Appendix 8

2015 Annual Groundwater Review*

(No. of pages including blank pages = 30)

*Note: A copy of this Appendix is available on the Project CD

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Dundon Consulting Pty Limited
ACN 083 246 459
ABN 27 083 246 459

PO Box 6219, PYMBLE NSW 2073
telephone: 02-9988 4449
facsimile: Nil
mobile: 0418 476 799
email: pjdundon@ozemail.com.au

25 February 2016

Donaldson Coal Ltd
PO Box 2275
GREENHILLS, NSW 2322

Attention: Phillip Brown

Dear Phillip,

Re: Abel Coal Project – Annual Groundwater Review – 2015 Year

1. Introduction

This letter reviews groundwater data for the Abel Underground Mine during the period 1 January 2015 to 31 December 2015.

There is an extensive groundwater monitoring network around the Abel and Tasman Underground Mines, which also incorporates an earlier monitoring network established for the former Donaldson Open Cut where mining has now ceased. This monitoring network is also integrated with the monitoring of the neighbouring Bloomfield Colliery, as a result of the integration of water management across both projects. Coal from the Abel, Tasman and Donaldson mines has been processed through the Bloomfield Coal Handling and Preparation Plant (CHPP), and excess water from the Abel and Donaldson mines has been and continues to be pumped into the Bloomfield water circuit for use in the CHPP and ultimate disposal thereafter.

This review presents a comprehensive assessment of mining and other impacts apparent in the monitoring data, and assesses these against predicted impacts reported in the various project environmental approval and SMP/Extraction Plan Approvals.

This letter report sets out the results of monitoring relative to the Abel Underground Mine and former Donaldson Open Cut. A separate report addresses monitoring related to the former Tasman Underground Mine.

During 2015, mining activities at Abel Underground Mine have included completion of secondary extraction from SMP Area 3, then progressing to development and secondary extraction from SMP Area 4.

2. Background

The Abel Underground Mine is located about 25 km west of Newcastle in NSW. It comprises an underground mine located to the south of John Renshaw Drive, which is accessed from a portal in a box-cut within the former Donaldson Open Cut, on the northern side of John Renshaw Drive.

Development Approval (05_0136) was granted for the Abel Underground Mine on 7 June 2007 by the NSW Minister of Planning pursuant to Section 79J of the NSW Environmental Planning and Assessment Act 1979. Mining of development headings commenced in March 2008. Secondary extraction commenced in April 2010.

Three modifications have subsequently been approved. The most recent Abel Upgrade Modification (MOD3) was lodged in February 2013, and was formally approved on 4 December 2013.

3. Groundwater and Surface Water Monitoring Data

The results of monitoring are reported each year in the Annual Environmental Management Reports. This report outlines the monitoring results and assessment of groundwater performance against predicted impacts for the 2015 calendar year.

Surface water and groundwater monitoring locations for the Abel Underground Coal Mine Project are shown on **Figure 1**.The groundwater monitoring data are presented in graphical format in **Figures 2** to **17**.

4.1 Groundwater Levels

Water levels are monitored monthly in the bores listed in **Table 1**, some of which are standpipe piezometers, and others are single-level or multi-level vibrating wire piezometer bores. The standpipe bores are monitored manually for direct measurement of water level approximately monthly. The vibrating wire piezometers are also monitored manually for hydrostatic pressures, which are converted to water level RLs.

Table 1: Groundwater Level Monitoring – Abel Underground Mine – Monthly

SP Bore	VW Bore	Interval / Formation Monitored	Comments
REGDPZ1		27-33m – lithology unknown	Regional control bore north of Donaldson OC – monitored since 2000.
DPZ1A		?? L Donaldson and Big Ben Seams	Donaldson OC area
DPZ3		6.8-18.8m – coal measures below L Donaldson Seam	Donaldson OC area
DPZ6		26.7-42.5m – U and L Donaldson Seams	South of Donaldson OC
DPZ8		22.2-32.2m – L Donaldson and Big Ben Seams	Donaldson OC area
DPZ10		11.8-29.8m – Beresfield Seam	Donaldson OC area
DPZ13		18-30m – U Donaldson Seam overburden	Abel UG mine
DPZ14A		?? Ashtonfield Seam	Donaldson OC area
DPZ16A		??	Donaldson OC area
DPZ17		62m – ??	NE of Donaldson OC
DPZ20		11.5-17.5m – Regolith	Donaldson OC area
FMCPZ2		??	Donaldson OC area
JRD1		??	Abel UG mine
JRD2		??	Abel UG mine
	C063B C063A	128.9m – Coal measures overburden 195.5m – L Donaldson Seam	East of Abel UG mine
C078B C078A		18-24m – Regolith 87-90m and 96-99m – Donaldson Seam	Abel UG mine
C072B	 C072A	42-45m – Regolith 262m – Donaldson Seam	South of Abel UG mine
C080		280m – Donaldson Seam	Abel UG mine
C081B	 C081A	14-20m – Regolith 54.7m – U Donaldson Seam	Pambalong NR
C082		14-20m – Regolith	Pambalong NR
C092		186m – Sandgate Seam	Abel UG mine
	C093	146m – U Donaldson Seam	West of Abel UG mine
	C095	249m – L Donaldson Seam	South of Abel UG mine
	C123F	29m – Fassifern – W Borehole interburden	West of Abel UG mine

Table 1: Groundwater Level Monitoring – Abel Underground Mine – Monthly

SP Bore	VW Bore	Interval / Formation Monitored	Comments
	C123E	78m – Sandgate – Donaldson interburden	
	C123D	148m – U Buttai Seam	
	C123C	162m – Beresfield Seam	
	C123B	207m – U Donaldson Seam	
	C123A	229m – L Donaldson Seam	
	C133E	100m – Thornton Seam	West of Abel UG mine
	C133D	145m – Big Ben Seam	
	C133C	172m – Ashtonfield Seam	
	C133A	192m – siderite	
	C133B	248m – Rathluba Seam	
	C138E	75m – Sandgate – Donaldson interburden	West of Abel UG mine
	C138D	113m – Donaldson Seam	
	C138C	136m – Big Ben Seam	
	C138B	142m – Big Ben – Ashtonfield interburden	
	C138A	163m – Ashtonfield Seam	
	C140E	50m – overburden shale/sandstone	West of Abel UG mine
	C140D	100m – overburden shale/sandstone	
	C140C	150m – overburden shale/sandstone	
	C140B	224m – Sandgate Seam	
	C140A	252m – siderite?	
	C148D	50m – W Borehole Seam	West of Abel UG mine
	C148C	125m – Sandgate – Donaldson IB	
	C148B	200m – Big Ben Seam	
	C148A	237m – Big Ben – Ashtonfield interburden	
	C223E	125m – W Borehole Seam	West of Abel UG mine
	C223D	160m – Sandgate Seam	
	C223C	242m – Buttai Seam	
	C223B	325m – U Donaldson Seam	
	C223A	350m – L Donaldson Seam	
	TA28	290m – Donaldson Seam	Tasman mine area
	B029E	66m – W Borehole Seam	Tasman Extension area
	B029D	92m – Sandgate Seam	
	B029C	150m – Sandgate – Donaldson IB	
	B029B	250m – U Donaldson Seam	
	B029A	280m – L Donaldson Seam	
	B030E	50m – Fassifern – W Borehole interburden	Tasman Extension area
	B030D	97m – Fassifern – W Borehole interburden	
	B030C	150m – Sandgate Seam	
	B030B	230m – U Donaldson Seam	
	B030A	300m – Donaldson – Big Ben interburden	
	B031D	54m – Fassifern – W Borehole interburden	Tasman Extension area
	B031C	100m – W Borehole Seam	
	B031B	180m – Sandgate – Donaldson IB	
	B031A	230m – U Donaldson Seam	

Bores TA28 and B029, B030 and B031 are included in **Table 1** as they include piezometers monitoring the Donaldson Seams and overburden strata, even though these bores are located in the Tasman or Tasman Extended areas.

Review of the water level monitoring data has shown that many of the piezometers are responding to mining effects, not just natural fluctuations due to rainfall recharge. However, these are all piezometers located within the coal measures, with the largest impacts seen in piezometers monitoring the Upper Donaldson and/or Lower Donaldson Seams.

The following comments are provided on the behaviour of each piezometer listed in **Table 1**:

- REGDPZ1 (**Figure 2**) – a regional control bore located in strata well below the Donaldson Seams. Shows gentle change in response to long-term rainfall pattern, declining gradually from 2000 to 2005 (a period of below average rainfall), and rising gradually from 2005 to 2015 (a period of slightly above average rainfall).
- DPZ1A (**Figure 2**) – replacement for DPZ1 which was screened in Donaldson Seam. Showed steady water level rise from 2010 to 2915, more slowly through 2014; relatively stable since cessation of mining in Donaldson OC, but at lower than pre-mining level.
- DPZ17 (**Figure 2**) – piezometer at 62m to base of Donaldson Seam. Showed rapid drawdown 2001 to 2004 during mining in Donaldson OC, then strong recovery from 2004 to 2013 after mining moved westwards in pit. Water level steady in 2014, and rising slightly again in 2015, but lower than pre-mining level.
- DPZ14 and 16 (**Figure 3**) – Both show some response to mining in Donaldson OC, and subsequent partial recovery, with stable water levels through 2014 and 2015.
- DPZ8 (**Figure 3**) – Screened in Donaldson and Big Ben Seams. Responded to mining in OC in 2007, then slight post-mining recovery thereafter. Water level steady in 2014-2015.
- DPZ20 (**Figure 4**) – Regolith bore, shows modest drawdown over period of monitoring. The low water levels in 2009 and 2010 were inadvertently measured in the deep piezometer at the same site (DPZ20B).
- DPZ10 (**Figure 4**) – Screened in the Beresfield Seam, and shows modest OC mining effect from 2001 to 2006, then modest recovery, and more recent response to Abel UG mining from 2011.
- DPZ13 (**Figure 4**) – Screened in Donaldson Seam overburden, and showed no response to OC mining, but clear response to Abel UG mining from early 2012. Groundwater level appears to have been below the bottom of the bore since 2013.
- DPZ3 (**Figure 5**) – Located in OC area, and screened in coal measures below Donaldson Seam. Showed unexplained rise in water level from 2004 to 2010, then decline apparently in response to mining from Donaldson OC. The rise in water level from 2004 to 2010 may be due to leakage from the Big Kahuna Dam or from Four Mile Creek both of which are close to the bore location. Current behaviour appears to be response to rainfall and natural recession.
- FMCPZ2 and DPZ6 (**Figure 5**) – Both showed drawdowns during latter stages of Donaldson OC, then more pronounced drawdown once development of the Abel UG South Mains started in April 2008. Both have showed partial recovery during 2013 to 2015, probably due to recovery in the former OC.
- JRD1 and JRD2 (**Figure 6**) – Bore construction is not known. Both bores show mining impacts.
- C078B (regolith) and C078A (Donaldson Seam) (**Figure 6**) – The shallow regolith bore shows no mining impact. The deeper Donaldson Seam bore showed no mining impact until the start of secondary extraction in Panel 23 in June 2013. Still declining, but at a slower rate in 2015.
- C082 (**Figure 7**) – Regolith bore which has showed steadily rising water level since 2006. No mining impact at least until 2014. The single water level measured in 2015 may indicate drawdown, and should be verified by follow-up monitoring.
- C081B (regolith) and C081A (Upper Donaldson Seam) (**Figure 7**) – The shallow regolith bore

shows no mining impact. Deeper Donaldson Seam bore shows continual steady drawdown since installation in 2006. Both bores steady during 2014 and early 2015.

- C095 (**Figure 7**) – Lower Donaldson Seam bore, showing drawdown during 2006-2009, then rising till 2013, and then drawdown again. The reason for this behaviour is not clear.
- C063B and C072B (regolith bores located east of Abel mine area) (**Figure 8**) – Both show no mining impacts over the period 2005 to early 2016.
- C063A (**Figure 8**) – This Donaldson Seam piezometer is believed to have failed. The hydrograph shows very slow decline in water level from installation until 2015 to well below sea level. The pattern of decline is the same through both mining and non-mining periods, and is suggestive of a piezometer not in hydraulic connection with the groundwater system. It is recommended that monitoring of C063A be discontinued.
- C072 (**Figure 8**) – Donaldson Seam piezometer, which has reported a steadily rising water level since installation in 2005. It is suspected that this bore is either not functioning or is not in good hydraulic connection with the groundwater system.
- C080 (**Figure 8**) – Donaldson Seam piezometer that showed modest mining impact during early development stages of Abel UG, then a pronounced drawdown impact from the start of secondary extraction from Panel 23 in August 2013. The final water level measurement in late 2015 is against the prior trend, and may indicate water level recovery. This should be verified from future monitoring.
- C123 and C223 (**Figure 9**) – Located near western side of the Abel ML, both are multi-level VW piezometers, screened at several levels from the Lower Donaldson up to the West Borehole Seams. C123 was only monitored in early 2015, and C223 has not been monitored since mid-2014. The Upper Donaldson in both bores shows steady drawdown, with lesser drawdown in the overburden piezometers as well. C123 Upper Donaldson and C223 Buttai responses suggest those piezometers may not be functioning correctly.
- C092 (**Figure 9**) – Apparent recovery in Sandgate Seam is unexplained.
- C133, C138 and C093 (**Figure 10**) – These three piezometer bores are located west of the Abel mine. C133 shows drawdown until late 2014 or early 2015, but recovery since that time. The partial recovery of groundwater levels in the Rathluba Seam, stratigraphically deeper than any mining at Abel or Donaldson, is clearly a response to changes in mining at Bloomfield where the Rathluba Seam was mined historically.

  The C138 and C093 piezometers show drawdown almost continually since installation in 2007 or 2008, at all stratigraphic levels, apart from the Ashtonfield Seam which showed partial recovery in 2015. Drawdown started before mining commenced at Abel, and even before development of the South Mains headings, indicating that the responses at least initially were probably due to mining at Bloomfield.
- C140 and C148 (**Figure 11**) – Responses occur before mining started at Abel, and are probably related to mining at Bloomfield. Water levels are relatively stable through 2015.
- TA28 (**Figure 11**) – Bore shows gradual drawdown in Donaldson Seam from 2006, believed to be in response to Donaldson OC, the pronounced drawdown from April 2010, coinciding with the start of secondary extraction from Panel 1.
- B029, B030 and B031 (Figure 12) – All three bores show drawdowns in the Donaldson Seam and some of the overburden strata. Early responses from 2008 to 2010 at B029 are probably slow adjustment to ambient heads in very low permeability strata.

In general, piezometer bores around the former Donaldson OC are mostly recovering after cessation of OC mining, albeit to lower than pre-mining levels. Piezometers located within and to the south of the Abel mine area are behaving predictably, with drawdown in the Donaldson Seams and by a lesser amount in most overburden piezometers as well. The Donaldson Seam is even showing clear mining related response as far south as TA28, located in the Tasman mine area. Piezometers to the west of Abel are generally not responding in a predictable way to mining at Abel or Donaldson, and are more likely influenced by mining activity at Bloomfield.

There is no evidence of any drawdown response in the alluvium or regolith groundwater (although the sole water level measurement at C082 in 2015 was below trend, and is probably erroneous, but this should be verified from ongoing monitoring.

The lack of any impact on the alluvium or regolith is best illustrated by the following hydrographs for paired regolith and Donaldson Seam piezometers:

- C078A (Donaldson Seam) and C078B (Regolith) – **Figure 6**; and
- C081A (Donaldson Seam) and C081B (Regolith) – **Figure 7**.

At the C078 and C081 sites, where two piezometers are present, a shallow piezometer in the regolith and a deep piezometer in the Donaldson Seam, the lack of drawdown response in the regolith is clearly apparent.

There are no drawdowns apparent in the water level monitoring data that would indicate any unanticipated impact on groundwater levels wither in the alluvium/regolith, or in the coal measures. The shallow monitoring piezometer C063B, which is located to the east of the Abel mine, and close to Hexham Swamp, shows no sign of mining related impact on groundwater levels, and it is concluded that there has been no noticeable impact on Hexham Swamp or the groundwater underlying the Swamp.

Bores C081A and B (**Figure 7**) are located adjacent to Pambalong Nature Reserve, and the shallow regolith monitoring bore shows no response to mining, while there is a clear response to mining in the deeper bore in the Donaldson Seam. The lack of response in the shallow regolith bore indicates that there has been no mining impact on the wetland located in Pambalong Nature Reserve. These two bores have had only limited monitoring in 2014 and 2015. It is recommended that monitoring resume on a more regular basis, as they are key bores for demonstrating that the Pambalong wetland is not being impacted.

4.2 Groundwater Quality

Only the standpipe piezometers are able to be sampled for water quality monitoring. There are currently 19 standpipe piezometers available for sampling, of which 14 are specified for regular sampling in the Water Management Plan, and these are all located around the Donaldson OC or immediately south of John Renshaw Drive. Only 11 are currently being sampled, as the other three have been reported to now have too little water to sample.

There are 6 standpipe bores located within and south of the Abel area which could be sampled but currently are not being monitored for water quality. These are C078B, C093, C080, C081B, C072B and C095. These would be more appropriate for monitoring the impacts of mining at Abel.

The eleven bores which are regularly sampled for water quality monitoring, are sampled monthly for temperature, pH, electrical conductivity (EC), total dissolved solids (TDS), total suspended solids (TSS) and sulphate; and quarterly for laboratory analysis of major anions and cations, selected metals, fluoride and alkalinity, as well as the monthly parameters. EC and pH are plotted for each monitored bore on **Figures 13** to **17**.

Salinity varies over a wide range from bore to bore, but within each bore, salinity generally is quite stable over time. Some of the monitored bores have reported occasional outliers of significantly lower salinity (EC and TDS) which are likely due to ingress of rainwater temporarily lowering the salinity in the bore. This is particularly apparent at bores DPZ17 (**Figure 13**), DPZ3 (**Figure 16**) and JRD2 (**Figure 17**).

A recent downward trend in EC has been noted at bores DPZ13 (**Figure 15**) and DPZ6 (**Figure 16**), which could be due to enhanced recharge following drawdowns in the coal measures as a result of mining. However, the monitoring has not indicated any rising trend in salinity in any bore, apart from the regional control bore REGDPZ1 (**Figure 13**), which is unrelated to any mining activity.

Likewise, although there are some pH variations from bore to bore, the monitoring has generally reported consistent pH values at individual bores over time.

4.3 Mine Inflows

Groundwater inflows were first encountered in the Abel Underground Mine during the initial development of the South Mains not far down dip from the portal. They have continued at a relatively modest rate since that time, with occasional short-term higher inflow from specific zones, related either to intersection of fractures/faults, or areas of limited cover depth. Inflow rates overall are reported by the mine personnel to be generally less than predicted by the groundwater modelling.

Groundwater inflow rates to the underground workings are difficult to measure, due to the importation of water for mining equipment operation, and the periodic fluctuations in the amount of water that remains stored within the mine. Water storage in the mine is particularly important, especially since around August 2013, when a large area of former workings downdip of the active areas became inaccessible for observation. There are several locations where water is able to accumulate without being observed, and under these circumstances it is not possible to accurately determine the water balance underground.

Prior to 13 August 2013, a crude estimate of groundwater inflow could be determined by subtracting water pumped into the mine ('Water In') from water pumped out ('Water Out'). However, from that date until 1 October 2015, Water Out minus Water In was unreliable for estimating groundwater inflow, as during that time a significant portion of mine water was accumulating in an isolated in-mine storage area within SMP Areas 1 and 2. This area, which had an estimated total storage volume of 390 ML filled slowly over the period 13 August 2013 until on 1 October 2015, water reported at the overflow point from this storage area, at the western end of Panel 20, indicating that the storage had filled up. A further region of isolated storage at the southern end of Panels 23 to 28 and 30 has an estimated volume of 69 ML, giving a total in-mine accumulation of 459 ML.

During the time that water was accumulating in the storage below the overflow point at the end of Panel 20, it cannot be reliably estimated what the daily or monthly groundwater inflow rates to the Abel mine were. However, by averaging the total storage volume of 459 ML over the 779 days between 13 August 2013 and 1 October 2015 (0.59 ML/d or approximately 18 ML/month), an average groundwater inflow rate can be calculated as "Water Out" minus "Water In" plus "average rate of accumulation in in-mine storage".

This is illustrated on **Figure 18**, which in the upper pane shows 'Water In', 'Water Out', 'Average Storage Accumulation' and 'Maximum Corrected Water Out' (ie, the reported Water Out figure plus 18 ML/month during the period 13 August 2013 to 1 October 2015). In the lower pane on **Figure 18**, the estimated net groundwater inflow derived as described above is plotted. From Figure 18, it is interpreted that the average rate of groundwater inflow has mostly been in the approximate range 20 to 10 ML/month (240 to 120 ML/y), but after 1 October 2015, the estimated inflow rate has jumped to between 20 and 30 ML/month (240 to 360 ML/y).

The mining sequence has varied a little from that simulated in the groundwater modelling carried out for MOD3 (RPS Aquaterra, 2013). However, the model-predicted rate of groundwater inflow by the stage that mining has reached by the second half of 2015 was between 800 and 1000 ML/y, which is well above the maximum rates of inflow actually occurring.

4. Groundwater Licensing

Groundwater impacts involve water takes regulated by both the *Water Act 1912* and the *Water Management Act 2000*.

The predicted maximum water takes from the relevant water sources for the currently approved mine plan are detailed in **Table 1** below. The affected water sources under the *Water Management Act 2000* are the Wallis Creek Water Source and the Newcastle Water Source in the Hunter Unregulated and Alluvial Water Sharing Plan (HUAWSP), and are due to predicted changes in baseflow or leakage to groundwater. The predicted mine inflows are from the Hard Rock water source which is regulated by the *Water Act 1912*.

Table 1: Predicted Maximum Water Takes from Approved Mine (MOD 3 Modification)

Water Sharing Plan	Management Zone / Groundwater Source	Currently Approved Maximum Annual Water Take (ML/y)	Licence Entitlement Currently Held
HUAWSP	Wallis Creek Water Source	0.19	Nil
	Newcastle Water Source	11.39	Nil
Water Act 1912	Hard Rock	2,304	500 ML/y (Licence number 20BL171935)

Operations to date have not exceeded the above maximum approved water takes from any water source. However, the current licences held by the project are insufficient to meet the predicted maximum water takes in coming years. Additional licence allocations will need to be acquired. However, to this stage of the project, the current licence entitlements have not been exceeded.

5. Conclusions and Recommendations

The groundwater monitoring has not shown any adverse impact on any surficial groundwater, either alluvium or regolith groundwater, within or surrounding the Abel Underground Mine. Groundwater levels and quality in the surficial aquifer system remain within trigger levels. At sites where both the regolith and the underlying coal measures are monitored, no mining induced drawdown impacts have been observed in the surficial groundwater, while significant drawdowns have occurred in the Donaldson Seam and coal measures overburden, and it is concluded that baseflow impacts from the project are negligible. Mine inflows from the Permian coal measures and other water takes are within the licensed amounts.

No changes to the monitoring network are considered necessary. The reporting of water level monitoring results in the annual AEMRs should include graphical presentations of water level data to indicate trends. Groundwater sampling and laboratory analysis should be extended to include the six standpipe bores located within and south of the Abel mine area that are currently not being sampled. Some of the bores in the former Donaldson OC area could be dropped from the ongoing sampling run.

6. References

Donaldson Coal Pty Ltd, 2008. *Abel Underground Mine Water Management Plan*. Document prepared in 2008, and updated in 2014 following Mod 3 Modification approval.

Evans and Peck, 2012. *Abel Upgrade Modification, Surface Water Assessment*. Report dated December 2012.

R W Corkery & Co Pty Ltd, 2015. *Annual Environmental Management Report – Abel Underground Coal Mine, 1 June 2014 – 31 December 2014*. Report dated 31 March 2015.

RPS Aquaterra, 2013. *Abel Upgrade Modification*[1] *Groundwater Assessment*. Report dated 7 February 2013.

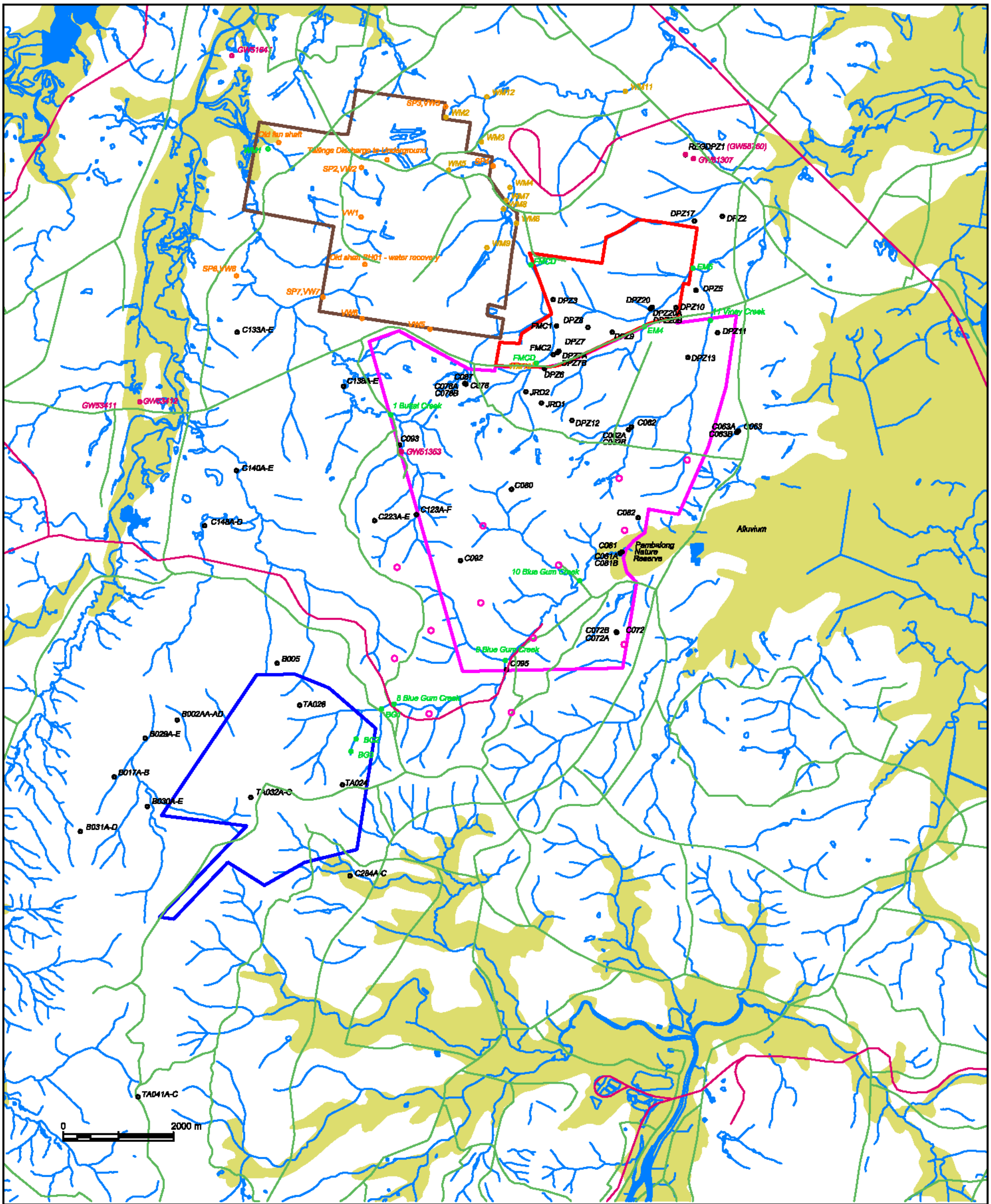
Figures

[1] MOD 3 Modification.

Figure 6	Water Level Hydrographs – JRD1, JRD2 and C078
Figure 7	Water Level Hydrographs – C082, C081 and C095
Figure 8	Water Level Hydrographs – C063, C072 and C080
Figure 9	Water Level Hydrographs – C123, C223 and C092
Figure 10	Water Level Hydrographs – C133, C138 and C093
Figure 11	Water Level Hydrographs – C140, C148 and TA28
Figure 12	Water Level Hydrographs – B029, B030 and B031
Figure 13	Water Quality – EC and pH – REGDPZ1, DPZ1 and DPZ17
Figure 14	Water Quality – EC and pH – DPZ16A, DPZ14A and DPZ8
Figure 15	Water Quality – EC and pH – DPZ20, DPZ10 and DPZ13
Figure 16	Water Quality – EC and pH – DPZ3, FMCPZ2 and DPZ6
Figure 17	Water Quality – EC and pH – JRD1 and JRD2
Figure 18	Estimated Net Groundwater Inflow

Yours faithfully.

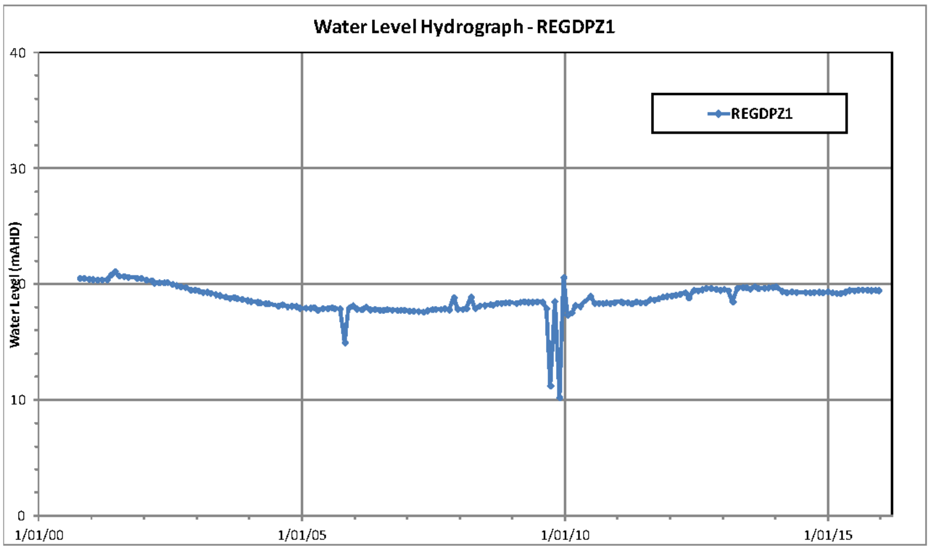
Peter Dundon

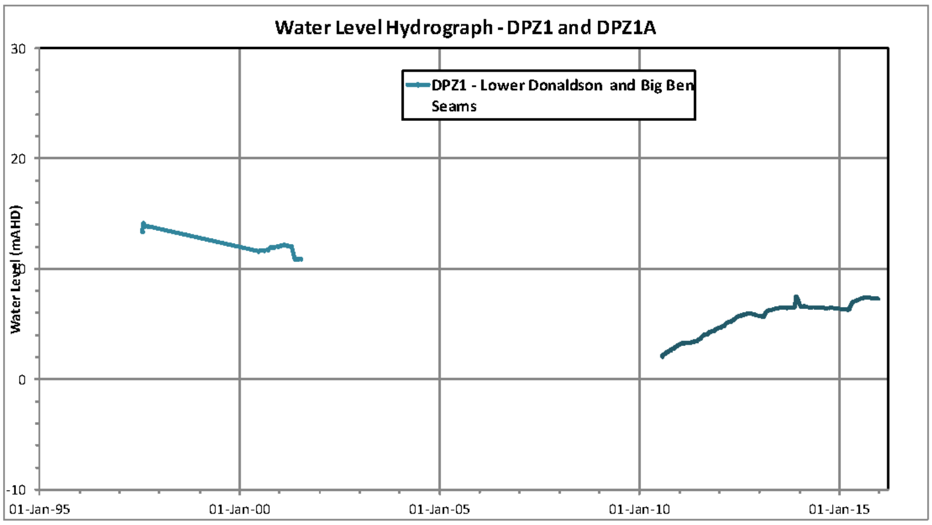


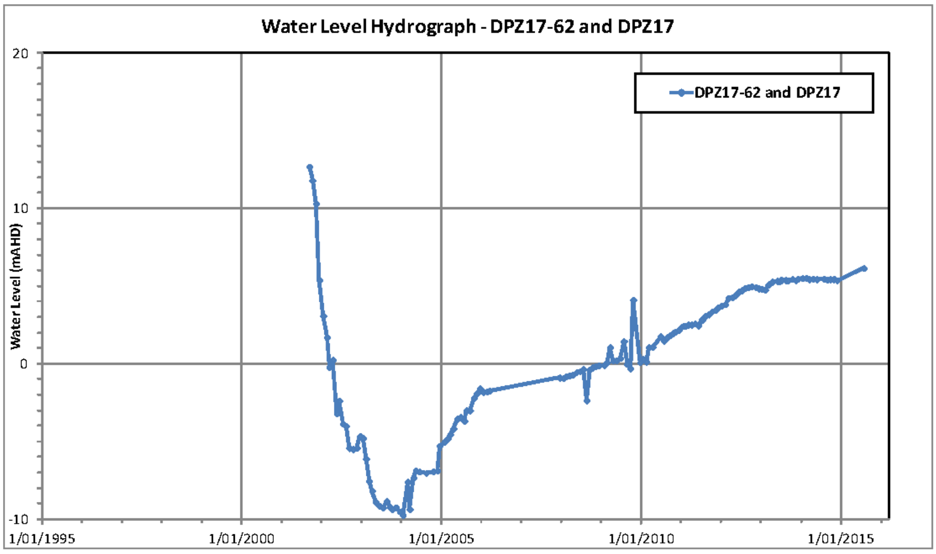
Legend

- Abel Project
- Tasman Project
- Bloomfield Project
- Donaldson Open Cut Project
- EM5 — Donaldson surface water monitoring point
- WM11 — Bloomfield surface water monitoring point
- BL02 — Bloomfield borehole/piezometer
- C063, DPZ9 — Donaldson piezometer
- GW78045 — NOW Registered Bore
- Roads
- Rail lines
- Streams

Date: 15 February 2016	Scale: as shown	**Donaldson Coal Pty Ltd**
Initials: PJD	Job No: 16-0313	**Abel Underground Mine Surface Water and Groundwater Monitoring Locations**
Drawing No: 0313-001	Rev:	
Dundon Consulting Pty Ltd		**Figure 1**







DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
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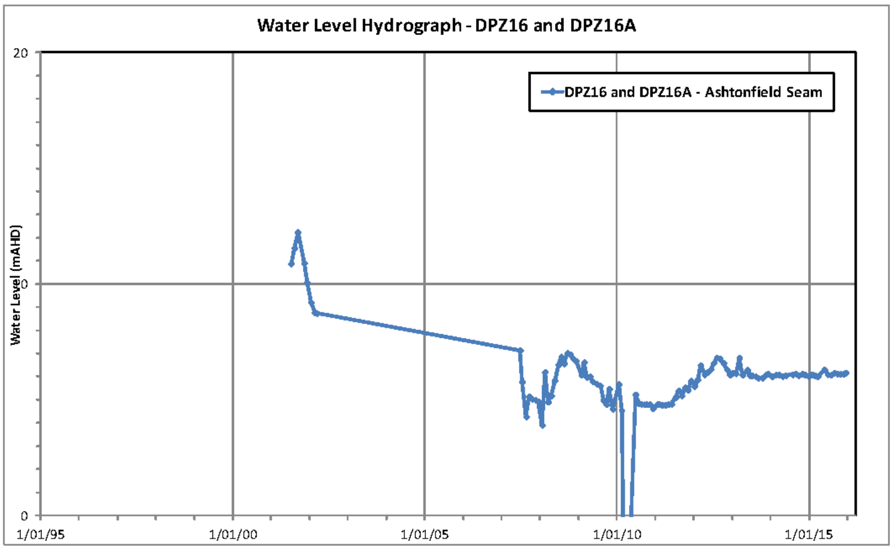
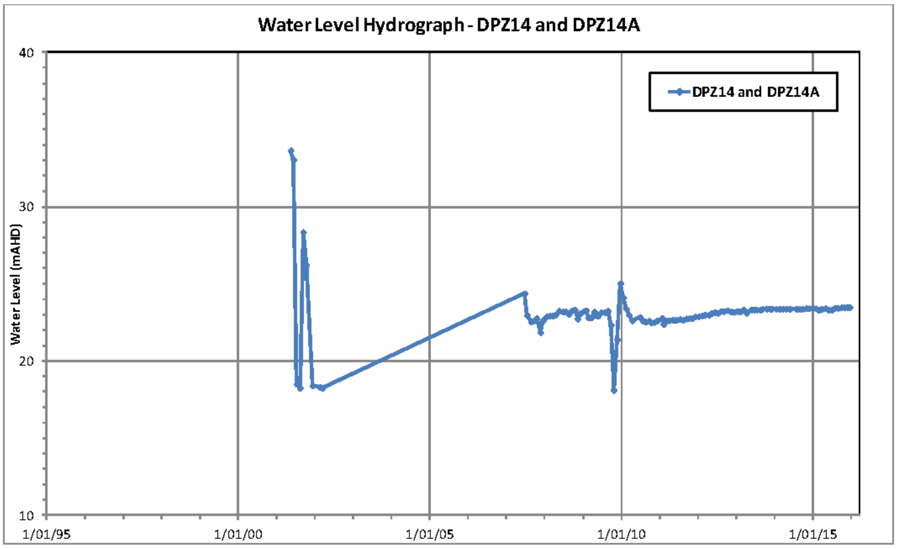
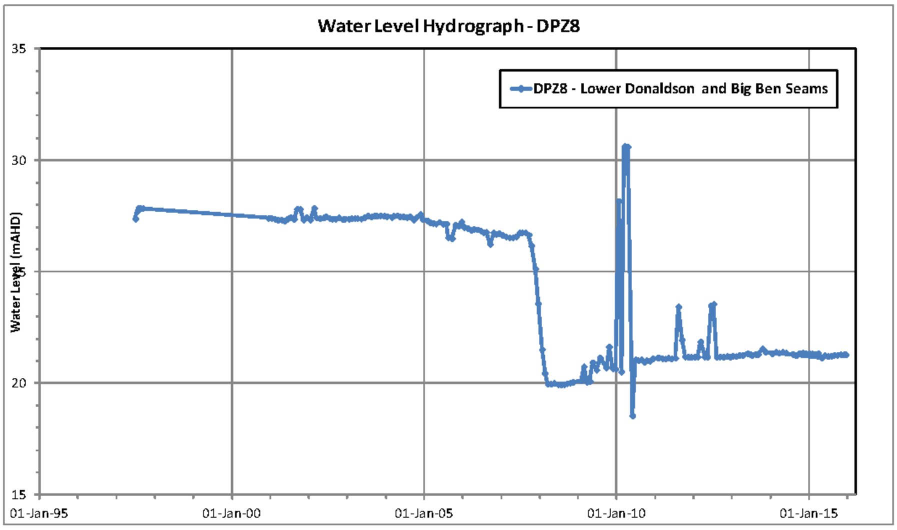
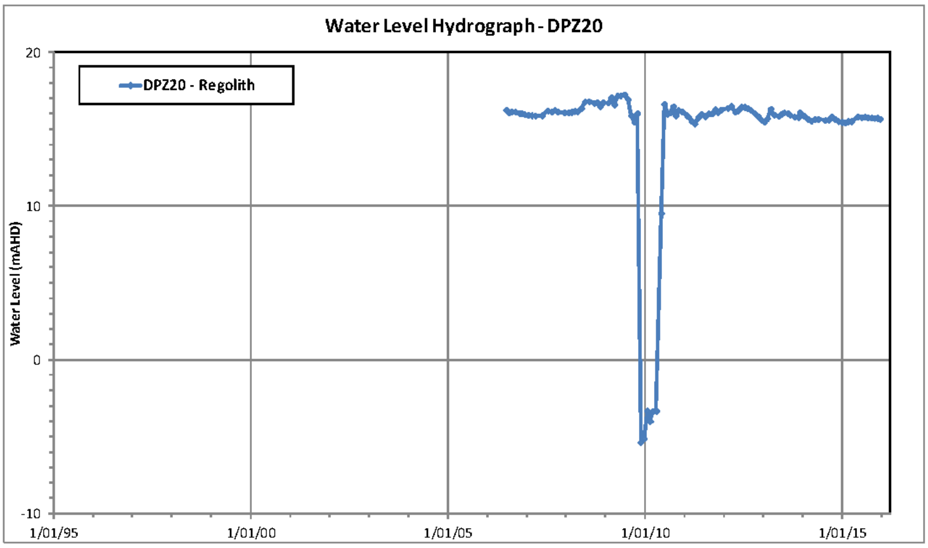
DRAWING NO: 0313-002	REVISION:	
Dundon Consulting Pty Ltd		**Figure 2**

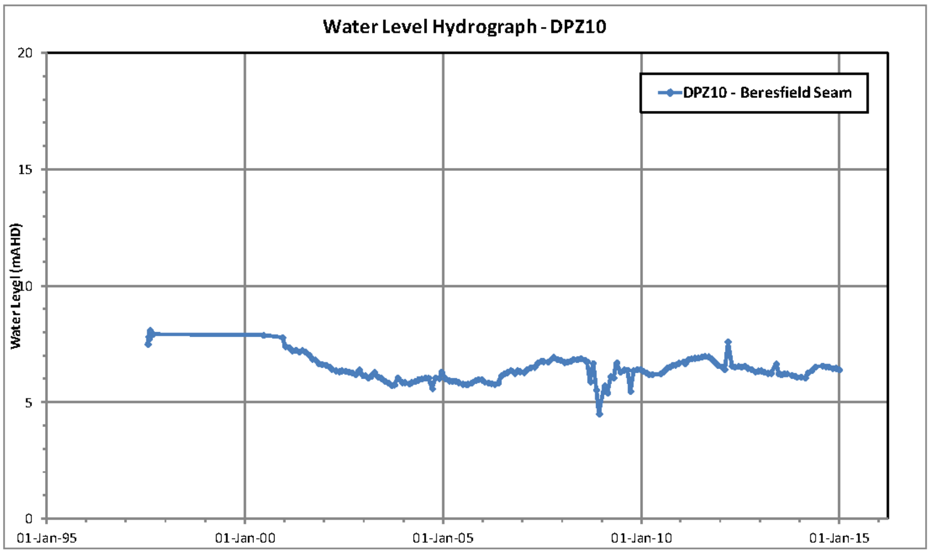


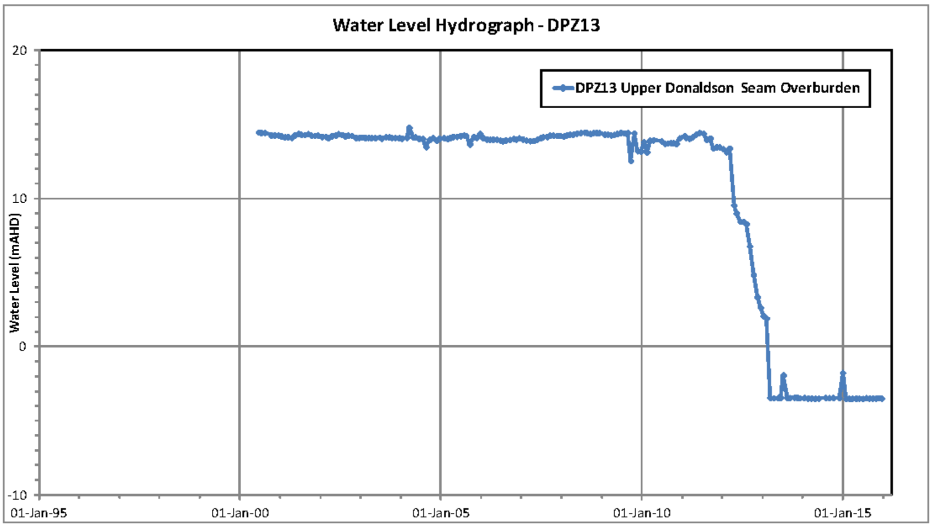




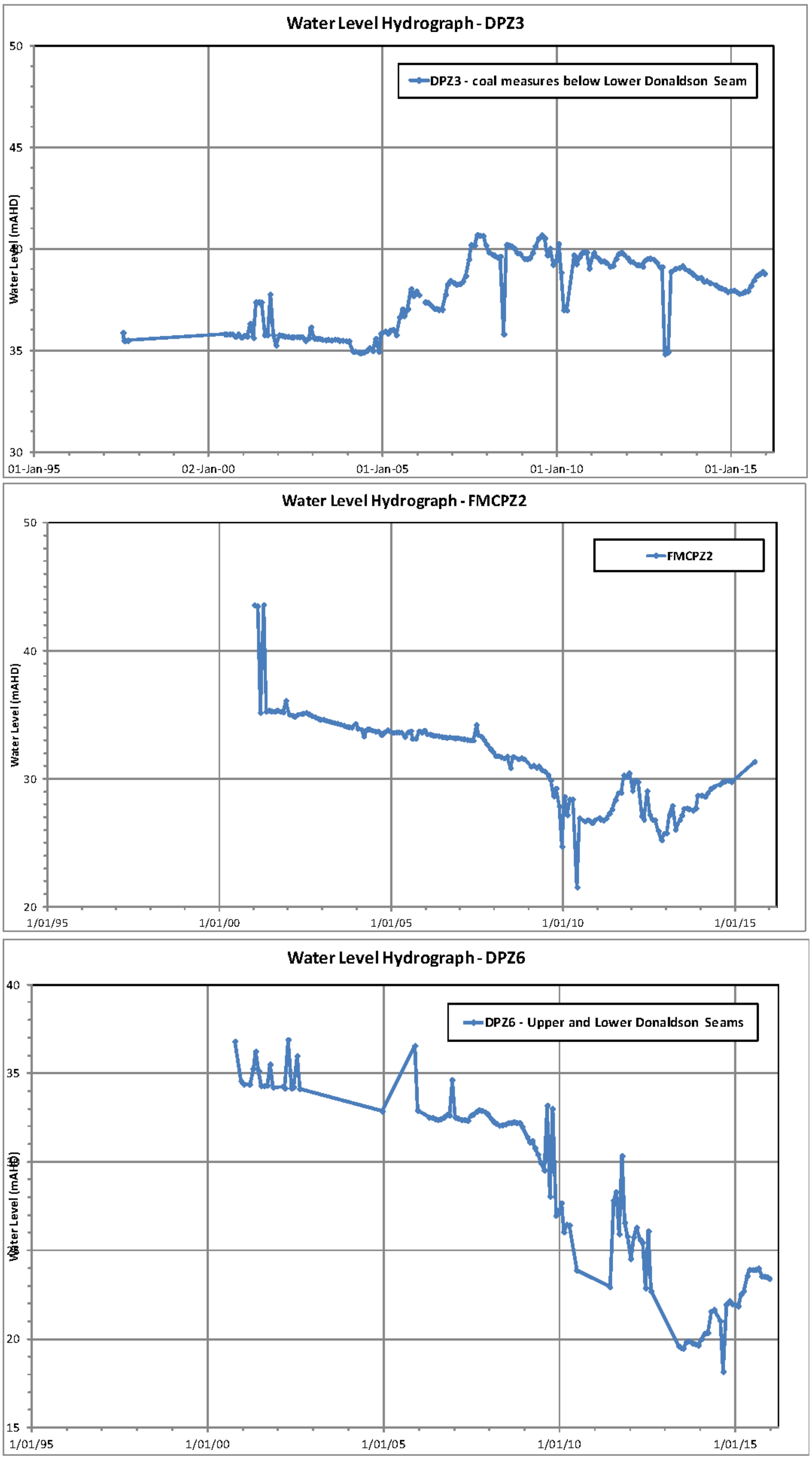
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - DPZ16A, DPZ14A and DPZ8
DRAWING NO: 0313-003	REVISION:	
Dundon Consulting Pty Ltd		Figure 3



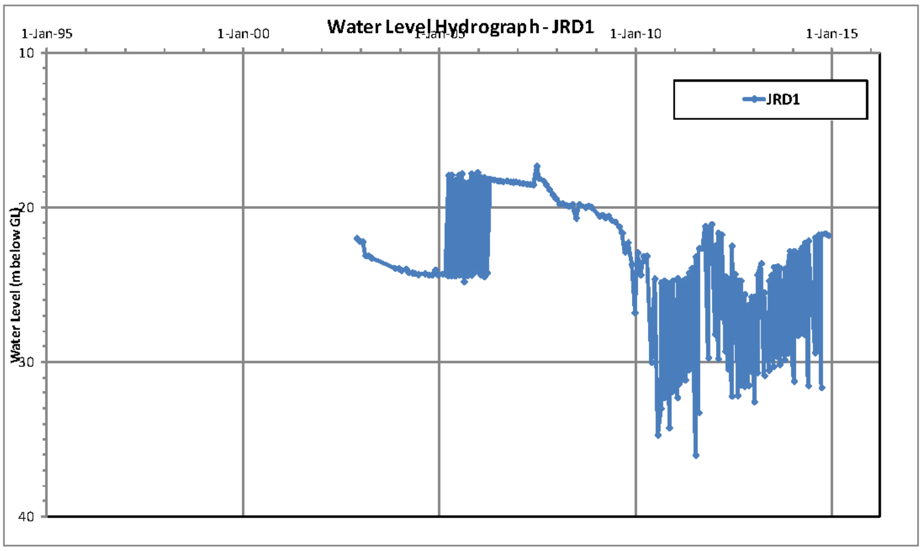


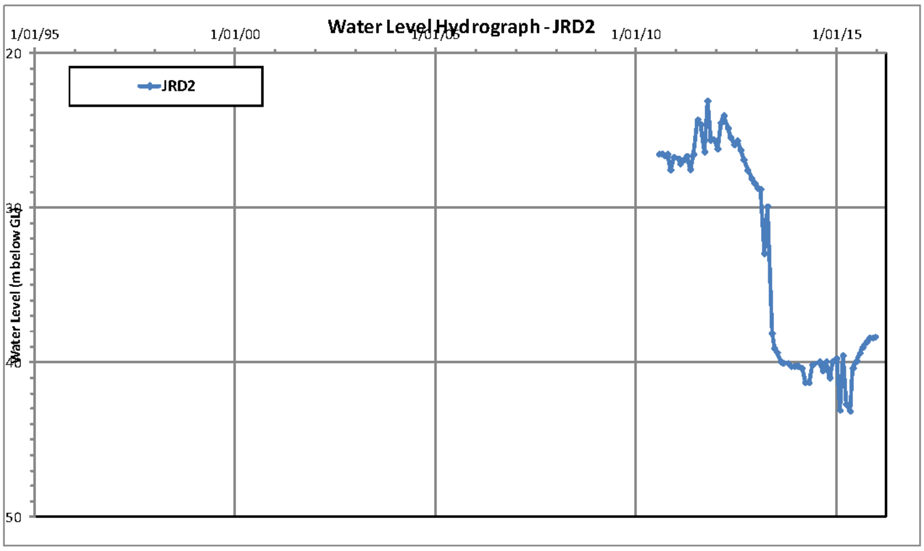


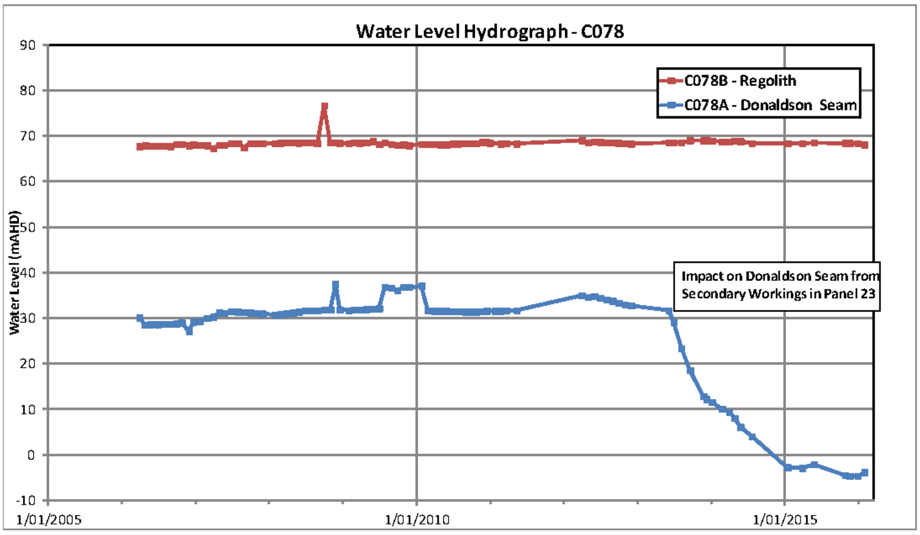
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - DPZ20, DPZ10 and DPZ13**
DRAWING NO: 0313-004	REVISION:	
Dundon Consulting Pty Ltd		**Figure 4**



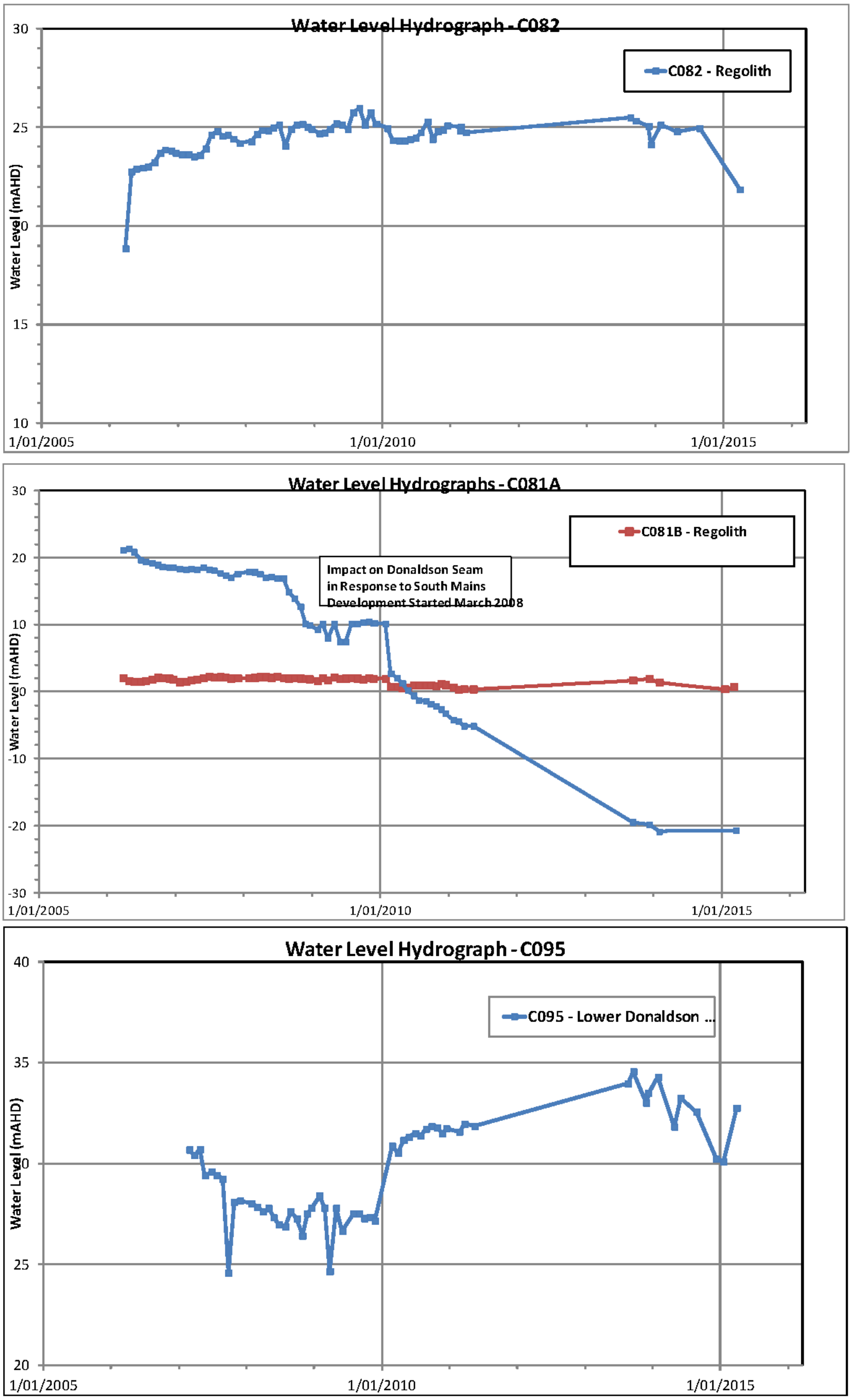
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - DPZ3, FMCPZ2 and DPZ6**
DRAWING NO: 0313-005	REVISION:	
Dundon Consulting Pty Ltd		**Figure 5**



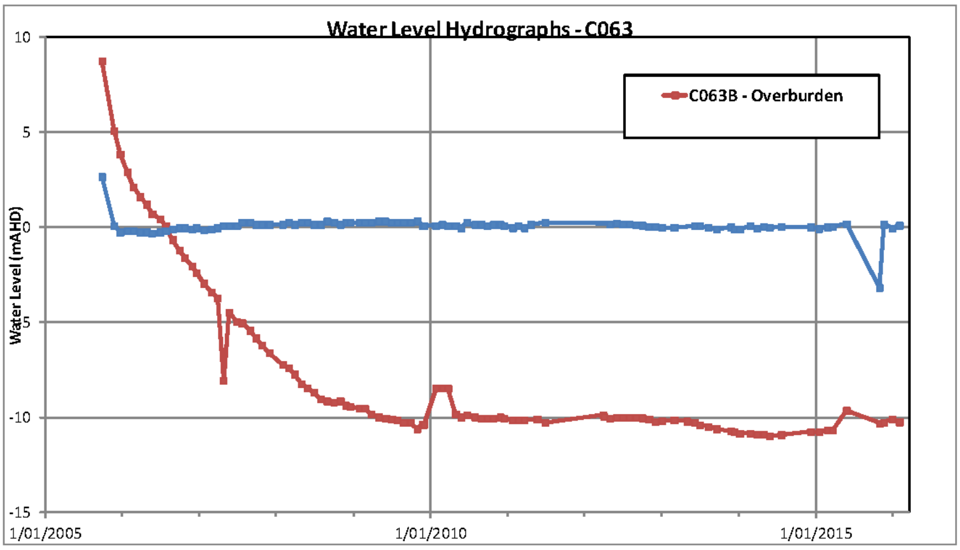


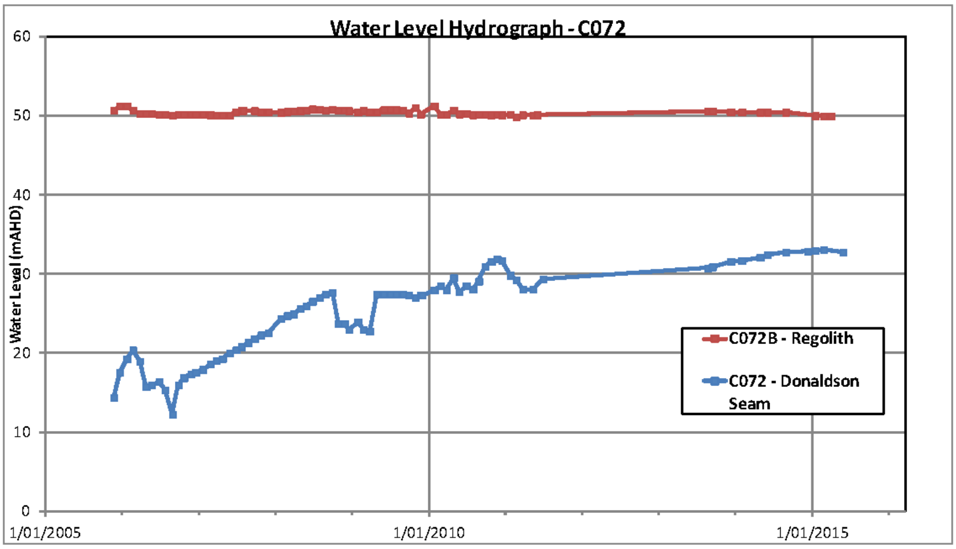


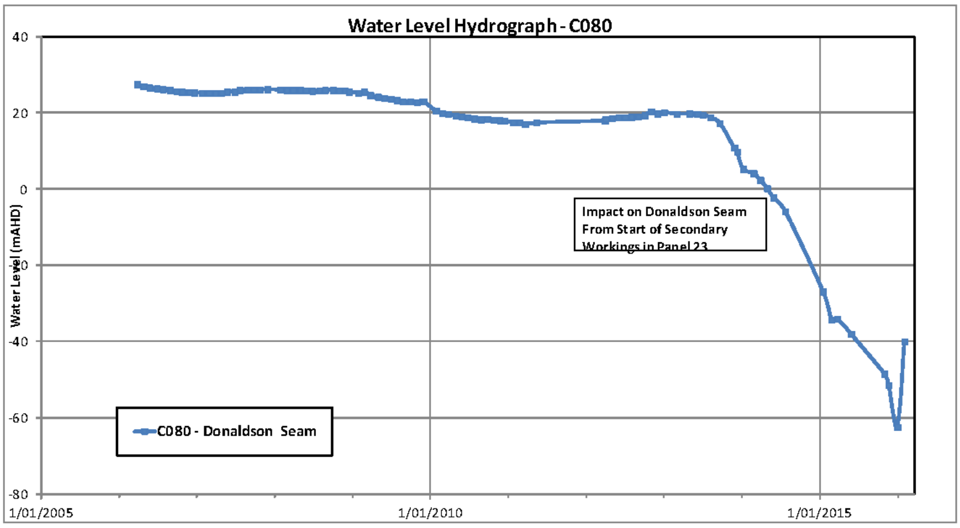
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - JRD1, JRD2 and C078**
DRAWING NO: 0313-006	REVISION:	
Dundon Consulting Pty Ltd		**Figure 6**



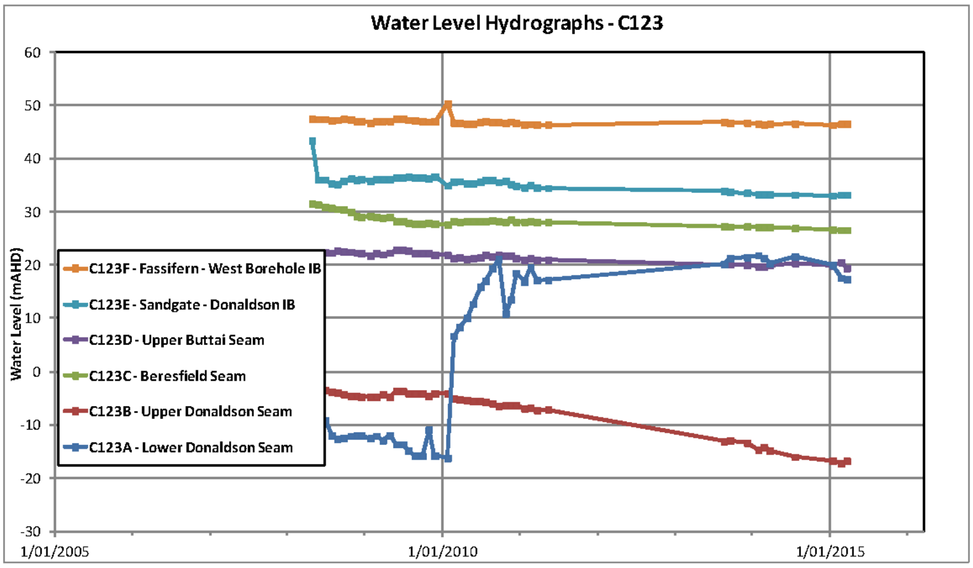
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - C082, C081 and C095**
DRAWING NO: 0313-007	REVISION:	
Dundon Consulting Pty Ltd		**Figure 7**

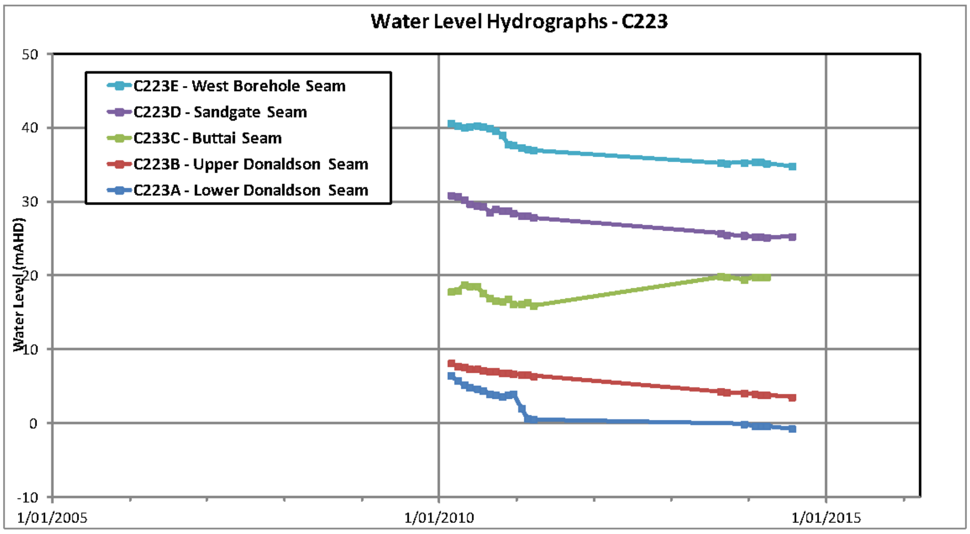


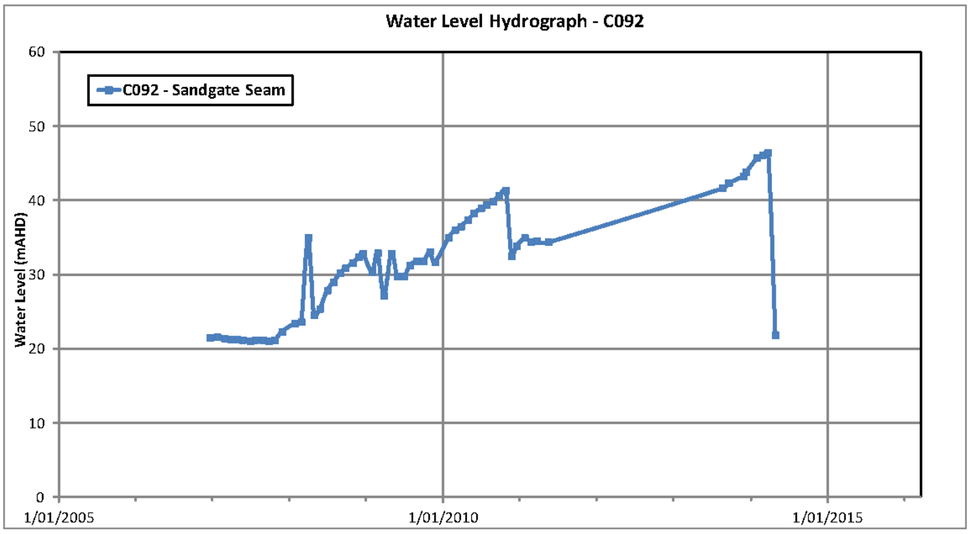




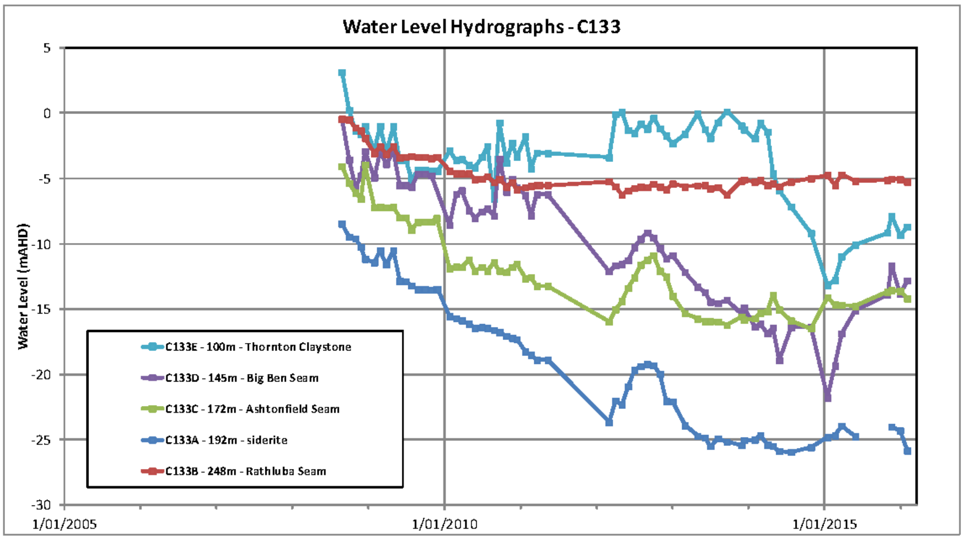
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**	
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - C063, C072 and C080	
DRAWING NO: 0313-008a	REVISION:		
Dundon Consulting Pty Ltd			Figure 8

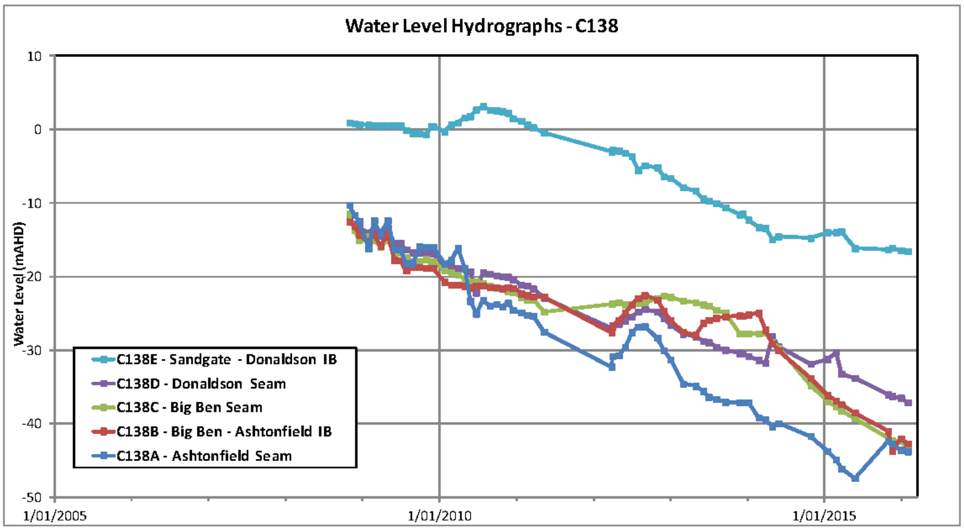


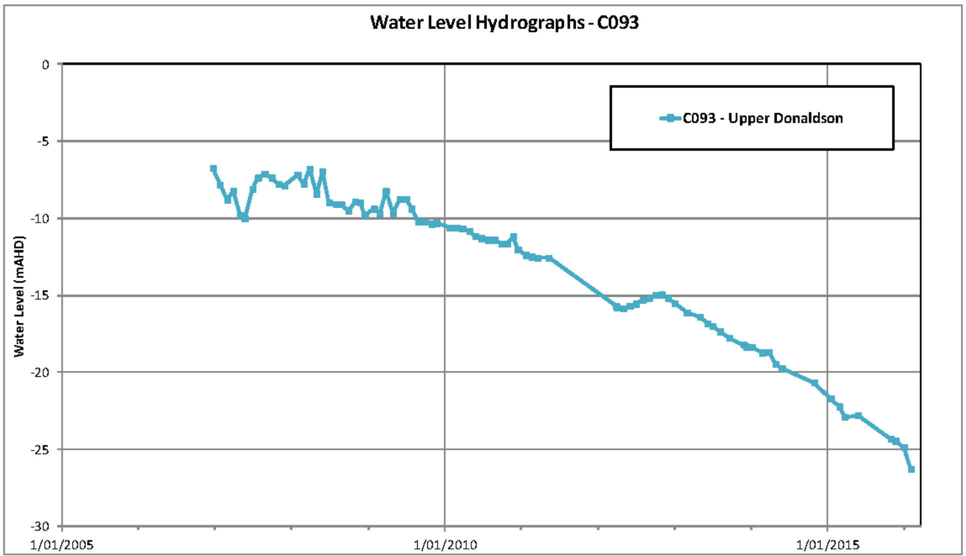




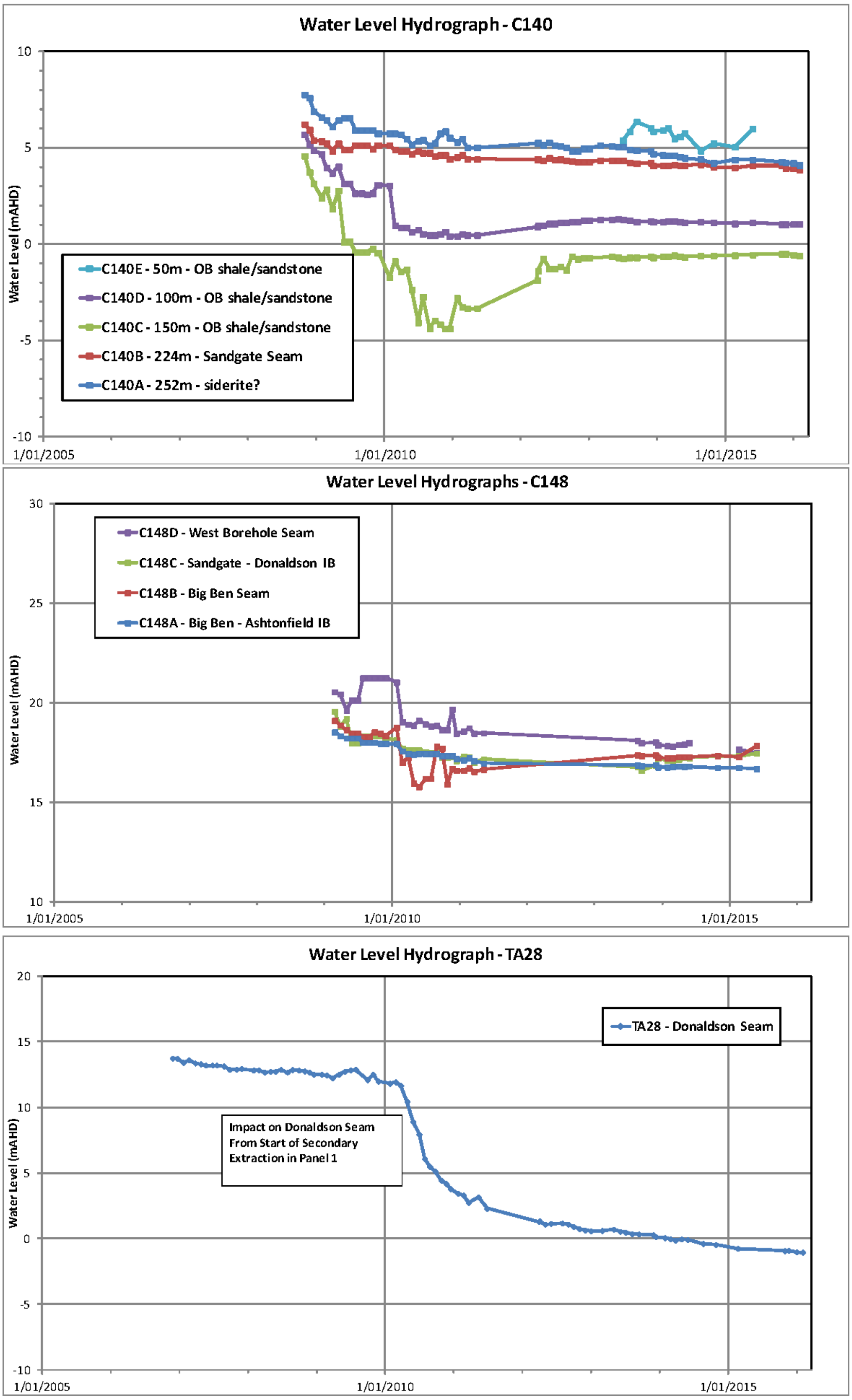
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - C123, C223 and C092**
DRAWING NO: 0313-009	REVISION:	
Dundon Consulting Pty Ltd		**Figure 9**



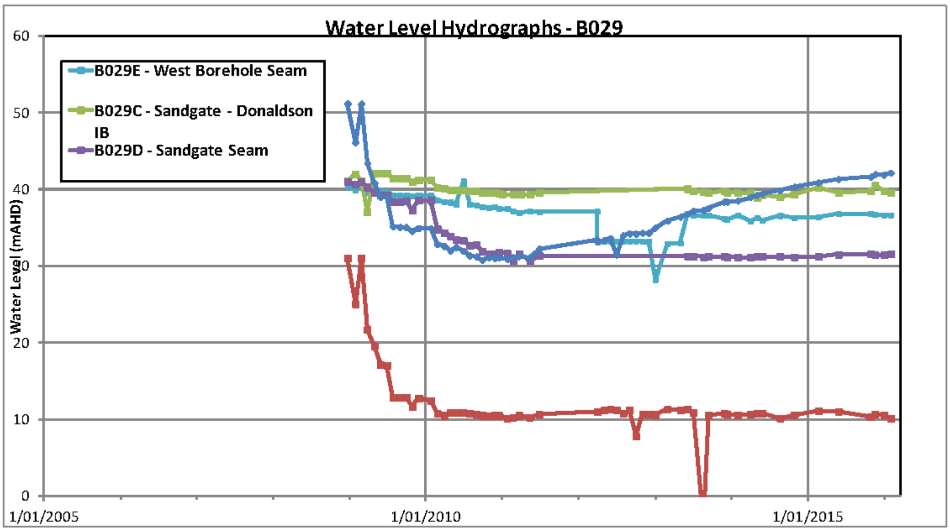


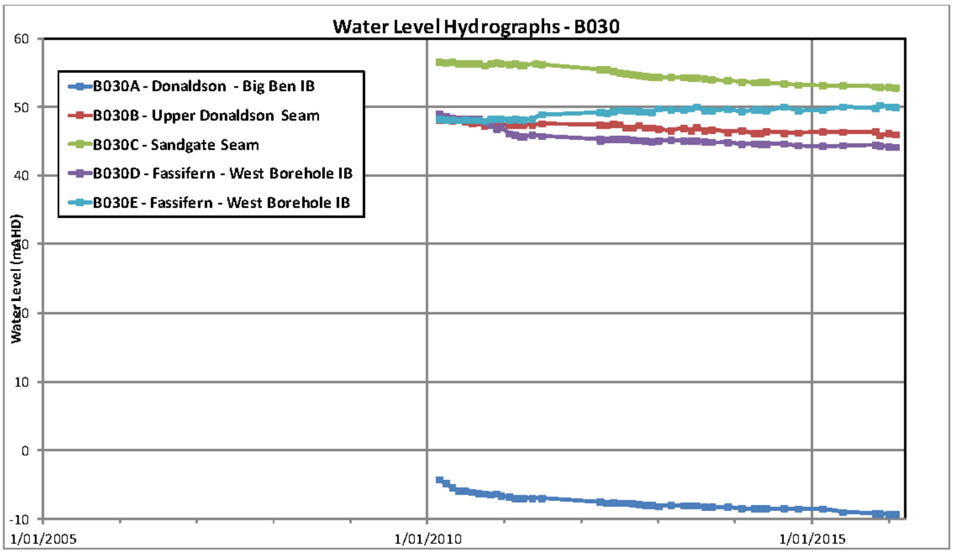


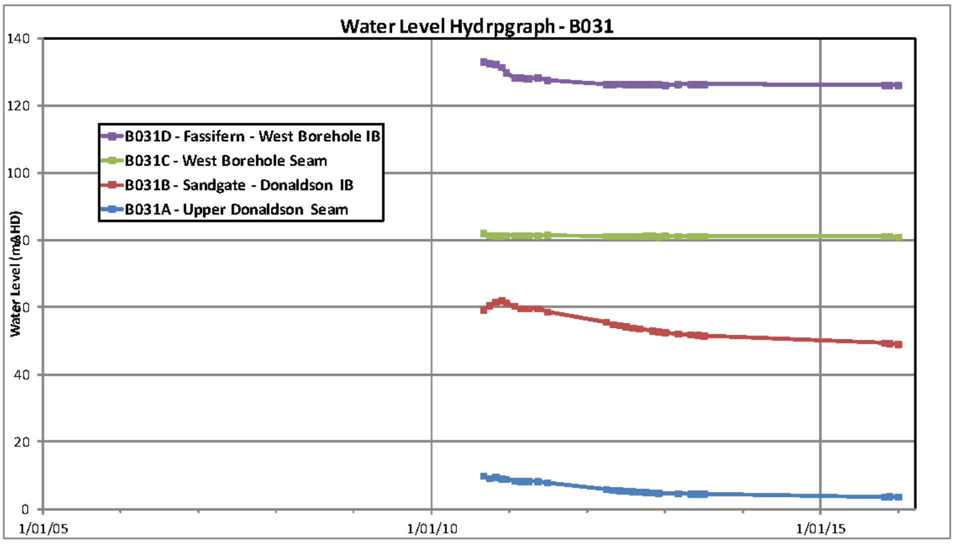
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - C133, C138 and C093**
DRAWING NO: 0313-010	REVISION:	
Dundon Consulting Pty Ltd		**Figure 10**



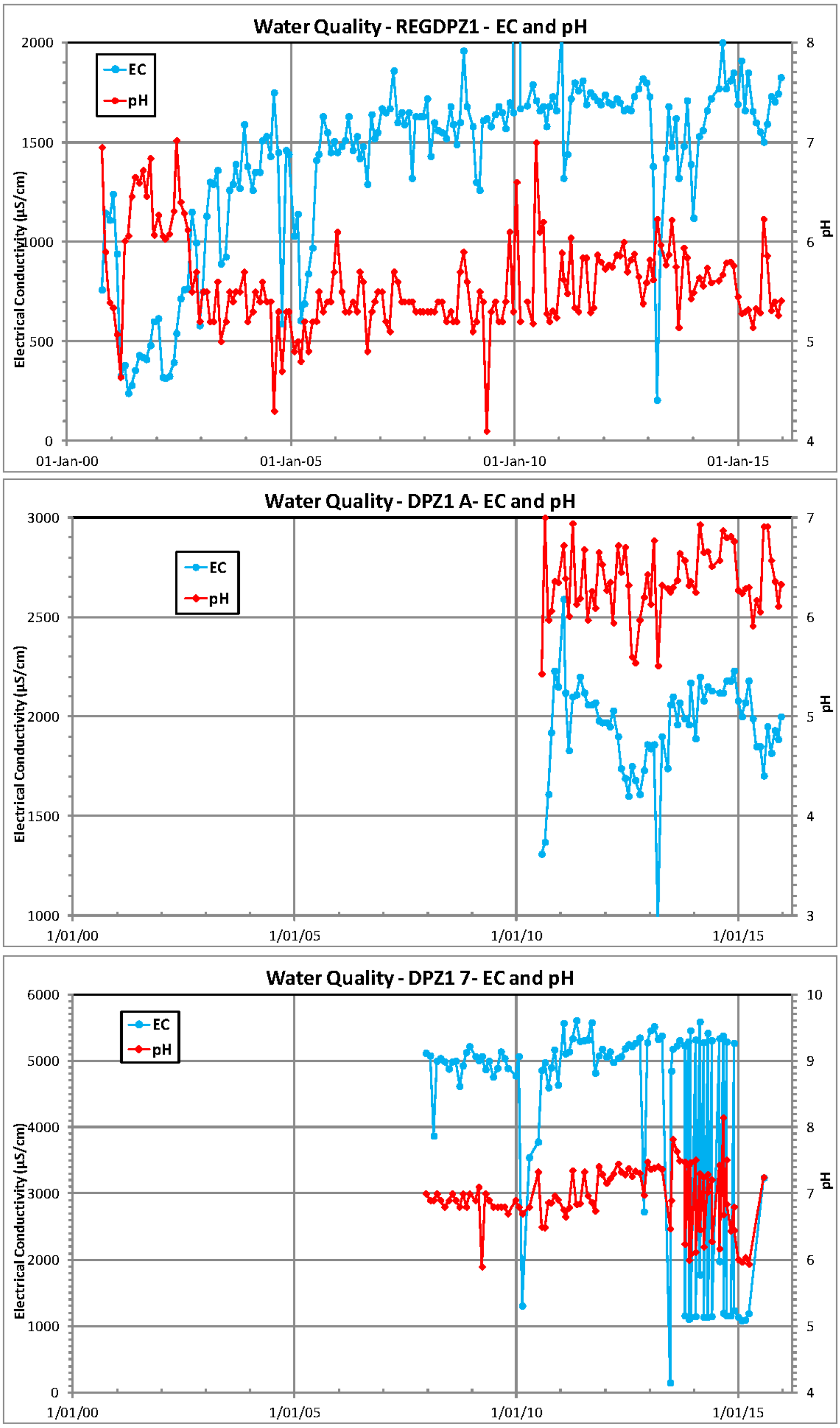
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - C140, C148 and TA28**
DRAWING NO: 0313-011	REVISION:	
Dundon Consulting Pty Ltd		**Figure 11**



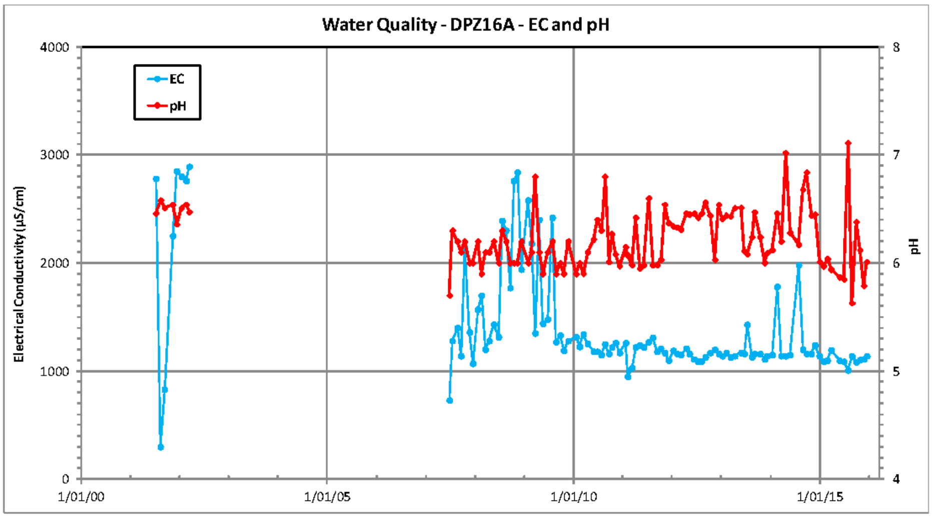


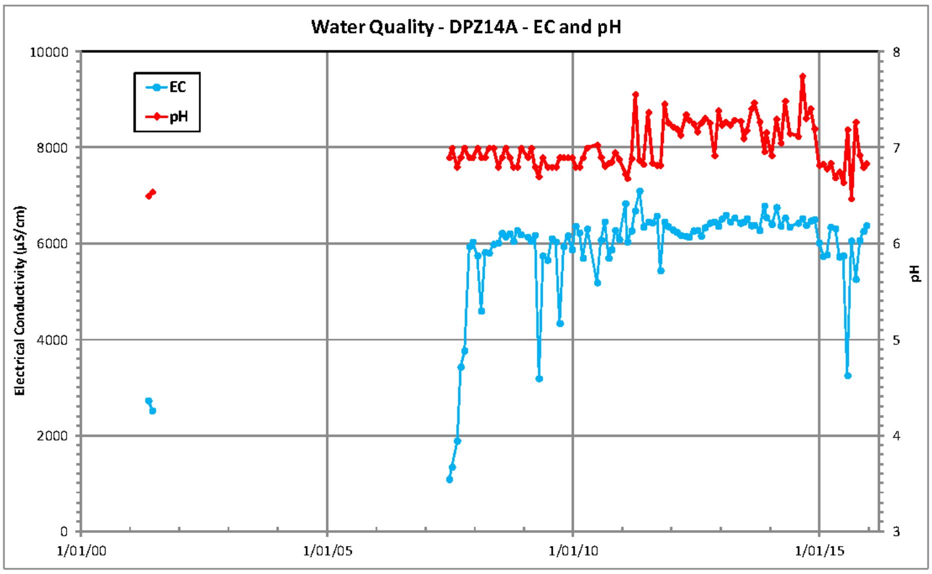


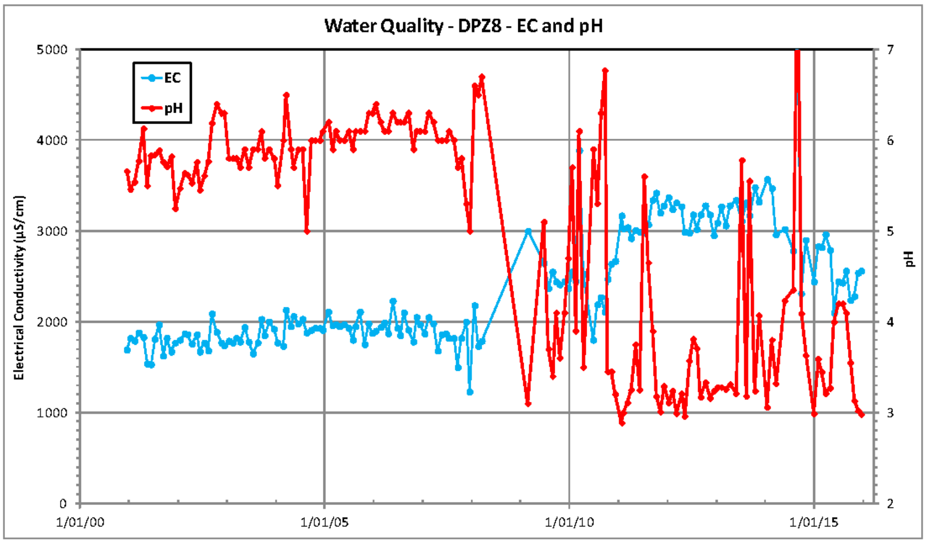
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER LEVEL HYDROGRAPHS - B029, B030 and B031**
DRAWING NO: 0313-012	REVISION:	
Dundon Consulting Pty Ltd		**Figure 12**



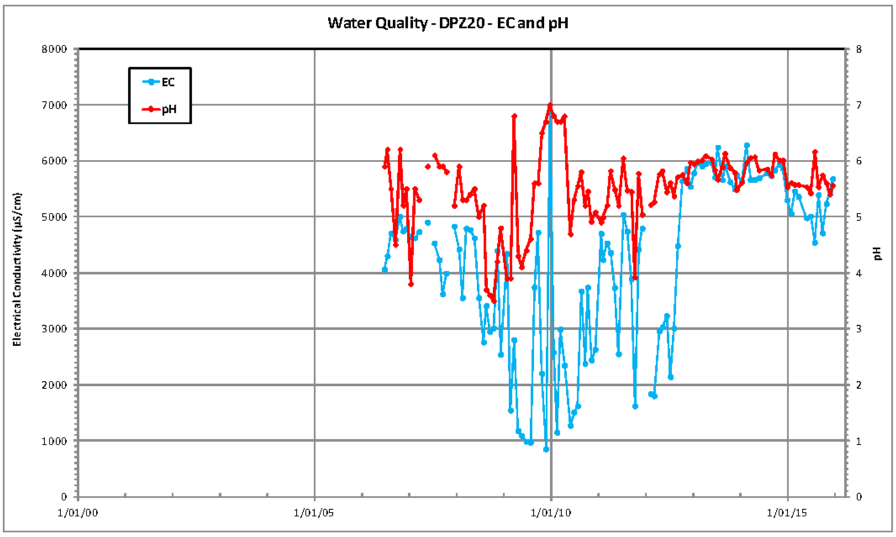
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**	
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER QUALITY - EC and pH REGDPZ1, DPZ1A and DPZ17**	
DRAWING NO: 0313-013	REVISION:		
Dundon Consulting Pty Ltd			**Figure 13**

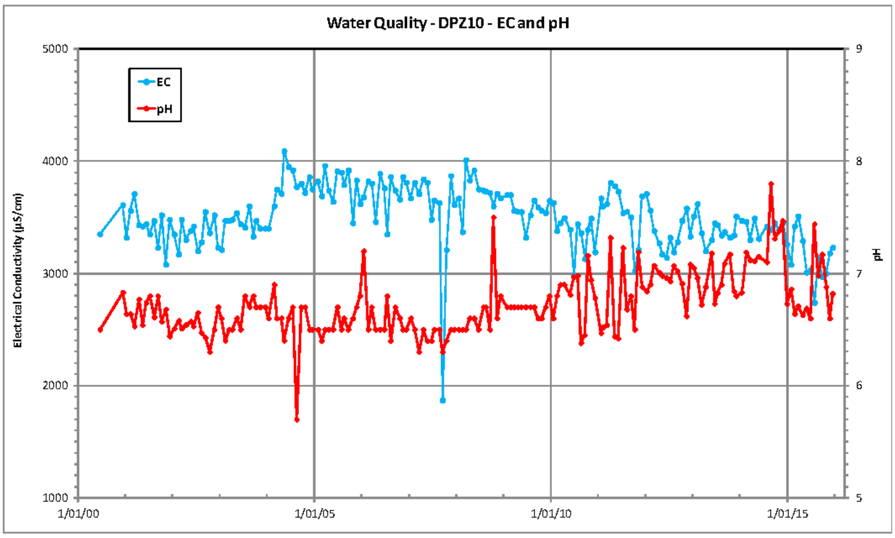


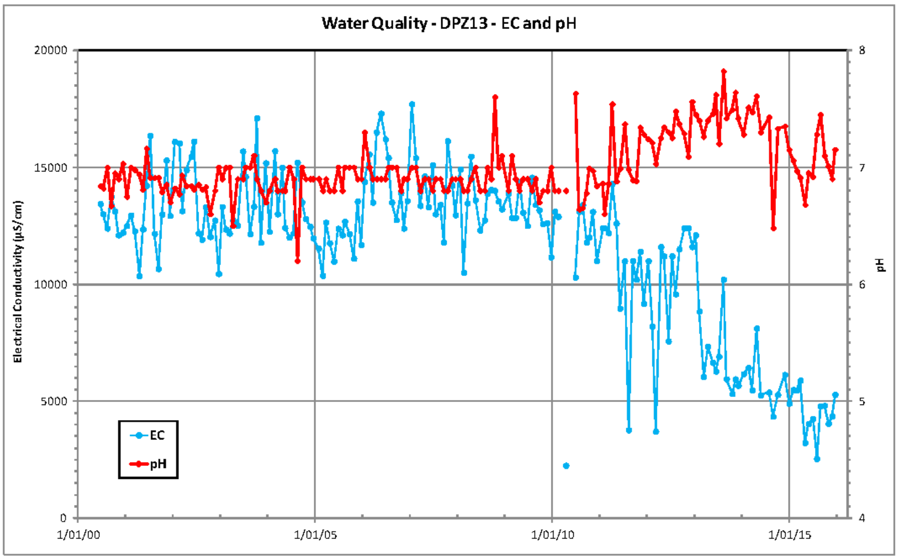




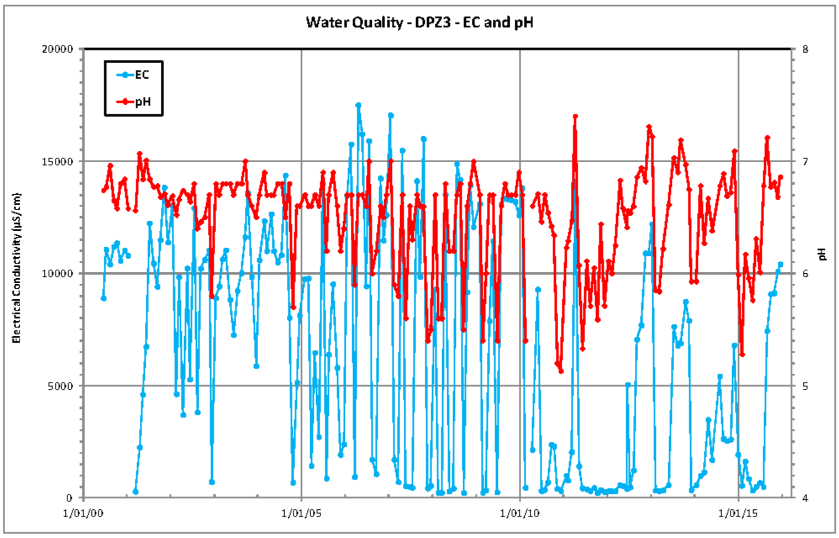
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER QUALITY - EC and pH DPZ16A, DPZ14A and DPZ8**
DRAWING NO: 0313-014	REVISION:	
Dundon Consulting Pty Ltd		**Figure 14**

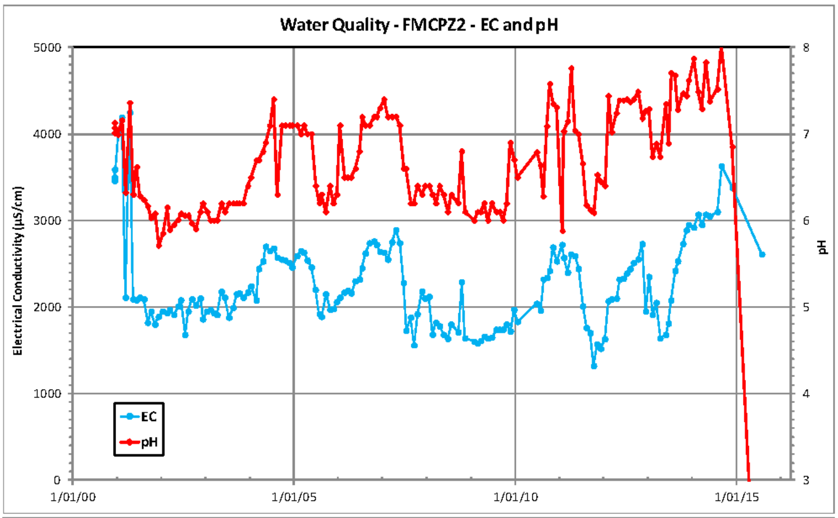


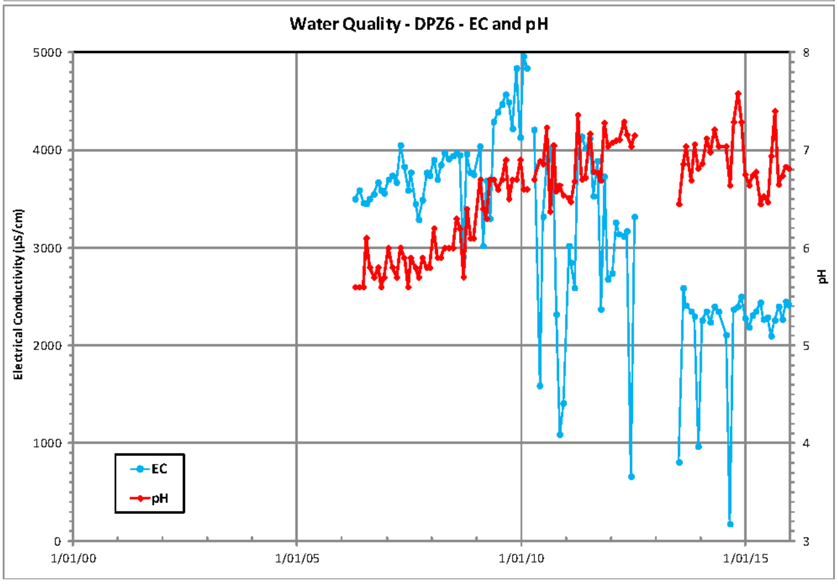




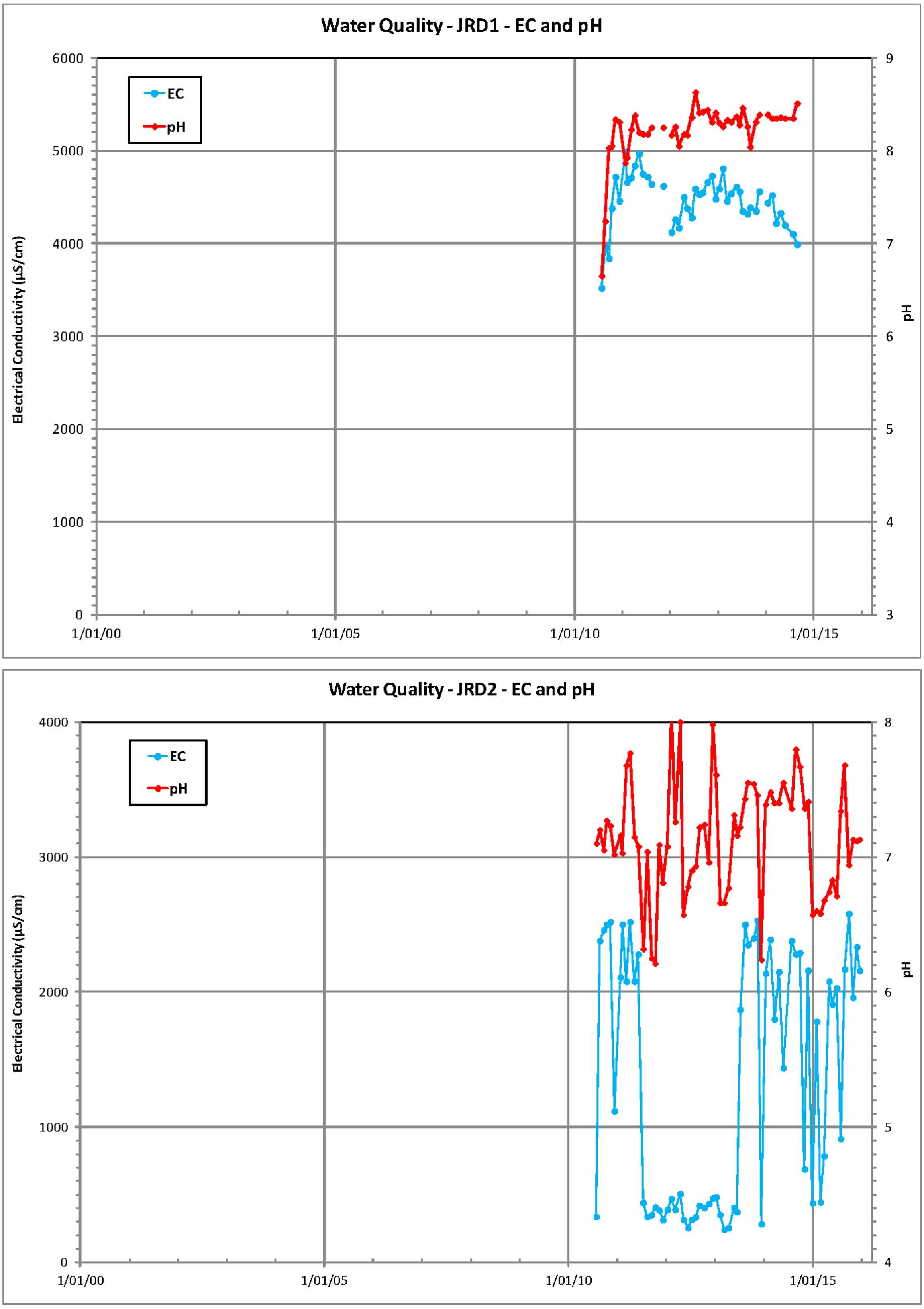
DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER QUALITY - EC and pH DPZ20, DPZ10 and DPZ13**
DRAWING NO: 0313-015	REVISION:	
Dundon Consulting Pty Ltd		**Figure 15**



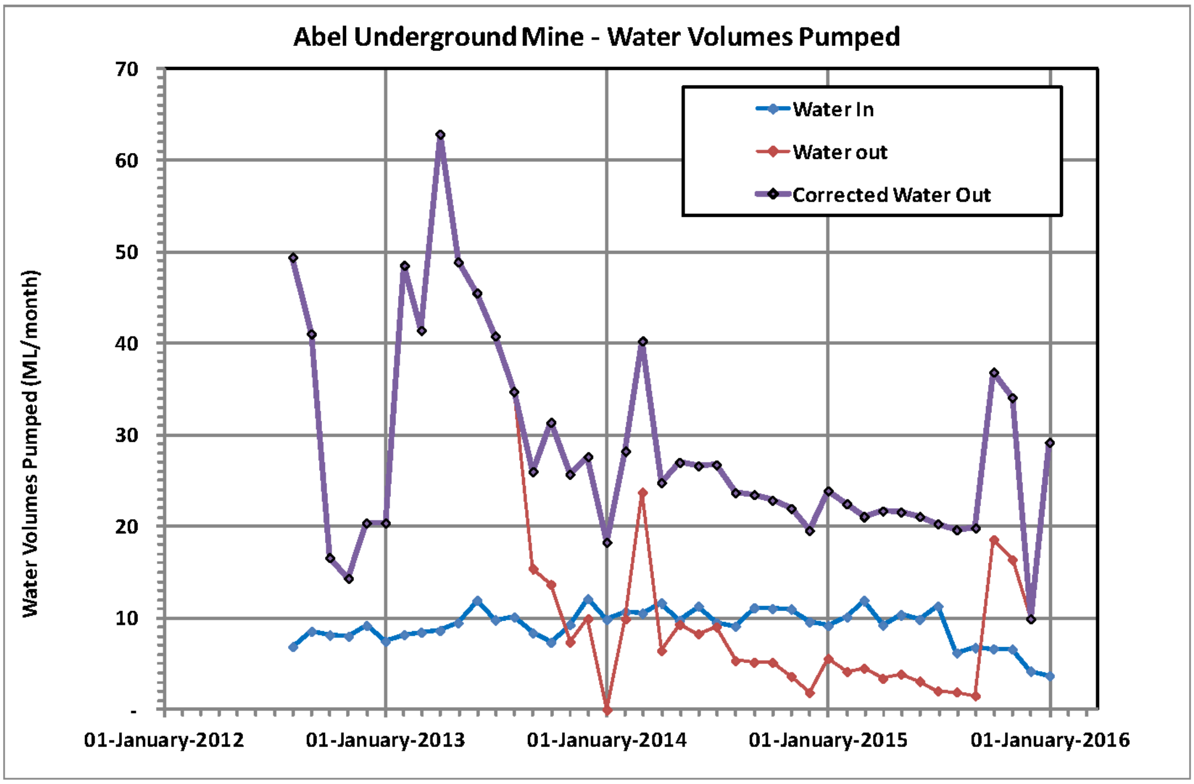


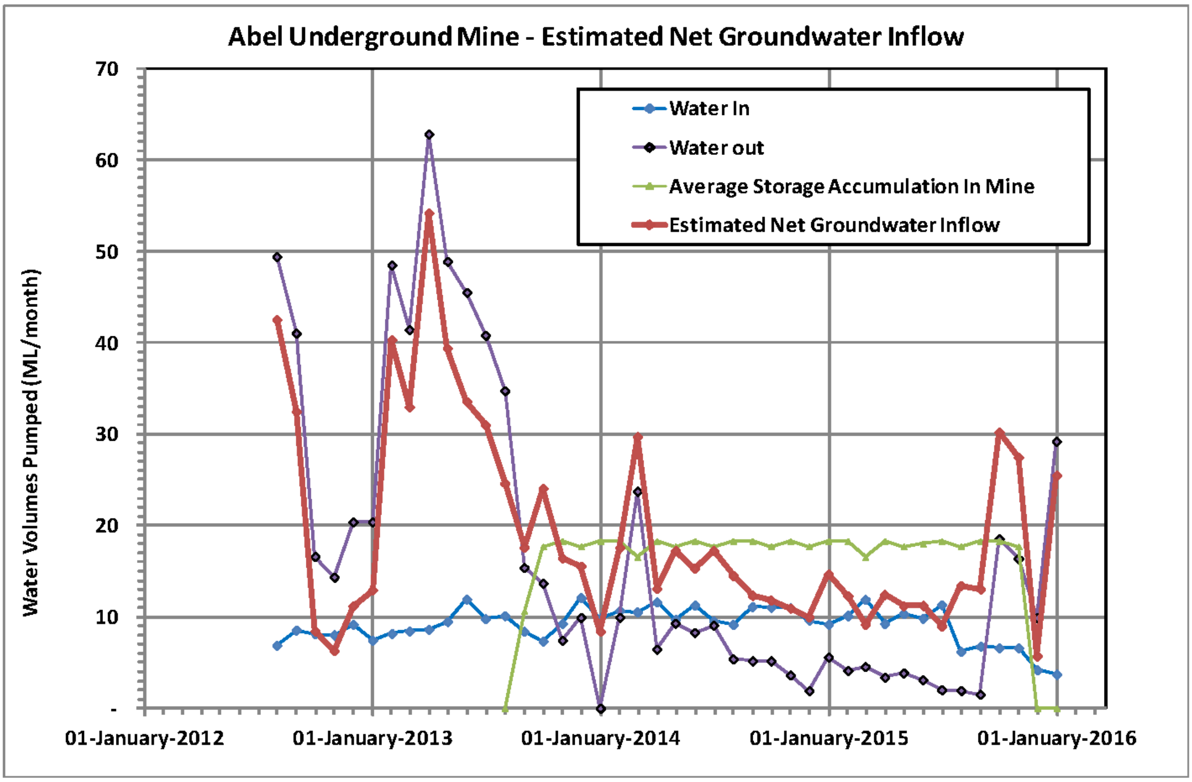


DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER QUALITY - EC and pH DPZ3, FMCPZ2 and DPZ6**
DRAWING NO: 0313-016	REVISION:	
Dundon Consulting Pty Ltd		**Figure 16**



DATE: 15 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**	
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE WATER QUALITY - EC and pH JRD1 and JRD2**	
DRAWING NO: 0313-017	REVISION:		
Dundon Consulting Pty Ltd			**Figure 17**





DATE: 29 February 2016	SCALE: N/A	**Donaldson Coal Pty Ltd**
AUTHOR: PD CHECKED: PD	PROJECT NO: 16-0313	**ABEL UNDERGROUND MINE ESTIMATED NET GROUNDWATER INFLOW**
DRAWING NO: 0313-018	REVISION:	
Dundon Consulting Pty Ltd		**Figure 18**

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