m	vs, vp (wet)	c	f	d	7.5YR5/8	
	20-30	7.5Y2/1 (95%), 10YR6/8 (5%)		C		massive		vs, vp (wet)	f	f-m	f	10YR6/8	many slickensides, partly interesting
	30-50	7.5Y4/1 (95%), 10YR6/8 (5%)		C	m-s	pr-abk	m	vs, vp (wet)	f	f	f	10YR6/8	dominant slickensides, predominantly interesting
	50-80	7.5Y4/1 (95%), 10YR6/8 (5%)		C	m-s	pr	c	vs, vp (wet)	f-c	f	f	10YR6/8	dominant slickensides, predominantly interesting
	80-120+	7.5Y5/1 (60%), 10YR6/8 (40%)		C	s	pr	c	vs, vp (wet)	m	m-c	d	10YR6/8	dominant slickensides, predominantly interesting, few fine Fe&Mn conc
-12	0-10	2.5Y3/1.5 (75%), 7.5YR5/8 (25%)		LS	m-s	sbk	f-m	h (dry)	c-m	f	f-d	7.5YR5/8	
	10-28	10YR3/2 (80%), 7.5YR4/6 (20%)		C, LS-SL	m	sbk	f-m	fr (moist)	c	f	f	7.5YR4/6	
	28-42	7.5YR4/2 (75%), 7.5YR5/8 (75%)		C, SCL	m	sbk	f-m	fr (moist)	c-m	f	d	7.5YR5/8	
	42-70	7.5YR4/2 (35%), 2.5Y7/1 (35%), 7.5YR4-6/8 (30%)		SCL-SL	m-s	abk-sbk	m	s, p (wet)	m	m-c	d	7.5YR4-6/8	
	70-100	5Y7/2 (50%), 7.5YR6/8 (20%), 10R4/8 (30%)		SCL	m-s	abk-sbk	f-m	s, p (wet)	m	c	d-p	7.5YR6/8 10R4/8	few soft Fe conc.
	100-120+	5Y7/2 (50%), 10R4/8 (50%)		SC	m-s	abk-sbk	f-m	s, p (wet)	m	c	p	10R4/8	few-common coarse soft Fe conc.
-13	0-20	5Y3/1 (50%), 5Y3/2 (30%), 7.5YR5/8 (20%)		C	s	sbk	m-c	vfi (moist)	c-m	f	d	7.5YR5/8	
	20-30	5Y3/1 (80%), 10YR6/8 (20%)		C	m	co-abk-sbk	m	vs, vp (wet)	c	m	f	10YR6/8	many slickensides, partly interesting
	30-50	7.5Y4.5/1 (70%), 10YR6/8 (30%)		C	m	co-abk	m-c	vs, vp (wet)	c-m	m-c	f-d	10YR6/8	abundant slickensides, predominantly interesting, few soft Mn conc.
	50-100	7.5Y5/1 (80%), 10YR6/6 (20%)		C	m-s	pr-co	m-c	vs, vp (wet)	c-m	f-m	f	10YR6/8	dominant slickensides, predominantly interesting, few m-c soft Mn conc.
	100-120+	7.5Y4/1 (90%), 10YR6/8 (10%)		C	m-s	pr-co	m-c	vs, vp (wet)	c	m	f	10YR6/8	abundant slickensides, predominantly interesting, few soft Mn conc.
-14	0-18	7.5Y2/1 (80%), 7.5YR5/8 (20%)		C	s	sbk	f-m	vfi (moist)	c-m	f-m	d	7.5YR6/8	
	18-42	7.5Y3/1 (90%), 7.5YR5/8 (10%)		C	m-s	abk	m-c	vs, vp (wet)	c	f-m	f	5YR2/4	abundant slickensides, predominant interesting, few f-m Mn conc
	42-80	7.5Y3.5/1 (90%), 10YR6/8 (10%)		C	m	pr-co	m-c	vs, vp (wet)	c	f	f	7.5YR5/8	dominant slickensides, predominantly interesting, few f-m Mn conc.
	80-120+	7.5Y4/1 (80%), 10YR6/8 (20%)		C	s	pr-co	c	vs, vp (wet)	c-m	m-c	f	2.5Y6/8	dominant slickensides, predominantly interesting, few f-m Mn conc.
-15	0-20	10YR3/2 (70%), 10YR3/1 (30%)		C	s	sbk	m-c	vh (dry)	c-m	f	f	7.5YR3/8	
	20-37	10YR2.5/2 (40%), 7.5YR5/8 (50%), 7.5YR3/4 (10%)		C	s	sbk-sbk	m-c	vh (dry)	m	m-c	f-d	7.5YR5/8 7.5YR3/4	
	37-60	5Y6/2 (35%), 5Y4/1 (35%), 10YR6/8 (30%)		C	s	co-abk-sbk	m	vh (dry)	m	c	d	10YR5/8	few fine Fe & Mn conc.
	60-83	5Y7/2 (70%), 10YR6/8 (30%)		C	s	pr-abk	m-c	vh (dry)	c-m	m-c	d	10YR6/8	few-common soft Mn conc
	83-120	5Y7/2 (50%), 10YR6/8 (20%), 2.5YR3/6 (30%)		C	s	pr-abk	c	vh (dry)	m	m-c	d	10YR6/8	few-common soft Fe & Mn conc. (2.5YR3/6)
	120+	7.5Y7/2 (50%), 10YR6/8 (20%), 2.5YR3/6 (30%)		C	s	pr-abk	c	vh (dry)	m	m-c	d	2.5Y6/8	few-common soft Fe & Mn conc (2.5YR3/6)
-16	0-10	10YR2/2 (80%), 7.5YR5/8 (20%)		C	m-s	cr	f-m	fr (moist)	c-m	f-m	f	7.5YR5/8	surface soil was removed out for making of the field bund.
	10-20	10YR3/1 (70%), 7.5YR5/8 (30%)		C	m-s	sbk	f-m	fr-fi (moist)	c-m	f-m	f-d	7.5YR5/8	
	20-30	2.5Y5/2 (30%), 2.5Y6/2 (30%), 10YR6/8 (40%)		C	s	sbk	f-m	fr (moist)	m	m-c	f	10YR6/8	
	30-70	5Y6/1 (60%), 7.5YR5/8 (20%), 2.5YR3/6 (20%)		C	m	pr-co	f-m	s, p (wet)	m	m-c	d-p	7.5YR5/8 2.5YR3/6	many - abundant slickensides, predominantly interesting
	70-120+	5Y6/1 (50%), 7.5YR5/8 (25%), 2.5YR3/6 (25%)		C	m-s	pr-co	m	s, p (wet)	m	m-c	d-p	same as 1th	abundant slickensides, predominantly interesting
-17	0-15	2.5Y2/1 (35%), 2.5Y3/1 (35%), 7.5YR4/6 (10%)		C	s	sbk	f-m	fr (moist)	c-m	f	f	7.5YR4/6	
	15-30	2.5Y2/1 (90%), 7.5YR5/8 (10%)		C	m	pr-co-abk	m	fr (moist)	c-m	m	f	7.5YR5/8	
	30-70	7.5Y2/1 (70%), 7.5Y3/1 (20%), 7.5YR4/6 (10%)		C	m-s	pr-co-sbk	m-c	vs, vp (wet)	c-m	f-m	f	7.5YR4/6	many slickensides, predominantly interesting
	70-95	7.5Y3/1 (80%), 7.5YR4/6 (20%)		C	m-s	pr-co	m c	vs, vp (wet)	c-m	m	f	7.5YR4/6	abundant slickensides, predominantly interesting, few f-m Mn conc.
	95-120+	7.5Y5/1 (40%), 5Y4/6 (40%), 7.5YR5/8 (20%)		C	m-s	pr-co-abk	m-c	vs, vp (wet)	c-m	m	f	7.5YR5/8	many slickensides, partly interesting, common medium Mn conc.

Table C-AI-1 General Description of Soil Profile in Other Project Areas

Location No.	Depth of Horizon	Color		Texture	Structure			Consistence	Mottling				Remarks
		wet (moist)	dry		grade	type	size		abundance	size	contrast	color	
Af-18	0-10	2.5Y3.5/2 (50%), 7.5YR6/8 (15%), 10YR3/6 (5%)		C.SL-C.SCL	m-s	sbk	f-m	sh (dry)	c-m	f-m	f-d	7.5YR6/8	
												10YR3/6	
	10-27	2.5Y4/2 (70%), 2.5Y7/3 (20%), 7.5YR6/8 (10%)		C.SCL	w-m	sbk	f-m	fr (moist)	c-m	f	f	10YR6/8	few fine Mn conc.
	27-57	2.5Y7/3 (85%), 10YR6/8 (15%)		SC	m-s	sbk	f-m	fr (moist)	f	f-m	f	10YR6/8	common - many Mn soft conc.
	57-87	2.5Y7/3 (80%), 10YR6/8 (20%)		SC	m-s	sbk	m	fr (moist)	c-m	m-c	f	10YR6/8	many medium soft Mn conc. (10-20%
	87-120+	2.5Y7/3 (75%), 10YR6/8 (25%)		SC	w-m	sbk	m	s, p (wet)	m	m-c	f-d	10YR6/8	many medium soft Mn conc. (20%)
Af-19	0-10	N2.5/1 (10YR1.7/1) (80%), 7.5YR4/6 (20%)		C	m-s	sbk	m-c	sh (dry)	c-m	f	d	7.5YR4/6	crack (2 cm of width, 10cm of length)
	10-42	5Y5/1 (70%), 5Y3/1 (10%), 10YR6/8 (20%)		C	w	abk	m	vs, vp (wet)	c-m	m	f	10YR6/8	many - abundant slickensides, predominantly intersecting
	42-82	5Y5/2 (50%), 5Y3/1 (10%), 10YR6/8 (40%)		C	s	pr-co	m	vs, vp (wet)	m	m-c	f	10YR6/8	dominant slickensides, predominantly intersecting
	82-120+	5Y6/2 (30%), N2.5/1 (20%), 10YR6/8 (50%)		C	s	pr-co	m-c	vs, vp (wet)	m	m-c	d	10YR6/8	abundant slickensides, predominantly intersecting
Af-20	0-10	N2/1 (10YR1.7/1) (90%), 7.5YR4/6 (10%)		C	s	sbk	m-c	sh (dry)	c	f	d	7.5YR4/6	crack (1 cm of width, 10cm of length)
	10-25	N3/1 (40%), 5Y3/1 (40%), 7.5YR4/6 (10%), 10YR3/6 (10%)		C	m	sbk	m	fi (moist)	c-m	f	f	7.5YR4/6	
										m	f	10YR3/6	
	25-45	5Y3.5/1 (60%), 7.5YR4/6 (40%)		C	m-s	pr-co	m-c	vs, vp (wet)	m	m	f	7.5YR4/6	abundant slickensides, predominantly intersecting, few medium Mn conc.
	45-85	5Y5/1 (50%), 7.5YR5/8 (50%)		SC	m-s	pr-co	m-c	s, p (wet)	m	c	d	7.5YR5/8	abundant slickensides, predominantly intersecting, few medium Mn conc.
	85-120+	5Y5/1 (40%), 7.5YR5/8 (60%)		SC	m-s	abk	m-c	s, p (wet)	m	m-c	d	7.5YR5/8	many slickensides, partly intersecting, O.M. inclusion
AK-1	0-16	7.5YR3/3	-	L-CL	w	cr	f-m	fr (mosit)	-	-	-	-	
	16-38	5YR3/4	-	CL	w-m	abk	f-m	fr (moist)	-	-	-	-	common clay ill.
	38-50	2.5YR4/8	-	CL	w	sbk	f-m	fr (moist)	-	-	-	-	few clay ill.
	50-92	2.5YR5/6	-	CL-C	w	sbk	f-m	fr (moist)	-	-	-	-	
	82-120+	2.5YR5/8	-	gravel, C	m	sbk	m	fi (moist)	-	-	-	-	many Fe conc. (0.2-1.0 cm : 40%)
AK-2	0-5	7.5YR3/3	-	L	w	cr	f	ss, sp (wet)	-	-	-	-	
	5-19	5YR6/3 (60%), 7.5YR3/3 (40%)	-	L-CL	w-m	sbk	f-m	ss, sp (wet)	-	-	-	-	few Fe conc. (0.2-0.5 cm : 5%)
	19-32	7.5YR4/4	-	L-CL	m	sbk	f-m	ss, sp (wet)	-	-	-	-	
	32-68	5YR4/8	-	SCL	m-s	sbk	m	s, p (wet)	-	-	-	-	common clay ill.
	68-100+	5YR5/8	-	CL	m-s	sbk	m	s, p (wet)	-	-	-	-	many clay ill.
AK-3	0-18	10YR3/2	-	S	w	sbk	f-m	fr (moist)	-	-	-	-	
	18-40	10YR5/4 (60%), 10YR5/2 (40%)	-	S-LS	m	sbk	m	fi (moist)	-	-	-	-	
	40-80	7.5YR5/3	-	LS	m	sbk	m	fi (moist)	-	-	-	-	few Fe conc. (0.2-1.0 cm : 5-10%)
	80-100+	7.5YR6/6	-	LS-SL	m	sbk	m	fi (moist)	-	-	-	-	
AK-4	0-15	7.5YR3/2	-	SL	w-m	sbk	f-m	fr (moist)	-	-	-	-	
	15-36	7.5YR4/6	-	SCL	m-s	sbk	m	fi (moist)	-	-	-	-	few clay ill.
	36-65	7.5YR4/8	-	SCL	m-s	sbk	m	fi (moist)	-	-	-	-	few clay ill.
	65-80	7.5YR4 5/8	-	gravel, C		massive			-	-	-	-	abundant Fe conc. (0.5-2.0 cm : 60%)
	80+												iron pan
AK-5	0-16	7.5YR2/2	-	SL	m	cr	f	fr (moist)	-	-	-	-	
	16-40	7.5YR4/4	-	L	m-s	sbk	f	fr (moist)	-	-	-	-	
	40-90	7.5YR5/8	-	SCL	m-s	sbk	m	fi (moist)	-	-	-	-	
	90-120+	7.5YR5/8	-	SCL	m-s	sbk	m	fi (moist)	-	-	-	-	
AK-6	0-12	7.5YR3.5/2	-	SL	w	cr	m	fr (moist)	-	-	-	-	
	12-32	7.5YR4/4	-	SL-L	m	sbk	m	fi (moist)	-	-	-	-	
	32-60	7.5YR5/8	-	SCL	m-s	abk	m	fi (moist)	-	-	-	-	common clay ill
	60-120+	7.5YR5/7	-	SCL-CL	m	sbk	m	fi (moist)	-	-	-	-	few clay ill , one iron rock
T-1	0-13	7.5YR3/3	-	SL	w	cr	f	vfr (moist)	-	-	-	-	
	13-30	7.5YR5/3	-	L-CL	w	sbk	f	fr (moist)	-	-	-	-	
	30-55	7.5YR4/6	-	CL	w	sbk	f-m	fr (moist)	-	-	-	-	few clay ill.
	55-83	5YR4/6	-	CL	w	abk	f-m	fr (moist)	-	-	-	-	few clay ill.
	83-120+	5YR5/8	-	gravel, C		m		s, p (wet)	-	-	-	-	abundant Fe conc. (0.5-3.0 cm : 60%)
T-2	0-9	7.5YR3/2	-	LS-SL	w	sbk	f	fr (moist)	-	-	-	-	
	9-20	5YR3/6	-	SCL	w-m	sbk	m	fr-fi (moist)	-	-	-	-	
	20-50	2.5YR3/6	-	CL	m-s	sbk	m	fi (moist)	-	-	-	-	few clay ill.
	50-70	2.5YR4/6	-	SiCL	m	abk	m	fi (moist)	-	-	-	-	common clay ill.
	70-120+	2.5YR4/8	-	SCL	m	abk	m	fi (moist)	-	-	-	-	
T-3	0-8	5YR2/3.5	-	SL	w	cr	f	vfr (moist)	-	-	-	-	
	8-30	2.5YR2/3.5	-	LS	w	cr	f-m	fr (moist)	-	-	-	-	
	30-70	2.5YR3/6	-	SCL	m	sbk	m	fr (moist)	-	-	-	-	few clay ill
	70-120+	2.5YR4/8	-	CL-C	m	abk	m	fi (moist)	-	-	-	-	common clay ill.
T-4	0-10	7.5YR2/2.5	-	C. SL	w	cr	f	fr (moist)	-	-	-	-	
	10-20	2.5YR2/2.5	-	gravel, L	single grain			vfr (moist)	-	-	-	-	abundant Fe conc. (0.5-3.0 cm : 60%)
	20+		-	Rock					-	-	-	-	abundant Fe conc. (60%), iron rocks (20-50 cm)
T-5	0-10	5YR5/3	-	gravel, L	w	cr	f	vfr (moist)	-	-	-	-	many Fe conc. (0.5-2.0 cm : 40%)
	10-25	5YR3/3	-	gravel, L	single grain			ns, np (wet)	-	-	-	-	abundant Fe conc. (0.5-2.0 cm : 60%)
	25-50	5YR3/4	-	gravel, CL	single grain			ss, sp (wet)	-	-	-	-	abundant Fe conc. (0.5-2.0 cm : 60%)
	50-70	2.5YR3/4	-	gravel, CL	single grain			s, p (wet)	-	-	-	-	abundant Fe conc. (0.5-2.0 cm : 50%)
	70-100+	2.5YR4/6	-	gravel, C	single grain			s, p (wet)	-	-	-	-	abundant Fe conc. (0.5-2.0 cm : 60%)
B-1	0-10	10YR4/3	-	S	w	cr	f	ns, np (wet)	f	f	f	10YR5/8	
	10-25	10YR5/4 (70%), 7.5YR6/8 (30%)	-	Fine S	w-m	sbk	m	ns, np (wet)	c	f-m	d	7.5YR6/8	
	25-45	10YR7/3 (60%), 7.5YR5/8 (30%)	-	SL	w-m	sbk	m	ss, sp (wet)	c	f-m	d	7.5YR5/8	
	45-74	10YR6/3 (70%), 5YR4/8 (30%)	-	CL	m	sbk	f-m	s, p (wet)	c-m	m	p	5YR4/8	
	74-100	10YR6/3 (70%), 5YR4/8 (30%)	-	CL	m	sbk	f-m	s, p (wet)	m	m	p	5YR4/8	few Fe conc.
	100-120+	5YR6/3(60%), 7.5-10YR6/8 (20%)	-	CL-C	m	sbk	f-m	vs, vp (wet)	m	m	f-d	10YR6/8	groundwater table at 100cm. common Mn conc.
												7.5YR5/8	
B-2	0-10	2.5Y3/3	2.5Y6/2	L	m	sbk	m	hard (dry)	f	f	f	10YR6/8	
	10-31	10YR6/3	2.5Y7/2 (70%), 10YR6/8 (30%)	SCL	w-m	sbk	f-m	hard (dry)	m	m	d	10YR6/8	few Fe conc (0.5-1.0 cm : 10%)
	31-58	10YR7/3	2.5Y7/2 (70%), 5YR4/8 (30%)	gravel, CL	w-m	sbk	f-m	firm (moist)	m	m	p	5YR4/8	many Fe & Mn conc. (0.5-1.0cm:30%
	58-88	2.5Y5/3 (60%), 7.5YR5/8 (40%)	-	gravel, CL-C	w-m	sbk	f-m	s, p (wet)	m	m	p	7.5YR5/8	many Fe & Mn conc. (0.5-1.0cm:40%
	88-120+	10YR7/2 (70%), 7.5YR6/8 (30%)	-	gravel, CL-C	w-m	sbk	f-m	vs, vp (wet)	m	m	d	7.5YR6/8	many Fe & Mn conc. (1.0-2.0cm:40%

Table C-AI-1 General Description of Soil Profile in Other Project Areas

ocation No.	Depth of Horizon	Color		Texture	Structure			Consisteace	Mottling				Remarks
		wet (moist)	dry		grade	type	size		abundance	size	contrast	color	
B-3	0-10	7.5YR3/4	10YR7/3	Fine SL	w	cr	f-m	sh (dry)					
	10-30	7.5YR4/4	-	SiL	w	sbk	f-m	fr (moist)	f-c	f-m	f		
	30-60	7.5YR5/4 (80%), 7.5YR4/6 (20%)	-	SiL	w	sbk	f-m	fr (moist)	c	f-m	f-d	7.5YR4/6	few to common Mn mottling
	30-85	10YR6/6	-	SiCL	m	abk	m	s, p (wet)	c-m	f-m	d		many Mn mottling
	85-100+			gravel, C									dominant Fe and Mn conc. (80%)
B-4	0-10	10YR5/3 (60%), 7.5YR4/6 (40%)	-	Fine SL	w	cr	f-m	fr (moist)	c-m	f	f	7.5YR4/6	
	10-22	2.5Y5/3 (70%), 7.5YR4/6 (30%)	-	Fine SL	m	sbk	f	ss, sp (wet)	c-m	f	f	7.5YR4/6	
	22-40	10YR6/3 (60%), 7.5YR5/8 (40%)	-	SiCL	m	sbk	f-m	s, p (wet)	m	f-m	d	7.5YR5/8	
	40-70	10YR6/3 (50%), 7.5YR5/8 (50%)	-	SiC	m	sbk	f-m	s, p (wet)	m	m	p	7.5YR5/8	few Fe conc. (0.5 cm : 10%), few clay ill.
	70-80	5YR6/2 (70%), 7.5YR5/8 (30%)	-	gravel, SiC	m	abk	m	vs, vp (wet)	c	f	d	7.5YR5/8	many Fe & Mn conc (0.2-0.5 cm:40%)
	80-120+	10Y5/1 (80%), 7.5YR5/8 (20%)	-	gravel, SiC	m	abk	m	vs, vp (wet)	c	f	f-d	7.5YR5/8	many Fe & Mn conc. (0.5-2.0cm:40%)
B-5	0-10	7.5YR3/2	-	CL	m	sbk	m	vfi (moist)	f-c	f	f	7.5YR4/6	
	10-53	10YR6/3	-	CL	m	sbk	m	s, p (wet)	c	f	f	7.5YR4/6	common fine Mn mottling (0.1 cm : 30%)
	53-85	10YR6/3 (70%), 10YR5/1 (30%)	-	gravel, SiC	m	abk	m-c	s, p (wet)	-	-	-		many Fe & Mn conc. (0.1-0.5cm : 40%)
	85-120+	10Y5/2 (70%), 10YR6/3 (30%)	-	gravel, SiC	m	abk	m-c	vs, vp (wet)	-	-	-		abundant Fe & Mn conc. (0.1-0.5cm : 60%)
													few Ca concretiions
B-6	0-15	10YR4/3	10YR5/3	Fine SL	m	cr	f-m	sh (dry)	c	f	f	7.5YR5/8	
	15-30	7.5YR6/3 (70%), 10YR4/6 (30%)	-	SiCL	m	sbk	f-m	fr (moist)	c	m	f	10YR4/6	few Mn soft conc. and motling
	30-45	7.5YR5/3 (70%), 10YR4/6 (30%)	-	SiCL	m-s	sbk	m	s, p (wet)	c	m	f	10YR4/6	few Mn conc.
	45-75	10YR6/2	-	gravel, SiC	m-s	sbk	m	s, p (wet)	f	m	f	10YR4/6	common Mn conc. (0.3cm : 20%), few clay ill.
	75-120+	10YR6/2	-	gravel, SiC	w-m	sbk	m	s, p (wet)					many Mn conc. (0.5-1.0cm : 40%), few clay ill.
B-7	0-6	7.5YR3/3 (70%), 7.5YR5/4 (30%)	7.5YR5/4 (80%), 7.5YR4/1 (20%)	Fine SL	w-m	cr	m	fr (moist)					
	6-20	7.5YR4/2	-	Fine SL	m	sbk	f-m	ss, sp (wet)	f-c	f	f	5YR5/4	
	20-30	7.5YR6/3 (70%), 7.5YR5/8 (30%)	-	Fine SCL	m	sbk	f-m	ss, sp (wet)	c-m	f-m	d	7.5YR5/8	
	30-55	5YR6/2 (80%), 7.5YR5/8 (20%)	-	C	m	sbk	f-m	s, p (wet)	c-m	f-m	d	7.5YR5/8	
	55-100+	10YR6/1	-	C	m	sbk	m	s, p (wet)	c	f	f		few Mn conc., groundwater table at 60 cm
B-8	0-5	7.5YR3/2 (70%), 7.5YR6/3 (30%)	-	SL	m	cr	f-m	fr (moist)	f-c	f	f	7.5YR4/6	
	5-12	2.5Y4/2	-	SL	m	sbk	f-m	fi (moist)	c	f-m	f	7.5YR4/6	
	12-28	10YR5/3 (80%),7.5YR5/8 (20%)	-	SL	m	sbk	f-m	fi (moist)	c	f	f	7.5YR5/8	
	28-50	7.5YR6/3 (70%), 7.5YR5/8 (30%)	-	L	w	sbk	f-m	ss, sp (wet)	c-m	f-m	d	7.5YR5/8	
	50-80	7.5YR6/3 (80%), 5YR4/6 (20%)	-	C	m-s	sbk	m	s, p (wet)	c-m	m	d	5YR4/8	few Mn conc. (0.1-1.0cm : 5%)
	80-120+	10YR6/2 (50%), 10YR6/6 (50%)	-	gravel, C	m	abk	m	s, p (wet)					many Mn conc. (0.1-1.0cm : 30%)
B-9	0-10	7.5YR3/3 8 (70%), 7.5YR5/6 (30%)	-	grabel, LS	m	sbk	f-m	fr (moist)	c-m	f	f	7.5YR4/6	many Fe & Mn conc. (0.2-1.0 cm:40%)
	10-18	7.5YR5/6	-	C, S	single grain			fr (moist)	-	-	-	-	
	18-38	-	-	-	-	-	-	-	-	-	-	-	Iron pan
	38-60	10Y5/1 (50%), 7.5YR5/8 (50%)	-	LS	m	sbk	f-m	fr (moist)	c-m	f-m	f	7.5YR5/8	
	60-100+			-	-	-	-	-	-	-	-	-	Iron pan, many Mn conc.
B-10	0-20	7.5YR3/3	10YR4/3	SL	w	cr	f-m	sh (dry)	f	f-m	f		
	20-38	7.5YR4/3	7.5YR6/3 (50%), 7.5YR6/6 (20%)	SL	m	sbk	f-m	fr (moist)	c	f-m	f	7.5YR6/6	
	38-54	7.5YR6/6	7.5YR6/4 (60%), 7.5YR6/8 (40%)	gravel, F. SL	m	sbk	f-m	fr (moist)	c	m	f-d	7.5YR6/4	few Mn conc. (0.1-1.0cm : 5%)
	54-60	7.5YR6/3	7.5YR7/3 (50%), 7.5YR5/8 (50%)	gravel, C	m-s	sbk	f-m	s, p (wet)	m	m	f-d	7.5YR5/8	many Mn conc. (0.1-1.0cm), common clay ill.
	60-75	10YR5/2 (70%), 10-7.5YR3-4/6 (30%)	-	gravel, C	m-s	sbk	m-c	s, p (wet)	m	f-m	p	10YR3/6	many Fe & Mn conc. (0.2-1.0 cm:30%)
	75-120+	10YR6/4 (80%), 10YR6/8 (20%)	-	gravel, C	m-s	sbk	m-c	s, p (wet)	c	f-m	f	10YR6/8	many Fe & Mn conc. (0.2-0.5 cm:50%)
B-11	0-15	7.5YR4 5/3	7.5YR6/4 (70%), 7.5YR5/6 (30%)	SL	w	cr	f	fr (moist)	c	m	f	7.5YR5/6	
	15-40	7.5YR5/4 (60%), 7.5YR4/6 (40%)	-	gravel, CL	m	sbk	f-m	fr (moist)	c-m	m	f	7.5YR4/6	many Fe & Mn conc. (0.2-1.0 cm:30%)
	40-60	7.5YR5/3 (50%), 7.5YR4/6 (50%)	-	L-CL (SiL)	m	sbk	f-m	ss, sp (wet)	m	f-m	f-d	7.5YR4/6	common Fe & Mn conc. (0.2-1.0 cm:10%)
	60-100	5Y4/1	-	L (SiL)	m-s	sbk	m-c	ss, sp (wet)	c	f	d	5YR1/8	groundwater table at 60-100cm
	100-120+	10Y5/1	-	L (SiL)	m-s	sbk	m-c	ss, sp (wet)	f	f-m	f	7.5Y5/3	
B-12	0-15	7.5YR4/2	2.5Y5/1 (60%), 7.5YR4/6 (40%)	Fine L	w	sbk	f-m	fi (moist)	c	f-m	f-d	7.5YR4/6	
	15-40	5YR5/2	7.5YR5/2 (80%), 7.5YR5/6 (20%)	Fine L	m	sbk	m-c	fi (moist)	c	f	f-d	7.5YR5/6	
	40-60	10YR6/3 (70%),7.5YR5/8 (30%)	-	SCL-CL	m	sbk	m	s, p (wet)	c-m	f-m	d	7.5YR5/8	
	60-90+	7.5YR6/3 (85%), 2.5YR4/8 (15%)	-	SCL	m	sbk	f-m	s, p (wet)	c	f-m	d	2.5YR4/8	common Fe & Mn conc. & motles
B-13	0-5	10YR3/2	10YR5/2 (50%)< 10YR5/8 (50%)	L	m-s	sbk	m-c	vh (dry)	f	f	d	7.5YR6/8	root channel mottle
	5-30	10YR3/3 (50%), 10YR5/4 (50%)	-	L	w	sbk	f	fr (moist)	-	-	-		few fine Mn conc. (0.2-0.5 cm)
	30-45	10YR5/3 (80%), 10YR5/8 (20%)	-	L	w-m	sbk	f-m	ss, sp (wet)	f-c	f	f	10YR5/8	
	45-90	10YR7/4 (65%), 10YR5/8 (40%)	-	CL	m	sbk	f	s, p (wet)	m	f-m	d	7.5YR5/8	few Fe & Mn conc. (5%)
	90-120+	7.5YR6/3 (60%), 5YR5/8 (30%)	-	gravel, CL	w-m	sbk	f	s, p (wet)	c	f-m	d	5YR5/3	many Fe & Mn soft conc. (30%)
B-14	0-20	10YR3/2	-	SL	w-m	sbk	f-m	fr (moist)	f	f	f	10YR5/8	
	20-30	10YR4/2	-	gravel, L-CL	w-m	sbk	f-m	-	-	-	-	-	iron pan or abundant/dominant Fe & Mn conc. (80%)
	30-50	7.5YR7/3 (50%), 5YR3/6 (30%), 10YR6/8 (20%)		SCL-CL	w	sbk	f-m	-	c	m	f-d	5YR3/6	few soft Mn conc. & motle
	50-75	7.5YR7/3 (50%),10YR6/8 (30%), 5YR3/6 (20%)		CL	w	sbk	f-m	ss, sp (wet)	c	m	f-d	10TR6/8	
	75-95+	2.5GY6/1 (70%)< 7.5YR5/8 (30%)	-	gravel, C	m	sbk	m-c	s, p (wet)	m	m	d	7.5TR5/8	many Fe & Mn conc. (0.1-0.5cm:40%). G.W at 90cm
B-15	0-15	2.5Y4.2 (80%), 10YR5/8 (20%)	-	SCL-CL	w	sbk	m	ss, sp (wet)	c	f	d	10YR5/8	few Fe & Mn conc. (5%)
	15-38	7.5Y4/1 (70%), 10YR4/6 (30%)	-	C		massive		s, p (wet)	c-m	f	d	10YR4/6	
	38-70+	10Y6/1 (85%), 10YR5/8 (15%)	-	C		massive		s, p (wet)	c	m	f-d	10YR5/8	G. W table at 70 cm
B-16	0-6	7.5YR3/2	-	SiCL	m-s	sbk	m	ss, sp (wet)	c	f	f	5YR4/8	root channel mottle
	6-15	7.5YR5/4 & 7.5YR4/6	-	SiCL	m-s	sbk	f-m	ss, sp (wet)	c-m	f-m	f	7.5YR4/6	root channel mottle, 7.5YR4/6 sand including
	15-30	10YR6/3 & 7.5YR5/6	-	C	m-s	sbk	m-c	s, p (wet)	c	f-m	f	7.5YR5/6	few Mn conc. & motles
	30-80	10YR6/3 (60%), 10YR5/8 (40%)	-	C	m-s	sbk	m-c	s, p (wet)	c	m	f	10YR5/8	common Mn fine -medium Mn conc. & motles
	80-120+	10YR7/2 (60%), 10YR5/8 (40%)	-	C	m-s	sbk	f-m	s, p (wet)	c	m	f	10YR5/8	many Mn fine-medium conc. & motles, G.W at 90cm
B-17	0-15	2.5Y3/2 (80%), 10YR5/8 (20%)	-	CL	m-s	sbk	f-m	s, p (wet)	c-m	f	f	10YR5/8	few Mn fine -medium Mn conc.
	15-30	2.5Y6/2 (60%), 10YR5/8 (40%)	-	CL	w-m	sbk	f-m	s, p (wet)	c-m	f-m	d	10YR5/8	
	30+	-	-	-	-	-	-	-	-	-	-	-	groundwater table at 30 cm

Table C-AI-1 General Description of Soil Profile in Other Project Areas

Location No.	Depth of Horizon	Color		Texture	Structure			Consistence	Mottling				Remarks
		wet (moist)	dry		grade	type	size		abundance	size	contrast	color	
B-18	0-20	7.5YR3/2	7.5YR3/2	SL	f	cr	f-m	fi (moist)	f	f	f	7.5YR5/8	root channel mottles, few Mn conc (0.1-0.3 cm)
	20-35	7.5YR4/2 (80%)< 7.5YR5/8 (20%)	-	SL	c	sbk	f-m	fi (moist)	c	f	f	7.5YR5/8	
	35-60	7.5YR6/3 (70%), 7.5YR5/8 (30%)	-	C	c	sbk	f-m	s, p (wet)	c	f-m	f-d	7.5YR5/8	
	60-90	7.5YR6/2 (60%), 7.5YR5/8 (20%)	-	C	m	sbk	f-m	s, p (wet)	m	m	d-p	7.5YR5/8	few fine Fe & Mn conc.
	90-120+	7.5YR7/2 (80%), 7.5YR4/6 (20%)	-	C		massive		s, p (wet)	-	-	-	-	many Fe & Mn conc. (0.5-1.5 cm)
S-1	0-5	7.5YR2.5/3	-	LS	w	cr	f	vfr (moist)	-	-	-	-	
	5-25	7.5YR3/3.5	-	C. LS	w	sbk	f-m	fr (moist)	-	-	-	-	
	25-50	7.5YR4/4	-	C. SL	m	sbk	m	fi (moist)	-	-	-	-	few clay ill
	50-80	5YR4/6	-	SCL	m-s	sbk	m	ss, sp (wet)	-	-	-	-	few clay ill
	80-120+	5YR6/8	-	SCL	m-s	sbk	m	ss, sp (wet)	-	-	-	-	few clay ill.
S-2	0-20	7.5YR3/4	-	S	single grain			vfr (moist)	-	-	-	-	
	20-35	7.5YR3/4	-	S	single grain			fr (moist)	-	-	-	-	
	35-65	5YR4 5/6	-	SL	w-m	sbk	f-m	fr (moist)	-	-	-	-	
	65-80	5YR5/8	-	SL-SCL	m	sbk	f-m	ss, sp (wet)	-	-	-	-	
	80+		-										iron pan or abundant/dominant Fe conc. (80%)
S-3	0-18	7.5YR3/2	-	LS	w-m	sbk	f-m	fr (moist)	-	-	-	-	
	18-40	7.5YR4/3	-	LS	w-m	sbk	f-m	fr (moist)	-	-	-	-	
	10-60	5YR4/6	-	SL-SCL	m	sbk	m	ss, sp (wet)	-	-	-	-	
	60+		-										iron pan or abundant/dominant Fe conc. (80%)

Table C-AI-2 Physical and Chemical Property of Soils in the Other Project Areas

ject	Sample ID	Layer	Particle size			Texture	pH (H2O) (1:2.5)	EC (1:5) (uS/cm)	Org.-C (%)	Tot -N (%)	C/N	Ava.-P (ppm)	CEC	Ex. Cations (me/100g)				BSP (%)	ESP (%)
			Sand	Silt	Clay									Ca	Mg	K	Na		
ı	W-1	0-20	90.7	1.4	7.9	S	6.3	25	0.29	0.04	7.3	1.8	20.0	0.92	0.62	0.48	0.08	10.5	0.4
ı	W-1	20-40	90.4	1.5	8.1	S	6.2	16	-	-	-	-	-	-	-	-	-	-	-
ı	W-2	0-20	83.2	6.5	10.4	LS	7.4	44	0.73	0.06	12.2	3.0	13.7	2.04	1.75	0.32	0.00	30.0	0.0
ı	W-2	40-60	81.3	5.8	12.9	LS	7.1	28	-	-	-	-	-	-	-	-	-	-	-
ı	W-2	80-100	57.7	6.9	35.4	SC	6.5	77	-	-	-	-	-	-	-	-	-	-	-
ı	W-3	0-20	73.6	6.1	20.4	SCL	6.5	64	0.88	0.05	17.6	5.0	16.5	2.41	2.52	0.17	0.57	34.4	3.5
ı	W-3	40-60	74.8	3.6	21.6	SCL	6.7	65	-	-	-	-	-	-	-	-	-	-	-
ı	W-3	80-100	65.3	47.3	30.4	SCL	7.7	118	-	-	-	-	-	-	-	-	-	-	-
ı	W-4	0-20	87.3	4.6	7.9	LS	6.5	64	0.41	0.07	5.9	10.1	20.2	0.74	0.85	0.29	0.22	10.4	1.1
ı	W-4	40-60	65.3	5.6	29.1	SCL	4.9	131	0.32	0.05	6.4	0.7	21.8	1.97	4.14	0.06	1.23	33.9	5.6
ı	W-4	80-100	62.0	8.9	29.1	SCL	5.1	85	0.22	0.03	7.3	0.6	24.0	2.54	5.10	0.07	2.00	40.5	8.3
ı	W-5	0-20	75.7	14.0	10.4	SL	7.5	157	0.48	0.05	9.6	11.1	14.3	1.42	1.53	0.37	0.49	26.6	3.4
ı	W-5	40-60	77.2	6.2	16.6	SL	6.5	74	0.13	0.05	2.6	1.3	24.1	1.15	1.80	0.16	0.78	16.1	3.2
ı	W-5	80-100	74.1	5.5	20.4	SCL	7.9	126	0.10	0.04	2.5	0.9	27.8	1.35	2.62	0.08	1.55	20.1	5.6
ı	W-6	0-20	50.7	31.5	17.9	L	7.0	65	0.83	0.07	11.9	3.6	26.2	2.79	2.83	0.27	0.54	24.5	2.1
ı	W-6	40-60	43.4	20.0	36.6	CL	6.7	150	-	-	-	-	-	-	-	-	-	-	-
ı	W-6	80-100	44.4	17.4	37.9	CL	8.1	521	-	-	-	-	-	-	-	-	-	-	-
ı	W-7	0-20	34.3	32.8	32.9	CL	5.7	73	0.90	0.1	9.0	0.8	34.1	3.77	4.48	0.25	0.63	26.8	1.8
ı	W-7	40-60	50.7	16.5	32.9	SCL	6.9	98	0.29	0.04	7.3	0.6	25.5	4.37	5.27	0.08	1.27	43.0	5.0
ı	W-7	80-100	69.6	5.0	25.4	SCL	6.7	151	0.05	0.02	2.5	0.9	30.0	3.13	4.50	0.00	1.27	29.7	4.2
ıa	W-8	0-20	77.2	8.7	14.1	SL	7.3	58	0.91	0.06	15.2	4.0	26.9	2.67	2.03	0.35	0.21	19.6	0.8
ıa	W-8	40-60	70.0	9.7	20.4	SCL	7.2	43	-	-	-	-	-	-	-	-	-	-	-
ıa	W-8	80-100	56.6	10.5	32.9	SCL	7.5	66	-	-	-	-	-	-	-	-	-	-	-
ıa	W-9	0-20	81.5	5.6	12.9	SL	7.5	78	0.73	0.06	12.2	6.2	14.6	2.15	2.24	0.40	0.39	35.5	2.7
ıa	W-9	40-60	52.6	14.6	32.9	SCL	7.2	192	-	-	-	-	-	-	-	-	-	-	-
ıa	W-9	80-100	51.2	17.2	31.6	SCL	8.9	340	-	-	-	-	-	-	-	-	-	-	-
ıa	W-10	0-20	79.4	10.3	10.4	SL	7.3	68	0.77	0.06	12.8	21.7	1.9	1.58	0.35	0.23		113.7	0.0
ıa	W-10	40-60	80.7	11.4	7.9	LS	7.4	59	-	-	-	-	-	-	-	-	-	-	-
ıa	W-10	80-100	75.8	11.4	12.9	SL	7.2	56	-	-	-	-	-	-	-	-	-	-	-
ıte	Am-1	0-20	77.2	5.4	17.5	SL	5.5	12	0.70	0.07	10.0	5.2	41.0	1.11	0.73	0.09	0.03	4.8	0.1
ıte	Am-1	20-40	64.8	2.8	32.5	SCL	4.6	18	0.51	0.05	10.2	0.9	33.3	1.06	0.25	0.04	0.03	4.1	0.1
ıte	Am-1	60-80	61.6	3.4	35.0	SC	4.5	15	0.32	0.04	8.0	0.8	55.8	0.51	0.67	0.04	0.03	2.2	0.1
ıte	Am-2	0-20	30.7	29.3	40.0	CL	7.9	94	1.60	0.16	10.0	6.0	65.6	1.87	3.08	1.30	0.06	9.6	0.1
ıte	Am-3	0-20	88.8	3.7	7.5	LS	6.8	11	0.22	0.03	7.3	0.8	22.5	0.35	0.20	0.04	0.02	2.7	0.1
ıte	Am-3	40-60	70.6	7.0	22.5	SCL	4.8	12	0.16	0.02	8.0	0.7	18.9	0.41	0.31	0.02	0.03	4.1	0.2
ıte	Am-3	80-100	61.6	5.9	32.5	SCL	4.8	16	0.15	0.02	7.5	0.5	21.0	0.72	0.52	0.02	0.04	6.2	0.2
ıte	Am-4	0-20	76.0	6.5	17.5	SL	7.0	33	0.96	0.07	13.7	6.1	45.2	4.41	1.08	0.17	0.03	12.6	0.1
ıte	Am-4	40-60	73.2	5.5	21.3	SCL	6.7	12	0.32	0.04	8.0	1.9	46.1	2.31	0.75	0.09	0.02	6.9	0.0
ıte	Am-4	80-100	66.2	3.8	30.0	SCL	5.3	15	0.18	0.02	9.0	1.0	44.3	1.13	0.86	0.05	0.02	4.6	0.0
ıte	Am-5	0-20	70.1	10.0	20.0	SL	7.2	35	1.12	0.1	11.2	9.8	30.8	6.08	1.48	0.47	0.04	26.2	0.1
ıte	Am-5	40-60	65.2	6.1	28.8	SCL	7.8	23	0.41	0.05	8.2	2.1	28.7	4.00	1.45	0.10	0.03	19.5	0.1
ıte	Am-5	80-100	58.8	6.2	35.0	SCL	6.0	40	0.22	0.02	11.0	1.5	22.5	2.36	0.86	0.08	0.03	14.8	0.1
ıte	Am-6	0-20	67.0	10.5	22.5	SCL	6.5	25	0.99	0.08	12.4	1.9	54.8	3.93	1.47	0.36	0.04	10.6	0.1
ıte	Am-6	40-60	46.1	8.9	45.0	C	6.6	23	0.48	0.05	9.6	1.1	41.3	3.28	1.35	0.07	0.04	11.5	0.1
ıte	Am-6	80-100	48.1	5.7	46.3	C	6.0	28	0.31	0.03	10.3	0.9	41.0	3.09	1.26	0.05	0.03	10.8	0.1
ıate	Am-7	0-20	63.4	11.6	25.0	SCL	6.9	29	1.09	0.09	12.1	2.1	40.7	3.77	1.72	1.02	0.05	16.1	0.1
ıate	Am-7	40-60	48.9	9.9	41.3	SC	6.6	14	0.64	0.05	12.8	1.2	47.6	3.28	1.23	0.31	0.04	10.2	0.1
ıate	Am-7	80-100	39.4	13.1	47.5	C	6.2	30	0.55	0.04	13.8	0.9	51.2	2.89	1.24	0.26	0.04	8.6	0.1
ıate	Am-8	0-20	81.3	5.0	13.8	LS	6.8	33	0.70	0.08	8.8	6.7	36.5	3.33	0.93	0.22	0.03	12.4	0.1
ıate	Am-8	40-60	80.4	4.6	15.0	SL	6.8	14	0.29	0.03	9.7	1.3	58.8	1.98	1.06	0.07	0.03	5.3	0.1
ıate	Am-8	80-100	84.5	3.1	12.5	LS	6.7	10	0.22	0.02	11.0	1.0	66.2	1.08	1.06	0.05	0.06	3.4	0.1
ife	Af-1	0-20	4.1	16.8	79.1	C	4.9	2000	2.62	0.13	20.2	1.5	96.4	9.00	6.46	0.26	9.78	26.5	10.1
ife	Af-1	20-40	4.5	30.2	65.4	C	4.3	2760	1.09	0.1	10.9	1.0	103.7	10.75	6.47	0.18	9.35	25.8	9.0
ife	Af-1	60-80	2.6	24.5	72.9	C	3.9	2150	0.56	0.09	6.2	0.9	55.1	9.29	6.33	0.08	8.26	43.5	15.0
ife	Af-2	0-20	2.9	29.3	67.9	C	5.5	356	1.84	0.12	15.3	1.0	99.3	12.41	6.42	0.25	3.04	22.3	3.1
ife	Af-2	40-60	3.4	18.7	77.9	C	5.5	737	0.80	0.08	10.0	0.9	74.4	11.83	6.05	0.09	0.81	25.3	1.1
ife	Af-2	80-100	48.5	7.4	44.2	C	5.7	1016	0.22	0.04	5.5	0.4	61.1	7.42	5.36	0.07	3.91	27.4	6.4
ife	Af-3	0-20	6.4	28.3	65.4	C	5.4	846	1.98	0.11	18.0	0.5	59.2	9.78	6.43	0.18	5.22	36.5	8.8
ife	Af-3	40-60	9.2	19.2	71.6	C	4.2	1852	0.64	0.06	10.7	0.4	74.6	7.95	6.38	0.06	9.78	32.4	13.1
ife	Af-3	80-100	30.1	9.5	60.4	C	3.9	1668	0.29	0.06	4.8	0.3	83.3	7.88	5.85	0.03	8.26	26.4	9.9
ife	Af-4	0-20	1.7	30.4	67.9	C	6.2	102	1.72	0.1	17.2	0.4	99.8	15.12	6.41	0.05	0.92	22.6	0.9
ife	Af-4	40-60	2.0	20.1	77.9	C	6.1	129	-	-	-	-	-	-	-	-	-	-	-
ife	Af-4	80-100	5.4	16.8	77.9	C	5.0	986	-	-	-	-	-	-	-	-	-	-	-
ife	Af-5	0-20	0.5	29.2	70.4	C	6.0	118	1.63	0.08	20.4	0.6	21.3	14.09	6.42	0.21	0.95	101.9	4.5
ife	Af-5	40-60	1.0	19.9	79.1	C	5.4	448	-	-	-	-	-	-	-	-	-	-	-
ife	Af-5	80-100	1.2	14.7	84.1	C	4.9	1457	-	-	-	-	-	-	-	-	-	-	-
ife	Af-6	0-20	2.9	34.3	62.9	C	6.0	117	2.27	0.12	18.9	1.3	33.8	17.41	6.21	0.26	2.61	78.5	7.7
fife	Af-6	40-60	2.1	26.3	71.6	C	6.0	118	1.85	0.08	23.1	0.5	40.8	15.65	6.42	0.15	0.91	56.7	2.2
fife	Af-6	80-100	6.8	17.9	75.4	C	6.7	148	0.32	0.03	10.7	0.5	68.7	15.10	6.40	0.08	2.39	34.9	3.5
fife	Af-7	0-20	1.2	23.4	75.4	C	6.1	120	1.47	0.09	16.3	0.5	55.7	14.00	6.43	0.31	0.93	38.9	1.7
fife	Af-7	40-60	0.6	22.8	76.6	C	6.0	168	-	-	-	-	-	-	-	-	-	-	-
fife	Af-7	80-100	1.4	19.4	79.1	C	5.7	375	-	-	-	-	-	-	-	-	-	-	-

Table C-AI-2 Physical and Chemical Property of Soils in the Other Project Areas

Project	Sample ID	Layer	Particle size			Texture	pH (H2O) (1:2.5)	EC (1:5) (uS/cm)	Org.-C (%)	Tot -N (%)	C/N	Ava.-P (ppm)	CEC	Ex. Cations (me/100g)				BSP (%)	ESP (%)
			Sand	Silt	Clay									Ca	Mg	K	Na		
Afife	Af-8	0-20	0.8	26.3	72.9	C	5.9	180	1.85	0.11	16.8	0.5	39.9	14.21	6.40	0.25	0.93	54.6	2.
Afife	Af-8	40-60	1.7	19.2	79.1	C	5.5	658	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-8	80-100	2.2	17.4	80.4	C	4.7	1257	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-9	0-20	6.3	30.9	62.9	C	6.1	77	1.52	0.08	19.0	0.1	37.0	14.02	6.34	0.17	0.58	57.1	1.
Afife	Af-9	40-60	4.8	19.8	75.4	C	6.4	60	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-9	80-100	17.8	19.3	62.9	C	6.6	122	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-10	0-20	4.4	32.7	62.9	C	5.9	101	1.88	0.1	18.8	1.2	62.9	14.98	6.36	0.21	0.63	35.3	1.
Afife	Af-10	40-60	2.4	22.2	75.4	C	5.6	87	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-10	80-100	3.3	18.8	77.9	C	5.6	208	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-11	0-20	2.6	32.0	65.4	C	5.9	59	2.19	0.11	19.9	0.5	63.2	14.70	6.33	0.19	0.65	34.6	1.
Afife	Af-11	40-60	2.5	24.7	72.9	C	5.9	212	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-11	80-100	10.9	22.5	66.6	C	6.4	108	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-12	0-20	82.2	6.2	11.6	LS	6.2	22	0.51	0.05	10.2	3.0	27.5	9.00	6.46	0.31	0.13	57.8	0.
Afife	Af-12	40-60	52.4	7.2	40.4	SC	5.2	69	0.48	0.05	9.6	1.0	40.0	10.75	6.47	0.05	0.64	44.8	1.
Afife	Af-12	80-100	63.8	7.1	29.1	SCL	4.9	162	0.26	0.03	8.7	0.9	39.0	9.29	6.33	0.04	0.77	42.1	2.
Afife	Af-13	0-20	4.8	31.1	64.1	C	6.0	84	1.63	0.1	16.3	1.0	41.1	12.41	6.42	0.19	0.75	48.1	1.
Afife	Af-13	40-60	7.3	26.1	66.6	C	6.4	123	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-13	80-100	6.6	31.7	61.6	C	6.6	149	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-14	0-20	4.9	32.3	62.9	C	6.0	112	2.23	0.11	20.3	1.2	53.7	3.29	1.86	0.25	0.67	11.3	1.
Afife	Af-14	40-60	3.2	23.9	72.9	C	6.3	66	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-14	80-100	8.5	21.1	70.4	C	6.6	73	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-15	0-20	69.8	11.1	19.1	SL	5.9	21	0.67	0.06	11.2	0.6	32.7	3.98	2.28	0.05	0.24	20.0	0.
Afife	Af-15	40-60	58.0	9.2	32.9	SCL	6.7	35	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-15	80-100	64.2	7.9	27.9	SCL	7.4	57	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-16	0-20	50.8	21.3	27.9	SCL	6.1	37	0.80	0.11	7.3	1.1	20.4	12.43	6.24	0.13	0.34	93.6	1.
Afife	Af-16	40-60	36.1	13.5	50.4	C	5.3	35	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-16	80-100	39.9	14.7	45.4	C	5.1	42	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-17	0-20	6.3	34.6	59.1	C	6.1	37	2.15	0.1	21.5	1.4	60.1	5.41	1.57	0.10	0.62	12.8	1.
Afife	Af-17	40-60	4.2	27.9	67.9	C	6.0	77	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-17	80-100	15.1	27.1	57.9	C	6.0	83	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-18	0-20	62.5	13.4	24.1	SCL	7.4	108	0.48	0.08	6.0	4.1	25.6	8.71	1.39	0.18	0.30	41.3	1.
Afife	Af-18	40-60	55.6	12.8	31.6	SCL	8.0	190	0.06	0.04	1.5	1.3	20.7	8.31	1.81	0.07	0.35	50.8	1.
Afife	Af-18	80-100	59.0	30.7	10.4	SL	8.4	140	0.03	0.03	1.0	0.0	27.6	7.76	2.11	0.04	0.70	38.4	2.
Afife	Af-19	0-20	6.4	35.7	57.9	C	6.4	96	0.13	0.1	1.3	0.5	42.1	12.81	6.23	0.22	0.71	47.5	1.
Afife	Af-19	40-60	15.9	31.2	52.9	C	6.1	100	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-19	80-100	17.8	29.3	52.9	C	6.5	108	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-20	0-20	12.8	30.5	56.6	C	5.4	137	2.07	0.11	18.8	0.7	33.7	9.30	6.48	0.14	4.78	61.4	14.
Afife	Af-20	40-60	39.3	17.8	42.9	C	5.9	97	-	-	-	-	-	-	-	-	-	-	-
Afife	Af-20	80-100	46.2	13.5	40.4	SC	5.3	326	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-1	0-20	50.5	14.6	35.0	SC	5.4	21	2.17	0.13	16.7	2.0	16.0	3.08	1.40	0.12	0.03	28.9	0.
Akumadan	AK-1	40-60	23.4	16.7	60.0	C	5.6	34	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-1	80-100	24.3	13.2	62.5	C	5.4	33	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-2	0-20	41.7	18.3	40.0	CL	6.9	59	1.56	0.12	13.0	4.3	27.3	6.11	1.66	0.70	0.05	31.2	0.
Akumadan	AK-2	40-60	41.9	10.8	47.5	C	7.1	32	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-2	80-100	26.2	13.8	60.0	C	5.4	22	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-3	0-20	83.7	6.3	10.0	LS	5.7	46	0.45	0.08	5.6	21.1	11.3	0.83	0.15	0.08	0.03	9.6	0.
Akumadan	AK-3	40-60	76.1	6.4	17.5	SL	6.0	12	0.27	0.03	9.0	1.9	11.8	1.00	0.55	0.05	0.02	13.7	0.
Akumadan	AK-3	80-100	71.3	6.2	22.5	SCL	5.0	22	0.19	0.03	6.3	1.3	17.9	0.60	0.88	0.10	0.11	9.4	0.
Akumadan	AK-4	0-20	63.4	7.8	28.8	SCL	5.9	21	0.96	0.09	10.7	12.4	14.3	3.21	0.72	0.23	0.03	29.4	0.
Akumadan	AK-4	40-60	43.7	8.8	47.5	C	4.9	46	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-5	0-20	66.7	5.8	27.5	SCL	5.9	32	1.09	0.08	13.6	2.2	14.3	2.49	1.10	0.19	0.03	26.7	0.
Akumadan	AK-5	40-60	34.9	12.7	52.5	C	4.6	n.a.	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-5	80-100	33.7	13.9	52.5	C	4.4	40	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-6	0-20	73.4	9.1	17.5	CL	5.7	32	1.05	0.07	15.0	20.0	17.9	2.03	0.93	0.17	0.06	17.8	0.
Akumadan	AK-6	40-60	48.8	8.7	42.5	C	4.6	25	-	-	-	-	-	-	-	-	-	-	-
Akumadan	AK-6	80-100	44.3	10.7	45.0	C	4.3	29	-	-	-	-	-	-	-	-	-	-	-
Tanoso	T-1	0-20	81.7	2.1	16.3	SL	5.0	11	0.73	0.08	9.1	14.6	12.3	0.91	0.27	0.15	0.12	11.8	1.
Tanoso	T-1	20-40	66.6	3.4	30.0	SCL	4.6	28	-	-	-	-	-	-	-	-	-	-	-
Tanoso	T-1	60-80	65.0	2.5	32.5	SCL	4.4	6	-	-	-	-	-	-	-	-	-	-	-
Tanoso	T-2	0-20	74.4	2.8	22.5	SCL	6.0	21	1.09	0.1	10.9	5.0	13.2	2.11	0.95	0.24	0.03	25.2	0.
Tanoso	T-2	40-60	45.4	9.6	45.0	SC	4.7	18	0.48	0.05	9.6	0.7	18.1	0.93	0.41	0.06	0.25	9.1	1.
Tanoso	T-2	80-100	40.2	6.1	53.8	C	4.8	23	0.29	0.06	4.8	0.6	22.7	0.46	0.40	0.07	0.09	4.5	0.
Tanoso	T-3	0-20	73.4	9.1	17.5	SL	7.9	117	1.37	0.11	12.5	3.4	13.2	9.31	0.90	0.21	0.20	80.8	1.
Tanoso	T-3	40-60	52.3	7.7	40.0	SC	7.6	28	-	-	-	-	-	-	-	-	-	-	-
Tanoso	T-3	80-100	41.9	5.6	52.5	C	7.2	38	-	-	-	-	-	-	-	-	-	-	-
Tanoso	T-4	0-20	68.8	13.7	17.5	SL	6.6	34	2.07	0.17	12.2	3.7	16.4	5.05	2.05	0.61	0.04	47.2	0.
Tanoso	T-5	0-20	64.6	12.9	22.5	SCL	5.7	64	1.88	0.13	14.5	15.4	14.7	3.23	1.15	0.14	0.04	31.0	0.
Tanoso	T-5	40-60	43.6	15.9	40.5	C	4.9	21	1.02	0.1	10.2	1.1	22.9	0.90	0.37	0.13	0.13	6.7	0.
Tanoso	T-5	80-100	42.5	10.0	47.5	C	5.0	3	0.56	0.06	9.3	0.7	23.8	0.30	0.10	0.08	0.03	2.1	0.

Table C-AI-2 Physical and Chemical Property of Soils in the Other Project Areas

roject	Sample	Layer	Particle size			Texture	pH (H2O)	EC (1:5)	Org.-C	Tot -N	C/N	Ava.-P	CEC	Ex. Cations (me/100g)				BSP	ESP
	ID		Sand	Silt	Clay		(1:2.5)	(uS/cm)	(%)	(%)		(ppm)		Ca	Mg	K	Na	(%)	(%)
ntanga	B-1	0-20	68.8	18.7	12.5	SL	5.3	16	0.26	0.03	8.7	3.4	37.0	0.90	0.41	0.06	0.09	3.9	0.2
ntanga	B-1	40-60	54.2	8.3	37.5	SC	5.1	8	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-1	80-100	31.7	13.4	55.0	C	5.2	6	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-2	0-20	15.7	56.9	27.5	SiCL	5.1	22	1.09	0.08	13.6	1.3	14.7	1.54	1.08	0.06	0.25	20.0	1.7
ntanga	B-2	40-60	6.9	45.6	47.5	SiC	5.2	25	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-2	80-100	15.2	44.8	40.0	SiC	5.2	17	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-3	0-20	77.9	9.6	12.5	SL	5.4	8	0.41	0.05	8.2	1.7	16.0	1.44	1.10	0.05	0.03	16.4	0.2
ntanga	B-3	40-60	69.2	13.3	17.5	SL	5.5	6	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-3	60-80	39.7	12.9	47.5	C	5.8	14	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-4	0-20	73.8	13.7	12.5	SL	5.0	14	0.45	0.05	9.0	1.3	12.9	0.90	0.44	0.09	0.04	11.4	0.3
ntanga	B-4	40-60	40.7	21.9	37.5	CL	5.4	7	1.04	0.04	26.0	0.7	20.6	2.66	2.91	0.22	0.27	29.4	1.3
ntanga	B-4	80-100	33.2	21.8	45.0	C	6.2	20	0.16	0.03	5.3	0.5	18.4	5.55	4.65	0.28	0.49	59.6	2.7
ntanga	B-5	0-20	44.8	25.2	30.0	CL	8.3	168	0.64	0.05	12.8	0.8	19.2	0.70	3.20	0.55	0.79	27.3	4.1
ntanga	B-5	40-60	23.3	36.7	40.0	CL	9.1	244	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-5	80-100	23.1	37.0	40.0	CL	9.1	204	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-6	0-20	54.5	30.5	15.0	SL	6.8	54	0.64	0.08	8.0	12.1	11.6	1.54	0.95	0.42	0.17	26.6	1.5
ntanga	B-6	40-60	41.7	25.9	32.5	CL	5.1	27	0.16	0.03	5.3	2.2	15.0	3.27	2.38	0.21	0.57	42.8	3.8
ntanga	B-6	80-100	37.5	27.5	35.0	CL	7.6	37	0.06	0.02	3.0	1.3	20.3	5.19	3.45	0.12	0.57	46.0	2.8
ntanga	B-7	0-20	66.1	23.9	10.0	SL	4.6	67	0.45	0.04	11.3	15.5	11.2	0.80	0.37	0.09	0.07	11.9	0.6
ntanga	B-7	40-60	38.9	28.6	32.5	CL	5.4	10	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-7	80-100	23.0	14.6	62.5	C	5.5	9	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-8	0-20	66.8	20.8	12.5	SL	5.5	12	0.29	0.03	9.7	4.2	13.5	0.93	0.50	0.08	0.09	11.9	0.7
ntanga	B-8	40-60	53.0	17.1	30.0	SCL	5.5	6	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-8	80-100	37.4	20.0	42.5	C	5.6	14	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-10	0-20	68.2	19.3	12.5	SL	6.6	24	0.45	0.04	11.3	2.1	12.3	2.14	1.03	0.06	0.12	27.1	1.0
ntanga	B-10	40-60	36.5	51.0	12.5	SiL	5.9	6	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-10	80-100	25.2	19.9	55.0	C	6.4	15	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-11	0-20	59.7	20.3	20.0	SL	5.5	16	0.73	0.07	10.4	1.6	13.2	1.96	1.13	0.12	0.20	25.9	1.5
ntanga	B-11	40-60	48.1	24.4	27.5	SCL	6.6	84	0.38	0.04	9.5	1.5	15.6	2.46	1.72	0.07	0.27	28.9	1.7
ntanga	B-11	80-100	58.0	22.0	20.0	SL	5.5	6	0.26	0.04	6.5	1.0	17.0	0.60	1.03	0.05	0.07	10.3	0.4
ntanga	B-12	0-20	60.1	27.4	12.5	SL	5.4	7	0.41	0.04	10.3	1.5	23.3	1.07	0.41	0.03	0.05	6.7	0.2
ntanga	B-12	40-60	55.6	20.6	23.8	SCL	5.1	4	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-13	0-20	49.4	25.6	25.0	SCL	7.2	36	0.54	0.04	13.5	2.7	15.7	4.67	2.43	0.13	0.04	46.2	0.3
ntanga	B-13	40-60	48.1	24.4	27.5	SCL	6.1	6	0.26	0.03	8.7	1.1	15.8	1.86	1.83	0.09	0.07	24.4	0.4
ntanga	B-13	80-100	37.9	24.7	37.5	CL	6.1	11	0.24	0.02	12.0	1.0	25.0	2.70	3.28	0.19	0.10	25.1	0.4
ntanga	B-14	0-20	62.1	22.9	15.0	SL	6.4	38	0.89	0.07	12.7	3.3	20.2	2.51	1.46	0.13	0.09	20.8	0.4
ntanga	B-14	40-60	50.9	24.1	25.0	SCL	5.6	3	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-14	80-100	35.8	16.8	47.5	C	5.7	6	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-15	0-20	64.2	18.3	17.5	SL	5.4	18	0.99	0.07	14.1	2.7	12.0	1.22	0.68	0.21	0.09	18.3	0.7
ntanga	B-15	40-60	7.5	45.0	47.5	SiC	4.9	8	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-16	0-20	46.3	38.7	25.0	L	7.2	98	0.70	0.07	10.0	3.2	20.0	5.58	2.11	0.26	0.23	41.0	1.2
ntanga	B-16	40-60	35.7	31.8	32.5	CL	8.1	89	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-16	80-100	28.7	33.8	37.5	CL	8.2	103	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-17	0-20	27.6	42.4	30.0	CL	5.3	26	0.89	0.07	12.7	1.1	17.0	2.42	1.44	0.14	0.14	24.4	0.8
ntanga	B-18	0-20	66.8	18.2	15.0	SL	6.5	5	0.64	0.06	10.7	3.8	20.6	2.81	1.01	0.12	0.11	19.7	0.5
ntanga	B-18	40-60	57.8	24.7	17.5	SL	5.6	12	-	-	-	-	-	-	-	-	-	-	-
ntanga	B-18	80-100	43.5	19.0	37.5	CL	5.6	4	-	-	-	-	-	-	-	-	-	-	-
ubinja	S-1	0-20	82.0	5.5	12.5	SL	5.8	12	0.51	0.05	10.2	3.0	10.9	1.04	0.53	0.06	0.02	15.1	0.2
ubinja	S-1	40-60	64.4	23.2	12.5	SL	4.5	25	0.34	0.04	8.5	1.5	17.0	0.40	0.14	0.05	0.02	3.6	0.1
ubinja	S-1	80-100	49.2	8.4	42.5	C	5.1	8	0.32	0.02	16.0	0.7	27.5	1.64	0.56	0.03	0.03	8.2	0.1
ubinja	S-2	0-20	n.a	n.a	n.a	n.a.	5.0	5	0.53	0.05	10.6	11.7	11.2	0.40	0.12	0.04	0.21	6.9	1.9
ubinja	S-2	40-60	64.0	3.5	32.5	SCL	4.5	6	0.48	0.04	12.0	1.2	32.0	1.49	0.88	0.03	0.02	7.6	0.1
ubinja	S-3	0-20	83.8	3.7	12.5	LS	6.1	11	0.45	0.05	9.0	2.9	16.3	1.57	0.45	0.03	0.01	12.6	0.1
ubinja	S-3	40-60	60.8	6.8	32.5	SCL	5.5	12	0.45	0.03	15.0	2.5	20.0	1.59	0.48	0.06	0.03	10.8	0.2

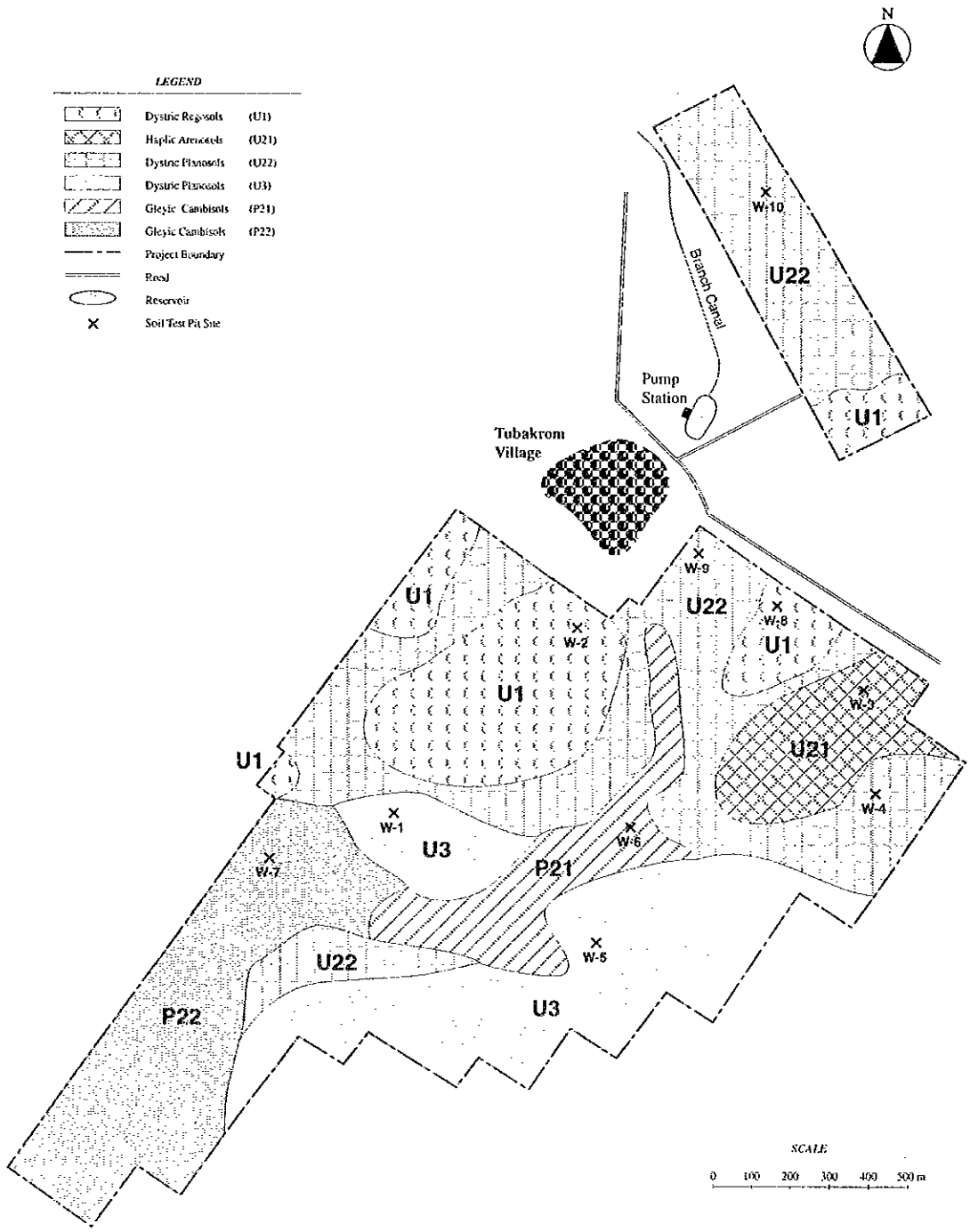

Fig. C-AI-1

Soil Map of Weija

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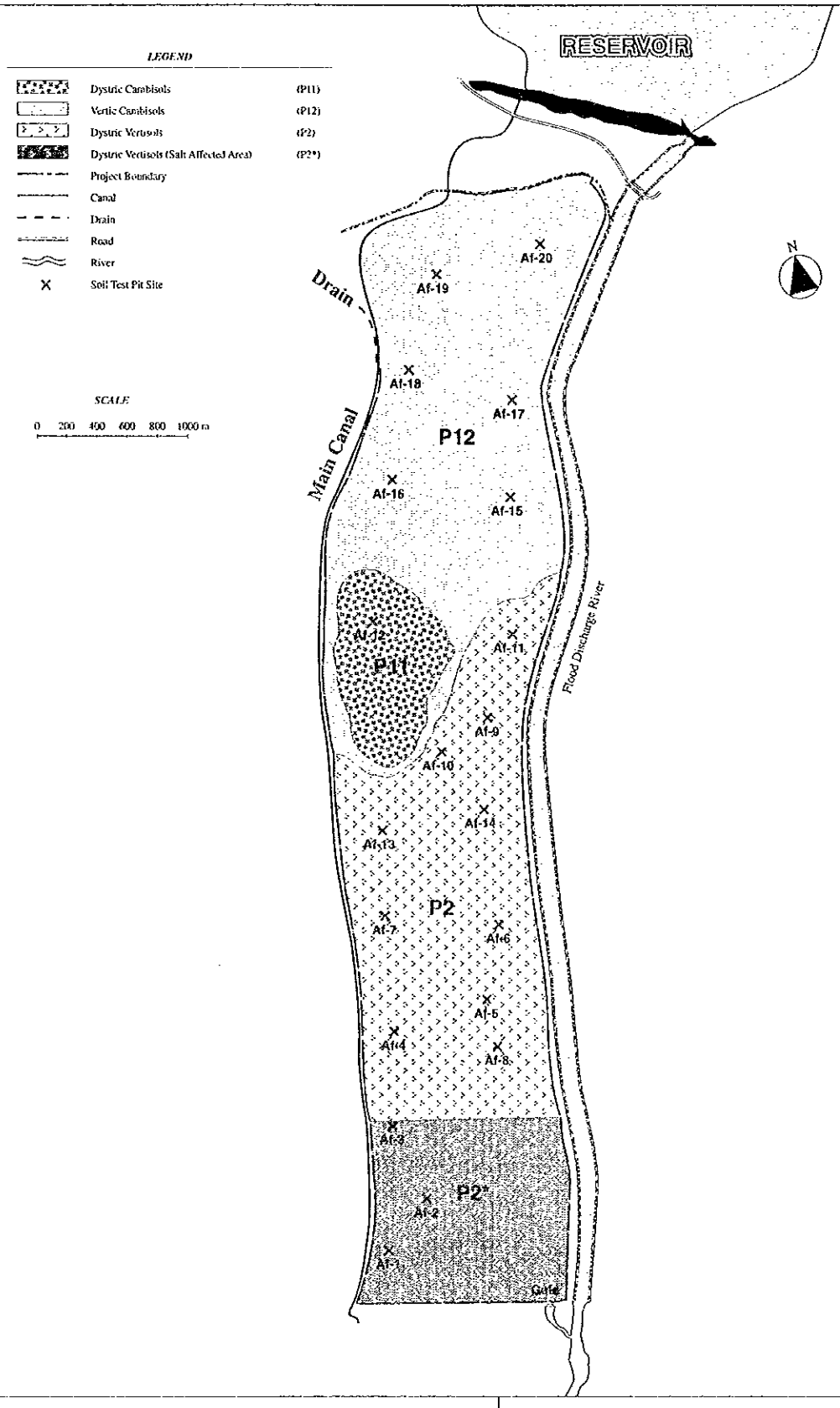

Fig. C-AI-2

Soil Map of Afife

THE STUDY ON THE REHABILITATION OF IRRIGATION PROJECTS IN THE REPUBLIC OF GHANA

Japan International Cooperation Agency

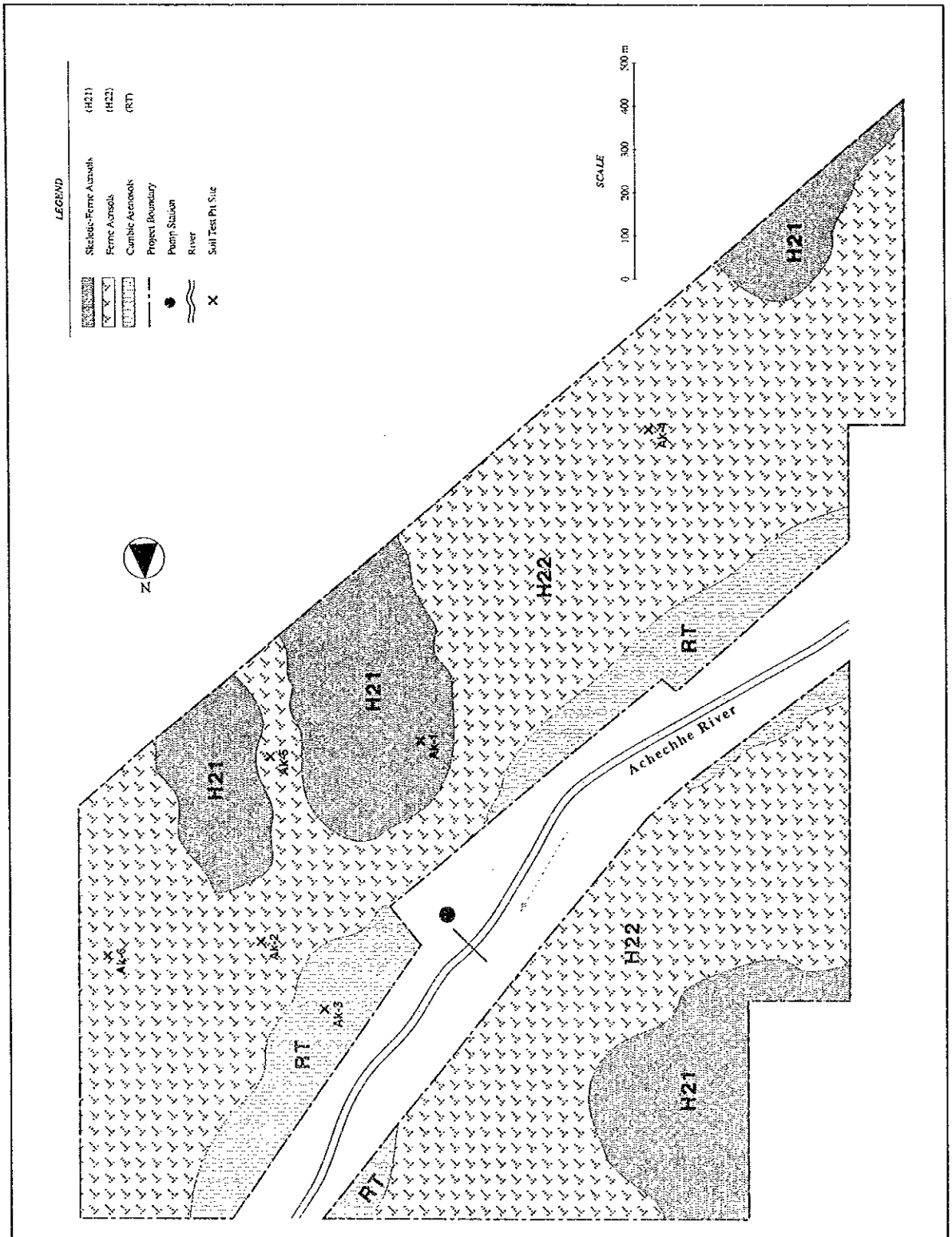

Fig. C-AI-3

Soil Map of Akumadan

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Japan International Cooperation Agency

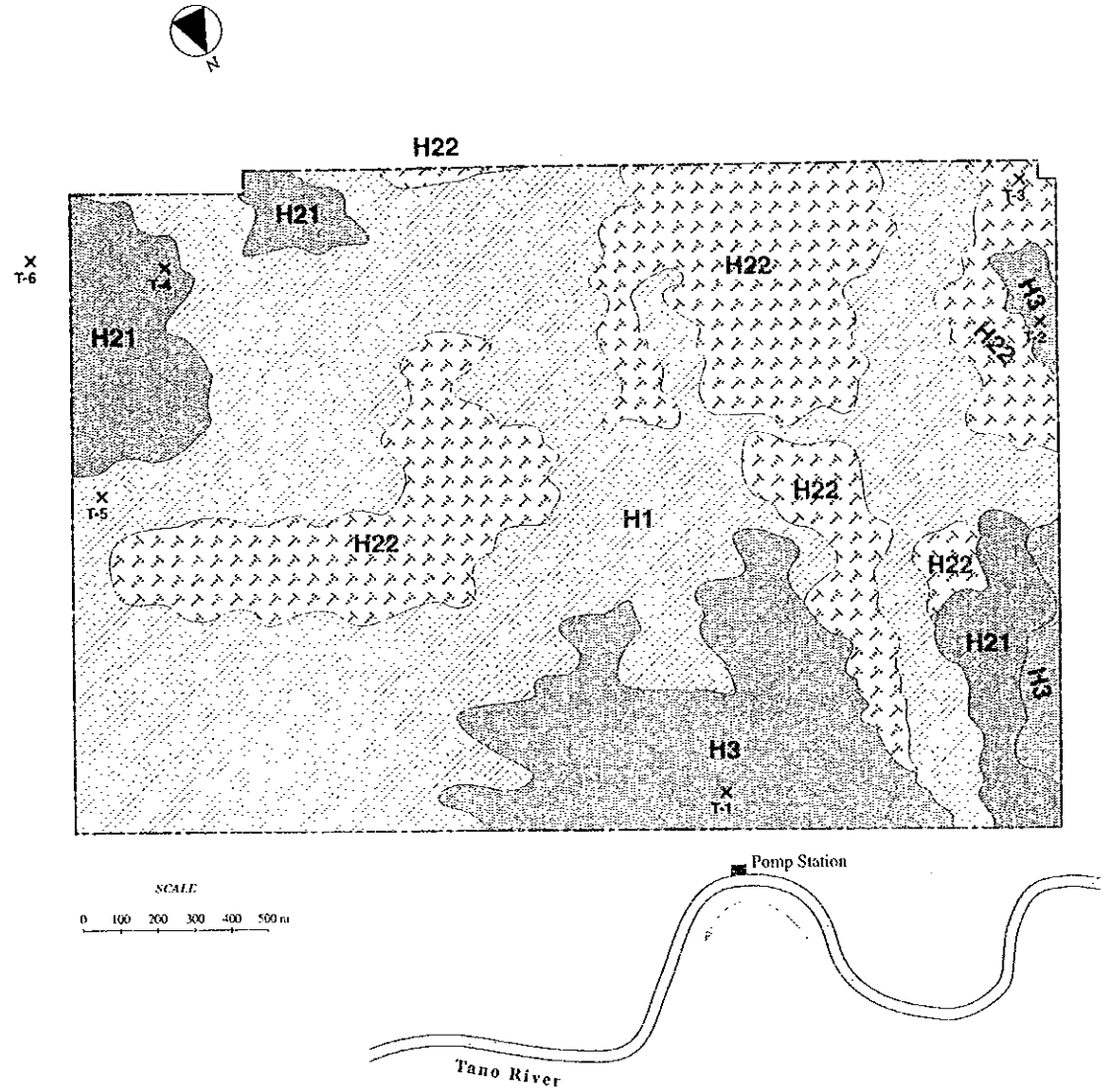

Fig. C-AI-4

Soil Map of Tanoso

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Japan International Cooperation Agency

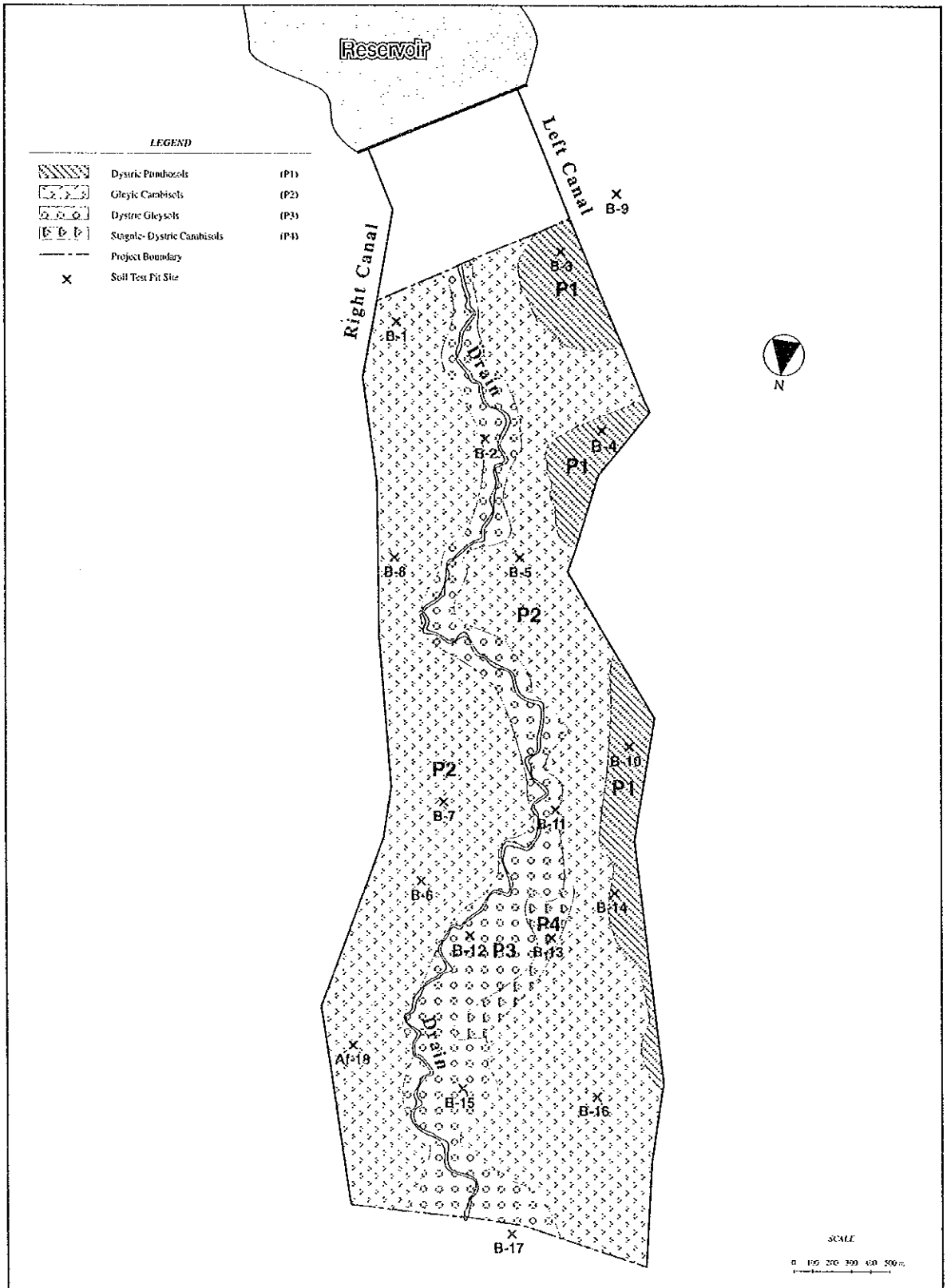

Fig. C-AI-5

Soil Map of Bontanga

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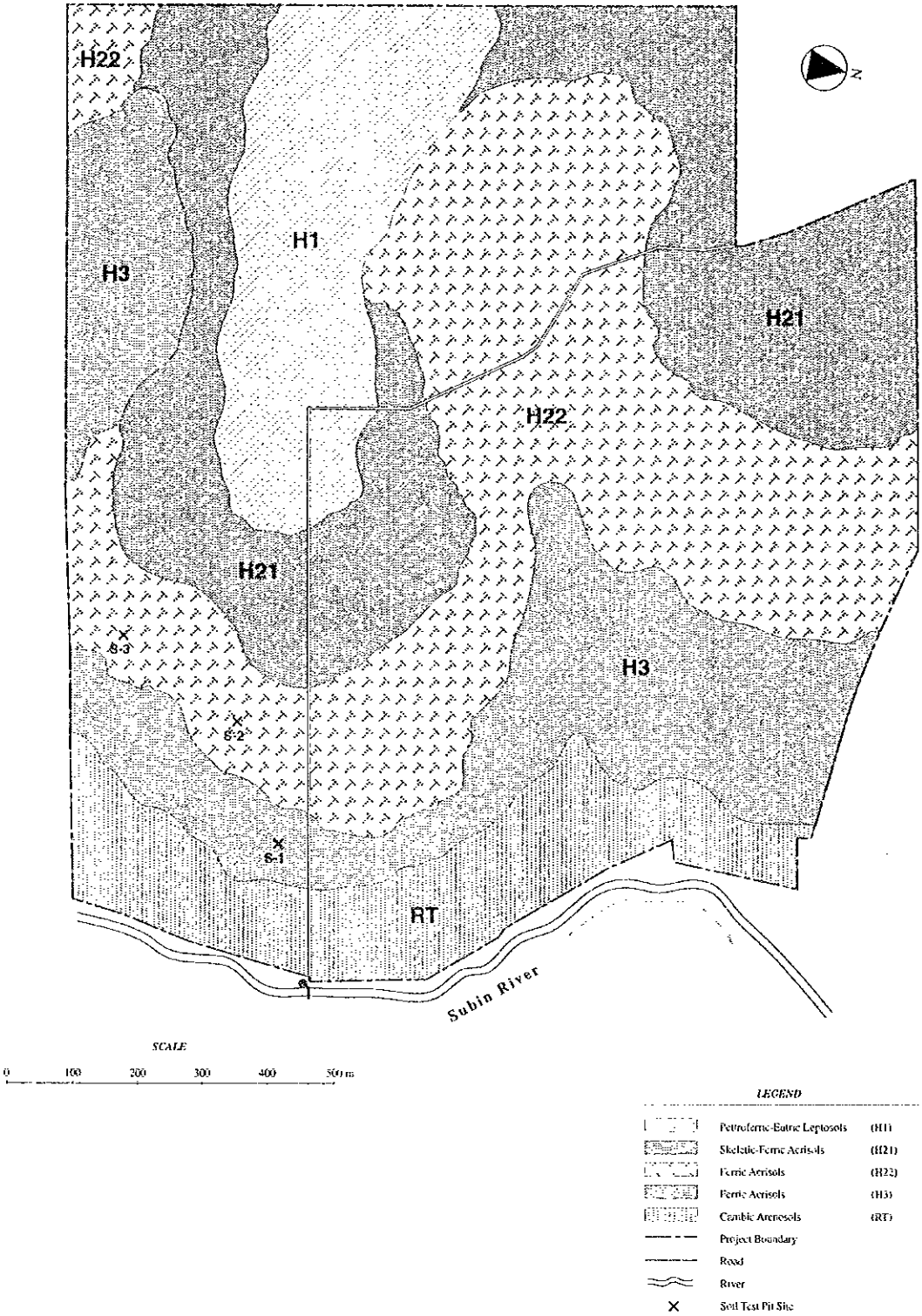

Fig. C-AI-6 **Soil Map of Subinja**	**THE STUDY ON THE REHABILITATION OF IRRIGATION PROJECTS IN THE REPUBLIC OF GHANA** Japan International Cooperation Agency

Attachment - II

Soil Profile Description of Typical Soil Units

Table C-AII-1 Profile Description of Typical Soil Types (1/11)

1. Soil Name	:	Ferric Alisols (FAO/UNESCO system)
2. Profile No.	:	Mn - 10
3. Observation Date	:	18, November, 1995
4. Location	:	Mankessim
5. Mapping Unit	:	T2
6. Parent Material	:	Old alluvial
7. Topography	:	Old plain
8. Slope of the site	:	Almost flat
9. Vegetation & Land use	:	Egg-plant
10. Drainage Condition		
internal	:	Slow
external	:	Moderate
11. Flooding	:	Free

12. Profile Description

0 - 15	Brown black (10YR 3/2, wet), grayish yellow brown (10YR 4/2, dry), sandy loam, moderate to strong medium subangular blocky, hard in dry, common roots, gradual smooth boundary.
15 - 35	Brown (7.5YR 4/3, wet), bright brown (7.5YR 5/6, dry), sandy loam, moderate fine to medium subangular blocky, very hard in dry, clear wavy boundary.
35 - 70	Dark reddish brown and brownish black (5YR 3/4 : 80% and 5YR 2/1 : 20%, moist), clay loam, moderate fine to medium subangular blocky, few illuvial clay, common fine manganese concretion, very firm in moist, diffuse wavy boundary.
70 - 90	Bright reddish brown (5YR 5/8, moist), clay loam, strong medium angular to subangular blocky, few to common illuvial clay, common fine manganese concretion, very firm in moist, diffuse smooth boundary.
90 - 120+	Bright reddish brown and brown (5YR 5/8 : 70% and 7.5YR 4/4 : 20%, moist), sandy clay loam to clay loam, strong medium angular to subangular blocky, common illuvial clay, many fine manganese concretion, very firm in moist.

Table C-AII-1 Profile Description of Typical Soil Types (2/11)

1. Soil Name	:	Haplic Alisols (FAO/UNESCO system)
2. Profile No.	:	Ok - 3
3. Observation Date	:	21, November, 1995
4. Location	:	Okyereko
5. Mapping Unit	:	T21
6. Parent Material	:	Alluvial and Colluvial
7. Topography	:	Almost flat
8. Slope of the site	:	Almost flat (Terrace land)
9. Vegetation & Land use	:	Maize
10. Drainage Condition		
internal	:	Moderate
external	:	Imperfect
11. Flooding	:	Free

12. Profile Description

0 - 10	Black (10YR 2/2, wet), brownish black (10YR 3/2, moist), clay loam, strong fine to medium subangular blocky, firm in moist, few fine faint iron mottling (10YR4/6), few fine to medium manganese concretion, common roots, gradual smooth boundary.
10 - 22	Brownish black (10YR 2.5/2, wet), brownish black (10YR 3/2 : 40% and 10YR 3/2 : 40%, moist), clay, strong medium subangular blocky, firm in moist, common fine faint iron mottling (7.5YR4/6 : 20%), few fine to medium manganese concretion, few roots, clear smooth boundary.
22 - 50	Grayish yellow blown and light gray (10YR 5/2 : 30% and 10YR 7/1 : 30%, moist), clay, strong medium to coarse angular to subangular blocky, firm in moist, many medium faint to distinct iron mottling (7.5YR4/6 : 40%), many fine to medium manganese concretion (60%), gradual wavy boundary.
50 - 65	Dark grayish yellow and light gray (2.5Y 5/2 : 40% and 10YR 7/1 : 20%, moist), clay, strong medium to coarse angular blocky, firm in moist, many medium faint iron mottling (7.5YR4/6 : 40%), many fine to medium manganese concretion (30%), diffuse smooth boundary.
65 - 120+	Dark grayish yellow and light gray (2.5Y 5/2 : 35% and 10YR 7/1 : 30%, moist), clay, strong medium to coarse angular blocky, firm in moist, many medium faint iron mottling (7.5YR4/6 : 35%), many fine to medium manganese concretion (30%), few fine calcium or carbonate concretion.

Table C-AII-1 Profile Description of Typical Soil Types (3/11)

1. Soil Name	:	Skeletic-Haplic Alisols (FAO/UNESCO system)
2. Profile No.	:	Mn - 9
3. Observation Date	:	18, November, 1995
4. Location	:	Mankessim
5. Mapping Unit	:	H21
6. Parent Material	:	Colluvial
7. Topography	:	Undulating
8. Slope of the site	:	sloping
9. Vegetation & Land use	:	Orchard
10. Drainage Condition		
internal	:	Rapid
external	:	Well
11. Flooding	:	Free

12. Profile Description

0 - 14	Dark reddish blown (2.5YR 3/2, wet), Dark reddish blown (2.5YR 3/3, dry), clay, strong fine to medium subangular blocky, hard in dry, common roots, clear smooth boundary.
14 - 64	Dark reddish blown (2.5YR 3/6, moist), clay, structureless, dominant quartz gravel (ϕ 0.2-5 cm : 80%), gradual wavy boundary.
64 - 110	Dark reddish blown (2.5YR 3/6, moist), clay, structureless, many quartz gravel and few iron concretion (ϕ 0.2-5 cm : 40%), few illuvial clay, gradual smooth boundary.
110 - 120+	Dark reddish blown (2.5YR 3/6, moist), clay, structureless, few quartz gravel and few iron concretion (ϕ 0.2-0.5 cm : 10%).

Table C-AII-1 Profile Description of Typical Soil Types (4/11)

1. Soil Name	:	Cambic Arenosols (FAO/UNESCO system)
2. Profile No.	:	Kp - 8
3. Observation Date	:	5, December, 1995
4. Location	:	Kpando-Torkor
5. Mapping Unit	:	R1
6. Parent Material	:	Alluvial + Colluvial
7. Topography	:	Undulating
8. Slope of the site	:	Gently sloping
9. Vegetation & Land use	:	Bush
10. Drainage Condition		
internal	:	Rapid
external	:	Well
11. Flooding	:	Free

12. Profile Description

0 - 15	Dark brown (7.5YR 3/3, wet), dull brown (7.5YR 5/3, dry), loamy sand, moderate fine to medium subangular blocky, slightly hard to hard in dry, many roots, gradual smooth boundary.
15 - 37	Brown (7.5YR 4/6, wet), bright brown (7.5YR 5/6, dry), loamy sand, weak to moderate fine to medium subangular blocky, slightly hard in dry, common roots, gradual wavy boundary.
37 - 72	Bright brown (7.5YR 5/6, wet), bright brown (7.5YR 5/8, moist), sand, weak fine to medium subangular blocky, very friable in moist, few roots, gradual smooth boundary.
72 - 115	Bright brown (7.5YR 5/6, wet), bright brown (7.5YR 5/8, moist), loamy sand, moderate fine to medium subangular blocky, very friable in moist, diffuse smooth boundary.
115 - 135	Orange (5YR 6/8, moist), sandy loam, moderate fine to medium subangular blocky, friable to firm in moist

Table C-AII-1 Profile Description of Typical Soil Types (5/11)

1. Soil Name	:	Ferralic Arenosols (FAO/UNESCO system)
2. Profile No.	:	Av - 7
3. Observation Date	:	28, November, 1995
4. Location	:	Aveyime (Block K)
5. Mapping Unit	:	U1
6. Parent Material	:	Old alluvial
7. Topography	:	Old levee
8. Slope of the site	:	Almost flat to gently sloping (Terrace land)
9. Vegetation & Land use	:	Sesame - Fallow
10. Drainage Condition		
internal	:	Rapid
external	:	Well
11. Flooding	:	Free

12. Profile Description

0 -38	Brown (7.5YR 4/3, wet), dull brown (7.5YR 6/3, dry), coarse sand, weak fine to medium subangular blocky, loose to soft in dry, common roots, clear wavy boundary.
38 - 62	Brown (7.5YR 4/6, wet), bright brown (7.5YR 5/6, dry), coarse sand, weak fine to medium subangular blocky, soft in dry and very friable in moist, few medium to coarse manganese concretion, gradual wavy boundary.
62 - 78	Reddish brown (5YR 4/8, wet), coarse sandy loam, weak to moderate fine to medium subangular blocky, very friable to friable in moist and slightly sticky and slightly plasticity in wet, few medium soft iron concretion (2.5YR3/6), diffuse smooth boundary.
78 - 120+	Reddish brown (5YR 4/8 50%, wet), coarse sandy loam, weak to moderate fine to medium subangular blocky, very friable in moist and slightly sticky and slightly plasticity in wet, common to many medium iron mottling (2.5YR3/4 : 50%).

Table C-AII-1 Profile Description of Typical Soil Types (6/11)

1. Soil Name	:	Dystric Cambisols (Gleyic Cambisols) (FAO/UNESCO system)
2. Profile No.	:	Ok - 1
3. Observation Date	:	21, November, 1995
4. Location	:	Okyereko
5. Mapping Unit	:	P21
6. Parent Material	:	Alluvial
7. Topography	:	Plain
8. Slope of the site	:	Almost flat (Terrace land)
9. Vegetation & Land use	:	Paddy
10. Drainage Condition		
internal	:	Slow
external	:	Imperfect to poor
11. Flooding	:	Occasion
12. Profile Description		

0 - 10	Black (10YR 2/1, wet), Black (10YR 2/1, moist), silty clay, moderate fine to medium crumble, firm in moist, common fine faint iron mottling (7.5YR4/6 : 20%), common roots, clear wavy boundary.
10 - 38	Grayish yellow brown (10YR 4/2, wet), dull yellowish brown and grayish yellow brown (10YR 4/3 : 60% and 10YR5/2 : 20%, moist), silty clay, moderate fine to medium subangular blocky, firm in moist, common fine to medium faint iron mottling (7.5YR4/6 : 20%), common fine to medium manganese soft concretion, few roots, gradual wavy boundary.
38 - 70	Grayish yellow brown (10YR 5/2 : 60%, moist to wet), clay, moderate fine to medium subangular blocky, sticky and plasticity in wet, many fine to medium faint iron mottling (10YR4/6 : 40%), common fine manganese soft concretion, gradual wavy boundary.
70 - 120+	Dark grayish yellow (2.5Y 5/2 : 30%, wet), clay, moderate medium to coarse subangular blocky, sticky and plasticity in wet, many medium to coarse faint iron mottling (10YR4/6 : 70%), few medium manganese soft concretion.

Table C-AII-1 Profile Description of Typical Soil Types (7/11)

1. Soil Name	:	Gleyic Cambisols (FAO/UNESCO system)
2. Profile No.	:	Av - 5
3. Observation Date	:	28, November, 1995
4. Location	:	Aveyime
5. Mapping Unit	:	P22
6. Parent Material	:	Alluvial
7. Topography	:	Plain (Concave)
8. Slope of the site	:	Almost flat (Terrace land)
9. Vegetation & Land use	:	Fallow
10. Drainage Condition		
internal	:	Slow
external	:	Poor
11. Flooding	:	Occasional

12. Profile Description

0 - 15	Olive brown (2.5Y 4/3 : 80%, wet), yellowish brown (2.5Y 5/3 : 80%, dry), clay, strong medium subangular blocky, hard in dry, common fine to medium faint iron mottling of root channel shape (7.5YR5/8 : 20%), common roots, gradual wavy boundary.
15 - 30	Grayish olive (5Y 6/2 : 50%, wet), light gray (5Y 8/1 : 50%, dry), clay, strong medium subangular blocky, hard in dry, many fine to medium distinct iron mottling (7.5YR5/8 : 50%), few roots, gradual wavy boundary.
30 - 50	Light gray (5Y 7/1 : 70%, moist), silty clay, moderate to strong medium subangular blocky, friable to firm in moist, common medium to coarse distinct iron mottling (7.5YR6/8 : 30%), diffuse smooth boundary.
50 - 120+	Light gray and light yellow (7.5Y 7/1 : 30% and 7.5Y 7/3 : 30%, moist), silty clay, moderate medium subangular blocky, friable in moist, many coarse distinct iron mottling (7.5YR6/8 : 40%), few iron and Manganese soft concretion.

Table C-AII-1 Profile Description of Typical Soil Types (8/11)

1. Soil Name	:	Skeletic-Vertic Cambisols (FAO/UNESCO system)
2. Profile No.	:	Kp - 4
3. Observation Date	:	5, December, 1995
4. Location	:	Kpando-Torkor
5. Mapping Unit	:	H21
6. Parent Material	:	Colluvial
7. Topography	:	Undulating
8. Slope of the site	:	Gently sloping
9. Vegetation & Land use	:	Bush, Grassland
10. Drainage Condition		
internal	:	Rapid to moderate
external	:	Well to moderate
11. Flooding	:	Free

12. Profile Description

0 - 12	Brownish black (7.5YR 2/2, wet), grayish brown (7.5YR 4/2, dry), loam, strong fine to medium crumb, very hard in dry, common iron and manganese concretion (ϕ 0.1-0.5 cm 15 %), common roots, gradual wavy boundary.
12 - 27	Brownish black (7.5YR 3/2, wet), grayish brown (7.5YR 4/2, dry), loam to clay loam, single grain (structureless), loose in dry, dominant iron and manganese concretion (ϕ 0.1-0.5 cm 80 %), few roots, clear wavy boundary.
27 - 35	Brown (2.5Y 4/4, wet), brown (7.5YR 4/3, dry), loam to clay loam, single grain (structureless), loose in dry, dominant iron and manganese concretion (ϕ 0.1-0.5 cm 80 %), few roots, diffuse wavy boundary.
35 - 120+	Accumulation of iron and manganese concretion such as a iron pan

Table C-AII-1 Profile Description of Typical Soil Types (9/11)

1. Soil Name	:	Dystric Fluvisols (FAO/UNESCO system)
2. Profile No.	:	Kp - 9
3. Observation Date	:	28, November, 1995
4. Location	:	Kpando-Torkor
5. Mapping Unit	:	R1
6. Parent Material	:	Alluvial + Colluvial
7. Topography	:	Undulating
8. Slope of the site	:	Gently sloping
9. Vegetation & Land use	:	Bush
10. Drainage Condition		
internal	:	Rapid
external	:	Well
11. Flooding	:	Sever

12. Profile Description

0 - 22	Brownish black (7.5YR 3/2, wet), brownish black (7.5YR 3/2, moist), sand, very weak fine crumble, loose in moist, many roots, gradual wavy boundary.
22 - 50	Dull brown (7.5YR 5/3, wet), sand, single grain (structureless), loose in moist, few fine faint iron mottling (7.5YR6/8), common roots, gradual wavy boundary.
50 - 75	Dull orange (7.5YR 6/4, wet), sand, single grain (structureless), loose in moist, few medium faint to distinct iron mottling (7.5YR6/8), few roots, gradual wavy boundary.
75 - 105+	Dull yellow orange and dull brown (10YR 7/3 : 50% and 7.5YR 6/3 : 40%, wet), sand, single grain (structureless), non-sticky and non-plasticity in wet, few medium to coarse faint iron mottling (7.5YR6/8 : 10%).

Table C-AII-1 Profile Description of Typical Soil Types (10/11)

1. Soil Name	:	Dystric Planosols (FAO/UNESCO system)
2. Profile No.	:	As - 1
3. Observation Date	:	15, November, 1995
4. Location	:	Ashaiman
5. Mapping Unit	:	U31
6. Parent Material	:	Old Alluvial
7. Topography	:	Middle slope
8. Slope of the site	:	Gently sloping(0 - 2 %) (Terrace land)
9. Vegetation & Land use	:	Okra - Fallow
10. Drainage Condition		
internal	:	Moderate
external	:	Imperfect
11. Flooding	:	Free

12. Profile Description

0 - 10	Brownish black (10YR 2/1.5, wet), sandy loam, weak medium subangular blocky, slightly sticky and slightly plasticity in wet, few fine faint mottling (7.5YR4/6); common roots, gradual smooth boundary.
10 - 27	Dark grayish yellow (2.5Y 4/2, wet), coarse loamy sand, weak medium subangular blocky, non-sticky and non-plasticity in wet, common fine distinct iron mottling (5YR4/8), few roots, diffuse smooth boundary.
27 - 45	Brown (10YR 4/6, wet), sand (coarse loamy sand), structureless, non-sticky and non-plasticity in wet, few fine and coarse faint iron mottling (2.5Y4/2), common roots, clear wavy boundary.
45 - 62	Grayish yellow brown (10YR 6/2, wet), sand, structureless, non-sticky and non-plasticity in wet, clear smooth boundary.
62 - 70	Brownish black (2.5Y 3/1, wet); sandy clay loam, moderate fine to medium subangular blocky, slightly sticky and slightly plasticity in wet , common fine faint iron mottling (10YR5/8), water seeping, clear wavy boundary.
70 - 94	Grayish olive (7.5YR 4/2, wet), sandy clay, moderate to strong medium angular to subangular blocky, sticky and plasticity in wet, common illuvial clay, common medium faint iron mottling (5Y5/6), clear wavy boundary.
94 - 120+	Gray (7.5Y 5/1, wet), sandy clay; moderate to strong medium angular to subangular blocky, very sticky and very plasticity in wet, few quartz, few medium faint iron mottling (5Y5/4).

Table C-AII-1 Profile Description of Typical Soil Types (11/11)

1. Soil Name	:	Dystric Vertisols (FAO/UNESCO system)
2. Profile No.	:	As - 5
3. Observation Date	:	15, November, 1995
4. Location	:	Ashaiman
5. Mapping Unit	:	P21
6. Parent Material	:	Alluvial
7. Topography	:	Flat to Concave
8. Slope of the site	:	Almost flat (Terrace land)
9. Vegetation & Land use	:	Okra
10. Drainage Condition		
internal	:	Slow
external	:	Imperfect
11. Flooding	:	Free

12. Profile Description

0 - 6	Black (2.5Y 2/1, moist), clay, moderate to strong medium subangular blocky, sticky and plasticity in wet, common roots, diffuse wavy boundary.
6 - 22	Brownish black to black (2.5Y 2.5/1, wet), clay, moderate medium subangular blocky, sticky and plasticity in wet, few fine faint iron mottling of root channel shape (7.5YR4/8), few roots, gradual smooth boundary.
22 - 40	Olive black (7.5Y 3/1, wet), clay, moderate medium subangular blocky, sticky and plasticity in wet, few fine to medium faint iron mottling (10YR4/6), few roots, clear wavy boundary.
40 - 63	Gray and olive black (7.5Y 4/1 and 7.5Y 3/1, wet), clay, moderate medium angular blocky, common illuvial clay, sticky and plasticity in wet, few fine faint iron mottling (10YR4/6), diffuse smooth boundary.
63 - 88	Grayish olive and olive black (7.5Y 4/2 and 7.5Y 3/1, wet), clay, moderate medium angular blocky, common illuvial clay, sticky and plasticity in wet, few roots residues, diffuse smooth boundary.
88 - 120+	Grayish olive and olive black (7.5Y 4/2 and 7.5Y 3/1, wet), clay, moderate medium angular blocky, common illuvial clay, sticky and plasticity in wet, few roots residues, diffuse smooth boundary.

Attachment - III

Explanation Note for the Preliminary Salt Balance Study

Salt Balance Study

1 General

The salinity soils were found in Ashaiman and Okyereko areas about 12 and 2 ha, respectively. In this Attachment, the salt balances under the proposed irrigation condition are examined how much soluble salts will be loss and how much still in soils. The factor for salt removing is percolation water flowing from surface to groundwater. The percolation waters will be useful and are necessary for leaching and controlling the salts in the soils. The salts will be moved with the percolation water seeping vertically downwards to the groundwater and will be drained out. In this examination, the horizontal movement of groundwater is considered negligible as compared with all percolation water and all the percolation water is considered to be drained through drainage canals.

Water and salt balance describe the gains or losses of water or salt in a given area or soil layer over a certain period of time period. They can be written as follows:

Incoming quantity - Outgoing quantity = Change of storage in the soil

2 Procedure of Calculation

The salt balance is examined by using the following method, which was developed by Boumans and later on extended by Van Der Molen.

2.1 Water balance

In general water balance for any given land is expressed by the following equation:

$$I(t) - D(t) = DS/dt$$

where, I(t) is incoming water to the land,
D(t) is outgoing water and dS/dt is the change of water stored in soils.

Precipitation and irrigation water are in this case the only means of supply of water to the root zone. Capillary rise of groundwater is only possible during non-irrigation and dry period.

Water balance of the root zone of an irrigated field may be written as:

$$Ir + N = ET + P + DV$$

where, Ir = Field irrigation supply less surface losses (dm)
{1 dm= 10 cm}
N = Precipitation less interception and surface run-off (dm)
ET = Evapotranspiration(dm)
P = Deep percolation below root zone or capillary water supply from below (P negative) (dm)
DV = Change in quantity of water stored (V) in root zone (dm)

Water balance below the root zone can be described by following equation:

$$P + S_p = D_n + D_r + DW = D_t + DW$$

where S_p = Underground water supply
D_n = Natural drainage
D_r = Artificial drainage
D_t = Total drainage

DW = Change in water storage below root zone

In this study underground water supply (S_p) is considered negligible.

2.2 Salt balance

Salt supplied by precipitation or assimilated by crops can be neglected. The salt balance of the root zone is as follows.

$$Ir \cdot C_{ir} = P \cdot C_p + DZ$$

where C_{ir} = Salt concentration of irrigation water (g/l)

C_p = Salt concentration of percolation water (g/l)

DZ = Change in quantity of dissolved salt (Z) in root zone (g/dm^2)

As already mentioned, P is negative when it represents capillary rise. If, in the period over which the balance is considered, both positive and negative percolation occurs, P is taken as the algebraic sum of both.

Efficiency of Leaching

Percolation water often passes through cracks, relative large pores in soil profile without any leaching effect. If the share of the effective water passage to the total percolation is k and the ineffective part is 1-k, the following relationship is valid:

$$C_p = k. C_{sm} + (1-k) C_{ir}$$

where C_{sm} is the salt concentration of the soil water in the root zone at the field capacity (g/l) and k the leaching coefficient.

For salinity control the salt content of the soil moisture (C_{sm}) in the unsaturated zone is decisive. One might take as an approximation C_{sm} at field capacity equal to C_p for light soil. The leaching coefficient is less than 1. It depends on the soil and, to some extent, also on the depth of root zone. Boumans suggested the following values for different soil classes. In this study, leaching coefficient is assumed 0.3 consideration of soils in the Project area.

Soil type	Leaching Coefficient (k)
Sand	0.7 - 0.8
Loam, sandy loam	0.5 - 0.7
Clay loam, clay	0.3 - 0.5
Heavy clay	0.2 - 0.3

Better information on the seasonal variation of soil salinity and peak drainage of soil salinity and the peak drainage demands can be obtained by studying the irrigation-salt-drainage relationship over monthly periods.

To obtain the quantity of salt content at the end of each month the following equation is used.

$$Z_2 = Z_1 + DZ$$
$$\bar{Z} = 0.5 (Z_1 + Z_2)$$

Where Z_2 = Dissolved salts in the root zone at the end of the month (g/dm^2)

Z_1 = Dissolved salts in the root zone at the beginning of the month (g/dm^2)

Z = Increase (+) or decrease (-) of salt per month (g/dm^2)

$\overline{Z}$ = Average of dissolved salts in the root zone during the month (g/dm^2)

The average content of dissolved salts in the root zone of thickness, T (dm), saturated up to field capacity is expressed as follows.

$$\overline{Z} = Z_1 + 0.5\ DZ = T.\ FC.\ C_{sm}$$

where FC = Soil moisture at the field capacity (by volume)

By combining the relationship between the salt balance in root zone, leaching efficiency and the average content of dissolved salts, the following equation is obtained.

$$\Delta Z = \frac{F - B\ .\ Z_1}{A}$$

where, $F = (Ir - (1-k)\ .\ P)\ .\ C_{ir}$

$B = k\ .\ P/(T\ .\ FC)$

$A = 1 + 0.5\ B$

3 Basic data applied for Study

Salt balance in the Study area was examined on the basis of the field test results of soil sample analysis. Although not all required data are available, value of unavailable data is assumed based on soil.

The soil depth is divided into root zone (1-50 cm) and drainage zone (below root zone and up to impermeable layer) for the purpose of the estimation of salt balance. Initial (present) salinity of the root zone and drainage zone in both projects is shown in the following table.

Project area	Root zone		Drainage zone	
	Depth (m)	ECe (mS/cm)	Depth (m)*1	ECe (mS/cm)*2
Ashaiman	0.5	8.8 - 16.6	4.0	2.9
Okyereko	0.5	5.1 - 23.0	4.0	3.6

Remarks : *1 assumed by JICA study team

*2 EC values of below 100 cm are applied to the ECe

Input parameters for the calculation of salt balance are assumed as follows.

(i) Irrigation water

Irrigation water are the diversion irrigation requirement including the evaporation and canal operation losses. Based on the results of water quality in IDC report (1993), the EC value is 0.13 in Ashaiman and 0.2 in Okyereko. Therefore, the irrigation waters in each area are estimated to have a salt concentration of 0.08 and 0.13 g/l throughout the year, respectively.

(ii) Rainfall

The rainfall data at the Tema and Saltpond stations area are used as the mean monthly rainfall in water balance study, respectively.

(iii) Return flow of irrigation

Return flow of irrigation is defined as the outgoing surface flow of supplied water, which consists of operational losses of canal water and irrigation surface runoff. In this study returning water of irrigation was assumed to be 10% of the total canal head supply.

(iv) Evapotranspiration from cropped land

Evapotranspiration from cropped land was calculated for the proposed cropping pattern by modified penman equation.

(v) Evaporation

Evaporation from canal water surface was estimated to be 1% of canal head supplies. Evaporation from non-cropped land is estimated assuming that all the rain falling on the non-cropped land are directly evaporated and that evaporation from groundwater corresponds to 10% of evaporation from free water surface.

(vi) Surface runoff of rain

Surface runoff of rainwater is assumed to be zero in this water balance study, from conservative view points

Based on the above data, the salt balance in the root zone and drainage zone is estimated using above mentioned Bouman's quantitative calculation technique.

4 Result of the Examination

The results of the examination are presented in following tables, and summarized as follows :

(Unit : mS/cm)

Project Area	Initial ECe of root zone	After irrigation		
		1 year	2 year	3 year
Ashaiman	13.2	4.0	1.5	0.9
	16.6	4.8	1.7	1.0
Okyereko	6.8	1.4	0.5	0.4
	23.0	3.8	0.9	0.5

The results show that even the soils of 16.6 and 23.0 mS/cm classified into strongly saline soil (over 16 mS/cm) will be improved to slightly saline (4 - 8 mS/cm) to salt free soils (less than 4.0 mS/cm) after 1 year irrigation under the proposed cropping pattern. Finally, ECe of soils in root zone will be stabilized at about 0.5 after 5 year's irrigation. A significant leaching effect by irrigation water can be expected under the proper drainage system, since the irrigation water of both areas is not effected by salt as 0.13 - 0.20 mS/cm.

Table C-AIII-1 Result of Salt Balance Study in Ashalman Project Area

(1) Case I : ECe 13.2 mS/cm

Description	Symbol	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
						1 st Year								
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cirl	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Zli	g	28.16	24.99	23.27	14.72	12.82	11.10	9.69	8.87	9.93	9.86	9.71	9.05
2. Change in Salt Content	dz	g	-3.17	-1.72	-8.55	-1.89	-1.72	-1.41	-0.82	1.06	-0.06	-0.15	-0.66	-0.62
3. End Salt Content	zl	g	24.99	23.27	14.72	12.82	11.10	9.69	8.87	9.93	9.86	9.71	9.05	8.43
4. Conc. of soil moisture	csml	g/l	15.62	14.54	9.20	8.01	6.94	6.06	5.54	6.21	6.17	6.07	5.65	5.27
5. EC saturation extract	ECe	mS/cm	11.71	10.91	6.90	6.01	5.20	4.54	4.16	4.65	4.62	4.55	4.24	3.95
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	5.04	4.58	3.62	2.64	2.30	2.01	1.80	3.81	1.86	1.84	1.82	1.70
						2 nd Year								
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	0.58	0.33	3.00	2.26	1.82	1.24	0.61	0.00	0.16	1.28	1.65	1.96
2. Salt Conc. of Irr. Water	Cirl	g/l	0.08	0.00	0.08	0.08	0.08	0.08	0.08	0.00	0.08	0.08	0.08	0.08
3. Evapotranspiration	ET	dm	0.54	0.45	0.97	2.00	2.00	1.54	0.59	0.45	0.30	0.43	1.18	1.32
4. Irrigation Return Flow	RT	dm	0.06	0.03	0.30	0.23	0.18	0.12	0.06	0.00	0.02	0.13	0.16	0.20
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
II. Salt Balance of Root Zone														
1. Initial Salt Content	Zli	g	8.43	8.45	8.76	5.59	5.02	4.40	3.92	3.60	4.59	4.44	3.53	3.27
2. Change in Salt Content	dz	g	0.03	0.31	-3.16	-0.57	-0.62	-0.49	-0.32	0.99	-0.15	-0.91	-0.26	-0.16
3. End Salt Content	zl	g	8.45	8.76	5.59	5.02	4.40	3.92	3.60	4.59	4.44	3.53	3.27	3.11
4. Conc. of soil moisture	csml	g/l	5.28	5.47	3.50	3.14	2.75	2.45	2.25	2.87	2.78	2.21	2.04	1.95
5. EC saturation extract	ECe1	mS/cm	3.96	4.10	2.62	2.35	2.06	1.84	1.69	2.15	2.08	1.66	1.53	1.46
6. Effective Drainage	Dr2	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
7. Salt Conc. of Perco Water	Cir2	g/l	1.64	3.75	1.40	1.05	0.94	0.84	0.76	3.56	0.90	0.81	0.70	0.66
						3 rd Year								
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cirl	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Zli	g	3.11	2.90	2.75	1.82	1.70	1.55	1.40	1.30	2.19	2.18	2.14	2.02
2. Change in Salt Content	dz	g	-0.22	-0.15	-0.93	-0.12	-0.14	-0.15	-0.10	0.89	-0.01	-0.03	-0.13	-0.04
3. End Salt Content	zl	g	2.90	2.75	1.82	1.70	1.55	1.40	1.30	2.19	2.18	2.14	2.02	1.97
4. Conc. of soil moisture	csml	g/l	1.81	1.72	1.13	1.06	0.97	0.88	0.81	1.37	1.36	1.34	1.26	1.23
5. EC saturation extract	ECe1	mS/cm	1.36	1.29	0.85	0.80	0.73	0.66	0.61	1.03	1.02	1.00	0.94	0.92
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	0.62	0.59	0.49	0.39	0.36	0.34	0.31	3.17	0.41	0.40	0.45	0.43
						4 th Year								
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	0.58	0.33	3.00	2.26	1.82	1.24	0.61	0.00	0.16	1.28	1.65	1.96
2. Salt Conc. of Irr. Water	Cirl	g/l	0.08	0.00	0.08	0.08	0.08	0.08	0.08	0.00	0.08	0.08	0.08	0.08
3. Evapotranspiration	ET	dm	0.54	0.45	0.97	2.00	2.00	1.54	0.59	0.45	0.30	0.43	1.18	1.32
4. Irrigation Return Flow	RT	dm	0.06	0.03	0.30	0.23	0.18	0.12	0.06	0.00	0.02	0.13	0.16	0.20
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
II. Salt Balance of Root Zone														
1. Initial Salt Content	Zli	g	1.97	2.01	2.27	1.51	1.46	1.35	1.24	1.15	1.97	1.90	1.53	1.47
2. Change in Salt Content	dz	g	0.04	0.25	-0.75	-0.06	-0.11	-0.11	-0.09	0.81	-0.06	-0.37	-0.06	0.00
3. End Salt Content	zl	g	2.01	2.27	1.51	1.46	1.35	1.24	1.15	1.97	1.90	1.53	1.47	1.47
4. Conc. of soil moisture	csml	g/l	1.26	1.42	0.95	0.91	0.84	0.77	0.72	1.23	1.19	0.96	0.92	0.92
5. EC saturation extract	ECe1	mS/cm	0.94	1.06	0.71	0.68	0.63	0.58	0.54	0.92	0.89	0.72	0.69	0.69
6. Effective Drainage	Dr2	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
7. Salt Conc. of Perco Water	Cir2	g/l	0.43	3.12	0.41	0.34	0.32	0.30	0.28	2.91	0.42	0.38	0.34	0.33
						5 th Year								
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cirl	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Zli	g	1.47	1.45	1.40	0.97	0.97	0.93	0.86	0.81	1.53	1.52	1.50	1.42
2. Change in Salt Content	dz	g	-0.02	-0.05	-0.43	0.00	-0.04	-0.07	-0.05	0.72	-0.01	-0.02	-0.08	0.01
3. End Salt Content	zl	g	1.45	1.40	0.97	0.97	0.93	0.86	0.81	1.53	1.52	1.50	1.42	1.42
4. Conc. of soil moisture	csml	g/l	0.91	0.88	0.61	0.61	0.58	0.54	0.51	0.96	0.95	0.93	0.88	0.89
5. EC saturation extract	ECe1	mS/cm	0.68	0.66	0.45	0.45	0.44	0.40	0.38	0.72	0.71	0.70	0.66	0.67
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	0.33	0.33	0.28	0.24	0.24	0.23	0.21	2.58	0.29	0.25	0.33	0.32

Remarks : Basic factors used in the examination are follows:

(1) Depth of root zone	50 cm	(4) Saturation or void ratio (%)	52.0	(7) Cropping pattern	
(2) ECe of Zone	13.2 mS/cm	(5) Leaching Fraction	0.3	1 st	Paddy - Okura
(3) Field Capacity	32.0 %	(6) Return Flow from Irrigation (%)	10.0	2 nd	Paddy - Tomato
				from 3 rd	Rotating these two pattern

Table C-AIII-1 Result of Salt Balance Study in Ashaiman Project Area

(2) Case 2 : ECe 8.8 mS/cm

Description	Symbol	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 st Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	18.77	16.71	15.58	9.88	8.65	7.52	6.58	6.03	7.07	7.02	6.92	6.45
2. Change in Salt Content	dz	g	-2.07	-1.13	-5.70	-1.23	-1.13	-0.94	-0.55	1.04	-0.05	-0.11	-0.47	-0.41
3. End Salt Content	z1	g	16.71	15.58	9.88	8.65	7.52	6.58	6.03	7.07	7.02	6.92	6.45	6.04
4. Conc. of soil moisture	csm1	g/l	10.44	9.74	6.18	5.41	4.70	4.11	3.77	4.42	4.39	4.32	4.03	3.78
5. EC saturation extract	ECe1	mS/cm	7.83	7.30	4.63	4.06	3.53	3.09	2.83	3.31	3.29	3.24	3.02	2.83
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	3.38	3.08	2.44	1.80	1.57	1.38	1.24	3.72	1.32	1.31	1.31	1.23
2 nd Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	0.58	0.33	3.00	2.26	1.82	1.24	0.61	0.00	0.16	1.28	1.65	1.96
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.00	0.08	0.08	0.08	0.08	0.08	0.00	0.08	0.08	0.08	0.08
3. Evapotranspiration	ET	dm	0.54	0.45	0.97	2.00	2.00	1.54	0.59	0.45	0.30	0.43	1.18	1.32
4. Irrigation Return Flow	RT	dm	0.06	0.03	0.30	0.23	0.18	0.12	0.06	0.00	0.02	0.13	0.16	0.20
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	6.04	6.07	6.37	4.09	3.71	3.28	2.93	2.70	3.66	3.54	2.82	2.63
2. Change in Salt Content	dz	g	0.03	0.30	-2.28	-0.38	-0.43	-0.35	-0.23	0.96	-0.12	-0.72	-0.19	-0.10
3. End Salt Content	z1	g	6.07	6.37	4.09	3.71	3.28	2.93	2.70	3.66	3.54	2.82	2.63	2.53
4. Conc. of soil moisture	csm1	g/l	3.80	3.98	2.56	2.32	2.05	1.83	1.69	2.29	2.21	1.77	1.65	1.58
5. EC saturation extract	ECe1	mS/cm	2.85	2.99	1.92	1.74	1.54	1.37	1.27	1.72	1.66	1.32	1.23	1.19
6. Effective Drainage	Dr2	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
7. Salt Conc. of Perco Water	Cir2	g/l	1.19	3.66	1.04	0.79	0.71	0.64	0.59	3.45	0.73	0.66	0.57	0.54
3 rd Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	2.53	2.38	2.27	1.52	1.44	1.33	1.21	1.13	1.98	1.97	1.94	1.83
2. Change in Salt Content	dz	g	-0.15	-0.11	-0.76	-0.08	-0.11	-0.12	-0.08	0.86	-0.01	-0.03	-0.11	-0.03
3. End Salt Content	z1	g	2.38	2.27	1.52	1.44	1.33	1.21	1.13	1.98	1.97	1.94	1.83	1.80
4. Conc. of soil moisture	csm1	g/l	1.49	1.42	0.95	0.90	0.83	0.76	0.71	1.24	1.23	1.21	1.14	1.13
5. EC saturation extract	ECe1	mS/cm	1.12	1.06	0.71	0.68	0.62	0.57	0.53	0.93	0.92	0.91	0.86	0.84
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	0.52	0.49	0.41	0.34	0.32	0.30	0.28	3.07	0.37	0.37	0.41	0.40
4 th Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	0.58	0.33	3.00	2.26	1.82	1.24	0.61	0.00	0.16	1.28	1.65	1.96
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.00	0.08	0.08	0.08	0.08	0.08	0.00	0.08	0.08	0.08	0.08
3. Evapotranspiration	ET	dm	0.54	0.45	0.97	2.00	2.00	1.54	0.59	0.45	0.30	0.43	1.18	1.32
4. Irrigation Return Flow	RT	dm	0.06	0.03	0.30	0.23	0.18	0.12	0.06	0.00	0.02	0.13	0.16	0.20
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	1.80	1.84	2.09	1.40	1.36	1.26	1.17	1.09	1.87	1.81	1.46	1.41
2. Change in Salt Content	dz	g	0.04	0.25	-0.69	-0.04	-0.10	-0.10	-0.08	0.79	-0.06	-0.35	-0.05	0.01
3. End Salt Content	z1	g	1.84	2.09	1.40	1.36	1.26	1.17	1.09	1.87	1.81	1.46	1.41	1.41
4. Conc. of soil moisture	csm1	g/l	1.15	1.31	0.88	0.85	0.79	0.73	0.68	1.17	1.13	0.91	0.88	0.88
5. EC saturation extract	ECe1	mS/cm	0.86	0.98	0.66	0.64	0.59	0.55	0.51	0.88	0.85	0.68	0.66	0.66
6. Effective Drainage	Dr2	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
7. Salt Conc. of Perco Water	Cir2	g/l	0.40	3.01	0.39	0.32	0.30	0.29	0.27	2.82	0.40	0.37	0.33	0.32
5 th Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	1.41	1.40	1.36	0.94	0.94	0.91	0.84	0.79	1.49	1.48	1.45	1.38
2. Change in Salt Content	dz	g	-0.02	-0.04	-0.42	0.00	-0.04	-0.06	-0.05	0.70	-0.01	-0.02	-0.08	0.01
3. End Salt Content	z1	g	1.40	1.36	0.94	0.94	0.91	0.84	0.79	1.49	1.48	1.45	1.38	1.39
4. Conc. of soil moisture	csm1	g/l	0.87	0.85	0.59	0.59	0.57	0.53	0.49	0.93	0.92	0.91	0.86	0.87
5. EC saturation extract	ECe1	mS/cm	0.66	0.64	0.44	0.44	0.42	0.39	0.37	0.70	0.69	0.68	0.65	0.65
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	0.32	0.32	0.27	0.23	0.23	0.22	0.21	2.50	0.28	0.27	0.32	0.32

Remarks : Basic factors used in the examination are follows:

(1) Depth of root zone	50 cm	(4) Saturation or void ratio (%)	52.0	(7) Cropping pattern	
(2) ECe of Zone	13.2 mS/cm	(5) Leaching Fraction	0.3	1 st	Paddy - Okura
(3) Field Capacity	32.0 %	(6) Return Flow from Irrigation (%)	10.0	2 nd	Paddy - Tomato
				from 3 rd	Rotating these two pattern

Table C-AIII-1 Result of Salt Balance Study in Ashaiman Project Area

(3) Case 3 : ECe 16.6 mS/cm

Description	Symbol	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 st Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	35.41	31.38	29.21	18.45	16.04	13.86	12.09	11.06	12.14	12.06	11.87	11.06
2. Change in Salt Content	dz	g	-4.03	-2.17	-10.76	-2.41	-2.18	-1.78	-1.03	1.08	-0.08	-0.19	-0.82	-0.79
3. End Salt Content	z1	g	31.38	29.21	18.45	16.04	13.86	12.09	11.06	12.14	12.06	11.87	11.06	10.27
4. Conc. of soil moisture	csm1	g/l	19.61	18.26	11.53	10.03	8.66	7.55	6.91	7.59	7.54	7.42	6.91	6.42
5. EC saturation extract	ECe	mS/cm	14.71	13.69	8.65	7.52	6.50	5.67	5.18	5.69	5.65	5.57	5.18	4.81
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	6.32	5.74	4.53	3.29	2.86	2.49	2.23	3.88	2.27	2.24	2.21	2.06
2 nd Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	0.58	0.33	3.00	2.26	1.82	1.24	0.61	0.00	0.16	1.28	1.65	1.96
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.00	0.08	0.08	0.08	0.08	0.08	0.00	0.08	0.08	0.08	0.08
3. Evapotranspiration	ET	dm	0.54	0.45	0.97	2.00	2.00	1.54	0.59	0.45	0.30	0.43	1.18	1.32
4. Irrigation Return Flow	RT	dm	0.06	0.03	0.30	0.23	0.18	0.12	0.06	0.00	0.02	0.13	0.16	0.20
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	10.27	10.29	10.60	6.75	6.03	5.27	4.68	4.29	5.31	5.14	4.08	3.76
2. Change in Salt Content	dz	g	0.02	0.31	-3.85	-0.72	-0.76	-0.59	-0.39	1.02	-0.17	-1.05	-0.32	-0.20
3. End Salt Content	z1	g	10.29	10.60	6.75	6.03	5.27	4.68	4.29	5.31	5.14	4.08	3.76	3.56
4. Conc. of soil moisture	csm1	g/l	6.43	6.63	4.22	3.77	3.29	2.92	2.68	3.32	3.21	2.55	2.35	2.23
5. EC saturation extract	ECe1	mS/cm	4.82	4.97	3.17	2.83	2.47	2.19	2.01	2.49	2.41	1.91	1.76	1.67
6. Effective Drainage	Dr2	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
7. Salt Conc. of Perco Water	Cir2	g/l	1.99	3.83	1.69	1.26	1.12	0.99	0.90	3.64	1.04	0.92	0.79	0.74
3 rd Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	3.56	3.29	3.11	2.05	1.90	1.72	1.55	1.44	2.35	2.33	2.30	2.16
2. Change in Salt Content	dz	g	-0.27	-0.18	-1.07	-0.15	-0.17	-0.17	-0.11	0.91	-0.02	-0.04	-0.14	-0.05
3. End Salt Content	z1	g	3.29	3.11	2.05	1.90	1.72	1.55	1.44	2.35	2.33	2.30	2.16	2.10
4. Conc. of soil moisture	csm1	g/l	2.06	1.95	1.28	1.19	1.08	0.97	0.90	1.47	1.46	1.44	1.35	1.32
5. EC saturation extract	ECe1	mS/cm	1.54	1.46	0.96	0.89	0.81	0.73	0.67	1.10	1.09	1.08	1.01	0.99
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	0.70	0.66	0.54	0.43	0.40	0.37	0.34	3.26	0.44	0.43	0.48	0.46
4 th Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	0.58	0.33	3.00	2.26	1.82	1.24	0.61	0.00	0.16	1.28	1.65	1.96
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.00	0.08	0.08	0.08	0.08	0.08	0.00	0.08	0.08	0.08	0.08
3. Evapotranspiration	ET	dm	0.54	0.45	0.97	2.00	2.00	1.54	0.59	0.45	0.30	0.43	1.18	1.32
4. Irrigation Return Flow	RT	dm	0.06	0.03	0.30	0.23	0.18	0.12	0.06	0.00	0.02	0.13	0.16	0.20
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	2.10	2.15	2.41	1.60	1.53	1.41	1.30	1.21	2.04	1.97	1.59	1.52
2. Change in Salt Content	dz	g	0.04	0.26	-0.81	-0.07	-0.12	-0.12	-0.09	0.83	-0.06	-0.39	-0.06	0.00
3. End Salt Content	z1	g	2.15	2.41	1.60	1.53	1.41	1.30	1.21	2.04	1.97	1.59	1.52	1.52
4. Conc. of soil moisture	csm1	g/l	1.34	1.50	1.00	0.96	0.88	0.81	0.75	1.27	1.23	0.99	0.95	0.95
5. EC saturation extract	ECe1	mS/cm	1.01	1.13	0.75	0.72	0.66	0.61	0.57	0.96	0.93	0.74	0.71	0.71
6. Effective Drainage	Dr2	dm	0.01	-0.08	2.43	0.72	0.81	0.70	0.49	-0.28	0.18	1.26	0.58	0.49
7. Salt Conc. of Perco Water	Cir2	g/l	0.46	3.19	0.43	0.35	0.33	0.31	0.29	2.99	0.43	0.39	0.35	0.34
5 th Year														
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.39	0.98	3.00	2.26	1.82	1.24	0.61	0.00	0.00	0.00	0.60	1.87
2. Salt Conc. of Irr. Water	Cir1	g/l	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00	0.00	0.00	0.08	0.08
3. Evapotranspiration	ET	dm	1.52	0.56	0.97	1.93	2.00	1.49	0.59	0.45	0.30	0.45	0.43	1.26
4. Irrigation Return Flow	RT	dm	0.24	0.10	0.30	0.23	0.18	0.12	0.06	0.00	0.00	0.00	0.06	0.19
5. Rainfall	Rain	dm	0.03	0.07	0.70	0.68	1.18	1.12	0.52	0.17	0.33	0.53	0.28	0.04
6. Percolation	P	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
II. Salt Balance of Root Zone														
1. Initial Salt Content	Z1i	g	1.52	1.49	1.44	0.99	0.99	0.95	0.88	0.82	1.56	1.55	1.53	1.44
2. Change in Salt Content	dz	g	-0.03	-0.05	-0.45	0.00	-0.04	-0.07	-0.05	0.74	-0.01	-0.02	-0.08	0.00
3. End Salt Content	z1	g	1.49	1.44	0.99	0.99	0.95	0.88	0.82	1.56	1.55	1.53	1.44	1.45
4. Conc. of soil moisture	csm1	g/l	0.93	0.90	0.62	0.62	0.59	0.55	0.51	0.98	0.97	0.95	0.90	0.91
5. EC saturation extract	ECe1	mS/cm	0.70	0.68	0.47	0.46	0.44	0.41	0.39	0.73	0.73	0.72	0.68	0.68
6. Effective Drainage	Dr2	dm	0.67	0.39	2.43	0.79	0.81	0.75	0.49	-0.28	0.03	0.08	0.39	0.46
7. Salt Conc. of Perco Water	Cir2	g/l	0.34	0.33	0.29	0.24	0.24	0.23	0.22	2.65	0.29	0.29	0.34	0.33

Remarks : Basic factors used in the examination are follows:

(1) Depth of root zone	50 cm	(4) Saturation or void ratio (%)	52.0	(7) Cropping pattern	
(2) ECe of Zone	13.2 mS/cm	(5) Leaching Fraction	0.3	1 st	Paddy - Okura
(3) Field Capacity	32.0 %	(6) Return Flow from Irrigation (%)	10.0	2 nd	Paddy - Tomato
				from 3 rd	Rotating these two pattern

Table C-AIII-2 Result of Salt Balance Study in Okyereko Project Area

(1) Case 1 : ECe 23.0 mS/cm

Description	Symbol	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.85	1.03	0.31	2.50	1.33	1.16	2.12	0.77	0.36	2.83	2.56	2.79
2. Salt Conc. of Irr. Water	Cir1	g/l	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
3. Evapotranspiration	ET	dm	1.69	0.81	0.45	1.11	1.71	1.46	1.35	0.64	0.45	1.04	1.75	1.69
4. Irrigation Return Flow	RT	dm	0.28	0.10	0.03	0.25	0.13	0.12	0.21	0.08	0.04	0.28	0.26	0.28
5. Rainfall	Rain	dm	0.15	0.24	0.47	0.45	1.50	1.48	0.50	0.53	0.58	0.74	0.35	0.20
6. Percolation	P	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
II. Salt Balance of Root Zone														
						1 st Year								
1. Initial Salt Content	Z1i	g	56.73	48.26	45.65	43.48	33.75	28.84	24.31	20.65	18.82	17.51	12.25	10.80
2. Change in Salt Content	dz	g	-8.47	-2.61	-2.17	-9.73	-4.91	-4.53	-3.66	-1.83	-1.31	-5.25	-1.45	-1.40
3. End Salt Content	z1	g	48.26	45.65	43.48	33.75	28.84	24.31	20.65	18.82	17.51	12.25	10.80	9.40
4. Conc. of soil moisture	csm1	g/l	26.09	24.68	23.50	18.24	15.59	13.14	11.16	10.17	9.46	6.62	5.84	5.08
5. EC saturation extract	ECe1	mS/cm	19.57	18.51	17.63	13.68	11.69	9.85	8.37	7.63	7.10	4.97	4.38	3.81
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	8.60	7.70	7.32	6.35	5.16	4.40	3.73	3.29	3.03	2.50	1.96	1.73
						2 nd Year								
1. Initial Salt Content	Z1i	g	9.40	8.21	7.84	7.48	5.94	5.14	4.37	3.84	3.54	3.30	2.42	2.32
2. Change in Salt Content	dz	g	-1.19	-0.36	-0.36	-1.54	-0.80	-0.77	-0.52	-0.30	-0.24	-0.88	-0.10	-0.11
3. End Salt Content	z1	g	8.21	7.84	7.48	5.94	5.14	4.37	3.84	3.54	3.30	2.42	2.32	2.21
4. Conc. of soil moisture	csm1	g/l	4.44	4.24	4.04	3.21	2.78	2.36	2.08	1.91	1.78	1.31	1.25	1.19
5. EC saturation extract	ECe1	mS/cm	3.33	3.18	3.03	2.41	2.08	1.77	1.56	1.44	1.34	0.98	0.94	0.90
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	1.52	1.39	1.33	1.18	0.99	0.86	0.76	0.69	0.64	0.55	0.47	0.46
						3 rd Year								
1. Initial Salt Content	Z1i	g	2.21	2.12	2.10	2.01	1.71	1.53	1.34	1.29	1.22	1.14	0.93	1.03
2. Change in Salt Content	dz	g	-0.09	-0.02	-0.09	-0.30	-0.18	-0.20	-0.05	-0.07	-0.08	-0.21	0.10	0.09
3. End Salt Content	z1	g	2.12	2.10	2.01	1.71	1.53	1.34	1.29	1.22	1.14	0.93	1.03	1.12
4. Conc. of soil moisture	csm1	g/l	1.15	1.13	1.09	0.93	0.83	0.72	0.70	0.66	0.62	0.50	0.56	0.60
5. EC saturation extract	ECe1	mS/cm	0.86	0.85	0.82	0.69	0.62	0.54	0.52	0.49	0.46	0.38	0.42	0.45
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.44	0.43	0.42	0.39	0.35	0.32	0.30	0.29	0.28	0.26	0.25	0.26
						4 th Year								
1. Initial Salt Content	Z1i	g	1.12	1.20	1.23	1.18	1.07	0.99	0.88	0.90	0.87	0.81	0.70	0.83
2. Change in Salt Content	dz	g	0.08	0.03	-0.05	-0.11	-0.08	-0.11	0.02	-0.04	-0.06	-0.11	0.13	0.12
3. End Salt Content	z1	g	1.20	1.23	1.18	1.07	0.99	0.88	0.90	0.87	0.81	0.70	0.83	0.95
4. Conc. of soil moisture	csm1	g/l	0.65	0.66	0.64	0.58	0.53	0.48	0.49	0.47	0.44	0.38	0.45	0.51
5. EC saturation extract	ECe	mS/cm	0.48	0.50	0.48	0.43	0.40	0.36	0.37	0.35	0.33	0.28	0.34	0.39
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.28	0.29	0.28	0.27	0.26	0.24	0.23	0.23	0.23	0.21	0.21	0.23
						5 th Year								
1. Initial Salt Content	Z1i	g	0.95	1.06	1.09	1.05	0.97	0.90	0.81	0.84	0.81	0.76	0.66	0.80
2. Change in Salt Content	dz	g	0.11	0.04	-0.04	-0.08	-0.07	-0.10	0.04	-0.03	-0.05	-0.10	0.14	0.12
3. End Salt Content	z1	g	1.06	1.09	1.05	0.97	0.90	0.81	0.84	0.81	0.76	0.66	0.80	0.92
4. Conc. of soil moisture	csm1	g/l	0.57	0.59	0.57	0.53	0.49	0.44	0.46	0.44	0.41	0.36	0.43	0.50
5. EC saturation extract	ECe1	mS/cm	0.43	0.44	0.43	0.39	0.37	0.33	0.34	0.33	0.31	0.27	0.32	0.37
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.25	0.26	0.26	0.25	0.24	0.23	0.22	0.22	0.22	0.21	0.21	0.23

Remarks : Basic factors used in the examination are follows:

(1) Depth of root zone	50 cm	(4) Saturation or void ratio (%)	50.0	(7) Cropping pattern	Paddy - Paddy
(2) ECe of Zone	23.0 mS/cm	(5) Leaching Fraction	0.3		
(3) Field Capacity	37.0 %	(6) Return Flow from Irrigation (%)	10.0		

Table C-AIII-2 Result of Salt Balance Study in Okyereko Project Area

(2) Case 2 : ECe 6.8 mS/cm

Description	Symbol	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.85	1.03	0.31	2.50	1.33	1.16	2.12	0.77	0.36	2.83	2.56	2.79
2. Salt Conc. of Irr. Water	Cir1	g/l	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
3. Evapotranspiration	ET	dm	1.69	0.81	0.45	1.11	1.71	1.46	1.35	0.64	0.45	1.04	1.75	1.69
4. Irrigation Return Flow	RT	dm	0.28	0.10	0.03	0.25	0.13	0.12	0.21	0.08	0.04	0.28	0.26	0.28
5. Rainfall	Rain	dm	0.15	0.24	0.47	0.45	1.50	1.48	0.50	0.53	0.58	0.74	0.35	0.20
6. Percolation	P	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
II. Salt Balance of Root Zone														
						1st Year								
1. Initial Salt Content	Z1i	g	16.77	14.45	13.73	13.09	10.27	8.83	7.47	6.46	5.92	5.51	3.95	3.64
2. Change in Salt Content	dz	g	-2.33	-0.71	-0.65	-2.82	-1.44	-1.35	-1.01	-0.54	-0.41	-1.56	-0.31	-0.31
3. End Salt Content	z1	g	14.45	13.73	13.09	10.27	8.83	7.47	6.46	5.92	5.51	3.95	3.64	3.33
4. Conc. of soil moisture	csm1	g/l	7.81	7.42	7.07	5.55	4.77	4.04	3.49	3.20	2.98	2.14	1.97	1.80
5. EC saturation extract	ECe1	mS/cm	5.86	5.57	5.31	4.16	3.58	3.03	2.62	2.40	2.23	1.60	1.47	1.35
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	2.62	2.37	2.26	1.98	1.64	1.41	1.22	1.09	1.02	0.86	0.70	0.65
						2 nd Year								
1. Initial Salt Content	Z1i	g	3.33	3.07	2.99	2.86	2.37	2.10	1.81	1.69	1.58	1.48	1.16	1.23
2. Change in Salt Content	dz	g	-0.26	-0.08	-0.13	-0.49	-0.27	-0.28	-0.12	-0.11	-0.11	-0.32	0.07	0.06
3. End Salt Content	z1	g	3.07	2.99	2.86	2.37	2.10	1.81	1.69	1.58	1.48	1.16	1.23	1.29
4. Conc. of soil moisture	csm1	g/l	1.66	1.62	1.55	1.28	1.13	0.98	0.91	0.85	0.80	0.63	0.66	0.70
5. EC saturation extract	ECe1	mS/cm	1.24	1.21	1.16	0.96	0.85	0.73	0.68	0.64	0.60	0.47	0.50	0.52
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.61	0.58	0.56	0.51	0.45	0.41	0.37	0.35	0.34	0.30	0.28	0.29
						3 rd Year								
1. Initial Salt Content	Z1i	g	1.29	1.34	1.36	1.31	1.17	1.07	0.95	0.96	0.92	0.86	0.73	0.86
2. Change in Salt Content	dz	g	0.05	0.02	-0.05	-0.14	-0.10	-0.12	0.01	-0.04	-0.06	-0.13	0.13	0.11
3. End Salt Content	z1	g	1.34	1.36	1.31	1.17	1.07	0.95	0.96	0.92	0.86	0.73	0.86	0.98
4. Conc. of soil moisture	csm1	g/l	0.72	0.74	0.71	0.63	0.58	0.51	0.52	0.50	0.47	0.40	0.47	0.53
5. EC saturation extract	ECe1	mS/cm	0.54	0.55	0.53	0.47	0.43	0.39	0.39	0.37	0.35	0.30	0.35	0.40
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.30	0.31	0.31	0.29	0.27	0.25	0.24	0.24	0.23	0.22	0.22	0.24
						4 th Year								
1. Initial Salt Content	Z1i	g	0.98	1.08	1.11	1.07	0.99	0.92	0.82	0.85	0.82	0.77	0.67	0.81
2. Change in Salt Content	dz	g	0.10	0.04	-0.04	-0.09	-0.07	-0.10	0.03	-0.03	-0.05	-0.10	0.14	0.12
3. End Salt Content	z1	g	1.08	1.11	1.07	0.99	0.92	0.82	0.85	0.82	0.77	0.67	0.81	0.93
4. Conc. of soil moisture	csm1	g/l	0.58	0.60	0.58	0.53	0.50	0.44	0.46	0.44	0.42	0.36	0.44	0.50
5. EC saturation extract	ECe1	mS/cm	0.44	0.45	0.44	0.40	0.37	0.33	0.35	0.33	0.31	0.27	0.33	0.38
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.26	0.27	0.27	0.26	0.24	0.23	0.23	0.23	0.22	0.21	0.21	0.23
						5 th Year								
1. Initial Salt Content	Z1i	g	0.93	1.04	1.08	1.04	0.96	0.89	0.80	0.84	0.81	0.75	0.66	0.80
2. Change in Salt Content	dz	g	0.11	0.04	-0.04	-0.08	-0.07	-0.09	0.04	-0.03	-0.05	-0.10	0.14	0.12
3. End Salt Content	z1	g	1.04	1.08	1.04	0.96	0.89	0.80	0.84	0.81	0.75	0.66	0.80	0.92
4. Conc. of soil moisture	csm1	g/l	0.56	0.58	0.56	0.52	0.48	0.43	0.45	0.44	0.41	0.36	0.43	0.50
5. EC saturation extract	ECe1	mS/cm	0.42	0.44	0.42	0.39	0.36	0.32	0.34	0.33	0.31	0.27	0.32	0.37
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.25	0.26	0.26	0.25	0.24	0.23	0.22	0.22	0.22	0.20	0.21	0.23

Remarks : Basic factors used in the examination are follows:

(1) Depth of root zone	50 cm	(4) Saturation or void ratio (%)	50.0	(7) Cropping pattern	Paddy - Paddy
(2) ECe of Zone	6.8 mS/cm	(5) Leaching Fraction	0.3		
(3) Field Capacity	37.0 %	(6) Return Flow from Irrigation (%)	10.0		

Table C-AIII-2 Result of Salt Balance Study in Okyereko Project Area

(3) Case 3 : ECe 5.1 mS/cm

Description	Symbol	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I. Income and Outgo of Water														
1. Irrigation Water	Ir	dm	2.85	1.03	0.31	2.50	1.33	1.16	2.12	0.77	0.36	2.83	2.56	2.79
2. Salt Conc. of Irr. Water	Cir1	g/l	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
3. Evapotranspiration	ET	dm	1.69	0.81	0.45	1.11	1.71	1.46	1.35	0.64	0.45	1.04	1.75	1.69
4. Irrigation Return Flow	RT	dm	0.28	0.10	0.03	0.25	0.13	0.12	0.21	0.08	0.04	0.28	0.26	0.28
5. Rainfall	Rain	dm	0.15	0.24	0.47	0.45	1.50	1.48	0.50	0.53	0.58	0.74	0.35	0.20
6. Percolation	P	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
II. Salt Balance of Root Zone														
1st Year														
1. Initial Salt Content	Z1i	g	12.63	10.94	10.42	9.94	7.83	6.75	5.73	4.99	4.58	4.27	3.09	2.90
2. Change in Salt Content	dz	g	-1.69	-0.52	-0.49	-2.10	-1.08	-1.02	-0.74	-0.41	-0.32	-1.18	-0.20	-0.20
3. End Salt Content	z1	g	10.94	10.42	9.94	7.83	6.75	5.73	4.99	4.58	4.27	3.09	2.90	2.70
4. Conc. of soil moisture	csm1	g/l	5.91	5.63	5.37	4.23	3.65	3.10	2.70	2.48	2.31	1.67	1.56	1.46
5. EC saturation extract	ECe1	mS/cm	4.43	4.23	4.03	3.18	2.74	2.32	2.02	1.86	1.73	1.25	1.17	1.09
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	2.00	1.82	1.74	1.53	1.27	1.10	0.96	0.87	0.81	0.69	0.57	0.54
2 nd Year														
1. Initial Salt Content	Z1i	g	2.70	2.54	2.49	2.38	2.00	1.78	1.55	1.47	1.38	1.29	1.03	1.12
2. Change in Salt Content	dz	g	-0.16	-0.05	-0.11	-0.38	-0.22	-0.23	-0.08	-0.09	-0.09	-0.26	0.09	0.08
3. End Salt Content	z1	g	2.54	2.49	2.38	2.00	1.78	1.55	1.47	1.38	1.29	1.03	1.12	1.19
4. Conc. of soil moisture	csm1	g/l	1.37	1.35	1.29	1.08	0.96	0.84	0.79	0.74	0.70	0.56	0.60	0.64
5. EC saturation extract	ECe1	mS/cm	1.03	1.01	0.97	0.81	0.72	0.63	0.59	0.56	0.52	0.42	0.45	0.48
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.51	0.50	0.48	0.45	0.40	0.36	0.33	0.32	0.31	0.28	0.26	0.28
3 rd Year														
1. Initial Salt Content	Z1i	g	1.19	1.26	1.29	1.24	1.11	1.02	0.91	0.93	0.89	0.83	0.71	0.84
2. Change in Salt Content	dz	g	0.07	0.03	-0.05	-0.12	-0.09	-0.11	0.02	-0.04	-0.06	-0.12	0.13	0.12
3. End Salt Content	z1	g	1.26	1.29	1.24	1.11	1.02	0.91	0.93	0.89	0.83	0.71	0.84	0.96
4. Conc. of soil moisture	csm1	g/l	0.68	0.69	0.67	0.60	0.55	0.49	0.50	0.48	0.45	0.39	0.46	0.52
5. EC saturation extract	ECe1	mS/cm	0.51	0.52	0.50	0.45	0.42	0.37	0.38	0.36	0.34	0.29	0.34	0.39
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.29	0.30	0.29	0.28	0.26	0.25	0.24	0.24	0.23	0.21	0.22	0.24
4 th Year														
1. Initial Salt Content	Z1i	g	0.96	1.06	1.10	1.06	0.98	0.91	0.81	0.85	0.82	0.76	0.67	0.80
2. Change in Salt Content	dz	g	0.10	0.04	-0.04	-0.08	-0.07	-0.10	0.03	-0.03	-0.05	-0.10	0.14	0.12
3. End Salt Content	z1	g	1.06	1.10	1.06	0.98	0.91	0.81	0.85	0.82	0.76	0.67	0.80	0.93
4. Conc. of soil moisture	csm1	g/l	0.58	0.60	0.57	0.53	0.49	0.44	0.46	0.44	0.41	0.36	0.43	0.50
5. EC saturation extract	ECe1	mS/cm	0.43	0.45	0.43	0.40	0.37	0.33	0.34	0.33	0.31	0.27	0.33	0.38
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.25	0.27	0.27	0.26	0.24	0.23	0.22	0.22	0.22	0.21	0.21	0.23
5 th Year														
1. Initial Salt Content	Z1i	g	0.93	1.04	1.07	1.04	0.96	0.89	0.80	0.84	0.80	0.75	0.66	0.80
2. Change in Salt Content	dz	g	0.11	0.04	-0.04	-0.08	-0.07	-0.09	0.04	-0.03	-0.05	-0.10	0.14	0.12
3. End Salt Content	z1	g	1.04	1.07	1.04	0.96	0.89	0.80	0.84	0.80	0.75	0.66	0.80	0.92
4. Conc. of soil moisture	csm1	g/l	0.56	0.58	0.56	0.52	0.48	0.43	0.45	0.44	0.41	0.36	0.43	0.50
5. EC saturation extract	ECe1	mS/cm	0.42	0.44	0.42	0.39	0.36	0.32	0.34	0.33	0.31	0.27	0.32	0.37
6. Effective Drainage	Dr2	dm	1.03	0.36	0.30	1.58	0.98	1.06	1.05	0.59	0.45	2.24	0.91	1.02
7. Salt Conc. of Perco Water	Cir2	g/l	0.25	0.26	0.26	0.25	0.24	0.23	0.22	0.22	0.22	0.20	0.21	0.23

Remarks : Basic factors used in the examination are follows:

(1) Depth of root zone	50 cm	(4) Saturation or void ratio (%)	50.0	(7) Cropping pattern	Paddy - Paddy
(2) ECe of Zone	5.1 mS/cm	(5) Leaching Fraction	0.3		
(3) Field Capacity	37.0 %	(6) Return Flow from Irrigation (%)	10.0		