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28 March 2018

Newnes Kaolin P/L
3 Karingal Court
MARSFIELD NSW 2122

ATTENTION: RON GOLDBERY

Dear Ron

RE: SUMMARY OF GROUNDWATER AND SURFACE WATER MONITORING DATA AT THE NEWNES KAOLIN SITE FOR THE PERIOD JANUARY 2017 TO DECEMBER 2017

1 INTRODUCTION

Ongoing water monitoring has been undertaken at the proposed Newnes-Kaolin Project, an open-pit operation at Newnes Junction (The Site) (see Figure 1). The monitoring data is collected by ALS, and is being formally reported herein.

This letter report has been provided to compile and summarise monitoring data that has been obtained for the period January 2017 to December 2017. During this time, the following monitoring of water was undertaken:

- continuous (6 hourly) monitoring of water levels in all bores
- quarterly sampling of groundwater from all bores and surface water sites:
  - March 2017 – "quarterly testing" of groundwater sources
  - June 2017 – "quarterly testing" of groundwater sources
  - September 2017 – "biannual testing" of groundwater sources and 'routine' testing of surface water sources
  - December 2017 – "biannual testing" of groundwater sources and 'routine' testing of surface water sources

Reporting for the previous period (June 2016 to March 2013) was presented by Pells Consulting on 31 March 2017 (ref: S024.L1).

2 SUMMARY OF MONITORING DETAILS

Groundwater levels and water quality are measured at six groundwater bores, which were installed at three locations at The Site in November 2004. At each of the groundwater monitoring locations, two bores were drilled, one being designated as “shallow” (at 17.5 m below ground level (BGL)) and the other as “deep” (at 60 m BGL for NE and NW sites, and 54 m BGL at S site). Monitoring of surface water quality at two locations has also been undertaken. The groundwater and surface water monitoring locations are shown in Figure 2.

The water monitoring conforms to a monitoring program established in September 2010, which sets out the following specifications:

- routine collection of surface water samples at locations SW1 and SW2, testing for: physical properties (pH, EC and TSS); BOD; selected metals, and; Oil and Grease.
- daily measurement of groundwater levels in all six bores
- quarterly collection of groundwater samples from all bores, testing for physical properties (pH, EC and TDS);
- biannual collection of groundwater samples from all bores, testing for:
  - physical properties (pH, EC and TDS);
  - major ions (Ca, Mg, K, Cl, SO_4, HCO_3 and CO_3);
  - nutrients, and;
  - dissolved metals.

The requirements for daily measurement of groundwater levels have been met by installation of groundwater measurement instruments, providing continuous logging of groundwater levels in all six bores. These instruments have a finite operation life of approximately 10 years, due to the battery system. New instruments have been installed over the last monitoring period as the operational life expires on the original instruments installed in 2004.

3 OBSERVATIONS

3.1 Groundwater levels

Groundwater levels have been plotted as metres below ground level (m BGL) in Figures 3 and 4 for the "deep" and "shallow" bores, respectively. Groundwater level data are also plotted as reduced levels (m AHD) in Figure 5[1]. Also shown on these plots are daily rainfall records from Bureau of Meteorology Station 63057 Mount Wilson (location shown on Figure 1)[2].

There are some gaps in continuous monitoring, corresponding with upgrading of instruments as the operational life of the original instruments expires. Readings from the instrument at bore NE60 for November and December 2017 perhaps reflect incorrect placement of the instrument for this period. In either case, routine manual ('dip') readings provide continuity of observations.

The observed groundwater levels remain consistent with previous monitoring, as demonstrated in Table 1 below.

TABLE 1
GENERAL GROUNDWATER LEVELS, PREVIOUS AND CURRENT MONITORING

	OBSERVED GROUNDWATER LEVELS (M BGL)		
	July 2010 to Dec 2014	**June 2016 to March 2017**	**March 2017 to December 2017**
GW1A (NW60)	7 to 12	9 to 10	9 to 10
GW1B (NW17.5)	5 to 9	7 to 8	8 to 8.5
GW2A (NE60)	30 to 40	32 to 37	32 to 38
GW2B (NE17.5)	11 to 14	12 to 13	13
GW3A (S54)	5 to 12	10	9.5 to 11
GW3B (S17.5)	5 to 11	9 to 10	9 to 10

There has been relatively little observable response to rainfalls during the recent monitoring period. Groundwater levels in NE60 are more dynamic, and are considered to reflect flow through stress relief openings close to the edge of the valley, which were interpreted to be encountered by this bore.

[1] Note that these reduced levels are based on approximate elevation data of the ground surface at each site as presented in WRL 2010/40.

[2] Daily rainfall data from Bureau of Meteorology Station 63057 Mount Wilson were obtained from the Silo database (http://www.longpaddock.qld.gov.au/silo) as a patched point data set.

On Figure 5, groundwater data are plotted as reduced levels (i.e. groundwater elevation in metres AHD). Groundwater elevations are lowest at the NE site and highest at the S site, indicating flow toward the NE. At each monitoring site, groundwater levels in the shallow bores (dashed lines) have a higher elevation than levels in the corresponding deep bores (solid lines), indicating a vertical-downwards gradient – i.e. signifying downward flow. This is consistent with flows moving downwards toward the valley, enroute to the Wollangambe creek. The vertical downward gradient is more pronounced at the NE site (i.e. the difference between shallow and deep groundwater elevations is greater), which is consistent with increasing flow gradient through the steeper topography just downstream of the NE site.

3.2 Groundwater quality

The groundwater quality data are summarised in Table 2 below. The data accord with previous measurements made. However, there are instances noted (in boldface in Table 1) where the recorded constituents are outside of the baseline range indicated in Tables 4.1 and 4.2 of the 2015 Newnes Kaolin Groundwater Monitoring Report (Aquaterra, 2015). As no works of significance to groundwater quality have yet been undertaken, these exceedances should be noted when establishing revised baseline levels prior to commencement of larger scale works.

3.3 Surface water quality

The surface water quality data are summarised in Table 3 below. In many of the designated sampling periods, the discharge of water in the designated surface water locations was too low for samples to be taken. The data for September 2017 at SW2 accord with previous measurements made and are within trigger levels.

4 SUMMARY

Monitoring data for the period January 2017 to December 2017 are presented above. The data are consistent with previous observations. In some cases, recorded water quality constituents outside of the baseline range set in previous reports. As no works of significance to groundwater quality have yet been undertaken, these exceedances should be noted when establishing revised baseline levels prior to commencement of larger scale works

For and on behalf of
PELLS SULLIVAN MEYNINK

STEVEN PELLS
Principal

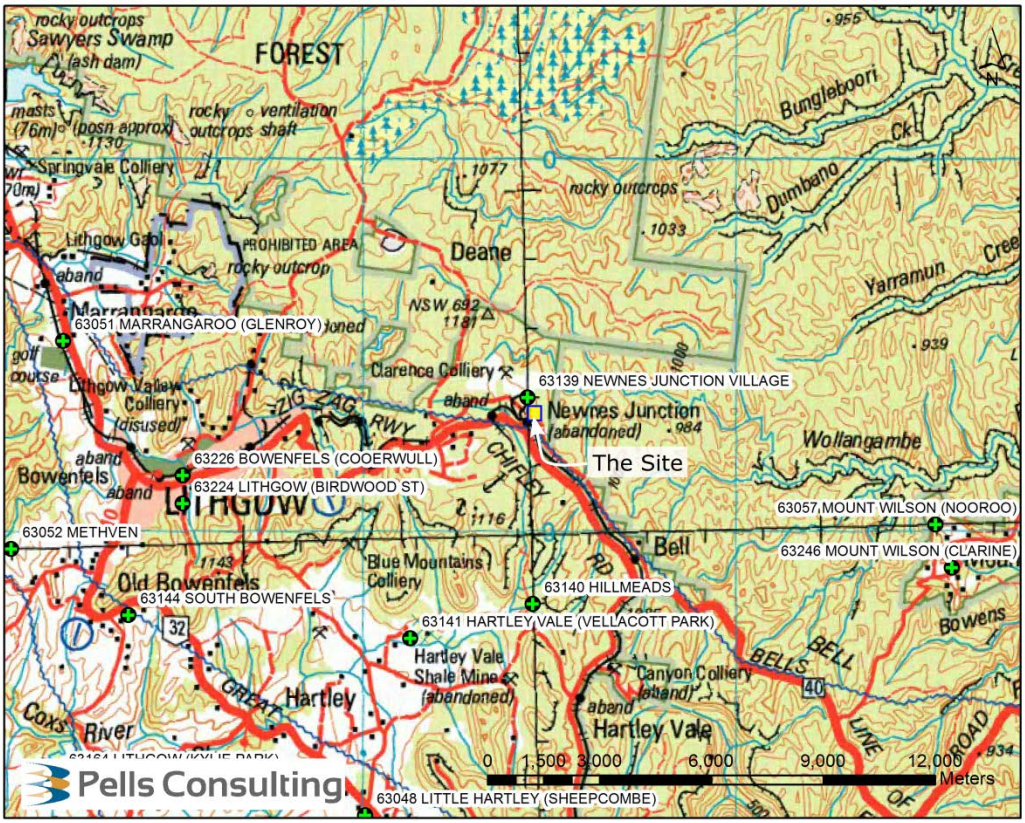

Figure 1 – Site location, showing locations of regional meteorological stations

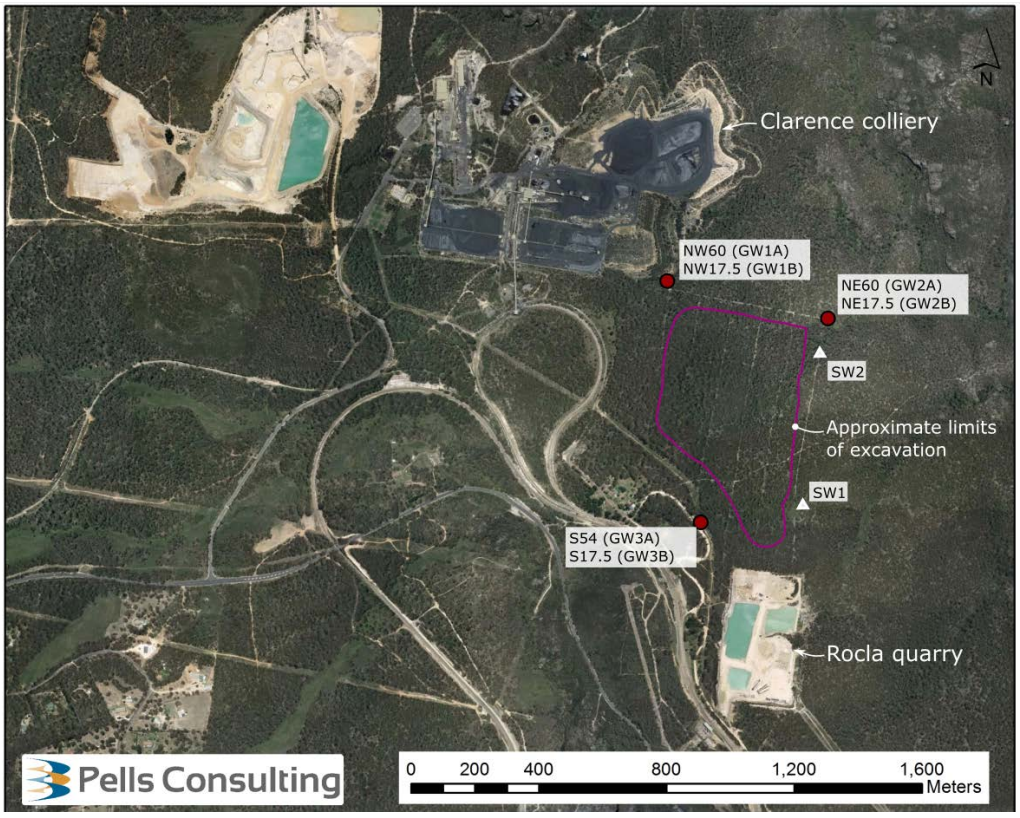

Figure 2 – Site location, showing monitoring locations

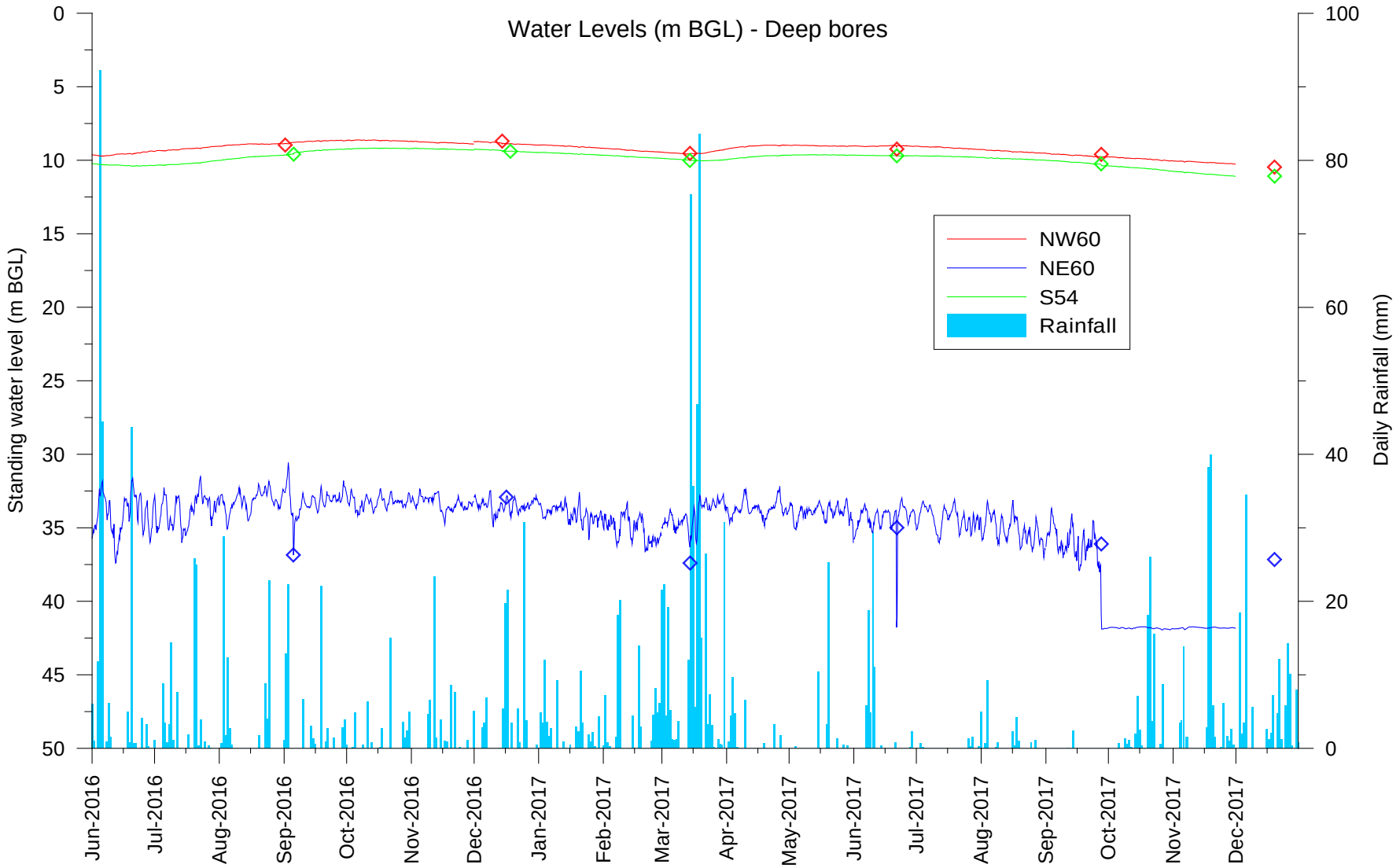

Figure 3 – Standing water levels as metres below ground, deep bores

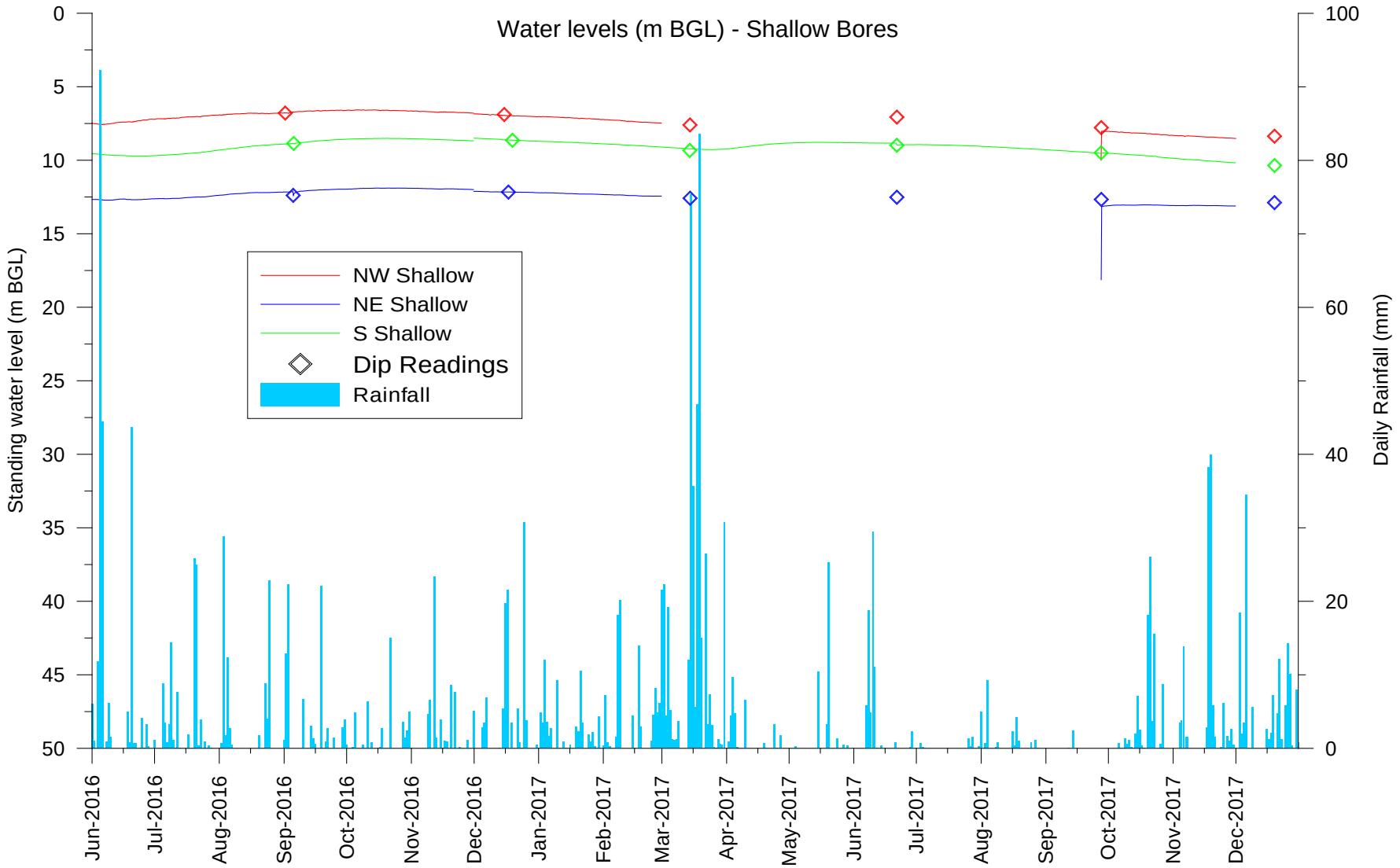

Figure 4 – Standing water levels as metres below ground, shallow bores

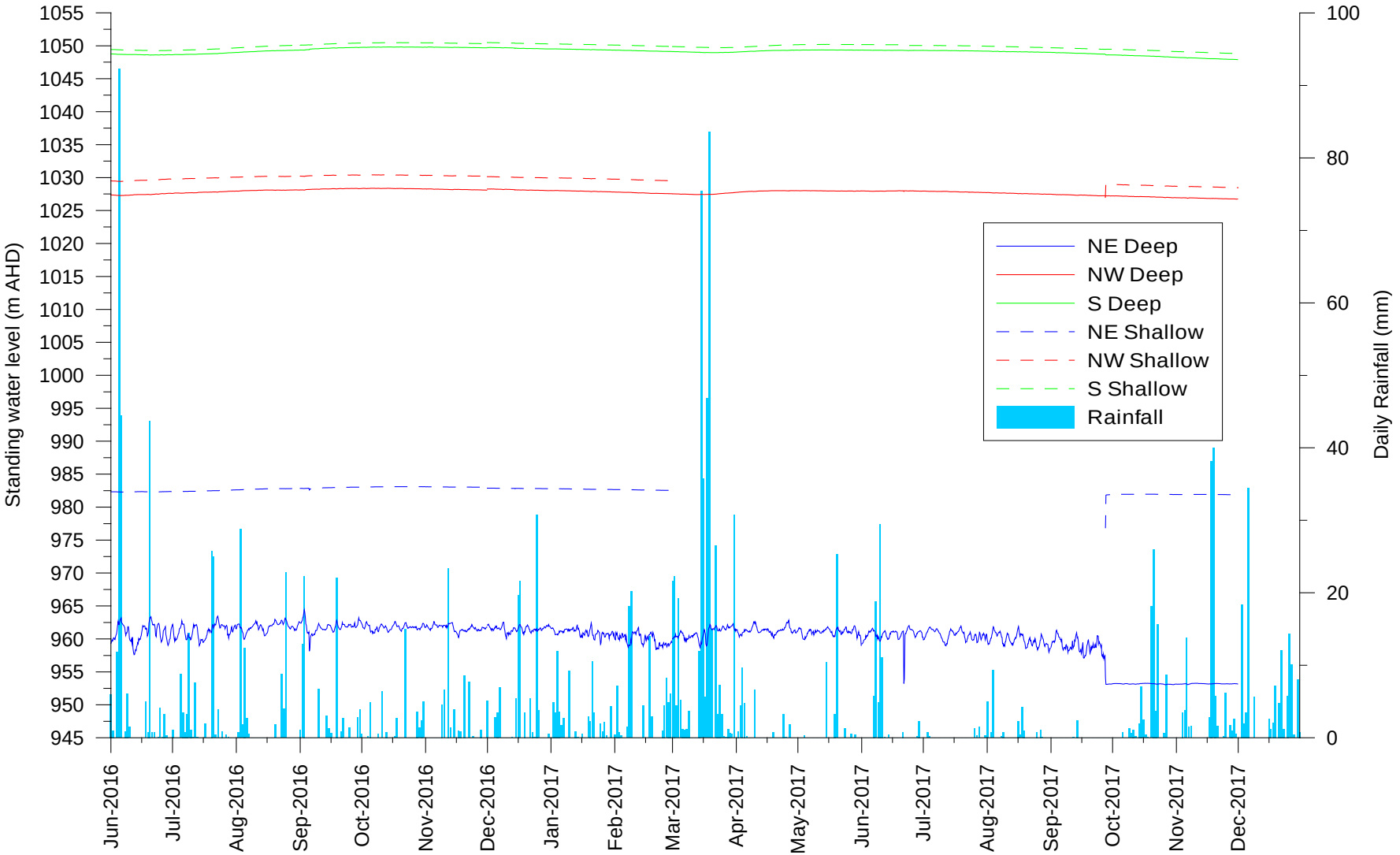

Figure 5 – Standing water levels as metres AHD, all bores

TABLE 2
SUMMARY OF GROUNDWATER QUALITY MEASUREMENTS

	DATE AND TIME	LOCATION	TEMP	PH	EC	TDS	CA	MG	NA	K	SO4	CL	FE	MN	$CACO_3$ (1.)	TOTAL P	NITRATE AS N
			°C	--	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
Jun-17	21-06-17 14:45	GW1A (NW60)	13.1	4.61	35	16											
	21-06-17 14:35	GW1B (NW17.5)	13.7	4.60	47	14											
	21-06-17 14:25	GW2A (NE60)	14.1	4.87	33	18											
	21-06-17 14:20	GW2B (NE17.5)	14.5	5.04	32	18											
	21-06-17 14:15	GW3A (S54)	14.5	4.73	66	38											
	21-06-17 14:10	GW3B (S17.5)	14.3	5.51	66	26											
Sep-17	27-09-17 13:30	GW1A (NW60)	12.5	4.60	24	44	<1	<1	3	<1	<1	5	<0.05	0.008	5	<0.01	0.12
	27-09-17 13:15	GW1B (NW17.5)	12.6	4.6	24	10	<1	<1	3	<1	<1	5	<0.05	0.012	2	<0.01	0.09
	27-09-17 14:00	GW2A (NE60)	14	4.5	28	36	<1	<1	3	<1	<1	7	<0.05	0.023	<1	0.02	0.06
	27-09-17 13:50	GW2B (NE17.5)	13.2	4.4	36	28	<1	<1	3	<1	<1	8	<0.05	0.065	<1	<0.01	0.1
	27-09-17 12:22	GW3A (S54)	11.8	4.6	52	34	<1	<1	6	<1	<1	7	<0.05	0.016	3	0.02	3
	27-09-17 12:45	GW3B (S17.5)	12.2	5	37	23	1	<1	4	<1	<1	6	<0.05	0.032	6	0.1	0.19
Dec-17	19-12-17 13:40	GW1A (NW60)	13.9	4.6	32	17	<1	<1	3	<1	<1	3	<0.05	0.011	<1	<0.01	0.13
	19-12-17 13:25	GW1B (NW17.5)	13.5	4.6	32	14	<1	<1	3	<1	<1	3	<0.05	0.013	4	<0.01	0.14
	19-12-17 12:45	GW2A (NE60)	14.7	4.5	43	18	<1	<1	4	<1	<1	5	<0.05	0.024	<1	0.02	0.1
	19-12-17 12:30	GW2B (NE17.5)	13.3	4.4	49	20	<1	<1	4	<1	<1	15	<0.05	0.072	<1	0.01	0.14
	19-12-17 14:05	GW3A (S54)	12.8	4.5	69	28	<1	<1	6	<1	<1	5	<0.05	0.009	<1	<0.01	3.18
	19-12-17 14:25	GW3B (S17.5)	12.3	4.9	43	18	1	<1	5	<1	<1	4	<0.05	0.034	4	0.05	0.28

1. Bicarbonate alkalinity at $CaCO_3$

TABLE 3
SUMMARY OF SURFACE WATER QUALITY MEASUREMENTS

	DATE	LOCATION	TEMP	PH	EC	TSS	FE	MN	OIL AND GREASE	BOD
			°C	--	*µS/cm*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
Mar-17		SW1 (South Creek)	dry							
		SW2 (North Creek)	Low flow							
Jun-17	-	SW1 (South Creek)								
	-	SW2 (North Creek)								
Sep-17	27-09-17 14:20	SW1 (South Creek)	dry							
	27-09-17 12:30	SW2 (North Creek)	10.8	5.70	27	<5	<0.05	0.006	<5	<2
Dec-17	-	SW1 (South Creek)								
	-	SW2 (North Creek)								