

Soil Mapping and Interpretation - what data have we collected and how are we using it?



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Setting the Scene

Limestone Park' Rex Tout - Irrigation and Infrastructure



- Centre Pivot Irrigator
- Lateral Move Irrigator
- K-Line Irrigation
- River Pump
- Supply Bore
- Boundary Fence
- Internal Fences
- Water Supply Pipes
- Effluent Pond

0 140 280 560
Metres

Map Created by: G Truman - NWLLS - 2016
Datum: WGS 84 Z50
Map created for Dairy Irrigation Project
Base Information and ADS40 Imagery (July 2010) courtesy of NSW Land and Property Information Bathurst
Disclaimer: Data has been extracted from digitized field information.
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Activities: Soil Mapping and Interpretation



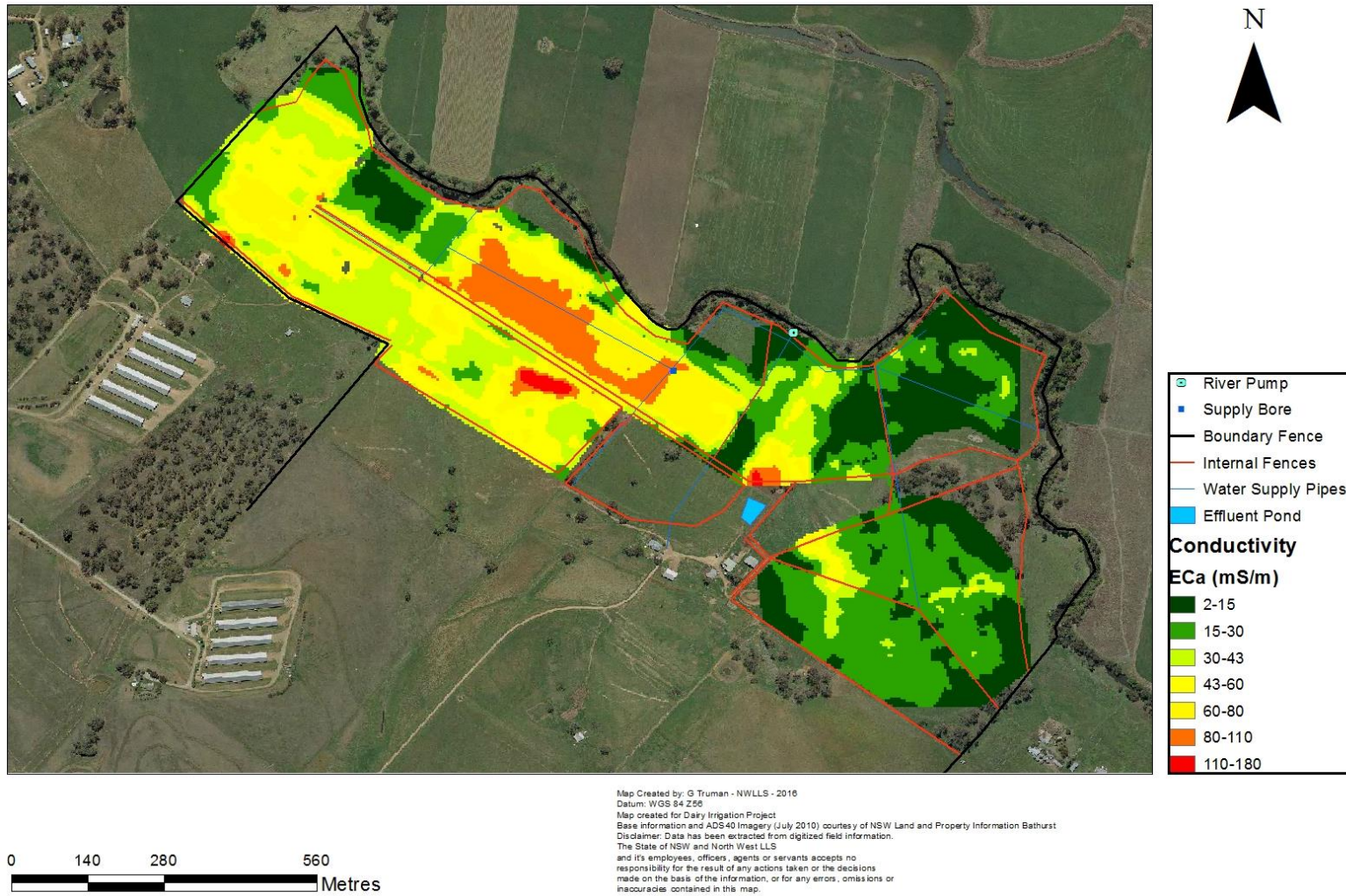
EM38 Conductivity Meter – maps apparent electrical conductivity (ECa)

Soil Texture
Salinity
Depth to Bedrock
Soil Moisture
Clay Type and Content



EMI Survey – what does it show us??

Limestone Park' Rex Tout - EMI Survey



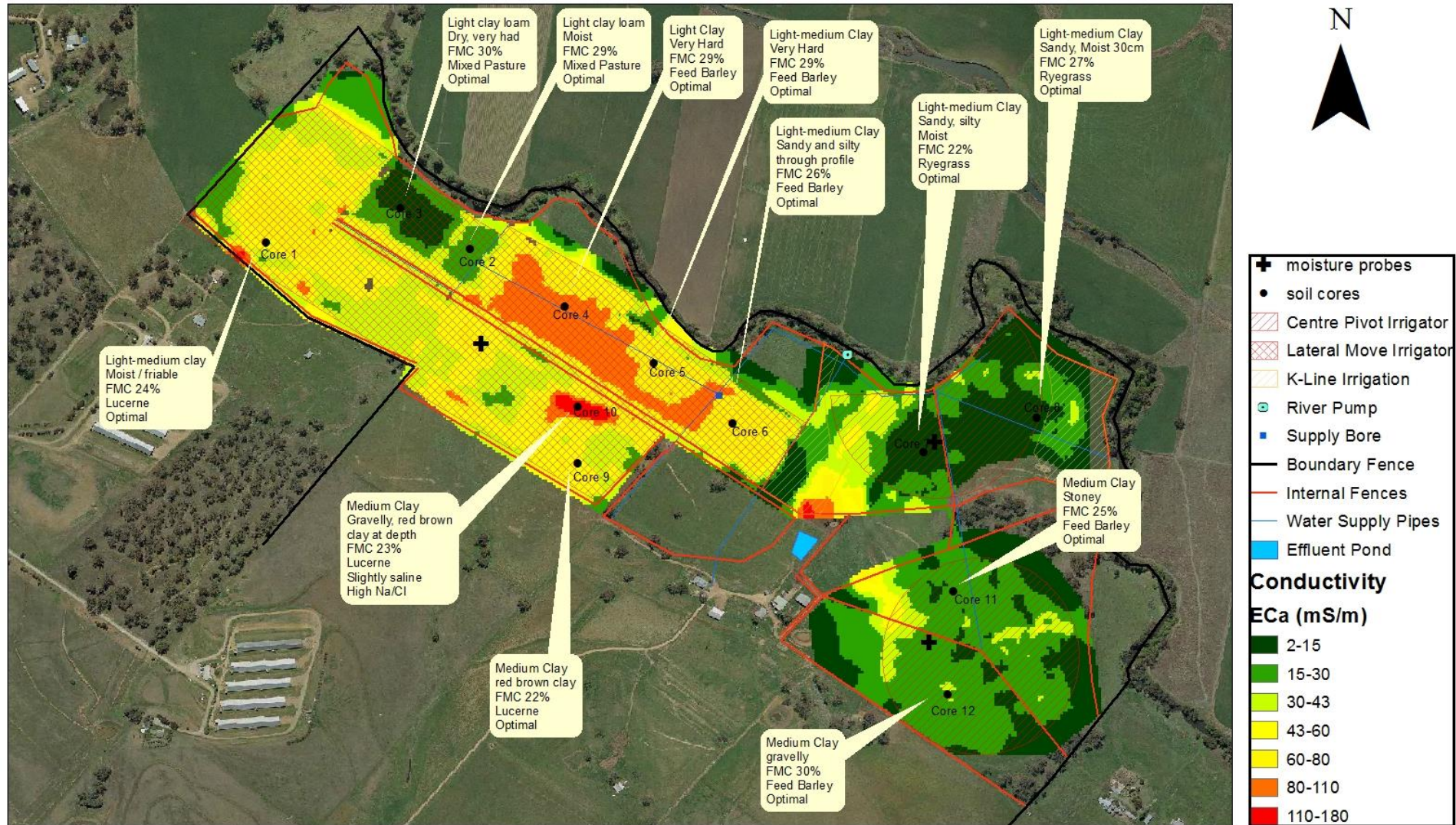
With some soil coring and analysis....



Soil Analysis

	Depth	Field Moisture			pH (H2O)		pH (CaCl2)		Sol. Cl		ECse	Texture	ECe	Salinity	EM38V	Ex K	Optimum
Site	cm	%	Field Texture	Description	pH units		pH units		mg/kg		dS/m	Conv	dS/m		ECa	mg/kg	180-250
Site 1	0-20	23.6%	Light medium clay	dark brown, moist, roots, friable	7.2	mildly alkaline	6.6	neutral	20.1	Low	0.11	8.6	0.9	non saline		290	High
-31.165231	20-50	24.2%	Light medium clay		7.3	mildly alkaline	6.7	neutral	21.1	Low	0.18	8.6	1.5	non saline		221	Optimal
151.035594	60-90	24.2%		brown, harder	7.5	mildly alkaline	6.7	neutral	14.5	Low	0.07	8.6	0.6	non saline	75	212	Optimal
Core 1		24.0%			7.3	mildly alkaline	6.6	neutral	18.6		0.12	8.6	1.0	non saline	75	241	
Site 2	0-20	29.7%	Clay Loam	brown clay	7.0	neutral	6.6	neutral	16.0	Low	0.23	8.6	2.0	non saline		228	Optimal
-31.165332	30-50	32.9%	Light Clay	moist brown clay	7.5	mildly alkaline	6.8	neutral	37.7	Low	0.16	8.6	1.4	non saline		184	Optimal
151.038736	90-110	25.3%		dry brown clay	7.9	mildly alkaline	7.1	neutral	41.5	Low	0.13	8.6	1.1	non saline	0	201	Optimal
Core 2		29.3%			7.4	mildly alkaline	6.8	neutral	31.7		0.17	8.6	1.5			204	
Site 3	0-20	29.7%	Clay Loam	brown clay, moist @ 30cm	6.7	neutral	6.2	neutral	21.5	Low	0.16	8.6	1.4	non saline		275	High
-31.164689	50-70	33.7%	Light medium clay	brown clay dry	7.5	mildly alkaline	6.8	neutral	94.0	Low	0.22	8.6	1.9	non saline		388	High
151.03766	90-110	28.7%		dry hard, gravelly	7.9	mildly alkaline	7.1	neutral	60.6	Low	0.19	8.6	1.6	non saline	50	229	Optimal
Core 3		30.7%			7.4	mildly alkaline	6.7	neutral	58.7		0.19	8.6	1.6	non saline	50	297	High
Site 4	0-20	25.1%	Light Clay	brown, soft, silty	6.9	neutral	6.5	neutral	13.1	Low	0.14	8.6	1.2	non saline		153	Optimal
-31.166231	40-60	27.9%	Light Clay	dark brown, very hard @ 50cm	7.5	mildly alkaline	6.8	neutral	20.9	Low	0.11	8.6	0.9	non saline		307	High
151.040184	90-110	33.5%			7.9	mildly alkaline	7.1	neutral	74.0	Low	0.16	8.6	1.4	non saline	95	316	High
Core 4		28.8%			7.4	mildly alkaline	6.8	neutral	36.0		0.14	8.6	1.2	non saline	95	259	
Site 5	0-20	28.1%	Light Medium Clay	brown	6.7	neutral	6.3	neutral	44.6	Low	0.25	8.6	2.2	slightly saline		411	High
-31.167076	40-60	33.7%	Light Medium Clay	dark brown	7.5	mildly alkaline	6.7	neutral	31.5	Low	0.12	8.6	1.0	non saline		193	Optimal
151.041561	90-110	27.1%			7.7	mildly alkaline	7.0	neutral	122.0	Slight	0.20	8.6	1.7	non saline		298	High
Core 5		29.6%			7.3	mildly alkaline	6.7	neutral	66.0		0.19	8.6	1.6	non saline		301	

Limestone Park' Rex Tout - Irrigation, EM Survey and Soil Type



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 Metres

Characteristics of the soils - broadly

Landscape:

Peel River Alluvium - Level plain and gently inclined slopes and low relief (1-9m).

Duri Hills – rolling to undulating hills.

Soil:

Peel River Alluvium - Brown Dermosols dominate throughout, with deep Brown Chromosols on the river levee banks.

Duri Hills – shallow to moderately deep Brown Chromosols (Red-Brown Earths)

Geology:

Peel River Alluvium - sand, silt, clay and gravel overlying mudstone, siltstone.

Duri Hills - derived from andesite and mudstone from Devonian and Carboniferous periods.

What we know about the soils – locally (100cm)



- ☐ Good structure, friable, good drainage (some sandy / silty subsoils).
- ☐ Some soils hard, dry at depth (sandy layer) above, clay below (less permeable).
- ☐ Good root structure with roots to at least 100cm.
- ☐ Medium-light clay, clay loam overlying medium clay.
- ☐ pH (6.2 – 8.8) neutral – alkaline.
- ☐ non saline (except core 10 – break of slope – slightly saline).
- ☐ Chlorides (low) except core 10 slight.
- ☐ Exchangeable cations (potassium, calcium, magnesium) Optimal/High.
- ☐ Exchangeable sodium – optimum except core 10 (High) – derived from Red Brown Earths high in sodium chloride salts.

How are we going to use this data?

- EM Data provides a layer (x-ray of what is below the surface) – can use it for future management decisions.
- Locating monitoring equipment (c-probes / soil cores / logging equipment).
- Irrigation scheduling – soil types, high / low water holding capacity, variable rate.
- Helping to delineate changes in biomass, yield, and pasture quality.
- Planning future pasture establishment (keeping within a specific soil type).

Other applications:

- ❖ Mapping salinity – extent and monitoring these areas.
- ❖ Defining the lateral variation in conductivity across a paddock (relate to other factors with soil tests).
- ❖ Siting irrigation storages and developing / modifying irrigation areas, installing pivot and lateral move irrigation systems.
- ❖ Siting infrastructure – high clay content (storages)
- ❖ Identifying textural variation (light sandy soils – heavy clay – plant / crop suitability)
- ❖ Selecting sites for soil cores (getting them in areas that are uniform)

and these are the girls that benefit from all this work!!?

