Potential Groundwater Flows – Bore data Wallabadah Creek Catchment

A short report and data analysis prepared for the Wallabadah Creek Catchment Community Group

Prepared by

SoilFutures Consulting Pty Ltd

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Introduction and Methods

The aim of this project was to examine the available bores in the Wallabadah Creek Catchment to determine potential flows of groundwater in the valley. Groundwater levels and bore depths were measured by landholders during August to September 2019. Accurate GPS referencing was used to place each bore location on a highly detailed digital terrain model using ARCGIS by staff of the Local Land Services. These points provided an accurate measure of the elevation above sea level (ASL) of each bore in the landscape.

The ASL data for each bore were used to determine the exact depth of each bore, and the elevation of the standing water level in each bore above sea level. Further elevation data for the nearest creek bed were estimated using Google Earth. This estimate gave a reading of approximately ± 5 m at the level of the creek bed.

Results and Discussion

On examination of the resultant data it became apparent that there were 4 types of bore within the catchment based on their depth and the elevation of the standing water level. The classification of the 4 bore types is given in Table 4 below. The location of bores relative to the creek bed is given in the valley cross-section in Figure 1.

Table 1: Classification of bore types within Wallabadah Creek Catchment

Bore type	Description
1	Bore in fractured rock with a standing water level above that of the nearest adjacent creek bed. This indicated that the water in the bore was within the fractured rock itself, and unrelated to potential creek recharge.
2	Bore in alluvium adjacent to creek, on alluvial floodplain, or in fractured rock with standing water level equivalent to that of within ±5 m of the bed of the creek. These bores were considered highly connected to the small alluvial aquifers in the creek bed.
3	Bore in fractured rock with a standing water level within ±10 m of the bed of the creek. These bores were considered to be probably well connected to the small alluvial aquifers in the creek bed.
4	Bore in fractured rock with a standing water level within >10 m of the bed of the creek. These bores were considered to be fed by fractured rock aquifers which had drained originally from a combination of local recharge and direct recharge from the creek bed.

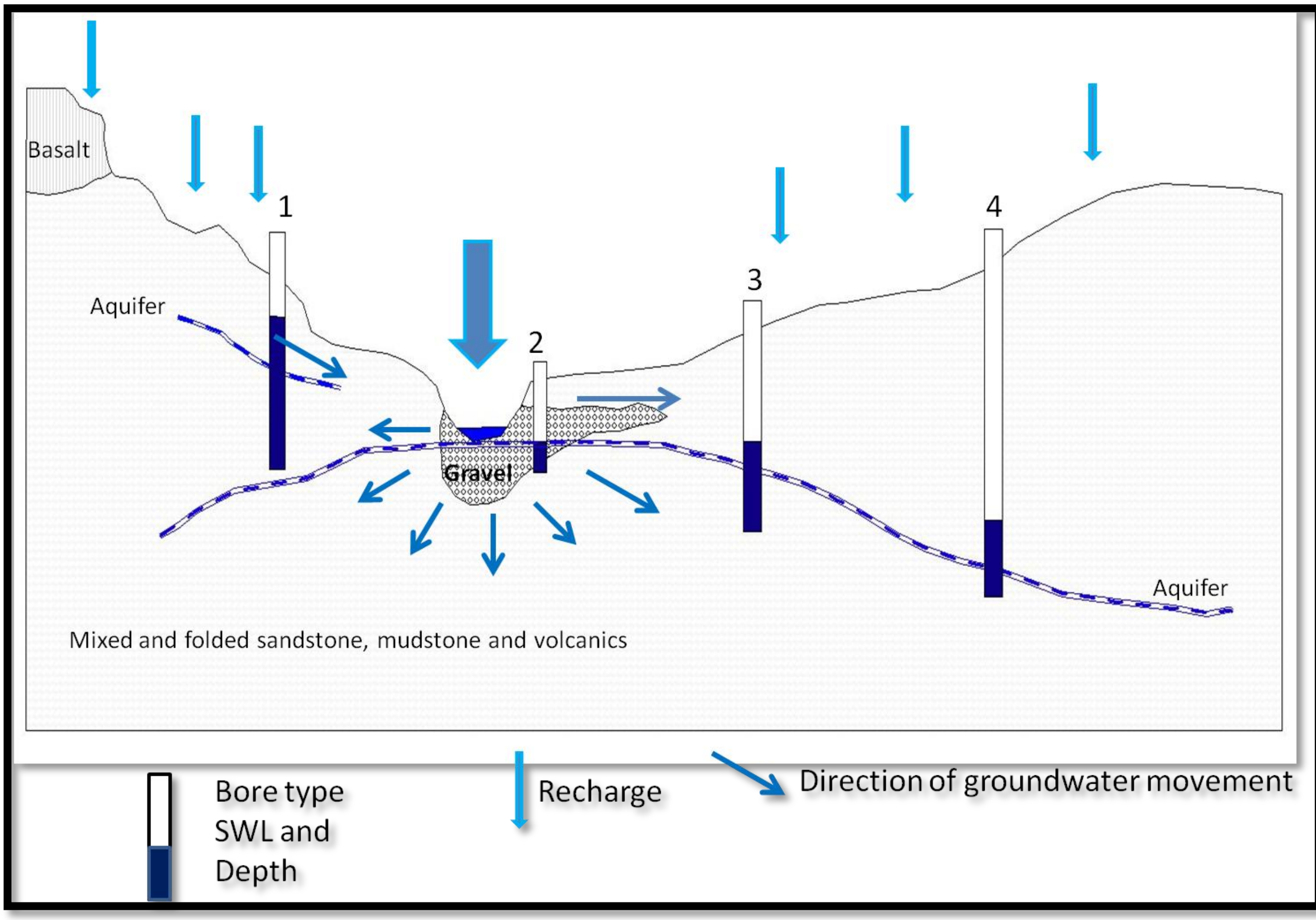

Figure 1: Schematic valley cross section illustrating bore type and depths, standing water levels and the location of aquifers.

The analysis of bore data in this way is by necessity low tech, as the bore data are quite limited for the catchment. Despite this simple approach, it can be shown that there is only one bore in the analysis that is in a fractured rock aquifer above the level of the creek bed gravel aquifers (Type 1). Bore Type 1 is fed by recharge directly into fractured rock through soils of the catchment. Bore Types 2 and 3 both show that they are very likely to be connected to the gravel aquifer of the creek bed and will probably be mostly recharged from the creek bed itself. 47% of the bores examined are in these categories. Bores classified as Type 4 are deep with a standing water level > 10 m below the creek bed. These bores are in fractured rock, and are probably fed by a combination of local and creek bed recharge and comprise 47% of the bores examined.

Concluding Remarks

Although much of the catchment of Wallabadah Creek is considered to be fractured rock, the narrow alluvial soils and gravels of the valley floor appear in this analysis to be the dominant driver of recharge to most of the bores examined in this study. The measurement of these levels at a time of extreme drought may impact on how these data are interpreted but at this point in time, many of the bores have a standing water level that is either equivalent to the alluvial gravels, or below the level of these gravels. The importance of more general through-soil recharge may be highly underestimated at this time because of the lack or rain.

In terms of potentially increasing recharge to useable groundwater, these data would indicate that works in the valley floor and creek bed to slow down water and raise the base level of the creek would be highly beneficial to recharge of most of the bores surveyed.

These results are consistent with the broad water chemistry obtained before. Showing that there are bores which have older water which has had time to become mineral rich, as well as relatively fresh water either through direct drainage from the creek or a mixing of waters from creek beds and fractured rock.

It is recommended that this exercise be repeated following the break of drought conditions to ascertain if the classification used in this study is adequate for the purpose.

Table 2: Bore data and processed data showing bore classification

All Data Available - In Catchment only

Bore type	Name	LOCATION	Standing_W	Bore_Depth	DDLat	DDLon	Elevation	SWL ASL	Depth ASL	Creek	SW Lminus Creek	Creek minus Bore depth
1	7	Jackson/Glen Idol	16.3	60	31.59429S	150.93407E	638.84	622.54	578.84	615	7.5	36.2
2	21	Hartigan/Wilgabah - CK #2*	1	3	31.53130S	150.79655E	449.20	448.20	446.20	444	4.2	0.0
2	22	Hartigan/Wilgabah - CK #3*	1	3	31.53139S	150.79694E	449.24	448.24	446.24	444	4.2	0.0
2	23	Hartigan/Wilgabah - Well*	1	3	31.53278S	150.80222E	452.96	451.96	449.96	450	2.0	0.0
2	1	Dent/Springfield - House Bore	9.5	42	31.58453S	150.91755E	585.91	576.41	543.91	572	4.4	28.1
2	2	Moore/Clydesdale	7	43	31.57990S	150.90867E	562.17	555.17	519.17	560	-4.8	40.8
2	20	Hartigan/Wilgabah - CK #1*	3	16	31.53119S	150.79572E	448.09	445.09	432.09	444	1.1	11.9
3	4	A & S McGilchrist/Temi - Bore	6	28	31.57476S	150.90621E	555.85	549.85	527.85	557	-7.2	29.2
3	5	A & S McGilchrist/Temi - Well	11	42	31.58170S	150.91363E	564.81	553.81	522.81	561	-7.2	38.2
4	3	L & C McGilchrist/ Crowtrap Hill	20.5	60	31.57441S	150.90839E	567.01	546.51	507.01	557	-10.5	50.0
4	6	Jackson/Creek Heights	17	24	31.60813S	150.95428E	658.32	641.32	634.32	654	-12.7	19.7
4	9	G Macdonald/Jobys - Mum's Bore	48.9	59.1	31.54560S	150.83829E	523.47	474.57	464.37	487	-12.4	22.6
4	17	Golland/Basin Creek	16.8	46	31.54009S	150.92553E	692.14	675.34	646.14	653	22.3	6.9
4	19	Golland/Chanbry Bore	14.3	29	31.55978S	150.88715E	526.80	512.50	497.80	526	-13.5	28.2
4	24	J McGilchrist - # 1	17	42	31.56839S	150.89815E	544.73	527.73	502.73	544	-16.3	41.3
4	25	J McGilchrist - # 2	12.5	44	31.56812S	150.89863E	544.09	531.59	500.09	544	-12.4	43.9
4	26	J McGilchrist - LM	18.2	38	31.57111S	150.90194E	544.96	526.76	506.96	545	-18.2	38.0

Depth Missing

Bore type	Name	LOCATION	Standing_W	Bore_Depth	DDLat	DDLon	Elevation	SWL ASL	Depth ASL	Creek	SW Lminus Creek	Creek minus Bore depth
NA	8	Hill/Redlands - House	14.4	NA	31.61043S	150.92317E	622.46	608.06	NA	620	-11.9	NA
NA	11	Karsen/Thurles - House Bore	18.5	NA	31.57833S	150.94528E	661.24	642.74	NA	655	-12.3	NA
NA	12	Karsen/Thurles - GW Bore	27.8	NA	31.57584S	150.94299E	647.43	619.63	NA	647	-27.4	NA
NA	15	S Macdonald/Wallabadah Stn - I Grazing	38	NA	31.52972S	150.86889E	551.59	513.59	NA	512	1.6	NA
NA	16	S Macdonald/Wallabadah Stn - Airstrip	46	NA	31.55083S	150.87333E	513.11	467.11	NA	510	-42.9	NA

Data Missing or out of catchment

Bore type/comment	Name	LOCATION	Standing_W	Bore_Depth	DDLat	DDLon	Elevation	SWL ASL	Depth ASL	Creek	SW Lminus Creek	Creek minus Bore depth
not in catch	10	G Macdonald/Jobys - Janie's Bore	10.9	99.1	31.54996S	150.83660E	500.91	490.01	401.81	NA	NA	NA
not in catch	13	Croker/NE Highway - Well	0	NA	31.55060S	150.82194E	523.18	523.18	NA	NA	NA	NA
not in catch	14	Conroy/Belambi - Bore	4	18.5	31.55750S	150.81833E	545.00	541.00	526.50	NA	NA	NA
Incorrect location	18	Golland/Woolshed Hill	22.6	38	31.54833S	150.83500E	496.77	474.17	458.77	NA	NA	NA