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Leaders in Environmental Practice

MEMORANDUM

Lake Disappointment: Riparian Zone Assessment Draft

To: Daniel Tenardi **From: Ryan Lawrence** **Date: 22 July 2016**

Riparian Zone Tecticornia

Objective of Investigation

To investigate the relationship between tecticornia and depth to ground water in the riparian zone and lake sediments.

Methodology

- Bores to measure groundwater levels at quarterly intervals were installed during May 2016 (Figures 1 and 2). At the time Lake Disappointment was flooded with a standing water level of up to 0.10m.
- Tecticornia has a shallow root system extending to a maximum depth of 0.3m below ground level (Figure 3).
- Bores were installed to a depth of 1.0m below ground level. The soil profile becomes less clay dominated with increasing sand content away from the lake (Figures 4 to 7 and Table 1).

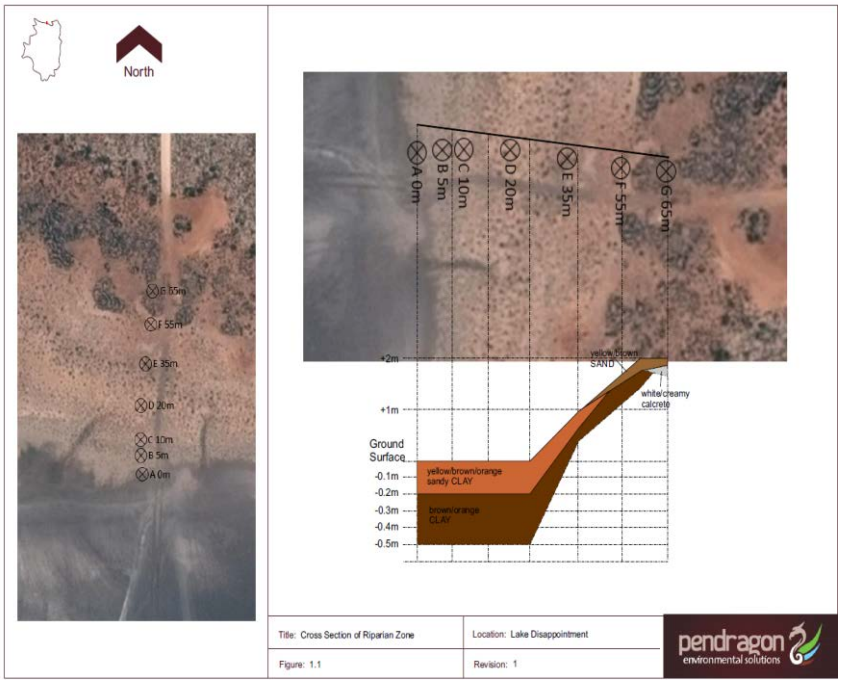

Figure 1: Bore Locations and Indicative Soil Profile.

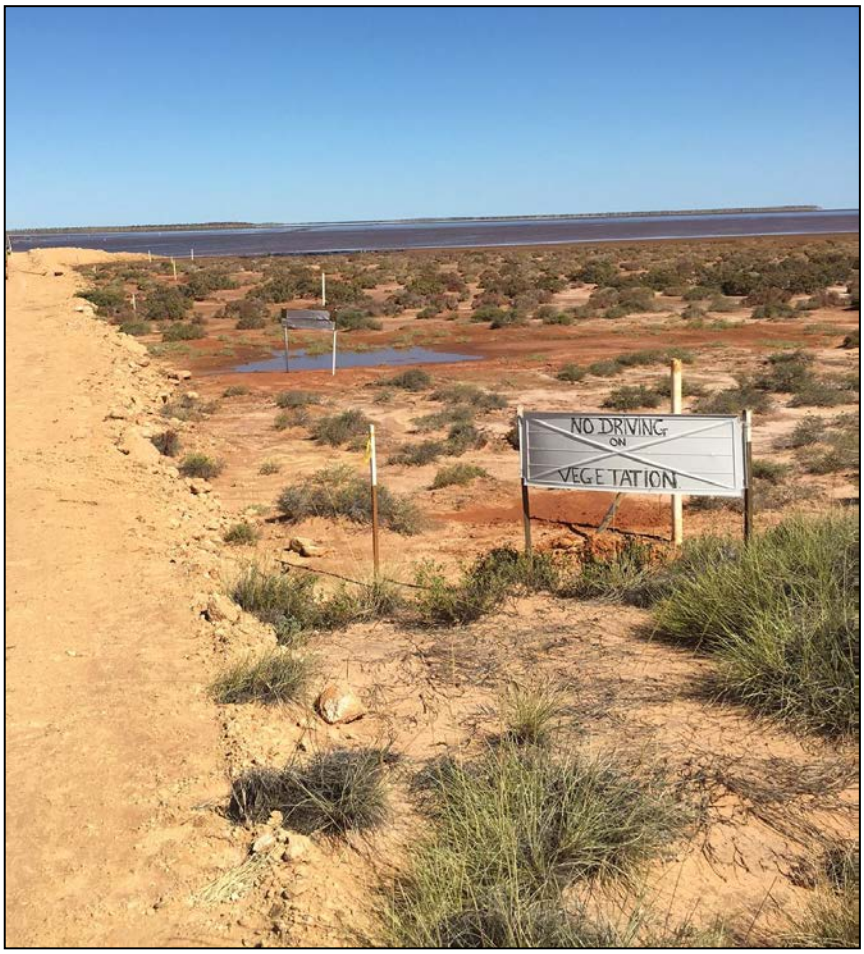

Figure 2: Location of Bores across the Riparian Zone.

Figure 3: Depth of Roots.

Figure 4: Soil Profile at Bore F.

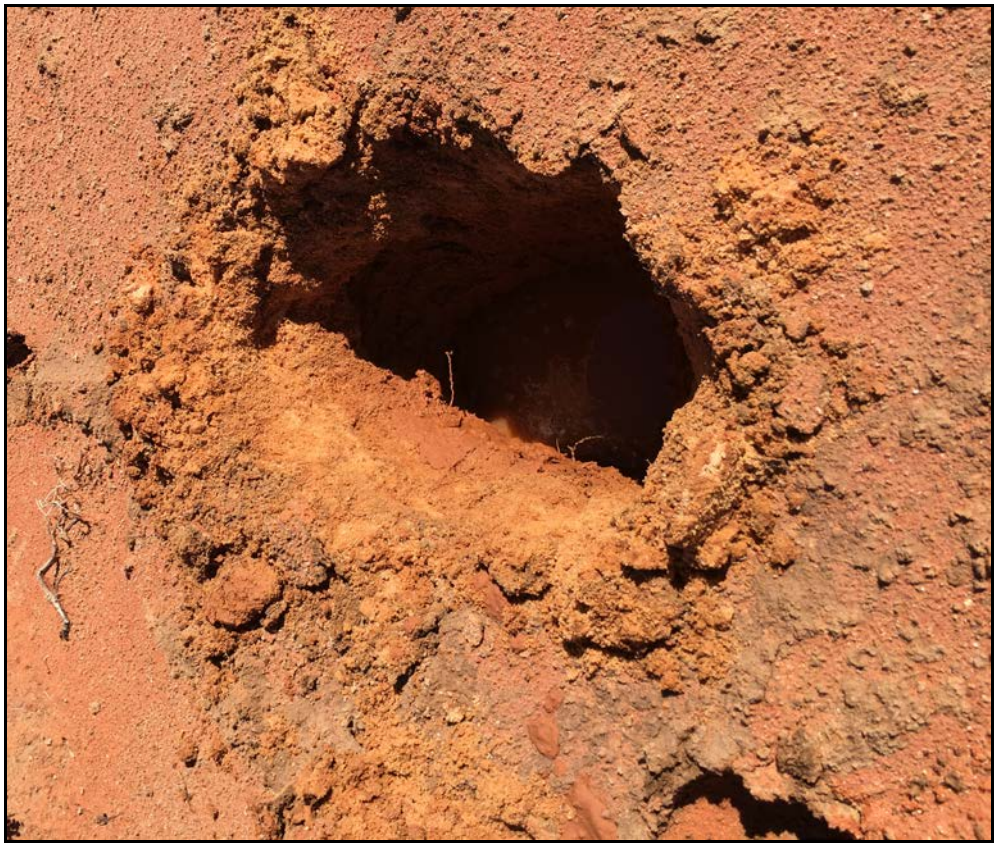

Figure 5: Soil Profile at Bore C.

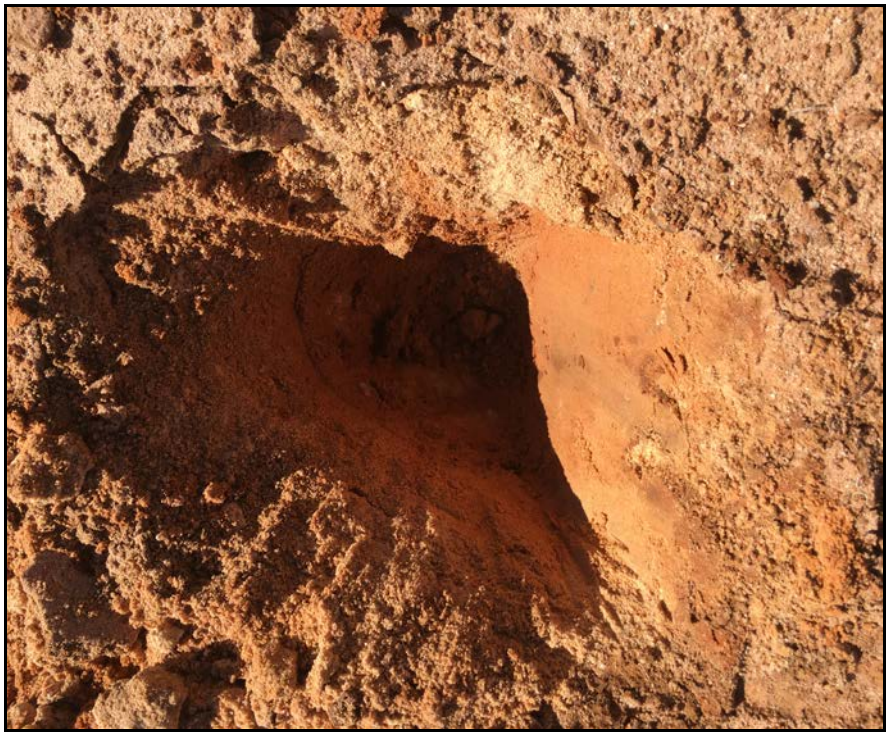

Figure 6: Soil Profile at Bore E.

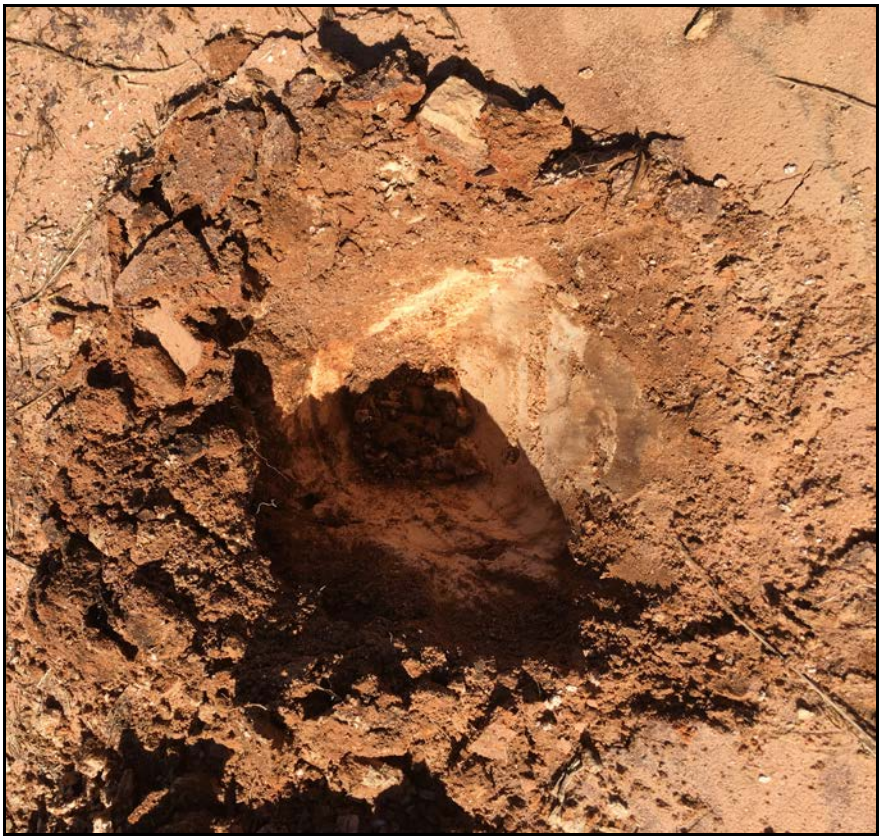

Figure 7: Soil Profile at Bore G.

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Table 1: Bore Profile Descriptions.

Client:	Reward Mineral								Project:	Lake Disappointment			
Logged By:	Ryan Lawrance								Job No:	PES14017			
Drilled By:	Ryan Lawrance								Date:	24/05/2016			
Depth	Distance	Lithology							Water Level	Note	Test Pit for visual inspection		
cm bgl	m	Major	Minor	Colour		Grain Size	Sorting	Moisture	(mbgl)		E	N	Photo Log
0-20	0	Gravel	Gravelly	White	Grey	Fine	Well	Dry	0.26	start of log	481528.03	7425585.02	
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
20-30	0	Gravel	Gravelly	White	Grey	Fine	Well	Dry					
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
30-50	0	Gravel	Gravelly	White	Grey	Fine	Well	Dry		dense layer of crystals			
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
0-20	10	Gravel	Gravelly	White	Grey	Fine	Well	Dry	0.315		481528.93	7425590.35	2313
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
20-30	10	Gravel	Gravelly	White	Grey	Fine	Well	Dry					
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
30-40	10	Gravel	Gravelly	White	Grey	Fine	Well	Dry		crystals			
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
40-50	10	Gravel	Gravelly	White	Grey	Fine	Well	Dry					
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
0-30	15	Gravel	Gravelly	White	Grey	Fine	Well	Dry	0.47		481530.62	7425598.19	2314
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
30-50	15	Gravel	Gravelly	White	Grey	Fine	Well	Dry					
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
50+	15	Gravel	Gravelly	White	Grey	Fine	Well	Dry					
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
0-20	20	Gravel	Gravelly	White	Grey	Fine	Well	Dry	0.405		481532.03	7425605.11	2315
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
20+	20	Gravel	Gravelly	White	Grey	Fine	Well	Dry					
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
0-10	30	Gravel	Gravelly	White	Grey	Fine	Well	Dry	0.78		481535.97	7425638.83	2321
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					2322
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
10-50	30	Gravel	Gravelly	White	Grey	Fine	Well	Dry					
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
0-5	40	Gravel	Gravelly	White	Grey	Fine	Well	Dry		start of dune	481539.06	7425608.47	2324
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp		some salt crystals			
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
5-50	40	Gravel	Gravelly	White	Grey	Fine	Well	Dry		calcrete			
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
0-5	50	Gravel	Gravelly	White	Grey	Fine	Well	Dry		10m into dune	481555.51	7425680.83	2326
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					
5-20	50	Gravel	Gravelly	White	Grey	Fine	Well	Dry		Calcrete			
		Sand	Sandy	Yellow	Cream	Medium	Moderate	Damp					
		Silt	Silty	Orange	Green	Coarse	Poor	Wet					
		Clay	Clayey	Brown	Black			Saturated					

Notes:
Gravel
Sand - Coarese
Sand - Medium
Sand - Fine
Silt Moisten Fingers - dab in clay and silt. Silt feels smooth, not sticky, dries powdery and dusts off easily.
Clay Clay becomes sticky, dries flaky and is hard to remove when dry.
A well-sorted soil has a narrow range of grain sizes, poorly sorted has a wide range of grain size.

Table 2: Ground Water Levels.

Bore	Distance from lake (m)	Groundwater Depth (m below ground level)	
		May 2016	June 2016
A	0	0.26	0.21
B	5	0.31	0.32
C	10	0.49	0.49
D	20	0.47	0.46
E	35	0.46	0.46
F	55	0.78	0.78
G	65	-	-

Currently, the groundwater level remains fairly constant; it should be noted that the surface of the lake remains fairly wet due to frequent rain.

It is recommended:

- Groundwater levels are to be monitored at quarterly intervals.
- Samples of groundwater should be obtained at the end of August and bi-annually afterwards.
- Should further disturbances be necessary within the riparian zone, then the opportunity should be taken to undertaken further intrusive excavations or trenching to ascertain changes in soil properties throughout the perimeter of the lake and riparian zone.
- The bores should be surveyed accurately (x, y and z) to calculate the groundwater level gradient across the riparian zone.