Werrimul - Heavy Flat

Depth cm	Avg PR kPa	Texture	Clay %	OC %	ECEC Cmol	$EC_{1:5}$ dS/m	pH w	MinN mg/kg	MinN kg/ha	Col P mg/kg	PBI	Ex.K mg/kg	KCl Sulfur mg/kg	Ex Na %	Boron mg/kg
0-10	1898	Sandy loam	10.2	0.59	9.56	0.09	7.78	4.1	6	28	44	508	19	1.2	0.59
10-20	2161	Sandy loam	9.6	0.43	11.9	0.21	8.07	4.3	7	27	48	391	12	3.6	0.6
20-35	2343	Clay loam	32.0	0.33	28	0.30	9.14	9.3	22	<5.0	71	515	8.3	15	1.8
35-70	2264 2466 2926 2816	Clay loam	30.1	0.23	34.7	0.73	9.31	13	71	<5.0	139	442	74	18	7.4
70-100	-	Clay loam	26.7	0.17	38.3	2.50	8.84	14.5	67	<5.0	182	440	360	28	17

- Soil strength – Moderate to severe below 20 cm
- Texture – >10% clay at the surface and no water repellence detected. Increasing clay content with depth and moderate to high cation exchange capacity.
- Organic Carbon – Moderately low
- pH extremes – Moderately to severely alkaline with depth. Severe effervescence in the 35-70 cm layer.
- Nutrients – N – 173 kg/ha of mineral N to 1m depth, but only 35 kg of this is present in the top 35 cm where crop roots can more freely explore.
- Nutrients – Sufficient phosphorus, potassium and sulphur for this environment
- Nutrients – Deficient in iron (6.1 mg/kg)
- Subsoil hostilities – moderately saline and sodic below 20 cm and severely below 70cm combined with severely elevated boron (toxicity), no doubt contributing to the bulge of nitrogen present there.

Take home message: Salinity, alkalinity and poor structure combine to limit root growth and reduce productivity.

Werrimul - Mid Slope

Depth cm	Avg PR kPa	Texture	Clay %	OC %	ECEC Cmol	$EC_{1:5}$ dS/m	pH w	MinN mg/kg	MinN kg/ha	Col P mg/kg	PBI	Ex.K mg/kg	KCl Sulfur mg/kg	Ex Na %	Boron mg/kg
0-10	1646	Sand	5.7	0.53	8.82	0.096	8.27	3.3	5	25	29	405	8.3	0.7	0.51
10-20	2503	Sand	5.9	0.44	9.97	0.087	8.6	2.9	4	6.8	30	299	2.5	0.4	0.61
20-40	2134 1681	Sandy loam	10.1	0.61	24.9	0.13	8.36	10.9	34	<5.0	88	344	5.4	0.4	1.5
40-60	1791 1966	Sandy loam	12.6	0.45	26.1	0.13	8.58	6.2	19	<5.0	90	272	6.9	0.9	1.9
60-80	2727	Loam	22.1	0.26	26.8	0.2	9.08	6.2	19	<5.0	148	383	6.5	5.2	2.4
80-100		Loam	22.8	0.19	28	0.35	9.69	14.5	45	<5.0	210	526	6.2	10	4.4

- Soil strength – Plough pan at 17-20 cm and moderate below.
- Texture – sand at the surface, non-repellent. Increasing clay content with depth and moderate cation exchange capacity throughout.
- Organic Carbon – Moderately low
- pH extremes – Moderately to severely alkaline with depth. Severe effervescence below 15 cm.
- Nutrients – N – 127 kg/ha of mineral N to 1m depth, with only 62 kg of present in the top 60 cm where crop roots freely explore; sufficient for 1.5 t/ha of wheat.
- Nutrients – Sufficient phosphorus, potassium and sulphur for this environment
- Nutrients – Deficient in iron (3.1 mg/kg) and marginal copper (0.25 mg/kg).
- Subsoil hostilities – Severely saline and sodic below 80 cm.

Take home message: This zone holds more water and nutrients than the dune while avoiding the severe salinity and structural constraints of the flats.

Werrimul - Sand Dune

Depth cm	Avg PR kPa	Texture	Clay %	OC %	ECEC Cmol	$EC_{1:5}$ dS/m	pH w	MinN mg/kg	MinN kg/ha	Col P mg/kg	PBI	Ex.K mg/kg	KCl Sulfur mg/kg	Ex Na %	Boron mg/kg
0-10	1503	Sand	4.7	0.37	2.86	0.04	6.79	8.3	13	17	19	117	2.5	0.5	0.13
10-20	2396	Sand	5.2	0.3	3.31	0.03	6.99	2.1	3	13	16	99	<2.5	0.6	0.17
20-40	2913 2925	Sand	5.6	0.22	4.4	0.06	8.46	1.8	6	<5.0	21	69	<2.5	0.5	0.17
40-60	2500 2111	Loamy sand	6.4	0.13	18	0.08	8.84	1.8	6	<5.0	31	53	<2.5	<0.2	0.25
60-100	1857	Sand	6.3	0.13	19	0.09	8.96	1.8	11	<5.0	54	56	3.2	0.6	0.47

- Soil strength – Moderate to severe below 10 cm
- Texture – Deep sandy soil with no water repellence detected. Low cation exchange capacity, hence low capacity for water and nutrient retention.
- Organic Carbon – Very low
- pH extremes – Neutral to severely alkaline at depth.
- Nutrients – N – Only 38 kg/ha of mineral N to 1m depth, with 27 kg of this is present in the top 60 cm, which is barely sufficient for 1 t/ha of wheat.
- Nutrients – marginal phosphorus and potassium for this environment.
- Nutrients – Deficient in sulphur (2.5 mg/kg), boron (0.13 mg/kg), iron (7.5 mg/kg) and copper (0.17 mg/kg).
- Subsoil hostilities – high soil strength and presence of precipitated carbonate, suggesting hard setting nature when dry.

Take home message: A naturally infertile sand dune with limited nutrient and water retention and supply, limiting crop yields.