

Ref: TW19118 – Broome RRRP – G1
 Rev: 1.a

1300 251 070
 Level 1, 604 Newcastle St
 Leederville WA 6007
 PO Box 454
 Leederville WA 6903
 info@talisconsultants.com.au
 www.talisconsultants.com.au

Memorandum

Groundwater Monitoring Data – 14/12/2020 to 30/3/2021

Broome RRRP – Site G1

To:	Jeremy Macmath, Shire of Broome	
CC:		
From:	Gray Ralph, Talis Consultants	
Date:	7 April 2021	

The purpose of this Memo is to provide results of ongoing monitoring for groundwater levels (GWL) at the proposed Broome RRRP Site G1 located on the Great Northern Highway, Roebuck WA approximately 38 km north-east of the town centre.

1 Groundwater Monitoring Wells

To understand the depth to water (DTW) and groundwater level response to rainfall across Site G1, five groundwater well clusters (GW1-5) which consisted of one deep well ‘D’ and one shallow well ‘S’ were installed at each location during November 2020 as part of the Phase 1 Hydrogeological Risk Assessment (see Talis, Site Investigation Report, February 2021). Groundwater monitoring is undertaken on a quarterly basis to confirm the baseline conditions. Groundwater levels for the ‘D’ wells, screened across the water table, are being monitored daily since installation using pressure transducers. The ‘S’ wells targeted the Pindan Plain Soils above the water table to allow future assessment of the significance of any temporary (wet season) perching of groundwater.

2 Groundwater Monitoring Well Locations

The groundwater monitoring wells have been placed at strategic locations across the site with particular focus on the proposed landfill footprint. The location of the monitoring wells is shown in Figure 1 and survey data is presented in Table 2-1 showing the elevation of the monitoring well top of casing (ToC) and ground level in meters above Australian Height Datum (m AHD).

Figure 1: Groundwater Monitoring Well Locations

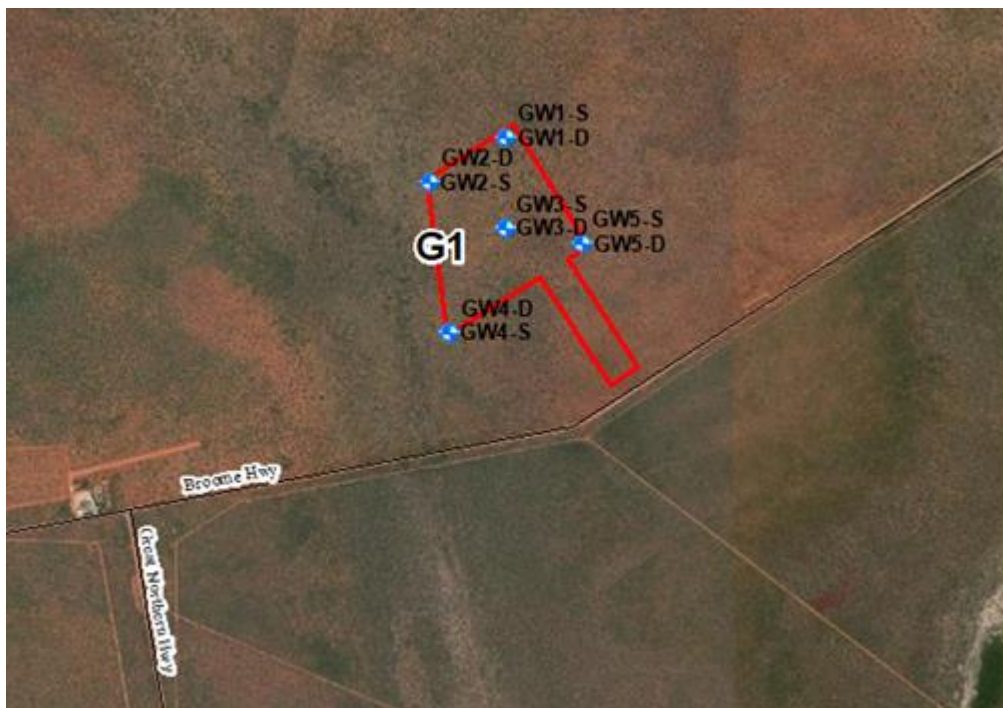


Table 2-1 Survey Data

Well ID	Northings (m)	Eastings (m)	Top of Casing (m AHD)	Ground level (m AHD)
Deep ('D') wells				
GW1-D	8028918.587	449726.723	22.201	21.453
GW2-D	8028629.441	449238.197	20.167	19.415
GW3-D	8028340.79	449721.717	21.188	20.441
GW4-D	8027672.937	449364.545	18.767	17.973
GW5-D	8028239.06	450209.918	24.327	23.593
Shallow ('S') wells				
GW1-S	8028918.825	449727.913	22.211	21.464
GW2-S	8028629.035	449239.474	20.08	19.400
GW3-S	8028339.666	449720.966	21.248	20.462
GW4-S	8027673.767	449364.464	18.769	17.989
GW5-S	8028239.442	450210.828	24.357	23.602

3 Rainfall

The rainfall recorded during the monitoring period and long-term average rainfall for Broome Airport (Bureau of Meteorology station No. 003003) is presented in Table 3-1. During the groundwater monitoring period (December 2020 to March 2021) the actual monthly rainfall for December 2020 was above average and January and February 2021 were below average.

Table 3-1: Monthly mean rainfall 1939 – 2020

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Rainfall (mm)	192.7	179.6	97.7	25.4	27.4	18.2	6.5	2.2	1.4	1.4	8.9	62.4
Actual	59.8	61.6	90	-	-	-	-	-	-	-	-	220

4 Depth to Water

The Depth to Water (DTW) recorded during the period is summarised in Table 4-1. The results indicate the minimum and maximum recorded DTW across the site was 7.3 and 12.9 m respectively.

The shallow ‘S’ wells screened above the regional water table including GW3-S and GW5-S were dry indicating no evidence of groundwater perching and are not discussed further.

Table 4-1 Depth to Water (meters below ground level, m bgl)

Well ID	Max	Min	Average	Range
GW1-D	10.0	9.8	9.9	0.2
GW2-D	8.0	7.8	7.9	0.2
GW3-D	9.4	9.2	9.3	0.3
GW4-D	7.7	7.3	7.5	0.4
GW5-D	12.9	12.7	12.8	0.2

5 Groundwater Levels

The groundwater levels (GWL) recorded at the beginning and end of the monitoring period are summarised in Table 5-1. The GWLs recorded from the pressure transducers (in m AHD) are presented in graphs together with daily recorded rainfall. Figure 2 presents the groundwater contour plan showing flow direction.

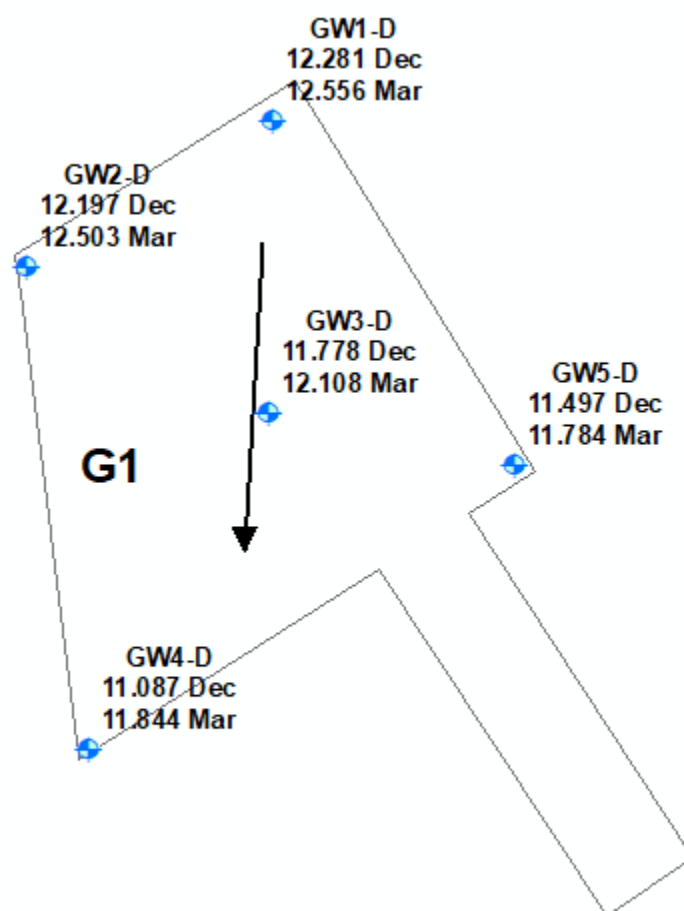
Table 5-1 Groundwater Level (m AHD)

Well ID	14/12/2020	30/3/2021
GW1-D	12.281	12.556
GW2-D	12.197	12.503
GW3-D	11.778	12.108
GW4-D	11.087	11.844
GW5-D	11.497	11.784

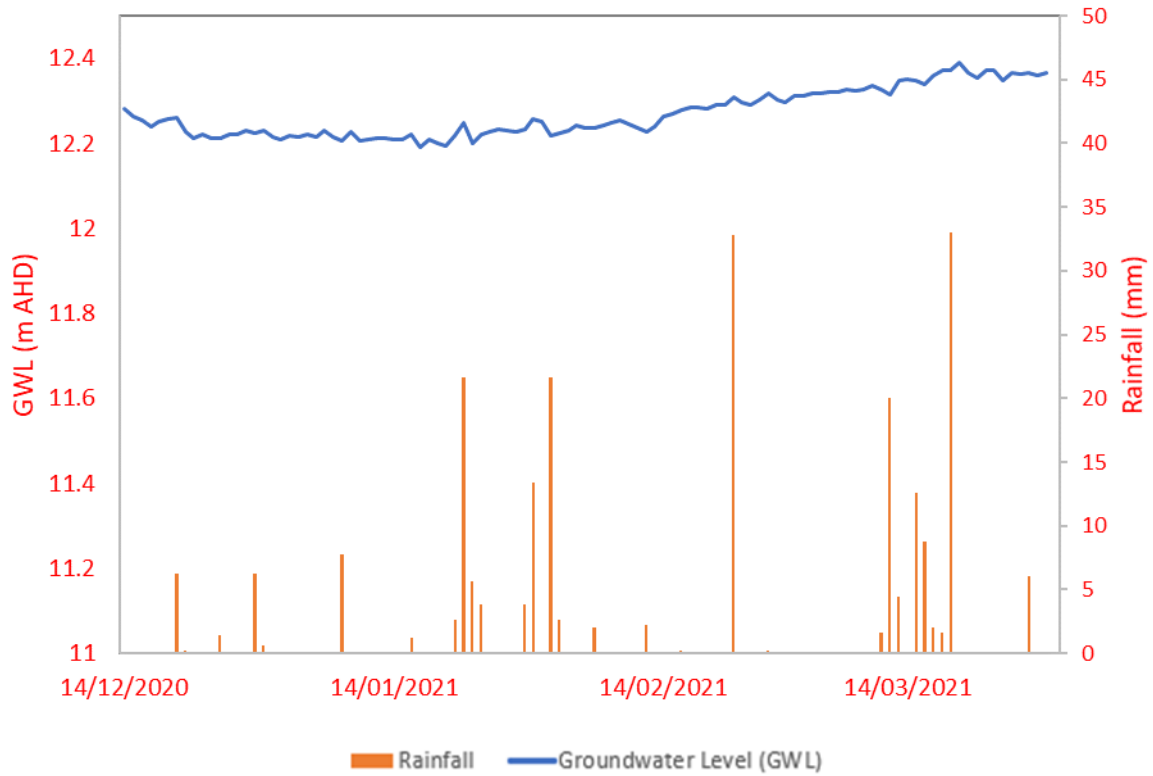
The results show an approximately 0.7 - 1.2 m fall in GWL across the Site from the north corner to the south corner indicating a southerly groundwater flow regime. This is consistent with the regional data and including Water Corporations modelling discussed in Section 3.3.1 of the Site Investigation Report (February 2021).

The results from pressure transducers plotted against rainfall show GWL respond rapidly to rainfall events indicating direct recharge to the aquifer from rainfall infiltration. GW4 and, to a lesser extent, GW2 showed a pronounced response to rainfall indicating localised recharge across the western side where the water table is shallowest and where natural drainage is developed off-site along the western site boundary.

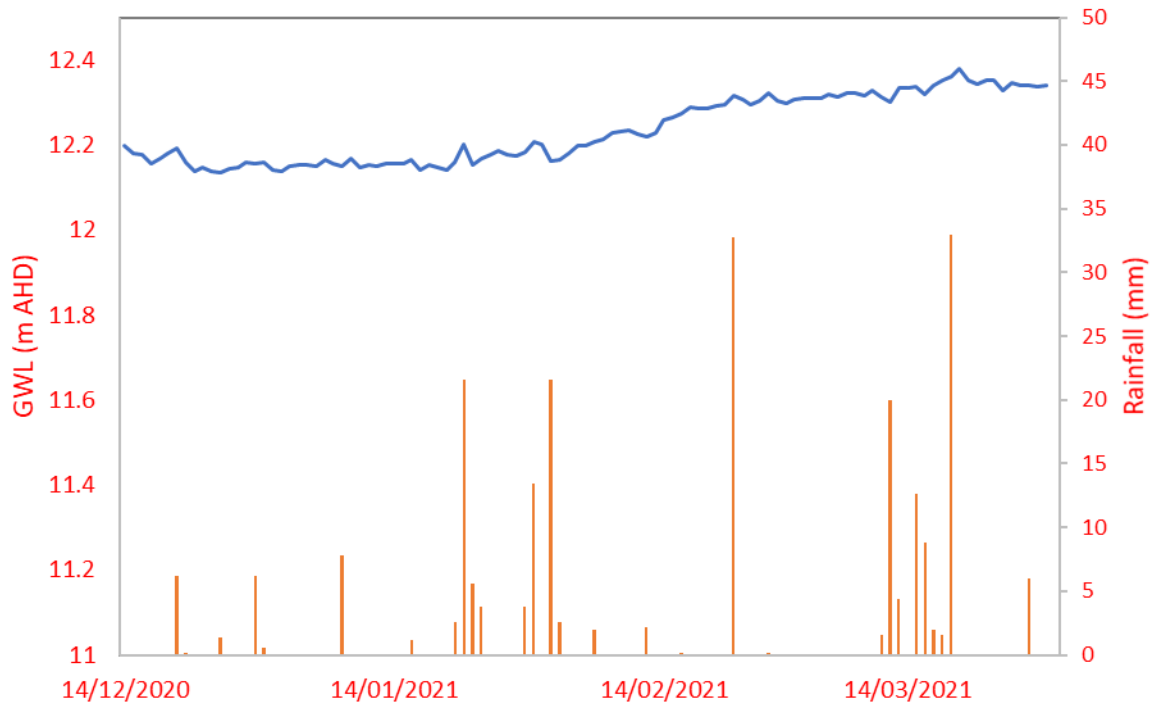
Figure 2: Groundwater Contour Plan (m AHD)



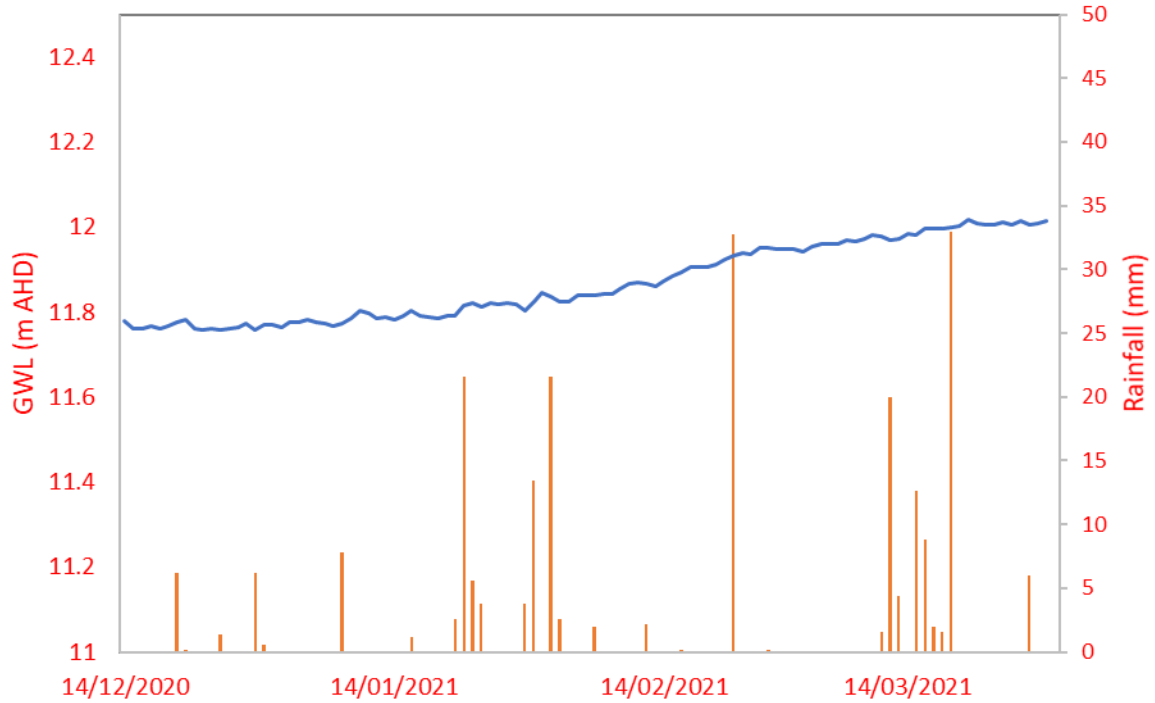
GW1-D



GW2-D



GW3-D



GW4-D

