

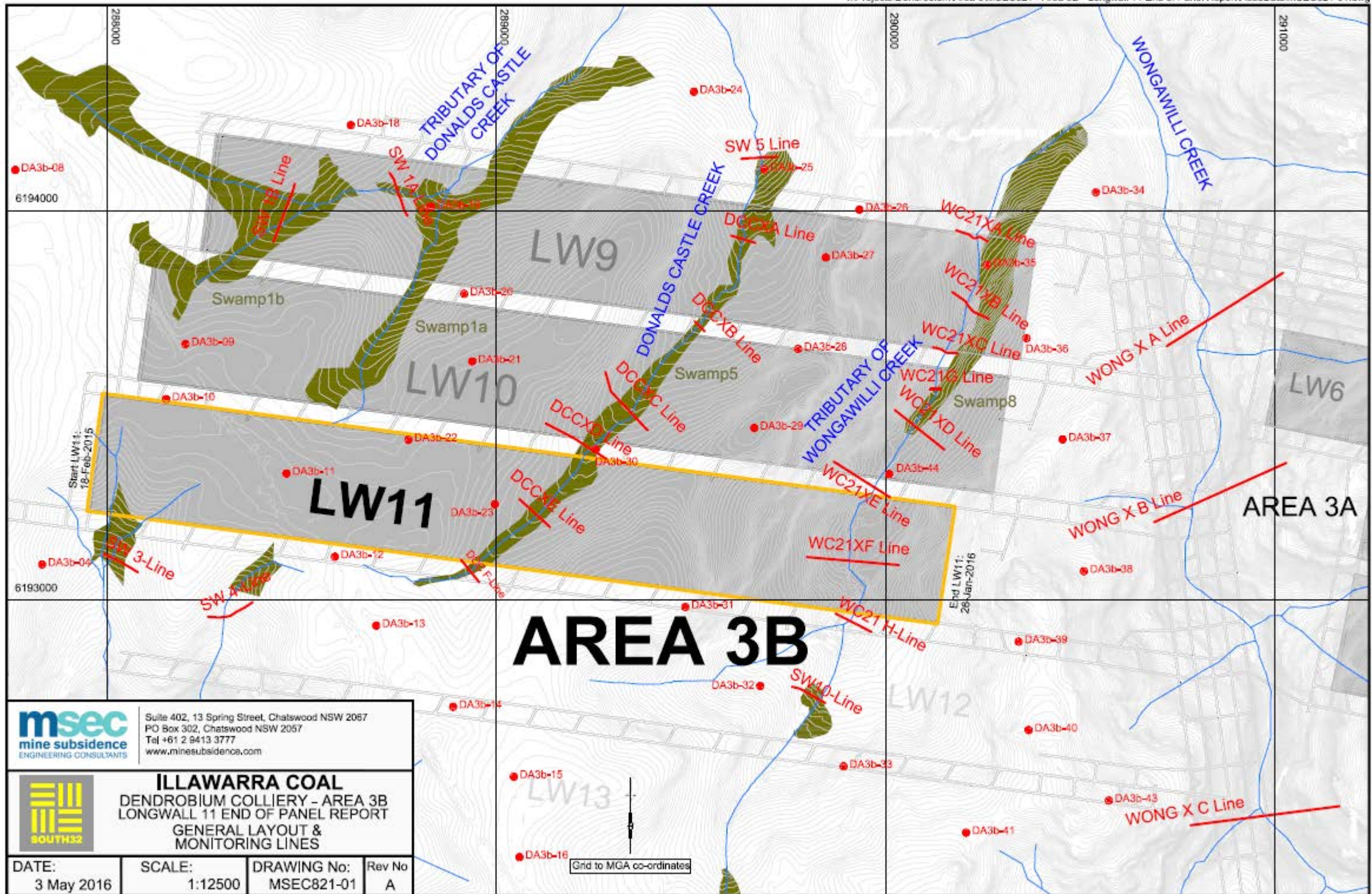


# DENDROBIUM MINE – LW11 EOP REPORT

ILLAWARRA COAL



# LW11 EOP REPORT



**msec** mine subsidence ENGINEERING CONSULTANTS  
 Suite 402, 13 Spring Street, Chatswood NSW 2067  
 PO Box 302, Chatswood NSW 2057  
 Tel +61 2 9413 3777  
 www.minesubsidence.com

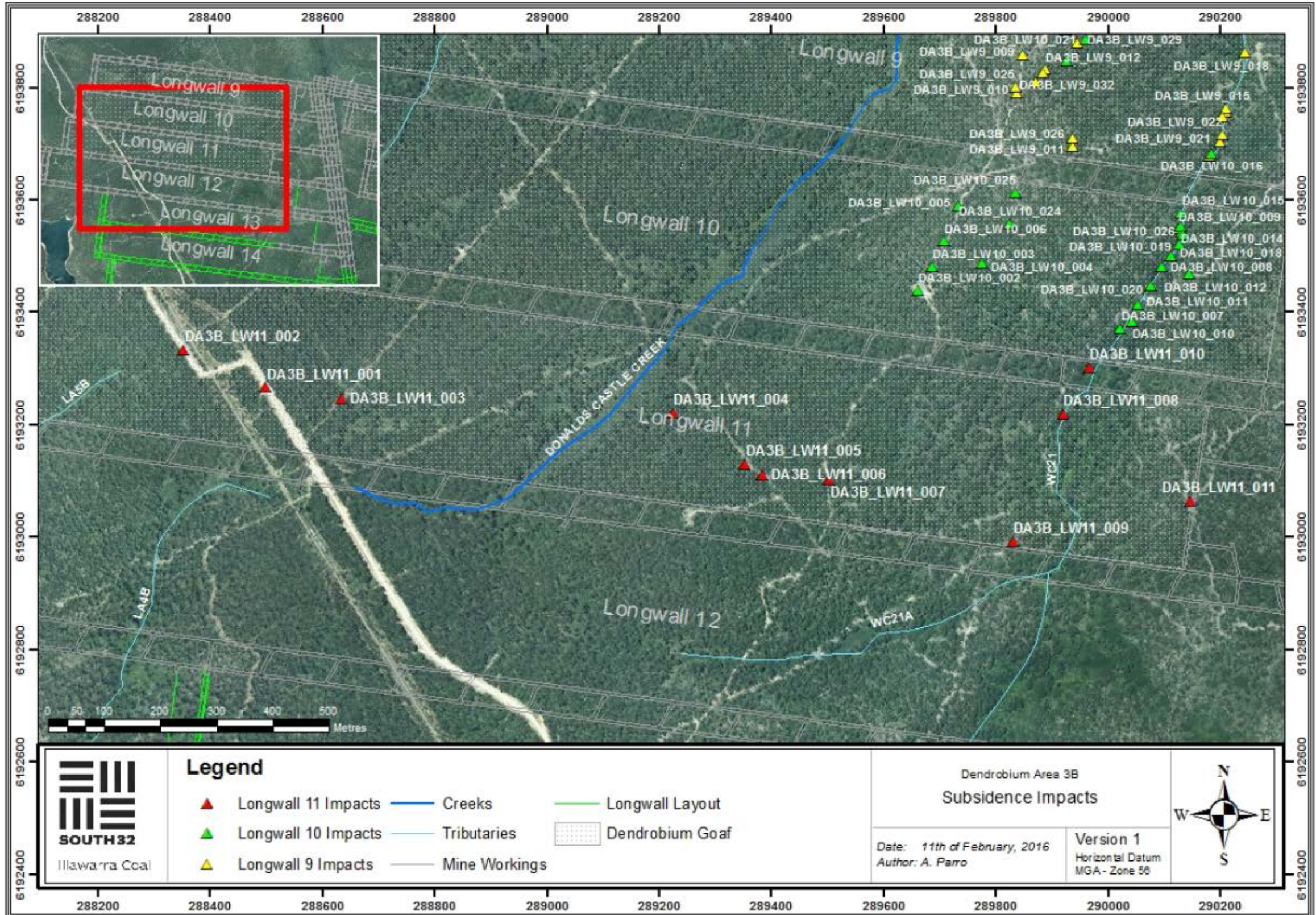
**ILLAWARRA COAL**  
 DENDROBIUM COLLIERY - AREA 3B  
 LONGWALL 11 END OF PANEL REPORT  
 GENERAL LAYOUT & MONITORING LINES

DATE: 3 May 2016	SCALE: 1:12500	DRAWING No: MSEC821-01	Rev No: A
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Grid to MGA co-ordinates



# LW11 EOP REPORT





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**Photo 5:** DA3B\_LW11\_008- Rock fracture, looking upstream along WC21. Taken on 14/01/2016.



**Photo 6:** DA3B\_LW11\_008- Rock fracture, looking along WC21. Taken on 14/01/2016.



# LW11 EOP REPORT



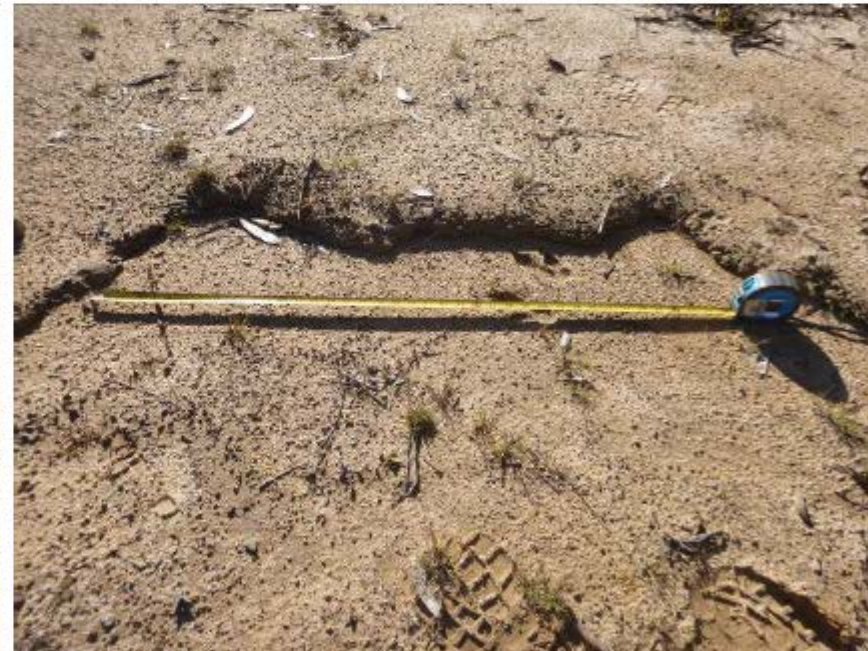
**Photo 13:** DA3B\_LW11\_001- Soil crack across Fire Road 6A. Uplift on the southern side of crack is only slightly evident in the photo. Taken on 1/06/2015.



**Photo 14:** DA3B\_LW11\_001- Uplift on southern side of crack. Taken on 1/06/2015.



**Photo 15:** DA3B\_LW11\_002- Soil crack across Fire Road 6A. Uplift evident on the northern side of crack, more pronounced to the east of Fire Road 6A. Taken on 1/06/2015.



**Photo 16:** DA3B\_LW11\_002- Eastern end of soil crack. Taken on 1/06/2015.



# LW11 EOP REPORT

Dendrobium Area 3b  
Piezometer 08\_01

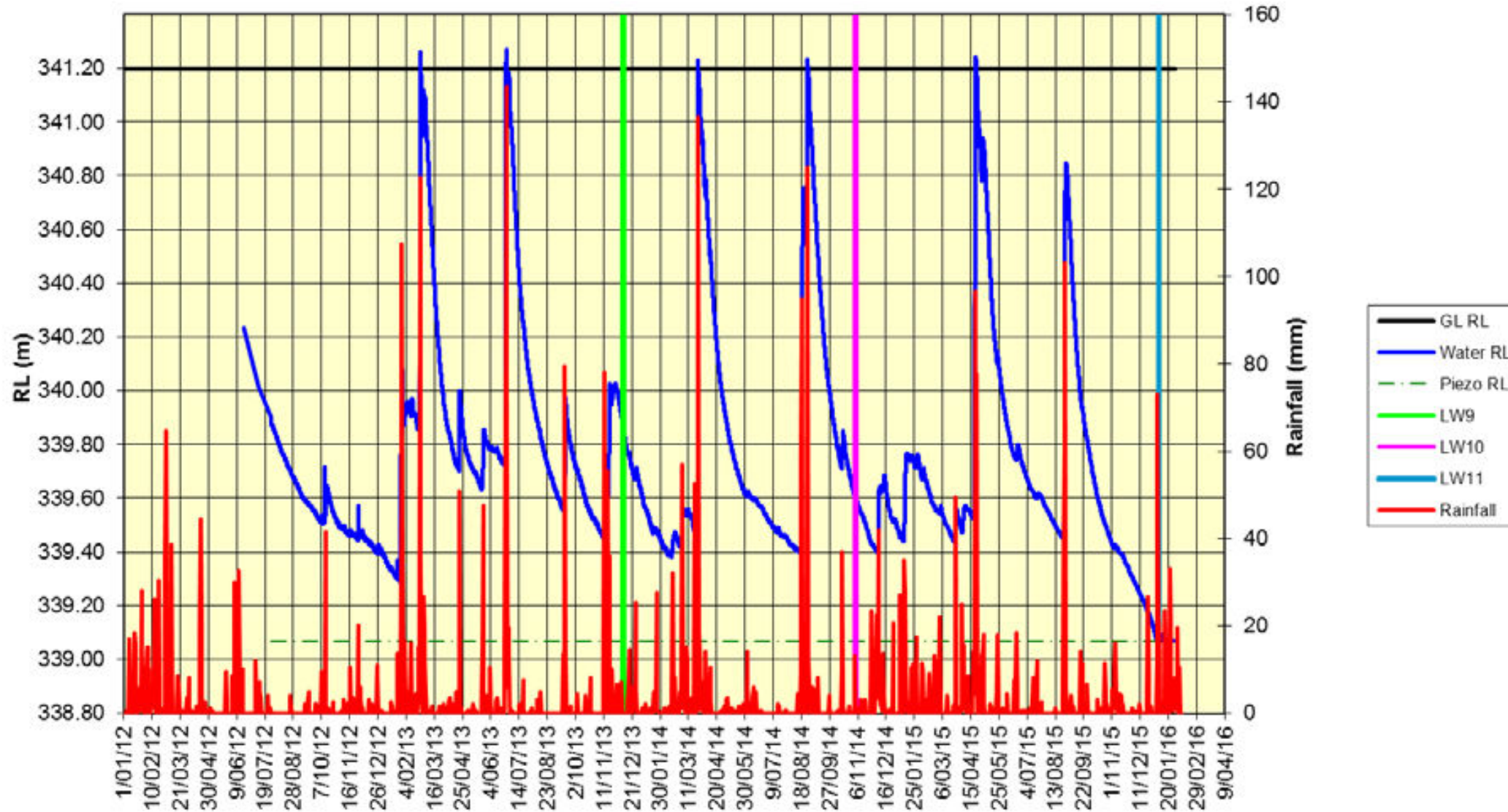


Figure 5.1: Groundwater levels measured borehole site 08\_01.

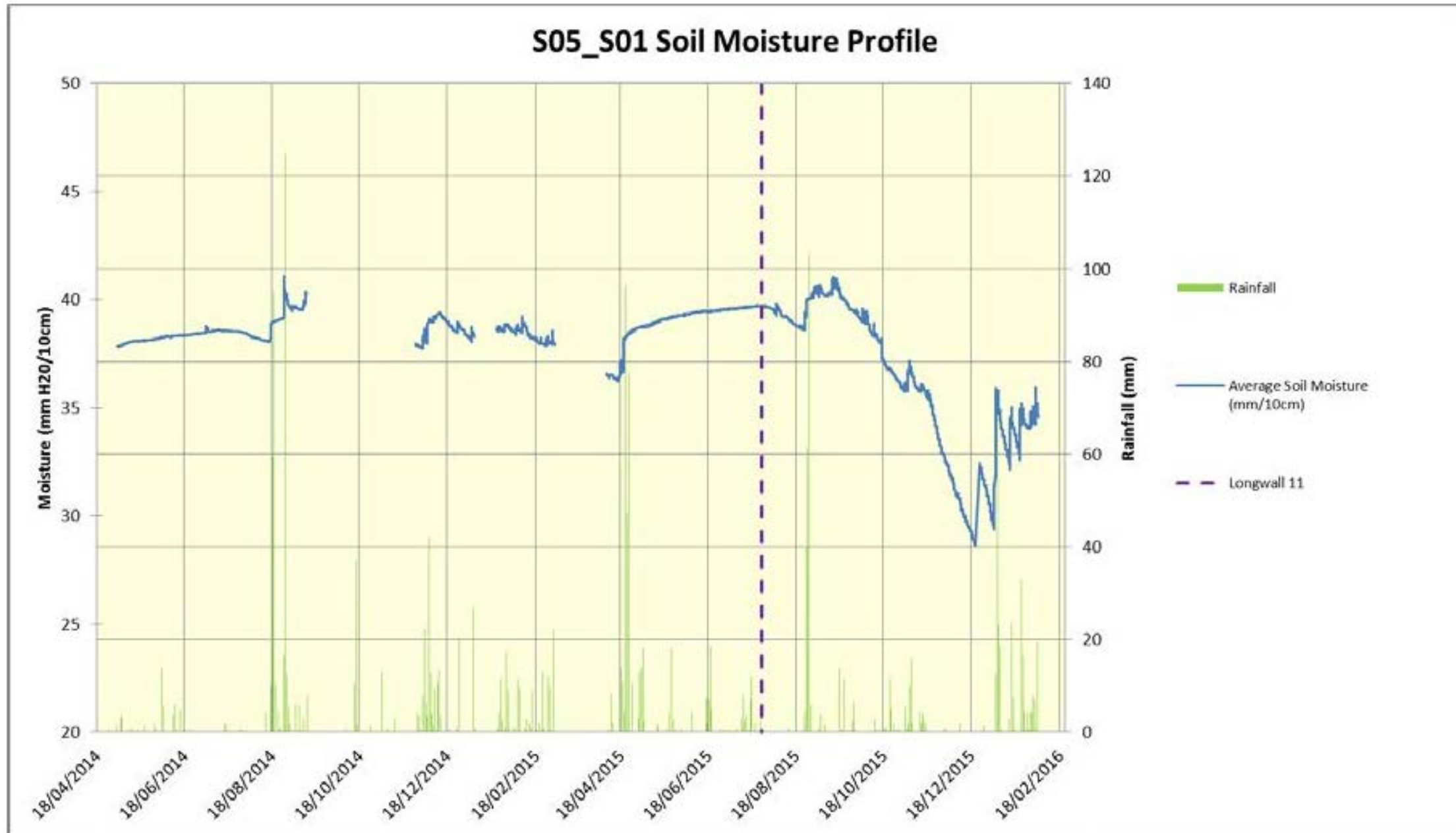


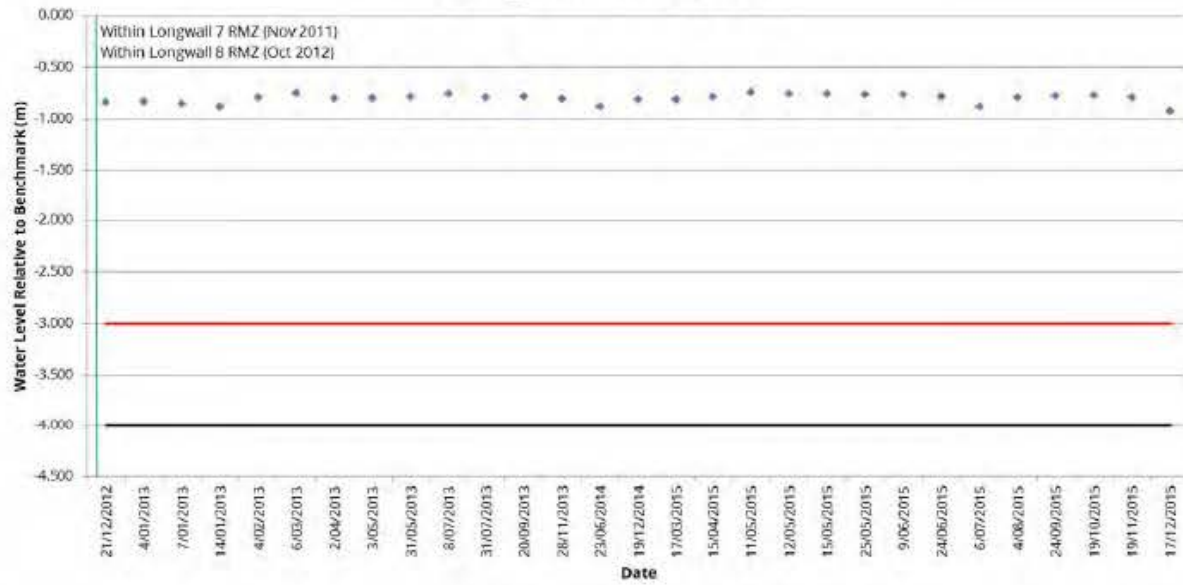
Figure 5.2: Soil moisture levels recorded at S05\_S01.

# LW11 EOP REPORT

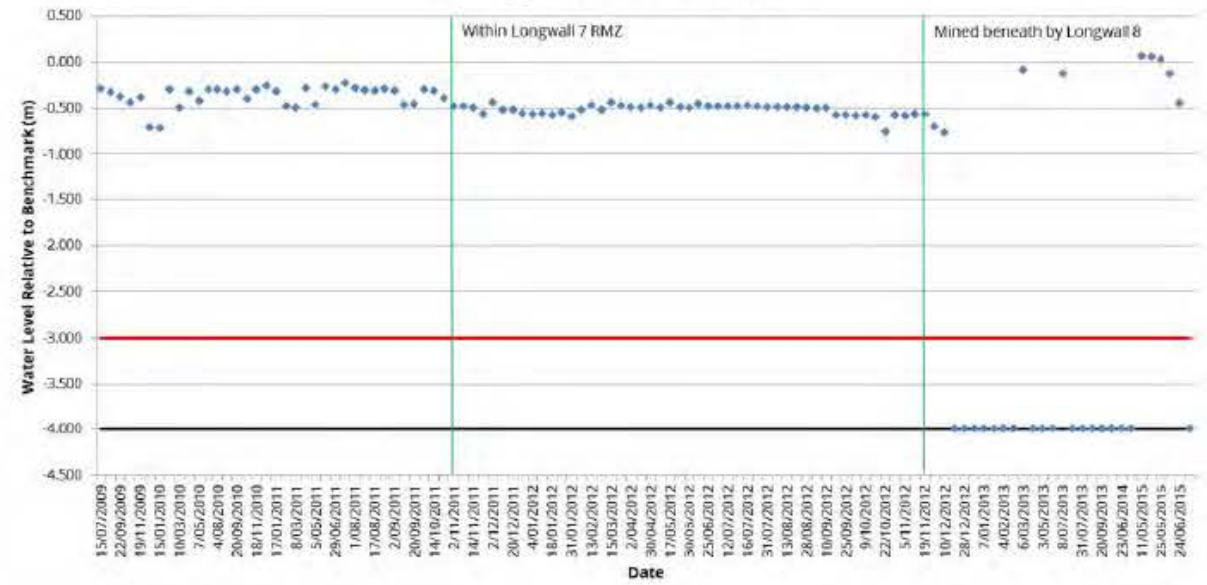


**Graph 1** Water level at four pools along SC10C including three known breeding pools for Littlejohn's Tree Frog; Pool 1, Pool 3 and Pool 5 (data provided by Illawarra Coal Environmental Field Team). Red lines represent water levels below nail and black lines represent dry pool.

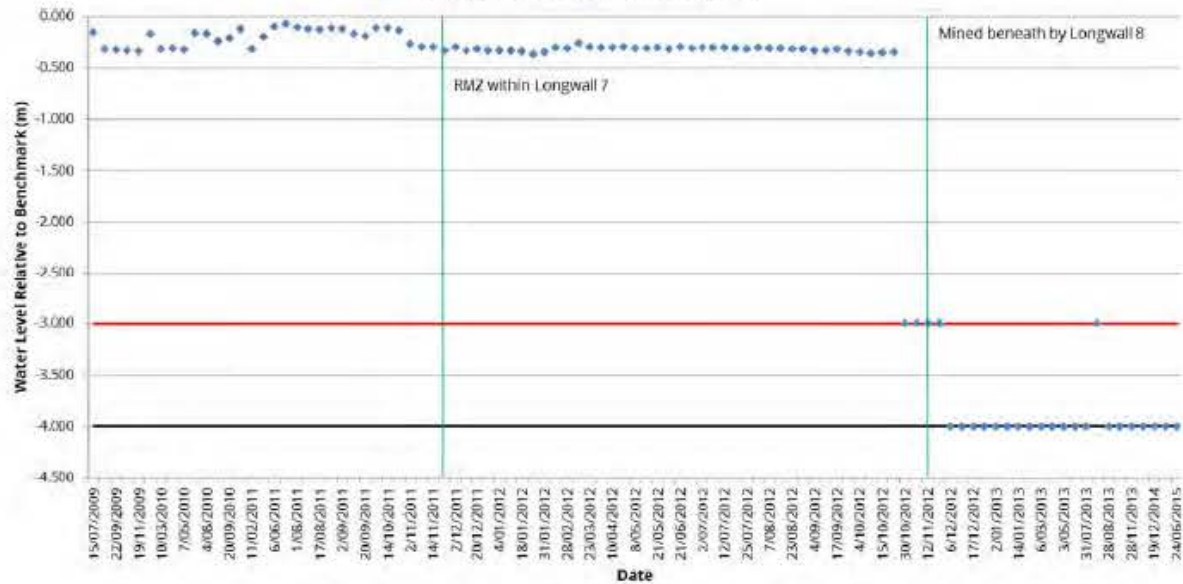
**SC10C\_Pool 1 Water Level**



**SC10C\_Pool 3 Water Level**



**SC10C\_Pool 5 Water Level**

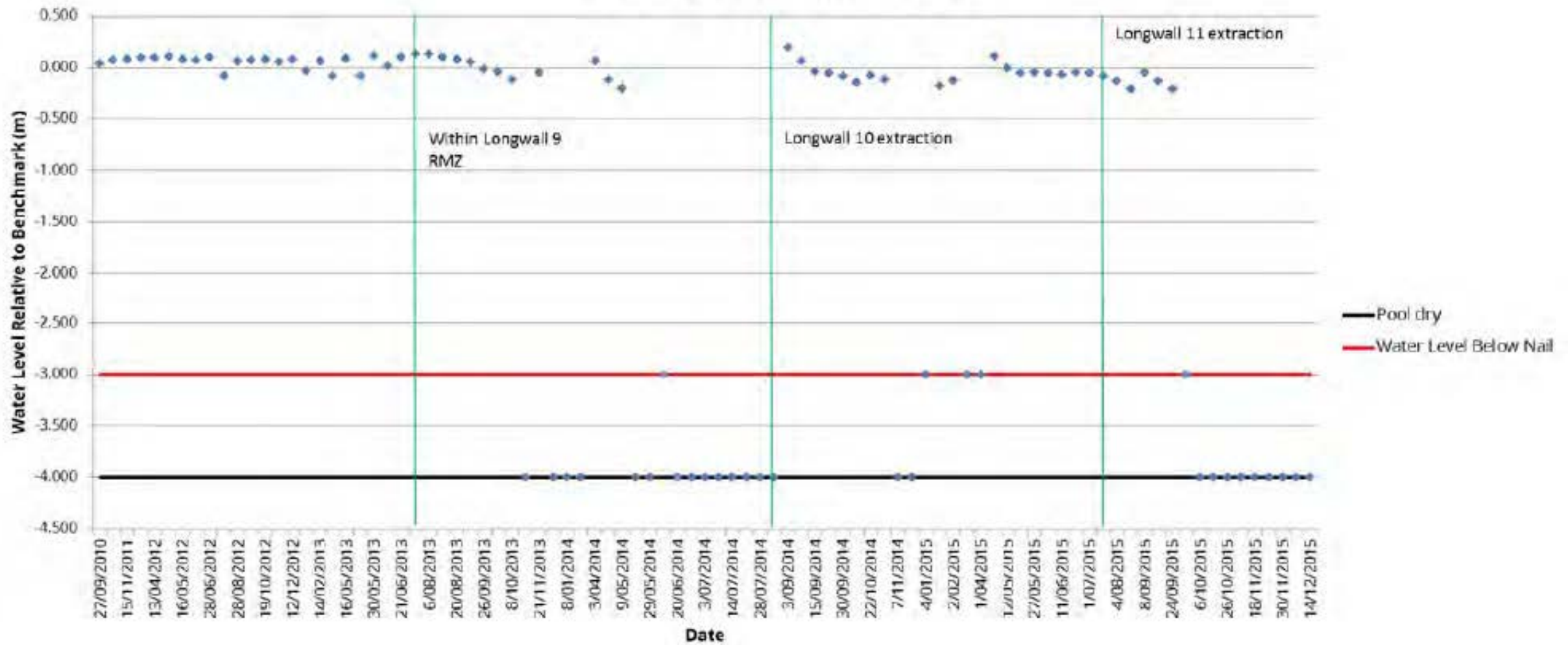




# LW11 EOP REPORT

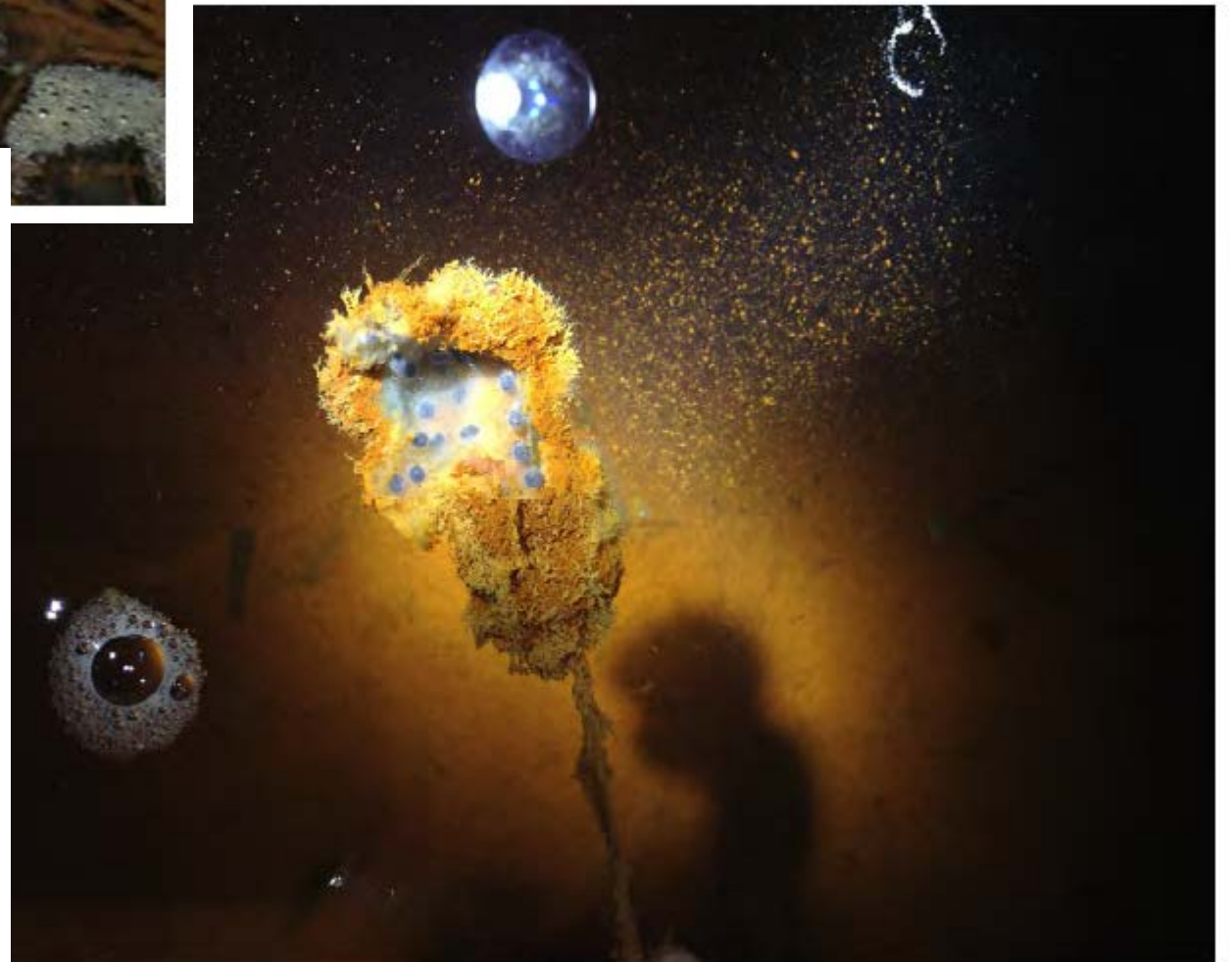
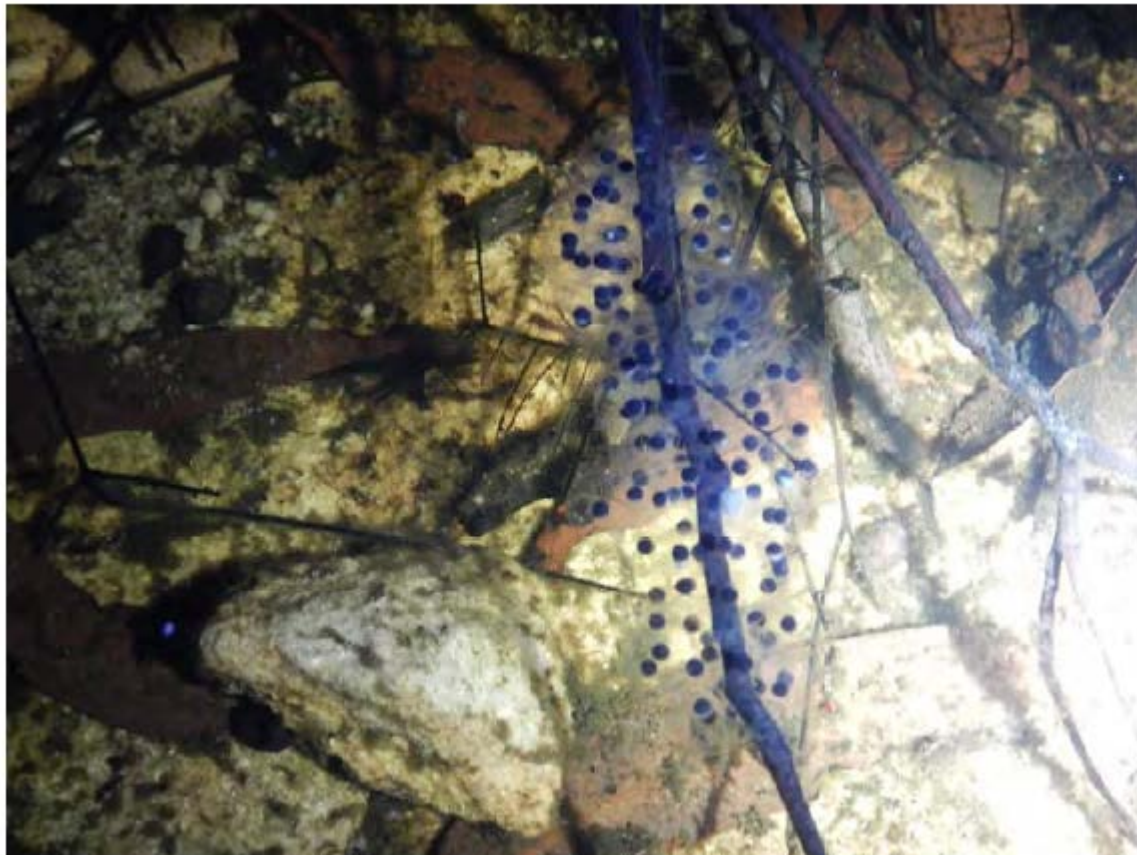


### DC(1)\_Pool 34 Water Level



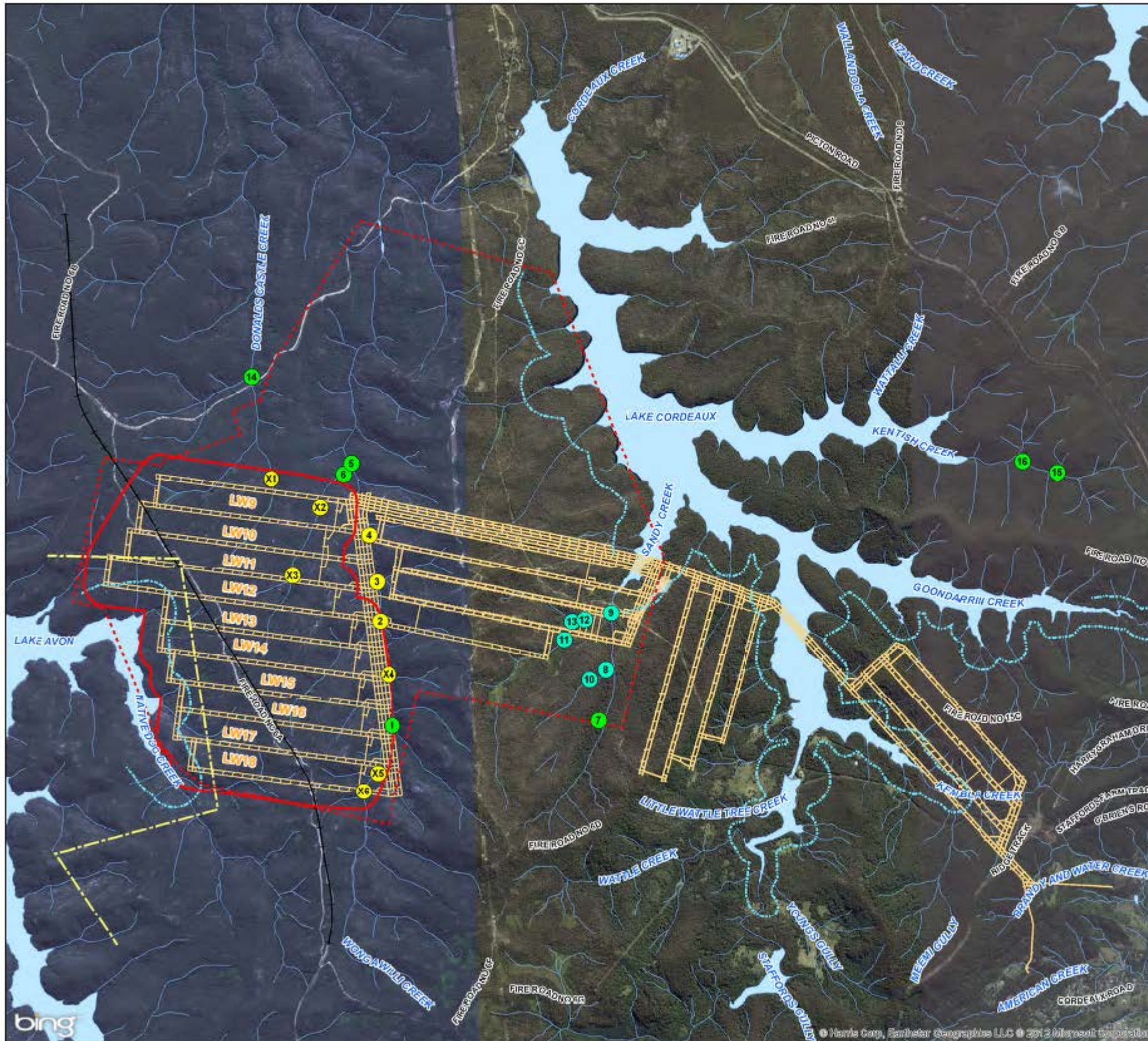


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# LW11 EOP REPORT



bhpbilliton  
**ILLAWARRA COAL**

## Aquatic Ecology Monitoring Locations

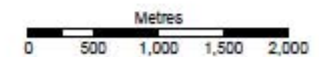
DENDROBIUM AREA 3B SMP

- Legend**
- Monitoring Sites (Cardno Ecology Lab)**
- Area 3A Monitoring Sites
  - Control Sites
  - Potential Impacts Sites
  - Watercourses (LPI)
  - SMP Area (1,199 ha)
  - - - Maximum Footprint Area 3
  - - - Restricted Zone
  - - - DGC Notification Zone
  - + Maldon to Dombarton Rail
  - Longwall Layout (BHPBIC, 2012)
  - Waterbodies (LPI)



FIGURE 2-57

1:45,000 Scale at A3

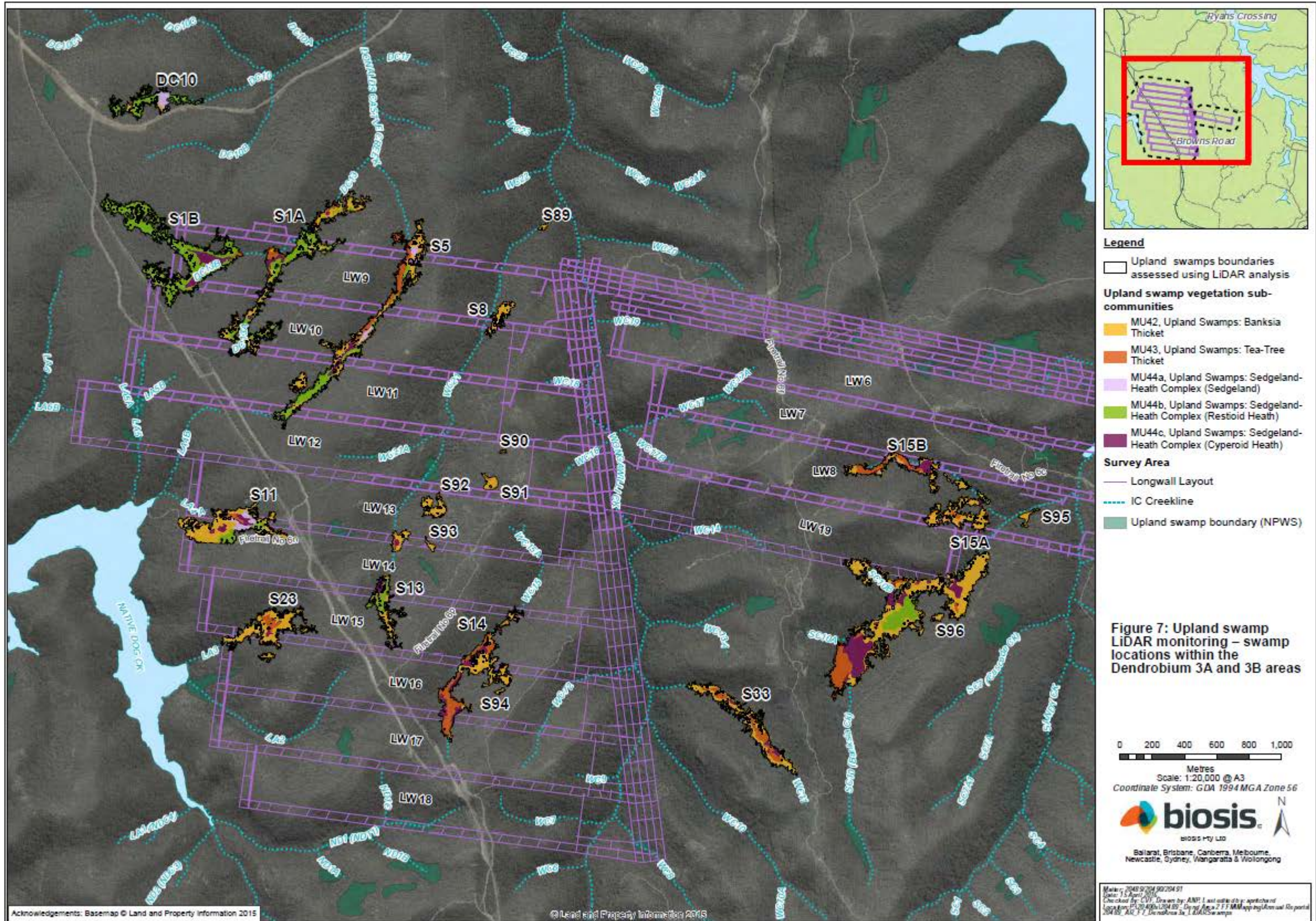


Map Produced by Cardno NSWACT Pty Ltd (WOL)  
Date: 2012-09-21  
Coordinate System: GDA 1984 MGA Zone 58  
Project: 112041-01  
Map: G1038\_AquaticMonitoringSiteTypes.mxd 01

Date supplied by MSEC (2012) unless otherwise stated  
Aerial imagery supplied by Bing Maps and associated third party suppliers

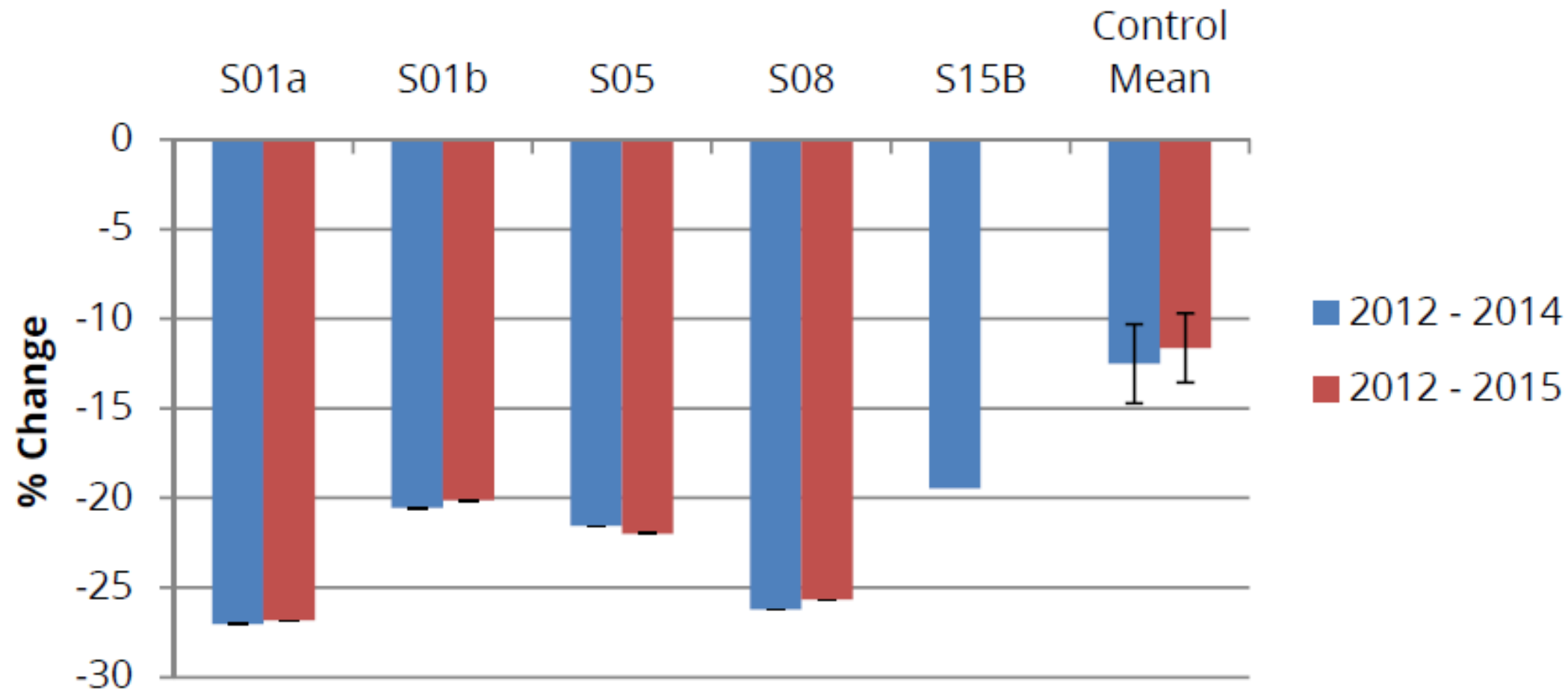


# LW11 EOP REPORT



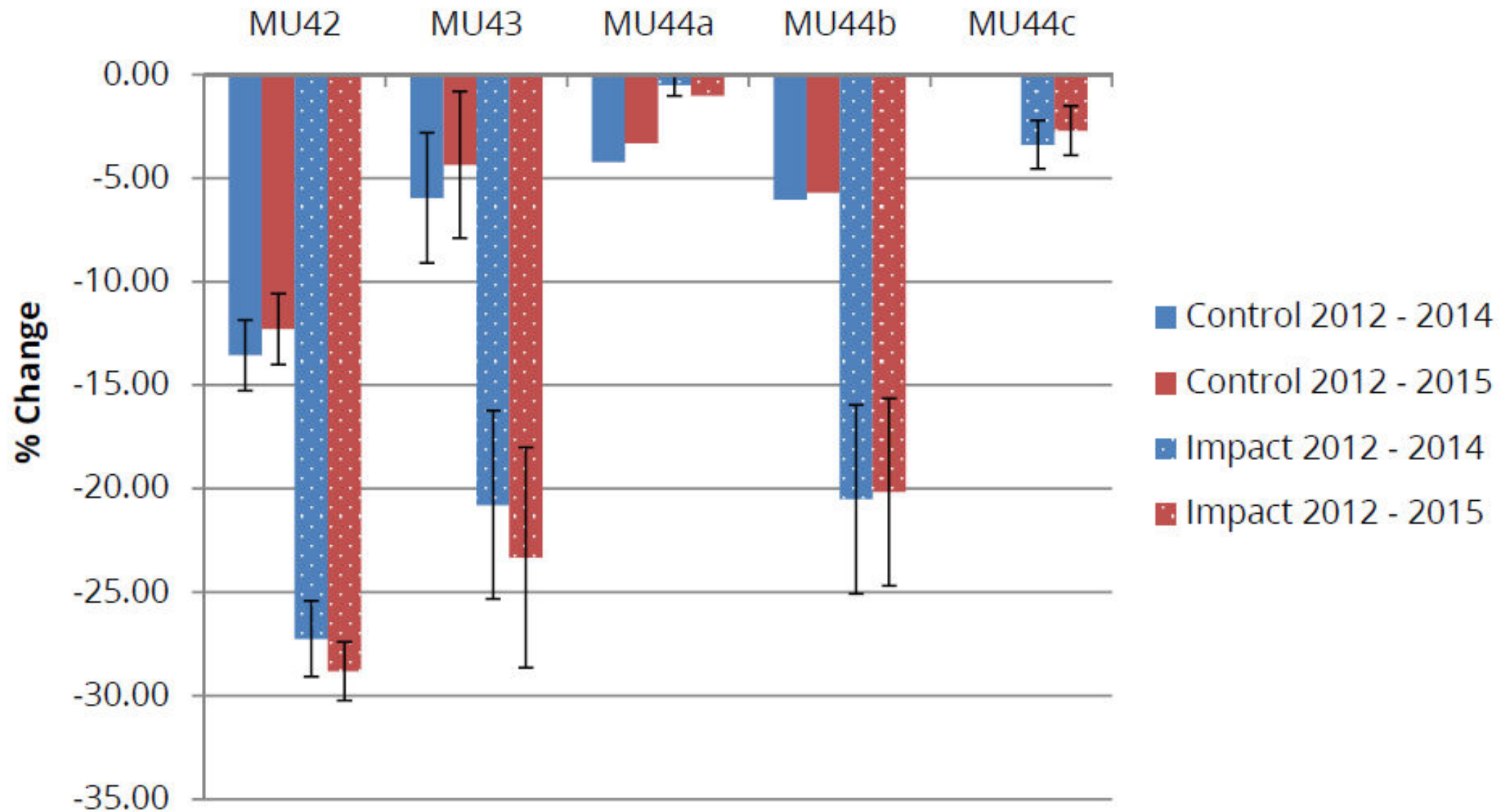


# LW11 EOP REPORT



**Percent change in swamp extent from 2012 - 2014 and 2012 - 2015 at impacted swamps and mean ( $\pm$ SE) change in swamp extent from 2012 - 2014 and 2012 - 2015 at control sites.**





**Graph 8** Mean ( $\pm$ SE) decrease in swamp sub-community extent at impacted and control swamps across the Dendrobium 3A and 3B Areas during the periods 2012 - 2014 and 2012 - 2015.



# LW11 EOP REPORT



Spring 2009



Spring 2014



Spring 2015

**Plate 3 Comparison of vegetation colouration at S1B-F2 South between spring 2009, spring 2014 and spring 2015.**



Spring 2009



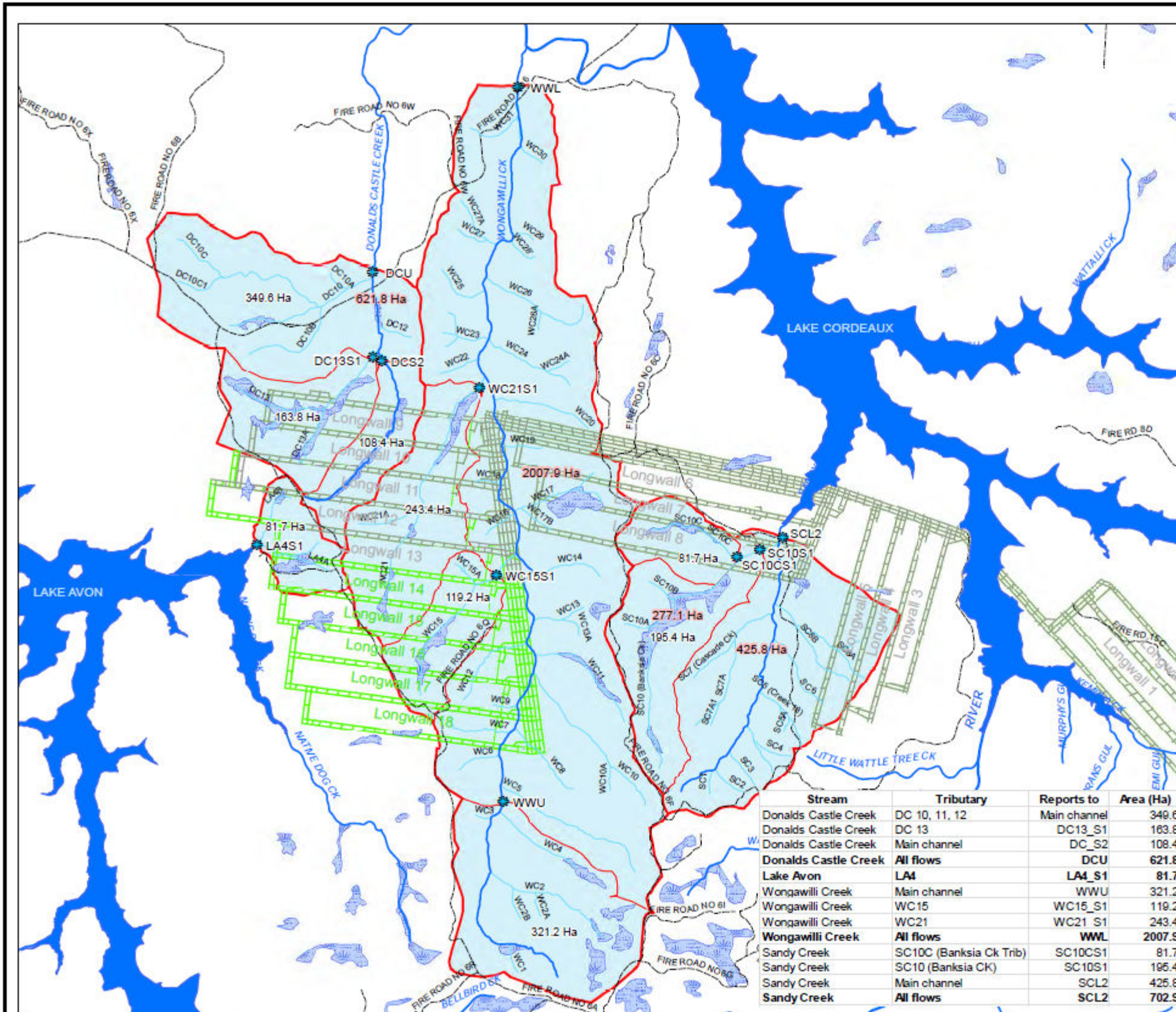
Spring 2014



Spring 2015



# LW11 EOP REPORT



**Dendrobium  
Flow Monitoring Points**  
Figure 2.36

- Legend**
- Water flow monitoring sites
  - Fire Roads
  - Flow monitoring catchments
  - Sub-catchments

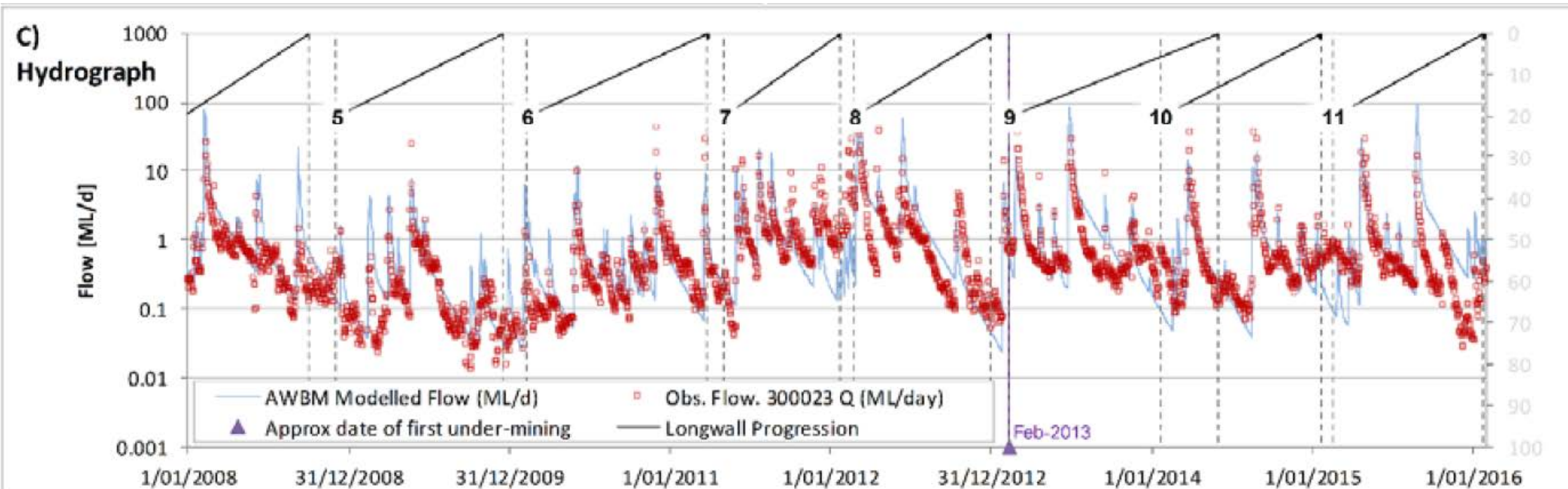
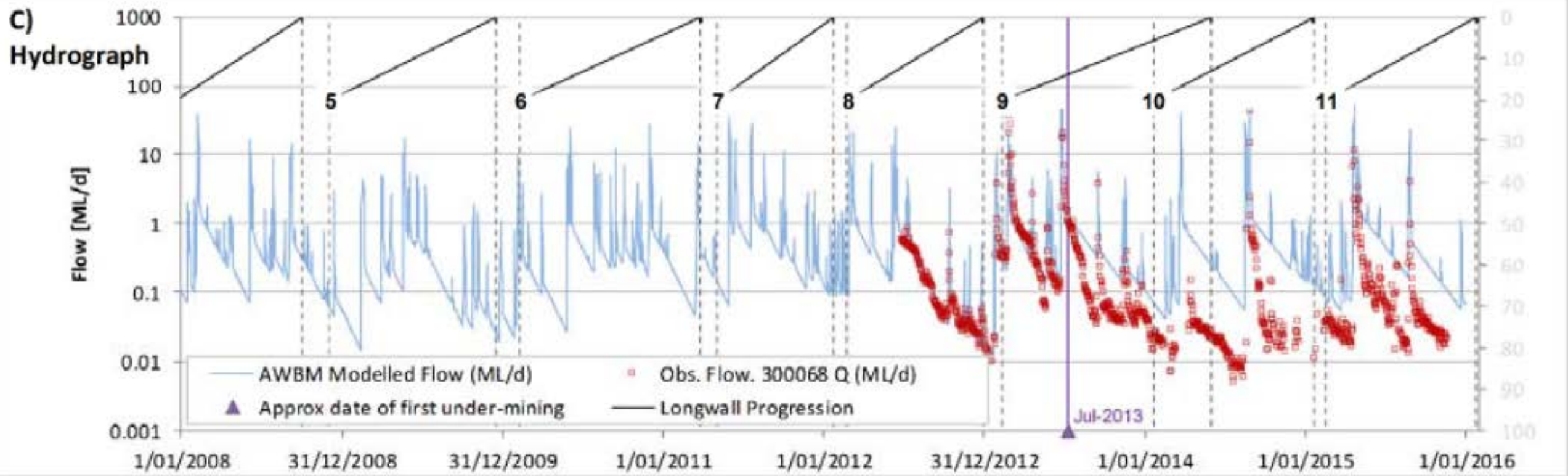
Stream	Tributary	Reports to	Area (Ha)
Donalds Castle Creek	DC 10, 11, 12	Main channel	349.6
Donalds Castle Creek	DC 13	DC13_S1	163.8
Donalds Castle Creek	Main channel	DC_S2	108.4
Donalds Castle Creek	All flows	DCU	621.8
Lake Avon	LA4	LA4_S1	81.7
Wongawilli Creek	Main channel	WWU	321.2
Wongawilli Creek	WC15	WC15_S1	119.2
Wongawilli Creek	WC21	WC21_S1	243.4
Wongawilli Creek	All flows	WWL	2007.9
Sandy Creek	SC10C (Banksia Ck Trib)	SC10CS1	81.7
Sandy Creek	SC10 (Banksia CK)	SC10S1	195.4
Sandy Creek	Main channel	SCL2	425.8
Sandy Creek	All flows	SCL2	702.9

Date: 29 May, 2015  
 Author: P.Crowe  
 Signed Off: G.Brassington

Version 2  
 Horizontal Datum  
 MGA - Zone 56

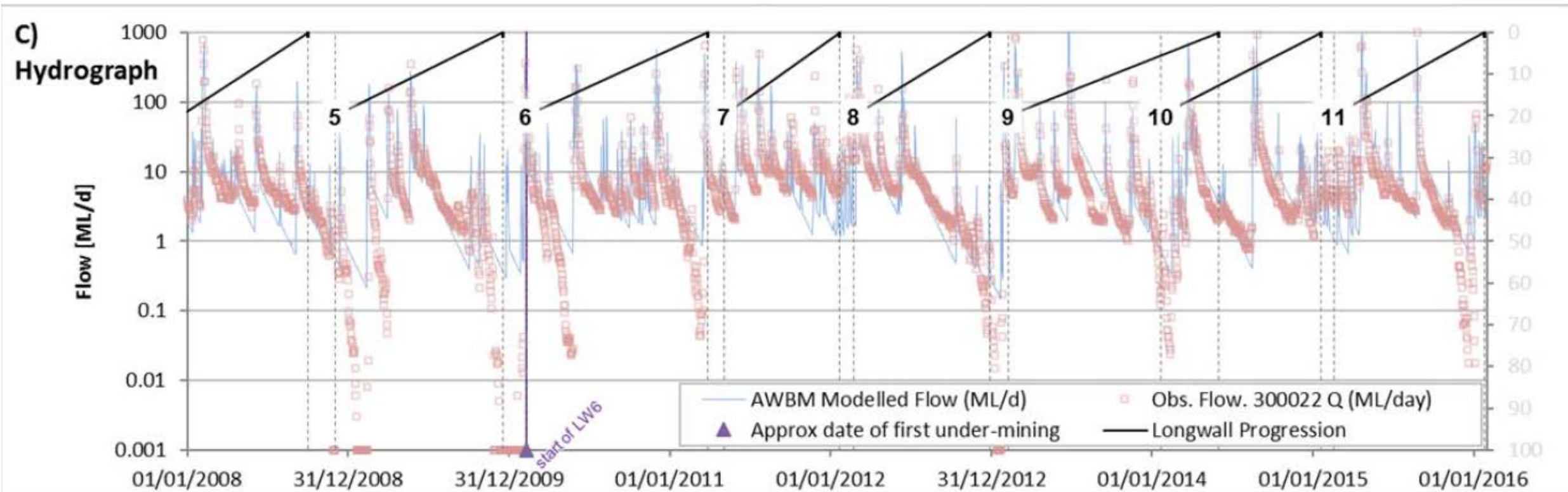
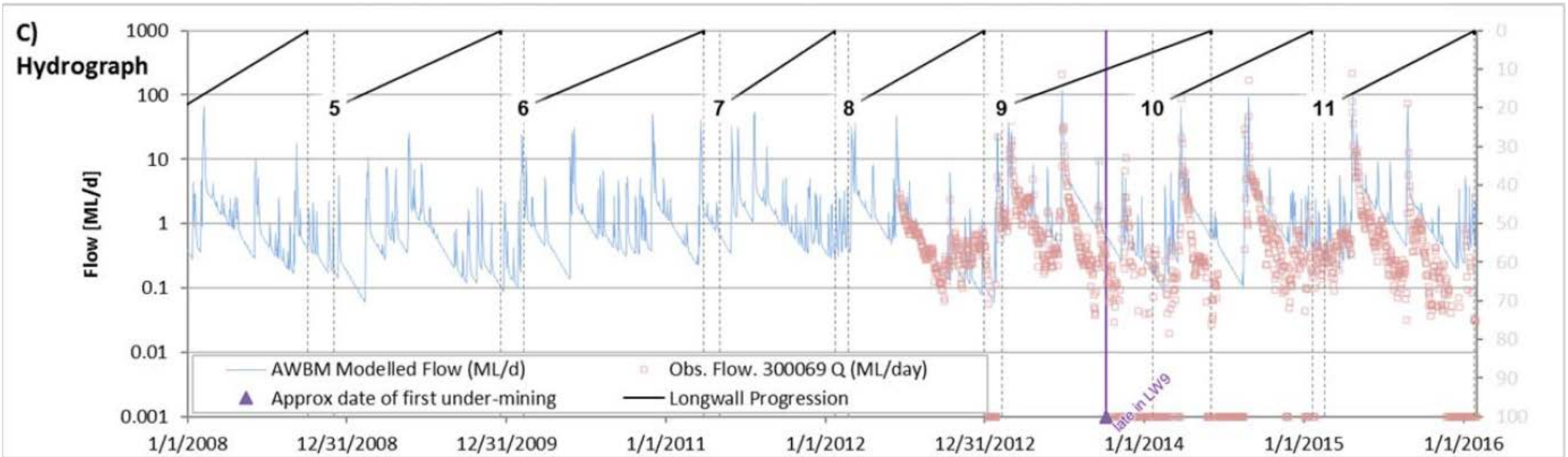


# LW11 EOP REPORT





# LW11 EOP REPORT





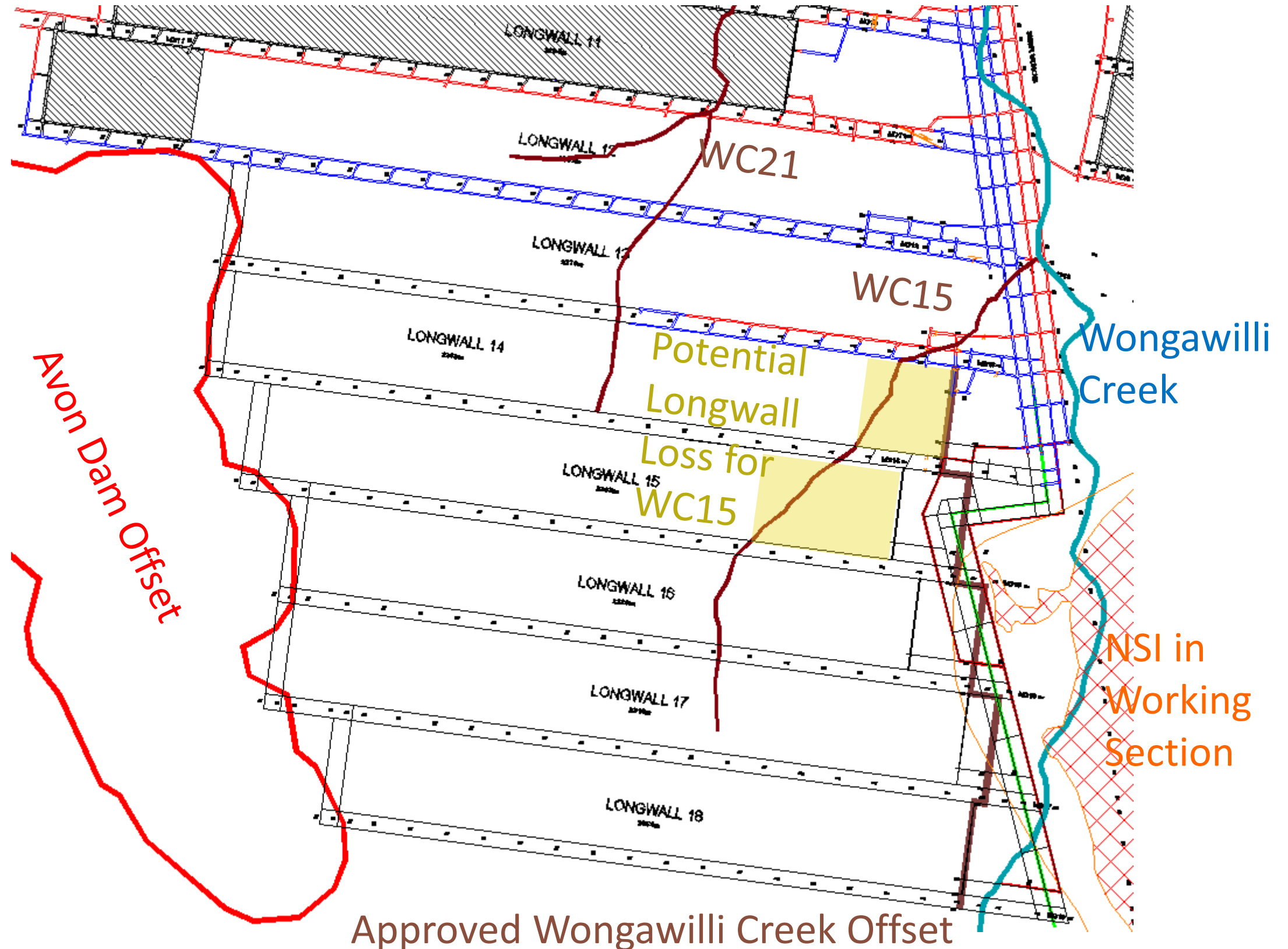
# LW11 EOP REPORT



LW 11 Surface water TARP Assessment		Catchment Yield TARP Assessment			Surface water quality TARP Assessment	
Catchment	Site	TARP Trigger	Yield change	Comment	TARP Trigger	Comment
Donalds Castle	DCS2	Level 3	-20%	Probably should have been triggered in LW10 (L2)	Level 1	Donalds Castle Ck (FR6); DO below TARP on one occasion
	DC13S1	Level 2	-15%	Probably should have been triggered in LW10 (L2)	N/A	
	DCU	not triggered			N/A	
Wongawilli Ck	WC15S1	not triggered			Level 2	Wongawilli Ck (FR6); DO below TARP on two non-consecutive occasions
	WC21S1	Level 1	-11% (so almost L2)		N/A*	* Not a TARP site, but an increase in pH, Fe and Mn noted in WC21_Pool 5 during LW10 and LW11
	WWL	not triggered			N/A	
Lake Avon trib	LA4_S1	[not triggered? – TBC]		not yet modelled, but suspect no issue	not triggered	

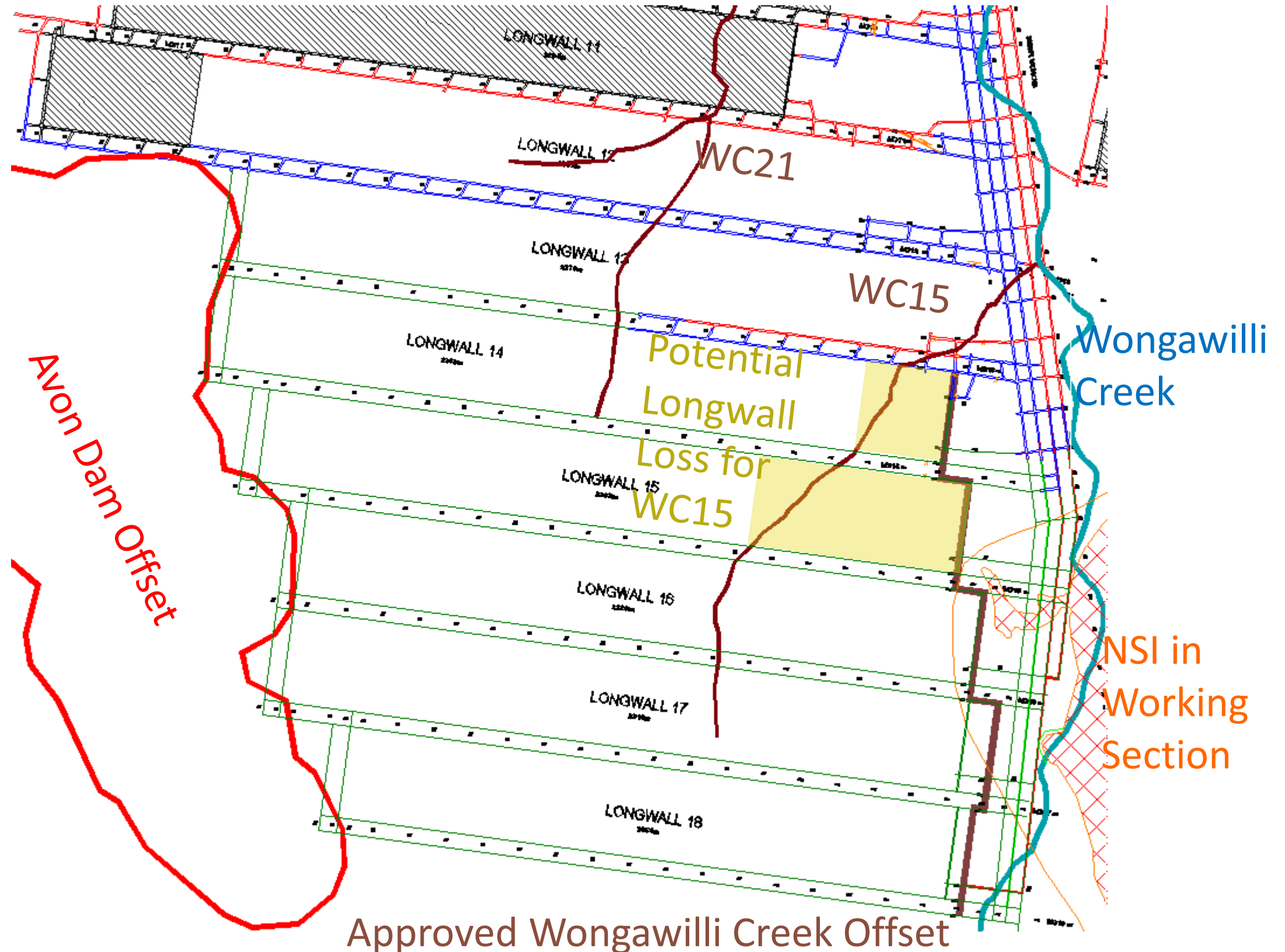


# DESIGN THEMES – AVOID NSI





# DESIGN THEMES – SIMPLIFY LAYOUT





# DESIGN THEMES – MAXIMISE RECOVERY

