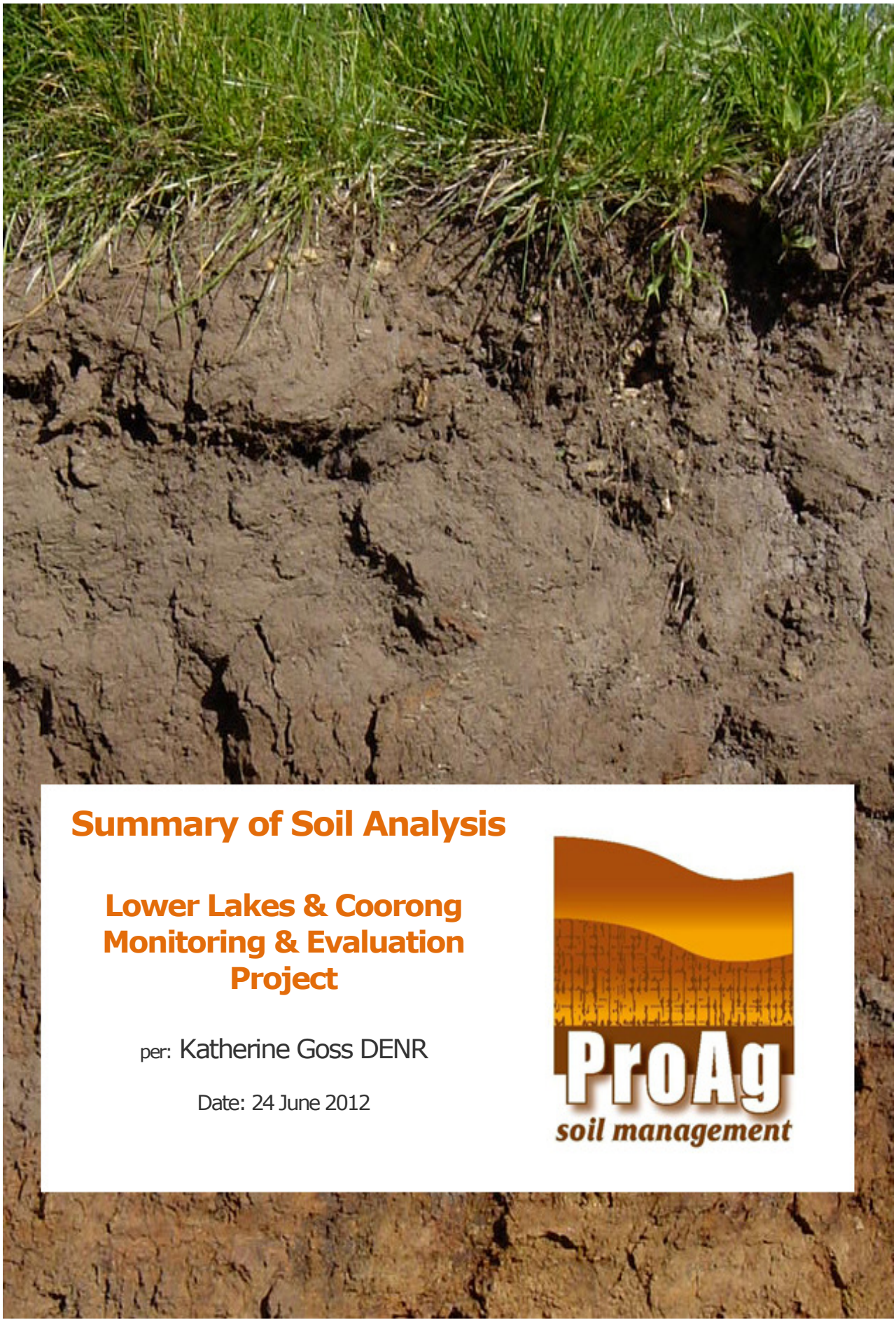

Summary of Soil Analysis

Lower Lakes & Coorong Monitoring & Evaluation Project

per: Katherine Goss DENR

Date: 24 June 2012

ProAg soil management

Introduction

Soil sampling of revegetation sites has been conducted as part of the Lower Lakes and Coorong Monitoring and Evaluation Project. The site sampling and assessment has been carried out by Project Officer Regina Durbridge and Katherine Goss DENR and samples analysed for a full agricultural suite of tests at APAL Laboratory in Magill.

Revegetation plantings date from 2010 with further plantings in 2011 and this year with varied success. The establishment on some sites is described as excellent while on others the survival of plants is low.

It is anticipated that the results of soil analysis will reveal the soil limiting factors on each site and suggest possible amendment programs to improve the results.

Pro Ag Consulting has undertaken to provide in this report an interpretation of the laboratory analysis results, a summary of the most significant issues at each site and recommendations for amendment where needed.

Laboratory Analysis

The samples were tested for a comprehensive range of agricultural parameters including pH, conductivity, organic matter, nitrogen, phosphorus, sulphur, cations - calcium, magnesium, potassium sodium, trace elements - iron, manganese, copper , zinc and boron.

Samples were also given hand texturing classifications and a table supplied to estimate percentages of sand and clay present.

Individual graph reports have already been forwarded and the lab data sheets follow in this report.

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: CLLMM

Agent: DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES **Date: 22 Jun 2012**

Farm:						
Sample:		1 WMR 201	2 WMR 201	3 WMR 201	4 WMR S &	5 WMR 201
Lab No:		G063	G064	G065	G066	G067
Total Exchange Capacity	ME/100g	31.88	6.55	4.19	4.54	1.85
pHw:		9.40	6.80	6.60	6.10	6.20
Organic Matter:	%	1.50	0.90	0.90	1.20	0.30
ANIONS	**NITROGEN:**	kg/ha	51	37	37	45	10
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	138	36	9	9	7.5
	PHOSPHORUS(Bray2):	Desired	330	260	260	260	260
	kg/ha	Found	317	203	252	236	203
		Deficit	13	57	8	24	57
	Olsen (P) :	ppm	18	9	11	12	8
	Total Phosphorus	ppm					
	P Recovery	%	60.00	100.00	100.00	96.00	100.00
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	9,738	1,764	1,129	1,224	499
	kg/ha:	Found	4,398	1,363	1,034	1,036	394
		Deficit	5,340	401	95	188	105
	MAGNESIUM:	Desired	1,031	224	224	224	224
	kg/ha:	Found	2,165	366	270	229	124
		Deficit					100
	POTASSIUM:	Desired	729	330	248	268	130
	kg/ha:	Found	4,248	392	267	291	104
		Deficit					26
	SODIUM:	kg/ha	4,492	637	75	113	44
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		30.65%	46.26%	54.84%	50.67%	47.27%
	Magnesium (10 to 20%):		24.89%	20.46%	23.63%	18.51%	24.55%
	Potassium (2 to 5%):		15.17%	6.82%	7.25%	7.29%	6.38%
	Sodium (0.5 to 3%):		27.29%	18.86%	3.48%	4.83%	4.60%
	Other Bases (Variable):		2.00%	4.60%	4.80%	5.20%	5.20%
EXCHANGEABLE HYDROGEN (10 to 15%):			0.00%	3.00%	6.00%	13.50%	12.00%
	Salinity 1:5 EC:	dS/m	5.33	0.05	0.04	0.07	0.02
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	23.11	0.65	0.42	0.33	0.13
	Iron (ppm)	ppm	5.00	209.66	185.11	159.37	232.02
	Manganese (ppm)	ppm	6.06	10.12	13.20	12.49	4.98
	Copper (ppm)	ppm	0.10	0.10	0.10	0.10	0.10
	Zinc (ppm)	ppm	1.00	1.00	1.00	1.00	1.00
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Control ID: 130 RunID: 12 ***Page 1 of 3***

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: CLLMM

Agent: DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES **Date: 22 Jun 2012**

Farm:							
Sample:			6 TGL 5 &	7 TGL 2011	8 BNS 201	9 BNS 201	10 BNS 20
Lab No:			G068	G069	G070	G071	G072
Total Exchange Capacity		ME/100g	9.45	4.62	5.29	2.76	1.51
pHw:			7.40	6.60	6.20	6.20	6.10
Organic Matter:		%	2.10	1.30	2.10	1.40	0.86
ANIONS	**NITROGEN:**	kg/ha	64	46	64	48	37
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	13.5	9	12	7.5	10.5
	PHOSPHORUS(Bray2):	Desired	260	260	260	260	260
	kg/ha	Found	431	366	350	171	171
		Deficit				89	89
	Olsen (P) :	ppm	13	15	15	9	6
	Total Phosphorus	ppm					
	P Recovery	%	96.00	100.00	100.00	100.00	100.00
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	2,887	1,244	1,426	744	407
	kg/ha:	Found	2,936	1,258	1,395	757	384
		Deficit			31		23
	MAGNESIUM:	Desired	306	224	224	224	224
	kg/ha:	Found	436	238	249	126	74
		Deficit				98	150
	POTASSIUM:	Desired	345	273	289	185	106
	kg/ha:	Found	704	315	169	68	40
		Deficit			120	117	66
	SODIUM:	kg/ha	79	48	93	35	30
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		69.00%	60.54%	58.55%	60.87%	56.40%
	Magnesium (10 to 20%):		16.89%	18.89%	17.21%	16.67%	17.98%
	Potassium (2 to 5%):		8.48%	7.78%	3.64%	2.80%	3.02%
	Sodium (0.5 to 3%):		1.62%	2.00%	3.39%	2.47%	3.90%
	Other Bases (Variable):		4.00%	4.80%	5.20%	5.20%	5.20%
EXCHANGEABLE HYDROGEN (10 to 15%):			0.00%	6.00%	12.00%	12.00%	13.50%
	Salinity 1:5 EC:	dS/m	0.13	0.06	0.05	0.03	0.02
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	0.63	0.32	0.50	0.16	0.11
	Iron (ppm)	ppm	120.10	158.41	138.28	134.32	135.99
	Manganese (ppm)	ppm	25.31	10.93	26.14	21.03	18.29
	Copper (ppm)	ppm	0.10	0.10	0.13	0.13	0.20
	Zinc (ppm)	ppm	2.45	3.46	2.52	1.60	1.90
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: CLLMM

Agent: DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES **Date: 22 Jun 2012**

Farm:							
Sample:			11 BNS 20	12 BNS 5 &			
Lab No:			G073	G074			
Total Exchange Capacity	ME/100g		3.54	29.97			
pHw:			5.90	9.10			
Organic Matter:	%		1.30	2.40			
ANIONS	**NITROGEN:**	kg/ha	46	71			
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	15	97.5			
	PHOSPHORUS(Bray2):	Desired	260	300			
	kg/ha	Found	244	49			
		Deficit	16	251			
	Olsen (P) :	ppm	15	39			
	Total Phosphorus	ppm					
	P Recovery	%	100.00	52.00			
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	955	9,155			
	kg/ha:	Found	815	6,986			
		Deficit	140	2,169			
	MAGNESIUM:	Desired	224	969			
	kg/ha:	Found	169	1,392			
		Deficit	55				
	POTASSIUM:	Desired	225	725			
	kg/ha:	Found	151	997			
		Deficit	74				
	SODIUM:	kg/ha	55	3,886			
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		51.06%	51.79%			
	Magnesium (10 to 20%):		17.50%	17.01%			
	Potassium (2 to 5%):		4.85%	3.79%			
	Sodium (0.5 to 3%):		2.99%	25.11%			
	Other Bases (Variable):		5.60%	2.30%			
EXCHANGEABLE HYDROGEN (10 to 15%):			18.00%	0.00%			
	Salinity 1:5 EC:	dS/m	0.05	1.27			
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	0.22	9.70			
	Iron (ppm)	ppm	136.94	5.00			
	Manganese (ppm)	ppm	32.54	4.49			
	Copper (ppm)	ppm	0.14	0.10			
	Zinc (ppm)	ppm	1.70	1.00			
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Control ID: 130 RunID: 12 **Page 3 of 3**

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: CLLMM

Agent: DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES **Date: 22 Jun 2012**

Farm:							
Sample:			13 SHW 5	14 SHW 20	15 SHW BA	16 WKN 5	17 WKN 20
Lab No:			M030	M031	M032	M033	M034
Total Exchange Capacity		ME/100g	7.35	6.92	6.83	8.97	5.77
pHw:			5.90	5.20	5.50	5.60	5.50
Organic Matter:		%	2.80	2.60	3.00	5.10	2.90
ANIONS	**NITROGEN:**	kg/ha	79	75	80	101	80
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	13.5	12	7.5	13.5	9
	PHOSPHORUS(Bray2):	Desired	260	260	260	260	260
	kg/ha	Found	146	220	228	293	244
		Deficit	114	40	32		16
	Olsen (P) :	ppm	6	15	13	18	19
	Total Phosphorus	ppm					
	P Recovery	%	96.00	92.00	96.00	96.00	96.00
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	2,244	1,865	1,840	2,740	1,556
	kg/ha:	Found	1,187	929	1,120	1,831	1,299
		Deficit	1,057	936	720	909	257
	MAGNESIUM:	Desired	238	224	224	290	224
	kg/ha:	Found	482	235	252	397	161
		Deficit					63
	POTASSIUM:	Desired	340	349	344	387	315
	kg/ha:	Found	492	479	604	181	78
		Deficit				206	237
	SODIUM:	kg/ha	335	138	124	137	57
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		35.90%	29.83%	36.44%	45.35%	49.96%
	Magnesium (10 to 20%):		24.05%	12.43%	13.55%	16.20%	10.21%
	Potassium (2 to 5%):		7.63%	7.88%	10.07%	2.30%	1.53%
	Sodium (0.5 to 3%):		8.82%	3.86%	3.53%	2.95%	1.90%
	Other Bases (Variable):		5.60%	7.00%	6.40%	6.20%	6.40%
EXCHANGEABLE HYDROGEN (10 to 15%):			18.00%	39.00%	30.00%	27.00%	30.00%
	Salinity 1:5 EC:	dS/m	0.10	0.09	0.07	0.09	0.04
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	0.62	0.28	0.22	0.39	0.11
	Iron (ppm)	ppm	267.41	173.36	212.96	92.50	105.18
	Manganese (ppm)	ppm	9.71	25.45	40.77	21.42	11.17
	Copper (ppm)	ppm	0.10	0.10	0.19	0.10	0.10
	Zinc (ppm)	ppm	1.00	1.00	1.56	2.26	1.47
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Control ID: 292 RunID: 16

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: CLLMM

Agent: DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES **Date: 22 Jun 2012**

Farm:							
Sample:			18 WKN 20				
Lab No:			M035				
Total Exchange Capacity	ME/100g		3.76				
pHw:			5.40				
Organic Matter:	%		1.90				
ANIONS	**NITROGEN:**	kg/ha	60				
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	4.5				
	PHOSPHORUS(Bray2):	Desired	260				
	kg/ha	Found	179				
		Deficit	81				
	Olsen (P) :	ppm	9				
	Total Phosphorus	ppm					
	P Recovery	%	96.00				
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	1,014				
	kg/ha:	Found	774				
		Deficit	240				
	MAGNESIUM:	Desired	224				
	kg/ha:	Found	110				
		Deficit	114				
	POTASSIUM:	Desired	239				
	kg/ha:	Found	63				
		Deficit	176				
	SODIUM:	kg/ha	40				
BASE SATURATION PERCENT							
Calcium (60 to 70%):			45.67%				
Magnesium (10 to 20%):			10.73%				
Potassium (2 to 5%):			1.92%				
Sodium (0.5 to 3%):			2.07%				
Other Bases (Variable):			6.60%				
EXCHANGEABLE HYDROGEN (10 to 15%):			33.00%				
Salinity 1:5 EC:	dS/m		0.03				
Chlorides (ppm)	ppm						
Boron (ppm)	ppm		0.10				
Iron (ppm)	ppm		129.77				
Manganese (ppm)	ppm		10.20				
Copper (ppm)	ppm		0.11				
Zinc (ppm)	ppm		1.07				
Cobalt (ppm)	ppm						
Molybdenum (ppm)	ppm						
Aluminium %	ppm						
Total Magnesium	ppm						
Total Zinc	ppm						

Control ID: 292 RunID: 16 ***Page 2 of 2***

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: DEPT FOR ENVIRONMENT & NA

Agent: APAL **Date: 22 Jun 2012**

Farm:							
Sample:			19 DIX 201	20 AOV 20	21 AOV 20	22 NRR 20	23 NRR 20
Lab No:			V006	V007	V008	V009	V010
Total Exchange Capacity		ME/100g	8.82	3.05	2.72	11.64	11.85
pHw:			5.50	5.60	5.90	7.10	7.80
Organic Matter:		%	1.70	0.71	0.72	2.10	1.80
ANIONS	**NITROGEN:**	kg/ha	55	28	28	64	57
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	13.5	9	10.5	13.5	12
	PHOSPHORUS(Bray2):	Desired	260	260	260	270	270
	kg/ha	Found	325	187	195	821	463
		Deficit		73	65		
	Olsen (P) :	ppm	18	6	7	26	33
	Total Phosphorus	ppm					
	P Recovery	%	100.00	100.00	100.00	96.00	100.00
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	2,695	822	733	3,554	3,619
	kg/ha:	Found	1,658	642	509	3,366	4,161
		Deficit	1,037	180	224	188	
	MAGNESIUM:	Desired	285	224	224	376	383
	kg/ha:	Found	363	127	139	690	433
		Deficit		97	85		
	POTASSIUM:	Desired	381	193	182	414	421
	kg/ha:	Found	381	66	278	879	386
		Deficit		127			35
	SODIUM:	kg/ha	84	35	62	66	78
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		41.75%	46.77%	41.57%	64.27%	78.03%
	Magnesium (10 to 20%):		15.08%	15.32%	18.76%	21.73%	13.38%
	Potassium (2 to 5%):		4.92%	2.47%	11.65%	8.60%	3.71%
	Sodium (0.5 to 3%):		1.85%	2.24%	4.42%	1.10%	1.27%
	Other Bases (Variable):		6.40%	6.20%	5.60%	4.30%	3.60%
EXCHANGEABLE HYDROGEN (10 to 15%):			30.00%	27.00%	18.00%	0.00%	0.00%
	Salinity 1:5 EC:	dS/m	0.08	0.03	0.05	0.15	0.11
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	0.31	0.13	0.18	0.99	0.84
	Iron (ppm)	ppm	200.58	136.29	133.61	126.16	125.27
	Manganese (ppm)	ppm	49.57	27.94	27.05	51.72	44.25
	Copper (ppm)	ppm	0.20	0.13	0.18	0.18	0.10
	Zinc (ppm)	ppm	3.69	1.32	1.80	57.18	5.44
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Control ID: 485 RunID: 22 **Page 1 of 2**

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: DEPT FOR ENVIRONMENT & NA

Agent: APAL **Date: 22 Jun 2012**

Farm:							
Sample:			24 NRA 20	25 BWB 20	26 MCK 20	27 MCK 20	28 HAL 201
Lab No:			V011	V012	V013	V014	V015
Total Exchange Capacity		ME/100g	22.84	40.34	6.36	7.40	1.41
pHw:			8.30	8.10	6.10	6.10	6.50
Organic Matter:		%	3.90	2.70	1.70	2.20	0.13
ANIONS	**NITROGEN:**	kg/ha	89	78	55	66	2
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	15	88.5	13.5	21	10.5
	PHOSPHORUS(Bray2):	Desired	280	400	260	260	260
	kg/ha	Found	976	512	366	350	163
		Deficit					97
	Olsen (P) :	ppm	40	51	19	19	40
	Total Phosphorus	ppm					
	P Recovery	%	88.00	92.00	100.00	100.00	100.00
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	6,975	12,323	1,715	2,261	379
	kg/ha:	Found	5,293	6,573	1,280	1,299	294
		Deficit	1,682	5,750	435	962	85
	MAGNESIUM:	Desired	739	1,305	224	239	224
	kg/ha:	Found	1,749	3,535	434	582	105
		Deficit					119
	POTASSIUM:	Desired	648	707	321	342	98
	kg/ha:	Found	1,213	2,260	423	327	76
		Deficit				15	22
	SODIUM:	kg/ha	1,331	4,585	134	324	55
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		51.50%	36.20%	44.67%	38.99%	46.43%
	Magnesium (10 to 20%):		28.06%	32.11%	24.98%	28.81%	27.46%
	Potassium (2 to 5%):		6.05%	6.38%	7.57%	5.02%	6.17%
	Sodium (0.5 to 3%):		11.29%	22.01%	4.09%	8.47%	7.55%
	Other Bases (Variable):		3.10%	3.30%	5.20%	5.20%	4.90%
EXCHANGEABLE HYDROGEN (10 to 15%):			0.00%	0.00%	13.50%	13.50%	7.50%
	Salinity 1:5 EC:	dS/m	0.46	1.28	0.09	0.17	0.03
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	3.07	3.30	0.36	0.74	0.24
	Iron (ppm)	ppm	66.55	47.56	391.14	245.49	273.45
	Manganese (ppm)	ppm	83.41	69.24	33.58	38.69	14.90
	Copper (ppm)	ppm	0.10	0.10	0.21	0.15	0.14
	Zinc (ppm)	ppm	6.05	1.57	2.47	2.46	1.21
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Control ID: 485 RunID: 22 ***Page 2 of 2***

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: DEPT FOR ENVIRONMENT & NA

Agent: APAL **Date: 24 May 2012**

Farm:						
Sample:		29 BLK 201	30 BLK RV	31 BLK 201	32 GRF 201	33 FIE 201
Lab No:		Z003	Z004	Z005	Z006	Z007
Total Exchange Capacity	ME/100g	5.58	6.23	4.62	15.78	5.73
pHw:		5.70	5.60	5.80	8.40	6.70
Organic Matter:	%	0.80	1.10	1.00	1.90	1.70
ANIONS	**NITROGEN:**	kg/ha	35	43	42	60	55
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	22.5	21	16.5	19.5	21
	PHOSPHORUS(Bray2):	Desired	260	260	260	270	260
	kg/ha	Found	130	195	154	16	236
		Deficit	130	65	106	254	24
	Olsen (P) :	ppm	2	3	2	7	13
	Total Phosphorus	ppm					
	P Recovery	%	96.00	100.00	96.00	4.00	96.00
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	1,505	1,679	1,246	4,819	1,545
	kg/ha:	Found	1,061	1,022	1,022	6,140	1,210
		Deficit	444	657	224		335
	MAGNESIUM:	Desired	224	224	224	510	224
	kg/ha:	Found	273	292	209	374	555
		Deficit			15	136	
	POTASSIUM:	Desired	305	314	273	524	313
	kg/ha:	Found	251	242	172	148	304
		Deficit	54	72	101	376	9
	SODIUM:	kg/ha	137	281	78	65	69
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		42.22%	36.47%	49.10%	86.46%	46.92%
	Magnesium (10 to 20%):		17.93%	17.17%	16.59%	8.68%	35.50%
	Potassium (2 to 5%):		5.11%	4.42%	4.23%	1.06%	6.04%
	Sodium (0.5 to 3%):		4.74%	8.73%	3.28%	0.80%	2.34%
	Other Bases (Variable):		6.00%	6.20%	5.80%	3.00%	4.70%
EXCHANGEABLE HYDROGEN (10 to 15%):			24.00%	27.00%	21.00%	0.00%	4.50%
	Salinity 1:5 EC:	dS/m	0.08	0.12	0.05	0.12	0.08
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	0.53	0.52	0.43	0.93	0.69
	Iron (ppm)	ppm	201.16	162.47	161.84	5.00	190.40
	Manganese (ppm)	ppm	21.07	27.22	33.50	4.09	41.68
	Copper (ppm)	ppm	0.20	0.23	0.25	0.10	0.10
	Zinc (ppm)	ppm	1.00	1.00	1.00	1.00	4.36
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Control ID: 563 RunID: 26 ***Page 1 of 2***

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: DEPT FOR ENVIRONMENT & NA

Agent: APAL **Date: 24 May 2012**

Farm:							
Sample:			34 LDB 201	35 LDB 201			
Lab No:			Z008	Z009			
Total Exchange Capacity		ME/100g	1.36	5.62			
pHw:			6.70	6.80			
Organic Matter:		%	0.17	1.90			
ANIONS	**NITROGEN:**	kg/ha	5	60			
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	30	25.5			
	PHOSPHORUS(Bray2):	Desired	260	260			
	kg/ha	Found	236	350			
		Deficit	24				
	Olsen (P) :	ppm	6	20			
	Total Phosphorus	ppm					
	P Recovery	%	100.00	100.00			
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	367	1,514			
	kg/ha:	Found	280	1,255			
		Deficit	87	259			
	MAGNESIUM:	Desired	224	224			
	kg/ha:	Found	106	477			
		Deficit	118				
	POTASSIUM:	Desired	95	307			
	kg/ha:	Found	110	436			
		Deficit					
	SODIUM:	kg/ha	53	81			
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		45.63%	49.64%			
	Magnesium (10 to 20%):		28.41%	31.13%			
	Potassium (2 to 5%):		9.24%	8.84%			
	Sodium (0.5 to 3%):		7.52%	2.80%			
	Other Bases (Variable):		4.70%	4.60%			
EXCHANGEABLE HYDROGEN (10 to 15%):			4.50%	3.00%			
	Salinity 1:5 EC:	dS/m	0.06	0.12			
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	0.40	0.91			
	Iron (ppm)	ppm	324.25	112.40			
	Manganese (ppm)	ppm	6.60	22.21			
	Copper (ppm)	ppm	0.10	0.10			
	Zinc (ppm)	ppm	1.00	3.12			
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Control ID: 563 RunID: 26 ***Page 2 of 2***

Premium Soil Analysis

APAL Laboratory Pty Ltd

Account of: DEPT FOR ENVIRONMENT & NA

Agent: APAL **Date: 15 Jun 2012**

Farm:							
Sample:			36 HTR FIR	37 NRA 20			
Lab No:			F010	F011			
Total Exchange Capacity	ME/100g		3.15	2.70			
pHw:			5.60	6.00			
Organic Matter:	%		1.36	0.78			
ANIONS	**NITROGEN:**	kg/ha	48	35			
	NO3 (ppm)						
	NH3 (ppm)						
	Total Nitrogen						
	SULPHUR:	ppm	9.7297297	8.7162162			
	PHOSPHORUS(Bray2):	Desired	260	260			
	kg/ha	Found	257	384			
		Deficit	3				
	Olsen (P) :	ppm	13.446153	12.561538			
	Total Phosphorus	ppm					
	P Recovery	%	100.00	100.00			
EXCHANGEABLE CATIONS	**CALCIUM:**	Desired	849	729			
	kg/ha:	Found	735	675			
		Deficit	114	54			
	MAGNESIUM:	Desired	224	224			
	kg/ha:	Found	91	114			
		Deficit	133	110			
	POTASSIUM:	Desired	200	181			
	kg/ha:	Found	57	155			
		Deficit	143	26			
	SODIUM:	kg/ha	39	29			
BASE SATURATION PERCENT							
	Calcium (60 to 70%):		51.80%	55.45%			
	Magnesium (10 to 20%):		10.55%	15.50%			
	Potassium (2 to 5%):		2.07%	6.54%			
	Sodium (0.5 to 3%):		2.38%	2.11%			
	Other Bases (Variable):		6.20%	5.40%			
EXCHANGEABLE HYDROGEN (10 to 15%):			27.00%	15.00%			
	Salinity 1:5 EC:	dS/m	0.04	0.03			
	Chlorides (ppm)	ppm					
	Boron (ppm)	ppm	0.21	0.28			
	Iron (ppm)	ppm	148.29	218.19			
	Manganese (ppm)	ppm	9.49	7.62			
	Copper (ppm)	ppm	0.10	0.10			
	Zinc (ppm)	ppm	1.27	6.27			
	Cobalt (ppm)	ppm					
	Molybdenum (ppm)	ppm					
	Aluminium %	ppm					
	Total Magnesium	ppm					
	Total Zinc	ppm					

Control ID: 645 RunID: 32 ***Page 1 of 1***

Summary of analysis

There are some general patterns that have emerged in the laboratory results.

TEC

The samples are mainly light sandy soils with low total exchange capacity (TEC). They are likely to be well drained but will have limited nutrient and water holding capacity. This will mean that moisture will be a critical factor in the initial establishment of vegetation. The capacity of these soils to hold water and nutrients could be increased by adding organic matter or other commercially available products like Hydrocell and TerraCottem.
There are some sites with loam and clay textured soil in addition to the sands.

pH

Samples vary from moderately acidic through neutral to some strongly alkaline sites associated with saline conditions. The acidic soils could be improved easily by broadcasting lime or dolomite - gypsum is also indicated on some sites. There is no easy way to reduce the pH of the alkaline sites so it will be important to plant species that will tolerate the high pH and saline conditions.

Organic matter

All sites have low organic matter which is probably due to their sandy texture and lack of healthy surface covering plants with good root systems. The only sample with adequate soil organic matter is Watkins 16 where there are mature trees. It may be possible to add and incorporate organic matter like compost before planting to improve plant establishment.

Nitrogen

Because soil organic matter is low, there is very little nitrogen that is available from mineralization.

Sulphur

Sulphur is generally low on all the sandy sites because it leaches readily down the profile with rainfall. The exceptions are those few sites with heavier soils and poor drainage, often also associated with salinity issues.

Phosphorus

Phosphorus levels are generally low except in some sites with higher TEC that may have had applications of fertilizer. The low P may not be a problem depending on the species being planted. However, although

some Australian native species are sensitive to phosphorus, many will respond to applications.

Cations (Ca, Mg, K & Na)
Calcium is generally low across most of the sites. *Magnesium* is high on some sites and with the low calcium, may be tightening these soils up so lime would be beneficial. Both calcium and magnesium are low in a couple of areas so dolomite would be a better option there.
Potassium is low in about half the sites and could be added in a fertilizer program or as organic matter – compost is able to supply good amounts of available potassium.
Sodium is elevated on seven of the sites some of which are saline but others aren't. High exchangeable sodium or sodic soils tend to have poor structure because they are dispersive however if they are also saline the dispersion can be reduced.
Adding lime, dolomite or gypsum where appropriate on these sodic soils can displace sodium with calcium and allow the sodium to leach.

Conductivity (salinity)
Only four sites are saline including lakes edge and poorly drained sites. It may be difficult to reduce the salinity unless the drainage can be improved.

Boron
Most sites have low boron because it will leach out of sandy soils. There are some sites however where boron is high enough to affect boron sensitive plants. These sites are the poorly drained, saline and sodic ones and plants that will tolerate salinity will usually tolerate elevated boron as well.

Trace Elements
Iron levels are generally good, particularly in the acidic soils, but manganese, copper and zinc are deficient in most samples. Trace elements could be added as part of a fertilizer mix before planting or added to planting holes in products like TerraCottem.

Amendment programs

The main issues identified in the analysis of soil samples are:

- Low nutrient and water holding capacity
- Low fertility of both major and trace elements
- Low calcium and high magnesium
- High exchangeable sodium, salinity and boron

I will therefore recommend:

- application of lime, dolomite or gypsum where appropriate.
- application of fertiliser and trace elements
- addition of organic matter as compost

Some other options to consider are:

Liquid calcium products – these materials may be useful in the saline and sodic sites and can be sprayed onto the soil surface before rainfall to saturate the soil with a highly available calcium source that helps to displace and leach sodium. Some examples are N-Cal, Aqua-Cal and Biologi-Cal.

Organic Matter – incorporating composted green organics has been found to be most successful in mine site revegetation. The Jeffries Group produces green organics compost in Adelaide from domestic green bin collection and it is in ready supply. Jeffries also have an B-Double truck with a blower that can lay down the compost as a surface mat. The truck also has a seed attachment that can incorporate any seeds you select into the compost as it is laid down. I believe that this method has great potential as it would protect and bind the soil surface together until it rained. After rain, the compost will help retain moisture and provide nutrients for germination. Over time it will also improve the underlying soil.
Compost could also be spread 20-25mm deep before planting and then incorporated along the planting lines or smaller amounts incorporated into just the planting hole soils.

There are also less bulky organic matter options like brown coal humates which could be used.

Water holding materials – I recommend trialing a product called Hydrocell which is a foam like material that provides water holding capacity, prevents compaction and can retain an oxygen supply to roots in water logged conditions. It will break down over 5 years and doesn't leave any long term residues. eg spread Hydrocell 20mm deep along the planting lines and then make one pass with a rotary hoe to incorporate it into the top 100mm of soil.

TerraCottem is another commonly used material used at planting to provide nutrients and water holding capacity which could be included in trials. In revegetation projects it has been added to tubestock planting holes at the rate of 25g/tree.

Biological stimulants – these materials supply a food source to promote the establishment of beneficial soil organisms of all types and are generally a blend of molasses, kelp extracts, fish emulsions, humic and fulvic acids etc. Increased soil life will aid plant establishment and resilience and improve soil structure. Examples are Quad Shot and Neutrog Go Go Juice.

Fertilisers – custom blends to meet the identified requirements can be made up in Adelaide – contact Pro Ag for details.

Individual sites

The following is interpretation of results from individual sites and recommendations for amendment.

(1)–(5) WESTMINSTER

This site was planted in 2010 and 3 samples were collected for analysis ranging from the saline lake edge and the sandy edge where there has been good establishment, to the sand dune where establishment has been poor. A sample was also taken from an adjacent paddock and another from a mature stand of trees for comparison.

(1) Trees have established successfully on the saline edge and because it will probably be difficult to remove the source of the salinity, no amendment is recommended.

(2) The sandy edge has established well but would benefit from the addition of lime and fertilizer.

- Lime – broadcast 12kg/100m^2 lime
- Broadcast the following fertilizer and trace elements per 100m^2:

MAP	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g

(3)& (4) The adjacent paddock and mature trees are similar soils to the sandy edge but with lower sodium. I assume that they will not be revegetated and have been include for comparison.

(5) The sand dune had poor establishment because of very low water and nutrient holding capacity. Fertility is also poor with low major and trace elements. When replanting I recommend trying the following to improve establishment.

Lime – broadcast *5kg/100m^2 lime*

Organic material – spread *Organic compost 25mm deep* over the planting area. Incorporate into the top 100-150mm of soil with 1.5kg/100m^2 of Sulphate of Ammonia.

Broadcast the following fertilizer and trace elements per 100m^2:

MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

Additional options to trial:

Hydrocell – spread Hydrocell 20mm deep along the planting lines and then make one pass with a rotary hoe to incorporate it into the top 100mm of soil.

Nutrients – add 25g Terra Cottem to each tube-stock planting hole and increase the rate proportionally for larger trees and shrubs.

(6) & (7) COUNCIL TRIANGLE

Two samples were collected from this site. The first from an area of existing vegetation established more than five years ago and the second from a 2011 revegetation site. The soils are similar in many respects but organic matter has built marginally in the mature tree block and the soil has higher exchange capacity.

There is no indication of the health or success of the 2011 planting, however although the soil is light and sandy other indicators are reasonable. Sulphur and calcium are low so gypsum is recommended. Phosphorus and potassium are well supplied but trace elements manganese, copper and zinc need attention.

(6) In the established area broadcast *10kg/100m^2 gypsum* if this is possible.

(7) In the 2011 planting area:

Gypsum – broadcast *10kg/100m^2 gypsum*

Broadcast the fertilizer & trace elements per 100m^2:

Organic Base (manure/humates)	10kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

(8) - (12) BURNS

Four samples were collected from the Burns site where revegetation results from 2011 plantings have been poor. On both the top bank above the lake and an adjacent sandy paddock the establishment has been poor but better on the hill slope site. All samples have very low nutrient and water holding capacity (low TEC and organic matter). Sulphur, phosphorus, potassium and trace elements are all low. Site (10) will be planted this year and the soil is similar to the other areas so some extra preparation may be needed to ensure success.

A further sample (12) was taken from an area the landholder has previously revegetated five years or more ago. The soil here is very different being heavier, strongly alkaline and both saline and sodic. High sulphur and boron indicate poor drainage.

(8), (9) & (11) 2011 plantings

Gypsum – broadcast *5kg/100m^2 gypsum*

Broadcast the fertilizer & trace elements per 100m^2:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

(10) Proposed 2012 planting

Gypsum – broadcast *5kg/100m^2 gypsum*

Organic material – spread *Organic compost 25mm deep* over the planting area. Incorporate into the top 100-150mm of soil with 1.5kg/100m^2 of Sulphate of Ammonia.

Broadcast the fertilizer & trace elements per $100m^2$:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

Additional options to trial:

Hydrocell – spread Hydrocell 20mm deep along the planting lines and then make one pass with a rotary hoe to incorporate it into the top 100mm of soil.

Nutrients – add 25g Terra Cottem to each tube-stock planting hole and increase the rate proportionally for larger trees and shrubs.

(12) Landholder planting – no action recommended if tolerant species are well established. Measures to reduce source of salinity would be beneficial.

(13)-(15) SHAW

Three samples were collected at this site, from the 2010 revegetation site and from under adjacent mature trees and paddock to give baseline data. The soils were hard and compacted in places.

All soils are very similar and although sandy have reasonable exchange capacity and some organic matter. They are acidic with very low calcium and because magnesium is high, this is making the soil tight and compact. You will note that the soil is hardest where magnesium is highest – lime is recommended. Sulphur, phosphorus and trace elements are needed.

(13)-(15) treat all Shaw sites the same way.

Lime – broadcast *25kg/100m² lime*

Broadcast the fertilizer & trace elements per $100m^2$:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

(16)-(18) WATKINS

Three samples were taken at the Watkins site from the 2011 planting, from the proposed site for 2012 planting and adjacent mature trees. There is no indication given of the success of the 2011 plantings.

The 2012 site (17) is sandy but has reasonable exchange capacity and some organic matter. It is acidic with very low calcium and magnesium so dolomite (mag lime) is recommended here. Sulphur, phosphorus, potassium and trace elements are needed.

(18) 2011 site

Dolomite – broadcast *10kg/100m^2 dolomite*

Broadcast the fertilizer & trace elements per 100m^2:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

(17) 2012 apply dolomite and fertilizer as above and also try:

Organic material – spread *Organic compost 25mm deep* over the planting area. Incorporate into the top 100-150mm of soil with 1.5kg/100m^2 of Sulphate of Ammonia.

Hydrocell – spread Hydrocell 20mm deep along the planting lines and then make one pass with a rotary hoe to incorporate it into the top 100mm of soil.

Nutrients – add 25g Terra Cottem to each tube-stock planting hole and increase the rate proportionally for larger trees and shrubs.

(19) DIX

This site was planted in 2010 and revegetation is poor. The testing shows that the soil is a sandy loam with reasonable nutrient holding capacity even though organic matter is low. Nutrient levels are not ideal but are not likely to be limiting. The main issue is very low calcium and elevated magnesium which may be tightening the soil up at this site so lime is recommended.

Lime – broadcast *30kg/100m^2 lime*

(20) & (21) AUSTRALIAN OLIVE

Both samples were taken from the 2011 revegetation site and no indication was given about how successful establishment has been. The samples have similar test results which show that they are light sandy soils with low nutrient and water holding capacity and very low organic matter. Phosphorus, sulphur, potassium and trace elements are all low.

(20)-(21) treat both Australian Olive sites the same way.

Gypsum – broadcast *10kg/100m^2 gypsum*

Broadcast the fertilizer & trace elements per 100m^2:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

(22) & (23) NARRUNG WETLAND

Two samples were tested from the 2011 revegetation site and from the proposed 2012 area. The 2011 plantings have been very successful with great establishment. These samples are similar sandy loams with good nutrient holding capacity and good levels of phosphorus and potassium and most trace elements. The 2011 planting area (22) has lower calcium and higher magnesium than ideal and gypsum could be beneficial, however because establishment has been so successful it is probably not necessary.

The proposed 2012 area (23) has ideal calcium:magnesium balance so establishment without any amendment would be expected to produce similar results to 2011. However it may be beneficial to trial some TerraCottem in the planting holes.

(22) – 2011 area – no amendment required

(23) – 2012 area. Nutrients – add 25g Terra Cottem to each tube-stock planting hole and increase the rate proportionally for larger trees and shrubs.

(24) & (37) NURRA NURRA

Two samples were taken from 2011 plantings from the flat and on the hillside and survival and establishment have been excellent in both areas.

The flat area (24) is heavy clay loam soil and has elevated salts, exchangeable sodium and boron with low calcium and high magnesium. The fact that establishment has been so good on this site shows that soil moisture is the most important factor in achieving successful revegetation. Amendment may be considered unnecessary however an application of gypsum would be beneficial.

Gypsum – broadcast *40kg/100m^2 gypsum*

The hill area (37) is very light sandy soil with very low organic matter and deficiencies of sulphur and trace elements so the fact that establishment has been good is inconsistent with other similar areas which have had problems. It may be due to an unknown factor like a thunderstorm providing moisture at a critical stage.

If the trees are well established and growing well, amendment will not be necessary, however if you want to improve growth try the following:

Gypsum – broadcast *5kg/100m^2 gypsum*

Broadcast the fertilizer & trace elements per 100m^2:

Organic Base (manure/humates)	10kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

(25) BROWNS BEACH

This is another 2011 planting into heavier saline and sodic soil where establishment has been good.

This area (25) has a heavy clay loam soil and elevated salts, exchangeable sodium and boron with very low calcium and high magnesium. The fact that establishment has been so good on this site shows that soil moisture is the most important factor in achieving successful revegetation. Amendment may be considered unnecessary

however and application of lime and gypsum combined would be beneficial.

Lime – broadcast *30kg/100m^2 lime*
Gypsum – broadcast *30kg/100m^2 gypsum*

(26) & (27) MCKINLAY

These areas were planted in 2010 and although vegetation established successfully, it was subsequently destroyed by fire. In area (26) there are no surviving plants but there are some in area (27).

The soils are sandy loams with reasonable nutrient holding capacity and good levels of sulphur, phosphorus and potassium so re-establishing vegetation should be as successful as the first time. The soil could be improved by liming to increase calcium and adding trace elements. Because major elements are good, the trace elements could be added to the planting holes.

(26) & (27) both areas:

Lime – broadcast *20kg/100m^2 lime*

Nutrients – add 25g Terra Cottem to each tube-stock planting hole and increase the rate proportionally for larger trees and shrubs.

(28) HALL

There has been poor establishment on this site planted in 2011 because this appears to be almost pure sand with very low TEC and organic matter which limits its capacity to hold nutrients and water.

Nutrient levels are also low but if any replanting is to be successful the most important amendments will be those that increase water holding capacity.

Broadcast the fertilizer & trace elements <u>per 100m^2</u>:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

Organic material – spread *Organic compost 25mm deep* over the planting area. Incorporate into the top 100-150mm of soil with 1.5kg/100m^2 of Sulphate of Ammonia.

Also consider trialling:

Hydrocell – spread Hydrocell 20mm deep along the planting lines and then make one pass with a rotary hoe to incorporate it into the top 100mm of soil.

Nutrients – add 25g Terra Cottem to each tube-stock planting hole and increase the rate proportionally for larger trees and shrubs.

(29)-(31) BLAKE

Three samples were collected at this site from the 2011 planting area, adjacent remnant vegetation and the proposed 2012 planting area. Establishment of the 2011 plantings has been excellent and because the results from the 2012 site are similar the same results can be expected this year.

Both samples are sandy and would benefit from an application of lime and fertilizer and you could trial compost, Hydrocel and TerraCottem in the 2012 plantings to improve conditions but you may be happy enough with the present results from the site.

If you decide that amendment will be worthwhile:

(29) 2011 plantings

Lime – broadcast *30kg/100m^2 lime*

Broadcast the fertilizer & trace elements <u>per 100m^2</u>:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

(31) 2012 plantings

Apply lime and fertilizer as above and also trial:

Organic material – spread *Organic compost 25mm deep* over the planting area. Incorporate into the top 100-150mm of soil with 1.5kg/100m^2 of Sulphate of Ammonia.

Hydrocell – spread Hydrocell 20mm deep along the planting lines and then make one pass with a rotary hoe to incorporate it into the top 100mm of soil.

Nutrients – add 25g Terra Cottem to each tube-stock planting hole and increase the rate proportionally for larger trees and shrubs.

(32) GRIFFIN

The establishment of 2011 plantings on this site has been excellent. Although alkaline this is a good loam soil with good drainage but adequate nutrient and water holding capacity. No lime or gypsum is needed but phosphorus, potassium and trace elements are low and could be added.

If amendment is considered to be worthwhile:

Broadcast the fertilizer & trace elements per 100m^2:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150

(33) FEIBIG

This site was planted in 2011 and establishment has been poor. Although the exchange capacity and organic matter are higher than in other sites, calcium is very low and magnesium is very high and this may be having an impact on water holding capacity. Major nutrients and trace elements are also lower than desired but still higher than many other sites. Lime is recommended with fertilizer and trace elements if practical.

(33) 2011 plantings

Lime – broadcast *10kg/100m^2 lime*

Broadcast the fertilizer & trace elements per $100m^2$:

Organic Base (manure/humates)	10kg
MAP	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

(34) & (35) LOVEDAY BAY

Two sites were sampled and both areas have had an excellent establishment of plants. Although (34) is lighter, these areas have ideal pH, good sulphur, phosphorus and potassium. Trace elements are low but obviously not limiting the establishment. Calcium is low and magnesium is high so an application of lime may be beneficial.

(34) & (35) 2011 plantings

Lime – broadcast *20kg/100m^2 lime*

(36) HAYTER

The soil at this site is light acidic sand with low organic matter. Calcium and magnesium are both low so an application of dolomite would be beneficial. Phosphorus levels are good but sulphur, potassium and trace elements are needed.

This site is designated for fire and sugar trials. I am not sure what the requirements are for these trials but if the intention is to revegetate this area, I recommend the following:

Lime – broadcast *30kg/100m^2 lime*

Broadcast the fertilizer & trace elements per $100m^2$:

Organic Base (manure/humates)	10kg
Sulphate of Potash	1.5kg
Manganese Sulphate	1kg
Zinc Sulphate	250g
Copper Sulphate	150g
Boron	150g

Apply lime and fertilizer as above and also trial:

Organic material – spread *Organic compost 25mm deep* over the planting area. Incorporate into the top 100-150mm of soil with 1.5kg/100m^2 of Sulphate of Ammonia.

Hydrocell – spread Hydrocell 20mm deep along the planting lines and then make one pass with a rotary hoe to incorporate it into the top 100mm of soil.

Nutrients – add 25g Terra Cottem to each tube-stock planting hole and increase the rate proportionally for larger trees and shrubs.

I am available to discuss the analysis results and program of amendment recommended for these sites, so please contact me if you have any queries.

Phil Barnett

Soil Consultant

phil@proagsoil.com.au
0417 925824

Attachments

1. Sand and clay percentages based on texture

Soil Type	Sand %	Clay %
Sand	88-100	0-9
	95	5
Loamy Sand	65-92	0-11
	78	5
Sandy Loam	70-80	10-20
	75	15
Loam	50-64	12-26
	57	19
Silty Loam	0-75	0-27
	38	14
Sandy Clay Loam	64-82	18-30
	53	24
Clay Loam	37-68	22-39
	52	30
Silty Clay Loam	0-487	28-40
	24	34
Sandy Clay	51-72	28-49
	61	39
Light Clay	31-62	31-45
	46	38
Silty Clay	0-34	41-75
	17	58
Medium Clay	21-52	46-55
	36	50
Heavy Clay	0-44	56-100
	22	79

Figures in green indicate average figure of Sand% or Clay% range