Project Name:
Project Code: **BILLABONG** **Site ID:** **CP407** **Observation ID:** **1**
Agency Name: **CSIRO Land and Water (ACT)**

Site Information

Desc. By: N.J. McKenzie

Locality: "Gull Foss Springs" Murray and Angela Cook. Pit site ~4km SSE Holbrook on south side of Ten Mile Ck. Access via Gull Foss Springs homestead. Site 20m south of laneway ~100m SSE of southern tree guard corner.

Date Desc.: 17/07/03
Map Ref.: Sheet No. : 8326 1:100000
Northing/Long.: 6043521 AMG zone: 55
Easting/Lat.: 529786 Datum: WGS84

Elevation: 272 metres
Rainfall: No Data
Runoff: Slow
Drainage: Imperfectly drained

Geology

ExposureType: Soil pit
Geol. Ref.: No Data

Conf. Sub. is Parent. Mat.: No Data
Substrate Material: Soil pit, 2 m deep,Parna

Land Form

Rel/Slope Class: Level plain <9m <1%
Morph. Type: Flat
Elem. Type: Plain
Slope: 1 %

Pattern Type: Plain
Relief: 5 metres
Slope Category: Very gently sloped
Aspect: No Data

Surface Soil Condition (dry): Firm

Erosion:

Soil Classification

Australian Soil Classification:
Bleached-Mottled Eutrophic Grey Chromosol

ASC Confidence:
Confidence level not specified

Mapping Unit: N/A
Principal Profile Form: N/A
Great Soil Group: N/A

Site Disturbance: Cultivation. Rainfed

Vegetation:

Surface Coarse Fragments: No surface coarse fragments

Profile Morphology

A1	0 - 0.07 m	Brown (7.5YR4/3-Moist); Mottles, 7.5YR42, 10-20% , 5-15mm, Faint; Mottles, 5YR44; Silty loam; Weak grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Moist; Firm consistence; Very few (0 - 2 %), Ferruginous, Fine (0 - 2 mm), Root linings; Field pH 4.5 (Raupach); Few, medium (2-5mm) roots; Abrupt, Smooth change to -
A21e	0.07 - 0.13 m	Brown (10YR5/3-Moist); Mottles, 10YR63, 10-20% , 5-15mm, Distinct; Mottles, 5YR44; Silty loam; Massive grade of structure; Rough-ped fabric; Moist; Firm consistence; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Nodules; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Root linings; Field pH 4.5 (Raupach); Few, fine (1-2mm) roots; Sharp, Smooth change to -
A22e	0.13 - 0.24 m	Light grey (10YR7/2-Moist); Mottles, 5YR46, 10-20% , 15-30mm, Prominent; Silty loam; Massive grade of structure; Rough-ped fabric; Moist; Firm consistence; Common (10 - 20 %), Ferromanganiferous, Coarse (6 - 20 mm), Nodules; Common (10 - 20 %), Ferromanganiferous, Coarse (6 - 20 mm), Root linings; Field pH 4.5 (Raupach); Few, fine (1-2mm) roots; Abrupt, Smooth change to -
A23e	0.24 - 0.34 m	Greyish brown (10YR5/2-Moist); Mottles, 5YR46, 10-20% , 15-30mm, Distinct; Silty clay loam; Massive grade of structure; Rough-ped fabric; Moist; Firm consistence; Few (2 - 10 %), Ferromanganiferous, Coarse (6 - 20 mm), Nodules; Field pH 5 (Raupach); Few, fine (1-2mm) roots; Clear, Smooth change to -
B21	0.34 - 0.6 m	Light brownish grey (10YR6/2-Moist); Mottles, 10YR68, 20-50% , 30-mm, Distinct; Light clay; Weak grade of structure, 20-50 mm, Angular blocky; Rough-ped fabric; Moist; Very firm consistence; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Ferromanganiferous, Medium (2 -6 mm), Nodules; Field pH 6.5 (Raupach); Few, very fine (0-1mm) roots; Gradual, Smooth change to -
B22	0.6 - 0.9 m	Brownish yellow (10YR6/6-Moist); Mottles, 10YR63, 20-50% , 30-mm, Distinct; Light clay; Weak grade of structure, 20-50 mm, Angular blocky; Rough-ped fabric; Moderately moist; Strong consistence; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7 (Raupach); Few, very fine (0-1mm) roots; Gradual, Smooth change to -

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B23	0.9 - 1.4 m	Light yellowish brown (2.5Y6/4-Moist); Mottles, 7.5YR22, 10-20% , 15-30mm, Distinct; Light medium clay; Weak grade of structure, 20-50 mm, Polyhedral; Rough-ped fabric; Coarse, (10 - 20) mm crack; Coarse, (10 - 20) mm crack; Moist; Very firm consistence; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferromanganiferous, Coarse (6 - 20 mm), Nodules; Common (10 - 20 %), Argillaceous, Coarse (6 - 20 mm), Soft segregations; Field pH 8.5 (Raupach); Few, very fine (0-1mm) roots; Gradual, Smooth change to -
B24	1.4 - 1.6 m	Light yellowish brown (2.5Y6/4-Moist); Mottles, 7.5YR22, 10-20% , 15-30mm, Distinct; Light medium clay; Moderate grade of structure, 20-50 mm, Polyhedral; Smooth-ped fabric; Moist; Very firm consistence; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferromanganiferous, Coarse (6 - 20 mm), Nodules; Common (10 - 20 %), Argillaceous, Coarse (6 - 20 mm), Soft segregations; Field pH 8.5 (Raupach); Few, very fine (0-1mm) roots;

Morphological Notes

A21e	Root linings with Fe/Mn mottles and nodules. Strongly dilatent when wet (flows).
A22e	Bread dough bolus. Strongly dilatent when wet (flows). Root linings with Fe/Mn mottles and nodules. May have even less clay (10-15%). Sporadic coatings of A22 & A23 found on B21 & B22.
A23e	Coatings of A22 & A23 found on B21 & B22.
B21	Albeluric coatings of A22 &A 23 found on B21 & B22 ~40%. Is ferrolysis active?(highly likely)
B22	Albeluric coatings of A22&A23 found on B21 & B22 ~40%. Is ferrolysis active?(highly likely)
B23	Unusual white clay segregation in B23. Is this reformed kaolinite or gypsum due to groundwater fringe or palygorskite residual from parna.
B24	Only minor hints of shrink swell at depth.

Observation Notes

Wetter, flatter and more acid than CP406. Stronger leaching here, no vertic properties in upper 1.5m. Gilgai relief may be a solution feature. Possibly a Hydrosol. Profile of contrasts acid over alkaline. Gilgai with minor shrink swell??

Site Notes

GPS Position using UTM WGS84. Triticale crop in this season. Very tough soil when dry & drab profile.

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Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations Ca	Mg	K	Na	Exchangeable Acidity	CEC	ECEC	ESP
m		dS/m				Cmol (+)/kg				%
0 - 0.07	3.99C	0.15A	1.8D	0.6	0.6	0.1		5L		2.00
0 - 0.18	4.63A									
0.07 - 0.13	3.99C	0.06A	0.9D	0.4	0.4	0.1		4.2L		2.38
0.13 - 0.24	4.64A									
0.24 - 0.34	4.13C	0.04A	0.6D	0.3	0.2	0.1		2.3L		4.35
0.34 - 0.6	4.81A									
0.4 - 0.6	4.2C	0.04A	1.9D	1.2	0.3	0.2		3.9L		5.13
0.6 - 0.9	5.08A									
0.9 - 1.4	5.53C	0.04A	5D	5	0.5	0.5		9.4L		5.32
0.9 - 1.1	6.74A									
1.4 - 1.6	6.43C	0.08A	4.5E	7.1	0.1	1.3		15.2B		8.55
	7.87A									
	6.86C	0.13A	4.8E	8.8	0.2	2.5		19.9B		12.56
	8.34A									
	7.17C	0.2A	4.9E	9.6	0.2	3.1		21.7B		14.29
	8.39A									

Depth	CaCO3	Organic C	Avail. P	Total P	Total N	Total K	Bulk Density	Particle Size Analysis GV	CS	FS	Silt	Clay
m	%	%	mg/kg	%	%	%	Mg/m3			%		
0 - 0.07	<2A	3.24B			0.27D							
0 - 0.18							1.49					
							1.45					
							1.64					
							1.60					
							1.61					
							1.59					
0.07 - 0.13	<2A	0.92B			0.06D							
0.13 - 0.24	<2A	0.28B			0.01D							
0.24 - 0.34	<2A	0.14B			<0.01D							
0.34 - 0.6	<2A	0.14B			0.01D							
0.4 - 0.6							1.67					
							1.68					
							1.70					
							1.66					
							1.70					
							1.65					
0.6 - 0.9	<2A	0.1B			0.01D							
0.9 - 1.4	<2A	<0.1B			0.01D							
0.9 - 1.1							1.70					
							1.71					
							1.75					
							1.72					
							1.71					
							1.71					
1.4 - 1.6	<2A	<0.1B			0.01D							

Depth	COLE	Gravimetric/Volumetric Water Contents Sat.	0.05 Bar	0.1 Bar	0.5 Bar	1 Bar	5 Bar	15 Bar	K sat	K unsat

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m		g/g - m3/m3		mm/h	mm/h
0 - 0.07					
0 - 0.18	0.39E	0.35E	0.06E	111.8D	2.4D
	0.4E	0.34E	0.07E	19.1D	2.1B
	0.35E	0.32E	0.08E	16.3D	3.5D
	0.37E	0.33E			3.1B
	0.36E	0.32E			4.2D
	0.36E	0.32E			3.5B
0.07 - 0.13					
0.13 - 0.24					
0.24 - 0.34					
0.34 - 0.6					
0.4 - 0.6	0.35E	0.33E	0.24E	0.1F	<0.1D
	0.31E	0.3E	0.19E	74.8D	<0.1B
	0.31E	0.29E	0.19E	130.6D	<0.1D
	0.34E	0.32E			0.1B
	0.32E	0.3E			0.2D
	0.34E	0.32E			0.2B
0.6 - 0.9					
0.9 - 1.4					
0.9 - 1.1	0.36E	0.34E	0.23E	5.7D	1.1D
	0.35E	0.33E	0.23E	10D	0.7B
	0.33E	0.31E	0.23E	32.6D	1.2D
	0.35E	0.34E			1B
	0.35E	0.32E			0.5D
	0.35E	0.32E			0.4B
1.4 - 1.6					

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Laboratory Analyses Completed for this profile

15B2_CA	Exchangeable bases (Ca2+,Mg2+,Na+,K+) - 1M ammonium chloride at pH 7.0, pretreatment for soluble salts
15B2_CEC	CEC - 1M ammonium chloride at pH 7.0, pretreatment for soluble salts
15B2_K	Exchangeable bases and CEC - 1M ammonium chloride at pH 7.0, pretreatment for soluble salts
15B2_MG	Exchangeable bases and CEC - 1M ammonium chloride at pH 7.0, pretreatment for soluble salts
15B2_NA	Exchangeable bases and CEC - 1M ammonium chloride at pH 7.0, pretreatment for soluble salts
15C1_CA	Exchangeable bases (Ca2+,Mg2+,Na+,K+) - alcoholic 1M ammonium chloride at pH 8.5, pretreatment for soluble salts
15C1_CEC	CEC - alcoholic 1M ammonium chloride at pH 8.5, pretreatment for soluble salts
15C1_K	Exchangeable bases and CEC - alcoholic 1M ammonium chloride at pH 8.5, pretreatment for soluble salts
15C1_MG	Exchangeable bases and CEC - alcoholic 1M ammonium chloride at pH 8.5, pretreatment for soluble salts
15C1_NA	Exchangeable bases and CEC - alcoholic 1M ammonium chloride at pH 8.5, pretreatment for soluble salts
19A1	Carbonates - rapid titration
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
4B2	pH of 1:5 soil/0.01M calcium chloride extract - following Method 4A1
5A2	Chloride - 1:5 soil/water extract, automated colour
6B2	Total organic carbon - high frequency induction furnace, volumetric
7A5	Total nitrogen - high frequency induction furnace, thermal conductivity
P10_S_0.48	0.48 micron (cumulative %) - Sedigraph
P10_S_1	1 micron (cumulative %) - Sedigraph
P10_S_1000	1000 micron (cumulative %) - Sedigraph
P10_S_125	125 micron (cumulative %) - Sedigraph
P10_S_15.6	15.6 micron (cumulative %) - Sedigraph
P10_S_2	2 micron (cumulative %) - Sedigraph
P10_S_20	20 micron (cumulative %) - Sedigraph
P10_S_2000	2000 micron (cumulative %) - Sedigraph
P10_S_250	250 micron (cumlative %) - Sedigraph
P10_S_3.9	3.9 micron (cumulative %) - Sedigraph
P10_S_31.2	31.2 micron (cumulative %) - Sedigraph
P10_S_500	500 micron (cumulative %) - Sedigraph
P10_S_53	53 micron (cumulative %) - Sedigraph
P10_S_63	63 micron (cumulative %) - Sedigraph
P10_S_7.8	7.8 micron (cumulative %) - Sedigraph
P3A1	Bulk density - g/cm3
P3A2_McK	Macro Porosity (%) as determined from McKenzie pore charts
P3A2_McKMP	Maximum pore diameter (mm) as determined from McKenzie pore charts
P3B1VL_15	15 BAR Moisture m3/m3 - Volumetric using <2mm sample on pressure plate
P3B3VLb001	0.01 BAR Moisture m3/m3 - Volumetric using undisturbed 73mm diameter and 75mm height core on suction plate taken from center of large core (CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996)
P3B3VLb003	0.03 BAR Moisture m3/m3 - Volumetric using undisturbed 73mm diameter and 75mm height core on suction plate taken from center of large core (CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996)
P3B3VLb01	0.1 BAR Moisture m3/m3 - Volumetric using undisturbed 73mm diameter and 75mm height core on suction plate taken from center of large core (CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996)
P3B3VLb03	0.33 BAR Moisture m3/m3 - Volumetric using undisturbed 73mm diameter and 75mm height core on suction plate taken from center of large core (CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996)
P3B3VLbSAT	Saturated Moisture m3/m3 - Volumetric using undisturbed 73mm diameter and 75mm height core on suction plate taken from center of large core (CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996)
P4_100DMcK	Unsaturated Hydraulic Conductivity - 100mm potential - Using disk permeameter with method CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996
P4_30DMcK	Unsaturated Hydraulic Conductivity - 30mm potential - Using disk permeameter with method CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996
P4_50DMcK	Unsaturated Hydraulic Conductivity - 50mm potential - Using disk permeameter with method CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996

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P4_sat_FH	Modified Saturated Hydraulic Conductivity - falling head (CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996)
P4_sat_McK	Saturated Hydraulic Conductivity (CSIRO Div of Soil, DR 125, McKenzie and Jacquier, 1996)