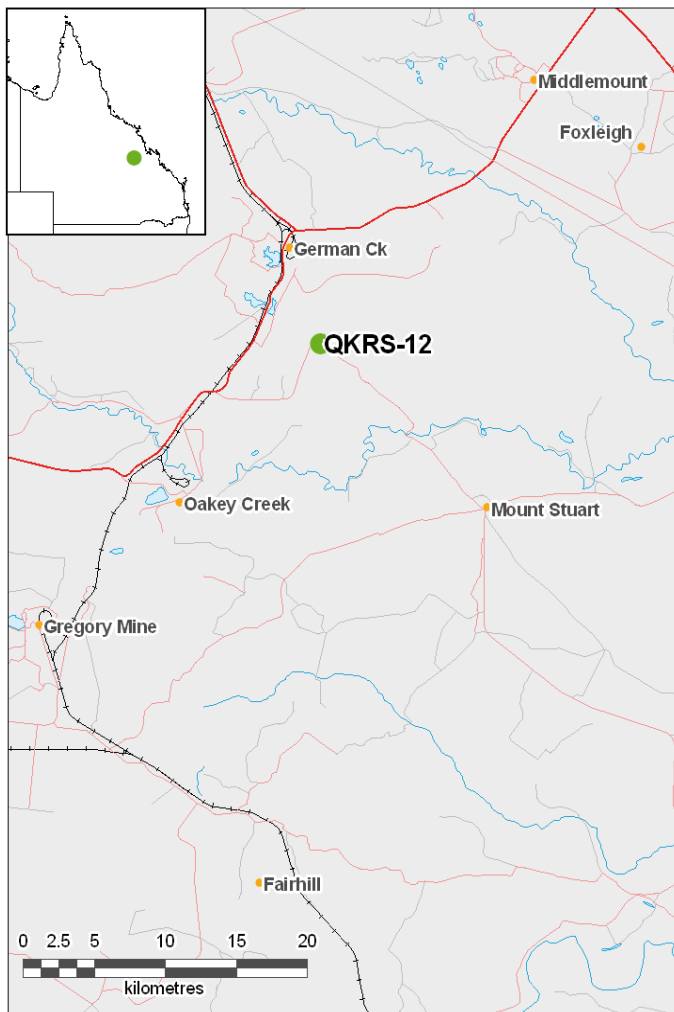


Key Reference Site 12

Site details

MGA Coordinates:	661374 mE	7457821 mN	Zone 55
Lat/long:	-22.98007 S	148.57429 E	
Primary site:	SALTC 349		
Geology:	Cz - Undifferentiated Cainozoic sediments (colluvial slopes) ¹		
Vegetation:	Woodland of Poplar box (<i>E. populnea</i>).		
Land use:	Grazing native pastures.		

Site location



Site notes

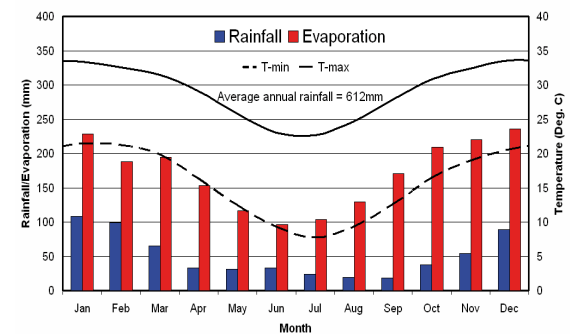
This reference site describes the undulating plains and lowlands associated with the sandstone tablelands in the Central Highlands. These landscapes support woodlands of poplar box (*E. populnea*) and are now managed primarily for their moderate to high productivity native grass pastures. This site is located on the **German Creek** property near Emerald in Central Queensland. It has been used to parameterise the model GRASP which estimates pasture growth in different landscapes based on soil-water simulations, climate variables and grazing density (Day et al, 1997)⁴.

This reference site consists of:

- soil and regolith description to 6.0 m
- measured electrical conductivity (EC), soluble chloride (Cl), soil nitrate (NO₃) and soil pH.
- soil profile laboratory analysis
- long term monitoring of pasture yields and soil water.

QKRS 12 is therefore a key point of reference for understanding the soils formed on sandstone tableland landscapes in central Queensland and for establishing links between soil and regolith attributes and the parameters used to model soil water and pasture growth.

Climate⁵



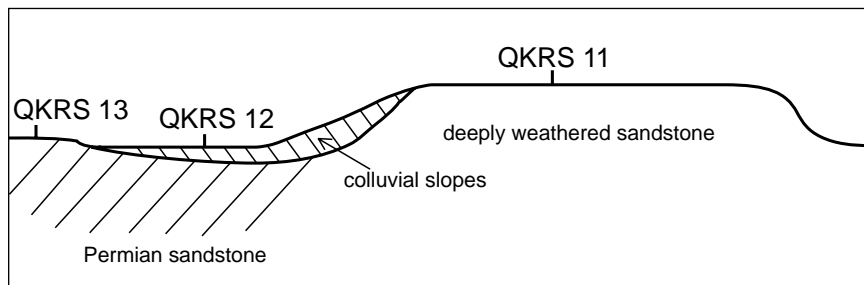
Soil and landscape correlation

	Name	Reference
Soil profile class:	Foxleigh (Fx)	WDH ²
Land system soil:	Broadmeadow	ZDK ³
Land system:	Monteagle	ZDK ³
Land unit:	Land Unit 3: lowlands and colluvial footslopes below the 'tableland surface'.	ZDK ³

Compared to evaporation, a rainfall deficit is experienced in every month of the year, and annual pan evaporation is 3.3 times the annual rainfall. 68 percent of the average annual rainfall (~416 mm) is received in the summer period (Nov – March), and this provides much of the moisture for pasture production. High degree of variability in seasonal and monthly rainfall means that pasture production is also highly variable.

Landscape details

Landscape sketch

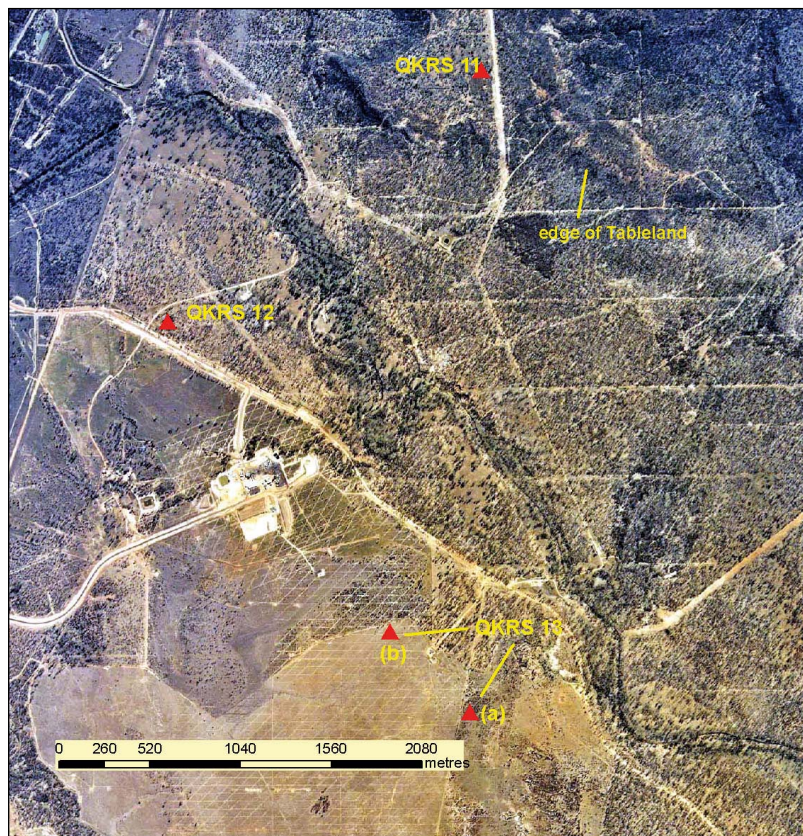
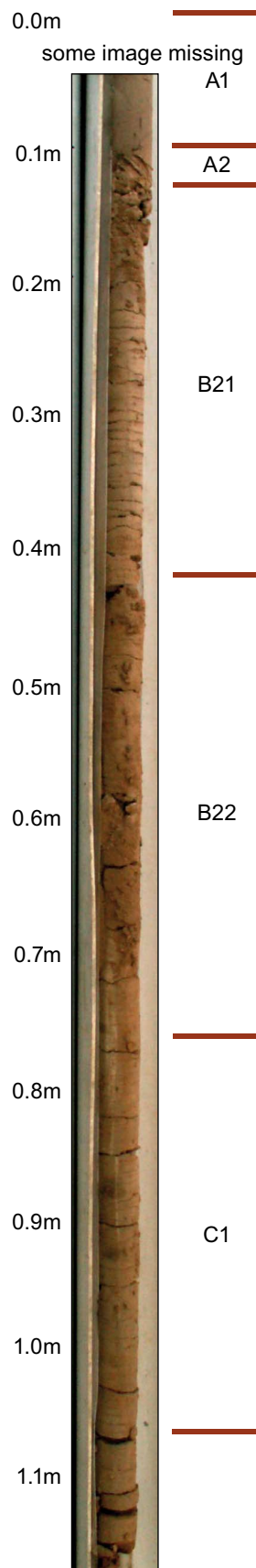


Landscape description

Landform pattern	undulating rises
Runoff	moderately rapid
Drainage	imperfectly drained
Rock outcrops	no bedrock exposed
Surface coarse fragments	no coarse fragments
Surface conditions	firm
Substrate lithology	unconsolidated sediments/ sandstone
Landform element	hillslope
Permeability	slowly permeable
Slope	2%

Soil details

Soil profile image - (SALTC 349, Obs 2)



German Creek aerial photo

Brief description	Shallow massive sandy surface soil, conspicuously bleached over an alkaline sodic clay with columnar structure.	
Classification	<p style="text-align: center;">Australian Soil Classification⁶</p> <p style="text-align: center;">Great Soil Group⁷</p> <p style="text-align: center;">Principal Profile Form⁸</p>	Calcic, Mesonatric, Brown Sodosol, medium, non-gravelly, sandy, clayey, very deep Solodized solonetz Db3.33
Description site	SALTC 349	
Matching sites	WDH - 91; German Creek Pasture site G2	

Soil morphology - (SALTC 349, Obs 1)

Name	Depth (m)	Colour	Mottles	Texture	Structure			Consistence	Coarse Fragments	Segregations	Boundary
					Grade	Type	Size				
A1	0.00-0.10	dark brown (10YR 3/3)	none	loamy sand	massive	-	-	-	none	none	gradual
A2	0.10-0.19	dark yellowish brown (10YR 4/4)	none	loamy sand	massive	-	-	-	none	none	gradual
A2e	0.19-0.20	greyish brown (10YR 5/2)	none	loamy sand	massive	-	-	-	none	none	abrupt
		light grey (10YR 7/2) dry				-	-	-			
B21	0.20-0.40	brown (10YR 4/3)	2-10% faint red (<5 mm)	sandy light medium clay	strong	subangular blocky	10-20 mm	-	none	none	gradual
						columnar	20-50 mm	-			
B22	0.40-0.65	dark yellowish brown (10YR 4/4)	10-20% distinct red (5-15 mm)	sandy light medium clay	strong	subangular blocky	10-20 mm	-	none	2-10% manganiferous soft segregations (6-20 mm)	gradual
B23k	0.65-0.90	strong brown (7.5YR 4/6)	10-20% distinct brown (5-15 mm)	clay loam, sandy	-	-	-	-	none	2-10% calcareous soft segregations (6-20 mm)	diffuse
					-	-	-	-		<2% calcareous nodules (6-20 mm)	
B24	0.90-1.40	greyish brown (10YR 5/2)	10-20% distinct brown (5-15 mm)	sandy light clay	massive	-	-	-	none	none	diffuse
			10-20% faint red (5-15 mm)		weak	subangular blocky	-	-			
B25	1.40-1.70	dark yellowish brown (10YR 4/6)	2-10% faint red (5-15 mm)	clay loam, sandy	massive	-	-	-	none	none	-
		greyish brown (10YR 5/2)				-	-	-			

Chemical analysis

Surface chemistry - (SALTC 349, Obs 1)

Depth (m)	pH (1:5 H ₂ O)	EC d/S/m	Cl mg/kg	NO ₃ -N mg/kg	P (Colwell) mg/kg	P BSES mg/kg	Extr. K (HCl) meq/100g	Org. C W&B %	Total N %	ESP %	CEC meq/100g	DTPA extractable trace elements mg/kg				Exchangeable cations (alcoholic) meq/100g			
												Cu	Zn	Mn	Fe	Ca	Mg	Na	K
B 0.00-0.10	6.4	0.02	6	1	6	11	0.5	0.76	0.04	2.3	4					1.73	0.7	<0.091	0.52

Soil profile chemistry - (SALTC 349, Obs 1)

Depth (m)	1:5 soil/water				Exchangeable cations (alcoholic) meq/100g				Exch. Acidity meq/100g		Particle size (%)						Moistures %			Disp. Total element ratio %			PAWC mm H2O		
	pH	EC	Cl	NO3-N	Ca	Mg	Na	K	Al	H	CEC	ESP	CS	FS	SIL	CLA	ADMC	1/3B	15B	R1	P	K		S	
		dS/m	mg/kg								meq/100g	%													
0.20-0.30	7.4	0.13	118	<1	2.98	5.93	1.81	0.33			13	13.9	17	43	4	36	1.5		13						55.4
0.50-0.60	8.3	0.22	191	<1	1.95	6.36	2.39	0.26			11	21.7													
0.80-0.90	9.1	0.4	427	<1	1.37	6.55	3.29	0.5			11	29.9													
1.10-1.20	9.1	0.42	470	<1	1.02	6.4	3.5	0.33			11	31.8													
1.40-1.50	8.3	0.29	395	<1	0.66	5.62	3.28	0.31			9	36.4													

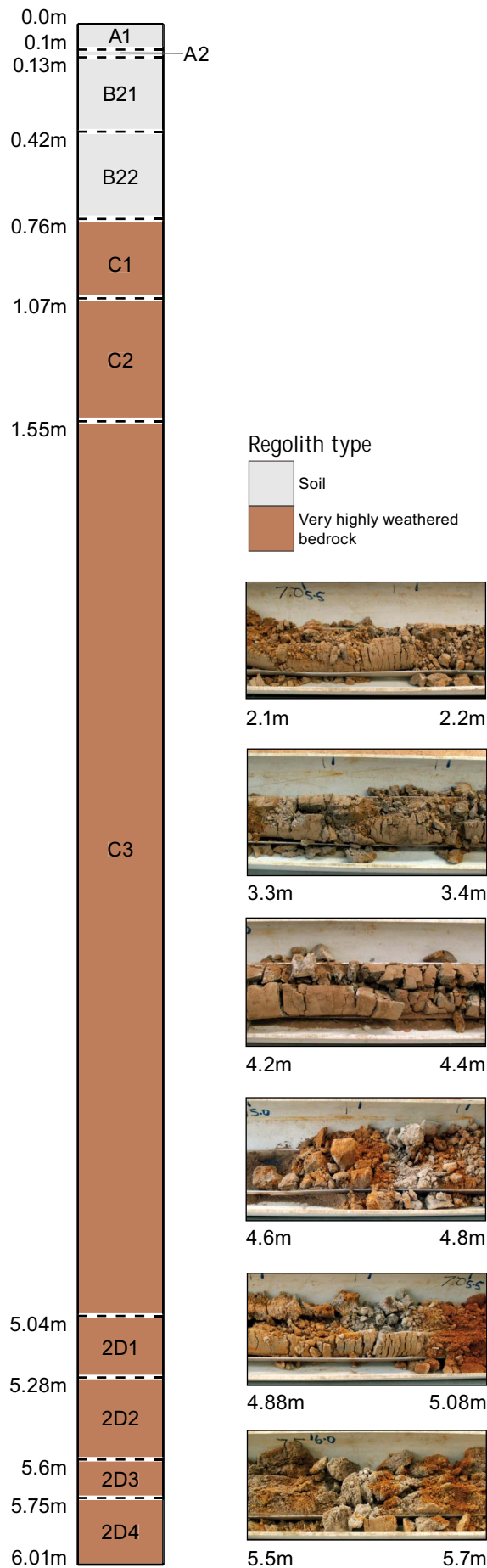
Regolith details

Regolith morphology - (SALTC 349, Obs 2)

Zone	Depth (m)	Colour	Mottles	Texture	Boundary	Grain Size Shape Sorting	Mineralogy	Lithology	Degree of Weathering	Regolith Type	Strength
A1	0.00-0.10	very dark greyish brown (10YR 3/2)	-	clayey sand							
A2	0.10-0.13	light grey (10YR 7/2) dry	-	clayey sand							
B21	0.13-0.42	dark yellowish brown (10YR 4/4)	10-20% faint orange (5-15 mm)	fine sandy light medium clay							
B22	0.42-0.76	very pale brown (10YR 7/3) dry brown (10YR 5/3)	10-20% distinct orange (15-30 mm) 2-10% distinct red (5-15 mm)	fine sandy light medium clay							
C1	0.76-1.07	light brownish grey (2.5Y 6/2)	10-20% distinct orange (15-30 mm)		gradual	clay (<0.002mm)		Clayey clay, quartz sandstone	very highly weathered	Very highly weathered bedrock	>90% earth material
C2	1.07-1.55	yellowish brown (10YR 5/4)	20-50% distinct orange (15-30 mm)		gradual	clay (<0.002mm)		Clayey clay, quartz sandstone	very highly weathered	Very highly weathered bedrock	>90% earth material
C3	1.55-5.04	grey (2.5Y 6/1)	2-10% distinct orange (5-15 mm)		gradual	clay (<0.002mm)		Clayey clay, quartz sandstone	very highly weathered	Very highly weathered bedrock	>90% earth material
2D1	5.04-5.28	dark brown (7.5YR3/4)	-		gradual	fine sand (0.125-0.25mm) rounded well sorted	quartz	Sandstone	very highly weathered	Very highly weathered bedrock	>90% earth material
2D2	5.28-5.60	grey (10YR6/1)	10-20% distinct brown (30-100mm)		gradual	fine sand (0.125-0.25mm) rounded well sorted	quartz	Sandstone	very highly weathered	Very highly weathered bedrock	>90% earth material
2D3	5.60-5.75	grey (10YR6/1)	10-20% distinct orange (15-30 mm)		gradual	fine sand (0.125-0.25mm) rounded well sorted	quartz	Sandstone	very highly weathered	Very highly weathered bedrock	>90% earth material
2D4	5.75-6.01	grey (2.5Y 6/1)	-			fine sand (0.125-0.25mm)	quartz	Sandstone	very highly weathered	Very highly weathered bedrock	>90% earth material

Very highly weathered sublittoral to quartzose sandstone; brown to grey sandy clay and quartz sand earth material, with distinct orange and brown mottling

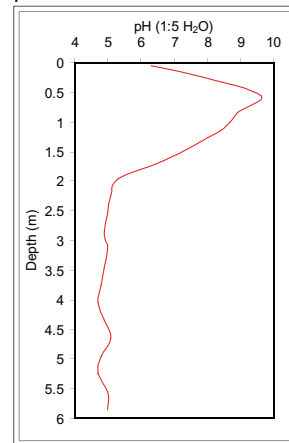
Regolith profile -
(SALTC 349, Obs 2)



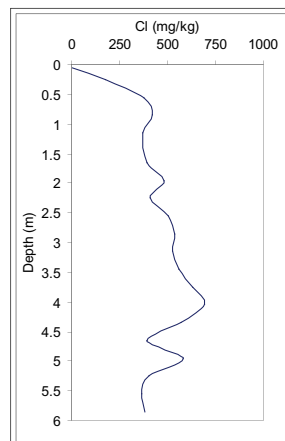
1:5 soil/water analysis -
(SALTC 349, Obs 2)

Depth (m)	pH	EC (dS/m)	Cl (mg/kg)	NO3-N (mg/kg)
0.00-0.10	6.3	0.04	7	9
0.20-0.30	7.9	0.19	179	4
0.50-0.60	9.6	0.43	378	3
0.80-0.90	8.9	0.38	420	1
1.10-1.20	8.4	0.3	370	1
1.60-1.70	6.7	0.33	393	1
1.90-2.00	5.3	0.35	485	<1
2.20-2.30	5.1	0.33	413	<1
2.50-2.60	5	0.37	507	<1
2.80-2.90	4.9	0.4	540	<1
3.10-3.20	5	0.39	525	<1
3.40-3.50	4.9	0.41	560	<1
3.70-3.80	4.8	0.42	632	<1
4.00-4.10	4.7	0.48	692	<1
4.30-4.40	4.9	0.4	574	<1
4.60-4.70	5.1	0.28	393	1
4.90-5.00	4.8	0.4	581	<1
5.20-5.30	4.7	0.28	406	<1
5.50-5.60	5	0.26	369	<1
5.80-5.90	5	0.26	384	<1

pH



Chloride



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