a methodology for locating
SOIL MOISTURE MONITORING EQUIPMENT – 'Kyong', Gloucester

This project has been funded by the Australian Government's National Landcare Program through Hunter Local Land Services. The 'Smarter Irrigation for Profit : Hunter Starting Smarter Project' was conducted during 2018 and managed by Peter Beale – Pastures Officer, Hunter Local Land Services with support from Marguerite White iCd Project Services, Mid Coast Dairy Advancement Group and Dairy NSW.

Background

This Project has been funded through Hunter Local Land Services under the Australian Governments National Landcare Program. The study was conducted on the Forbes family property 'Kyong' at Gloucester.

Objective

The objective of this preliminary report is to provide some insight into the best location for the installation of soil moisture monitoring equipment.

It will also give some insight into the management of irrigation in the field.

The recommendations made are based on a methodology which reviews:

- results from the combination of the EM38 survey;
- validation with soil cores;
- use of IrriSat imagery to view previous wetting and drying cycles and
- what is practical in terms of location within the field.

It is important to note that this methodology provides greater understanding of the field, and should avoid problems, but the actual siting is flexible within a range of locations.

There are limitations with information from only 4 to 6 core sites, and subsurface variability could mean these sites are not highly representative.

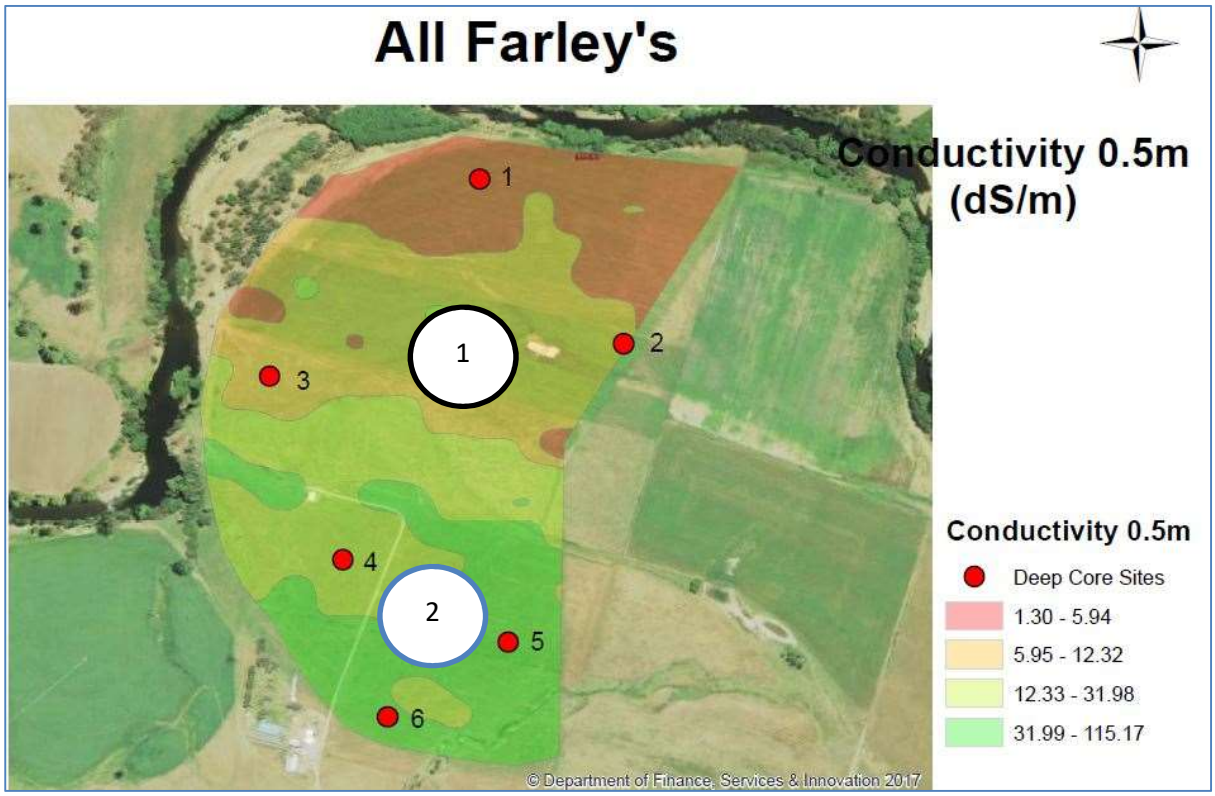
The principles are to locate the probe so that:

1. It will provide greatest representation of the whole or largest paddock needs. i.e somewhere in the largest soil type.
2. It will pre-empt the drying down process for the field. Thus site the probe on soils with towards the lower end of the WHC as they will dry first, provided this does not skew the representation of the whole field.
3. Anomalies are avoided: e.g. locations that stay wetter longer due to a drainage line, or low spots in the field, areas underlain by sand, gravel or at the other extreme where heavy clay would impede drainage.

The data will also provide some rough predictions of Readily Available Water (RAW) from two sources. This will need to be validated over time by observing wetting and drying cycles. The soil chemical properties provide some insight into physical properties and some nutritional issues that can be addressed by fertiliser or other ameliorants.

Soil texture was assessed by hand in the lab, and though useful, there are more precise methods that could be undertaken during installation of the probes.

Summary & Recommendations



1. Soil cores from north to south show a visible and measurable increase in clay content. Texture increases from Sandy Clay or Light Clay (50% Sand, 38% clay) in the north, to a Medium Clay (33% Sand 50% Clay) in the south. This confirms the EM38 data. The presence of gravel, or river rock, in Core 2 suggests the red areas are underlain by gravel beds of river rock. This should be avoided as it is not representative of the entire site.
2. Soil Water Holding Capacity was estimated using Soil Water Express http://www.apsim.info/swe/Default.aspx and other estimates (Appendix
3. The presence of dense impervious clays in Cores 5 and 6 indicate the irrigated area is moving from alluvial to underlain sedimentary material derived from sedimentary rock associated with the surrounding ridges. These soils are more likely to see waterlogging and runoff due to the dense impervious nature of these subsoil clays. Core 6 became stuck in the corer indicating increased clay content.
4. Cores 5 and 6 have elevated ESP% >10% i.e. they are Sodic and this is reflected in dense impervious clays. These cores also have low to very low pH at depth that would be expected to limit species like lucerne, but the impervious sodic soils are more of an issue.
5. Cores, 4, 5 and 6 had a reversal of Ca:Mg ratio at depth. This appears to be associated with heavier clay and the parent material at depth that is derived from the sedimentary rock. This occurs in other parts of the Gloucester area and may also indicate Mg responsive soils but without trials it's is hard to know.

6. In Cores 1,2,3 ESP %, EC and Chloride are all very low indicating well leached profiles.
7. Cores 3 had very low Mg (<1.0 cmol/kg) levels at depth but Ca:Mg ratio were still high. The levels are low enough <1.0 cmol/kg to consider some Mg fertiliser test strips and it may just be associated with lighter texture.
8. All cores had very low potassium to depth <0.2 cmol/kg. This indicates possible response to K fertiliser.
9. Given these sharp contrasts in soil at depth it is not surprising that lucerne and chicory are surviving well on the well-drained section and not the heavy clay area. It is most likely you will always have different species on these soils except perhaps ryegrass through the winter.
10. In locating the probes it make sense to avoid the red areas that may have gravel beds of variable thickness through them and the heaviest clay areas to the south. Therefore to aim for the main probe in the section of light brown EM38. The second probe may go in the heavy clay area to give and insight into the degree of water logging that occurs if irrigation is based on the first probe.
11. There is obviously a lot of flexibility and the property owner needs to think about what best suits his current paddock management but the data shows the EM38 has been quite useful in determining what is happening underneath.
12. It is likely there is a lot of variability across the field even within the EM38 zones.

Figure Paddock layout and natural drainage lines. From the image and site visit is apparent that the pivot covers a large area of alluvial soils but also some area of the upper ridge soils.

Electrical Conductivity EM38 Survey

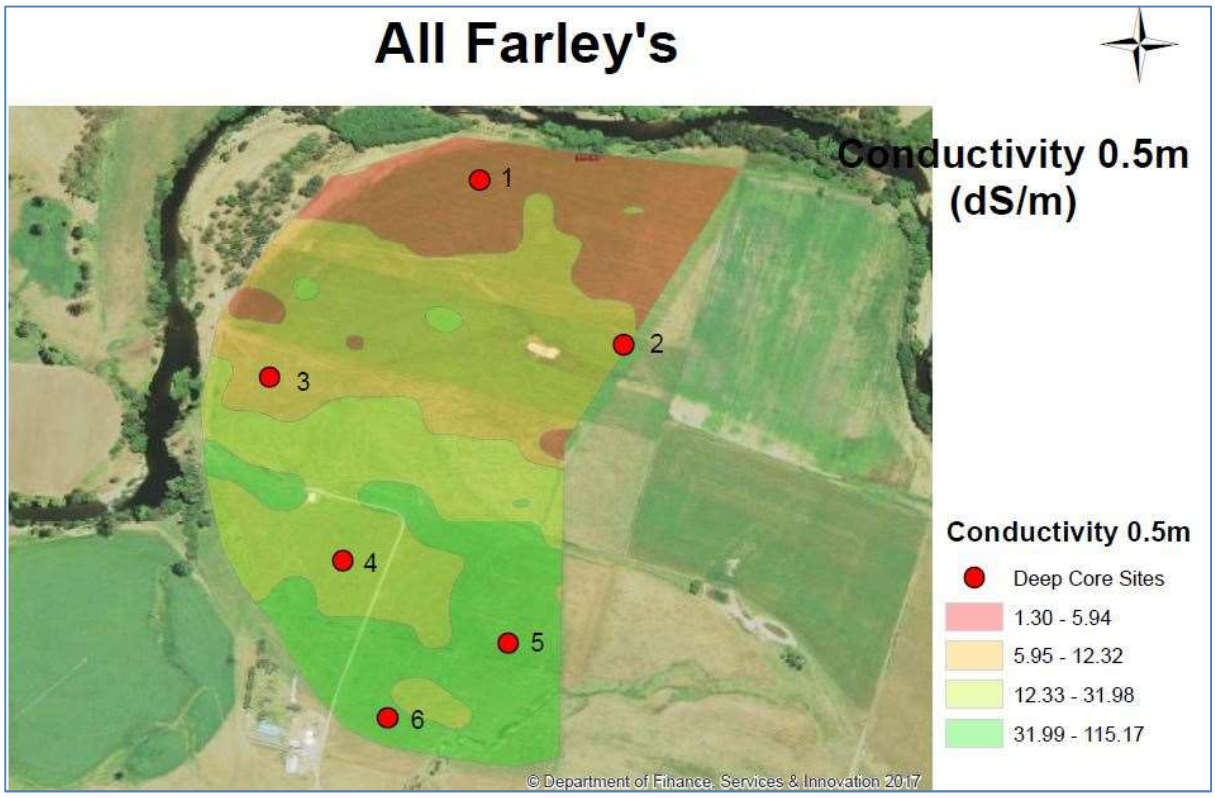


Figure x Conductivity 0 to 0.5 m and deep core sites

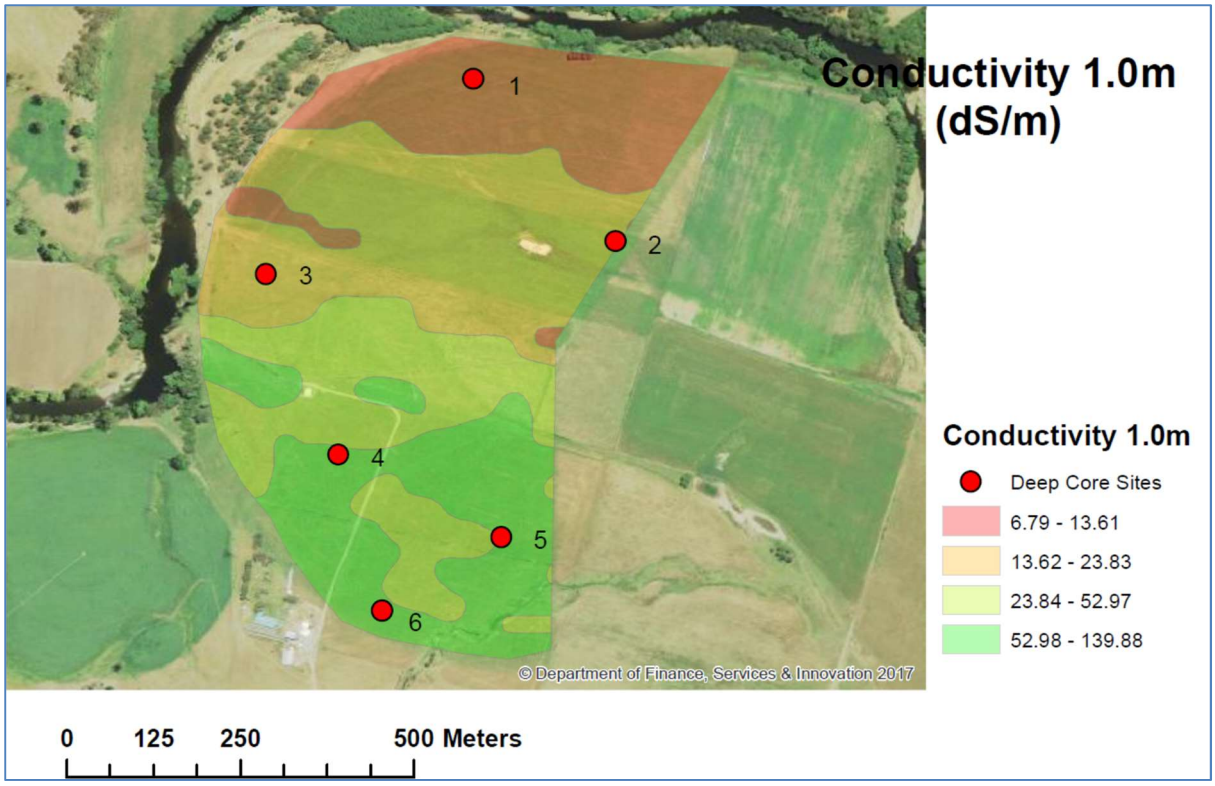


Figure x Conductivity 0 to 0.5 m and deep core sites

13. Soil cores from north to south show a visible and measurable increase in clay content see Tables on following pages. Texture increases from Sandy Clay or Light Clay (50% Sand, 38% clay) n the north, to a Medium Clay (33% Sand 50% Clay) in the south. This confirms the EM38 data. The presence of gravel, or river rock, in Core 2 suggests the red areas are underlain by gravel beds of river rock. This should be avoided as it's is not representative of the entire site.
14. The presence of dense impervious clays in cores 5 and 6 indicate the irrigated area is moving from alluvial to underlain sedimentary material derived from sedimentary rock associated with the surrounding ridges. These soils are more likely to see waterlogging and runoff due to the dense impervious nature of these subsoil clays. Core 6 became stuck in the corer indicating increased clay content.
15. All cores had very low potassium to depth <0.2 cmol/kg. This indicate possible response to K fertiliser
16. Cores 3 had very low Mg (<1.0 cmol/kg) levels at depth but Ca:Mg ratio were still high. The levels are low enough <1.0 cmol/kg to consider some Mg fertiliser test strips and it may just be associated with lighter texture.

Core 3	Exch Mg
	cmol/kg
0-20	1.44
20-40	0.94
40-60	0.85
60-80	0.94
80-100	0.83

17. Cores, 4, 5 and 6 had a reversal of Ca:Mg ratio at depth. This appears to be associated with heavier clay and the parent material at depth that is derived from the sedimentary rock. This occurs in other part of the Gloucester area and may also indicate Mg responsive soils but without trials it's is hard to know.
18. In Cores 1,2,3 ESP %, EC and Chloride are all very low indicating well leached profiles.
19. However Cores 5 and 6 have elevated ESP% >10% and this is reflected in dense impervious clays. These cores also have low to very low pH at depth that would be expected to limit species like lucerne, but the impervious sodic soils are more of an issue.

Soil Core Data

Core 1

Core 2

Core 3

CORE 1										
Depth	pH	EC	ECEC	Ca/ Mg	ESP%	Exch K	Field Texture	Bulk Density	3 WHC** USDA	2 WHC
cm		dS/m	cmol/ kg		%	cmol/kg		g/cm3	mm/20cm	mm/20cm
0-20	5.5	0.09	11.3	4.69	2.38	0.30	SC	0.7	22.0	39.3
20-40	6.0	0.06	9.2	4.75	3.21	0.15	SC	0.9	22.0	37.8
40-60	6.0	0.05	10.8	4.70	3.06	0.16	SC	1.6	22.0	33.0
60-80	5.9	0.05	8.4	3.62	3.97	0.10	SC	1.0	22.0	36.6
80-100	6.0	0.05	9.1	3.35	3.34	0.13	SC	1.3	22.0	34.8
									110.0	181.6

CORE 2										
Depth	pH	EC	ECEC	Ca/ Mg	ESP%	Exch K	Field Texture	Bulk Density	3 WHC	2 WHC
cm		dS/m	cmol/ kg		%	cmol/kg		g/cm3	mm/20cm	mm/20cm
0-20	6.04	0.15	14.2	3.08	3.70	1.07	SC	0.9	22.0	37.8
20-40	5.02	0.08	9.83	6.11	5.49	0.16	SC	1.2	22.0	35.6
40-60	5.03	0.08	17.9	4.93	4.55	0.22	SC	1.4	22.0	33.9
60-80	5.28	0.08	9.80	2.40	2.87	0.10	SC	1.7	22.0	32.5
80-100	5.41	0.07	9.9	2.35	2.35	0.12	SC	1.5	22.0	33.3
									110.0	173.1

CORE 3										
Depth	pH	EC	ECEC	Ca/ Mg	ESP%	Exch K	Field Texture	Bulk Density	3 WHC	2 WHC
cm		dS/m	cmol/ kg		%	cmol/kg		g/cm3	mm/20cm	mm/20cm
0-20	4.99	0.07	8.4	4.58	2.79	0.14	SC	1.0	22.0	36.9
20-40	4.95	0.04	6.7	5.63	4.15	0.12	SC	1.5	22.0	33.8
40-60	5.37	0.03	4.6	4.05	4.57	0.08	SC	1.2	22.0	35.4
60-80	5.64	0.03	5.3	4.17	6.40	0.10	SL	1.3	18.0	38.3
80-100	5.86	0.03	4.4	3.79	6.08	0.11	SL	0.8	18.0	42.0
									102.0	186.4

Core 4

Core 5

Core 6

CORE 4										
Depth	pH	EC	ECEC	Ca/ Mg	ESP%	Exch K	Field Texture	Bulk Density	3 WHC	2 WHC
cm		dS/m	cmol/ kg		%	cmol/kg		g/cm3	mm/20cm	mm/20cm
0-20	5.85	0.07	6.9	5.04	5.31	0.11	LMC	1.3	24.0	24.6
20-40	4.61	0.1	12.7	0.51	10.6	0.13	MC	1.3	28.0	19.0
40-60	4.45	0.2	14.1	0.15	15.1	0.13	LC	1.2	24.0	25.3
60-80	4.38	0.2	12.6	0.18	16.8	0.19	MC	1.5	28.0	18.5
80-100	4.32	0.1	10.5	0.07	24.8	0.12	MC	1.6	28.0	11.8
									132.0	99.3

CORE 5										
Depth	pH	EC	ECEC	Ca/ Mg	ESP%	Exch K	Field Texture	Bulk Density	3 WHC	2 WHC
cm		dS/m	cmol/ kg		%	cmol/kg		g/cm3	mm/20cm	mm/20cm
0-20	5.84	0.10	11.0	4.58	3.21	0.14	MC	1.0	28.0	20.3
20-40	4.56	0.12	9.1	1.52	6.21	0.10	LMC	1.6	24.0	23.5
40-60	3.96	0.17	12.5	0.46	11.2	0.15	MC	1.4	28.0	18.7
60-80	3.88	0.14	13.1	0.07	18.8	0.13	LC	1.5	24.0	23.8
80-100	3.89	0.09	12.9	0.12	18.5	0.21	MC	1.5	28.0	15.6
									132.0	101.9

CORE 6										
Depth	pH	EC	ECEC	Ca/ Mg	ESP%	Exch K	Texture	Bulk Density	3 WHC	2 WHC
cm		dS/m	cmol/ kg		%	cmol/kg		g/cm3	mm/20cm	mm/20cm
0-20	4.9	0.14	7.33	2.0	6.4	0.25	MC	0.5	28.0	22.3
20-40	4.6	0.11	7.72	1.4	6.4	0.20	MC	0.5	28.0	22.3
40-60	4.3	0.09	9.95	0.7	7.2	0.22	MC	0.5	28.0	22.1
60-80	4.2	0.10	11.0	0.4	8.8	0.14	MC	0.7	28.0	21.4
80-100	4.1	0.12	11.5	0.3	10.9	0.14	MC	0.7	28.0	21.2
									140.0	109.4

Appendix 1: Soil Water Express Predictions (http://www.apsim.info/swe/Default.aspx)

Core 1

Soil Water Profiler

Modify Calculation Settings

Soil Characteristics

Layer			Physical		Texture			Chemistry			
No.	Top (cm)	Bottom (cm)	BD (g/cm^3)	Rock (Vol %)	Sand (%)	Clay (%)	Texture	ESP (%)	EC (µS/cm)	Cl (mg/kg)	B (mg/kg)
1	0	20	0.7	0	50	38	Light Clay	2.38	0.09	17.3	
2	20	40	0.9	0	50	38	Light Clay	3.21	0.6	20.6	
3	40	60	1.6	0	50	38	Light Clay	3.06	0.5	20.6	
4	60	80	1.0	0	50	38	Light Clay	3.97	0.5	25.4	
5	80	100	1.3	0	50	38	Light Clay	3.34	0.5	16.7	
6	100										

Add New Row

Estimated Soil Water Profile

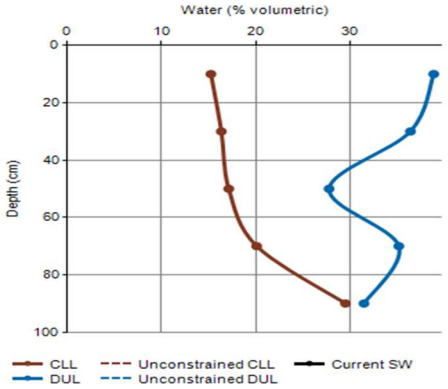
Layer			Physical	Unconstrained Soil Water			Plant Available Water Capacity		
No.	Depth (cm)	Thickness (cm)	BD (g/cm^3)	CLL (Vol %)	DUL (Vol %)	SW (mm)	CLL (Vol %)	DUL (Vol %)	SW (mm)
1	10	20	0.70	15	39	47	15	39	47
2	30	20	0.90	16	36	40	16	36	40
3	50	20	1.60	17	28	21	17	28	21
4	70	20	1.00	20	35	30	20	35	30
5	90	20	1.30	29	31	4	29	31	4
6									

Monitoring Device Soil Water Profile

Layer			Profile Estimates		Calibration Readings		Plant Available Water		
No.	Depth (cm)	Thickness (cm)	CLL (Vol %)	DUL (Vol %)	CLL Raw Reading	DUL Raw Reading	CURRENT Raw Reading	SW (Vol %)	SW (mm)
1	10	20	15.2	38.8					
2	30	20	16.3	36.3					
3	50	20	17.1	27.7					
4	70	20	20.1	35.1					
5	90	20	29.5	31.4					
6									

Soil Profile Summary

Light Clay



Plant Available Water Capacity (PAWC)	142mm
Profile Depth	100cm
Average Water Availability per cm	1.6mm/cm
Depth to Solid Rock	N/A
Unconstrained PAWC	142mm
Plant Available Water (PAW)	0mm
% of PAWC	0%

Core 2

Soil Water Profiler

Modify Calculation Settings

Soil Characteristics

Layer			Physical		Texture			Chemistry			
No.	Top (cm)	Bottom (cm)	BD (g/cm^3)	Rock (Vol %)	Sand (%)	Clay (%)	Texture	ESP (%)	EC (µS/cm)	Cl (mg/kg)	B (mg/kg)
1	0	20	0.9	0	50	38	Light Clay	3.70	0.15	49.1	
2	20	40	1.2	0	50	38	Light Clay	5.49	0.08	29.0	
3	40	60	1.4	0	50	38	Light Clay	4.55	0.08	32.1	
4	60	80	1.7	0	50	38	Light Clay	2.87	0.08	43.8	
5	80	100	1.5	0	50	38	Light Clay	2.35	0.07	46.2	
6	100										

Add New Row

Estimated Soil Water Profile

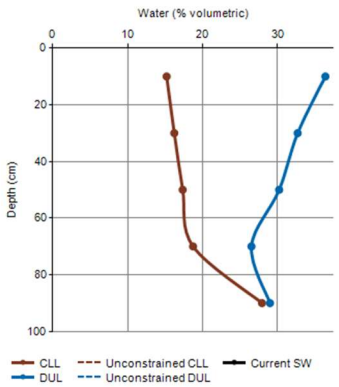
Layer			Physical	Unconstrained Soil Water			Plant Available Water Capacity		
No.	Depth (cm)	Thickness (cm)	BD (g/cm^3)	CLL (Vol %)	DUL (Vol %)	SW (mm)	CLL (Vol %)	DUL (Vol %)	SW (mm)
1	10	20	0.90	15	36	42	15	36	42
2	30	20	1.20	16	33	33	16	33	33
3	50	20	1.40	17	30	26	17	30	26
4	70	20	1.70	19	26	16	19	26	16
5	90	20	1.50	28	29	2	28	29	2
6									

Monitoring Device Soil Water Profile

Layer			Profile Estimates		Calibration Readings		Plant Available Water		
No.	Depth (cm)	Thickness (cm)	CLL (Vol %)	DUL (Vol %)	CLL Raw Reading	DUL Raw Reading	CURRENT Raw Reading	SW (Vol %)	SW (mm)
1	10	20	15.2	36.3					
2	30	20	16.2	32.6					
3	50	20	17.3	30.2					
4	70	20	18.7	26.5					
5	90	20	27.9	29.0					
6									

Soil Profile Summary

Light Clay



Plant Available Water Capacity (PAWC)	119mm
Profile Depth	100cm
Average Water Availability per cm	1.3mm/cm
Depth to Solid Rock	N/A
Unconstrained PAWC	119mm
Plant Available Water (PAW)	0mm
% of PAWC	0%

Core 3

Soil Water Profiler

Modify Calculation Settings

Soil Characteristics

Layer			Physical		Texture			Chemistry			
No.	Top (cm)	Bottom (cm)	BD (g/cm³)	Rock (Vol %)	Sand (%)	Clay (%)	Texture	ESP (%)	EC (µS/cm)	Cl (mg/kg)	B (mg/kg)
1	0	20	1.0	0	50	38	Light Clay	2.79	0.07	18.4	
2	20	40	1.5	0	50	38	Light Clay	4.15	0.04	9.90	
3	40	60	1.2	0	50	38	Light Clay	4.57	0.03	4.60	
4	60	80	1.3	0	65	20	Loam	6.40	0.03	11.2	
5	80	100	0.8	0	65	20	Loam	6.08	0.03	11.4	
6	100										

Add New Row

Estimated Soil Water Profile

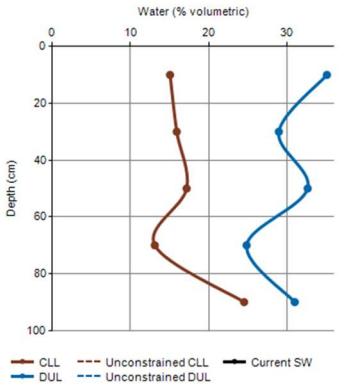
Layer			Physical	Unconstrained Soil Water			Plant Available Water Capacity		
No.	Depth (cm)	Thickness (cm)	BD (g/cm³)	CLL (Vol %)	DUL (Vol %)	SW (mm)	CLL (Vol %)	DUL (Vol %)	SW (mm)
1	10	20	1.00	15	35	40	15	35	40
2	30	20	1.50	16	29	26	16	29	26
3	50	20	1.20	17	33	31	17	33	31
4	70	20	1.30	13	25	23	13	25	23
5	90	20	0.80	25	31	13	25	31	13
6									

Monitoring Device Soil Water Profile

Layer			Profile Estimates		Calibration Readings		Plant Available Water		
No.	Depth (cm)	Thickness (cm)	CLL (Vol %)	DUL (Vol %)	CLL Raw Reading	DUL Raw Reading	CURRENT Raw Reading	SW (Vol %)	SW (mm)
1	10	20	15.1	35.1					
2	30	20	15.9	29.0					
3	50	20	17.2	32.6					
4	70	20	13.1	24.8					
5	90	20	24.5	31.0					
6									

Soil Profile Summary

Light Clay



Plant Available Water Capacity (PAWC)	134mm
Profile Depth	100cm
Average Water Availability per cm	1.5mm/cm
Depth to Solid Rock	N/A
Unconstrained PAWC	134mm
Plant Available Water (PAW)	0mm
% of PAWC	0%

Core 4

Soil Water Profiler

Modify Calculation Settings

Soil Characteristics

Layer			Physical		Texture			Chemistry			
No.	Top (cm)	Bottom (cm)	BD (g/cm³)	Rock (Vol %)	Sand (%)	Clay (%)	Texture	ESP (%)	EC (µS/cm)	Cl (mg/kg)	B (mg/kg)
1	0	20	1.3	0	36	43	Light Clay	5.31	0.07	46.9	
2	20	40	1.3	0	33	50	Medium Clay	10.6	0.11	16.8	
3	40	60	1.2	0	50	38	Light Clay	15.1	0.17	13.2	
4	60	80	1.5	0	33	50	Medium Clay	16.8	0.16	18.9	
5	80	100	1.6	0	33	50	Medium Clay	24.8	0.12	44.6	
6	100										

Add New Row

Estimated Soil Water Profile

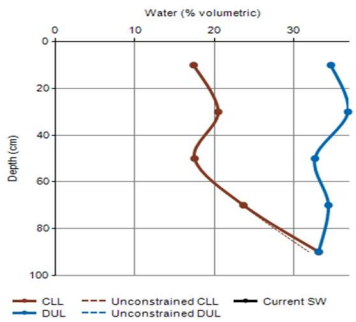
Layer			Physical	Unconstrained Soil Water			Plant Available Water Capacity		
No.	Depth (cm)	Thickness (cm)	BD (g/cm³)	CLL (Vol %)	DUL (Vol %)	SW (mm)	CLL (Vol %)	DUL (Vol %)	SW (mm)
1	10	20	1.30	17	35	35	17	35	35
2	30	20	1.30	20	37	33	20	37	33
3	50	20	1.20	18	33	30	18	33	30
4	70	20	1.50	24	34	22	24	34	21
5	90	20	1.60	32	33	2	33	33	0
6									

Monitoring Device Soil Water Profile

Layer			Profile Estimates		Calibration Readings		Plant Available Water		
No.	Depth (cm)	Thickness (cm)	CLL (Vol %)	DUL (Vol %)	CLL Raw Reading	DUL Raw Reading	CURRENT Raw Reading	SW (Vol %)	SW (mm)
1	10	20	17.4	34.7					
2	30	20	20.5	36.8					
3	50	20	17.5	32.6					
4	70	20	23.7	34.3					
5	90	20	33.1	33.1					
6									

Soil Profile Summary

Light Clay over Medium Clay over Light Clay



Plant Available Water Capacity (PAWC)	119mm
Profile Depth	100cm
Average Water Availability per cm	1.3mm/cm
Depth to Solid Rock	N/A
Unconstrained PAWC	122mm
Plant Available Water (PAW)	0mm
% of PAWC	0%

Core 5

Soil Water Profiler

Modify Calculation Settings

Soil Characteristics

Layer			Physical		Texture			Chemistry			
No.	Top (cm)	Bottom (cm)	BD (g/cm³)	Rock (Vol %)	Sand (%)	Clay (%)	Texture	ESP (%)	EC (µS/cm)	CI (mg/kg)	B (mg/kg)
1	0	20	1.0	0	33	50	Medium Clay	3.21	0.10	29.9	
2	20	40	1.6	0	36	43	Light Clay	6.21	0.12	9.20	
3	40	60	1.4	0	33	50	Medium Clay	11.2	0.17	16.1	
4	60	80	1.5	0	50	38	Light Clay	18.8	0.14	28.5	
5	80	100	1.5	0	33	50	Medium Clay	18.5	0.09	39.1	
6	100										

Add New Row

Estimated Soil Water Profile

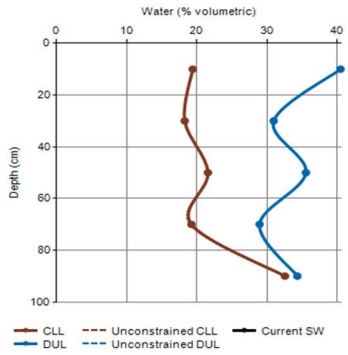
Layer			Physical	Unconstrained Soil Water			Plant Available Water Capacity		
No.	Depth (cm)	Thickness (cm)	BD (g/cm³)	CLL (Vol %)	DUL (Vol %)	SW (mm)	CLL (Vol %)	DUL (Vol %)	SW (mm)
1	10	20	1.00	19	40	42	19	40	42
2	30	20	1.60	18	31	25	18	31	25
3	50	20	1.40	22	36	28	22	36	28
4	70	20	1.50	19	29	20	19	29	19
5	90	20	1.50	32	34	4	33	34	4
6									

Monitoring Device Soil Water Profile

Layer			Profile Estimates		Calibration Readings		Plant Available Water		
No.	Depth (cm)	Thickness (cm)	CLL (Vol %)	DUL (Vol %)	CLL Raw Reading	DUL Raw Reading	CURRENT Raw Reading	SW (Vol %)	SW (mm)
1	10	20	19.4	40.5					
2	30	20	18.3	31.0					
3	50	20	21.6	35.6					
4	70	20	19.3	29.0					
5	90	20	32.6	34.3					
6									

Soil Profile Summary

Medium Clay over Light Clay over Medium Clay



Plant Available Water Capacity (PAWC)	118mm
Profile Depth	100cm
Average Water Availability per cm	1.3mm/cm
Depth to Solid Rock	N/A
Unconstrained PAWC	120mm
Plant Available Water (PAW)	0mm
% of PAWC	0%

Core 6

Soil Water Profiler

Modify Calculation Settings

Soil Characteristics

Layer			Physical		Texture			Chemistry			
No.	Top (cm)	Bottom (cm)	BD (g/cm³)	Rock (Vol %)	Sand (%)	Clay (%)	Texture	ESP (%)	EC (µS/cm)	CI (mg/kg)	B (mg/kg)
1	0	20	0.5	0	33	50	Medium Clay	6.41	0.14	45.7	
2	20	40	0.5	0	33	50	Medium Clay	6.42	0.11	27.9	
3	40	60	0.5	0	33	50	Medium Clay	7.17	0.09	19.2	
4	60	80	0.7	0	33	50	Medium Clay	8.75	0.10	16.9	
5	80	100	0.7	0	33	50	Medium Clay	10.9	0.12	21.0	
6	100										

Add New Row

Estimated Soil Water Profile

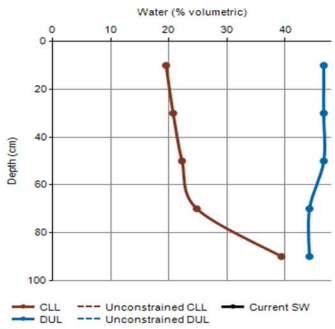
Layer			Physical	Unconstrained Soil Water			Plant Available Water Capacity		
No.	Depth (cm)	Thickness (cm)	BD (g/cm³)	CLL (Vol %)	DUL (Vol %)	SW (mm)	CLL (Vol %)	DUL (Vol %)	SW (mm)
1	10	20	0.50	20	47	54	20	47	54
2	30	20	0.50	21	47	52	21	47	52
3	50	20	0.50	22	47	49	22	47	49
4	70	20	0.70	25	44	39	25	44	39
5	90	20	0.70	39	44	10	39	44	10
6									

Monitoring Device Soil Water Profile

Layer			Profile Estimates		Calibration Readings		Plant Available Water		
No.	Depth (cm)	Thickness (cm)	CLL (Vol %)	DUL (Vol %)	CLL Raw Reading	DUL Raw Reading	CURRENT Raw Reading	SW (Vol %)	SW (mm)
1	10	20	19.5	46.6					
2	30	20	20.7	46.6					
3	50	20	22.3	46.6					
4	70	20	24.8	44.2					
5	90	20	39.4	44.2					
6									

Soil Profile Summary

Medium Clay



Plant Available Water Capacity (PAWC)	203mm
Profile Depth	100cm
Average Water Availability per cm	2.3mm/cm
Depth to Solid Rock	N/A
Unconstrained PAWC	203mm
Plant Available Water (PAW)	0mm
% of PAWC	0%