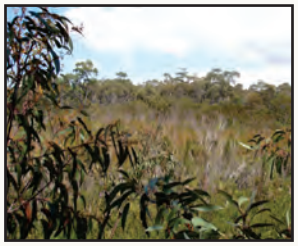
METROPOLITAN COAL

2015 ANNUAL REVIEW



Peabody ENERGY

METROPOLITAN COAL

Name of Operation	Metropolitan Coal
Name of Operator	Peabody Energy Australia Pty Ltd
Project Approval	Project Approval 08_0149
Name of Holder of Project Approval	Metropolitan Collieries Pty Ltd
Mining Leases	Consolidated Coal Lease 703 Mining Lease 1610 Mining Lease 1702
Name of Holder of Mining Leases	Metropolitan Collieries Pty Ltd
Water Licence	Water Access Licence – WAL25410 Bore Licence Certificate – 10BL603595
Name of Holder of Water Licence	Metropolitan Collieries Pty Ltd
MOP Start Date	October 2012
MOP End Date	September 2019
Annual Review Start Date	1 January 2015
Annual Review End Date	31 December 2015

I, Jon Degotardi, certify that this audit report is a true and accurate record of the compliance status of Metropolitan Coal for the period 1 January to 31 December 2015 and that I am authorised to make this statement on behalf of Peabody Energy Australia Pty Ltd.

Note.

a) The Annual Review is an 'environmental audit' for the purposes of section 122B(2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of Authorised Reporting Officer	Jon Degotardi
Title of Authorised Reporting Officer	Manager – Technical Services
Signature of Authorised Reporting Officer	
Date	31/08/2016 (Revision to address comments from the DP&E)

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1 STATEMENT OF COMPLIANCE

The compliance status of the Metropolitan Coal Mine with its relevant approval conditions at the end of the reporting period (31 December 2015) is provided in Table 1.

Table 1
Statement of Compliance

Were all conditions of the relevant approval(s) complied with?	
Project Approval 08_0149	NO
Development Consent D90/832	YES
Consolidated Coal Lease 703	YES
Mining Lease 1610	YES
Mining Lease 1702	YES
Coal Lease 379	YES
Mining Purpose Lease 320	YES
Environment Protection Licence No. 767	NO

Table 2 summarises the non-compliances with the approval conditions.

Table 2
Summary of Non-Compliances

Relevant Approval	Condition Number	Condition Description	Compliance Status	Comment	Report Section
Project Approval 08_0149	Condition 1, Schedule 4	Noise Impact Assessment Criteria (Table 2)	Non-compliant	Sustained non-compliances with the Noise Impact Assessment Criteria have been recorded at two monitoring locations during the reporting period.	6.2.1
Project Approval 08_0149	Condition 1, Schedule 5	Notification of Landowners	Non-compliant	Landowners with identified exceedances of Condition 1, Schedule 4 were not notified within the timeframe specified in Condition 1, Schedule 5.	6.2.1
Environment Protection Licence No. 767	Condition M2	Air Quality Monitoring	Non-compliant	Sampling was not able to be conducted at all monitoring points at the frequencies described in Conditions M2.1 and M2.2.	6.2.2

Compliance Status Key for Table 2 – Non-Compliances

Risk Level	Colour Code	Comment
High	Non-compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence.
Medium	Non-compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur.
Low	Non-compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur.
Administrative Non-compliance	Non-compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions).

2 INTRODUCTION

Metropolitan Coal is wholly owned by Peabody Energy Australia Pty Ltd (Peabody), and is located adjacent to the township of Helensburgh and approximately 30 kilometres (km) north of Wollongong in New South Wales (NSW) (Figure 1). Metropolitan Coal is located within Consolidated Coal Lease (CCL) 703, Mining Lease (ML) 1610 and ML 1702. Metropolitan Coal is one of the earliest established and longest continually running coal mining operations in Australia, with a history dating back to the 1880s.

Metropolitan Coal was granted approval for the Metropolitan Coal Project (the Project) by the Minister for Planning under Section 75J of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 22 June 2009. A copy of the Project Approval is available on the Peabody website (http://www.peabodyenergy.com). The Project comprises the continuation, upgrade and extension of underground coal mining operations and surface facilities at Metropolitan Coal. The underground mining longwall layout is shown on Figure 2. The extent of the mine's surface facilities area is shown on Figure 3.

The surface facilities include administration buildings, workshops, bath houses, ablution facilities, haul roads, access roads, fuel and consumables storages, hardstand areas, a Coal Handling and Preparation Plant (CHPP), stockpiles (including run-of-mine [ROM] coal, product coal and coal reject stockpiles), underground coal emplacement plant, and associated coal handling infrastructure (for example conveyors, transfer points and buffer bins).

Coal extracted from the underground mining operations is transferred by conveyor to the surface facilities area. ROM coal is crushed, screened and washed at the CHPP. The majority of product coal is transported by train to the Port Kembla Coal Terminal to domestic and overseas customers (Figure 1). Previously, a small proportion of the product coal was transported by truck to the Corrimal Coke Works and Coalcliff Coke Works for domestic use (Figure 1). CHPP coal reject material is transported by truck to the Glenlee Washery (Figure 1), or emplaced in unused workings.

The Environmental Management Structure of the Project is shown on Figure 4. It includes the Metropolitan Coal Environmental Management Strategy, developed to provide the strategic context for environmental management at Metropolitan Coal, and management plans and monitoring programs applicable to the underground mining area or mine's surface facilities area. In accordance with the mining lease conditions, Metropolitan Coal has also prepared the *Metropolitan Coal Mining Operations Plan, 2012 – 2019* (herein referred to as the Metropolitan Coal MOP).

2.1 PURPOSE AND SCOPE

Metropolitan Coal's environmental reporting requirements include an Annual Review, which is to be prepared in accordance with Condition 3, Schedule 7 of the Project Approval, an Annual Environmental Management Report (AEMR), to be prepared in accordance with CCL 703, and an Annual Rehabilitation Report, to be prepared in accordance with ML 1610 and ML 1702.

The Metropolitan Coal 2015 Annual Review has been prepared to meet the above reporting requirements and to review the environmental performance of the Project during the reporting period (i.e. 1 January to 31 December 2015), consistent with the NSW Government (2015) *Annual Review Guideline for State Significant Mining Developments*.

2.2 MINE CONTACTS

Contact details for key Metropolitan Coal employees are provided below:

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The street and postal address for Metropolitan Coal is provided below:

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HELENSBURGH NSW 2508

Postal Address
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3 APPROVALS

Metropolitan Coal operates under a number of statutory approvals, leases and licences granted by the NSW Government as outlined in Table 3.

Table 3
Consent, Lease and Licence Details

Consent/Lease/Licence	Authority	Grant/Renewal	Expiry Date
Project Approval 08_0149	DP&E	22/6/2009	22/6/2032
Project Approval 08_0149 – Mod 1	DP&E	8/9/2010	22/6/2032
Project Approval 08_0149 – Mod 2	DP&E	2/7/2011	22/6/2032
Project Approval 08_0149 – Mod 3	DP&E	3/10/2013	22/6/2032
Development Consent D90/832	WCC	5/1/1995	-
Consolidated Coal Lease 703	DRE	1/4/2004	26/1/2024
Mining Lease 1610	DRE	7/5/2014	26/9/2031
Coal Lease 379	DRE	14/11/2013*	4/10/2033
Mining Purpose Lease 320	DRE	16/6/2014	9/12/2035
Mining Lease 1702	DRE	13/10/2014	13/10/2035
Bore Licence Certificate 10BL603595	DPI-Water	25/1/2013	24/1/2018
Camp Creek Weir Surface Water Certificate of Title	DPI-Water	28/11/2012	-
Environment Protection Licence (EPL) No. 767	EPA	9/9/2002	-
Radiation Licence – Radiation Management Licence 5063985	EPA	28/9/2015	27/8/2016
Licence to store explosives and/or security sensitive dangerous substances	WorkCover NSW	15/11/2011	15/11/2016

DP&E Department of Planning and Environment
DRE NSW Department of Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy
EPA Environment Protection Authority
DPI-Water Department of Primary Industries – Water
WCC Wollongong City Council
* Date lease offer was signed.

4 OPERATIONS SUMMARY

4.1 MINING OPERATIONS

The extraction of Longwall 23 commenced in May 2014 and was completed in March 2015 (Figure 5). Longwall 24 extraction commenced in April 2015 and was completed in September 2015. Longwall 25 extraction commenced in October 2015.

The amount of waste rock/overburden, ROM coal, coal reject and product coal produced in the previous reporting period, current reporting period and forecast for the next reporting period is provided in Table 4.

Table 4
Production Summary

Material	Approved Limit	2014 Reporting Period (Actual)	2015 Reporting Period (Actual)	2016 Reporting Period (Forecast)
Waste Rock/Overburden	N/A	N/A	N/A	N/A
ROM Coal	3.2 Mt per calendar year[1]	2,649,894 t	2,297,856 t	1,948,248 t
Coal Reject	N/A	368,914 t	424,453 t	379,080 t
Saleable Product[2]	[2.8 Mt per calendar year[1]]	2,265,500 t	1,898,285 t	1,569,168 t

N/A = not applicable; Mt = million tonnes; t = tonnes.

[1] Condition 6, Schedule 2 of the Project Approval states:

The Proponent shall not:

(a) extract more than 3.2 million tonnes of ROM coal from the mining area in a calendar year, or

(b) transport more than 2.8 million tonnes of product coal from the site in a calendar year.

[2] Note, there is no Approval limit for saleable product itself. The only Approval limit relating to saleable product is the amount of product coal transport from the site in a calendar year. Note that the quantities presented in Table 4 reflect the saleable product produced by Metropolitan Coal and are therefore not consistent with the quantities dispatched from site that are reported on the Peabody website in the Truck and Rail Register.

4.2 OTHER OPERATIONS

In addition to the production approval limits detailed in Table 4, other relevant operational conditions are described in Table 5.

Table 5
Other Relevant Operational Conditions

Operational Condition		Operational Condition Met?	Comment
Limits on Approval (Project Approval Conditions 5 and 7, Schedule 2)	5. *The Proponent may undertake mining operations in the mining area for up to 23 years from the date of this approval.* *Note: Under this approval, the Proponent is required to rehabilitate the site and perform additional undertakings to the satisfaction of the Director-General. Consequently, this approval will continue to apply in all other respects other than the right to conduct mining operations until the site has been properly rehabilitated.*	Yes	Metropolitan Coal was granted approval for the Project in June 2009.
	7. *The Proponent shall not export any coal reject from the site after 2021 without the written approval of the Director-General.*	Yes	-

Table 5 (Continued)
Other Relevant Operational Conditions

Operational Condition		Operational Condition Met?	Comment
Limits on Approval (Continued) (Project Approval Condition 8, Schedule 2)	*8. The Proponent shall not emplace coal reject on the surface of the site without the written approval of the Director-General.* *Note: This condition applies to the Camp Gully Emplacement Area, as well as to the rest of the surface of the site. It does not apply to the proposed additional coal reject stockpile shown in Appendix 4.*	Yes	Metropolitan Coal has DP&E approval to emplace coal reject on the site when used for construction purposes (e.g. as engineered fill material).
Structural Adequacy (Project Approval Condition 9, Schedule 2)	*9. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structure, are constructed in accordance with:* *(a) the relevant requirements of the BCA; and* *(b) any additional requirements of the MSB in areas where subsidence effects are likely to occur.* *Notes:* • *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works.* • *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*	Yes	Building construction activities during the reporting period included the upgrade of the CHPP, completion of the new winder house and commencement of construction of the new compressor shed. Building Code of Australia requirements were stipulated for all buildings.
Demolition (Project Approval Condition 10, Schedule 2)	*10. The Proponent shall ensure that all demolition work is carried out in accordance with Australian Standard AS 2601-2001: The Demolition of Structures, or its latest version.*	Yes	Metropolitan Coal did not undertake any demolition activities during the reporting period.
Operation of Plant and Equipment (Project Approval Condition 11, Schedule 2)	*11. The Proponent shall ensure that all plant and equipment used at the site is:* *(a) maintained in a proper and efficient condition; and* *(b) operated in a proper and efficient manner.*	Yes	All plant and equipment in use at Metropolitan Coal is regularly serviced in accordance with the relevant Industry & Investment NSW Mining Design Guidelines to ensure plant and equipment is maintained in proper and efficient condition. All plant and equipment are operated in a proper and efficient manner.
Rail Noise (Project Approval Condition 4, Schedule 4)	*4. The Proponent shall only use locomotives that are approved to operate on the NSW rail network in accordance with noise limits L6.1 to L6.4 in RailCorp's EPL (No. 12208) and ARTC's EPL (No. 3142) or a Pollution Control Approval issued under the former Pollution Control Act 1970.*	Yes	All locomotives used by Metropolitan Coal are approved to operate on the NSW rail network in accordance with the relevant noise limits.
Blasting (Project Approval Condition 7, Schedule 4)	*7. The Proponent shall not undertake blasting operations at the surface facilities area without the written approval of the Director-General.*	Yes	No blasting activities were carried out at the surface facilities area during the reporting period. Minor blasting underground is necessary at times when geological structures are encountered that cannot be excavated by the longwall mining machine and when a section of the longwall roof falls ahead of the hydraulic supports of the longwall mining machine.

4.3 OPERATIONAL ACTIVITIES ANTICIPATED IN THE NEXT REPORTING PERIOD

Longwall 25 and Longwall 26 will be completed in April 2016 and September 2016, respectively. Longwall 27 will commence in October 2016 (Figure 6).

Metropolitan Coal obtained approval to revise the first workings of Longwall 26 in March 2016. The revised layout is shown on the figures included in this report.

Metropolitan Coal will commence the transport of coal reject to the Lend Lease Calderwood Urban Development Project for the beneficial re-use of the coal reject as fill material. Metropolitan Coal will also continue its consultation with the WCC regarding the potential for coal rejects to be beneficially re-used at the Helensburgh Landfill. Further testwork of the coal reject material will be conducted in this regard. The coal reject backfill emplacement project will also continue during 2016.

Upgrades to the Turkey's Nest Dam and installation of a new sediment catch pit to improve the efficiency of the water management system will also be implemented in 2016. Coal reject material will be beneficially re-used for the Turkey's Nest Dam upgrade.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

Following review of the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report, the DP&E requested the aspects outlined in Table 6 be addressed in the next Annual Review. It is noted, however, that the requests were made in relation to the previous report structure and not the revised structure required by the NSW Government (2015) *Annual Review Guideline for State Significant Mining Developments*. Table 6 details the actions taken and, where appropriate, where each aspect is addressed in this report.

WaterNSW also provided Metropolitan Coal with detailed comments on the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report. Metropolitan Coal provided a detailed response to WaterNSW's comments and, where appropriate, has included relevant information in this report.

Table 6
Actions Arising from the 2014 Annual Review and AEMR/Rehabilitation Report Review

Action Required	Action Taken	Report Section
REQUESTED BY DP&E		
Catchment Monitoring		
A progress update of the catchment model to be developed for the Eastern Tributary and Honeysuckle Creek gauging stations.	Catchment models have been developed for the Eastern Tributary and Honeysuckle Creek gauging stations.	Section 6.1.2 (Surface Water Flow)
An update on the development of the recalibrated catchment models for the Waratah Rivulet, Woronora River and O'Hare's Creek gauging stations.	Re-calibrated catchment models have been developed.	Section 6.1.2 (Surface Water Flow)
Water Management		
Provide an update on gas releases in Pool K, Pool L, Pool O and Pool P1/P2.	The status of gas releases is described.	Section 6.1.2 (Stream Features)
Develop plans for rectification of site WRGW8 which has been deemed to be faulty and is not recording reliable data.	Rectification of site WRGW8 is not required given the availability of data at site WRGW7 on the opposite bank of the Waratah Rivulet.	Section 6.1.2 (Shallow Groundwater Levels)
Develop plans for repair of bore RTGW1A.	Repair of bore RTGW1A is not required as sufficient data has been obtained in relation to tributary shallow groundwater levels to date.	Section 6.1.2 (Shallow Groundwater Levels)

Table 6 (Continued)
Actions Arising from the 2014 Annual Review and AEMR/Rehabilitation Report Review

Action Required	Action Taken	Report Section
REQUESTED BY DP&E (Continued)		
Water Management (Continued)		
Provide an update on impacts at Pool N, which ceased to flow on three occasions during the 2014 reporting period and in which cracking was evident.	Pool N water levels are described.	Section 6.1.2 (Pool Water Levels)
Provide an update on the accumulation of algae observed at rock bar P and Pools Q, R and S.	A description of algal accumulation has been provided.	Section 6.1.2 (Stream Features)
Provide an update on iron staining observed in the reporting period downstream of the rock bar of Pool ETAQ.	A detailed photographic record of the Eastern Tributary has been taken within three months of completion of Longwalls 23 and 24.	Section 6.1.2 (Stream Features)
Provide an update on the flow in Pools ETJ and ETM.	An update on water levels in Pools ETJ and ETM is provided.	Section 6.1.2 (Pool Water Levels)
Provide results of the investigation into the accuracy of the cease to flow levels in the Eastern Tributary.	A description of Metropolitan Coal's investigation of cease to flow levels for pools on the Eastern Tributary is provided.	Section 6.1.2 (Pool Water Levels)
Provide an update on actions to be undertaken as a result of the qualitative assessment of data quality undertaken for the vibrating wire piezometer hydrographs that were found to be either unreliable or unstable.	The qualitative assessment of data quality has been reviewed. No actions are required.	Section 6.1.2 (Deep Groundwater Levels/Pressures)
Provide a discussion regarding the implications of the change for trend analysis for reporting against a six month median as opposed to the sliding 12 month mean.	A detailed review of Metropolitan Coal's proposed changes to the water quality performance indicator assessment methods was conducted by the DP&E in late 2014 and throughout 2015 and revisions to the water quality performance indicator assessment methods were finalised. The Water Management Plans will be revised following the 2015 Annual Review to reflect these changes.	Section 6.1.2 (Water Quality)
Biodiversity Management		
Provide an update on vegetation health in swamps and riparian zones, with scattered and isolated dead plants and dieback observed in both longwall and control swamps.	A summary of the vegetation monitoring results is provided.	Section 6.1.3 (Upland Swamp Vegetation Monitoring and Riparian Vegetation Monitoring)
Provide an update on Swamp 20, that has changed from being permanently waterlogged (during the wet period in 2011) to intermittently waterlogged during 2013 and throughout the reporting period.	A summary of the Swamp 20 substrate groundwater level monitoring results is provided.	Section 6.1.3 (Upland Swamp Groundwater Monitoring)
Provide an update on the investigation of the sensor at Swamp 137a that has provided erroneous data from mid-October 2014.	An update of Swamp 137a groundwater level monitoring is provided.	Section 6.1.3 (Upland Swamp Groundwater Monitoring)
Discuss whether there have been changes in macrophyte assemblages as a result of iron staining at Locations C1, C3 and C4 on Tributary C/Eastern Tributary.	A summary of the macrophyte assemblage monitoring results is provided.	Section 6.1.3 (Aquatic Biota and their Habitats)
Provide an update on the patterns of change and variability in macroinvertebrates and components of the assemblage, particularly at Location B1, which is likely to be associated with the mining related subsidence impacts that have been observed.	A summary of the macroinvertebrate monitoring results for Tributary B is provided.	Section 6.1.3 (Aquatic Biota and their Habitats)

Table 6 (Continued)
Actions Arising from the 2014 Annual Review and AEMR/Rehabilitation Report Review

Action Required	Action Taken	Report Section
REQUESTED BY DP&E (Continued)		
Biodiversity Management (Continued)		
Provide an update on the algal/iron floc that was observed to cover up to approximately 95% of the substratum of the pools sampled along the Waratah Rivulet in autumn 2014.	An update on the presence of an algal/iron floc is provided in relation to the aquatic ecology sampling sites in the specialist aquatic reports.	-
Provide the results of the investigation into the 10 m piezometer in Bee Creek Swamp, as the water level is unusually high.	An update of Bee Creek water levels (control swamp) is provided in the specialist groundwater reports.	-
Heritage Management		
Provide an update on monitoring of the three sites observed to have changes due to mine subsidence.	The results of Aboriginal heritage site monitoring are described.	Section 6.1.5
Air Quality		
Include a comparison of dust deposition results, and discussion of trends, for the past three (3) years.	Dust deposition results and trends are described.	Section 6.2.2
Consider inclusion of limit/performance indicator lines on graphs to visually represent compliance.	Noted.	-
Waste		
Consider using a bar graph rather than a pie graph for waste disposal/recycling data.	Bar graphs showing the waste monitoring results are provided on Figure 22.	Section 6.2.4
Provide details of the extensive test work that has been undertaken to investigate and optimise the composition of the emplacement material.	An overview of the coal reject emplacement testwork is provided.	Section 6.2.4
Rehabilitation		
Provide an update on stream remediation activities at Pools A, F, G and G1.	A description of the stream remediation activities conducted during the reporting period is provided.	Section 9.3.2
Include outcomes of the assessment of stream remediation at any additional pools/rock bars between Flat Rock Swamp and Pool F.	Metropolitan Coal will continue to monitor pool water levels and will conduct an analysis of the stream remediation activities against the stream remediation performance indicator detailed in the Metropolitan Coal Rehabilitation Management Plan once a significant period of drier climatic conditions has been experienced.	Section 9.3.2
Noise		
The Department requests that a revised timeline be submitted within 28 days of this letter with the anticipated dates of commissioning these upgrades, with an indication of the likely influence not commissioning these upgrades will have on meeting the Noise Impact Assessment Criteria in Schedule 4 Condition 1.	A letter from Metropolitan Coal detailing the progress of the relevant upgrades was provided to the DP&E in June 2015.	-

6 ENVIRONMENTAL PERFORMANCE

6.1 UNDERGROUND MINING AREA AND SURROUNDS

Section 6.1 provides a summary of the key environmental monitoring results for subsidence, surface water, groundwater, biodiversity, land, heritage, built features and public safety in the underground mining area, an assessment of environmental performance and a description of the management measures implemented during the reporting period.

Each section indicates in which management plan or monitoring program details of the underground mining management and monitoring are available. The Metropolitan Coal management plans and monitoring programs are available on the Peabody website (http://www.peabodyenergy.com).

6.1.1 Subsidence Monitoring

The Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Subsidence Monitoring Programs were prepared to validate subsidence predictions and analyse the relationship between the subsidence effects and subsidence impacts of the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans in accordance with Condition 6(e), Schedule 3 of the Project Approval.

As indicated in the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report, the Metropolitan Coal Longwalls 20-22 Subsidence Monitoring Program has effectively been discontinued as the appropriate subsidence survey lines and points for ongoing monitoring were incorporated into the Metropolitan Coal Longwalls 23-27 Subsidence Monitoring Program. The Metropolitan Coal Longwalls 23-27 Subsidence Monitoring Program was revised during the reporting period in accordance with Condition 4, Schedule 7 of the Project Approval (post submission of the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report) to include two additional ridgetop survey locations and an additional Waratah Rivulet crossline. The subsidence parameter monitoring locations are shown on Figure 7.

In accordance with the Metropolitan Coal Longwalls 23-27 Subsidence Monitoring Program, the predicted and observed subsidence movements for the subsidence monitoring lines have been assessed following the completion of Longwall 23 in March 2015 and Longwall 24 in September 2015.

Subsidence movements are surveyed in three dimensions using a total station survey instrument.

Condition 3, Schedule 3 of the Project Approval states:

3. *If the subsidence effects and subsidence impacts of the project exceed the relevant predictions by more than 15% at any time after mining has progressed beyond the halfway mark of Longwall 21, or if the profile of vertical displacement does not reflect predictions, then the Proponent shall use appropriate numerical modelling to supplement the subsequent predictions of subsidence effects and subsidence impacts for the project to the satisfaction of the Director-General.*

   Note: The aim of the numerical modelling is to give a better insight into the mechanisms that may account for the differences between predicted and actual subsidence effects and impacts.

The Project subsidence effects and subsidence impacts were as predicted or less than those predicted for the reporting period.

In accordance with the Metropolitan Coal Longwalls 23-27 Biodiversity Management Plan, an assessment of the subsidence effects at the occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion Endangered Ecological Community situated approximately 300 to 500 metres (m) to the east of Longwalls 23-27 has also been conducted. The results of the assessment indicate that the subsidence parameters to the east of Longwalls 23-27 were as predicted or less than those predicted for the reporting period.

6.1.2 Water Management

The Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans were prepared to manage the potential environmental consequences of the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans on watercourses (including the Woronora Reservoir), aquifers and catchment yield in accordance with Condition 6, Schedule 3 of the Project Approval.

The Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans will be revised in accordance with Condition 4, Schedule 7 of the Project Approval post submission of the Metropolitan Coal 2015 Annual Review.

Hydro Engineering & Consulting (2016) and HydroSimulations (2016) have reviewed the environmental performance of the Project in relation to surface water and groundwater in the underground mining area and surrounds for the reporting period. The reports prepared in support of this Metropolitan Coal 2015 Annual Review are provided in Appendices A and B, respectively.

Stream Features

On the Waratah Rivulet, new surface cracking was observed at Pool G1 (widening of existing cracks), the Pool H rock bar (minor cracking at downstream end of rock bar H, some widening of existing cracks) and between Pools N and O (at the Pool N rock bar and in Pool O). On the Eastern Tributary, new surface cracking was observed at Pool ETZ (cracking at a step down in sandstone to the south of Pool ETZ1) and Pool ETAE (a crack on a sandstone shelf along the eastern bank). Additional surface cracking was also identified along Tributaries A and B during the reporting period, including a rock ledge collapse at the upstream end of Pool TB-M (described in Section 6.1.4).

Iron staining and water discolouration was noted at a number of rock bars and/or pools on Waratah Rivulet and Eastern Tributary. There was no evidence of changes in the extent or nature of iron staining observed between Pools P to W on the Waratah Rivulet, or downstream of the maingate of Longwall 26 on the Eastern Tributary, during the reporting period.

In the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report (Metropolitan Coal, 2014), an accumulation of algae observed on Waratah Rivulet at rock bar P and Pools Q, R and S, which increased during times of low rainfall, was reported. Further monitoring conducted by Metropolitan Coal during the reporting period indicated that algae tends to accumulate during times of low rainfall and is washed away by rainfall events.

No gas releases have been observed on the Eastern Tributary. During the reporting period, gas releases in the Waratah Rivulet were observed in pools previously identified with gas releases (i.e. Pools K, L, O and P). Gas releases were observed sporadically at Pool K from October to December 2015. Gas releases continued to be observed in Pools L and P throughout the reporting period and at Pool O from January to June 2015. The gas releases were predominantly comprised of methane and no environmental effects resulting from the gas releases (such as riparian vegetation dieback or dead fish) have been observed.

The visual and photographic surveys conducted within three months of the completion of each longwall provide a detailed photographic record of stream features. A detailed photographic record of the Waratah Rivulet, Eastern Tributary, Tributary A and Tributary B was conducted within three months of Longwall 23 completion and Longwall 24 completion.

The results of the stream inspections are consistent with the potential subsidence impacts described in the Metropolitan Coal Project Environmental Assessment (Project EA) (Helensburgh Coal Pty Ltd [HCPL], 2008), the Preferred Project Report (HCPL, 2009) and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans, including cracking and dilation of bedrock which has resulted in the localised diversion of a portion of the surface flow through either:

- **diversion into subterranean flows**, where water travels via new mining induced fractures and opened natural joints in the bedrock into near-surface dilated strata beneath the bedrock, ultimately re-emerging at the surface downstream; or
- **leakage through rock bars**, where the rate of leakage from pools through rock bars to the downstream reaches of the stream is increased by new mining induced fractures.

The Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans indicated that the effects of underflow would be localised to the subsidence affected reaches of streams. Underflow has been observed to result in lower water levels in pools as they become hydraulically connected with the fracture network. During prolonged dry periods when flows recede to low levels, the number of instances where loss of flow continuity between pools occurs increases with a greater proportion of the flow being conveyed entirely in the subsurface fracture network. These impacts are described further in the pool water levels section below.

The key potential subsidence impacts and environmental consequences in relation to bed gradients, scouring and stream alignment described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans included:

- Potential changes in bed gradients could occur, however, were anticipated to be small relative to the existing grades.
- An increased potential for scouring of the stream bed and banks (at locations where the predicted tilts considerably increase the natural pre-mining stream gradients). The potential for scouring is greatest in stream sections with alluvial deposits. Since the streambed of the Waratah Rivulet and the Eastern Tributary is predominantly erosion-resistant Hawkesbury Sandstone, scouring was expected to be very low.
- Subsidence fracturing of bedrock has the potential to cause dislodgement of rock fragments during high flow events.
- The potential for changes to stream alignment as a result of mine subsidence effects was considered to be low.
- Minor stream bank erosion, where changes in channel gradients result in increases in flow energy. It would be expected that bank erosion would be relatively minor and comprise a slow retreat of the bank until a new dynamic equilibrium is reached.

The results of the stream inspections have generally been consistent with these predictions. On the Waratah Rivulet (in a section of the stream over Longwall 21) and Eastern Tributary (in a section of the stream over Longwalls 20 and 21) increased ponding from changes in bed gradients has resulted in the prolonged inundation of the adjacent riparian vegetation. This prolonged inundation has resulted in some vegetation dieback on a local scale as described in Section 6.1.3.

As described in the Southern Coalfield Panel Report (Department of Planning [DoP], 2008) and the NSW Planning Assessment Commission's Report for the Metropolitan Coal Project (NSW Planning Assessment Commission, 2009), under certain conditions the cracking of stream beds and underlying strata has the potential to result in changes in water quality, particularly ferruginous springs and/or development of iron bacterial mats. Experience at Metropolitan Coal prior to Project Approval indicated that areas of the substratum can be covered by iron flocculent material for several hundred metres downstream of mine subsidence fractures.

Metropolitan Coal has monitored the extent of iron staining through visual and photographic surveys and assessed the extent of iron staining against the subsidence impact performance measures as follows:

- Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases) on the Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P).
- Negligible environmental consequences over at least 70% of the stream length (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases) on the Eastern Tributary between the full supply level of the Woronora Reservoir and the maingate of Longwall 26.

Monitoring to date indicates the subsidence impact performance measures for the Waratah Rivulet and Eastern Tributary have not been exceeded.

Prior to approval of the Project in 2009, no gas releases had been observed along the Waratah Rivulet, Eastern Tributary or other tributaries over the Metropolitan Coal lease, either before or during mining. Notwithstanding, the Project EA, Preferred Project Report, and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans recognised there was the potential for gas releases to occur. Assessments against the subsidence impact performance measures for negligible environmental consequence on the Waratah Rivulet and Eastern Tributary indicate the performance measures have not been exceeded (Gilbert & Associates, 2014; The University of Queensland, 2014).

Surface Water Flow

During the reporting period, catchment models were developed for the Metropolitan Coal-owned gauging stations on the Eastern Tributary and Honeysuckle Creek.

Gilbert & Associates (now Hydro Engineering & Consulting), on behalf of Metropolitan Coal, also revised the rating relationships for the Waratah Rivulet (GS 2132102), Woronora River (GS 2132101) and O'Hares Creek (GS 213200) gauging stations during the reporting period and regenerated the flow records using the amended rating relationships.

The Waratah Rivulet, Woronora River and O'Hares Creek catchment models have been re-calibrated against the revised flow data. Regional and local meteorological data is available from various Bureau of Meteorology weather stations. Rainfall data is also available from Metropolitan Coal pluviometers situated in the Waratah Rivulet, Eastern Tributary, Woronora River and Honeysuckle Creek catchments (Figure 8). The revised rating curves and associated re-calibration of the catchment models were peer reviewed by Emeritus Professor Tom McMahon (School of Engineering, The University of Melbourne).

Stream flow data is analysed to assess whether a statistically significant reduction in the quantity of water entering Woronora Reservoir in the post-mine period relative to the pre-mine period has occurred, that has not also occurred in the control catchment(s). The quantity of water entering the Woronora Reservoir is not considered to be significantly different post-mining compared to pre-mining if the median (of the ratio of 14 day sums of monitored flow) does not fall below the 20th percentile of the baseline data. Chart 1 indicates that the 12 month sliding median has not fallen below the 20th percentile value.

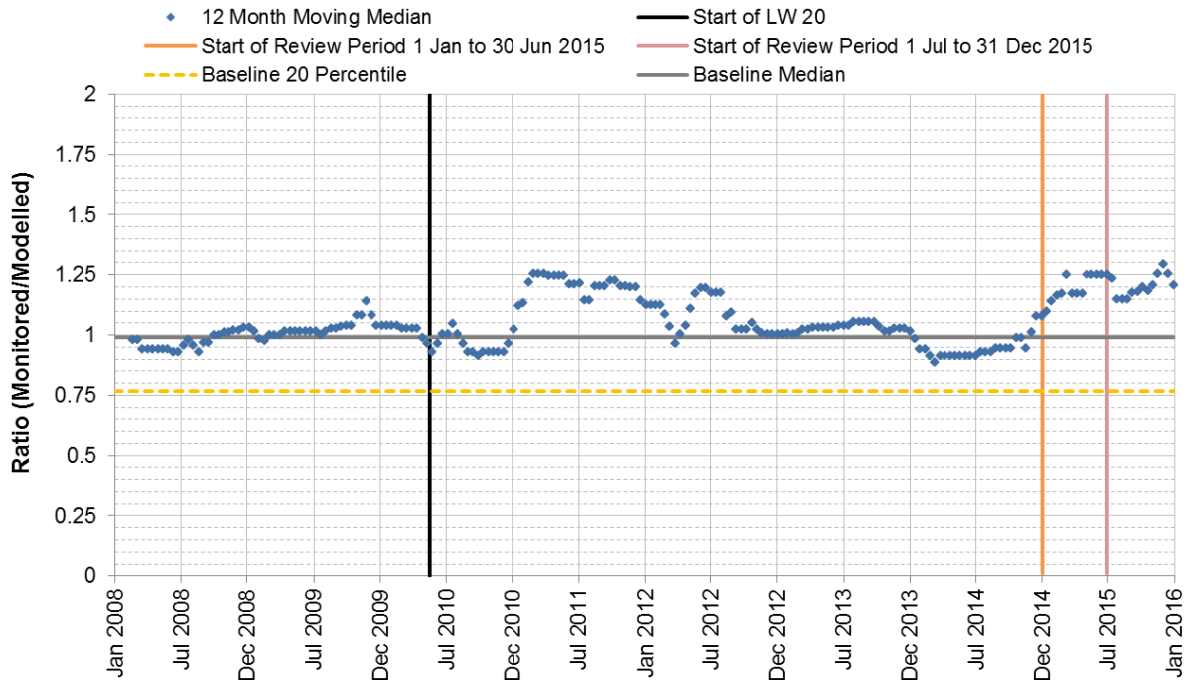


Chart 1 One Year Sliding Median for the Ratios of the 14 Day Sums of Monitored and Modelled Flow Rates at Waratah Rivulet (GS 2132102)

Surface water flow monitoring at the Waratah Rivulet, Woronora River (Figure 9) and O'Hares Creek gauging stations indicates there has been a negligible reduction in the quantity of water resources reaching the Woronora Reservoir.

For the Project EA a comprehensive analysis of stream flow data and data on the yield behaviour of Woronora Reservoir indicated that past mining at Metropolitan Coal had no discernible effect on the inflow to, or yield from, the reservoir. Surface water flow monitoring at the Waratah Rivulet, Woronora River and O'Hares Creek gauging stations since the commencement of Longwall 20 indicates there has been a negligible reduction in the quantity of water resources reaching the Woronora Reservoir.

Pool Water Levels

The water level in a number of pools on the Waratah Rivulet, Eastern Tributary, Tributary B and Woronora River (Figure 9) has been either manually monitored on a daily basis or monitored using a continuous water level sensor and logger. Further review of pool water level data and cease to flow levels has been conducted throughout the reporting period, resulting in a number of measures being implemented to improve the accuracy of monitoring and maintenance of monitoring equipment (e.g. the replacement of loggers lost during high flow). During the reporting period, Metropolitan Coal's surveyors resurveyed a number of the pool reference levels and estimated cease to flow levels at pools on the Eastern Tributary to improve the accuracy of these levels.

During the reporting period, all pools on the Waratah Rivulet and Eastern Tributary remained above their cease to flow levels or exhibited natural behaviour (i.e. pools that do not have 'solid' rock-bar controls), with the exception of Pool G on the Waratah Rivulet and Pools ETG, ETJ and ETM on the Eastern Tributary (Figure 9 and Charts 2, 3, 4 and 5, respectively). Pool RTP1 on Tributary B is typically dry with overflow events limited to significant, wet periods (Chart 6). Pool RTP2 on Tributary B has regularly fallen below its cease to flow level, however generally overflows during and following rainfall events (Chart 7). Since 2012 sections of Tributary B have been mostly dry (in the vicinity of site RTP1) with no surface flow.

To date, mining has not resulted in the diversion of flows or change to the natural drainage behaviour of pools on the Waratah Rivulet downstream of the maingate of Longwall 23 (i.e. Pools P to W) or on the Eastern Tributary downstream of the maingate of Longwall 26 (i.e. Pools ETAG to ETAU).

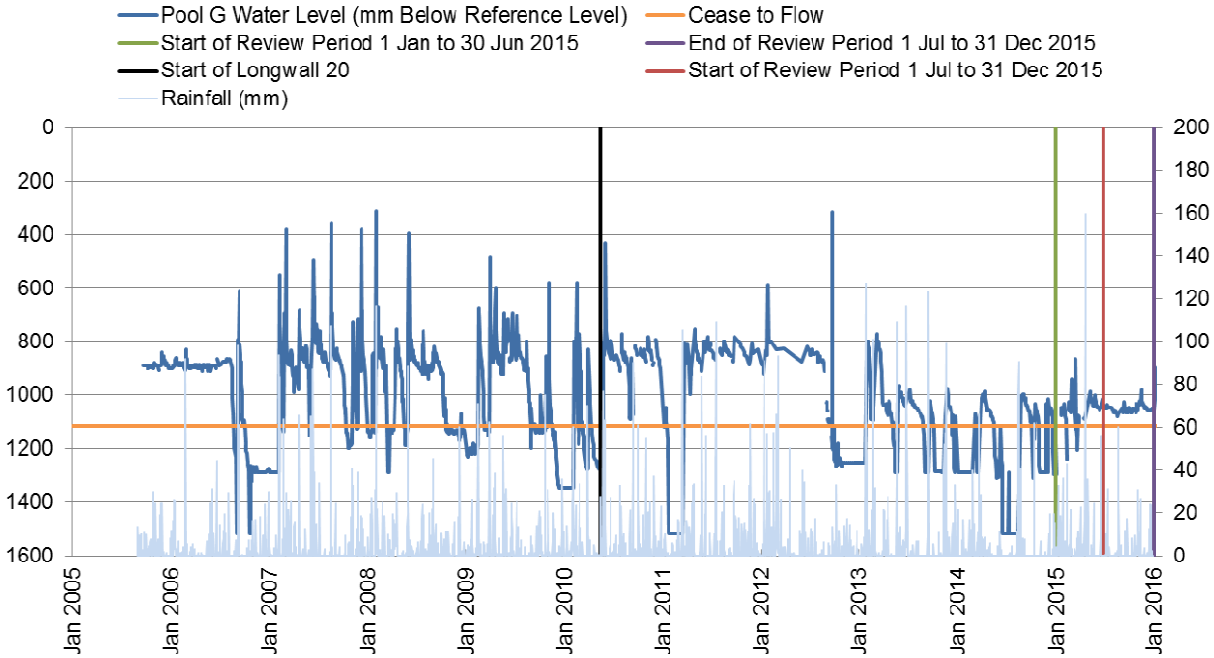


Chart 2 Pool G Waratah Rivulet (Manual Observations)

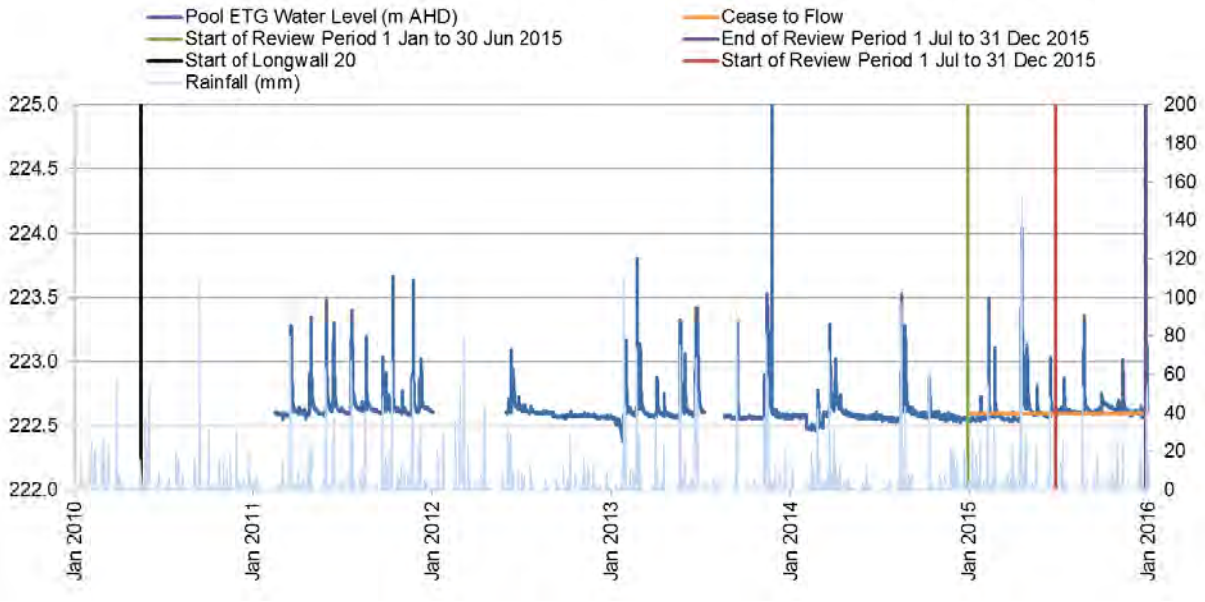


Chart 3 Pool ETG Eastern Tributary

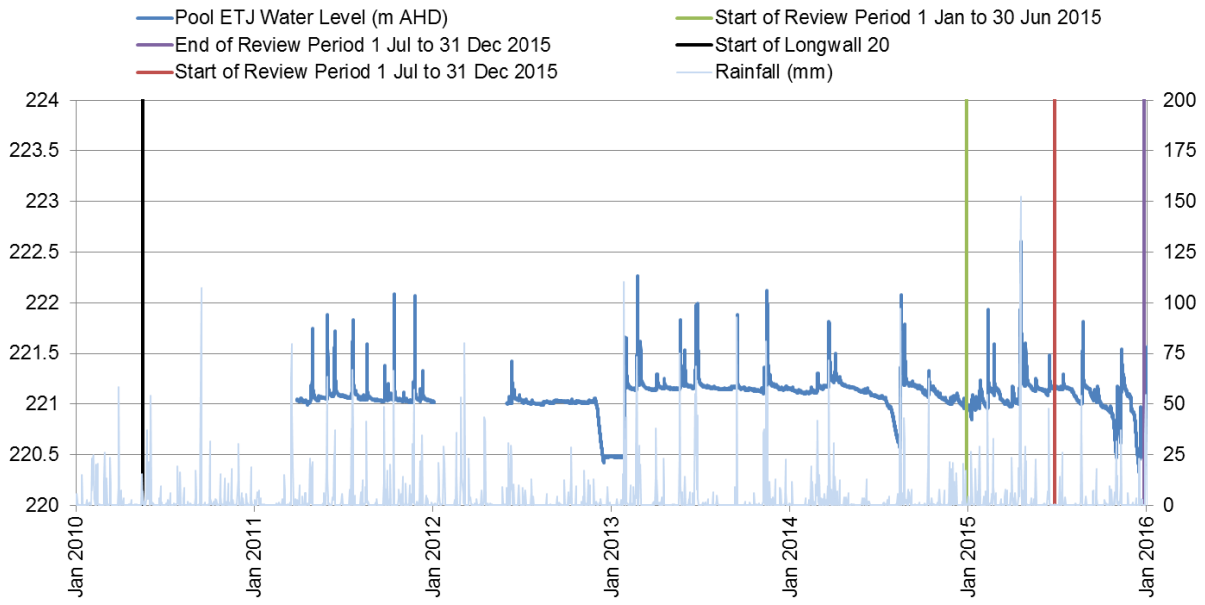


Chart 4 Pool ETJ Eastern Tributary

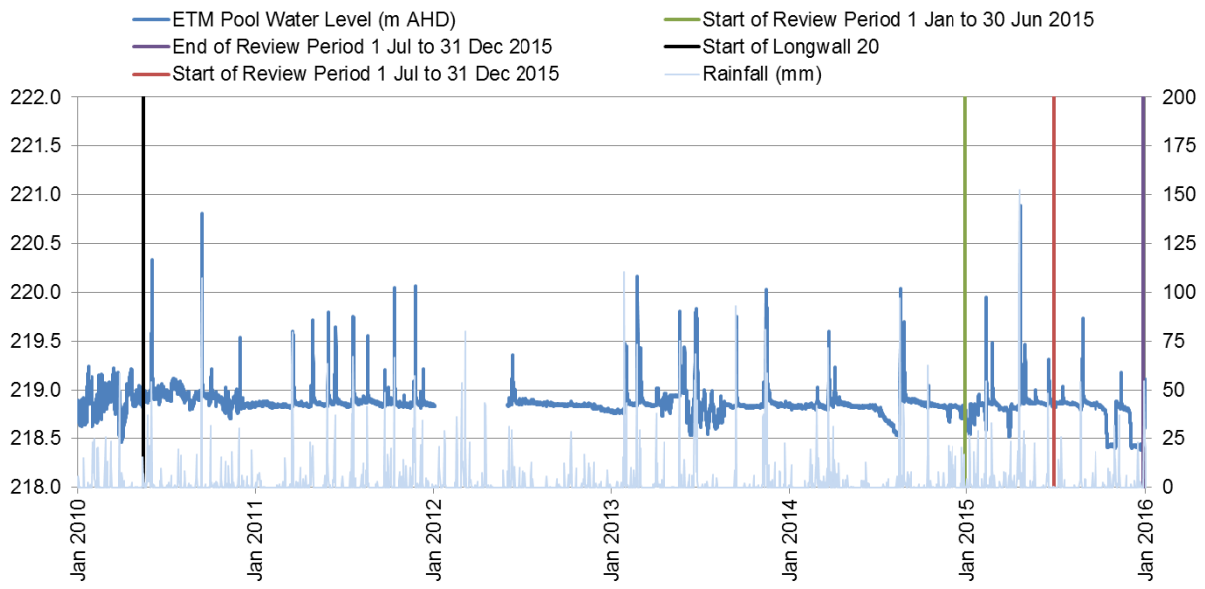


Chart 5 Pool ETM Eastern Tributary

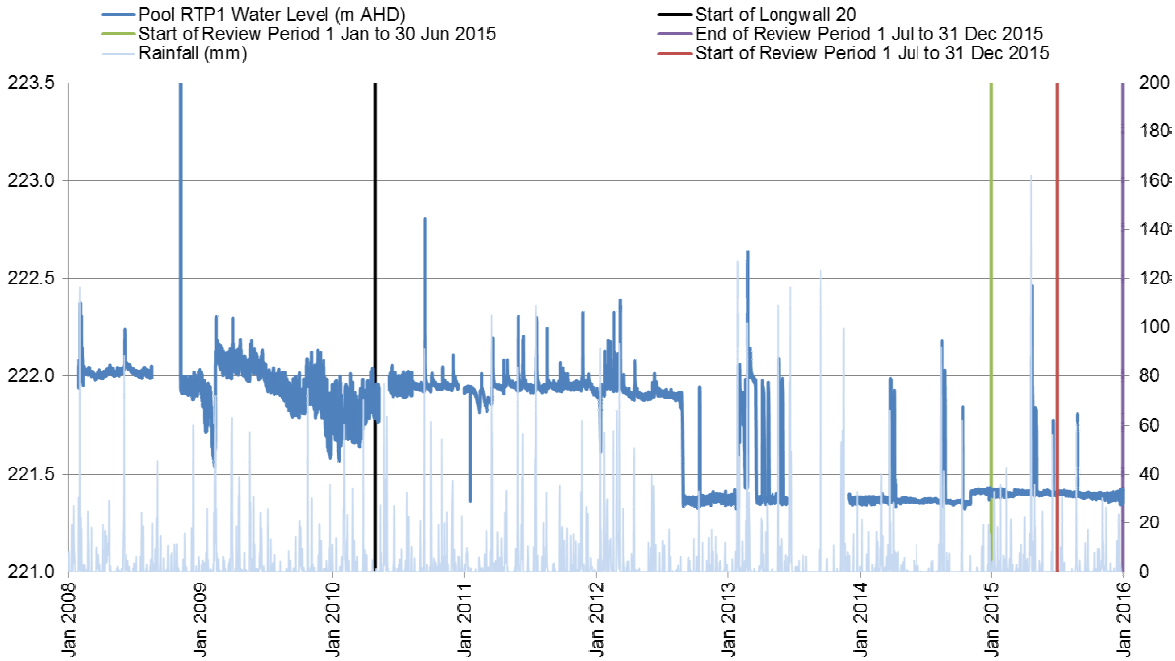


Chart 6 Pool RTP1 Tributary B

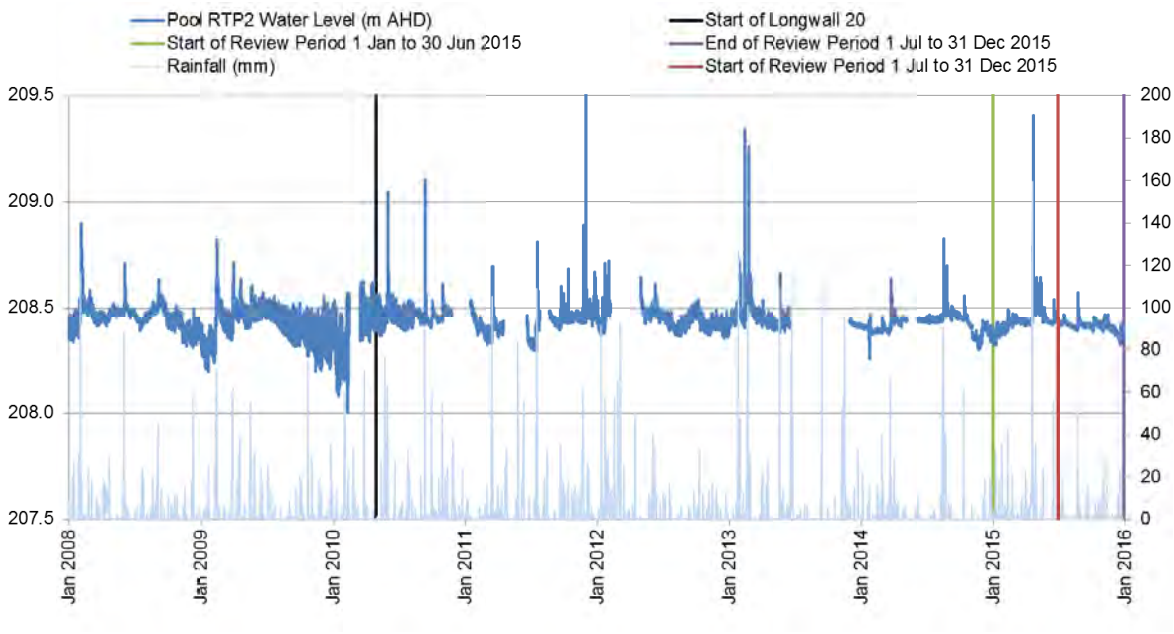


Chart 7 Pool RTP2 Tributary B

The Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans indicated that valley closure values of greater than 200 millimetres (mm) were predicted at pools/rock bars on the Waratah Rivulet upstream of the maingate of Longwall 23. Pools P to W on the Waratah Rivulet were predicted to be subject to valley closure values of less than 200 mm.

The Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans indicated that valley closure values of greater than 200 mm were predicted at pools/rock bars along the Eastern Tributary (from Pool ETF over Longwall 20 extending to Pool ETAC over Longwall 26 and from Pool ETAH over Longwall 27 extending to Pool ETAL downstream of Longwall 27). Approximately 244 m of the Eastern Tributary between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir (i.e. from Pool ETAH to Pool ETAL) was predicted to be subject to valley closure values of greater than 200 mm as a result of Longwalls 23-27.

The Preferred Project Report (HCPL, 2009) and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans indicated that valley closure values of greater than 200 mm would also occur on Tributary B (maximum predicted total closure of 718 mm at the completion of Longwall 27).

The NSW Planning Assessment Commission's Report for the Metropolitan Coal Project (NSW Planning Assessment Commission, 2009) indicates the Panel considered 'negligible consequence' for a watercourse to mean, *'no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases'*, and is assumed to be achieved in circumstances where predicted valley closure is less than 200 mm.

The pool water level monitoring results are consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans.

Stream Water Quality

Surface water quality sampling has been conducted monthly at the following sites on Waratah Rivulet (sites WRWQ2, WRWQ6, WRWQ8, WRWQ9, WRWQM, WRWQN, WRWQP, WRWQR, WRWQT, WRWQW), Eastern Tributary (sites ETWQF, ETWQJ, ETWQN, ETWQU, ETWQW, ETWQAF, ETWQAH, ETWQAQ, ETWQAU), Tributary B (site RTWQ1), Tributary D (site UTWQ1), Far Eastern Tributary (site FEWQ1), Honeysuckle Creek (site HCWQ1), Bee Creek (site BCWQ1) and the Woronora River (WOWQ1 and WOWQ2) in accordance with the Metropolitan Coal Longwalls 20-22 and 23-27 Water Management Plans (Figure 10).

Water quality patterns at the abovementioned monitoring sites over the reporting period have generally been consistent with earlier data. Trends in the monitoring data to date for key parameters (pH, electrical conductivity, dissolved iron, dissolved manganese and dissolved aluminium) are summarised in Table 7 (Appendix A).

Table 7
Summary of Results for Key Water Quality Parameters

Stream(s)	pH	Electrical Conductivity	Dissolved Iron	Dissolved Manganese	Dissolved Aluminium
Waratah Rivulet (sites WRWQ2, WRWQ6, WRWQ8, WRWQ9, WRWQM, WRWQN, WRWQP, WRWQR, WRWQT and WRWQW) (Charts 8 to 17)	• Upstream sites (e.g. sites WRWQ2 and WRWQ6) - slightly acidic to near neutral pH values. • Downstream sites (e.g. sites WRWQR and WRWQT) - higher (slightly alkaline) pH values.	• Consistently low.	• Typically higher at the most upstream sites (e.g. site WRWQ2). • Concentrations at all sites were lower during the second half of the year.	• Elevated values (highest for the period of record) recorded at three upstream sites in November 2015. In December 2015 the concentrations returned to values similar to the remainder of 2015. • Elevated values recorded at two downstream sites in December 2015.	• Consistent from upstream to downstream. • Low concentrations. • Values during the second half of the year at or close to the laboratory limit of detection at most sites.
Woronora River (sites WOWQ1 and WOWQ2, control stream) (Charts 18 to 22)	• High variability in pH, typically slightly acidic.	• Consistently low. • Similar to values recorded on Waratah Rivulet.	• A period of slightly elevated dissolved iron was recorded at site WOWQ2 (downstream) early in the year.	• Typically low, with more elevated concentrations occurring in the summer months.	• Typically low concentrations. • Typically higher concentrations at WOWQ1 (upstream) than at WOWQ2 (downstream).
Eastern Tributary (sites ETWQF, ETWQJ, ETWQN, ETWQU, ETWQW, ETWQAF, ETWQAH, ETWQAQ and ETWQAU) (Charts 23 to 27)	• Variable but typically near neutral pH values.	• Consistently low.	• Evidence of seasonal effects. • Some relatively elevated concentrations (e.g. 2.6 milligrams per litre [mg/L] at site ETWQU in August 2015). • Concentrations at other sites similar to previous years with most sites exhibiting low concentrations in the second half of the year (at or near the laboratory limit of detection).	• Concentrations higher at four sites (ETWQU, ETWQW, ETWQAF and ETWQAH) compared with previous years.	• Typically low concentrations. • An exception in November 2015, with elevated values recorded at ETWQAU and at ETWQAQ. • In December 2015 values returned to low values (at or near laboratory limit of detection).
Bee Creek (site BCWQ1, control stream), Honeysuckle Creek (site HCWQ1, control stream), Far Eastern Tributary (site FEWQ1), Tributary B (site RTWQ1) and Un-named Tributary (site UTWQ1) (Charts 28 to 32)	• Bee Creek and Honeysuckle Creek - variable to slightly acidic pH levels. • Far Eastern Tributary - near neutral pH levels. • Tributary B - an upward trend in pH to near neutral values from mid-2012. • Un-named Tributary - variable and inconsistent pH levels, generally between pH 5 and 7.	• Generally low. • Un-named Tributary - generally low. • Tributary B - recorded values have typically been higher since late 2013 (e.g. 469 microSiemens per centimetre in February 2015).	• Generally low, with periodic small spikes recorded mostly during summer months.	• Generally low, with periodic small spikes recorded mostly during summer months. • Tributary B - an upward trend in concentrations recorded since mid-2012, however were reducing towards the end of the reporting period. [A similar trend was observed while mining occurred beneath the Un-named Tributary].	• Bee Creek and Honeysuckle Creek - higher (in relation to other tributary sites) over the period of record. This trend has continued through 2015. • Far Eastern Tributary - low concentrations. • Low concentrations.

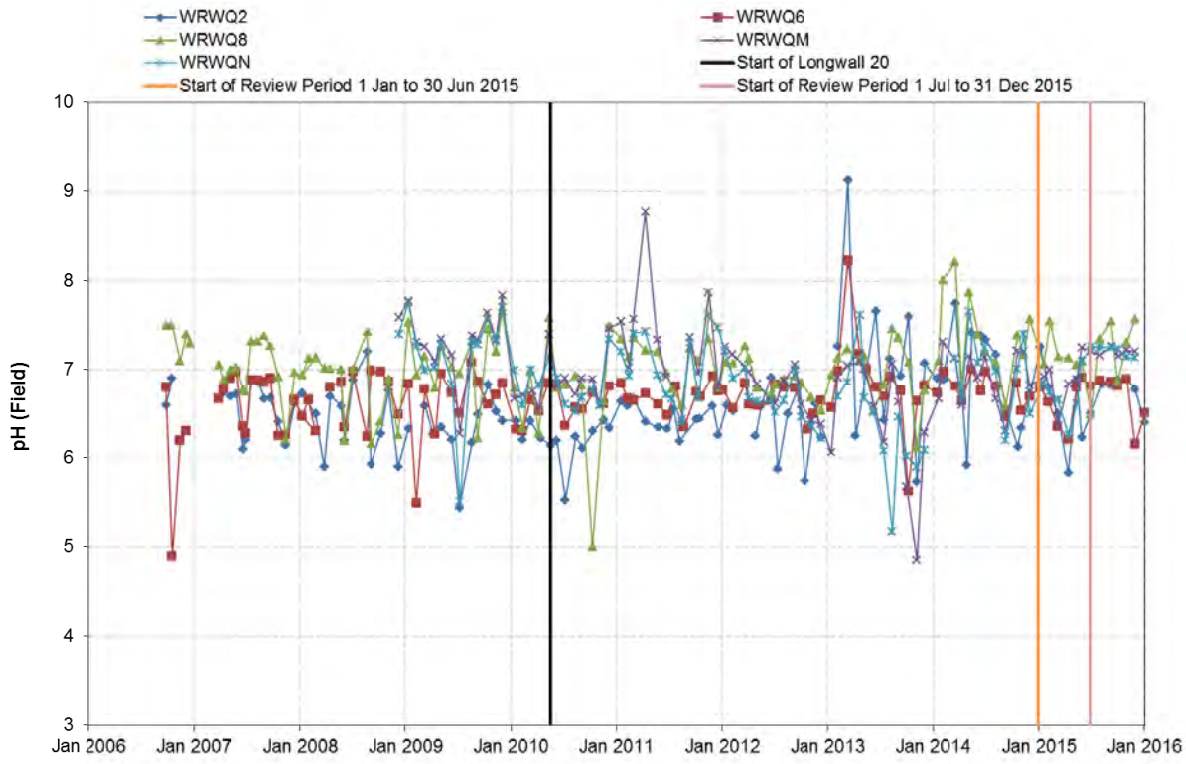


Chart 8 pH Levels Waratah Rivulet – Upper to middle reach sites

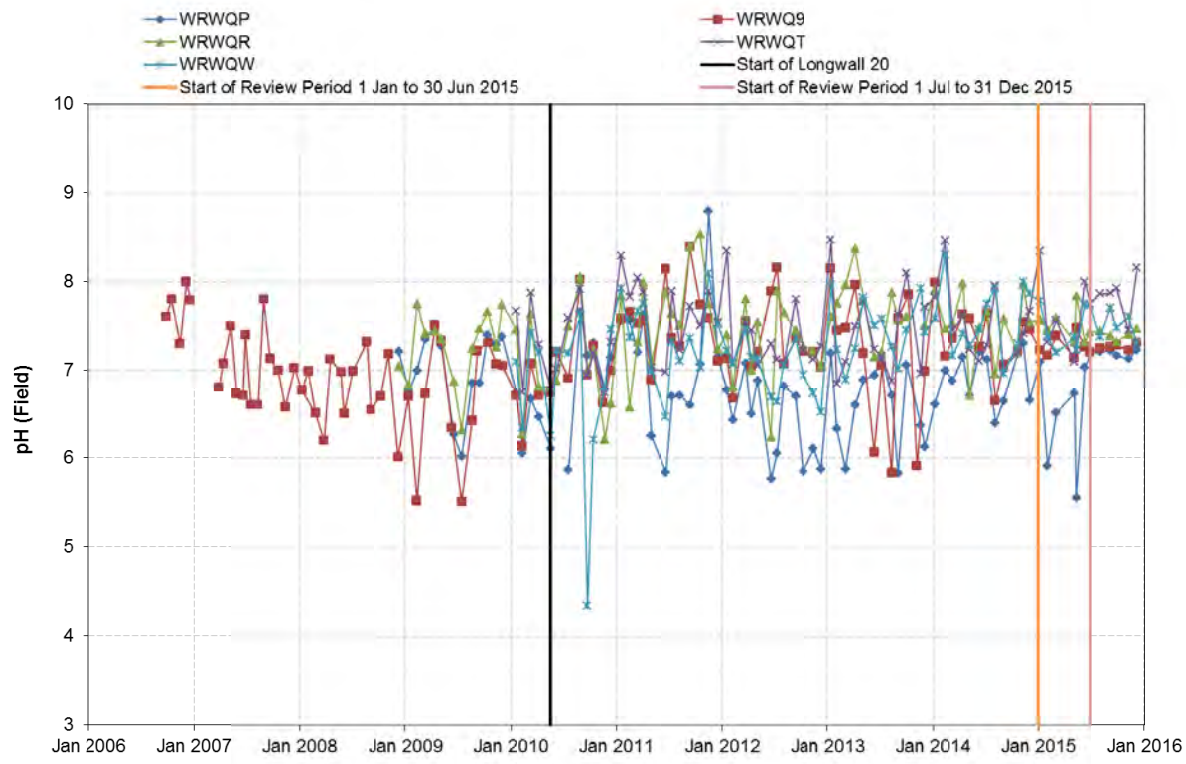


Chart 9 pH Levels Waratah Rivulet – Lower reach sites

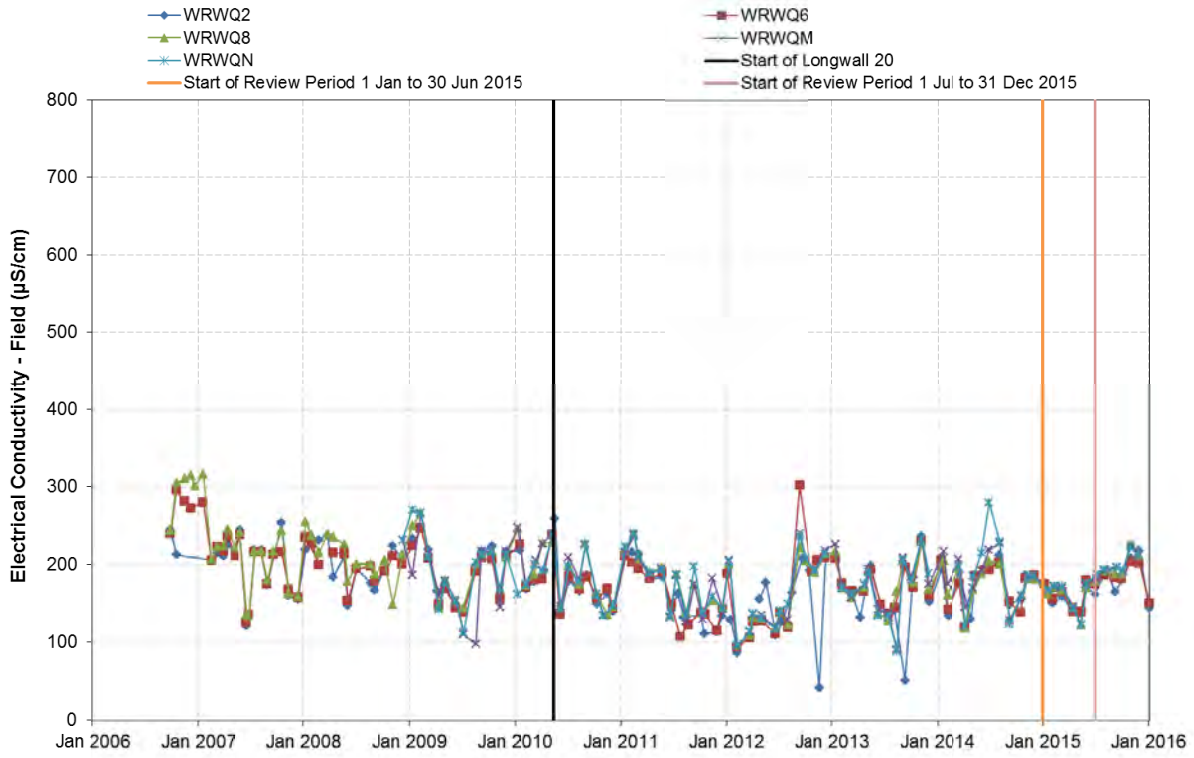


Chart 10 Electrical Conductivity (EC) Waratah Rivulet – Upper to middle reach sites

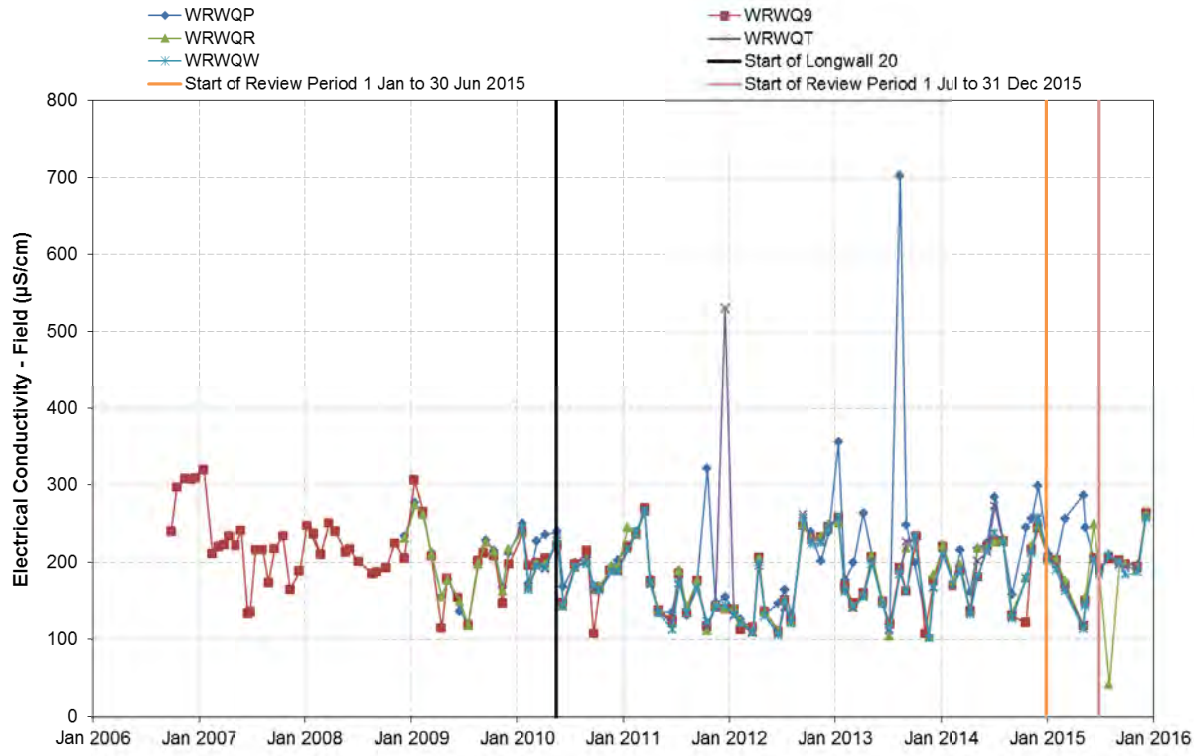


Chart 11 Electrical Conductivity (EC) Waratah Rivulet – Lower reach sites

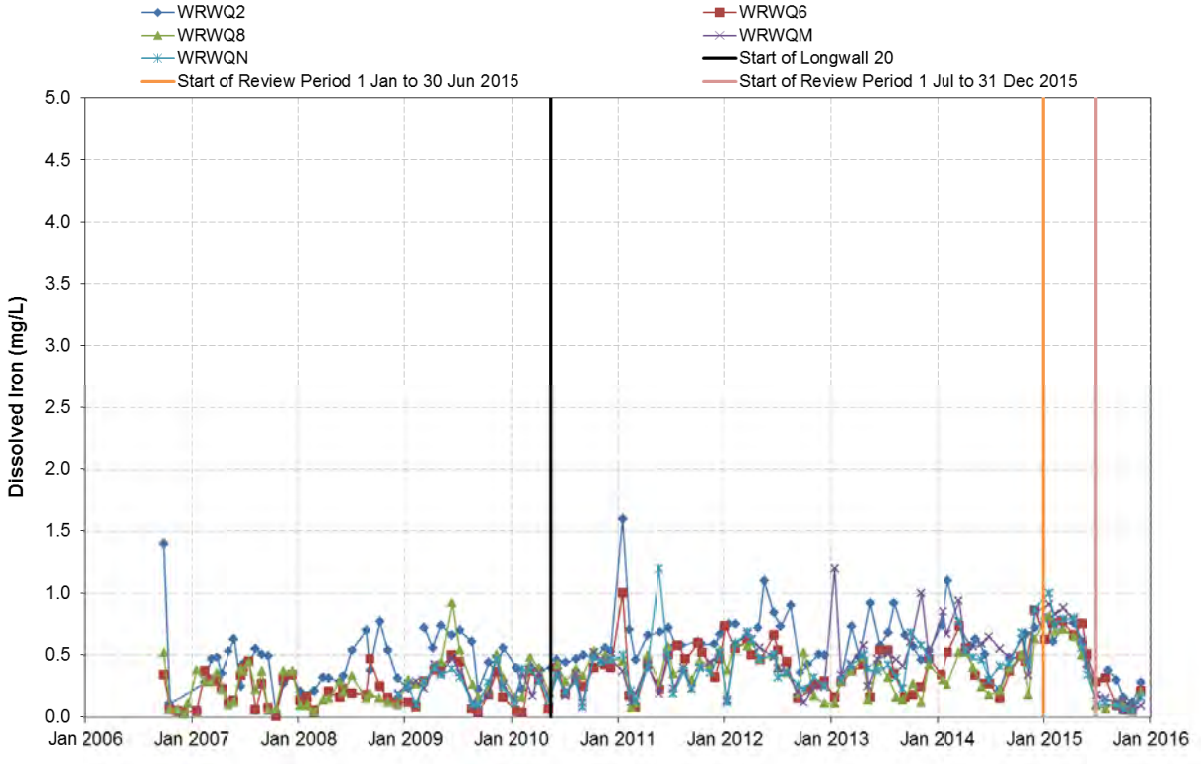


Chart 12 Dissolved Iron Waratah Rivulet – Upper and middle reach sites

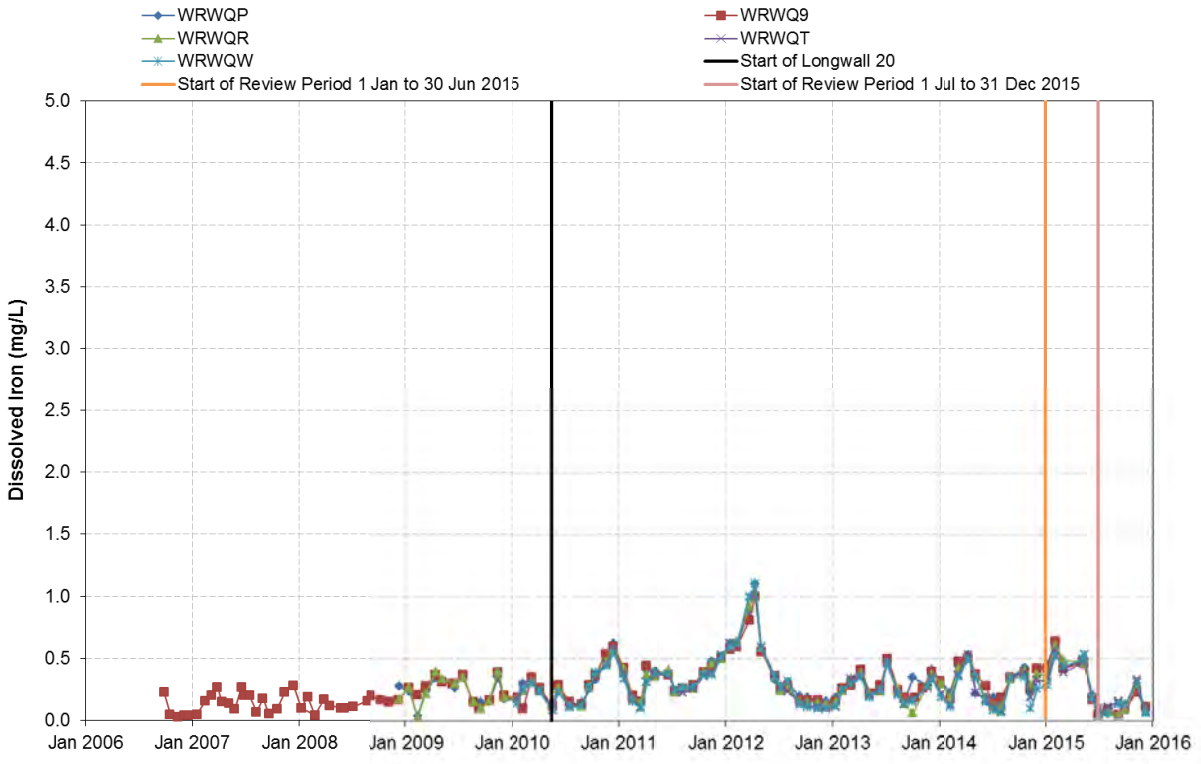


Chart 13 Dissolved Iron Waratah Rivulet – Lower reach sites

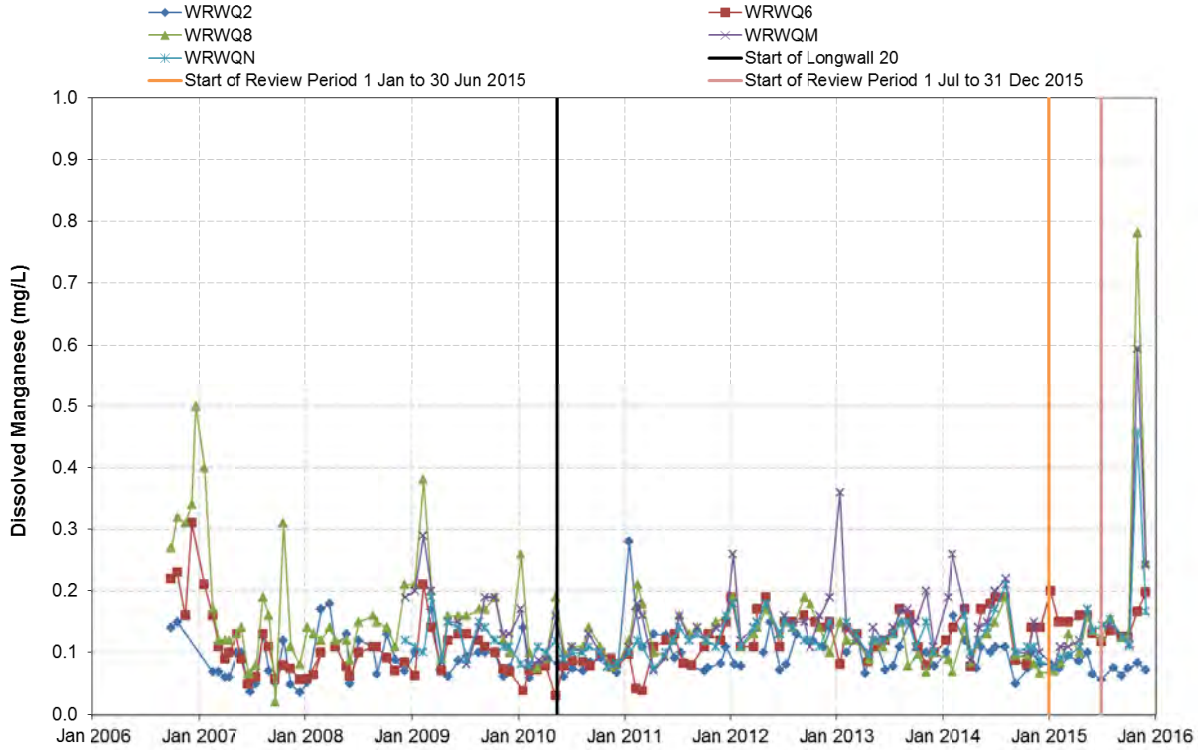


Chart 14 Dissolved Manganese Waratah Rivulet – Upper to middle reach sites

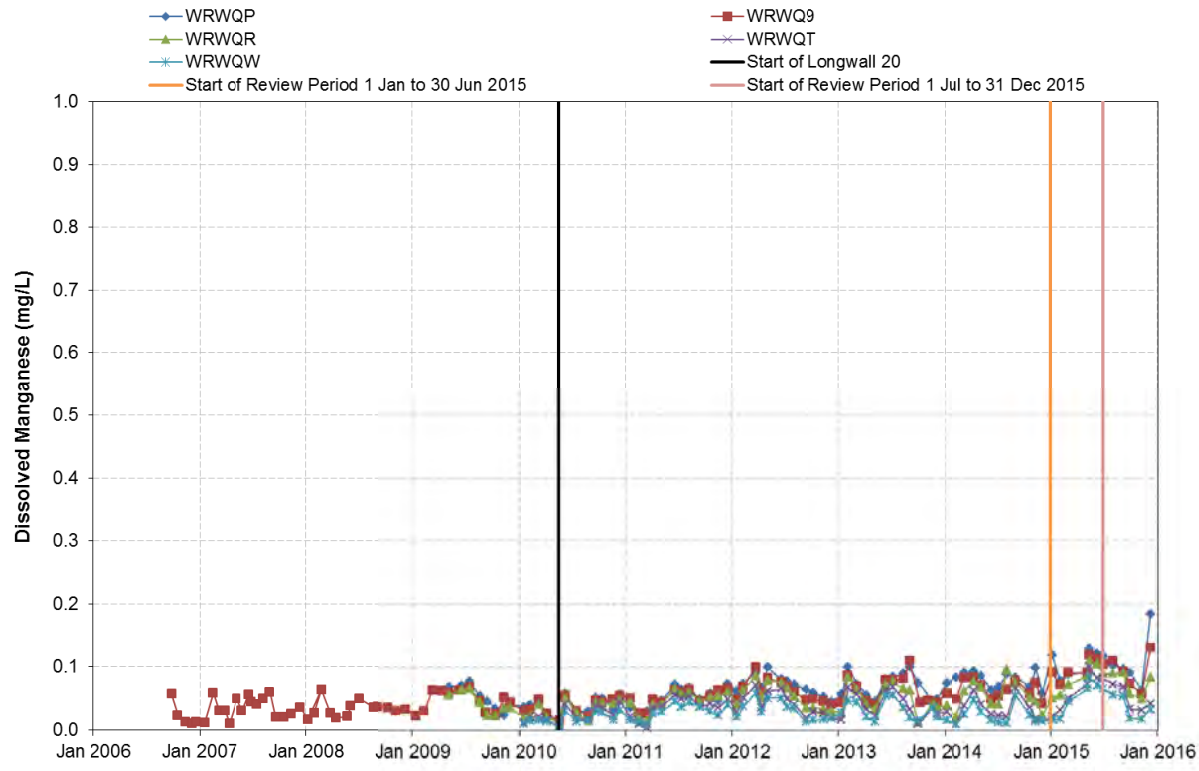


Chart 15 Dissolved Manganese Waratah Rivulet – Lower reach sites

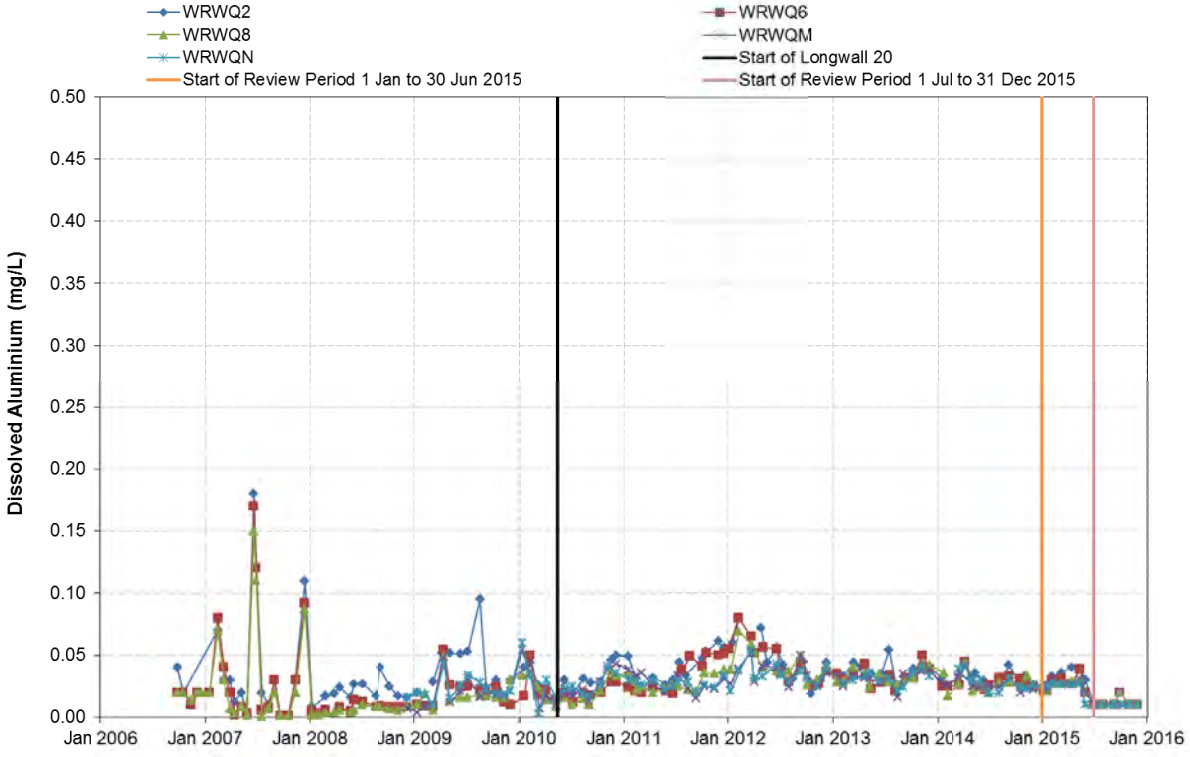


Chart 16 Dissolved Aluminium Waratah Rivulet – Upper to middle reach sites

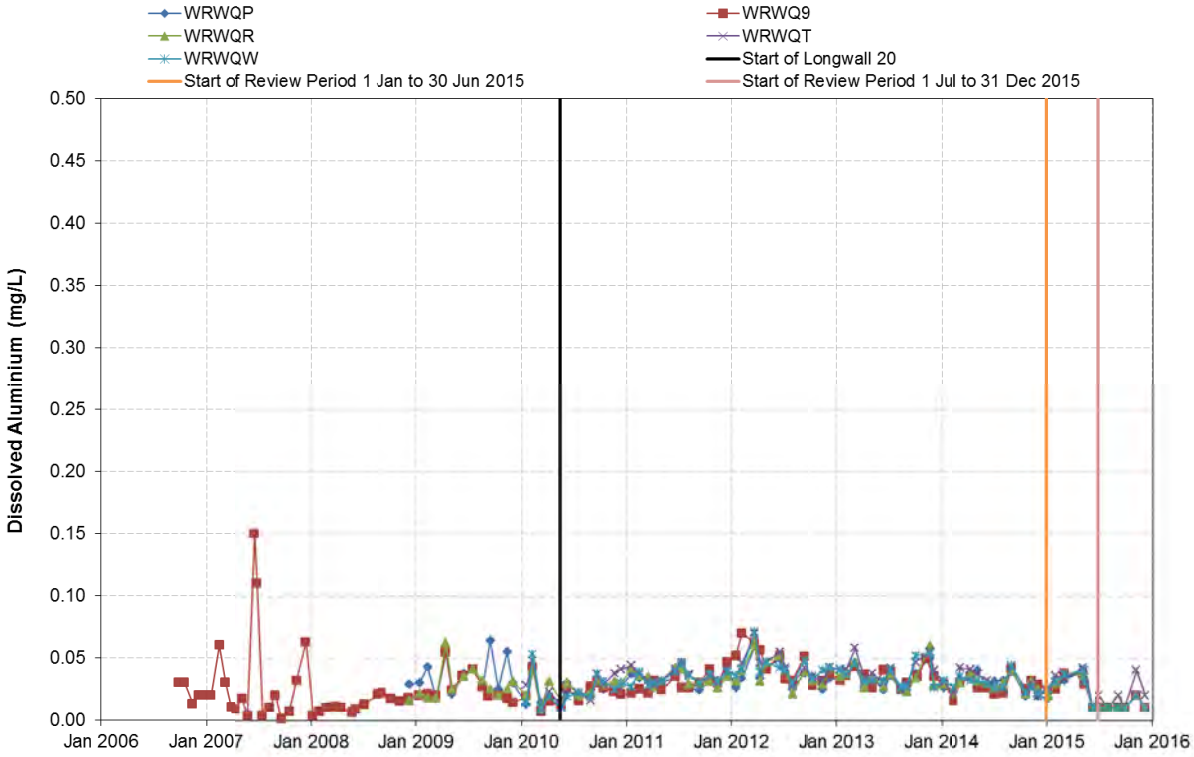


Chart 17 Dissolved Aluminium Waratah Rivulet – Lower reach sites

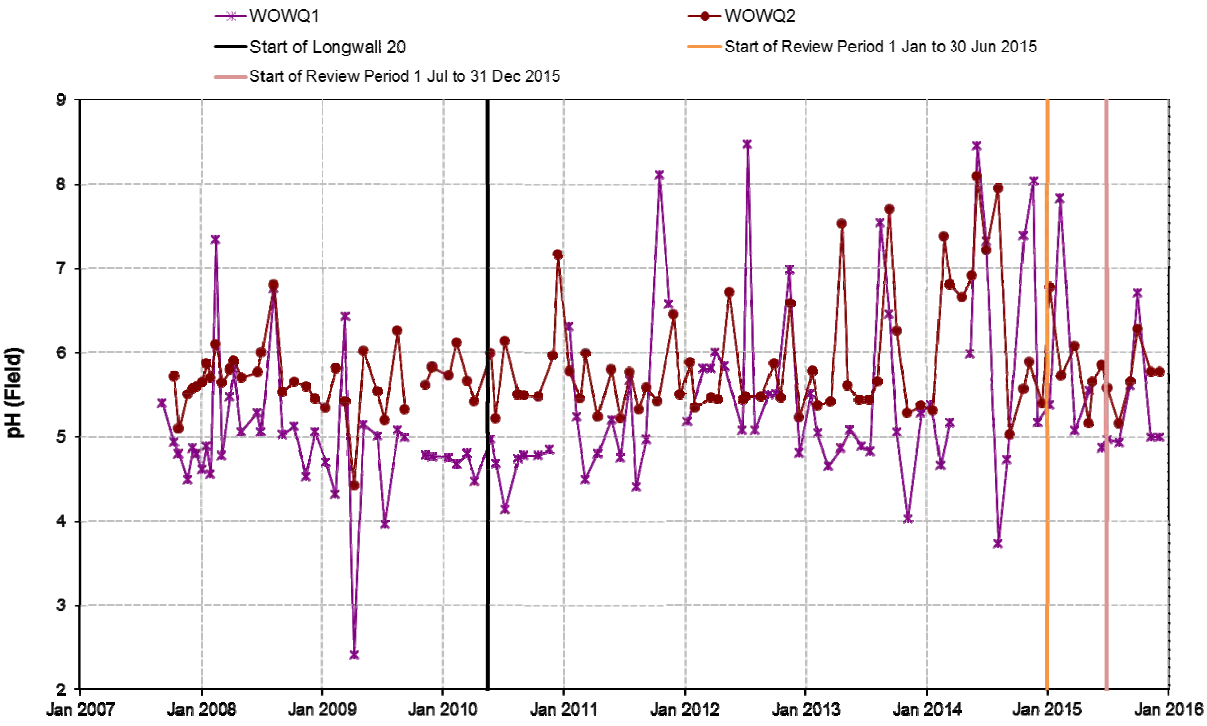


Chart 18 pH Levels Woronora River

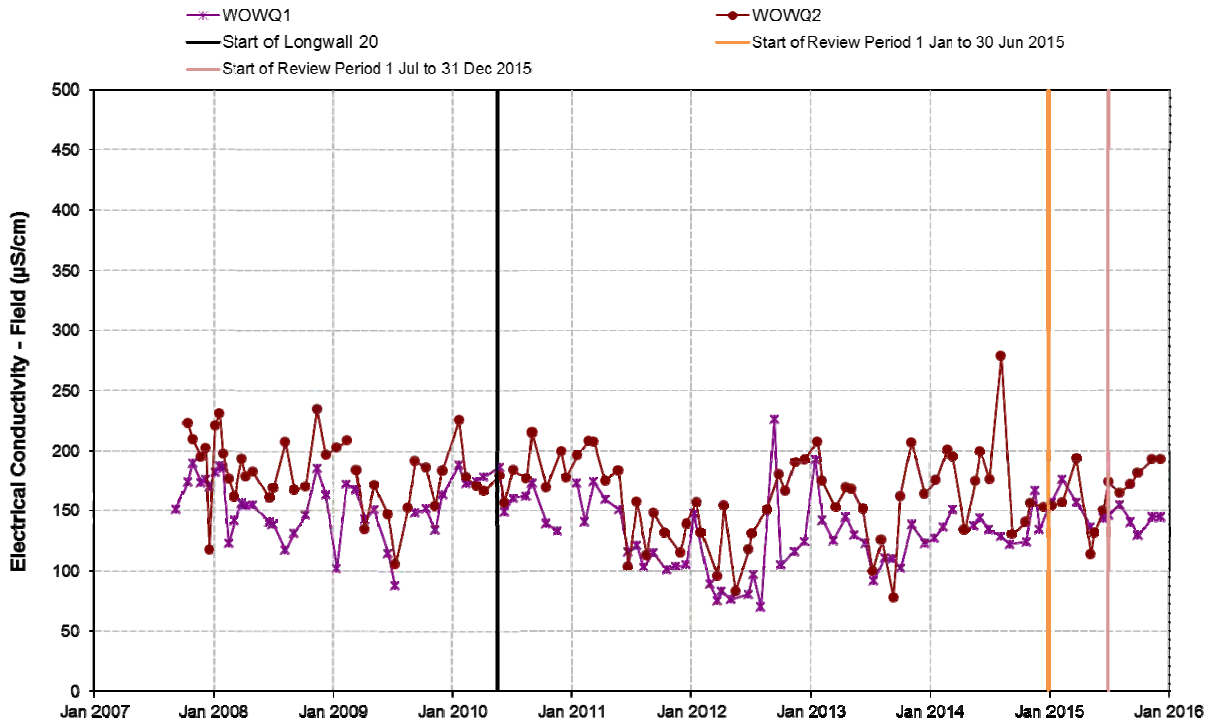


Chart 19 Electrical Conductivity (EC) Woronora River

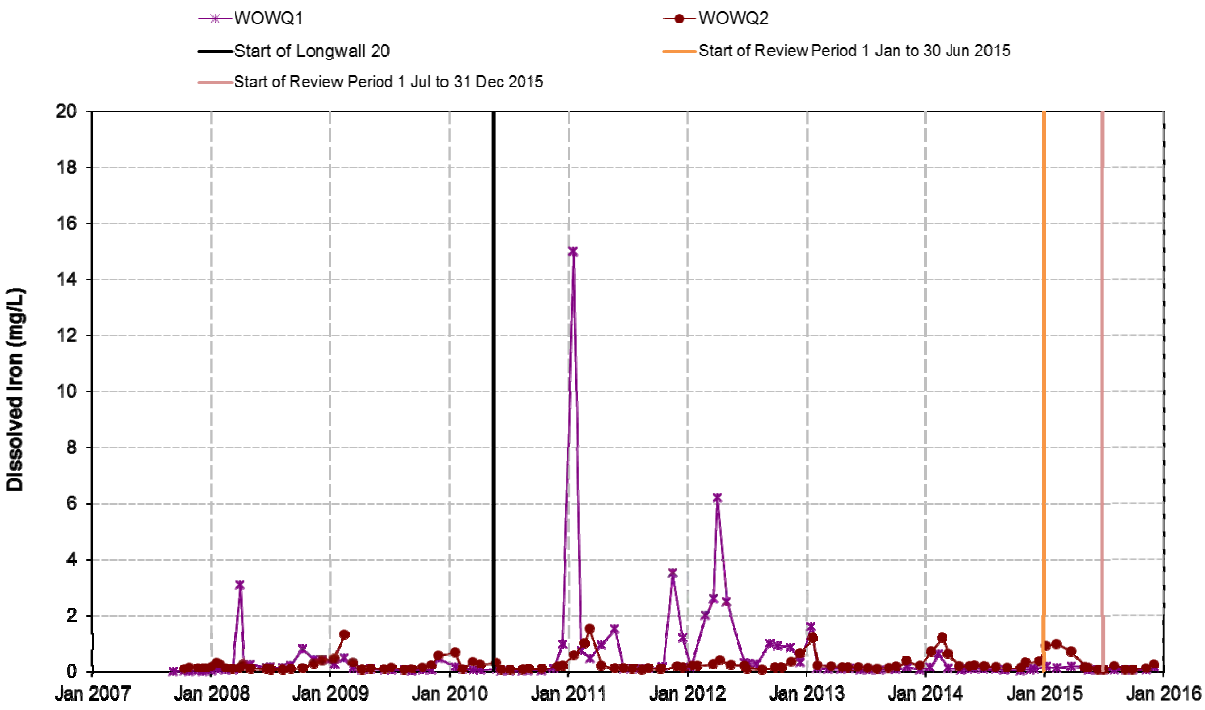


Chart 20 Dissolved Iron Woronora River

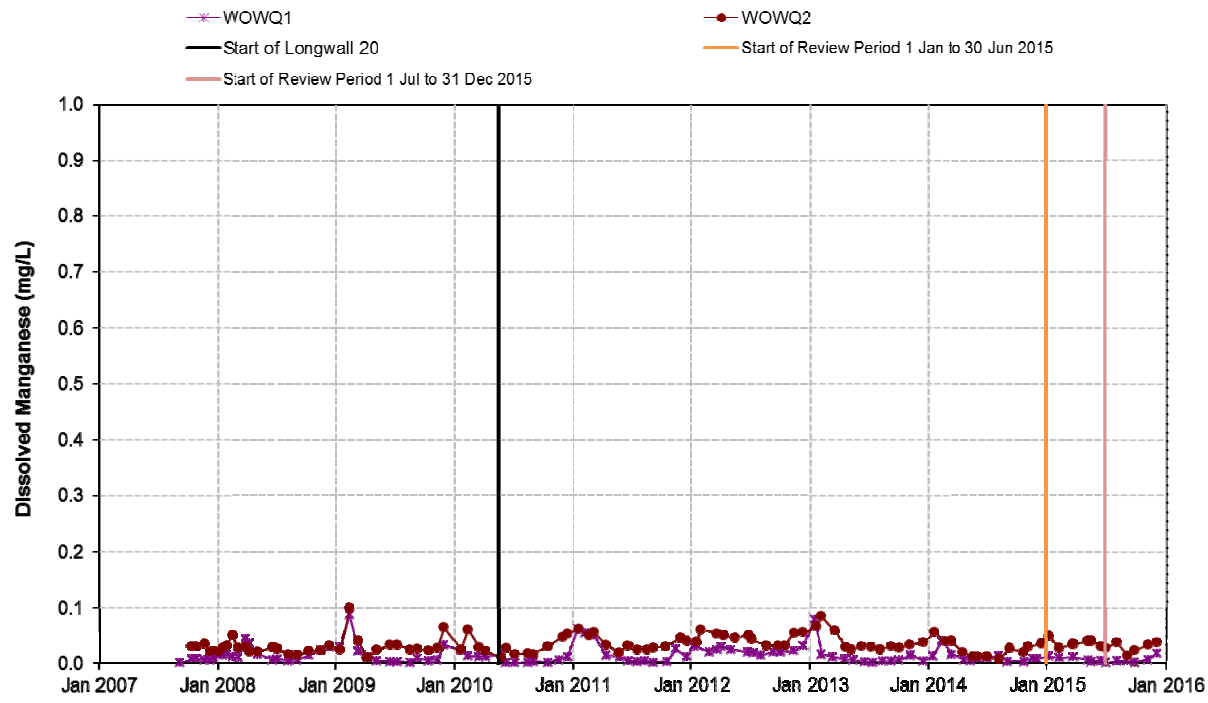


Chart 21 Dissolved Manganese Woronora River

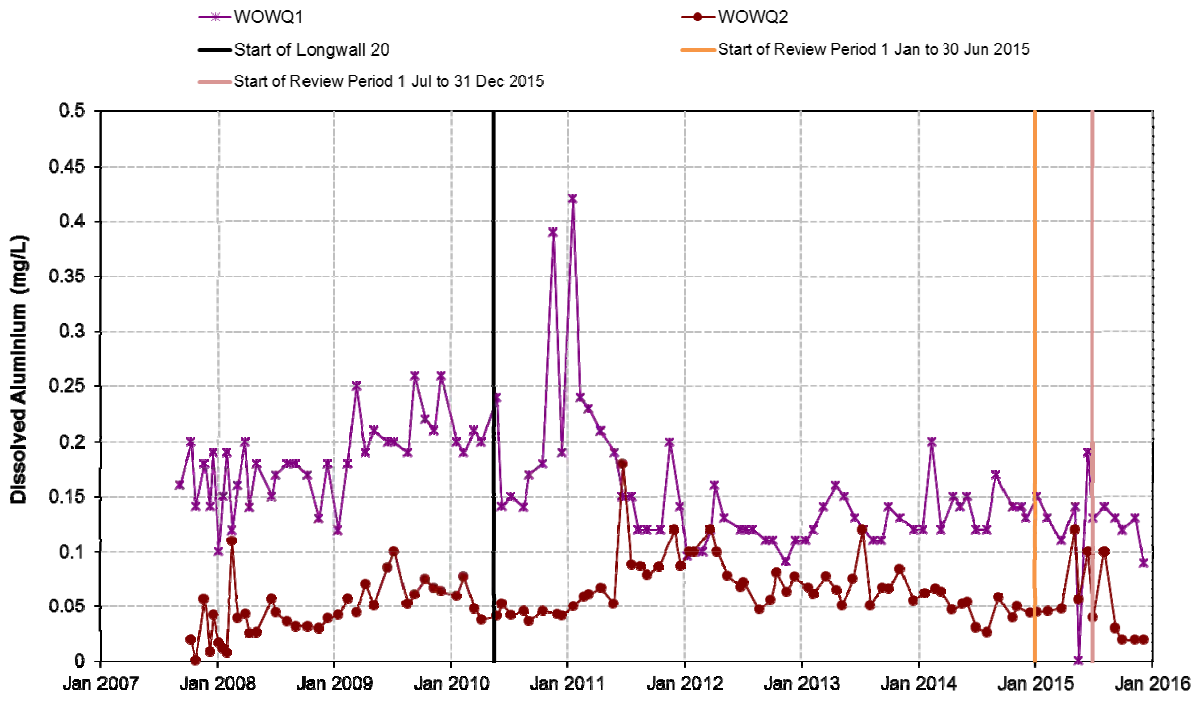


Chart 22 Dissolved Aluminium Woronora River

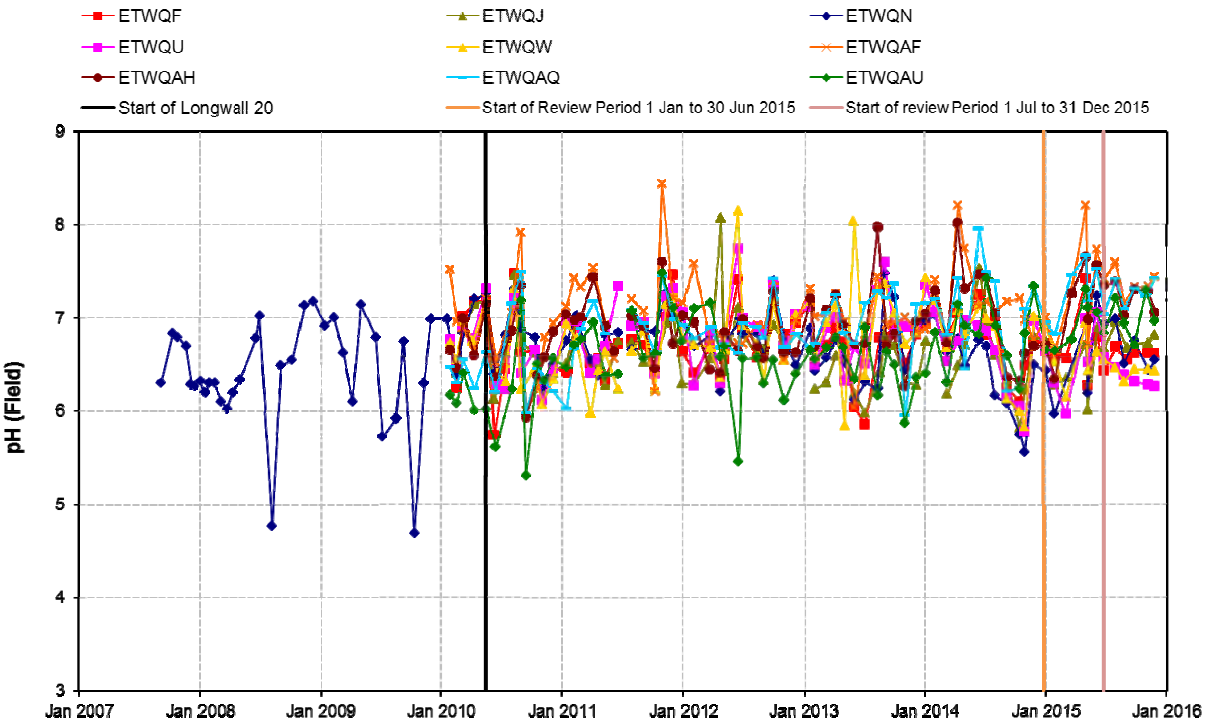


Chart 23 pH Levels Eastern Tributary

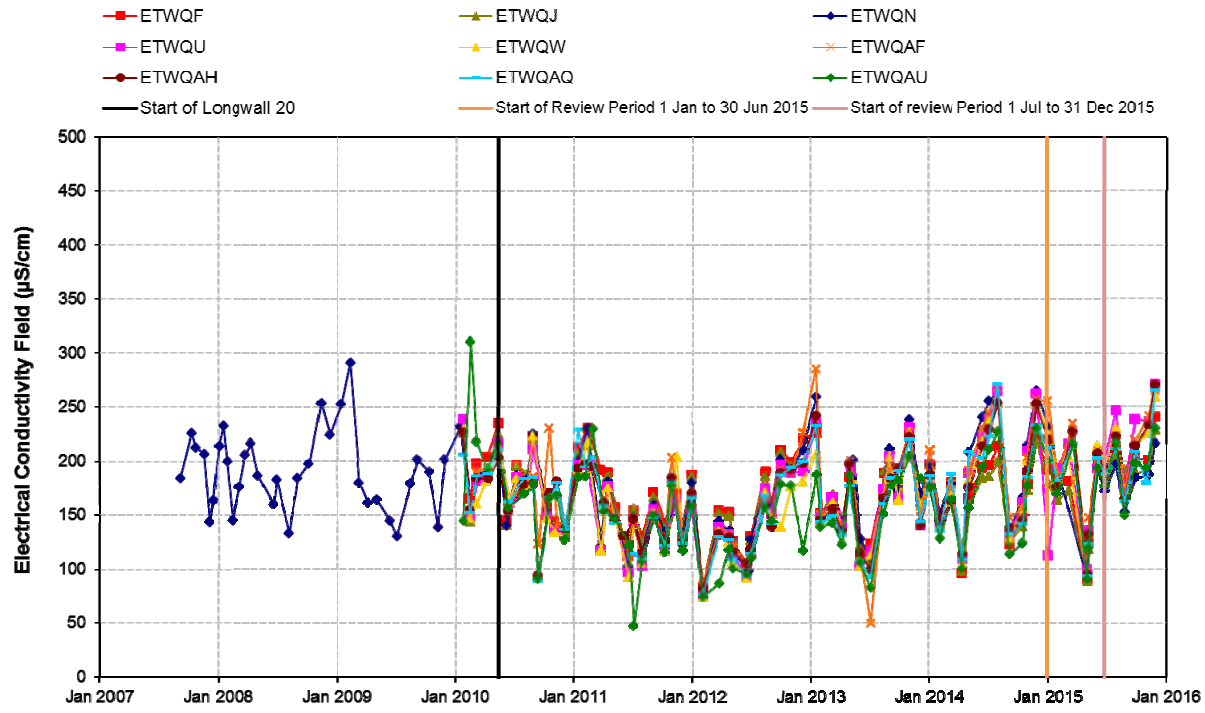


Chart 24 Electrical Conductivity (EC) Eastern Tributary

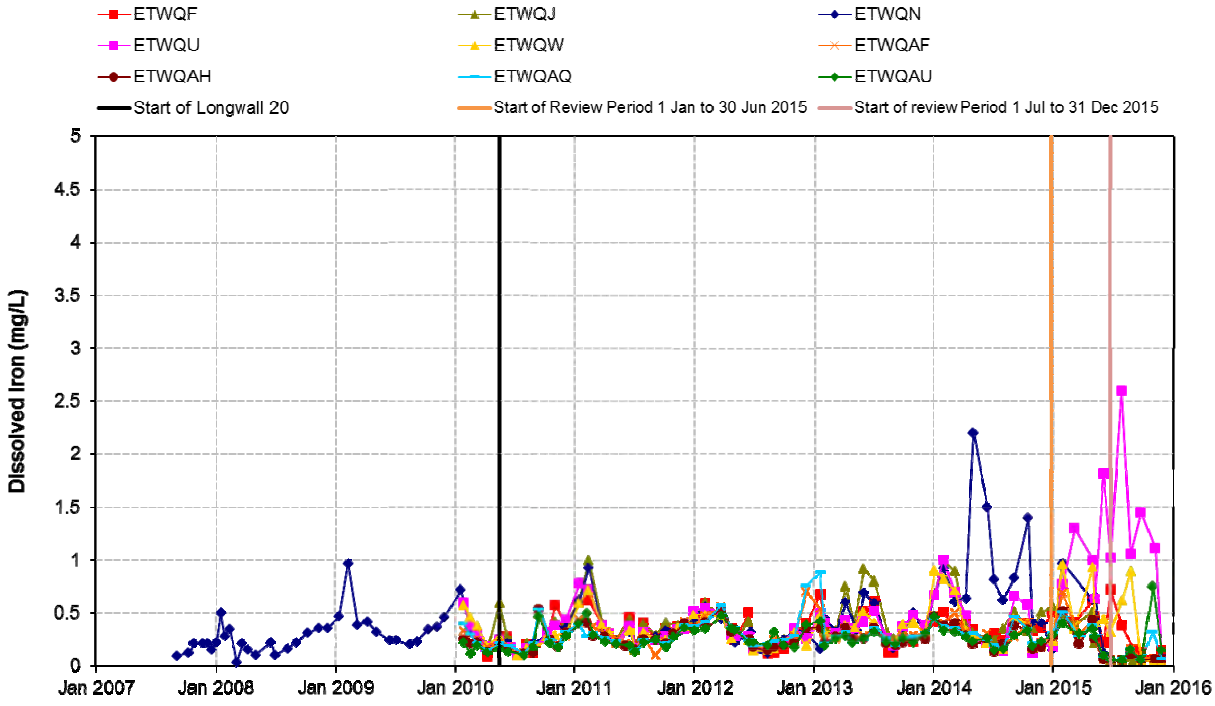


Chart 25 Dissolved Iron Eastern Tributary

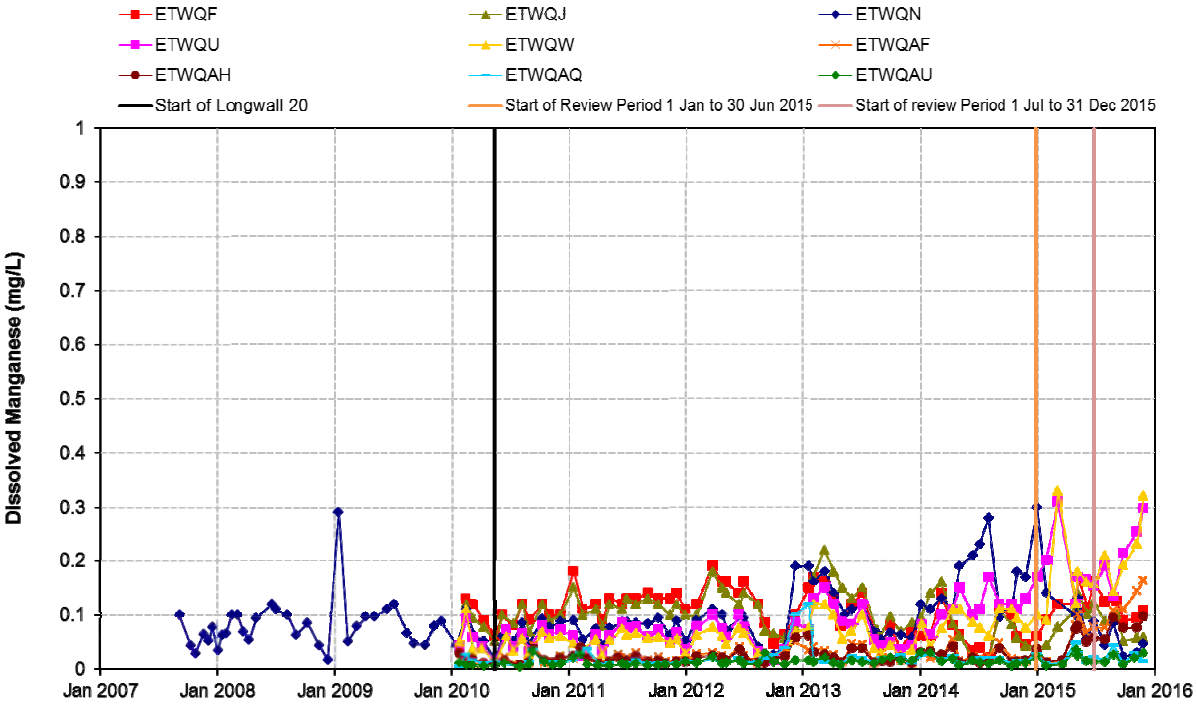


Chart 26 Dissolved Manganese Eastern Tributary

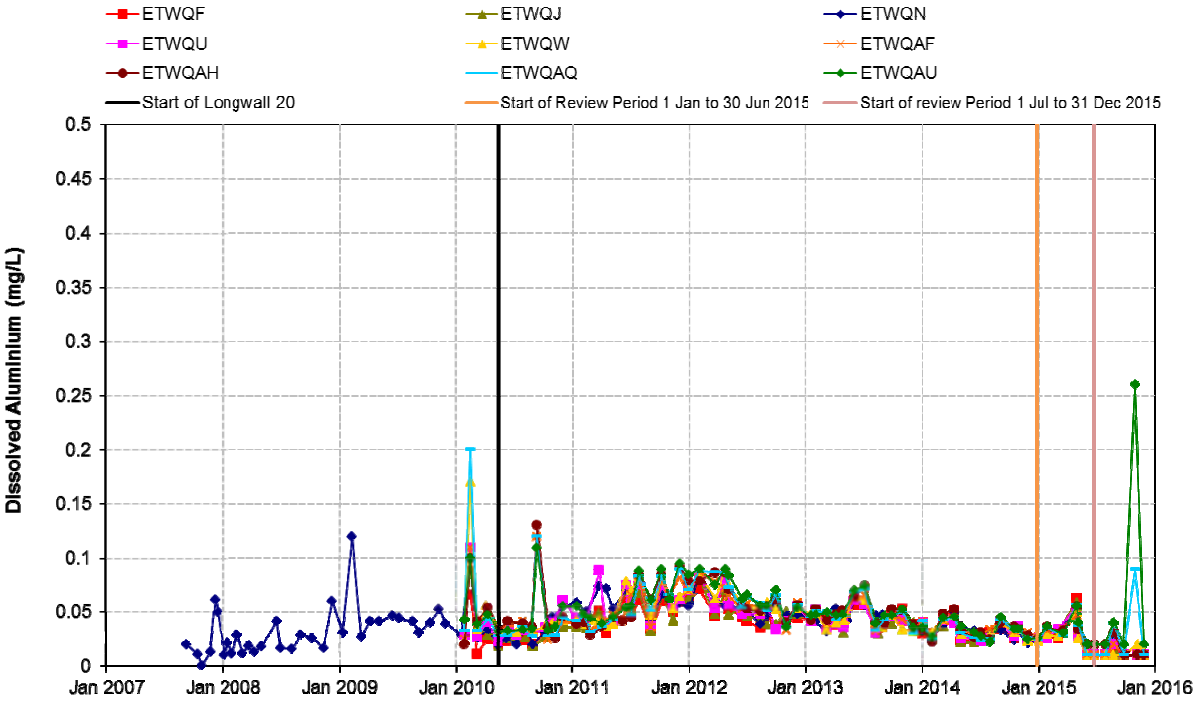


Chart 27 Dissolved Aluminium Eastern Tributary

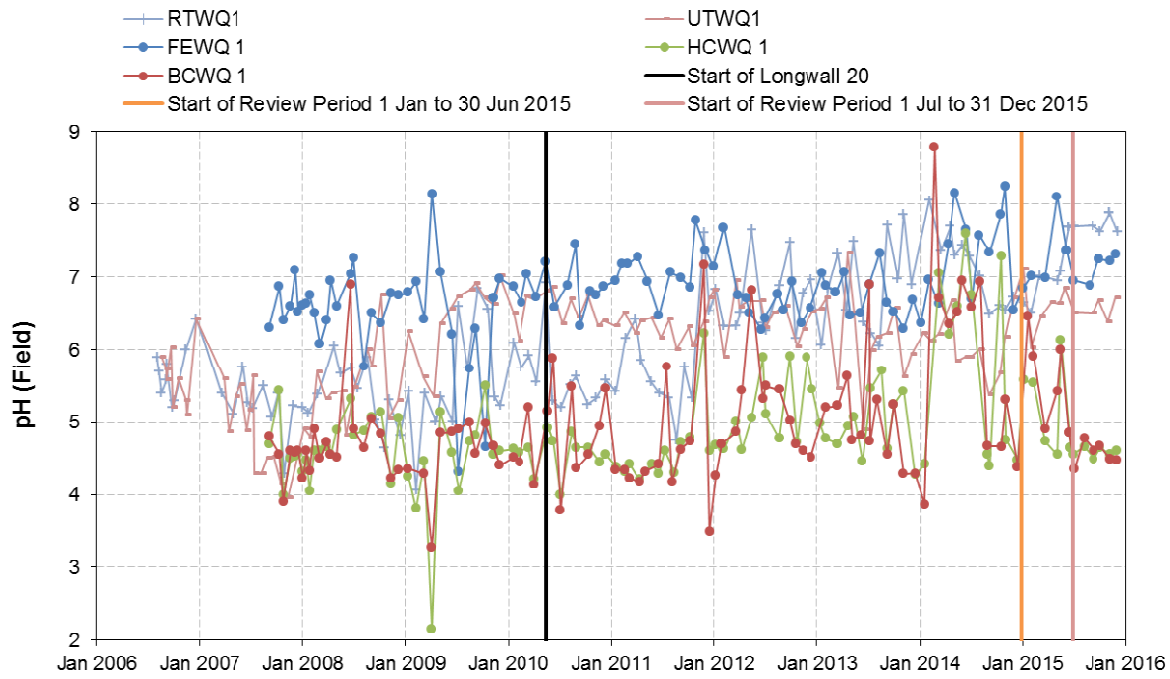


Chart 28 pH Levels Tributary B, Tributary D, Far Eastern Tributary, Bee Creek and Honeysuckle Creek

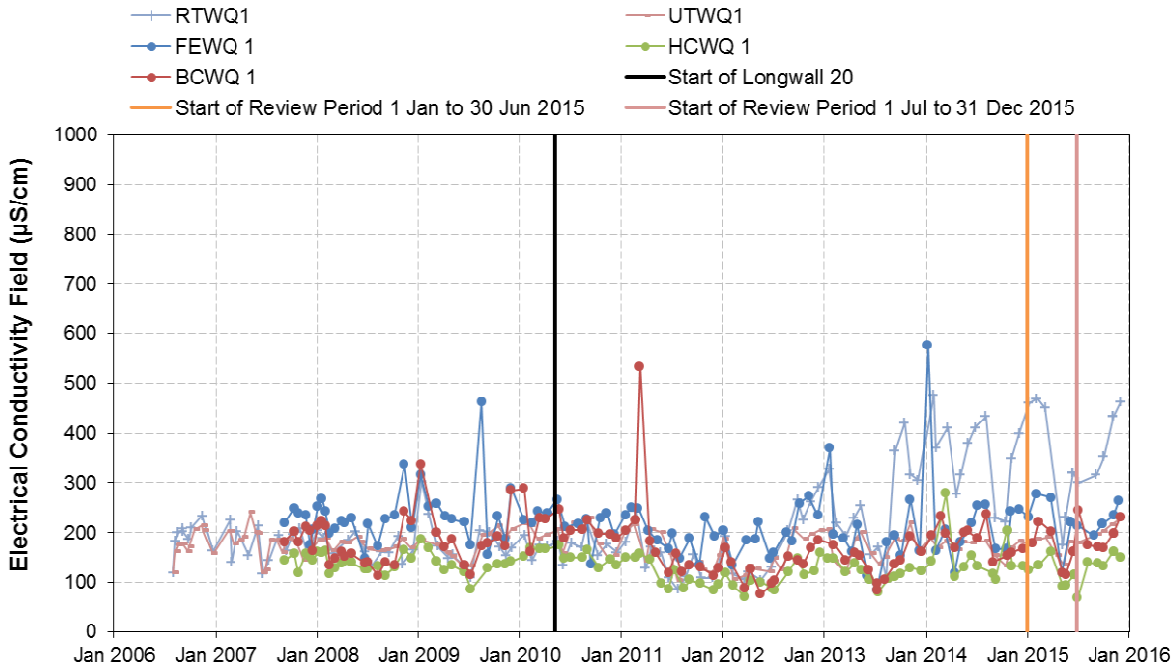


Chart 29 Electrical Conductivity (EC) Tributary B, Tributary D, Far Eastern Tributary, Bee Creek and Honeysuckle Creek

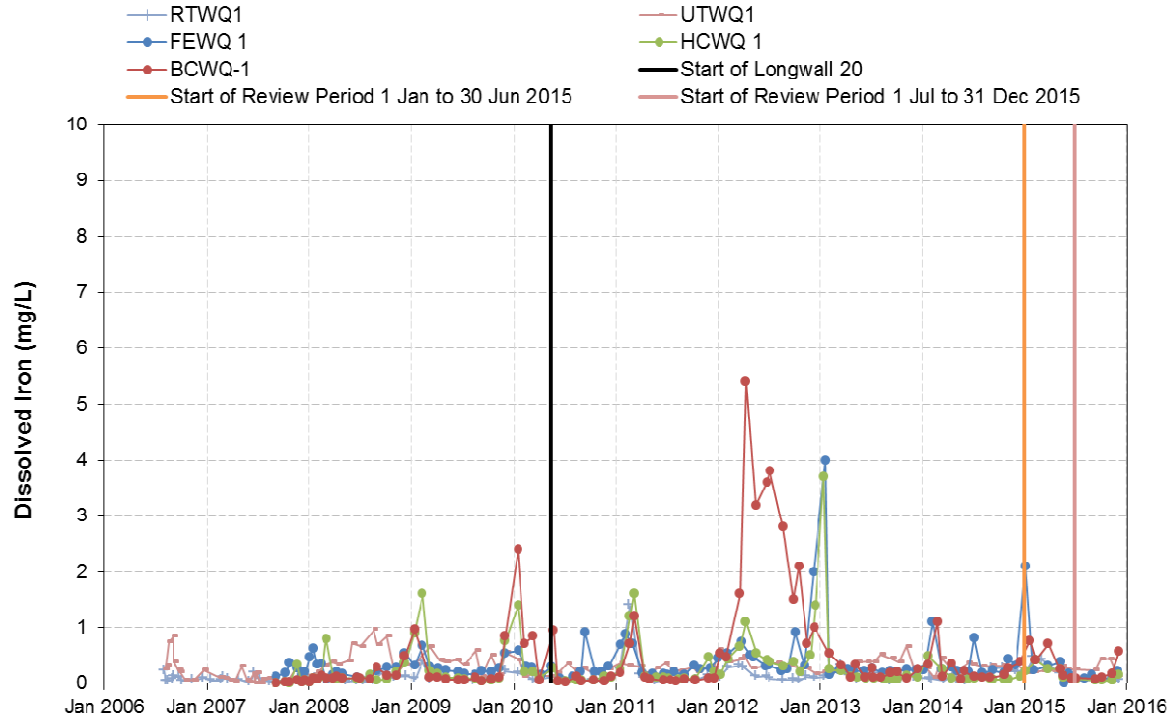


Chart 30 Dissolved Iron Tributary B, Tributary D, Far Eastern Tributary, Bee Creek and Honeysuckle Creek

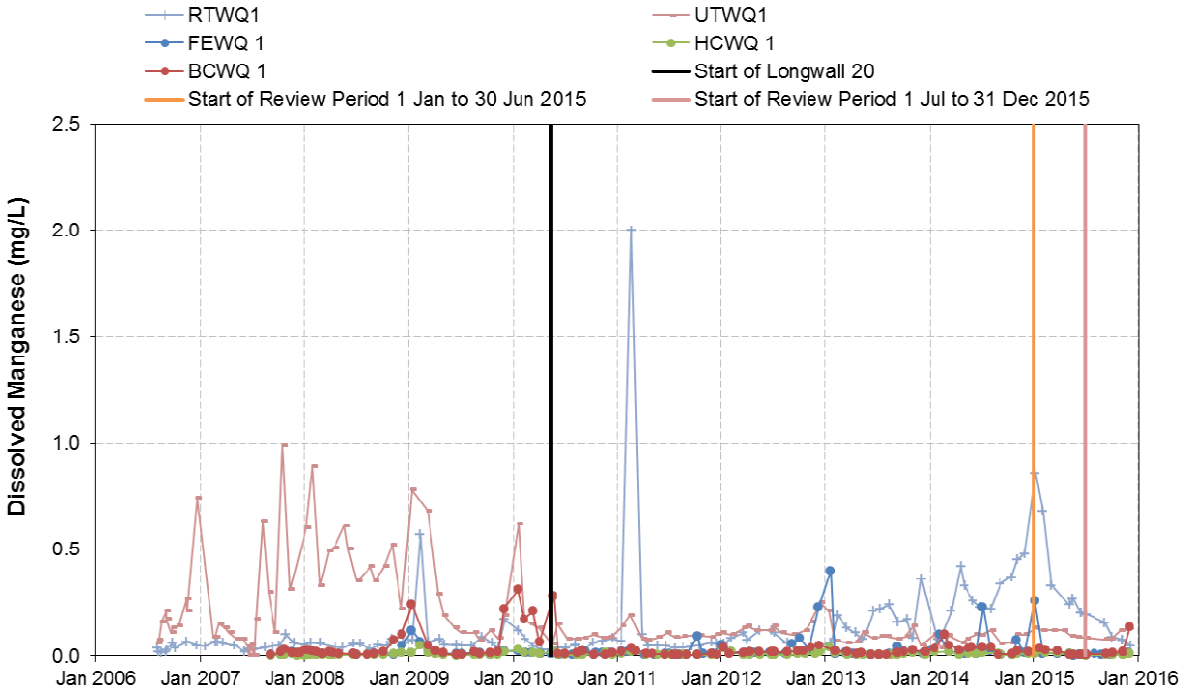


Chart 31 Dissolved Manganese Tributary B, Tributary D, Far Eastern Tributary, Bee Creek and Honeysuckle Creek

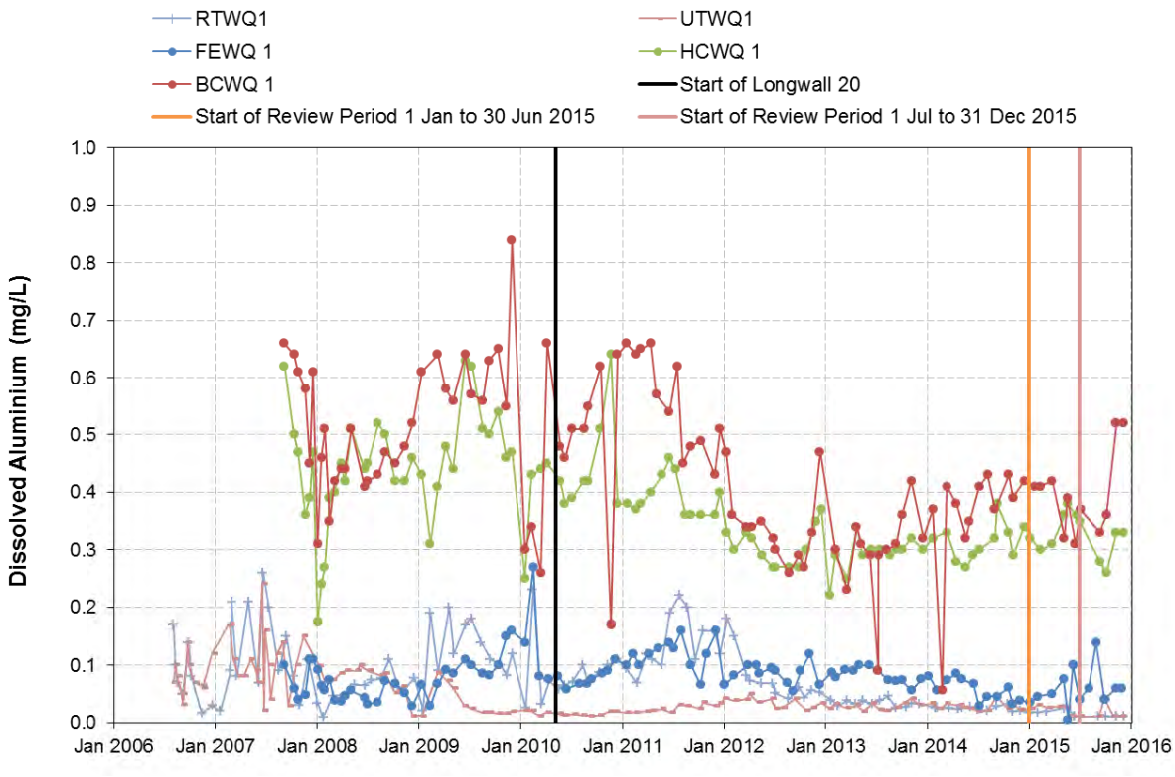


Chart 32 Dissolved Aluminium Tributary B, Tributary D, Far Eastern Tributary, Bee Creek and Honeysuckle Creek

During the 2014 Annual Review reporting period, Metropolitan Coal proposed revisions to improve the assessment methods for the quality of water resources reaching the Woronora Reservoir in response to peer review recommendations. Following a detailed review process led by the DP&E, the revised assessment methods have been used to assess the quality of water resources reaching the Woronora Reservoir.

Water quality data has been analysed for key water quality parameters of relevance to water supply and the effects of subsidence, namely iron, manganese and aluminium at site WRWQ9 on Waratah Rivulet, site ETWQ AU on Eastern Tributary and at control site WOWQ2 on the Woronora River.

The performance indicator, *Changes in the quality of water entering Woronora Reservoir are not significantly different post-mining compared to pre-mining concentrations that are not also occurring at control site WOWQ2,* is considered to have been exceeded if data analysis indicates a significant change in the quality of water post mining of Longwall 20. Specifically if[1]:

- any water quality parameter exceeds the adjusted baseline mean plus two standard deviations for two consecutive months; or
- over a three month period the water quality parameter exceeds the adjusted mean plus two standard deviations in the first month, the adjusted mean plus one standard deviation in the next month and the adjusted mean plus two standard deviations in the third month; or
- the six month mean of the water quality parameter exceeds the adjusted baseline mean plus one standard deviation for two consecutive assessment periods (i.e. over two six monthly reports); and
- there was not a similar exceedance of the trigger at the control site.

[1] Note each 'mean' is calculated as a geometric mean.

There was no exceedance of the performance indicator as a result of the assessment methods for dissolved iron or dissolved aluminium at site WRWQ9 on Waratah Rivulet or site ETWQ AU on Eastern Tributary. There was also no exceedance of the performance indicator as a result of the assessment methods for dissolved manganese at site WRWQ9 or site ETWQ AU, with the exception of the six month mean exceeding the adjusted baseline mean plus one standard deviation for two consecutive assessment periods at site WRWQ9 (Chart 33).

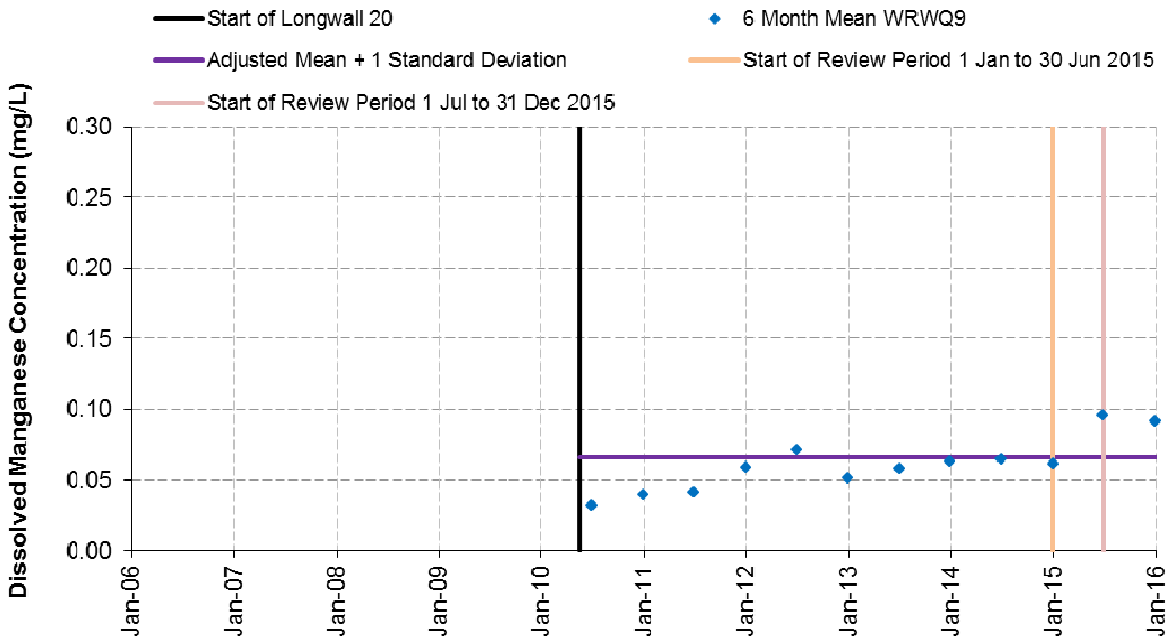


Chart 33 Six Monthly Means of Dissolved Manganese Concentrations in Waratah Rivulet at WRWQ9

There was no exceedance of this measure at the control site on Woronora River at site WOWQ2 during the review period (Chart 34). As a result, an assessment was made against the subsidence impact performance measure, *Negligible reduction to the quality of water resources reaching the Woronora Reservoir.*

The assessment undertaken by Hydro Engineering & Consulting (2016) is provided in the report in Appendix A. Assessment of the monitoring data indicates there has been a negligible reduction to the quality of water resources reaching the Woronora Reservoir. The assessment by Hydro Engineering & Consulting will be subject to peer review in accordance with the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans.

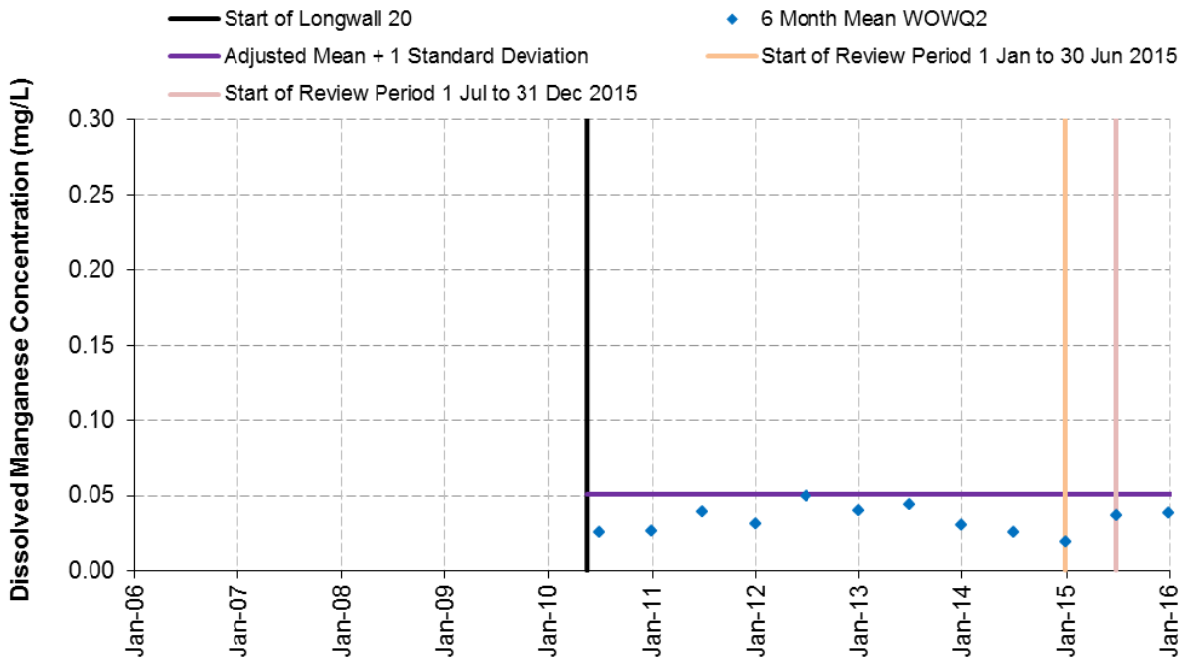


Chart 34 Six Monthly Means of Dissolved Manganese Concentrations in Woronora River at WOWQ2

The environmental consequences of subsidence impacts on water quality were predicted by the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans to be similar to that previously observed at Metropolitan Coal, specifically, transient pulses of iron manganese and aluminium, which would likely occur following fresh cracking of the stream bed.

Water quality monitoring results to date indicate there has been a negligible reduction in the quality of water resources reaching the Woronora Reservoir.

Woronora Reservoir Water Quality

Metropolitan Coal has sourced water quality data for the Woronora Reservoir from WaterNSW in accordance with a data exchange agreement. Results in relation to total iron, aluminium and manganese levels from 0 m to 9 m below the reservoir surface for Woronora Reservoir throughout the period of record are presented in Charts 35, 36 and 37.

During the 2014 Annual Review reporting period, Metropolitan Coal proposed revisions to the assessment methods for Woronora Reservoir water quality in response to peer review recommendations. Following a detailed review process by the DP&E, the revised assessment methods have been used to assess Woronora Reservoir water quality. Assessment of the monitoring data indicates there has been a negligible reduction in the water quality of Woronora Reservoir.

The Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans predicted the Project would not impact on the performance of the Woronora Reservoir and would have a neutral effect on water quality. Water quality monitoring results to date are consistent with the predictions.

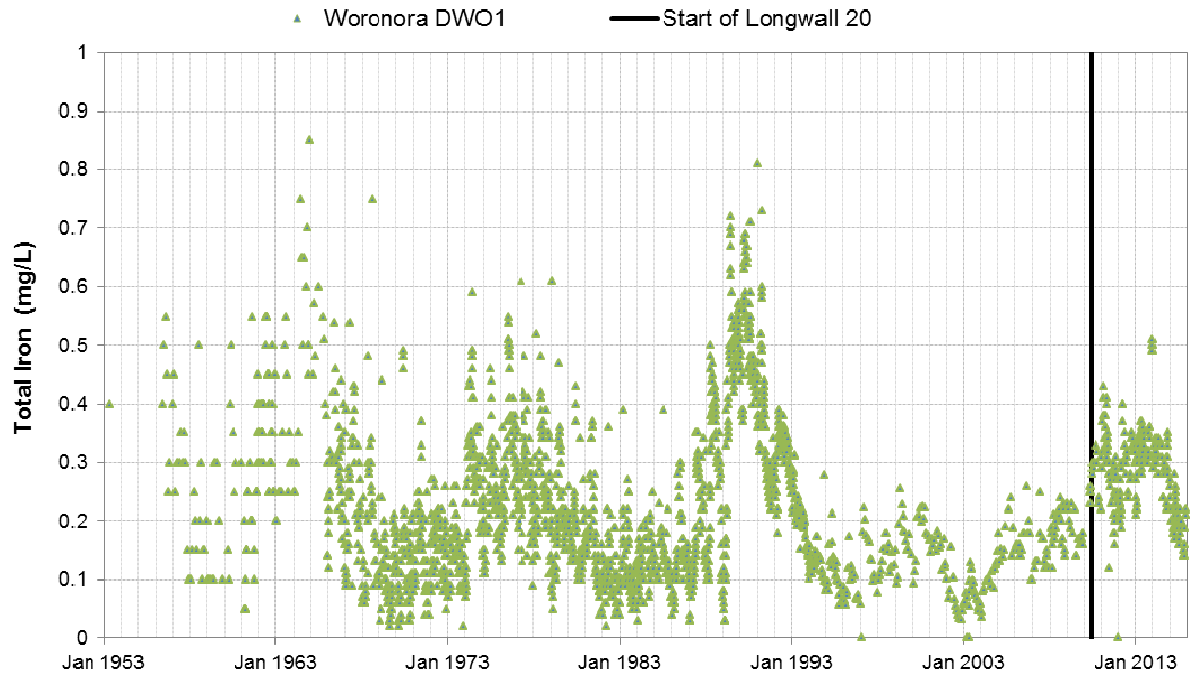


Chart 35 Total Iron Concentration Woronora Reservoir

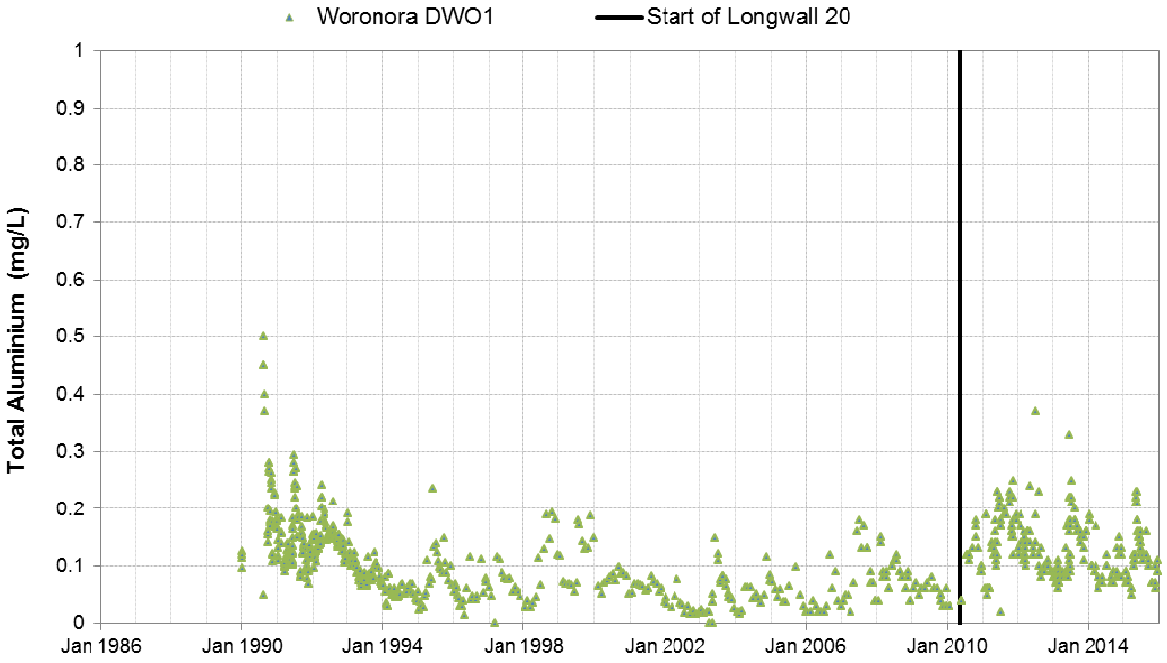


Chart 36 Total Aluminium Concentration Woronora Reservoir

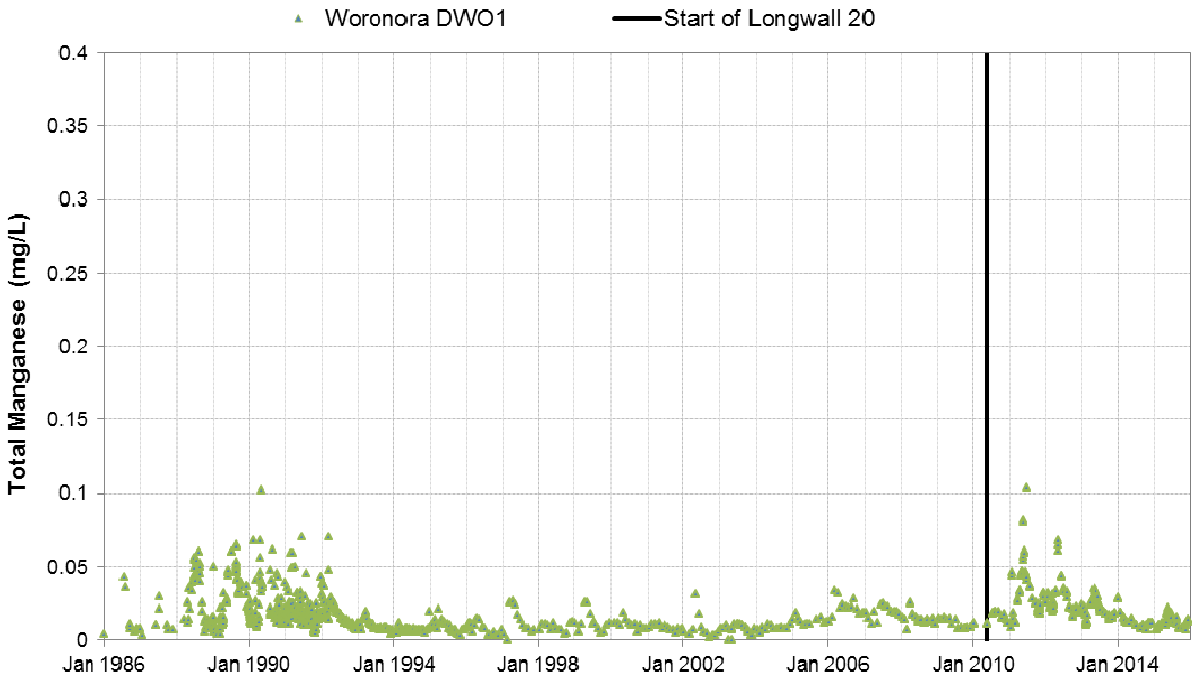


Chart 37 Total Manganese Concentration Woronora Reservoir

Swamp Groundwater Levels

Groundwater monitoring of upland swamps involves the use, where practicable, of paired piezometers, one in the swamp substrate and one sandstone piezometer.

For the first time drops in sandstone piezometer water levels were identified at Swamps 28 and 33 during the reporting period as a result of mining (Chart 38 and Chart 39). At Swamp 30, the groundwater level in the sandstone declined rapidly by 1.25 m in December 2015 (Chart 40). The decline corresponds with the passage of Longwall 25 past Swamp 30, making it possible that it is also associated with mine subsidence.

The swamp substrate water levels of Swamps 25, 28, 30, 33 and 35 however remained perched during the reporting period (Appendix B). Swamp 20 substrate water levels previously changed from being permanently saturated to being periodically saturated as a result of the passing of Longwall 21. This trend continued to be observed throughout the reporting period (Chart 41).

The key potential subsidence impacts and environmental consequences on perched groundwater systems described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans, included:

- Any cracking of the bedrock within upland swamps is expected to be isolated and of a minor nature, due to the relatively low magnitudes of the predicted strains and the relatively high depths of cover.
- Surface cracking resulting from mine subsidence within the upland swamps is not expected to result in an increase in the vertical movement of water from the perched water table into the regional aquifer as the sandstone bedrock is massive in structure and permeability decreases with depth.

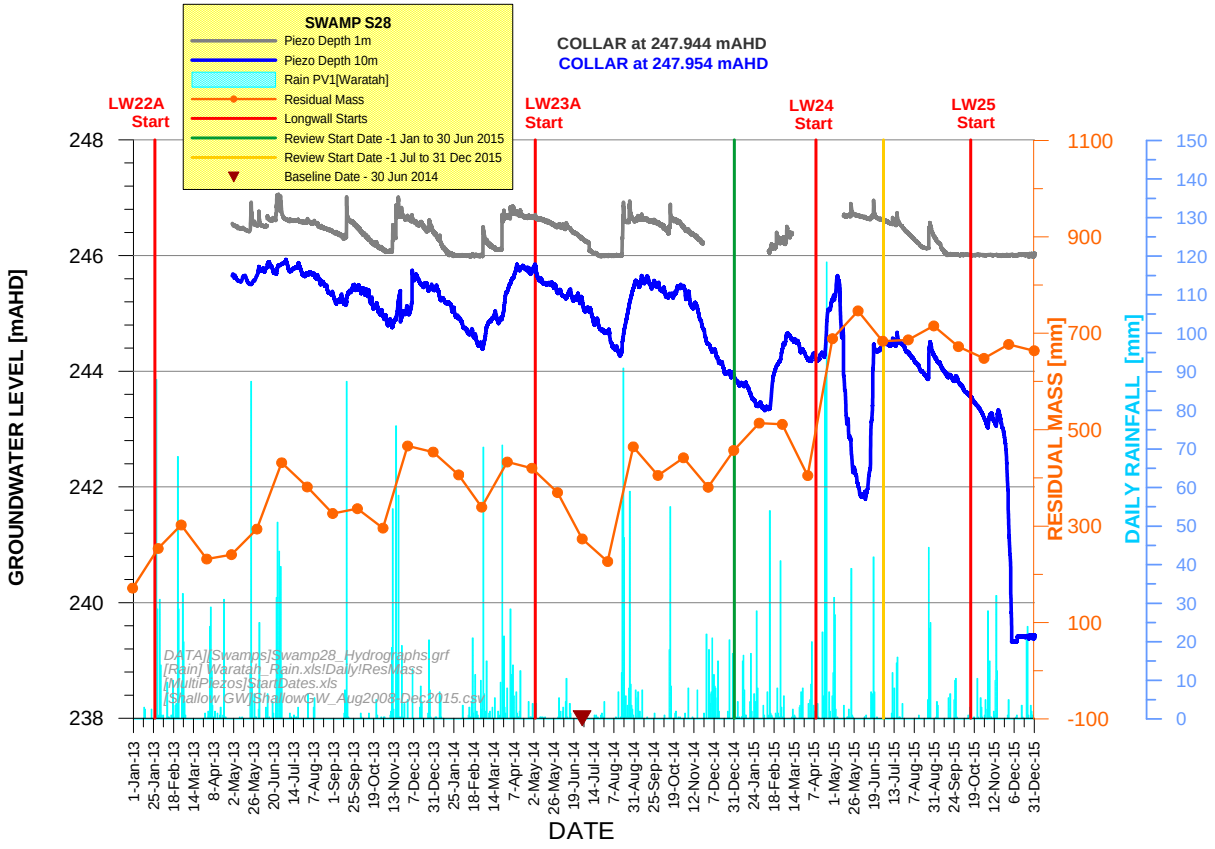


Chart 38 Groundwater Hydrographs at Swamp 28

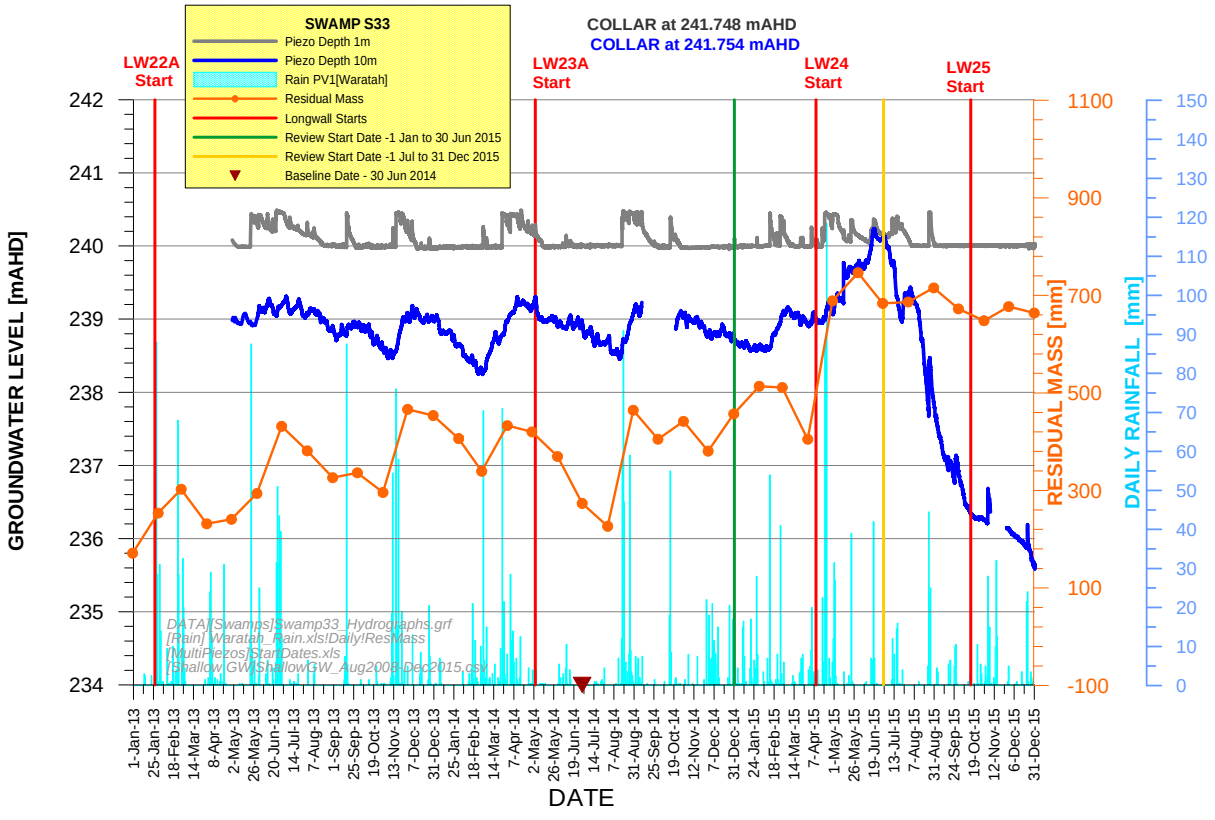


Chart 39 Groundwater Hydrographs at Swamp 33

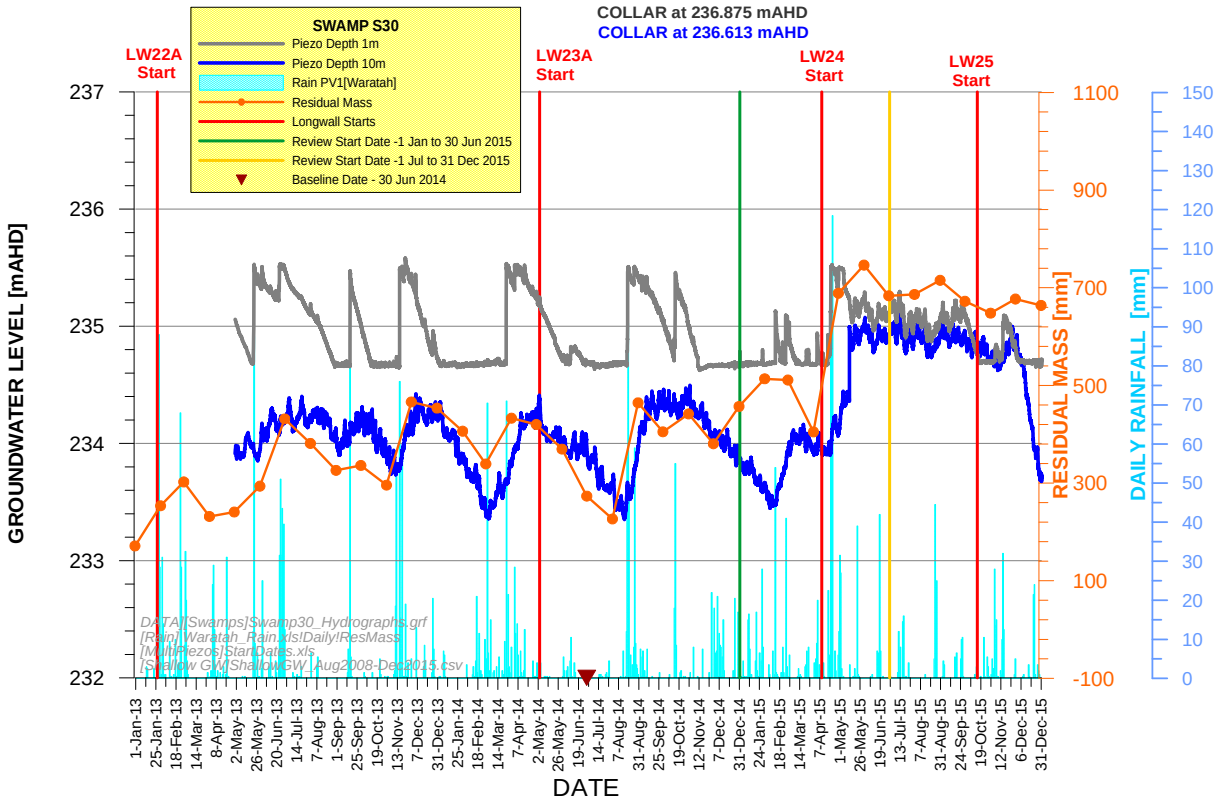


Chart 40 Groundwater Hydrographs at Swamp 30

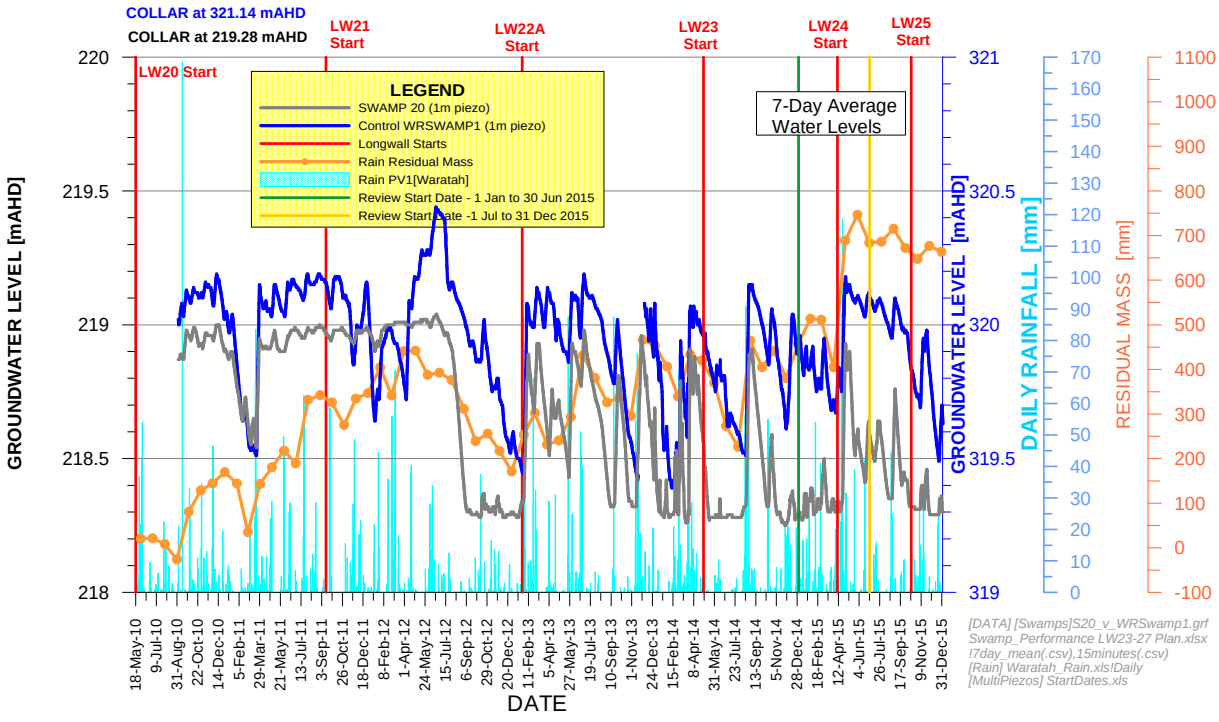


Chart 41 Comparison of Piezometer Responses at Swamp 20 and Woronora River 1 Control Swamp

- It is expected that any surface cracking that may occur would be superficial in nature (i.e. would be relatively shallow) and would terminate within the unsaturated part of the low permeability sandstone. Any changes in swamp water levels as a result of cracking are expected to be immeasurable when compared to the scale of seasonal and even individual rainfall event based changes in swamp groundwater levels.
- Whilst swamp grades vary naturally, the predicted maximum mining-induced tilts are generally orders of magnitude lower than the existing natural grades within the swamps. The predicted tilts would not have any significant effect on the localised or overall gradient of the swamps or the flow of water. Any minor mining-induced tilting of the scale and nature predicted is not expected to significantly increase lateral surface water movements which are small in relation to the other components in the swamp water balance.

No change to the fundamental surface hydrological processes and upland swamp vegetation were expected within upland swamps.

In relation to impacts of the Project on upland swamps, the NSW Planning Assessment Commission (2009) concluded that the mining parameters were such that:

- for most swamps in the Project Area, there was low risk of negative environmental consequences; and
- that there was a very low risk that a significant number of swamps would suffer such consequences.

The subsidence predictions presented in the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans indicated that Swamp 20 was most at risk of subsidence impacts. Swamp 20 is an in-valley swamp situated on a second order tributary over Longwall 21. All other swamps over Longwalls 20-22 and Longwalls 23-27 are valley side swamps.

The results of upland swamp monitoring for Longwalls 20-22 and Longwalls 23-27 are considered to be consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans. However, while the water lost from Swamp 20 was retained in the unsaturated sandstone above the regional water table, the changes in swamp water levels as a result of cracking are measurable when compared to seasonal individual rainfall event based changes in swamp groundwater levels. Whether or not this change in swamp water level is affecting only a small portion of Swamp 20 is unknown at this stage.

Shallow Groundwater Levels

Continuous water level monitoring of shallow groundwater levels has been conducted at sites WRGW1, WRGW2 and WRGW7 along Waratah Rivulet and sites ETGW1 and ETGW2 on the Eastern Tributary (Figure 11 and Charts 42, 43 and 44)[2].

[2] As previously reported, site WRGW8 is faulty and is not recording reliable data. Metropolitan Coal does not propose to replace the shallow groundwater bore at site WRGW8 given data is available at site WRGW7 on the opposite bank of the Waratah Rivulet. Due to bore failure as a result of subsidence, bore RTGW1A on Tributary B has not been able to be dipped since December 2013. The diver was able to be downloaded up until May 2014. Metropolitan Coal does not propose to install a new bore at site RTGW1A. It is considered that sufficient data has been obtained from this and previous bores on tributaries to understand the impacts of mine subsidence on the shallow groundwater.

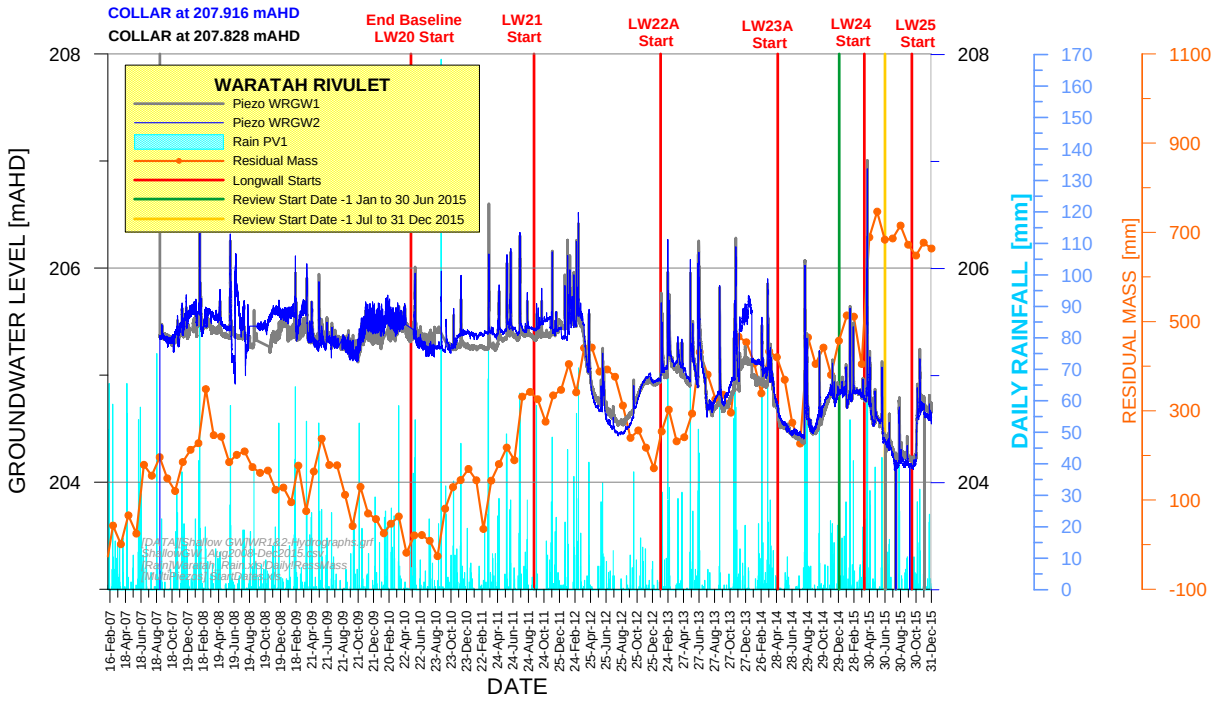


Chart 42 Shallow Groundwater Hydrographs on Waratah Rivulet at WRGW1 and WRGW2

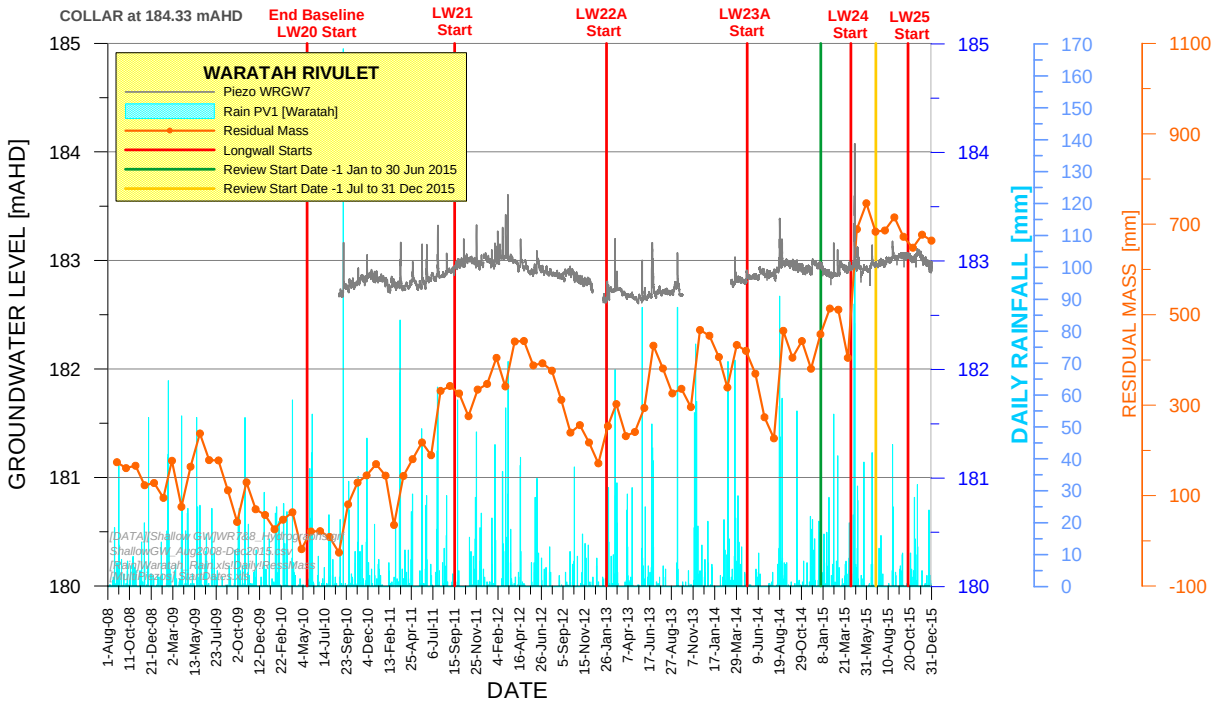


Chart 43 Shallow Groundwater Hydrographs on Waratah Rivulet at WRGW7

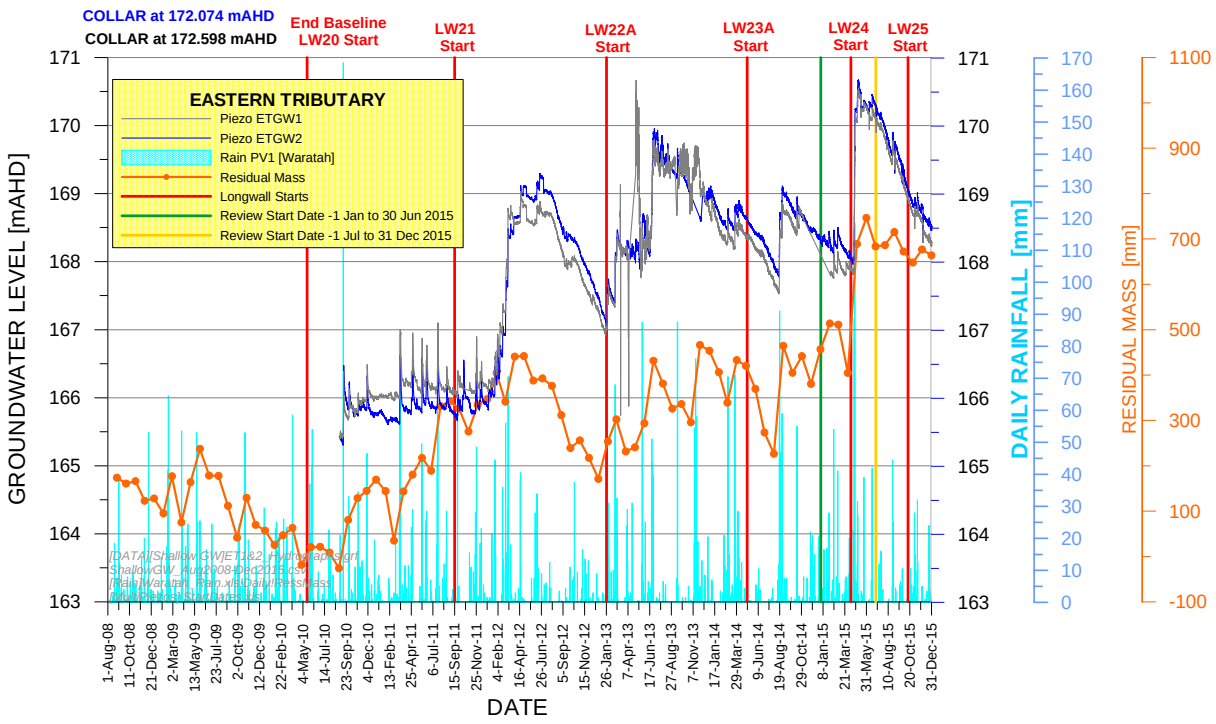


Chart 44 Shallow Groundwater Hydrographs on Eastern Tributary at ETGW1 and ETGW2

At the time of passage of the Longwall 21 mining face past the piezometer sites WRGW1 and WRGW2 on the Waratah Rivulet (March 2012), the groundwater levels dropped by about 1 m (Chart 42). Since March 2012, groundwater levels recorded in WRGW1 and WRGW2 have fluctuated in response to seasonal rainfall variations with a seasonal (dry) minimum that is approximately 0.75 m below previous levels. Shallow groundwater levels at sites WRGW7, ETGW1 and ETGW2 correlate with rainfall trends and remained unaffected by mining during the reporting period (Charts 43 and 44).

The key potential subsidence impacts and environmental consequences on shallow groundwater systems and inflows to the Woronora Reservoir described in the Project EA, Preferred Project Report and the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans included:

- Permanent mining-induced changes in the groundwater levels of shallow aquifers in connection with streams and ecosystems at Metropolitan Coal would not occur to any significant degree (i.e. the direction of shallow groundwater system flow [i.e. in the Hawkesbury Sandstone] has not been altered by mining).
- As there is an alternation of thick sandstone/claystone lithologies, there is a constrained zone in the overburden that remains rigid and acts as a bridge which isolates shallow and deep aquifers. At the substantial depths of cover of the Project, there would not be connective cracking from the mined seam to the surface.
- The depressurisation effects described below for the deep groundwater system would not propagate to the Hawkesbury Sandstone where the shallow groundwater system is located. As a result, no measurable impacts on registered bores in the wider Project area and surrounds would be expected.

- Based on the analysis of the conceptual groundwater system, there would be negligible loss of groundwater yield to the Woronora Reservoir. This is reinforced by the groundwater modelling which indicates negligible reduction in cumulative average inflows to the Woronora Reservoir. In relation to the potential loss of catchment yield, the NSW Planning Assessment Commission (2009) was of the view that the risk of any significant loss is very low unless a major geological discontinuity is encountered during mining that provides a direct hydraulic connection between the surface and the mine workings.

The groundwater monitoring results for Longwalls 20-22 and Longwalls 23-27 are considered to be consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans.

Deep Groundwater Levels/Pressures

Immediately above a mined coal seam, rocks collapse into the void created by the removal of coal to form a caved zone and a fractured zone develops above the caved zone. This causes aquifer properties to change (e.g. permeability and porosity) and results in a higher vertical permeability as a result of mining.

A three-dimensional numerical model of groundwater flow was developed for the mine and its surroundings prior to the commencement of Longwall 20. Since then, the model has been recalibrated and refined in the upper layers (Hawkesbury Sandstone) and extended from 13 to 15 layers. The groundwater model has been updated progressively as new multi-level piezometric data becomes available from the monitoring program.

Transient calibration has been undertaken during the reporting period to incorporate Metropolitan Coal updates to the geological model. The revised model includes an update of the topographical surface and geological interfaces, the addition of two model layers below the Bulli seam and updated estimates of the fractured zone height. A report is currently being prepared for the updated model.

Continuous groundwater level/pressure monitoring has been conducted at bores 9HGW0 (Longwall 10 Goaf Hole), 9EGW1B, 9FGW1A, 9GGW1-80, 9GGW2B, 9HGW1B, PM02, PM01, 9EGW2A, PM03, PHGW1B, PHGW2A, F6GW3 and F6GW4 (Figure 11). The time-series head variations and vertical head differences for these bores have been examined (Charts 45 to 58) with the following outcomes:

- very few installations are providing unreliable data;
- sites close to current mining show significant depressurisation with depth, consistent with the Project EA; and
- sites close to old workings at Helensburgh show substantial depressurisation with depth, consistent with the Project EA.

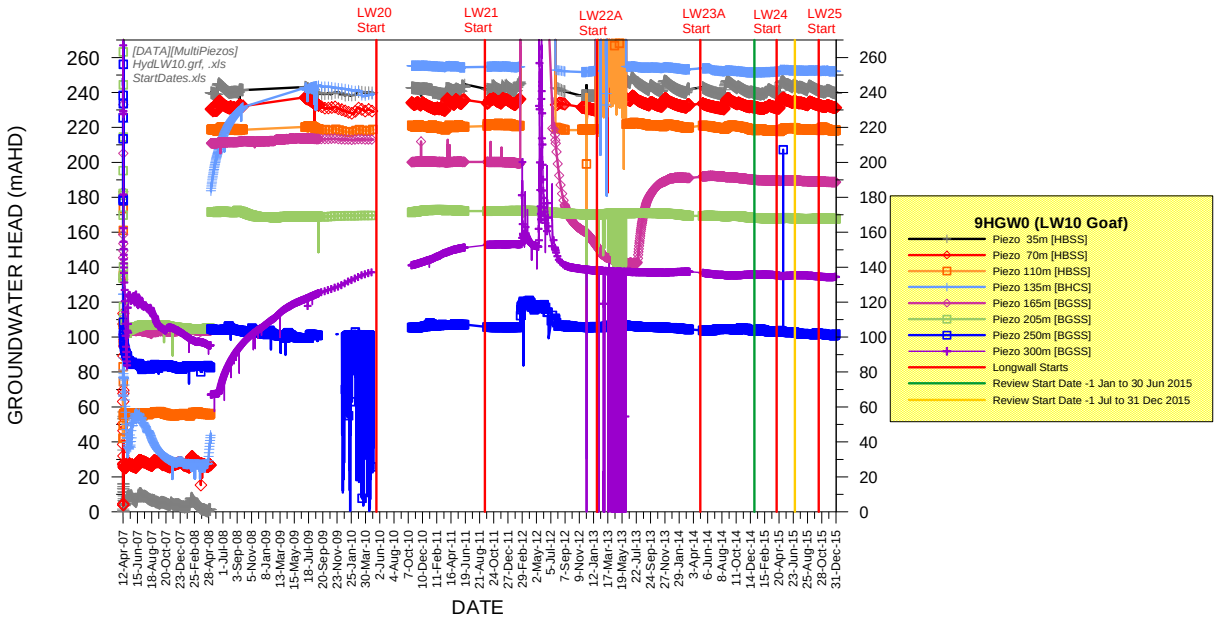


Chart 45 Time Variations in Potentiometric Heads at 9HGW0

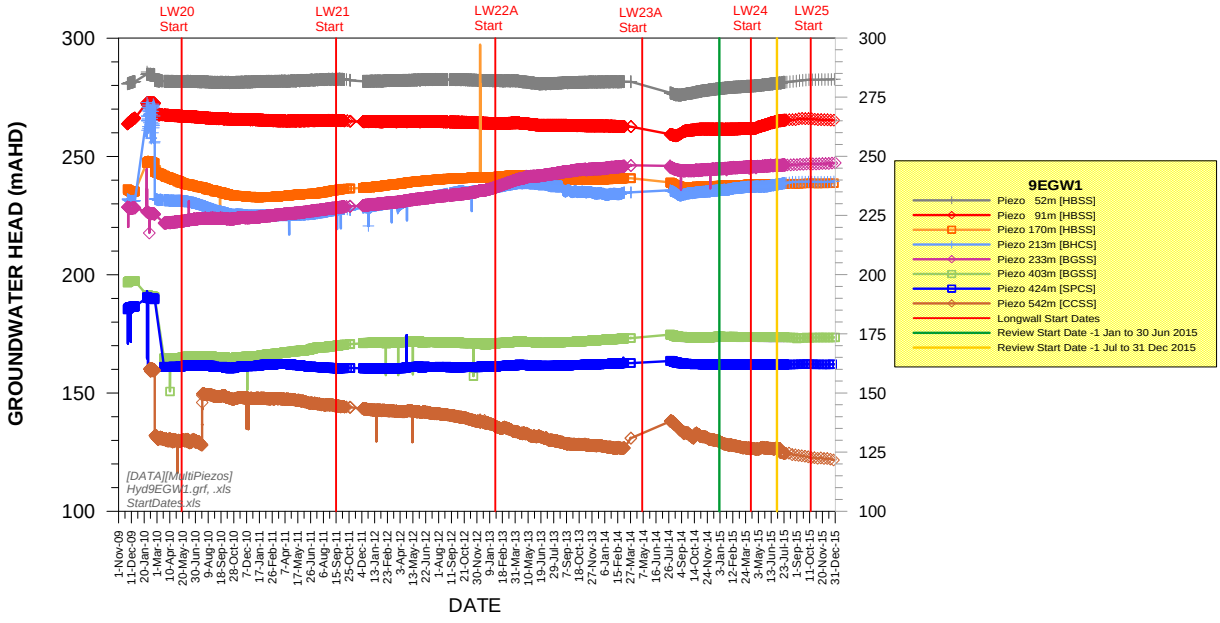


Chart 46 Time Variations in Potentiometric Heads at 9EGW1B

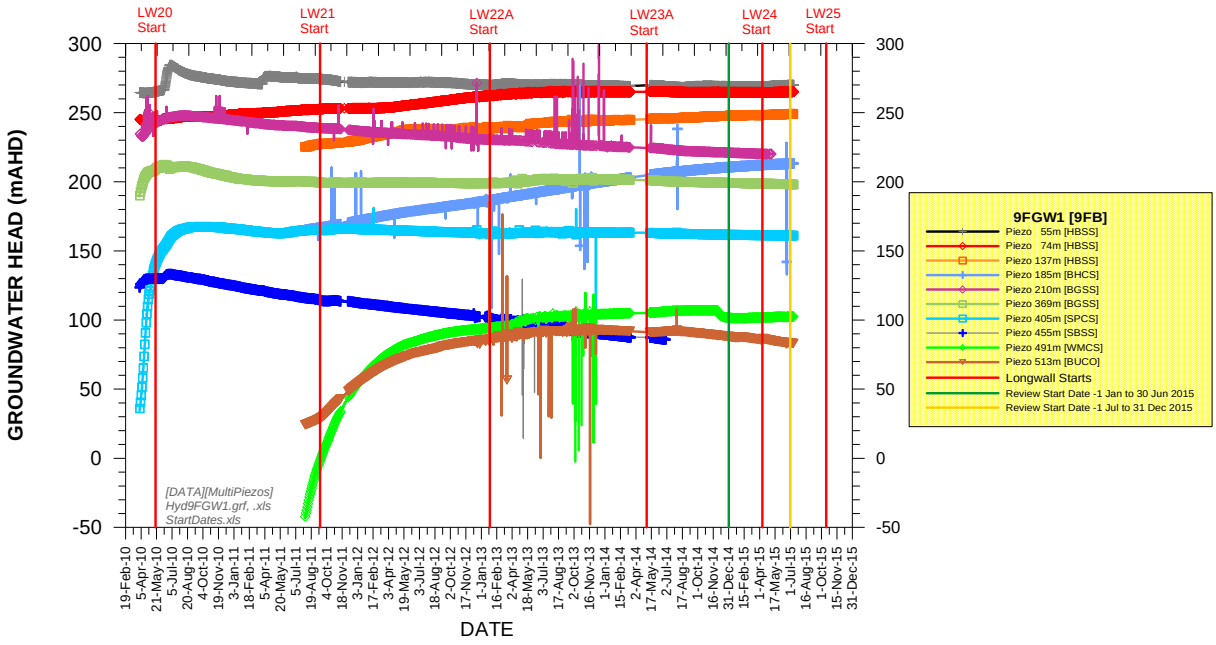


Chart 47 Time Variations in Potentiometric Heads at 9FGW1A

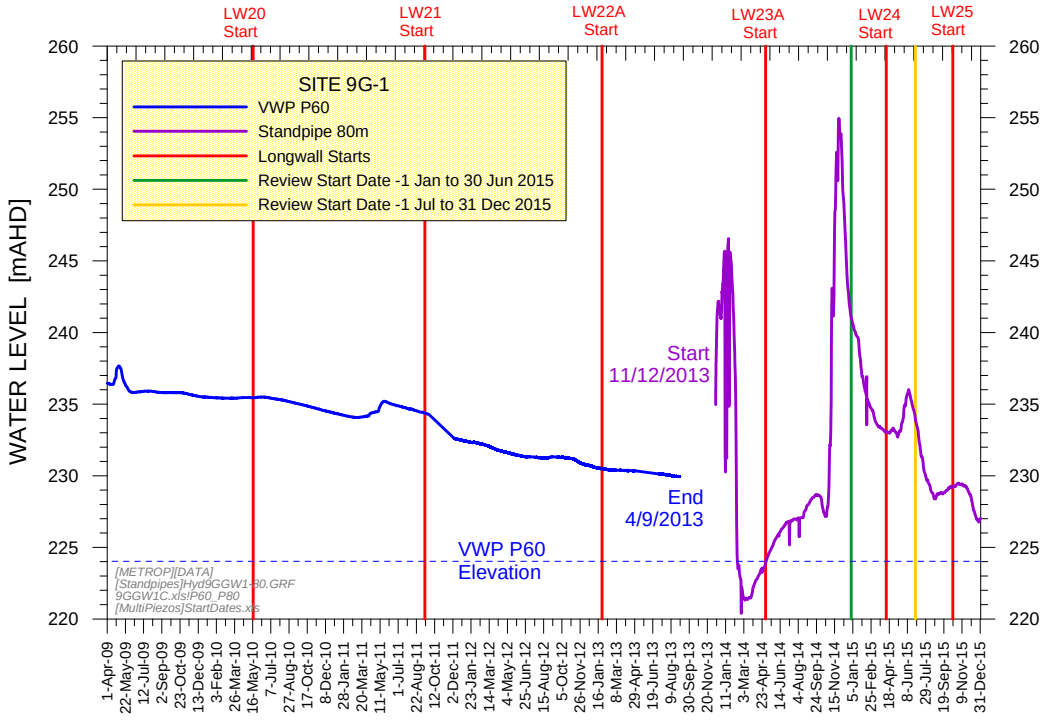


Chart 48 Time Variations in Water Table at Standpipe 9GGW1-80 and Decommissioned Vibrating Wire Piezometer 9GGW1-60

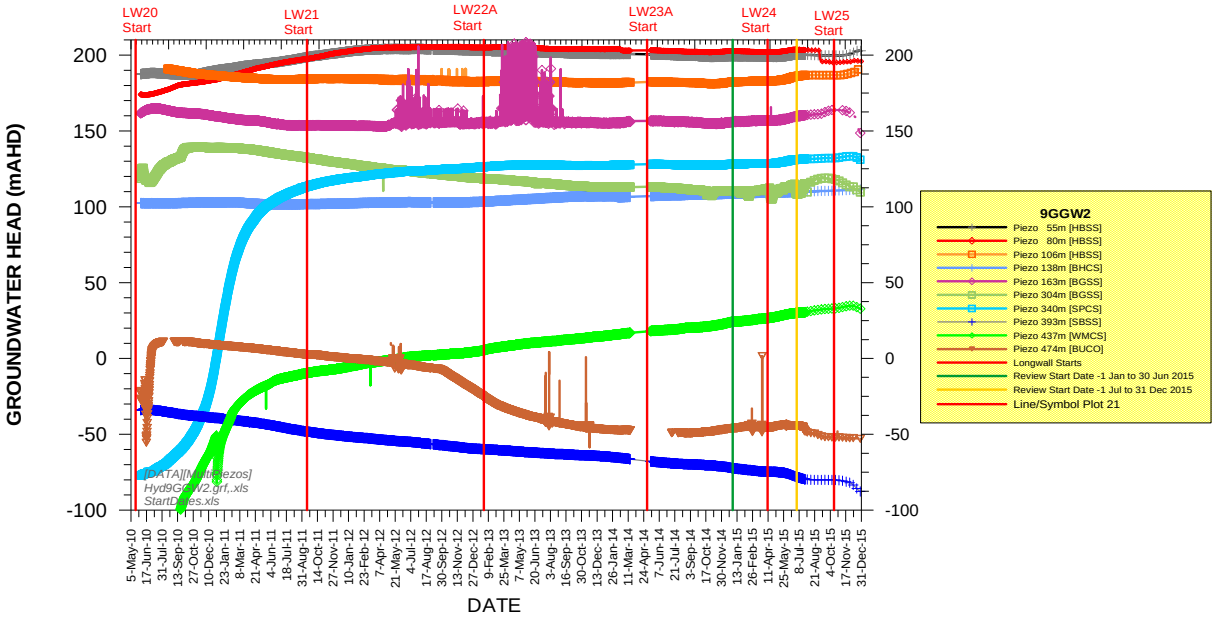


Chart 49 Time Variations in Potentiometric Heads at 9GGW2B

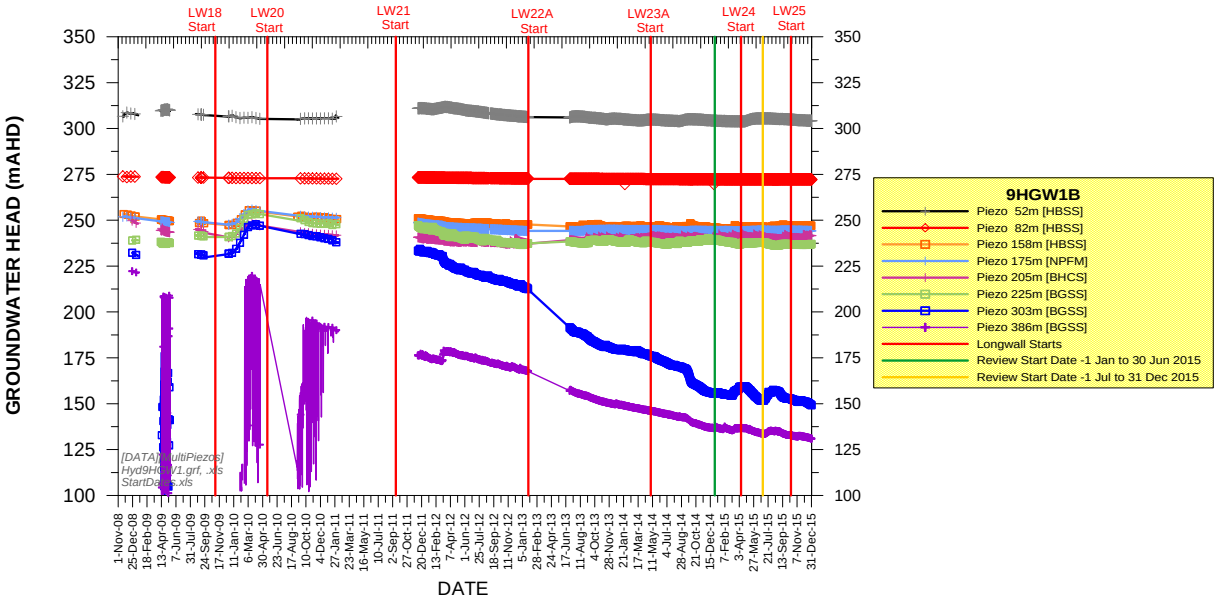


Chart 50 Time Variations in Potentiometric Heads at 9HGW1B

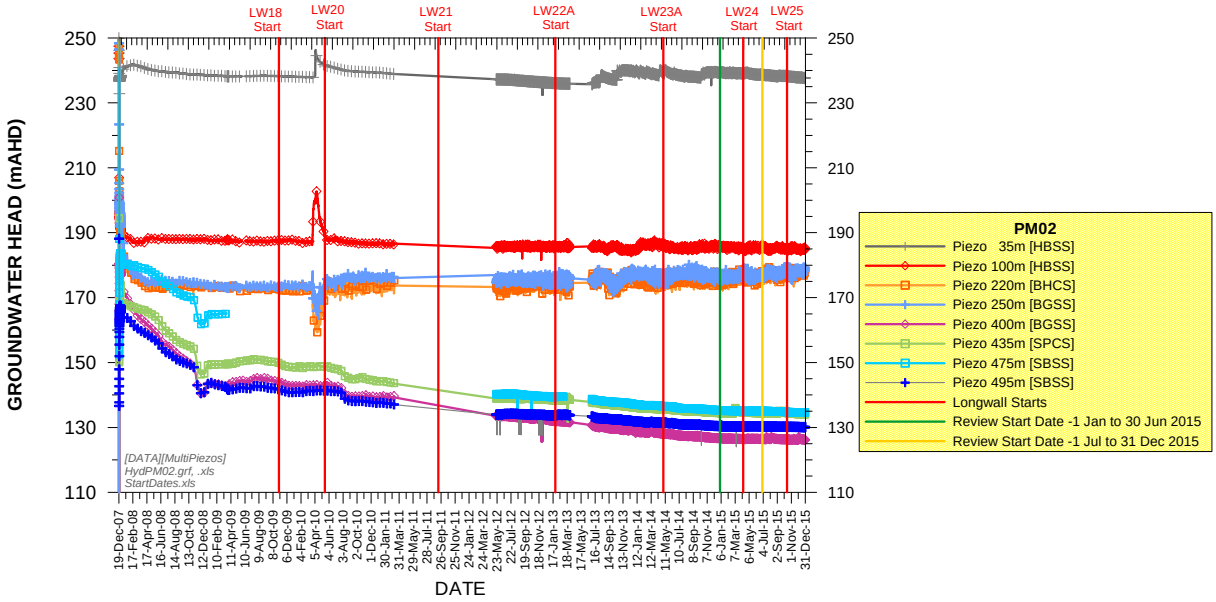


Chart 51 Time Variations in Potentiometric Heads at PM02

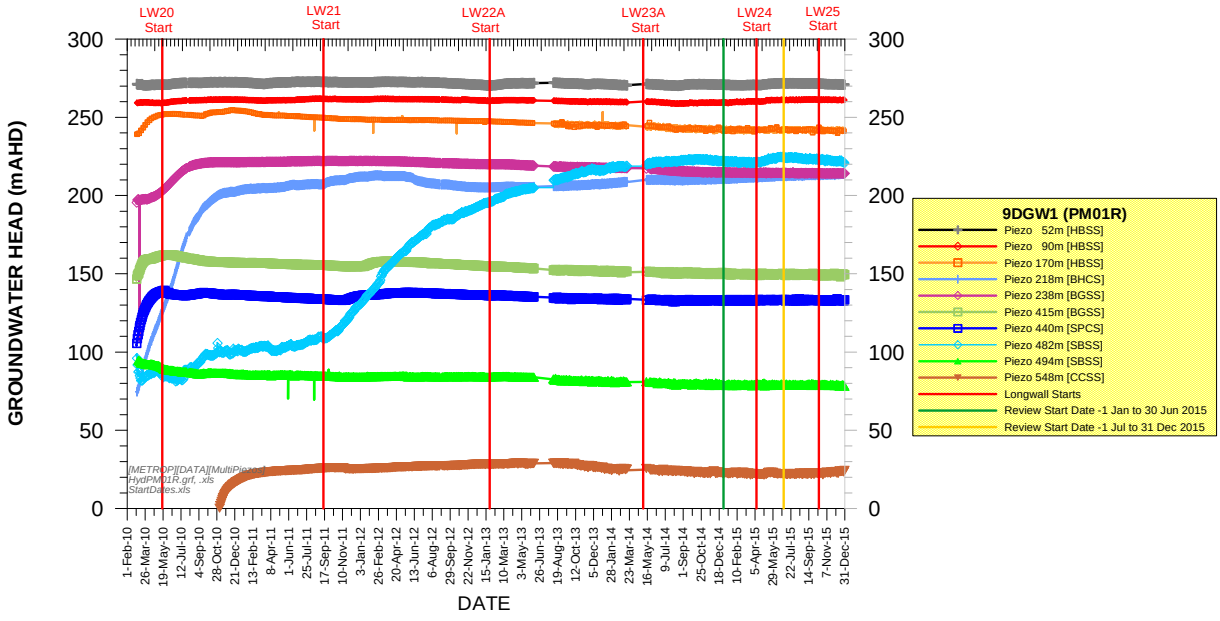


Chart 52 Time Variations in Potentiometric Heads at PM01

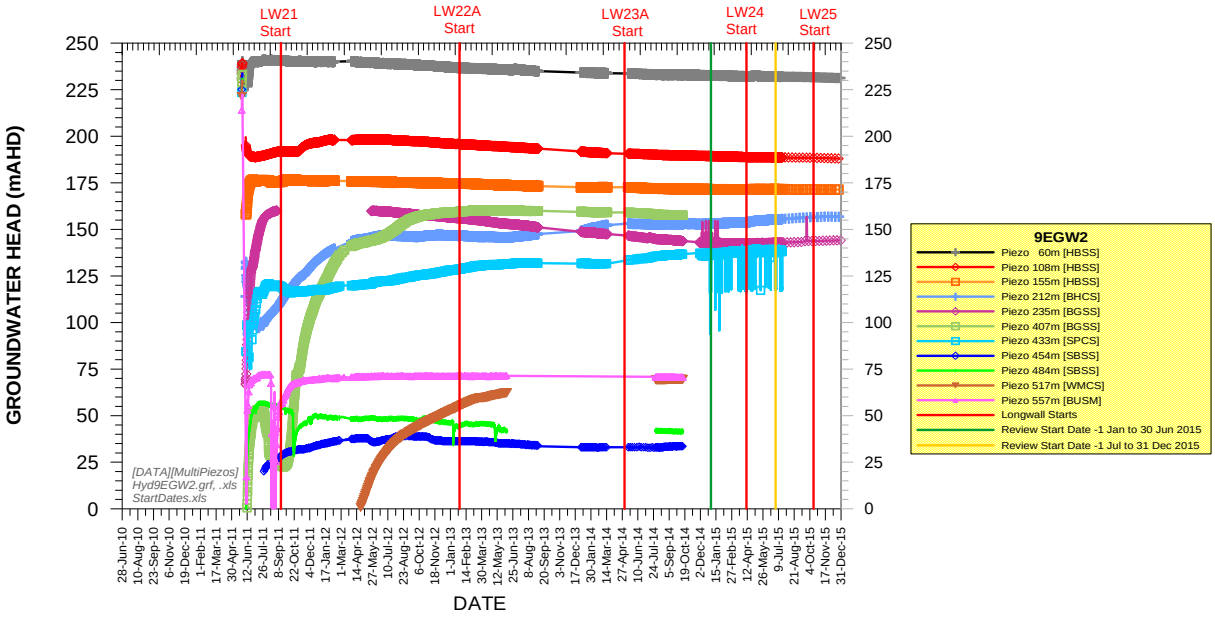


Chart 53 Time Variations in Potentiometric Heads at 9EGW2A

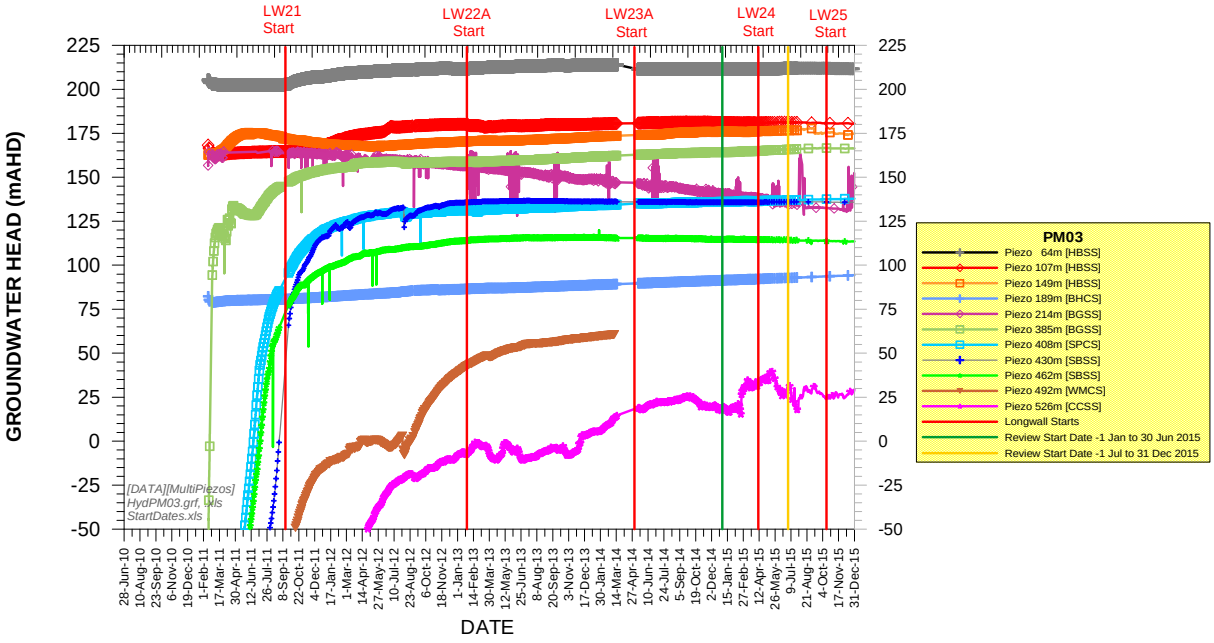


Chart 54 Time Variations in Potentiometric Heads at PM03

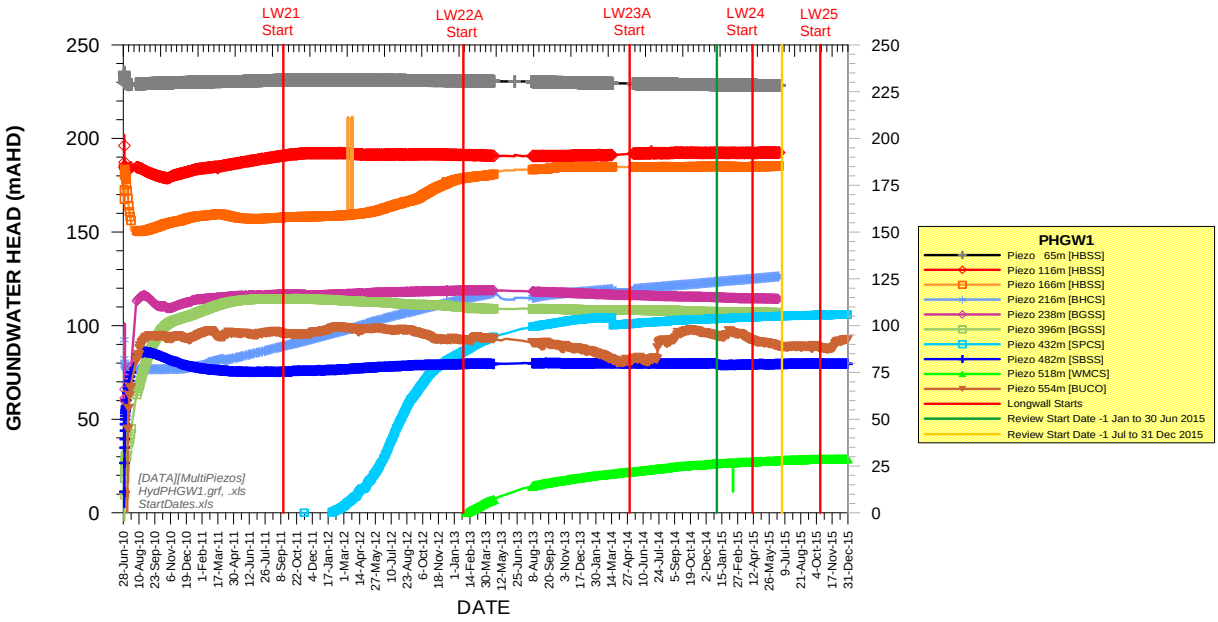


Chart 55 Time Variations in Potentiometric Heads at PHGW1B[3]

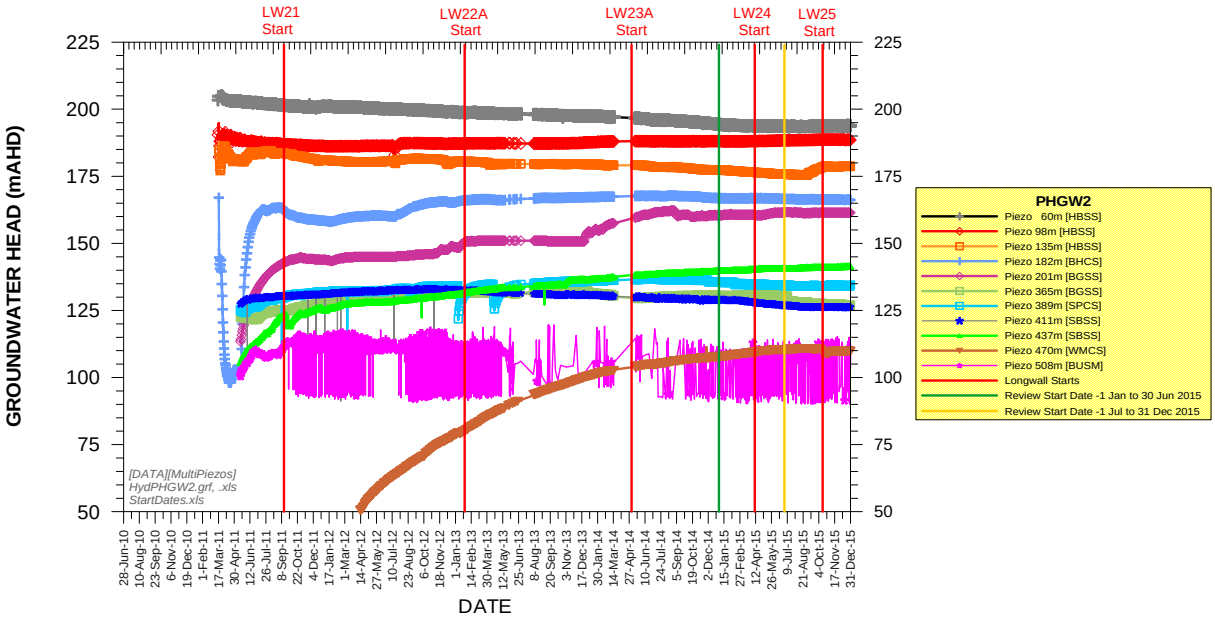


Chart 56 Time Variations in Potentiometric Heads at PHGW2A

[3] Note that a connection failure prevented upload of data for five sensors in PHGW1B during the reporting period. The equipment supplier has been notified.

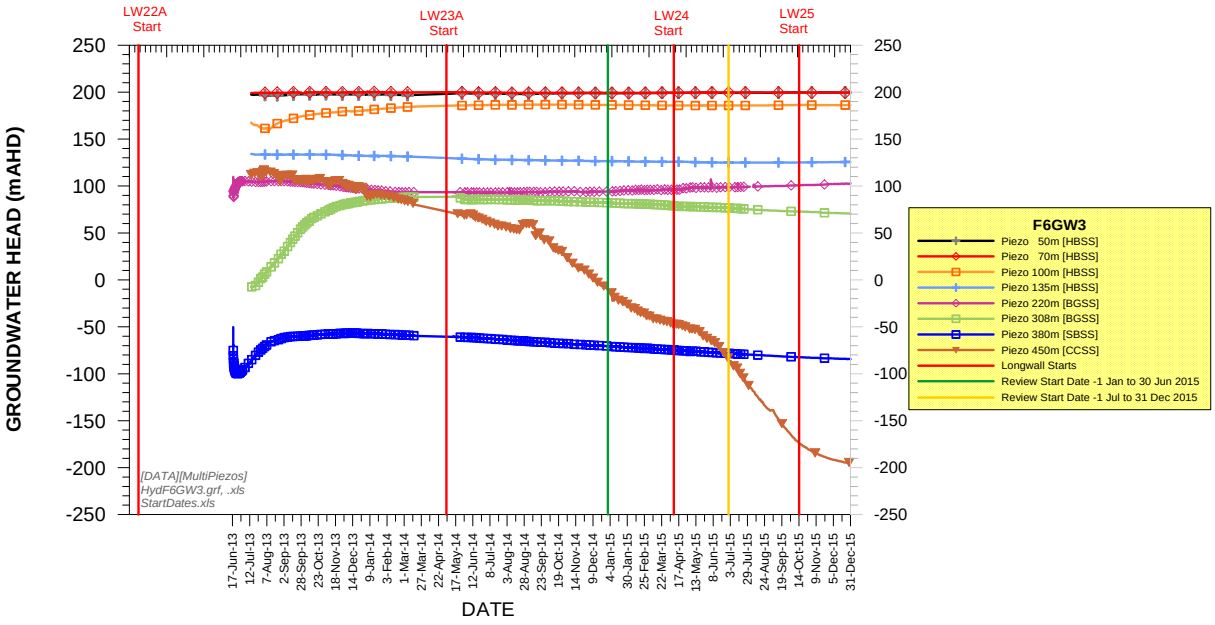


Chart 57 Time Variations in Potentiometric Heads at F6GW3

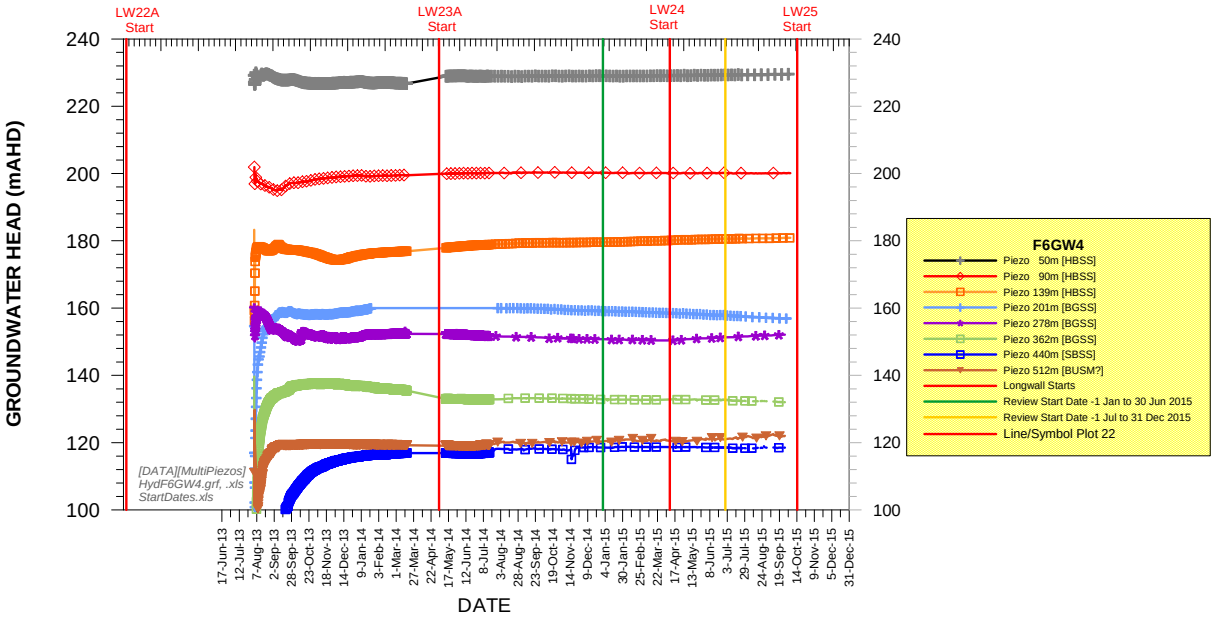


Chart 58 Time Variations in Potentiometric Heads at F6GW4

The water tables measured at Bores 9FGW1A and 9GGW1-80 at the 55 m and 80 m piezometers, respectively, are compared to the water levels of streams crossed by a transect along Longwall 22. The transect on Chart 59 provides an illustration of relative ground and water levels on transect A-A' along Longwall 22 through indicator sites 9FGW1A and 9GGW1-80. The transect from west to east crosses Tributary B (twice), Waratah Rivulet, Tributary A and the Eastern Tributary. The monitoring results indicate that a hydraulic gradient is maintained between piezometers and the floor levels of the nearest streams (Chart 59).

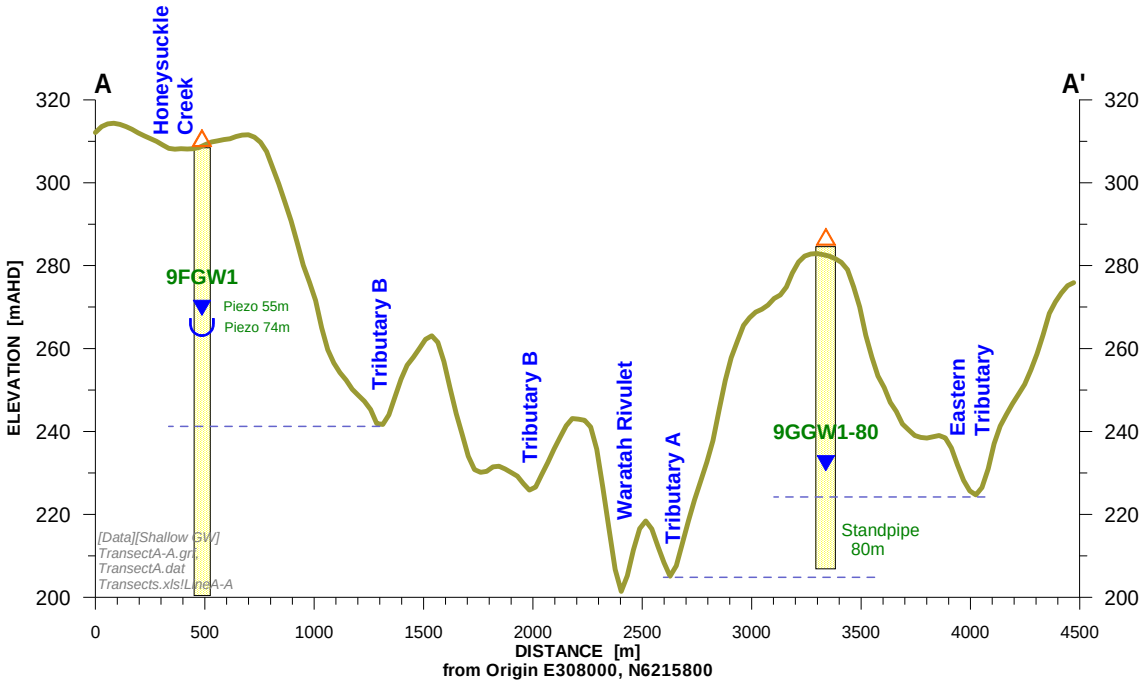


Chart 59 Topographic Transect A-A' along Longwall 22 and Hawkesbury Sandstone Water Levels

The groundwater levels measured at Bores 9GGW2B and PM02 at the 55 m and 35 m piezometers, respectively, are compared to the Woronora Reservoir at the level of the regional water table. Chart 60 indicates that the seven day average groundwater levels have not fallen below the reservoir water level (i.e. a hydraulic gradient exists from the bores to the Woronora Reservoir).

The vertical potentiometric head profiles at Bores 9GGW2B and 9FGW1A also support the assessment of no connective cracking between the surface and the mine.

The key potential subsidence impacts and environmental consequences on the deep groundwater system described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans, included:

- Based on experience at Metropolitan Coal, substantial depressurisation of the deep aquifers in the fractured zone above the goaf is restricted to a height of less than 130 m from the top of the goaf, while transient pressure effects have been observed to propagate to a height of about 300 m above the goaf. That is, there is a pronounced increase in vertical hydraulic gradient in the deep groundwater system over the Metropolitan Coal longwalls.
- Above goaf zones there would be substantial changes in fracture porosity and permeability, due to opening up of existing joints, new fractures and bed separation. Permeability increases would have accompanying reductions in lateral hydraulic gradients, with associated changes in groundwater levels and pressures. Pronounced changes in groundwater levels can occur without any significant drainage into a mine, particularly from the Narrabeen Group sandstones.

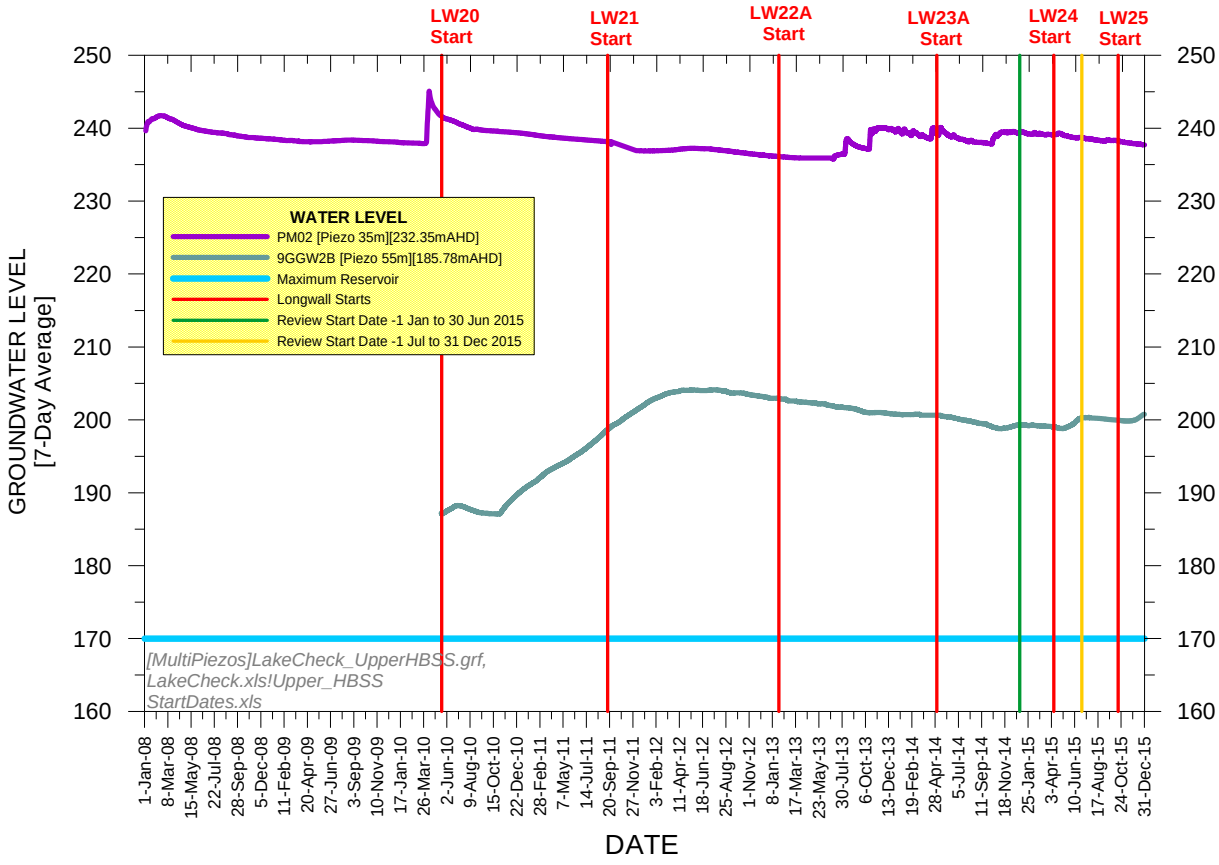


Chart 60 Seven Day Average Shallow Hawkesbury Sandstone Groundwater Levels at PM02 and 9GGW2B

- Groundwater discharge to the mined seam would occur from above and below the seam in proportion to local permeabilities. The water make (i.e. groundwater inflow) is expected to be in the order of 0.1 megalitres per day (ML/day), but modelling indicates that the inflow could be up to 0.5 ML/day from the deep groundwater system during mining of Longwall 24.
- Due to the substantial depths of cover at the Project, there would not be connective cracking from the mined seam to the surface. Groundwater modelling for the Project indicates that there is expected to be eventual recovery of deep groundwater system pressures over many decades following the cessation of mining.

The NSW Planning Assessment Commission (2009) concluded that given the considerable depth of mining and the restricted panel width in the Project area, that, in the absence of geological structures such as faults and igneous intrusions (sills, dykes and diatremes), there is a very high probability that a constrained zone will be associated with the mine layout proposed over the Project area, thereby preventing direct hydraulic connections between mine workings and surface water bodies.

The groundwater monitoring results for Longwalls 20-22 and Longwalls 23-27 are considered to be consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans.

Groundwater Quality

Groundwater quality monitoring on Waratah Rivulet (at sites WRGW1 to WRGW7, Figure 12 and Charts 61, 62 and 63) and Eastern Tributary (at sites ETGW1 and ETGW2, Figure 12 and Charts 64, 65 and 66) during the reporting period indicates iron concentrations have remained below 10 mg/L at the Waratah Rivulet sites and below 14 mg/L at the Eastern Tributary sites[4]. Manganese concentrations have typically been less than 1 mg/L[5], pH has been generally acidic and usually between pH 5.5 and 7, and aluminium concentrations have been low. The observations are consistent with those reported previously.

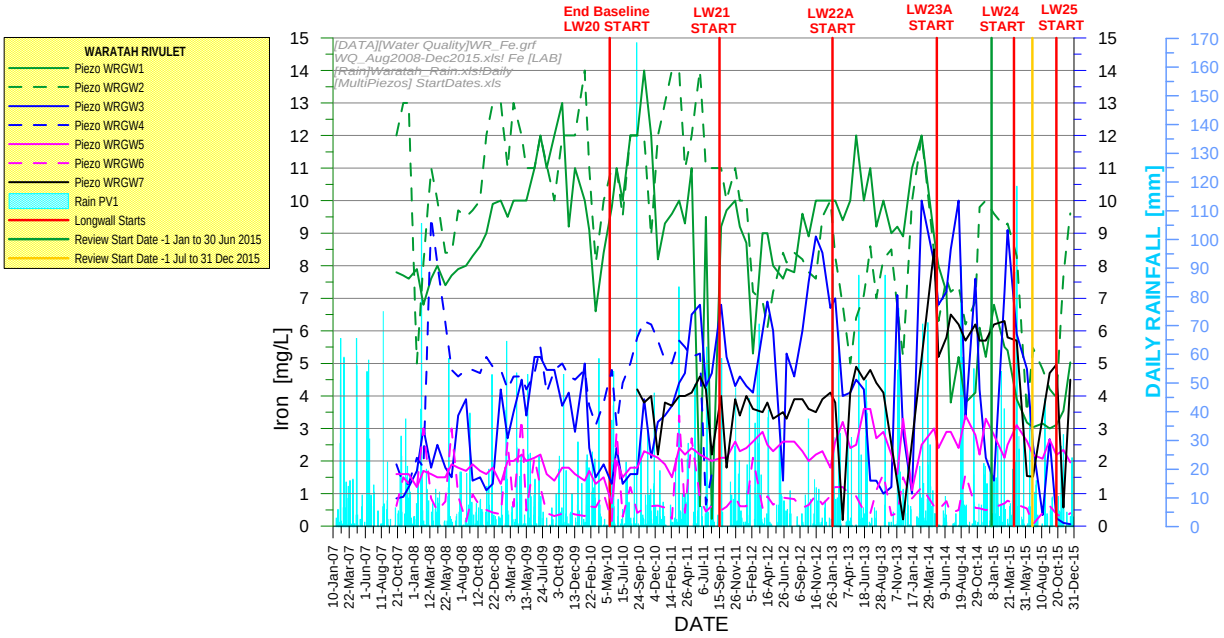


Chart 61 Iron Concentrations at WRGW1 to WRGW7 on Waratah Rivulet

[4] An anomalously low result for iron was recorded at ETGW1 in October 2015 (Chart 64).

[5] Anomalously high concentrations of manganese were reported for WRGW3 in June 2015 (3.36 mg/L) and September 2015 (1.47 mg/L) (Chart 62). These results appear to be transient outliers, with manganese concentrations returning to within the typical range for the last three months of 2015.

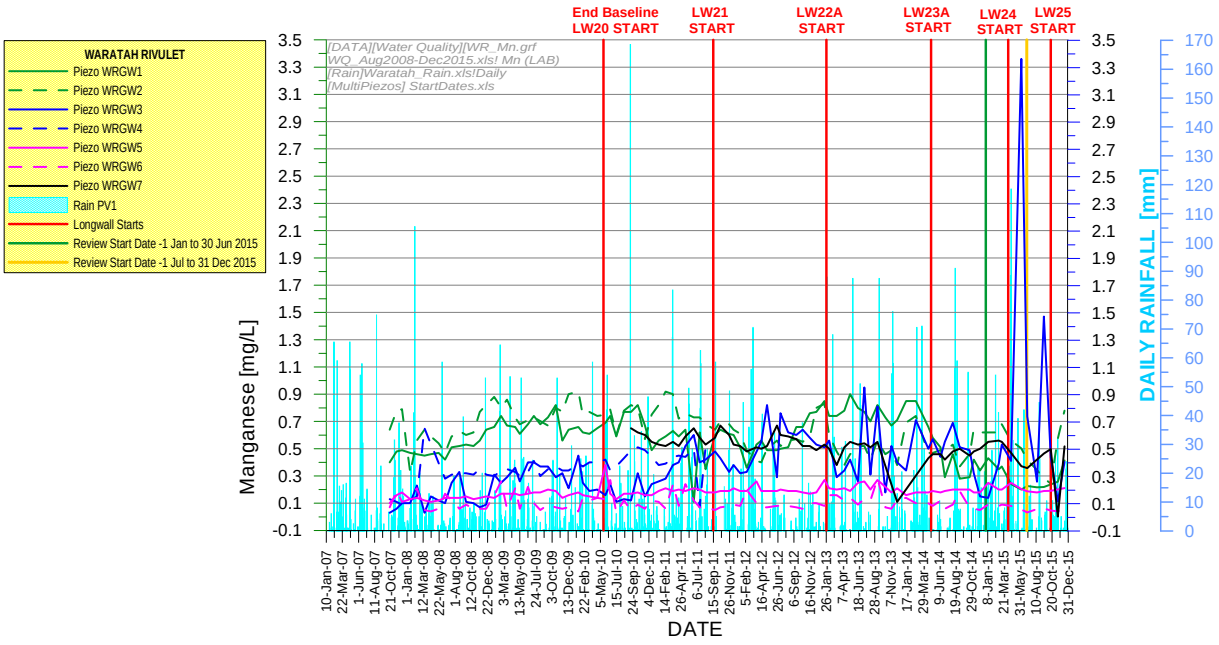


Chart 62 Manganese Concentrations at WRGW1 to WRGW7 on Waratah Rivulet[6]

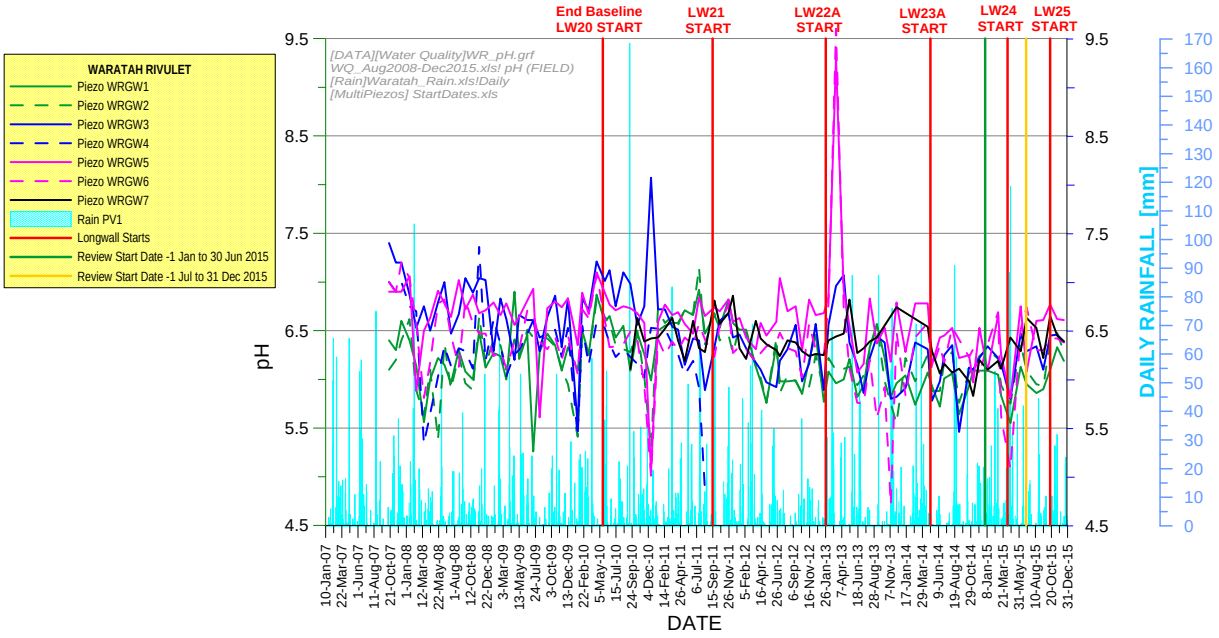


Chart 63 pH Levels at WRGW1 to WRGW7 on Waratah Rivulet

[6] Anomalously high concentrations of manganese were reported for WRGW3 in June 2015 (3.36 mg/L) and September 2015 (1.47 mg/L). These results appear to be transient outliers, with manganese concentrations returning to within the typical range for the last three months of 2015.

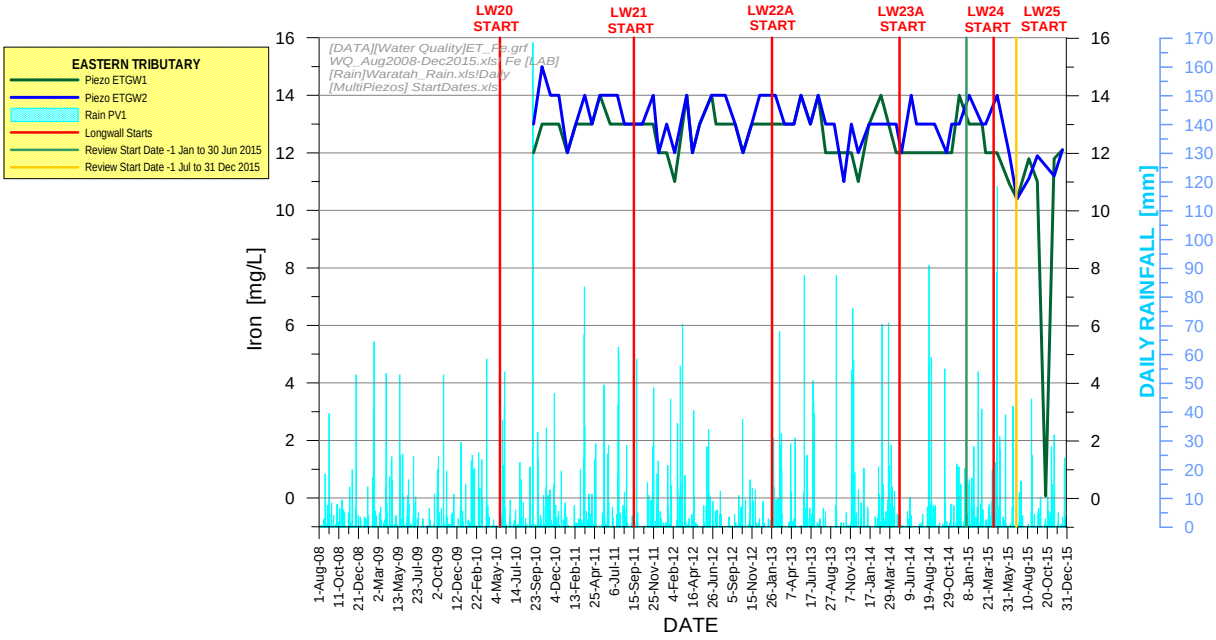


Chart 64 Iron Concentrations at ETGW1 and ETGW2 on Eastern Tributary[7]

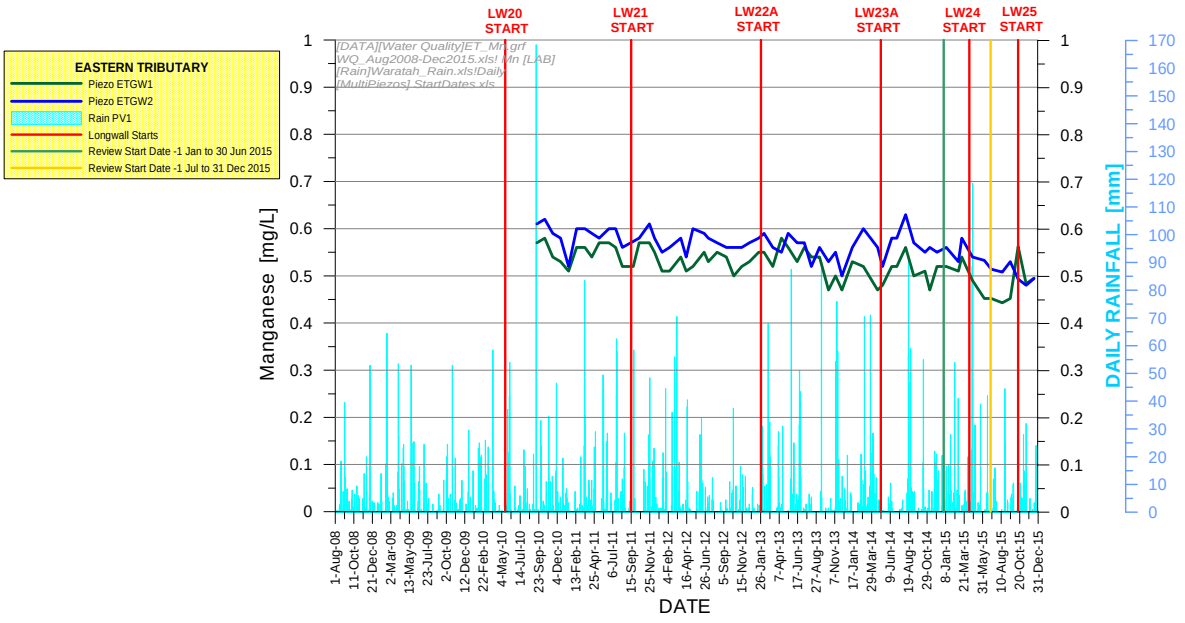


Chart 65 Manganese Concentrations at ETGW1 and ETGW2 on Eastern Tributary

[7] An anomalously low result for iron was recorded at ETGW1 in October 2015.

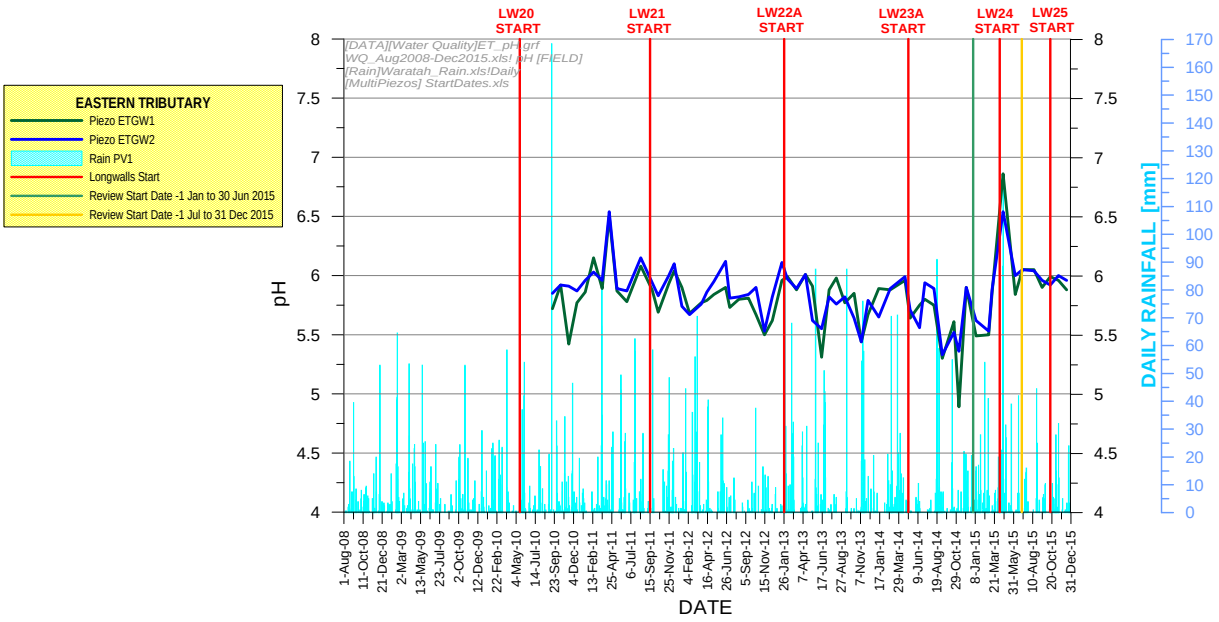


Chart 66 pH Levels at ETGW1 and ETGW2 on Eastern Tributary

The Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans predicted local surface water quality impacts as a result of enhanced groundwater-surface water interactions (as described for surface water quality above). The groundwater quality observations for the reporting period are consistent with those reported previously. There groundwater quality monitoring results are considered to be consistent with the predictions.

Inspections of Mine Workings

Mine inspections did not identify any abnormal water flows from the goaf, geological structure, or strata generally during the reporting period.

The observations are consistent with the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans, as described for mine water make below.

Mine Water Make

The inferred water make (i.e. groundwater that has seeped into the mine from the strata) is calculated from the difference between total mine inflows and total mine outflows. Given the large fluctuations in daily water usage and the cycle period for water entering the mine, a 20 day average is used to provide a more reliable estimate of water make. On the basis of groundwater predictions, the 20 day average daily mine water make is assessed against a subsidence impact performance indicator for mine water make of no more than 2 megalitres per day (ML/day). The 20 day average mine water make was less than 2 ML/day during the reporting period (Chart 67).

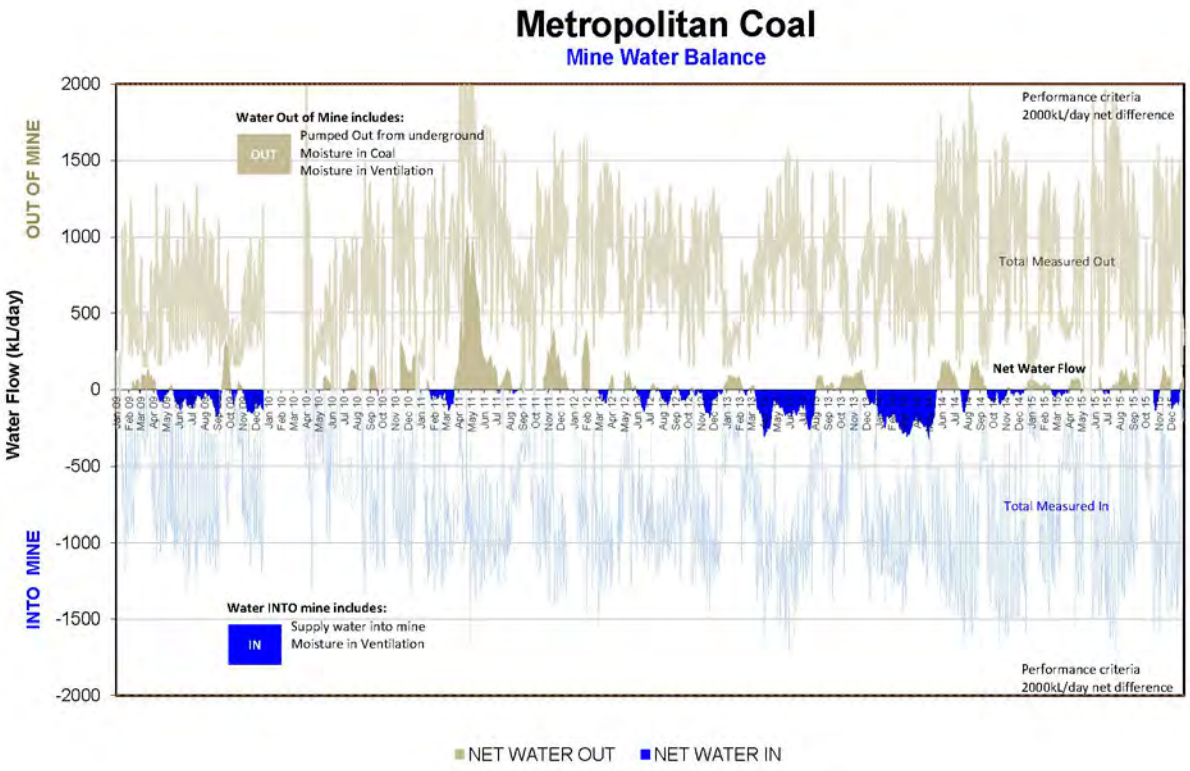


Chart 67 Estimated Daily Mine Water Make

The mine water make monitoring results are consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans, which predicted the water make (i.e. groundwater inflow) to be in the order of 0.1 megalitres per day (ML/day). Modelling indicated that the inflow could be up to 0.5 ML/day from the deep groundwater system during the mining of Longwall 24. Due to the substantial depths of cover at the Project, it was predicted there would not be connective cracking from the mined seam to the surface. The monitoring results for Longwalls 20-22 and Longwalls 23-27 are considered to be consistent with the predictions for mine water make.

6.1.3 Biodiversity Management

The Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Biodiversity Management Plans have been prepared to manage the potential environmental consequences of the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans on aquatic and terrestrial flora and fauna, with a specific focus on swamps, in accordance with Condition 6, Schedule 3 of the Project Approval.

The Metropolitan Coal Longwalls 23-27 Biodiversity Management Plan was revised during the reporting period in accordance with Condition 4, Schedule 7 of the Project Approval (post submission of the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report).

Upland Swamp Vegetation Monitoring

Upland swamp vegetation monitoring is conducted at a number of swamps overlying or adjacent to Longwalls 20-27 and at a number of control swamps (Figures 13 and 14).

The results of the Longwalls 20-22 and Longwalls 23-27 upland swamp vegetation monitoring programs (up to and including the autumn 2015 survey) can be summarised as follows:

- No cracking of exposed bedrock areas or swamp sediments was observed in either longwall or control swamps, other than those recorded during the baseline surveys. Areas in which active erosion was observed were all minor and limited to access tracks, drainage lines and areas of bare earth without vegetation cover. At Swamp 20, iron-stained groundwater seepage has been observed since spring 2012 on the terminal rocky step and a small rocky step.
- The vegetation structure, dominant species and estimated cover abundance for each stratum has been variable across all seasons with variations recorded between sites, seasons and strata. Within the variability of this dataset, a general trend towards increasing height and cover abundance of vegetation structural layers has occurred across all seasons particularly within the tallest structural layer and is a recognised pattern as a consequence of time since fire. No notable changes in vegetation structure, dominant species or estimated cover/abundance which could be attributed to impacts associated with the mining have been recorded within longwall or control swamps.
- Fluctuations in species cover/abundance have been recorded across all sites. No patterns of increasing or decreasing cover/abundance have been identified in relation to individual species across sites or groups of species (i.e. swamp indicator species, generalist species, shrubs, ground covers) within sites.
- Fluctuations in vegetation condition have also been recorded across sites. Generally, vegetation within Restioid Heath/Banksia Thicket swamps has been in a healthy condition with observations of dieback limited to isolated individuals within swamps. For the Tea Tree Thickets, vegetation has been observed to be in a healthy to variable condition in both longwall and control swamps.
- Species richness within Restioid Heath/Banksia Thicket sites in autumn 2015 was within the range of previous seasons (Charts 68 and 69). Analysis of species richness within Restioid Heath/Banksia Thicket sites using analysis of variance did not detect significant differences between longwall and control sites in any season including autumn 2015.
- Species richness within Tea Tree Thicket sites has been relatively stable at control sites across all seasons including autumn 2015, with small decreases and increases observed from season to season (Charts 68 and 70). At the single longwall Tea Tree Thicket swamp over Longwalls 20-22, Swamp 20, decreases in species richness have been recorded in autumn 2012 and spring 2013, with species richness increasing each subsequent season up to and including autumn 2015 (Chart 68). Since spring 2013, species richness within Swamp 20 has continued to increase including the current autumn 2015 season with species richness in autumn 2015 only outside the range for the period spring 2009 to spring 2011 by a single species. At the single longwall Tea Tree Thicket swamp over Longwalls 23-27, species richness decreased in autumn 2015 compared to spring 2014 (Chart 70). A decrease was also observed at two of the control sites (Woronora River 1 and Woronora River South Arm) (Chart 70).
- Analysis of quadrat/transect data indicates that the vegetation in upland swamps overlying longwall mining has not experienced changes significantly different to changes in control swamps.

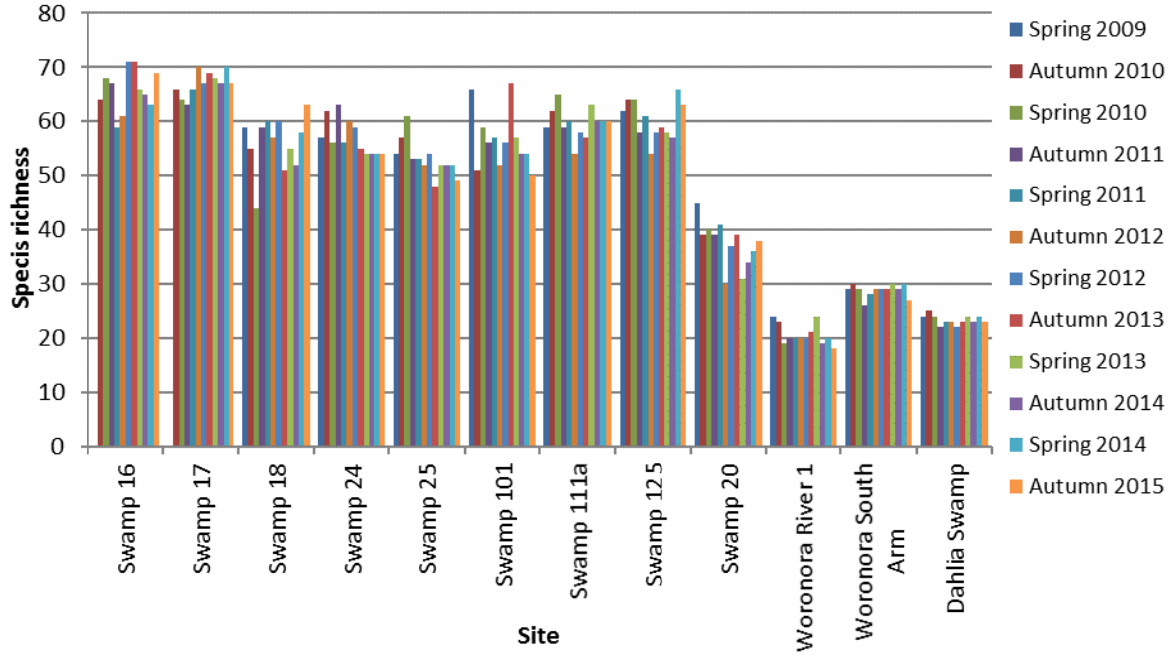


Chart 68 **Species richness in upland swamp sites, spring 2009 – autumn 2015 (Longwalls 20-22 program)**

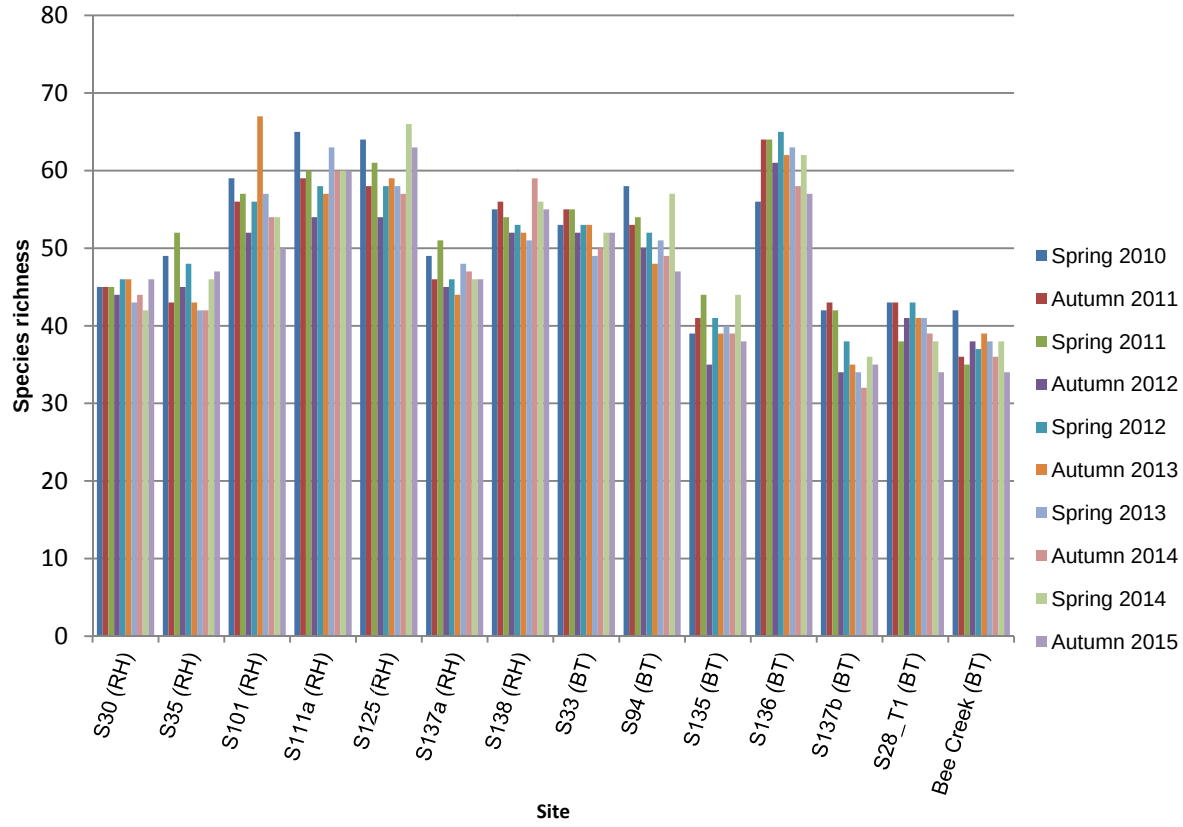


Chart 69 **Species richness within upland swamp sites supporting Restioid Heath and Banksia Thicket, spring 2010 – autumn 2015 (Longwalls 23-27 program)**

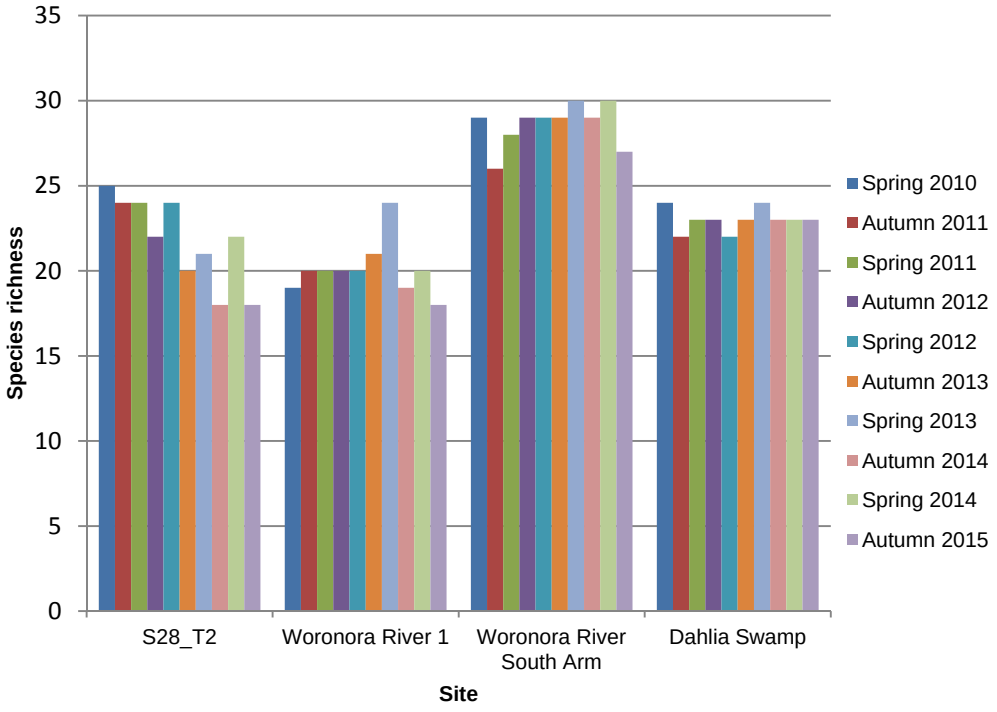


Chart 70 Species richness within upland swamp sites supporting Tea Tree Thicket, spring 2010 – autumn 2015 (Longwalls 23-27 program)

- Monitoring of the indicator species for Longwalls 20-22 identified that for all Restioid Heath/Banksia Thicket swamps the mean vegetation condition in autumn 2015 was similar between longwall and control sites. For the Tea Tree Thicket swamps the mean vegetation condition was similar at both longwall and control sites with the exception of *Leptospermum juniperinum* where vegetation condition at Swamp 20 was greater than at control sites. The mortality rates for each indicator species was also similar between longwall and control swamps.
- Monitoring of indicator species for Longwalls 23-27 identified higher mortality rates within longwall sites compared to control sites for *Epacris obtusifolia, Pultenaea aristata* and *Banksia robur* in autumn 2015. However, similar differences were observed during the baseline monitoring period, indicating that the observed differences do not appear to be related to the mining of Longwalls 23-27.
- The upland swamp vegetation performance indicator, *The vegetation in upland swamps is not expected to experience changes significantly different to changes in control swamps*, has not been exceeded.

The Autumn 2015 Longwalls 20-22 and Longwalls 23-27 Vegetation Monitoring Reports prepared by Eco Logical Australia Pty Ltd are provided in Appendices C and D, respectively.

The key potential subsidence impacts and environmental consequences on upland swamps described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans are described in Section 6.1.2 (Swamp Groundwater Levels).

As a result of the potential subsidence impacts and environmental consequences, no change to the fundamental surface hydrological processes and upland swamp vegetation were expected within upland swamps.

The subsidence predictions presented in the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans indicated that Swamp 20 was most at risk of subsidence impacts. Swamp 20 is an in-valley swamp situated on a second order tributary over Longwall 21. All other swamps over Longwalls 20-22 and Longwalls 23-27 are valley side swamps.

The results of upland swamp monitoring for Longwalls 20-22 and Longwalls 23-27 are considered to be consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans. However, while the water lost from Swamp 20 was retained in the unsaturated sandstone above the regional water table, the changes in swamp water levels as a result of cracking are measurable when compared to seasonal individual rainfall event based changes in swamp groundwater levels. Whether or not this change in swamp water level is affecting only a small portion of Swamp 20 is unknown at this stage. To date, no changes to the vegetation in swamps, including Swamp 20, has been detected that is significantly different to changes in control swamps.

Upland Swamp Groundwater Monitoring

As described in Section 6.1.2, the swamp substrate water levels of Swamps 25, 28, 30, 33 and 35 remained perched during the reporting period (consistent with previous monitoring results). Swamp 20 substrate water levels previously changed from being permanently waterlogged to being periodically waterlogged as a result of the passing of Longwall 21 (Chart 41 and Appendix B).

As a result the upland swamp groundwater performance indicator, *Surface cracking within upland swamps resulting from mine subsidence is not expected to result in measurable changes to swamp groundwater levels when compared to control swamps or seasonal variations in water levels experienced by upland swamps prior to mining*, continued to be exceeded at Swamp 20 (overlying Longwall 21) during the reporting period.

Continued exceedance of the performance indicator at Swamp 20 triggered an assessment against the performance measure, *Negligible impact on threatened species and populations*. Assessments conducted by Dr. Colin Bower (FloraSearch, 2015) and Dr. David Goldney (Cenwest Environmental Services, 2015) for threatened flora or threatened fauna species, respectively, concluded that the subsidence impact performance measure had not been exceeded. The assessments are provided in Appendices E and F, respectively.

The key potential subsidence impacts and environmental consequences on upland swamps described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans are described in Section 6.1.2 (Swamp Groundwater Levels).

The results of upland swamp monitoring for Longwalls 20-22 and Longwalls 23-27 are considered to be consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans. However, while the water lost from Swamp 20 was retained in the unsaturated sandstone above the regional water table, the changes in swamp water levels as a result of cracking are measurable when compared to seasonal individual rainfall event based changes in swamp groundwater levels. Whether or not this change in swamp water level is affecting only a small portion of Swamp 20 is unknown at this stage.

In relation to threatened flora and fauna, the Project was considered unlikely to have a significant effect on threatened flora or fauna (Appendix G of the Project EA). The assessments undertaken to date are consistent with the assessments made in the Project EA for species associated with upland swamps (Appendices E and F).

Riparian Vegetation Monitoring

Riparian vegetation monitoring is conducted at a number of sites on the Waratah Rivulet and Eastern Tributary, overlying Longwalls 20-27 and downstream of Longwalls 20-27 (Figure 15).

The Autumn 2015 Longwalls 20-22 and Longwalls 23-27 Vegetation Monitoring Reports prepared by Eco Logical Australia Pty Ltd are provided in Appendices C and D, respectively.

The results of the Longwalls 20-22 and Longwalls 23-27 riparian vegetation monitoring programs (up to and including the autumn 2015 survey) can be summarised as follows:

- Vegetation at riparian monitoring sites was generally observed in good condition, with the exception of sites MRIP02 on Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary. Within the riparian sites (i.e. excluding sites MRIP02, MRIP05 and MRIP09), dieback was limited to isolated and scattered individuals observed with dieback, and flood impacts (e.g. flood-swept and prone vegetation).
- Increased ponding at site MRIP02 on the Waratah Rivulet and between sites MRIP05 and MRIP09 on the Eastern Tributary from subsidence has resulted in prolonged inundation of streamside vegetation causing vegetation dieback. Vegetation dieback was first observed at site MRIP02 in spring 2012 and between sites MRIP09 and MRIP05 in autumn 2014.
- The riparian vegetation performance indicator, *Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at Metropolitan Coal*, continued to be exceeded at site MRIP02 on Waratah Rivulet and between sites MRIP09 and MRIP05 on the Eastern Tributary, with vegetation dieback observed greater than 50 cm from the Waratah Rivulet/Eastern Tributary.
- Continued exceedance of the performance indicator triggered an assessment against the performance measure, *Negligible impact on threatened species and populations*. Assessments conducted by Dr. Colin Bower (FloraSearch, 2015) and Dr. David Goldney (Cenwest Environmental Services, 2015) for threatened flora or threatened fauna species, respectively, concluded that the impact performance measure had not been exceeded. The assessments are provided in Appendices E and F, respectively.

The key potential subsidence impacts and environmental consequences on streams described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans are described in Section 6.1.2.

The Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Biodiversity Management Plans predicted potential impacts on riparian vegetation, primarily as a result of changes in stream water levels. As described above and in Section 6.11, increased ponding from changes in bed gradients has resulted in the prolonged inundation of the adjacent riparian vegetation which has resulted in vegetation dieback.

In relation to threatened flora and fauna, the Project was considered unlikely to have a significant effect on threatened flora or fauna (Appendix G of the Project EA). The assessments undertaken to date are consistent with the assessments made in the Project EA for species associated with riparian vegetation (Appendices E and F).

Aquatic Biota and their Habitats

The aquatic ecology monitoring programs for Longwalls 20-22 and Longwalls 23-27 have been designed to monitor subsidence-induced impacts on aquatic ecology (referred to as stream monitoring) and the response of aquatic ecosystems to the implementation of potential future stream remediation works (referred to as pool monitoring). The locations of the monitoring sites are shown on Figure 16.

The Autumn 2015 Longwalls 20-22 and Longwalls 23-27 Aquatic Ecology Monitoring Reports prepared by Bio-Analysis Pty Ltd are provided in Appendices G and H, respectively.

Multivariate and univariate statistical procedures (Permutational Multivariate Analyses of Variance [PERMANOVA] and Plymouth Routines in Multivariate Ecological research [PRIMER] software packages) were used to examine temporal and spatial patterns in macroinvertebrates and macrophytes sampled within the study area. Specifically, PERMANOVA's were used to test hypotheses related to differential changes e.g. (before vs after commencement of mining) in multivariate and univariate (e.g. total number of taxa, total abundance and abundances of the most important taxonomic groups identified from the samples) estimates occurring in streams or pools subject to mining (i.e. potential 'impact' streams) in comparison to independent streams or pools that are not subject to mine subsidence (i.e. control places).

Multivariate statistical techniques (Bray Curtis dissimilarities) were also used to examine patterns in assemblages of macroinvertebrates and macrophytes among locations or pools. Multivariate methods allow comparisons of two (or more) samples based on the degree to which these samples share particular species, at comparable levels of abundance (Clarke and Warwick, 1994). Principal Coordinates Analyses are used to present a graphical representation of relationships among samples. Similarity of percentages (SIMPER) are used to determine those taxa primarily responsible for the observed similarities (or dissimilarities) (Clarke, 1993).

<u>Stream Monitoring Program</u>

Multivariate analyses (PERMANOVA) of the Longwalls 20-22 and Longwalls 23-27 stream monitoring data compared before versus after mining indicates that any effect of longwall mining on assemblages of aquatic macroinvertebrates and macrophytes at Locations C1, C2, C3 and C4 on the Eastern Tributary and at Locations WT3, WT4 and WT5 on the Waratah Rivulet to date (to autumn 2015) are within the range of natural variability in these assemblages as measured by the control locations.

The Principal Coordinates Analyses indicated that assemblages of macroinvertebrates at Location C3 on the Eastern Tributary have grouped separately from prior sampling occasions since spring 2012. The spring 2012 survey coincided with observed inundation of the stream bank as a result of subsidence and riparian vegetation dieback was noted at Location C3 in the following season (i.e. autumn 2013). SIMPER analyses indicated that differences were mostly due to changes in the contribution that the families Atyidae (freshwater shrimps) and Leptophlebiidae (mayflies) made to the structure of the assemblage. There have been considerable spikes in mean total numbers of macroinvertebrates at Location C3 in spring 2012, autumn 2013 and spring 2014, driven mostly by increased numbers of Leptophlebiidae. In contrast, mean numbers of Atyidae have decreased since spring 2012. The riparian vegetation dieback has not affected emergent species of macrophyte at the location. Rather, emergent species have colonised sections of the inundated area.

Quantitative sampling of aquatic macroinvertebrates was not carried out at Location B1 on Tributary B in autumn 2015, spring 2014 or spring 2013 due to insufficient habitat available for sampling. A considerable drop (approximately 1 m) in water level was noted in a large pool at Location B1 in spring 2012. By autumn 2013, the pool had almost completely emptied and there was no surface flow along the study reach due to subsidence associated with mining of the Longwalls 20-22 underground mining area.

For the first time since sampling commenced in spring 2009, there was evidence of minor cracking of the stream substratum at the most upstream site (Site B2-1) at Location B2 on Tributary B. The structure of assemblages of aquatic macroinvertebrates at Location B2 on Tributary B have differed significantly from before-to-after the commencement of Longwalls 23-27 in comparison to the control locations since spring 2014. However, there were no spatial and/or temporal patterns of aquatic macrophytes at Location B2 on Tributary B related to the commencement of mining of Longwalls 23-27.

Pool Monitoring Program

To date, multivariate analyses comparing temporal and spatial patterns of change in assemblages of aquatic macroinvertebrates in large and small pools sampled on the Waratah Rivulet with the control pools have not detected significant differences in the structure of assemblages of macroinvertebrates or their main components (i.e. Leptophlebiidae and Atyidae) when comparing the before-to-after mining periods. Mean diversity of macroinvertebrates in Pools J and M1 has increased significantly in relation to control pools since the commencement of Longwalls 20-22.

In autumn 2015, the structure of aquatic macroinvertebrates at large pool ETAH sampled on the Eastern Tributary was found to differ significantly from before-to-after mining, largely due to changes in the contribution that the families Atyidae, Leptophlebiidae and Leptoceridae made to the structure of the assemblage. Analyses of macroinvertebrate data collected in small pools on the Eastern Tributary indicate that to date, changes before-to-after mining Longwall 23 are within the range of natural variability as measured by the control locations.

Macrophyte assemblages at the large and small pools on the Waratah Rivulet and the Eastern Tributary have been distinctive among streams since the commencement of sampling. Differences among streams are mostly due to the different species that dominate the assemblages. Assemblages of macrophytes in Pool N on Waratah Rivulet appear to have changed since spring 2012 compared to prior sampling occasions. Analyses examining changes in aquatic macrophytes in small pools on Waratah Rivulet and Eastern Tributary found no evidence of impacts related to mining activities.

The key potential subsidence impacts and environmental consequences for streams described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Biodiversity Management Plans are described in Section 6.1.2. Potential environmental consequences include impacts on aquatic habitats (e.g. alteration of hydrology, pool habitat, in-stream connectivity and water quality), and on biodiversity (e.g. aquatic macrophytes, macroinvertebrates, fish and riparian vegetation). In summary, the key potential environmental consequences described in the Project EA, Preferred Project Report, and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Biodiversity Management Plans include:

- Changes in stream flows as a result of fracturing of bedrock and the consequent diversion of a portion of the total stream flow as underflow. The effects of underflow would be most noticeable during periods of low flow and on the frequency of no flow, while the effects on the frequency and magnitude of high flows would be negligible.
- Changes in pool water levels and in-stream connectivity - underflow has been observed to result in lower water levels in pools as they become hydraulically connected with the fracture network. During prolonged dry periods when flows recede to low levels, the number of instances where loss of flow continuity between pools occurs increases with a greater proportion of these lower flows being conveyed entirely in the subsurface fracture network.
- Impacts on water quality following cracking of the stream bed that can reduce the quality of habitat for aquatic biota (e.g. generation of iron flocculent material).
- Minor stream bank erosion, where changes in channel gradients result in increases in flow energy.

- Impacts on aquatic macrophytes plants (e.g. as a result of changes in hydrology described above) resulting in exposure and desiccation or smothering of plants by iron flocculent material. Aquatic macrophytes have evolved reproductive strategies to cope with the variable nature of flow in streams and wetlands within Australia. Obligate water plants generally require permanent water, however they can recolonise once water becomes available again. Localised impacts on aquatic macroinvertebrates as a result of changes in aquatic habitat/hydrology described above. The Project is unlikely to have any significant long-term impacts on assemblages of macroinvertebrates.
- The conveyance of surface water flows to sub-surface fractures in the area affected by subsidence has the potential to reduce available habitat for fish (e.g. aquatic macrophytes, pools) and connectivity among sections of the stream channel, impeding fish passage.

The results of aquatic ecology monitoring for Longwalls 20-22 and Longwalls 23-27 are considered to be consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Water Management Plans and Biodiversity Management Plans. However, subsidence impacts on Tributary B have resulted in no surface flow along the stream in the vicinity of Location B1 for an extended period of time. This change in aquatic habitat/hydrology has resulted in impacts to the aquatic macroinvertebrate assemblage at this location.

Amphibian Surveys

Monitoring programs have been developed for Longwalls 20-22 and Longwalls 23-27 to monitor amphibian species, with a focus on the habitats of the Giant Burrowing Frog (*Heleiporus australiiacus*) and Red-crowned Toadlet (*Pseudophryne australis*) associated with tributaries. The locations of the monitoring sites are shown on Figure 17.

The Spring-Summer 2014 Longwalls 20-22 and Longwalls 23-27 Amphibian Monitoring Reports prepared by Cenwest Environmental Services are provided in Appendices I and J, respectively.

A Poisson regression analysis has been used to analyse the amphibian survey results obtained to date (i.e. to spring/summer 2014). No adverse impact from mining has been detected for any frog species including the Giant Burrowing Frog and Red-crowned Toadlet, at the 95% confidence level.

The monitoring results are consistent with the predictions described in the Project EA, Preferred Project Report, and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Biodiversity Management Plans, specifically, that it is unlikely that any vertebrate population would be put at risk by the Project.

6.1.4 Land Management

The Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Land Management Plans were prepared to manage the potential environmental consequences of the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans on cliffs, overhangs, steep slopes and land in general, in accordance with Condition 6, Schedule 3 of the Project Approval.

Steep Slopes and Land in General

Opportunistic visual inspections for subsidence impacts on steep slopes and land in general are conducted by Metropolitan Coal and its contractors as part of routine works conducted in the catchment.

No additional surface tension cracks to those reported previously were observed during the reporting period.

Visual inspections and photographic surveys conducted along Tributary B following the completion of Longwall 23 identified a collapsed rock ledge at the upstream end of Pool TB-M. The dimensions of the rock ledge was approximately 0.4 – 0.7 m (thick) by 6 m (wide) by 2 – 3 m (deep). The potential for environmental consequences or safety hazard were assessed and documented in the Land Management Plan – Subsidence Impact Register. No management measures were required to be implemented. The subsidence impact is consistent with the potential subsidence impacts described in the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans.

Cliffs and Overhangs

Visual inspections have been conducted monthly for the period of time Longwalls 23-27 extraction has been within 400 m of sites COH2, COH3, COH4, COH5, COH6, COH6a, COH7, COH8, COH9, COH10, COH14, COH15 and COH16 (Figure 18) and following the completion of each longwall to record evidence of subsidence impacts.

Previously, a small rock fall was recorded in December 2013 at site COH2 (Figure 18). No additional rock falls at the cliff or overhang sites were recorded during the reporting period.

The Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Land Management Plans predicted that the length of potential cliff instabilities would be expected to be less than 3% of the lengths of the cliffs. The total length of cliffs and associated overhangs within the Project underground mining area is approximately 772 m. The total length of cliffs and associated overhangs within the mining area to experience cliff instability (i.e. the exposure of a fresh face of rock and debris scattered around the base of the cliff or overhang) is to be less than 23 m. Less than 3% of the total length of cliffs (and associated overhangs) within the mining area have experienced mining-induced rock fall.

6.1.5 Heritage Management

The Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Heritage Management Plans were prepared to manage the potential environmental consequences of the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans on Aboriginal heritage sites or values in accordance with Condition 6, Schedule 3 of the Project Approval.

The Metropolitan Coal Longwalls 23-27 Heritage Management Plan was revised during the reporting period in accordance with Condition 4, Schedule 7 of the Project Approval (post submission of the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report).

A monitoring program has been implemented to monitor the impacts and consequences of mine related subsidence on Aboriginal heritage sites located within the 35^{o} angle of draw of Longwalls 20-22 and Longwalls 23-27 (Figure 19). The Aboriginal heritage sites monitoring program is carried out by an archaeologist (with experience in rock art recording and management) and Aboriginal stakeholder representatives.

Five heritage sites (FRC 15, FRC 281, FRC 283, FRC 284 and MET 1) were determined by the Longwalls 20-22 Rounds 1, 2 and 3 Aboriginal heritage surveys to have changes due to mining induced subsidence from Longwalls 20-22 (as reported in the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report). The first round of monitoring for Longwalls 23-27 (Round 1) was conducted in September and October 2015 following the completion of Longwall 23 by Niche Environment and Heritage Pty Ltd (2016). The Round 1 monitoring report is provided in Appendix K. One Aboriginal heritage site (FRC 176) was observed during the Round 1 monitoring to have changes due to mining induced subsidence, specifically, vertical cracking along the northern and southern ends of the shelter. The art panel was not affected by this cracking.

In accordance with the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Heritage Management Plans, Aboriginal heritage site monitoring results are used to assess the Project against the Aboriginal heritage subsidence impact performance measure:

> *Less than 10% of Aboriginal heritage sites within the mining area are affected by subsidence impacts.*

For the purpose of measuring performance against the Aboriginal heritage subsidence impact performance measure, sites are considered to be "affected by subsidence impacts" if they exhibit one or more of the following consequences that cannot be attributed to natural weathering or deterioration:

- overhang collapse;
- cracking of sandstone that coincides with Aboriginal art or grinding grooves; and
- rock fall that damages Aboriginal art.

The mining area is defined by the Project Approval and is shown on Figure 2 of this report (labelled Project Underground Mining Area Longwalls 20-27 and 301-317). Of the sites at which changes due to mining induced subsidence have occurred, site FRC 281 has been affected by subsidence impacts as a result of cracking of sandstone that coincides with Aboriginal art. This means that less than 1% of sites within the mining area have been affected, which is within the approved performance measure.

Round 2 of the Longwalls 23-27 monitoring program has been conducted between three to six months following the completion of Longwall 24 and Round 3 of the Longwalls 23-27 monitoring program will be undertaken within three to six months following the completion of Longwall 25. The results of these surveys will be reported in the Metropolitan Coal 2016 Annual Review.

The Aboriginal heritage monitoring results are consistent with the potential subsidence impacts and environmental consequences described in the Project EA, Preferred Project Report and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Heritage Management Plans including the potential for open sites and overhang sites to be impacted by the cracking of sandstone resulting from mine subsidence. Where cracking is coincident with an overhang, there is potential for an isolated rock fall as the result of mining, or in extreme cases, collapse. The observed rate of subsidence effects at the time of the Project EA and Preferred Project Report was that up to 10% of sites experience an effect such as cracking, accelerated weathering or blockfall. The Project EA, Preferred Project Report, and Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Heritage Management Plans predicted that the majority of identified Aboriginal heritage sites would experience no significant change, particularly when compared to natural deteriorating processes unrelated to mining.

6.1.6 Built Features Management

The Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Built Features Management Plans were developed to manage the potential environmental consequences of the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans on built features in accordance with Condition 6, Schedule 3 of the Project Approval.

As indicated in the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report, the Metropolitan Coal Longwalls 20-22 Built Features Management Plan has effectively been discontinued as the appropriate monitoring for built features has been incorporated into the Metropolitan Coal Longwalls 23-27 Built Features Management Plan.

A monitoring program has been implemented to monitor subsidence impacts on infrastructure owned by Endeavour Energy, Nextgen, TransGrid, Optus, Telstra, Roads and Maritime Services, RailCorp, Sydney Water and WCC. Analysis of measured subsidence was conducted at the end of Longwall 23 and 24 by Mine Subsidence Engineering Consultants (MSEC). MSEC concluded that subsidence measurements for built features were similar to or less than those predicted. No subsidence impact to any built feature was evident over the reporting period.

The Project Approval requires Metropolitan Coal not to exceed the following built features subsidence impact performance measure:

Safe, serviceable and repairable, unless the owner and the MSB agree otherwise in writing.

The built features subsidence impact performance measure was not exceeded during the reporting period.

The Project Approval also requires Metropolitan Coal not to exceed the heritage subsidence impact performance measure for items of heritage or historical significance at the Garrawarra Centre. The Garrawarra Complex is located more than 2.5 km from Longwalls 23-27 and at this distance no measurable systematic or non-systematic subsidence movements were indicated.

During the reporting period, an extensive structural investigation was completed for Bridge 2 to determine the safe and serviceable criteria. Real time monitoring provisions and future mining stand-off requirements were established for Bridge 2 to meet the safe and serviceable criteria.

6.1.7 Public Safety Management

The Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Public Safety Management Plans were prepared to manage the potential consequences of the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Extraction Plans on public safety within the underground mining areas in accordance with Condition 6, Schedule 3 of the Project Approval.

Monitoring of cliffs and overhangs, steep slopes and land in general has been conducted for subsidence impacts in accordance with the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Land Management Plans, and of infrastructure items in accordance with the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Built Features Management Plans. No subsidence impacts were identified during the reporting period that were considered to pose a risk to public safety.

Further, no safety incidents were reported by visitors, personnel or contractors to Metropolitan Coal in the underground mining area during the reporting period.

6.1.8 Assessment of Environmental Performance

The subsidence impact performance indicators and performance measures in Table 8 were developed to address the predictions of subsidence impacts and environmental consequences on water resources, watercourses, biodiversity, land, heritage, built features and public safety included in the Project EA, Preferred Project Report, Metropolitan Coal Longwalls 20-22 Extraction Plan and Longwalls 23-27 Extraction Plan. Assessment against the subsidence impact performance indicators and performance measures have been conducted for the reporting period (1 January to 31 December 2015) in Table 8.

Table 8
Assessment of Environmental Performance – Underground Mining Area and Surrounds

Monitoring Components	Subsidence Impact Performance Indicator(s)	Longwalls 20-22 Extraction Plan*	Longwalls 23-27 Extraction Plan#	Subsidence Impact Performance Indicator Exceeded?	Resulting Actions	Subsidence Impact Performance Measure	Subsidence Impact Performance Measure Exceeded?
WATER MANAGEMENT							
Surface Water Flow	*Changes in the quantity of water entering Woronora Reservoir is not significantly different post-mining compared to pre-mining, that is not also occurring in the control catchment(s)*	✓	✓	No	Continue monitoring	*Negligible reduction to the quantity of water resources reaching the Woronora Reservoir*	No
Water Quality Reaching Woronora Reservoir	*Changes in the quality of water entering Woronora Reservoir are not significantly different post-mining compared to pre-mining concentrations that are not also occurring at control site WOWQ2*	✓	✓	Yes	Assessment against the performance measure conducted by Hydro Engineering & Consulting (2016) (Appendix A). Continue monitoring	*Negligible reduction to the quality of water resources reaching the Woronora Reservoir*	No. Assessment to be subject to peer review.
Connective Cracking	*Visual inspection does not identify abnormal water flow from the goaf, geological structure, or the strata generally*	✓	✓	No	Continue monitoring	*No connective cracking between the surface and the mine*	No
	The 20-day average mine water make does not exceed 2 ML/day	✓	✓	No	Continue monitoring		No
	Significant departures from the predicted envelope of vertical potentiometric head profiles at Bores 9GGW2B and 9FGW1A do not occur	✓	×	No	Continue monitoring		No
	Significant departure from the predicted envelope of the vertical potentiometric head profile at Bore 9GGW2B does not occur	×	✓	No	Continue monitoring		No
	The water tables measured at Bores 9FGW1A and 9GGW1-80 are higher than the water levels of streams crossed by a transect along Longwall 22 (i.e. a hydraulic gradient exists from each bore to the nearest watercourse)	✓	✓	No	Continue monitoring		No

Table 8 (Continued)
Assessment of Environmental Performance – Underground Mining Area and Surrounds

Monitoring Components	Subsidence Impact Performance Indicator(s)	Longwalls 20-22 Extraction Plan*	Longwalls 23-27 Extraction Plan#	Subsidence Impact Performance Indicator Exceeded?	Resulting Actions	Subsidence Impact Performance Measure	Subsidence Impact Performance Measure Exceeded?
WATER MANAGEMENT (Continued)							
Leakage from the Woronora Reservoir	*The groundwater head of Bores 9GGW2B and PM02 is higher than the water level of Woronora Reservoir (i.e. a hydraulic gradient exists from the bores to the Woronora Reservoir)*	✓	✓	No	Continue monitoring	*Negligible leakage from the Woronora Reservoir*	No
Water Quality of Woronora Reservoir	*Changes in the quality of water in the Woronora Reservoir are not significantly different post-mining compared to pre-mining concentrations*	✓	✓	No	Continue monitoring	*Negligible reduction in the water quality of Woronora Reservoir*	No
Waratah Rivulet Environmental Consequences	*No change to the natural drainage behaviour of Pool P. Specific indicators include: no new cracking in the stream bed of Pool P or rock bar; continual flow through/below the rock bar of Pool P such that water is ponded upstream; and continual surface water flow along the length of Pool P*	✓	×	No	Continue monitoring	*Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases) on the Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P)*	No
	No change to the natural drainage behaviour of Pools P, Q, R, S, T, U, V and W. Specific indicators include: no new cracking in the stream bed of pools or rock bars (where relevant); continual flow over/ through/below the rock bars/terminal boulder fields of pools such that water is ponded upstream; and continual surface water flow along the length of the pools	×	✓	No	Continue monitoring		No
	Analysis of water depth data for Pool P (when mining is within 400 m of Pool P) indicates the water depth is at or above the pool's previous minimum (i.e. when mining is beyond 400 m of Pool P)	✓	×	No	Continue monitoring		No

Table 8 (Continued)
Assessment of Environmental Performance – Underground Mining Area and Surrounds

Monitoring Components	Subsidence Impact Performance Indicator(s)	Longwalls 20-22 Extraction Plan*	Longwalls 23-27 Extraction Plan#	Subsidence Impact Performance Indicator Exceeded?	Resulting Actions	Subsidence Impact Performance Measure	Subsidence Impact Performance Measure Exceeded?
WATER MANAGEMENT (Continued)							
Waratah Rivulet Environmental Consequences (Continued)	*Analysis of water depth data for Pools P, T and V (when mining is within 400 m of the pools) indicates the water depth is at or above the pool's previous minimum (i.e. when mining is beyond 400 m of the pools)*	×	✓	No	Continue monitoring	*Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases) on the Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P)*	No
	Analysis of water depth data for Pools Q, R and S on Waratah Rivulet indicates the water depths are above that required to maintain water over the downstream rock bar	✓	✓	No	Continue monitoring		No
	Visual inspection of the Waratah Rivulet between the full supply level of the Woronora Reservoir and Pool P does not show significant changes in the extent or nature of iron staining that isn't also occurring in the Woronora River (control site)	×	✓	No	Continue monitoring		No
Waratah Rivulet Environmental Consequences (Continued)	*Visual observations of gas releases in Pool P on the Waratah Rivulet indicate the gas releases have increased beyond those observed up to 17 April 2014*	✓	✓	No	Continue monitoring	*Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases) on the Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P)*	No
	No gas releases observed at Pools Q to W on the Waratah Rivulet	×	✓	No	Continue monitoring		No

Table 8 (Continued)
Assessment of Environmental Performance – Underground Mining Area and Surrounds

Monitoring Components	Subsidence Impact Performance Indicator(s)	Longwalls 20-22 Extraction Plan*	Longwalls 23-27 Extraction Plan#	Subsidence Impact Performance Indicator Exceeded?	Resulting Actions	Subsidence Impact Performance Measure	Subsidence Impact Performance Measure Exceeded?
WATER MANAGEMENT (Continued)							
Eastern Tributary Environmental Consequences	*No change to the natural drainage behaviour of at least 70% of the stream reach (from Pools ETAF to ETAU). Specific indicators include: no new cracking in the stream bed of pools or rock bars (where relevant); continual flow over/through/below the rock bar of pools/terminal boulder fields such that water is ponded upstream; and continual surface water flow along the length of pools*	×	✓	No	Continue monitoring	*Negligible environmental consequences over at least 70% of the stream length (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases) on the Eastern Tributary between the full supply level of the Woronora Reservoir and the maingate of Longwall 26*	No
	Analysis of water depth data for Pool ETAI on the Eastern Tributary (when mining is within 400 m of the pool) indicates the water depth is at or above the pool's previous minimum (i.e. when mining is beyond 400 m of the pool)	×	✓	No	Continue monitoring		No
	No significant change to the extent or nature of iron staining over more than 30% of the Eastern Tributary between maingate 26 and full supply level	×	✓	No	Continue monitoring		No
	Gas releases observed over less than 30% of the Eastern Tributary between maingate 26 and full supply level, that is not also occurring in the Woronora River (control site)	×	✓	No	Continue monitoring		No
BIODIVERSITY MANAGEMENT							
Upland Swamps Vegetation Monitoring	*The vegetation in upland swamps is not expected to experience changes significantly different to vegetation in control swamps*	✓	✓	No	Continue monitoring	*Negligible impact on threatened species and populations*	No

Table 8 (Continued)
Assessment of Environmental Performance – Underground Mining Area and Surrounds

Monitoring Components	Subsidence Impact Performance Indicator(s)	Longwalls 20-22 Extraction Plan*	Longwalls 23-27 Extraction Plan#	Subsidence Impact Performance Indicator Exceeded?	Resulting Actions	Subsidence Impact Performance Measure	Subsidence Impact Performance Measure Exceeded?
BIODIVERSITY MANAGEMENT (Continued)							
Upland Swamps Groundwater Monitoring	*Surface cracking within upland swamps resulting from mine subsidence is not expected to result in measurable changes to swamp groundwater levels when compared to control swamps or seasonal variations in water levels experienced by upland swamps prior to mining*	✓	✓	Yes – performance indicator exceeded for Swamp 20 overlying Longwall 21 (Longwalls 20-22 upland swamps) (Appendix B) No (Longwalls 23-27 upland swamps) (Appendix B)	Assessment against the performance measure conducted by FloraSearch (2015) (threatened flora) and Cenwest Environmental Services (2015) (threatened fauna) in relation to Swamp 20 (Appendices E and F, respectively). Continue monitoring	*Negligible impact on threatened species and populations*	No
Riparian Vegetation	*Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at Metropolitan Coal*[1]	✓	✓	Yes – performance indicator exceeded at site MRIP02 on the Waratah Rivulet and between sites MRIP09 and MRIP05 on the Eastern Tributary (Appendices C and D)	Assessment against the performance measure conducted by FloraSearch (threatened flora) and Cenwest Environmental Services (threatened fauna) (Appendices E and F, respectively. Continue monitoring		No

Table 8 (Continued)
Assessment of Environmental Performance – Underground Mining Area and Surrounds

Monitoring Components	Subsidence Impact Performance Indicator(s)	Longwalls 20-22 Extraction Plan*	Longwalls 23-27 Extraction Plan#	Subsidence Impact Performance Indicator Exceeded?	Resulting Actions	Subsidence Impact Performance Measure	Subsidence Impact Performance Measure Exceeded?
BIODIVERSITY MANAGEMENT (Continued)							
Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC	*Subsidence effects at the occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC situated approximately 400 m to the east of Longwalls 20-22 are expected to be negligible*	✓	×	No	Continue monitoring	*Negligible impact on threatened species and populations*	No
	Subsidence effects at the occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC situated approximately 300 to 500 m to the east of Longwalls 23-27 are expected to be negligible	×	✓	No	Continue monitoring		No
Aquatic Biota	*The aquatic macroinvertebrate and macrophyte assemblages in streams and pools are not expected to experience long-term impacts as a result of mine subsidence*	✓	✓	No[2]	Continue monitoring		No
Amphibian Monitoring	*The amphibian assemblage is not expected to experience changes significantly different to the amphibian assemblage at control sites*	✓	✓	No	Continue monitoring		No
LAND MANAGEMENT							
Steep Slopes and Land in General	*Steep slopes and land in general are expected to experience surface tension cracking no greater than 0.1 m wide and 25 m in length*	✓	✓	No	Continue monitoring	-	-
Cliffs and Overhangs	-	✓	✓	-	-	*Less than 3% of the total length of cliffs (and associated overhangs) within the mining area experience mining-induced rock fall*	No

Table 8 (Continued)
Assessment of Environmental Performance – Underground Mining Area and Surrounds

Monitoring Components	Subsidence Impact Performance Indicator(s)	Longwalls 20-22 Extraction Plan*	Longwalls 23-27 Extraction Plan#	Subsidence Impact Performance Indicator Exceeded?	Resulting Actions	Subsidence Impact Performance Measure	Subsidence Impact Performance Measure Exceeded?
HERITAGE MANAGEMENT							
Aboriginal Heritage Sites	-	✓	✓	-	-	*Less than 10% of Aboriginal heritage sites within the mining area are affected by subsidence impacts*	No
BUILT FEATURES MANAGEMENT							
Built Features	-	✓	✓	-	-	*Safe, serviceable and repairable, unless the owner and the MSB agree otherwise in writing*	No
	-	✓	✓	-	-	*Negligible damage (fine or hairline cracks that do not require repair), unless the owner of the item and the appropriate heritage authority agree otherwise in writing*	No
PUBLIC SAFETY MANAGEMENT							
Public Safety	*Public safety will be ensured in the event that any hazard to the general public arising from subsidence effects becomes evident*	✓	✓	No	Continue monitoring	*Safe, serviceable and repairable, unless the owner and the MSB agree otherwise in writing*	No

* Performance indicator applicable to Longwalls 20-22 (✓) Yes; (×) No.

\# Performance indicator applicable to Longwalls 23-27 (✓) Yes; (×) No.

1 This indicator is exceeded if visual inspections identify vegetation dieback greater than 50 cm from the stream.

2 This performance indicator will be assessed after the completion of Longwall 26 (for Longwalls 20-22) and after the completion of Longwall 303 (for Longwalls 23-27), and after one year of the completion of stream remediation (for relevant pools).

6.2 SURFACE FACILITIES AREA

Section 6.2 provides a summary of the key environmental monitoring results for noise, air quality, traffic and waste at the surface facilities area, an assessment of environmental performance and a description of the management measures implemented during the reporting period.

The environmental performance of surface facilities water management is provided in Section 7.

Each section indicates in which management plan details of the surface facilities management and monitoring are available. The Metropolitan Coal management plans are available on the Peabody website (http://www.peabodyenergy.com).

6.2.1 Noise Management

The Metropolitan Coal Noise Management Plan has been prepared for the surface facilities area in accordance with Condition 8, Schedule 4 of the Project Approval.

Real-time Noise Monitoring

Real-time noise monitoring for the Project is undertaken using an unattended statistical noise logger located at the northern boundary of 16 Oxley Place (Figure 20). Real-time noise monitoring is used as an internal noise management tool and not for compliance purposes.

The real-time noise monitor records noise levels 24 hours a day, 7 days a week, and a graphical summary of the previous 24 hours of noise is sent to mine staff via email on a daily basis.

A real-time noise performance indicator, *The $L_{Aeq(5\ minute)}$ night-time noise level does not exceed 50 dB(A) for six consecutive 5 minute samples*, has been developed in consideration of façade reflection and as an alert to the potential exceedance of the noise acquisition criteria.

Real-time noise monitoring includes an audio function which allows the monitor to record audio of the noise signal and an 'alarm' function whereby noise data is processed and compared against the real-time noise performance indicator. The audio of these events can then be reviewed to see if the cause is Project related, allowing Metropolitan Coal to investigate the causes and potential controls for high Project related noise events.

The real-time noise performance indicator is considered to be exceeded if the $L_{Aeq(5\ minute)}$ night-time noise level exceeds 50 A-weighted decibels (dB[A]) for six consecutive 5 minute samples.

The real-time noise performance indicator was triggered some 230 times during the reporting period. Reviews conducted following these typically indicated that the source of the trigger was overflying aircraft, birds, bats, vehicles on Parkes Street, dogs barking, wind and/or rain.

However, on two occasions, distinct noise events were identified that warranted further investigation to determine whether they were the result of mine activities. The first, a series of five loud bangs in April 2015, could not be sourced to any on-site activities and the source of the noise remains unknown. The second event was the result of a delivery truck making a late night delivery to Metropolitan Coal in July 2015 without authorisation.

Attended Noise Monitoring

Noise monitoring for the Project has consisted of quarterly attended noise monitoring at 16 Oxley Place, 53 Parkes Street, 50 Parkes Street and 36 Old Station Road (sites representative of the nearest residences to the Project [Figure 20]) to quantify the intrusive noise emissions from the mine, including processing (CHPP) and transportation operations as well as the overall level of ambient noise.

Noise monitoring is conducted for 15 minute periods during the daytime, evening and night-time over two consecutive days and nights and compared to applicable Noise Impact Assessment Criteria, Noise Mitigation Criteria and Noise Acquisition Criteria (refer Section 6.2.5 and Appendix L).

The quarterly noise monitoring and compliance results for the reporting period can be summarised as follows:

- There were no daytime non-compliance results at all four operator-attended monitoring locations against the intrusive Noise Acquisition Criteria, Noise Mitigation Criteria and Noise Impact Assessment Criteria.
- There were no evening non-compliance results at all four operator-attended monitoring locations against the intrusive Noise Acquisition Criteria, Noise Mitigation Criteria and Noise Impact Assessment Criteria except as follows:
  - 16 Oxley Place (Quarter 2) where the measured noise level was of 49 dBA was (conditionally) non-compliant with the Noise Mitigation Criteria of 48 dBA.
  - 16 Oxley Place (Quarter 2) where the measured noise levels of 49 dBA and 48 dBA were non-compliant with the Noise Impact Assessment Criteria of 45 dBA.
  - 16 Oxley Place (Quarter 4) where the measured noise levels of 48 dBA and 48 dBA were (conditionally) non-compliant with the Noise Impact Assessment Criteria of 45 dBA.
  - 53 Parkes Street (Quarter 2) where the measured noise level of 48 dBA was (conditionally) non-compliant with the Noise Impact Assessment Criteria of 45 dBA.
- There were no night-time non-compliance results at all four operator-attended monitoring locations against the intrusive Noise Acquisition Criteria, Noise Mitigation Criteria and Noise Impact Assessment Criteria except as follows:
  - 36 Old Station Road (Quarter 1) where the measured noise level was of 49 dBA was (conditionally) non-compliant with the Noise Mitigation Criteria of 48 dBA.
  - 16 Oxley Place (Quarter 2) where the measured noise level of 48 dBA was non-compliant with the Noise Impact Assessment Criteria of 45 dBA.
  - 16 Oxley Place (Quarter 4) where the measured noise levels of 48 dBA was non-compliant and 48 dBA was (conditionally) non-compliant with the Noise Impact Assessment Criteria of 45 dBA.
  - 36 Old Station Road (Quarter 1) where the measured noise level was of 49 dBA was non-compliant with the Noise Impact Assessment Criteria of 45 dBA.
- There were no night-time non-compliance results at all four operator-attended monitoring locations against the maximum Noise Impact Assessment Criteria[8] except as follows:
  - 16 Oxley Place (Quarters 1, 2, 3 & 4) where the measured noise levels of 62 dBA, 60 dBA, 54 dBA, 55 dBA and 58 dBA were non-compliant with the Impact Criteria of 50 dBA.

[8] The Noise Acquisition Criteria and Noise Mitigation Criteria do not include any test against maximum measured noise levels.

- 53 Parkes Street (Quarter 2) where the measured noise level of 63 dBA was non-compliant with the Impact Criteria of 50 dBA.
- 50 Parkes Street (Quarter 1 & 2) where the measured noise levels of 54 dBA and 56 dBA were non-compliant with the Impact Criteria of 50 dBA.
- 36 Old Station Road (Quarter 1) where the measured noise levels of 55 dBA and 57 dBA was non-compliant with the Impact Criteria of 50 dBA.

Sustained non-compliances can be defined as two consecutive quarters of the non-compliant noise monitoring results coinciding with normal mine operations. No sustained non-compliances with the Noise Acquisition Criteria (Table 3, Condition 2, Schedule 4 of the Project Approval) or Noise Mitigation Criteria (Table 4, Condition 3, Schedule 4 of the Project Approval) were recorded during the reporting period at any of the representative monitoring locations (Appendix L). Sustained non-compliances with respect to the evening and night-time intrusive Noise Impact Assessment Criteria (Table 2, Condition 1, Schedule 4 of the Project Approval) have been identified during the reporting period at 16 Oxley Place (Appendix L). Sustained non-compliances with respect to the night-time maximum Noise Impact Assessment Criteria (Table 2, Condition 1, Schedule 4 of the Project Approval) have been identified during the reporting period at 16 Oxley Place and 50 Parkes Street (Appendix L).

However, conclusive identification of sustained non-compliances at 16 Oxley Place and 50 Parkes Street was not determined until Quarter 1 of 2016, when the monitoring results were supplied by the consultant and analysed in detail.

Further modelling analysis is required in order to determine if sustained non-compliances with the noise impact assessment criteria may also have occurred at any residences on adjacent privately-owned land on Oxley Place or Parkes Street or on more than 25% of any adjacent privately-owned land.

Further discussion of the monitoring results and identification of the non-compliances is provided in Appendix L.

The modelling of existing Metropolitan Colliery and Project noise emissions (for Years 3 and 15) in the Project EA indicated that no privately owned residences would experience an increase in operational noise following the proposed Project upgrades of the surface facilities. At the majority of private residences that are located in close proximity to the major surface facilities area, the Project was predicted to provide significant operational noise reductions in comparison to the noise emissions of the Metropolitan Colliery at the time of the Project EA. While the as-built Project upgrades have reflected an alternative timeframe and objectives due to changing market requirements, the noise monitoring results in the reporting period are generally consistent with the predictions in that operational noise levels at proximal residences have been reduced by the on-site upgrades and management controls.

Noise Management Measures

Operational noise levels from the Metropolitan Coal Mine were materially higher prior to the approval of the Metropolitan Coal Project in June 2009. A range of operational noise control measures has been implemented since that time in association with extensive upgrades of existing infrastructure at the surface facilities area, including the upgrade of the CHPP to facilitate increased production. Extensive noise reduction works have been implemented progressively and noise monitoring and modelling has been used to identify areas where additional reasonable and feasible noise attenuation measures could be implemented. The 2010 to 2014 Metropolitan Coal Annual Reviews describe the noise mitigation measures implemented prior to the reporting period.

Metropolitan Coal has implemented the following additional noise management and mitigation measures during the reporting period:

- Replacement of the external walls on the crusher building with Kingspan noise suppressive cladding and installation of additional noise suppressive insulation in the roof area.
- Fitting custom designed and engineered noise mitigation equipment on the Front End Loaders.
- Sound power level testing of the upgraded coarse and large coal building of the CHPP, the upgraded crusher building and Front End Loaders fitted with noise mitigation equipment, to confirm the noise reductions achieved.
- Updated the noise model in accordance with the results of the sound power level testing.
- Based on the updated noise model, the contributions from the fixed and mobile plant were ranked at the nearest receivers, and opportunities for further noise reductions were identified.
- Fitting custom designed and engineered noise mitigation equipment on Dozers.
- The number of trucks using the mine haul road in any 15 minute period during the day was limited.

Metropolitan Coal will continue to implement noise monitoring and modelling in accordance with the Metropolitan Coal Noise Management Plan. Metropolitan Coal will implement the following mitigation measures in the next reporting period:

- Enclosure and/or sealing of select conveyors.
- Cladding and sealing of the new compressor shed and upgraded backfill plant pump room in Kingspan noise suppressive cladding.
- Additional sound power level testing to update the noise model.
- The number of trucks using the mine haul road in any 15 minute period will continue to be limited.

The extensive and long running noise control program has reduced noise emissions at nearby residences, however, the number of remaining material, reasonable and feasible noise controls is diminishing.

Noise Complaints

During the reporting period, one complaint was received on an afternoon in October 2015 from a neighbouring resident concerned with a truck's use of exhaust brakes while driving down the Colliery entrance road. Investigation of the incident indicated the truck was carrying heavy equipment to the site which necessitated the use of the exhaust brakes to effectively control the vehicle on the steep gradient while entering site.

Given the proximity of the major surface facilities to the nearby private residences (Figure 20) this is considered to be a very low number of noise complaints.

6.2.2 Air Quality and Greenhouse Gases Management

The Metropolitan Coal Air Quality and Greenhouse Gas Management Plan has been prepared for the surface facilities area in accordance with Condition 13, Schedule 4 of the Project Approval.

Pacific Environment Operations Pty Ltd has reviewed the environmental performance of the Project in relation to air quality for the reporting period. The report prepared in support of this Metropolitan Coal 2015 Annual Review is provided in Appendix M.

Dust Deposition

Metropolitan Coal monitors monthly dust deposition rates at ten dust gauges (DG1 to DG10, Figure 21), consistent with EPL No. 767 and the Metropolitan Coal Air Quality and Greenhouse Gas Management Plan.

As described in Table 2, sampling during the reporting period was not able to be conducted at all monitoring points at the frequencies described in Conditions M2.1 and M2.2 of EPL No. 767. Specifically:

- The dust deposition gauge located at the Helensburgh Public School (DG9) was unable to be collected in January 2015 due to locked gates preventing access (during school closure).
- The dust deposition gauges include a bottle which captures the dust between collection periods. When inspected, samples from dust gauges, DG4 and DG8 (in February 2015) and DG3 (in December 2015), were unable to be collected as the bottle was broken and no sample was recoverable.
- The dust deposition gauge (DG7) located at 32 Old Station Road, is on private property. In August 2015, the property owner instructed Metropolitan Coal that they no longer wished to host a depositional dust gauge at the property. Following further consultation with Metropolitan Coal, the owner agreed to continue to host the gauge on their property and sampling recommenced in November 2015.

The results of the dust deposition monitoring are assessed against air quality performance indicators and air quality impact assessment criteria. The results of the assessment are provided in Section 6.2.5 and key aspects are summarised below.

The performance indicator concentration for annual average deposited dust of 3 grams per square metre per month (g/m^2/month) was met at the majority of monitoring sites during the reporting period. At DG3, an annual average dust deposition rate of 3.5 g/m^2/month was recorded, principally due to elevated monthly deposition rates in July and November 2015 (Chart 71). A similar (and higher) annual average deposited dust concentration was recorded at DG4 (3.9 g/m^2/month), located some 2 km from the surface facilities area (i.e. a control monitoring site), also due to high dust deposition rates in July and November 2015 (Chart 71). All other dust deposition gauges proximal to the mine site met the deposited dust performance indicator. As a result, the dust deposition performance indicator is not considered to have been exceeded as a result of the Project.

The annual average dust deposition rate at all dust gauges was below the long-term impact assessment criteria for deposited dust of 4 g/m^2/month (Chart 71). The annual average dust deposition rate over the whole network was 2 g/m^2/month for the reporting period.

Annual average dust deposition rates at each gauge from 2003 to 2015 are shown in Chart 72a and Chart 72b. From 2003 to 2015, there were no clear trends in dust deposition rates; however, relatively higher dust deposition rates were recorded at some sites in 2009 and 2015. The annual average dust deposition rate at each gauge in 2015 was within the range previously recorded for the dust gauges, with the exception of DG7 for which the highest annual average dust deposition rate was recorded in 2015 (of 2.3 g/m^2/month).

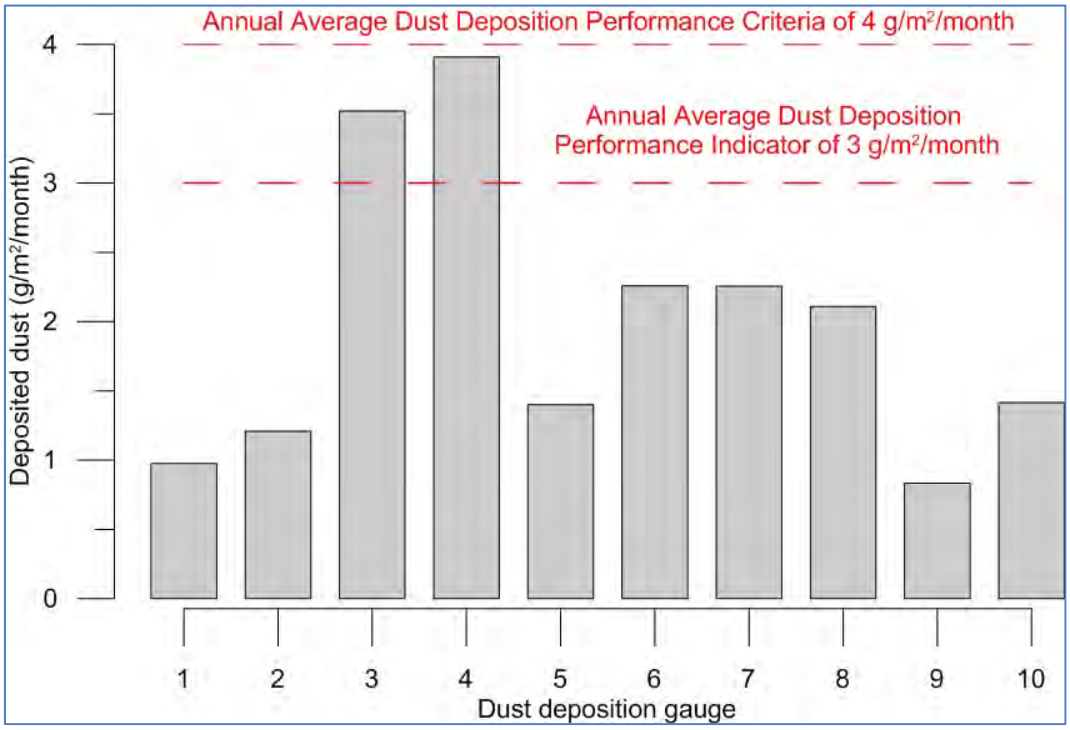


Chart 71 Annual Average Dust Deposition Rates Measured at Dust Gauges (DG1 to DG10)

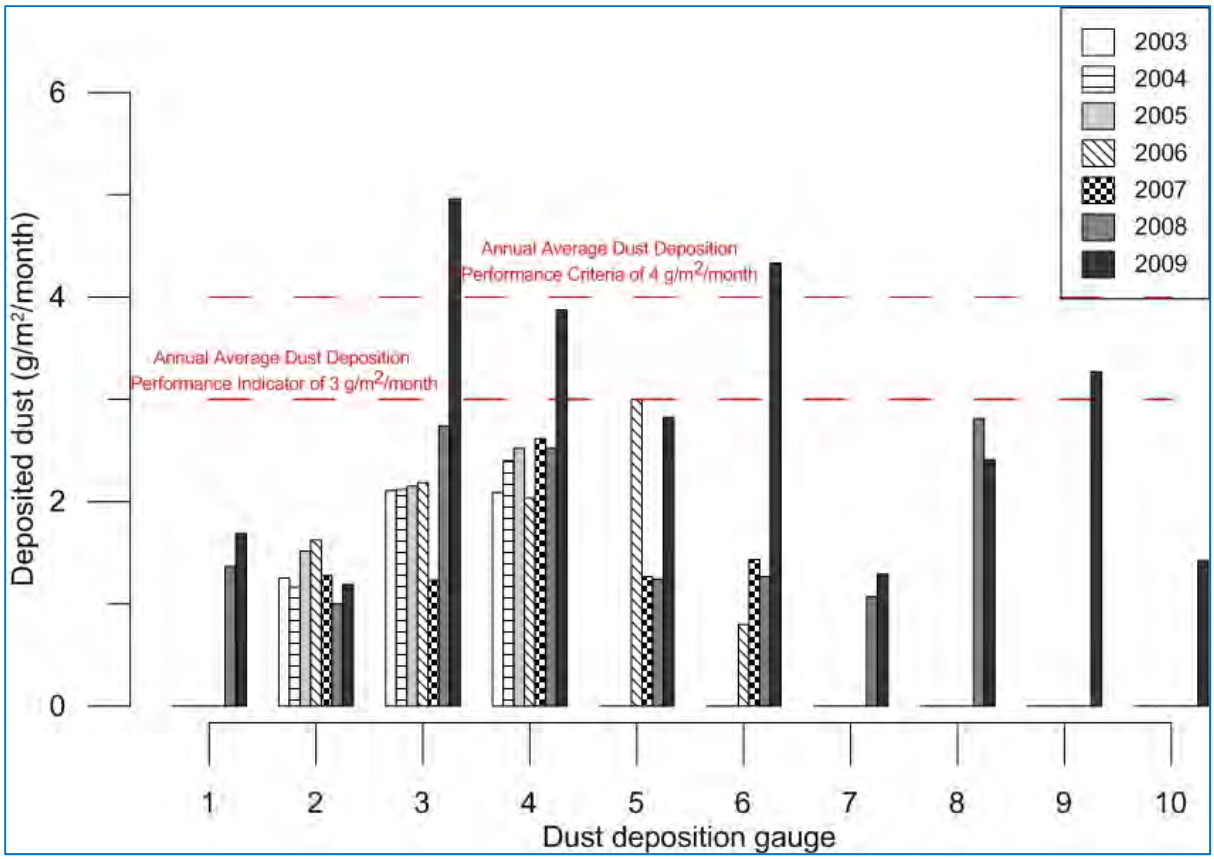


Chart 72a Annual Average Dust Deposition Rates at DG1 to DG10 from 2003 to 2009

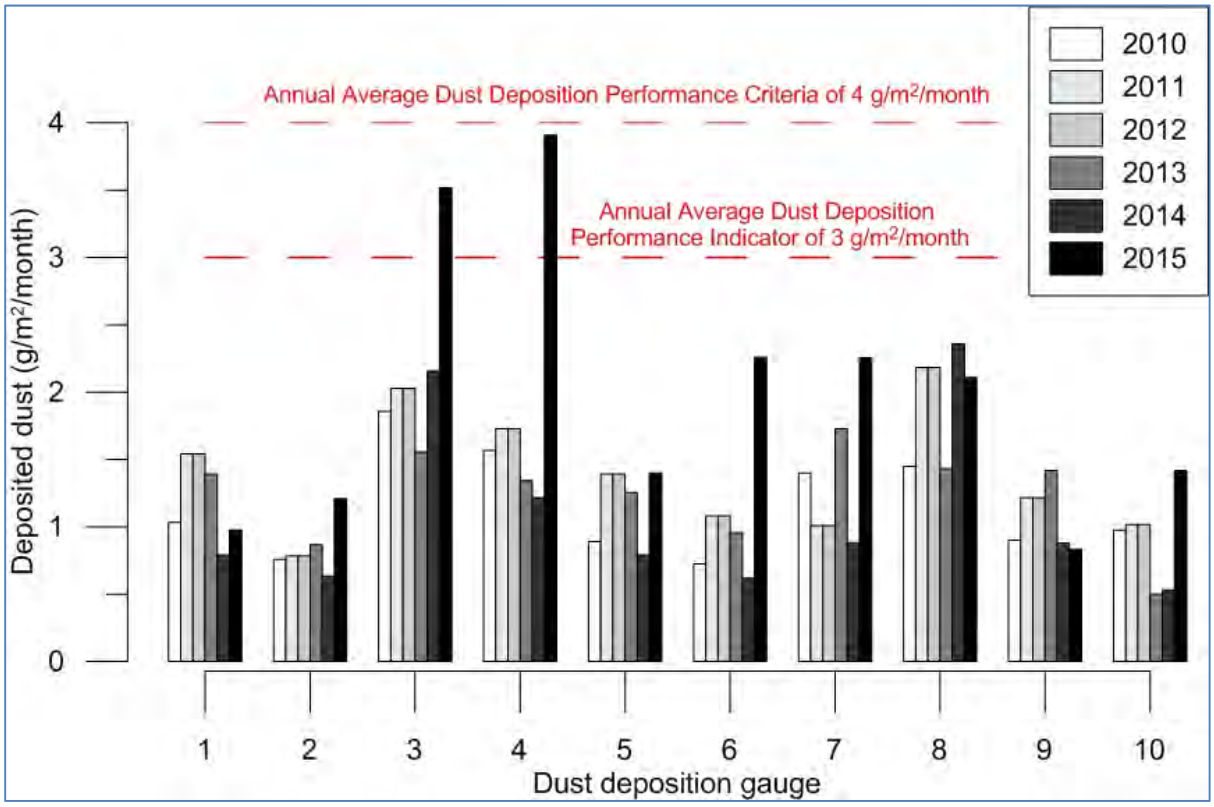


Chart 72b Annual Average Dust Deposition Rates at DG1 to DG10 from 2010 to 2015

Additional temporary dust deposition gauges were installed and monitored to the north of the stockpile area at 42 and 48 Parkes Street from April to November 2015. Elevated dust deposition levels were recorded at the temporary dust deposition gauge located at 42 Parkes Street in April (11.8 g/m^2/month) and September 2015 (9.7 g/m^2/month). In April 2015, the dust deposition levels were not elevated at nearby DG2 (0.8 g/m^2/month) or 48 Parkes Street (2.3 g/m^2/month). In September 2015, elevated dust deposition levels were recorded at nearby DG2 (5.8 g/m^2/month) and 48 Parkes Street (5.4 g/m^2/month).

Microscopic analysis of samples from 42 Parkes Street was conducted from June to November 2015 to determine the constituent components of the deposited dust. Dust constituents were grouped as coal and coke; inorganic, soil minerals (quartz, iron oxides, clays, etc.); and insect and plant remains. The proportion of plant matter was high in each sample and greater than 90% in each month, with the exception of June 2015, in which plant fragments comprised only 30 to 40% of the total deposited dust. The proportion of coal matter was highly variable in each month, ranging from a trace (<5%) from August to November 2015, to minor (5-30%) in July 2015 and major (>30%) in June 2015. The highest proportion of coal matter was recorded in June and comprised approximately 0.39 g/m^2/month of the 1.1 g/m^2/month sample.

The Project EA (modelling for Years 3 and 15) predicted that the annual average dust deposition due to the Project plus background would not be above the applicable 4 g/m^2/month amenity criterion at any receiver (modelling for Years 3 and 15). The air quality monitoring results are consistent with the Project EA predictions in relation to dust deposition.

Particulate Matter

One Tapered Element Oscillating Microbalance (TEOM) and one High Volume Air Sampler (HVAS) are located near the surface facilities area (Figure 21). The TEOM allows for continuous measurement of particulate matter less than 10 micrometers in diameter (PM_{10}) concentrations at ten-minute intervals, while the HVAS provides an average PM_{10} concentration for a specific 24-hour period, on a one-day-in-six cycle.

As described in Table 2 and above, sampling during the reporting period was not able to be conducted at all monitoring points at the frequencies described in Conditions M2.1 and M2.2 of EPL No. 767. Specifically, one day of data was missing on 10 July 2015 due to HVAS equipment failure.

The results of the PM_{10} monitoring are assessed against air quality performance indicators and air quality impact assessment criteria. The results of the assessment are provided in Section 6.2.5 and key aspects are summarised below.

The annual average PM_{10} concentrations (measured by the HVAS) from 2007 to 2015 are shown on Chart 73. The annual average PM_{10} concentration measured at the HVAS for the reporting period was 13.5 µg/m^3, which is lower than the annual average PM_{10} performance indicator of 25 µg/m^3 and well below the annual average PM_{10} air quality impact assessment criterion of 30 µg/m^3 (Chart 73). Whilst all similar in magnitude, this annual average concentrations was lower than 2012 and 2013, and marginally higher than 2014.

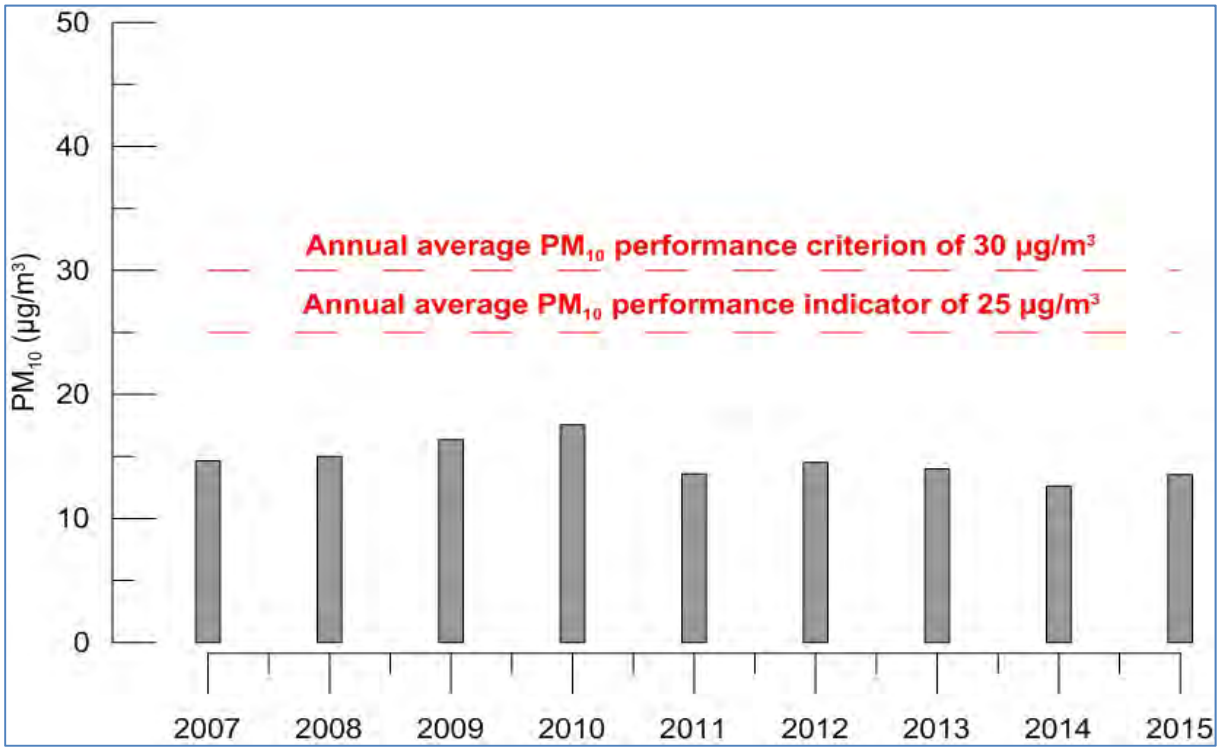


Chart 73 Annual Average PM_{10} Concentrations from 2007 to 2015 (measured by the HVAS)

The performance indicator for 24-hour average PM_{10} concentration is 37.5 micrograms per cubic metre (µg/m^3). A 24-hour average PM_{10} concentration of 42.3 µg/m^3 was recorded at the TEOM in May 2015 (Chart 74) and concentrations of 60 µg/m^3 and 42.3 µg/m^3 were recorded at the HVAS in October and December 2015 (Chart 75), respectively. The 60 µg/m^3 PM_{10} concentration recorded at the HVAS in October 2015 also exceededed the 24-hour average PM_{10} short-term impact assessment criterion of 50 µg/m^3. Woodsmoke from nearby residences was observed in May 2015 and backburning was being conducted in the area in October 2015. In December 2015, the Princes Highway was closed in both directions between Helensburgh and Bulli Tops due to a bushfire south of Sydney. The exceedances of the performance indicator concentration of 37.5 µg/m^3 and the 24-hour PM_{10} short-term impact assessment criterion of 50 µg/m^3 are not considered to be a result of the Project.

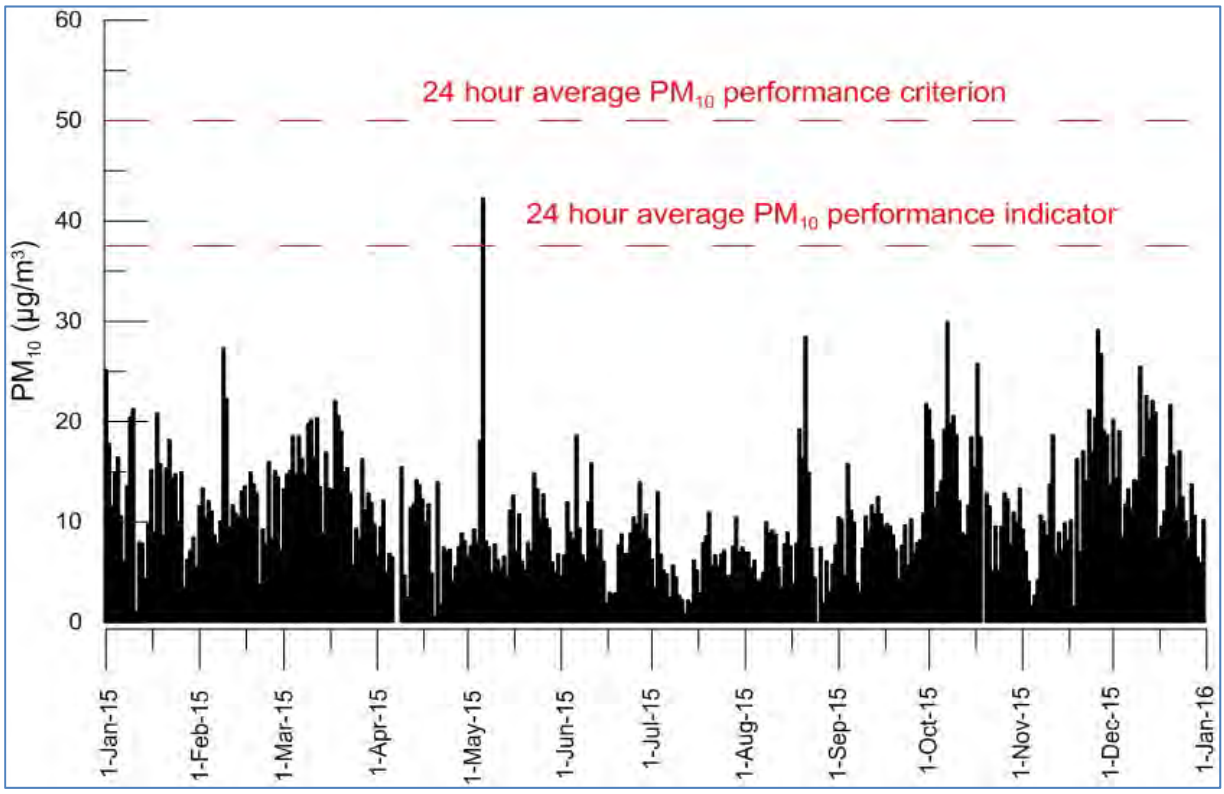


Chart 74 24-hour Average PM_{10} Concentrations (measured by the TEOM)

The highest 10 minute average PM_{10} concentration measured at the TEOM for the reporting period was 147.8 µg/m^3 which is lower than the air quality performance indicator for the 10 minute average PM_{10} concentration of 150 µg/m^3.

The predicted annual average PM_{10} (Project plus background) concentrations modelled for Years 3 and 15 in the Project EA were not predicted to be above the 30 µg/m^3 assessment criterion at any receiver. The maximum 24-hour average PM_{10} concentrations modelled for Years 3 and 15 by the Project EA were not predicted to exceed the assessment criterion (Project only) of 50 µg/m^3 at any receiver. Residences located in close proximity to the major surface facilities area on Parkes Street were predicted to experience maximum 24-hour average PM_{10} concentrations close to the criteria (i.e. 49 µg/m^3) in Year 15 due to their close proximity to the coal stockpiles and train loading activities.

The monitoring results are consistent with the Project EA predictions in relation to particulate matter.

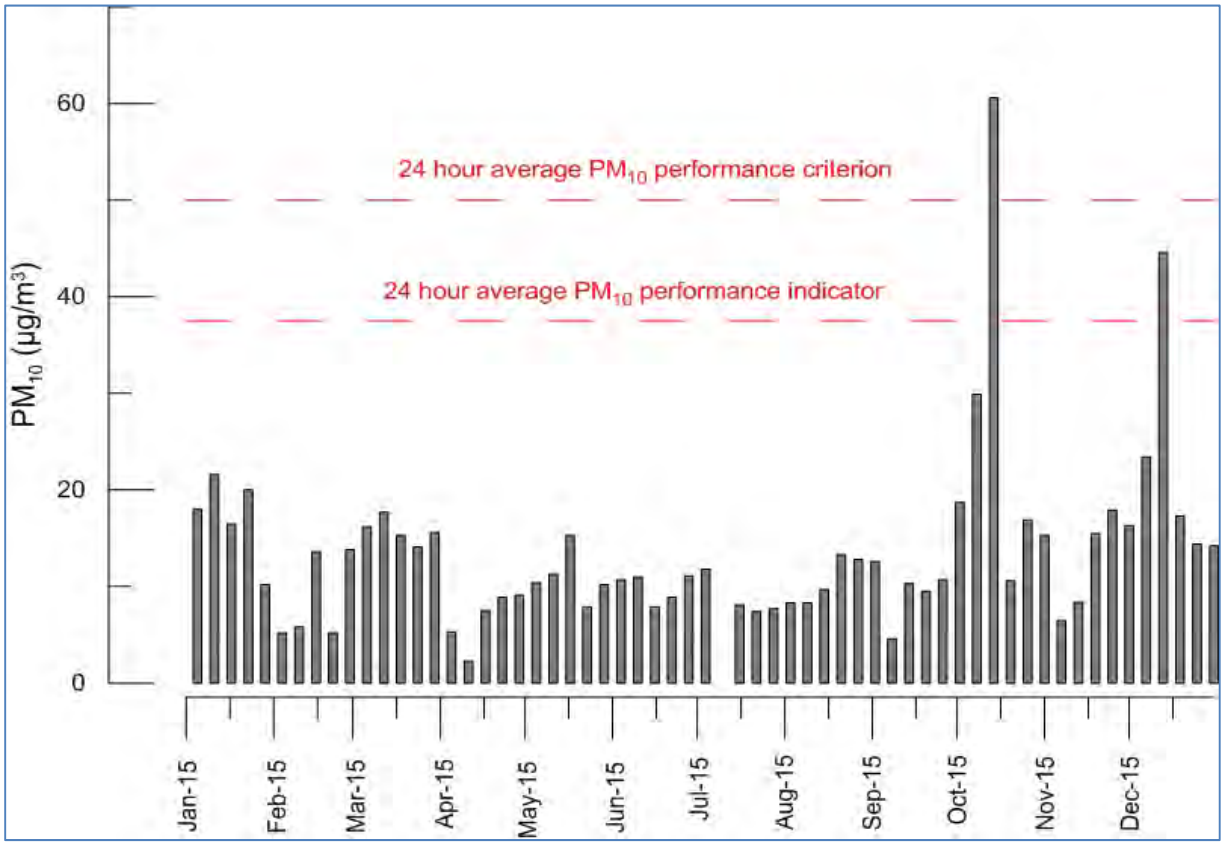


Chart 75 24-hour Average PM_{10} Concentrations (measured by the HVAS)

Management Measures

A number of measures are implemented to manage and mitigate air quality impacts at Metropolitan Coal, as reported in previous Annual Reviews. Metropolitan Coal has continued to review and build on its industry best practice dust suppression system during the reporting period, with the installation of additional dust sprays at the coal wash reject stockpile. This brings the dust suppression sprays to a total of 36, covering more than 90% of stockpile surfaces at Metropolitan Coal.

6.2.3 Traffic Management

The Metropolitan Coal Traffic Management Plan has been prepared to minimise the traffic impacts of the Project on the residential areas and schools within Helensburgh in accordance with Condition 22, Schedule 4 of the Project Approval.

The Metropolitan Coal Traffic Management Plan was revised during the reporting period in accordance with Condition 4, Schedule 7 of the Project Approval (post submission of the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report).

Metropolitan Coal monitors the amount of product coal transported from site by road and by rail. A total of 1,824,452 t of product coal was transported from site by rail during the reporting period. No product coal was transported from the site by road.

Metropolitan Coal also monitors the amount of coal reject that is transported from the site by road each year. A total of 417,274 t of coal reject was transported from the site by road in 2015.

During the reporting period, Metropolitan Coal marked designated footpaths in the carpark to improve pedestrian safety. A double white line was also marked along the entrance road to stop vehicles overtaking other vehicles when leaving or entering the site.

During the next reporting period, Metropolitan Coal will commence the transport of coal reject to the Lend Lease Calderwood Urban Development Project where coal reject will be beneficially re-used as fill material. The Metropolitan Coal Traffic Management Plan will be revised to reflect the transport of coal reject to the Lend Lease Calderwood Urban Development Project.

6.2.4 Waste Management

The Metropolitan Coal Waste Management Plan has been prepared for the surface facilities area in accordance with Condition 25, Schedule 4 of the Project Approval to identify waste streams and monitor the quantities generated, identify waste management measures to minimise waste generation, and ensure that waste generated by Metropolitan Coal is appropriately stored, handled and disposed.

Waste generated by Metropolitan Coal can include tyres, oil, sewage effluent, paint, lead acid batteries, coal rejects, drift waste rock, office waste (e.g. paper, plastics, aluminium cans and printer cartridges), scrap metal, general inert waste (e.g. concrete, timber, pipe, rope, rags), underground waste (e.g. packaging, cloths, pipe), oil/fuel filters, absorbents (e.g. spent oil spill material) and food waste.

Metropolitan Coal monitors waste generated on a monthly basis through waste disposal receipts provided by Metropolitan Coal's waste contractors. Figure 22(a) shows the amount of general waste disposed of in 2015 compared with previous calendar years. Approximately 246,600 kilograms of general waste was disposed of to a licensed landfill facility in 2015.

Waste recycled by Metropolitan Coal during the reporting period included waste oil, scrap wood, scrap metal, batteries and office waste (e.g. paper, cardboard and plastic). Figure 22(b-f) shows the amount of waste recycled in 2015, compared with previous calendar years.

Figure 22(g) and Figure 22(h) show the amount of coal reject emplaced by Metropolitan Coal in underground workings and disposed of at the Glenlee Washery, respectively, during the 2012 to 2015 calendar years. Approximately 417,274 t of coal reject were disposed of at the Glenlee Washery in 2015 and approximately 25,846 t of coal reject were emplaced underground. The emplacement of coal reject underground has reduced the off-site disposal of coal reject by approximately 106,837 t to date.

During the reporting period, further test work was conducted to investigate and optimise the composition of the coal reject emplacement material, including slump testing, beach angle testing and spontaneous combustion assessment of the coal washery rejects.

Metropolitan Coal will also commence the transport of coal reject to the Lend Lease Calderwood Urban Development Project for the beneficial re-use of the coal reject as fill material. The Metropolitan Coal Waste Management Plan will be revised to reflect the transport of coal reject to the Lend Lease Calderwood Urban Development Project.

Metropolitan Coal will also continue its consultation with the WCC regarding the potential for coal rejects to be beneficially re-used at the Helensburgh Landfill. Further testwork of the coal reject material will be conducted in this regard. The coal reject backfill emplacement project will also continue during 2016.

Metropolitan Coal will continue to seek opportunities for additional waste minimisation and for the recycling and re-use of materials at the site.

6.2.5 Assessment of Environmental Performance

The performance indicators, impact assessment criteria and Project Approval conditions in Table 9 assess the performance of environmental management at the surface facilities area including those related to noise, air quality, greenhouse gases, odour, traffic, waste and visual impacts for the reporting period and reflect the predictions included in the Project EA, Preferred Project Report and the surface facilities management plans (Noise Management Plan, Air Quality and Greenhouse Gas Management Plan, Traffic Management Plan, Surface Facilities Water Management Plan and Waste Management Plan).

Table 9
Assessment of Environmental Performance – Surface Facilities Area

Monitoring Aspect	Performance Indicator, Impact Assessment Criteria and/or Project Approval Condition	Indicator, Criteria or Condition Met?	Comments
NOISE			
Real-time Noise Performance Indicator	*The $L_{Aeq(5\ minute)}$ night-time noise level does not exceed 50 dB(A) for six consecutive 5 minute samples.*	No	On two occasions in 2015, distinct noise events exceeding the Real-time Noise Performance Indicator were investigated: • in April 2015, a series of five loud bangs; and • in July 2015, a delivery truck made a late night delivery without authorisation. Analysis of the playback recording for the five loud bangs that occurred in April could not determine an onsite source. No repeat incident has occurred. Following the late night delivery in July, the transport company was contacted and advised that deliveries must be made within the stated delivery hours. No repeat incident has occurred.
Noise Impact Assessment Criteria (Project Approval Table 2, Condition 1, Schedule 4)	Day $L_{Aeq(15\ minute)}$ – 50 dB(A)	Yes	There were no sustained non-compliance results at all four operator-attended monitoring locations in the daytime.
	Evening $L_{Aeq(15\ minute)}$ – 45 dB(A)	No	There were no sustained non-compliance results at all four operator-attended monitoring locations in the evening, except as follows: • 16 Oxley Place (Quarter 2 measured noise levels of 49 dBA and 48 dBA/Quarter 4 measured noise levels of 48 dBA and 48 dBA).
	Night $L_{Aeq(15\ minute)}$ – 45 dB(A)	No	There were no sustained non-compliance results at all four operator-attended monitoring locations in the night-time, except as follows: • 16 Oxley Place (Quarter 2 measured noise level of 48 dBA/Quarter 4 measured noise levels of 48 dBA and 48 dBA).
	Night $L_{A1(1\ minute)}$ – 50 dB(A)	No	There were no sustained non-compliance results at all four operator-attended monitoring locations in the night-time, except as follows: • 16 Oxley Place (Quarters 1, 2, 3 & 4) measured noise levels of 62 dBA, 60 dBA, 54 dBA, 55 dBA and 58 dBA. • 50 Parkes Street (Quarter 1 & 2) measured noise levels of 54 dBA and 56 dBA.
Noise Mitigation Criteria (Project Approval Table 4, Condition 3, Schedule 4)	Day $L_{Aeq(15\ minute)}$ – 53 dB(A)	Yes	There were no sustained non-compliance results at all four operator-attended monitoring locations (Appendix L).
	Evening $L_{Aeq(15\ minute)}$ – 48 dB(A)	Yes	
	Night $L_{Aeq(15\ minute)}$ – 48 dB(A)	Yes	

Table 9 (Continued)
Assessment of Environmental Performance – Surface Facilities Area

Monitoring Aspect	Performance Indicator, Impact Assessment Criteria and/or Project Approval Condition	Indicator, Criteria or Condition Met?	Comments
NOISE (Continued)			
Noise Acquisition Criteria (Project Approval Table 3, Condition 2, Schedule 4)	Day $L_{Aeq(15\ minute)}$ – 55 dB(A)	Yes	There were no sustained non-compliance results at all four operator-attended monitoring locations (Appendix L).
	Evening $L_{Aeq(15\ minute)}$ – 50 dB(A)	Yes	
	Night $L_{Aeq(15\ minute)}$ – 50 dB(A)	Yes	
Rail Noise (Project Approval Conditions 4, 5 and 6, Schedule 4)	4. *The Proponent shall only use locomotives that are approved to operate on the NSW rail network in accordance with noise limits L6.1 to L6.4 in RailCorp's EPL (No. 12208) and ARTC's EPL (No. 3142) or a Pollution Control Approval issued under the former Pollution Control Act 1970.*	Yes	All locomotives used by Metropolitan Coal are approved for operations in accordance with the noise limits in the relevant EPL.
	5. *The Proponent shall use its best endeavours to minimise night-time movements of rolling stock on the Metropolitan rail spur.*	Yes	Metropolitan Coal has endeavoured to minimise night-time movements of rolling stock on the Metropolitan rail spur.
	6. *In the event of any rail noise or vibration issues that may arise from the haulage of coal over the life of the Project, the Proponent shall liaise with the CCC and the rail service provider to facilitate resolution of these issues and implement additional noise reduction measures where appropriate.*	Yes	No issues with rail noise or vibration were identified during the reporting period.

Table 9 (Continued)
Assessment of Environmental Performance – Surface Facilities Area

Monitoring Aspect	Performance Indicator, Impact Assessment Criteria and/or Project Approval Condition	Indicator, Criteria or Condition Met?	Comments
NOISE (Continued)			
Notification of Landowners (Project Approval Condition 1, Schedule 5)	1. *If the results of the monitoring required in schedule 4 identify that impacts generated by the project are greater than the relevant impact assessment criteria in schedule 4, except where a negotiated agreement has been entered into in relation to that impact, then the Proponent shall, within 2 weeks of obtaining the monitoring results, notify the Executive Director Mineral Resources, the affected landowners and tenants (including tenants of mine owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the criteria in schedule 4.*	No	Metropolitan Coal has not notified the landowners at 16 Oxley Place and 50 Parkes Street of the sustained non-compliances, as conclusive identification of the sustained non-compliances at the monitoring locations was not determined until Quarter 1 of 2016 (adjacent residences are yet to be determined by additional analysis). Notwithstanding, in accordance with Section 9 of the Metropolitan Coal Noise Management Plan, the Contingency Plan will be implemented as follows: • Metropolitan Coal has commissioned a Sound Power Level review and remodelling of noise emissions to identify the specific residences on adjacent privately-owned land on Oxley Place and Parkes Street that are estimated to be exceeding the Noise Impact Assessment Criteria (or adjacent properties exceeding on more than 25% of privately-owned land) (i.e. determine a relationship between the quarterly monitoring locations and nearby residences). • Metropolitan Coal will notify those residences where exceedances of the Noise Impact Assessment Criteria are likely to be sustained in accordance with the requirements of Condition 1, Schedule 5 of the Project Approval (i.e. locations to be identified by the modelling described above) and action other relevant elements of the Metropolitan Coal Noise Management Plan Contingency Plan.
AIR QUALITY			
Air Quality Performance Indicators [1,2]	PM_{10} indicator = 150 µg/m^3 (10 minute averaging period assessed using TEOM data)	Yes	The maximum 10 minute average PM_{10} concentration recorded by the TEOM was 147.8 µg/m^3 on 6 May 2015.
	PM_{10} indicator = 37.5 µg/m^3 (24-hour averaging period assessed using TEOM data)	Yes	While one exceedance of the 24-hour average PM_{10} performance indicator concentration of 37.5 µg/m^3 was recorded on 6 May 2015 by the TEOM of 42.3 µg/m^3, observations at the time noted woodsmoke from nearby residences. The exceedance of the performance indicator concentration is not considered to be a result of the Project.
	PM_{10} indicator = 37.5 µg/m^3 (24-hour averaging period assessed using HVAS data)	Yes	While one exceedance of the 24-hour average PM_{10} performance indicator concentration of 37.5 µg/m^3 was recorded by the HVAS on 14 October 2015 of 60 µg/m^3 and one exceedance was recorded by the HVAS in December 2015 of 42.3 µg/m^3, backburning was being conducted in the area in October and bushfires were occurring in December 2015. The exceedances of the performance indicator concentration of 37.5 µg/m^3 are not considered to be a result of the Project.
	PM_{10} indicator = 25 µg/m^3 (Annual averaging period assessed using HVAS data)	Yes	An annual average PM_{10} concentration of 13.5 µg/m^3 was recorded by the HVAS.

Table 9 (Continued)
Assessment of Environmental Performance – Surface Facilities Area

Monitoring Aspect	Performance Indicator, Impact Assessment Criteria and/or Project Approval Condition	Indicator, Criteria or Condition Met?	Comments
AIR QUALITY (Continued)			
Air Quality Performance Indicators [1,2] (Continued)	Maximum total deposited dust level = 3 g/m^2/month (Annual averaging period)[3]	Yes	At DG3, an annual average dust deposition rate of 3.5 g/m^2/month was recorded principally due to elevated monthly deposition rates in July and November 2015. A similar (and higher) annual average deposited dust concentration was recorded at DG4 (3.9 g/m^2/month), located some 2 km from the mine's surface facilities area, also due to high dust deposition rates in July and November 2015. All other dust gauges proximal to the mine site met the deposited dust performance indicator. As a result, the exceedance of the performance indicator concentration at DG3 is not considered to be a result of the Project.
Air Quality Impact Assessment Criteria (Project Approval Condition 11, Schedule 4)	TSP Criteria[4] = 90 µg/m^3 (Annual averaging period)	Yes	Based on the annual average PM_{10} concentrations recorded by the HVAS, the annual average TSP is estimated to be less than 27 µg/m^3.
	PM_{10} Criteria[4] = 30 µg/m^3 (Annual averaging period)	Yes	An annual average PM_{10} concentration of 13.5 µg/m^3 was recorded by the HVAS.
	PM_{10} Criteria[4] = 50 µg/m^3 (24 hour averaging period)	Yes	While one exceedance of the 24-hour average PM_{10} criterion of 50 µg/m^3 was recorded by the HVAS on 14 October 2015 of 60 µg/m^3, observations at the time noted backburning was being conducted in the area. The exceedance of the PM_{10} criterion is not considered to be a result of the Project.
	Maximum total deposited dust level of 4 g/m^2/month (Annual averaging period)	Yes	The maximum annual average dust deposition was below 4 g/m^2/month during the reporting period at all dust gauges.
ODOUR			
Odour (Project Approval Condition 9, Schedule 4)	9. *The Proponent shall not cause or permit the emission of offensive odours from the site, as defined under Section 129 of the POEO Act.*	Yes	No odour complaints were received during the 2015 reporting period.
GREENHOUSE GASES			
Greenhouse Gas Emissions (Project Approval Condition 10, Schedule 4)	10. *The Proponent shall implement all reasonable and feasible measures to minimise:* *(a) energy use on site; and* *(b) the scope 1, 2 and 3 greenhouse gas emissions produced on site,* *to the satisfaction of the Director-General.*	Yes	Metropolitan Coal has implemented the viable energy saving measures contained within their Energy Savings Action Plan.

Table 9 (Continued)
Assessment of Environmental Performance – Surface Facilities Area

Monitoring Aspect	Performance Indicator, Impact Assessment Criteria and/or Project Approval Condition	Indicator, Criteria or Condition Met?	Comments
TRAFFIC			
Annual Road Maintenance Performance Indicators	*When annual road maintenance contribution negotiations are required, the negotiations should commence with the relevant councils and/or DP&I by 31 August.*	Yes	No negotiations with the WCC, Campbelltown City Council and Wollondilly Shire Council were required during the reporting period.
	Annual road maintenance contributions to relevant councils are made by 30 November.	Yes	Metropolitan Coal made contributions to the WCC, Campbelltown City Council and Wollondilly Shire Council by 30 November 2015.
Coal Transport Off-site Performance Indicators	*Coal transported off-site by road in a calendar year does not reach 150,000 tonnes prior to 31 October.*	Yes	Metropolitan Coal has currently ceased the transport of product coal to Corrimal Cokeworks and Coalcliff Cokeworks. No product coal was transported by road during the reporting period.
	Product coal truck movements to the Corrimal Cokeworks and Coalcliff Cokeworks do not exceed 22 and 27 movements respectively in any one day.	Yes	
Limits on Approval (Project Approval Condition 6[b], Schedule 2)	*6. The Proponent shall not:* *(a) ...* *(b) transport more than 2.8 million tonnes of product coal from the site in a calendar year.*	Yes	Metropolitan Coal transported a total of 1,824,452 t of product coal from site by rail in the 2015 calendar year.
Transport (Project Approval Conditions 17, 18, 19, 20 and 21, Schedule 4)	*17. By the end of 2010, the Proponent shall:* *(a) undertake a road safety audit of the Parkes Street and Colliery Road intersection, in consultation with the RTA and WCC; and* *(b) implement any recommendations of this audit,* *to the satisfaction of the Director-General.*	Yes	The Road Safety Audit of the Mine Access Road and Parkes Street intersection was conducted in September 2010 in accordance with Condition 17(a), Schedule 4 of the Project Approval. Metropolitan Coal has requested the DP&E indicate whether the Director-General (now Secretary) is satisfied that the requirements of Condition 17 have been met.
	18. From the end of 2009, the Proponent shall make a suitable annual contribution to WCC, WSC, and CC for the maintenance of local roads that are used as haulage routes by the project. If there is any dispute over the amount of the contribution, the matter must be referred to the Director-General for resolution.	Yes	Metropolitan Coal has made a suitable annual contribution to the WCC, Campbelltown City Council and Wollondilly Shire Council.

Table 9 (Continued)
Assessment of Environmental Performance – Surface Facilities Area

Monitoring Aspect	Performance Indicator, Impact Assessment Criteria and/or Project Approval Condition	Indicator, Criteria or Condition Met?	Comments
TRAFFIC (Continued)			
Transport (Project Approval Conditions 17, 18, 19, 20 and 21, Schedule 4) (Cont.)	*19. The Proponent shall not:* *(a) load coal or coal reject onto trucks, or transport it off site by road, outside the hours of 7am and 6pm Monday to Friday;* *(b) transport more than 170,000 tonnes of coal off site by road in a calendar year;* *(c) transport any coal off site to the Port Kembla Coal Terminal by road;* *(d) permit the departure of more than 25 trucks containing product coal for delivery to the Corrimal Cokeworks on any given day; or* *(e) permit the departure of more than 30 trucks containing product coal for delivery to the Coalcliff Cokeworks on any given day.*	Yes	The loading and transport of coal product and coal reject has been undertaken in accordance with Condition 19, Schedule 4 of the Project Approval.
	20. During emergencies (such as the disruption of rail services) the Proponent may exceed the restrictions in condition 19 above with the written approval of the Director-General.	Yes	No emergencies requiring amendments to Condition 19 occurred during the reporting period.
	21. The Proponent shall monitor the amount of coal and coal reject transported from the site by road and rail each year, and report the results of this monitoring on its website every six months.	Yes	The results of coal transport monitoring have been provided on Metropolitan Coal's website and updated every six months.
WASTE			
Waste Generation Performance Indicator	*Waste generation has been minimised, as evidenced by:* - *an increase in the amount or type of waste recycled;* - *a decrease in the amount of waste generated that is disposed of to licensed landfill facilities; and/or* - *no practicable opportunities for additional waste minimisation have been identified to those currently being implemented.*	Yes	Metropolitan Coal has minimised waste generation during the reporting period. The underground emplacement project had reduced the off-site disposal of coal reject by approximately 106,837 t at the end of the reporting period. During the next reporting period, Metropolitan Coal will commence the transport of coal reject to the Lend Lease Calderwood Urban Development Project for the beneficial re-use of the coal reject as fill material. No further practicable opportunities for waste minimisation were identified.

Table 9 (Continued)
Assessment of Environmental Performance – Surface Facilities Area

Monitoring Aspect	Performance Indicator, Impact Assessment Criteria and/or Project Approval Condition	Indicator, Criteria or Condition Met?	Comments
WASTE (Continued)			
Storage of Waste Performance Indicator	*Waste has been separated and stored according to type in appropriate storage facilities (e.g. sealed containers for liquid waste).*	Yes	Waste on-site is adequately sorted and stored according to waste type prior to collection. Weekly site inspections are conducted by the site Environment and Community Coordinator to ensure waste is separated and stored in accordance with the Metropolitan Coal Waste Management Plan.
Handling and Disposal of Waste Performance Indicator	*The transport of particular waste types has been tracked in accordance with DECCW waste tracking requirements.* *Metropolitan Coal's waste management contracts, where relevant, specify that the waste is to be transported by an appropriately licensed contractor and disposed of at an appropriately licensed facility.*	Yes	All transport of waste from the Metropolitan Coal site has been tracked in accordance with the NSW Office of Environment and Heritage (previously the NSW Department of Environment, Climate Change and Water [DECCW]) waste tracking requirements. Metropolitan Coal's waste management contracts specify waste is to be removed by an appropriately licensed contractor and disposed of at an appropriately licensed facility.
Waste Generation (Project Approval Condition 24, Schedule 4)	*24. The Proponent shall:* *(a) minimise the waste (including coal reject) generated by the project; and* *(b) ensure that the waste generated by the project is appropriately stored, handled, and disposed of,* *to the satisfaction of the Director-General.*	Yes	Metropolitan Coal has minimised waste (including coal reject) generated during the reporting period. The underground emplacement project had reduced the off-site disposal of coal reject by approximately 106,837 t at the end of the reporting period). Waste on-site is adequately sorted and stored according to waste type prior to collection. Weekly site inspections are conducted by the site Environment and Community Coordinator to ensure waste is separated and stored in accordance with the Metropolitan Coal Waste Management Plan. Metropolitan Coal's waste management contracts specify waste is to be removed by an appropriately licensed contractor and disposed of at an appropriately licensed facility.
VISUAL			
Visual Impacts (Project Approval Condition 23, Schedule 4)	*23. The Proponent shall minimise the visual impacts, and particularly the off-site lighting impacts, of the surface facilities area and two ventilation shaft sites to the satisfaction of the Director-General.*	Yes	

Note: $L_{Aeq(15\ minute)}$ = intrusive equivalent noise level; $L_{A1(1\ minute)}$ = short-term noise level; dB(A) = A-weighted decibels; PM_{10} = Particulate matter less than 10 microns; HVAS1 = High Volume Air Sampler 1; TEOM1 = Tapered Element Oscillating Microbalance 1; $\mu g/m^3$ = micrograms per cubic metre; g/m^2/month = grams per square metre per month; TSP = total suspended particulate matter.

[1] Total measured level excluding extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities.

[2] Background PM_{10} concentrations due to all other sources plus the incremental increase in PM_{10} concentrations due to the mine alone.

[3] Dust deposition assessment criteria are to be measured using DG1 to DG10 excluding DG4, which is a control dust gauge that is located at the Helensburgh Golf Course some 2 km from the mine's surface facilities area.

[4] PM_{10} air quality impact assessment criteria are to be measured using HVAS data.

7 WATER MANAGEMENT

A Metropolitan Coal Surface Facilities Water Management Plan has been prepared for the surface facilities area and two ventilation shaft sites in accordance with Condition 15, Schedule 4 of the Project Approval.

The Metropolitan Coal Surface Facilities Water Management Plan was revised during the reporting period in accordance with Condition 4, Schedule 7 of the Project Approval (post submission of the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report).

This section details the water use, licensed discharge and water quality monitoring results for the surface facilities area and the management measures implemented during the reporting period. The environmental performance of water management in the underground mining area and surrounds is described in Section 6.1.

The surface facilities area is located in a steep-sided valley adjacent to the town of Helensburgh and next to Camp Gully (Figure 3). The site water management system comprises a series of collection dams, sumps and treatment systems. The system is operated to avoid the mixing of clean water runoff and mine water, minimise off-site release of runoff, and to provide water supply requirements on-site.

Water Use

The main uses of water on site are to supply underground mining operations and the coal washery. Metropolitan Coal draws its water from three main sources, namely, Camp Gully, the potable town water supply and water captured on-site.

Camp Gully runs adjacent to the southern edge of Metropolitan Coal's surface facilities area (Figure 23). Metropolitan Coal's extraction of water from Camp Gully is specifically regulated by the Camp Creek Weir Surface Water Certificate of Title and more generally by the *Water Act, 1912* and the *Water Management Act, 2000*.

Metropolitan Coal's annual entitlement under the Camp Gully extraction licence is 130 megalitres (ML). A concrete weir was historically constructed on Camp Gully (approximately 1930s) to facilitate the extraction of water for the mine. Table 10 describes the volume of water sourced from Camp Gully during the reporting period, a total of 47 ML. In comparison, Metropolitan Coal sourced 77 ML of water from Camp Gully in the 2014 calendar year, 99 ML in the 2013 calendar year and 94 ML from Camp Gully in the 2012 calendar year.

Table 10
Camp Gully Water Take, 1 January to 31 December 2015

Water Licence	Water Licence Number	Entitlement (ML)	Passive take/inflows (ML)	Active Pumping (ML)	Total (ML)
Camp Creek Weir Surface Water Certificate of Title	WAL25410	130	0	47	47

The use of potable water (sourced from Sydney Water) for mine purposes occurs when insufficient water is available from Camp Gully and/or on-site harvesting. Potable water is sourced from two mains, one of which supplies the bathhouses and drinking water utilities and one that supplements water supplies for mining purposes. Use of potable water is recorded and minimised in accordance with the site's commitments under the Water Savings Action Plan. Metropolitan Coal used approximately 378 ML of potable town water (as recorded by the Sydney Water meter) during 2015 (a monthly average of approximately 31.5 ML), in comparison to 388 ML in 2014.

The use of potable water per tonne of ROM coal produced is variable and is generally higher during periods of low rainfall (Chart 76). Ongoing site auditing during the reporting period has not identified incidences of potable water being used where there is a viable alternative.

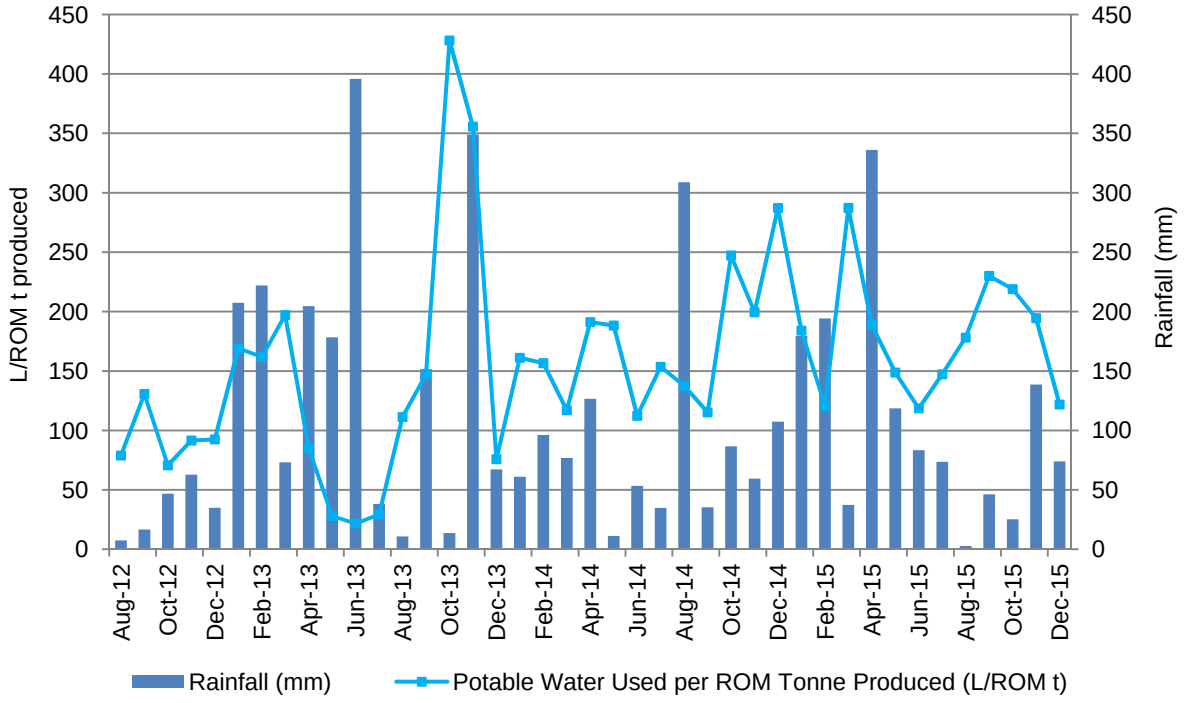


Chart 76 Potable Water Used per ROM Tonne Produced vs Rainfall

Licensed Discharge

Water discharged from the Water Treatment Plant to Camp Gully is monitored in accordance with EPL No. 767, which requires Metropolitan Coal to continuously monitor the volume (kilolitres per day) of water discharged from the clean water tank in the Water Treatment Plant to Camp Gully. The total amount of water discharged from the Water Treatment Plant to Camp Gully during the reporting period was approximately 96 ML, in comparison to 109 ML in 2014, 151 ML in 2013 and 98 ML in 2012.

Water Quality

Surface water quality monitoring of pH, oil and grease and total suspended solids is conducted at the Water Treatment Plant in accordance with EPL No. 767.

The water quality monitoring results indicate that pH levels (ranging from 8.3 to 8.5 pH), oil and grease (ranging from less than 2 mg/L to 6 mg/L) and total suspended solids (ranging from less than 5 mg/L to 18 mg/L) were within the water quality limits prescribed by EPL No. 767 (i.e. 6.5 to 8.5 pH, 10 mg/L for oil and grease, and 30 mg/L for total suspended solids) during the reporting period. Similarly, no exceedances of the EPL No. 767 concentration limits were recorded by Metropolitan Coal in the 2011 to 2014 calendar years.

The Project EA predicted there would be no material effect to downstream water quality as a result of water releases from the major surface facilities area to Camp Gully (which are constrained by EPL No. 767). The monitoring results are consistent with the Project EA predictions in relation to water quality.

Overall System Integrity

Surface facilities water management items (such as pipelines and pumps, bunded areas, main water storages, signs of discharge of site runoff, upslope diversions and erosion control measures) are visually inspected by Metropolitan Coal and reported in accordance with the mine's maintenance system.

During the reporting period, Metropolitan Coal hydromulched the outer batters of the Turkey's Nest Dam to minimise the potential for soil erosion. Upgrades to the Turkey's Nest Dam and installation of a new sediment catch pit to improve the efficiency of the water management system will be implemented in 2016. Coal reject material will be beneficially re-used for the Turkey's Nest Dam upgrade.

Assessment of Environmental Performance

In accordance with the Metropolitan Coal Surface Facilities Water Management Plan, an assessment of the environmental performance of water management at the surface facilities area is provided in Table 11.

Table 11
Assessment of Environmental Performance – Surface Facilities Water Management

Monitoring Aspect	Performance Indicator or Project Approval Condition	Indicator or Condition Met?	Comments
SURFACE FACILITIES WATER MANAGEMENT			
Water Use Performance Indicator	*The use of potable water (i.e. megalitres of town water used per tonne of coal produced) does not increase over time, after taking into consideration climatic conditions.* *Potable water has not been used in circumstances where there is a viable alternative.*	Yes	Ongoing site auditing during the reporting period has not identified incidences of potable water being used where there is a viable alternative.
Erosion Control Performance Indicator	*Inspections of the major surface facilities area and ventilation shaft(s) indicate the measures implemented are effectively controlling erosion.*	Yes	Weekly inspections of the surface facilities area and ventilation shaft(s) indicate that the erosion control measures implemented during the reporting period have effectively controlled erosion.
Containment of Contaminants Performance Indicator	*Effective containment and/or isolation measures are in place for potential contaminants on site.*	Yes	Weekly inspections have confirmed that effective containment and isolation measures have been in place for potential contaminants on-site.
Licensed Discharge Performance Indicator	*Surface water discharges comply with the requirements of EPL No. 767.*	Yes	All water discharge criteria were met during the reporting period.
System Integrity Performance Indicator	*Inspections of system components indicate the integrity of the system is not at risk of being compromised.*	Yes	Daily and weekly inspections of the water management system confirmed the integrity of the system was not at risk.
Discharges (Project Approval Condition 14, Schedule 4)	*14. The Proponent shall ensure that all surface water discharges from the site comply with the discharge limits (both volume and quality) set for the project in any EPL.*	Yes	All water discharge criteria were met during the reporting period.

8 CONSTRUCTION MANAGEMENT

A Metropolitan Coal Construction Management Plan has been prepared for surface construction works (excluding remediation or rehabilitation works) in the Woronora Special Area in accordance with Condition 11, Schedule 3 of the Project Approval. The Metropolitan Coal Construction Management Plan was revised during the reporting period in accordance with Condition 4, Schedule 7 of the Project Approval (post submission of the Metropolitan Coal 2014 Annual Review and AEMR/Rehabilitation Report).

No construction activities in the underground mining area were conducted during the reporting period.

Metropolitan Coal submitted a Construction Management Plan Surface Works Assessment Form to the DP&E and WaterNSW for a transect of groundwater piezometers overlying the 300 series longwalls following consultation with WaterNSW. These piezometers will be installed in the next reporting period. In the next reporting period, Metropolitan Coal will also install groundwater piezometers within swamps overlying Longwalls 301-303.

9 REHABILITATION

9.1 REHABILITATION SUMMARY

Metropolitan Coal has prepared a Rehabilitation Strategy for the surface facilities area in accordance with Condition 2, Schedule 6 of the Project Approval. The surface facilities area includes roads, facilities (e.g. the CHPP, administration buildings and workshops), stockpiles (coal and reject stockpiles), railroads, water storages and infrastructure. Rehabilitation of the surface facilities area is described in Section 9.2.

A Metropolitan Coal Rehabilitation Management Plan has been prepared for underground mining areas requiring rehabilitation or remediation measures, including surface disturbance and stream pool/rock bar remediation in accordance with Condition 4, Schedule 6 of the Project Approval. Rehabilitation of the underground mining area is described in Section 9.3.

A summary of the rehabilitation status at Metropolitan Coal for the previous, current and forecast reporting periods is provided in Table 12.

The total mine footprint includes the Metropolitan Coal surface facilities, the No. 3 Ventilation Shaft facilities, the temporary cable runway and electricity cable, disturbance associated with exploration boreholes and monitoring equipment installation in the underground mining area.

Two Catchment Improvement Works Projects have been conducted in accordance with Condition 5(b), Schedule 6 of the Project Approval, which requires Metropolitan Coal to carry out catchment improvement works in the Woronora catchment area. Catchment improvement work activities conducted in the reporting period are described in Section 9.4.

An assessment of rehabilitation environmental performance is provided in Section 9.5.

Table 12
Rehabilitation Status

Mine Area Type	As at December 2014	As at December 2015	As at December 2016 (Forecast)
A. Total mine footprint[1]	~ 17 ha	~ 17 ha	~ 17 ha
B. Total active disturbance[2]	~ 17 ha	~ 17 ha	~ 17 ha
C. Land being prepared for rehabilitation[3]	0	0	0
D. Land under active rehabilitation[4]	0	0	0
E. Completed rehabilitation[5]	0	0	0

1 ***Total mine footprint:*** *includes all areas within a mining lease that either have at some point in time, or continue to, pose a rehabilitation liability due to mining and associated activities. As such, it is the sum of total active disturbance, decommissioning, landform establishment, growth medium development, ecosystem establishment, ecosystem development and relinquished lands (as defined in the DRE MOP/RMP Guidelines). Please note that subsidence remediation areas are excluded.*

2 ***Total active disturbance:*** *includes all areas ultimately requiring rehabilitation such as: on-lease exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste emplacements (active/unshaped/in or out-of-pit), and tailings dams (active/unshaped/uncapped).*

3 ***Land being prepared for rehabilitation:*** *includes the sum of mine disturbed land that is under the following rehabilitation phases – decommissioning, landform establishment and growth medium development (as defined in DRE MOP/RMP Guidelines).*

4 ***Land under active rehabilitation:*** *includes areas under rehabilitation and being managed to achieve relinquishment – includes the following rehabilitation phases as described in the DRE MOP/RMP Guidelines – "ecosystem and land use establishment" (area seeded OR surface developed in accordance with final land use) and "ecosystem and land use sustainability" (revegetation assessed as showing signs of trending towards relinquishment OR infrastructure development).*

5 ***Completed rehabilitation:*** *requires formal sign-off by DRE that the area has successfully met the rehabilitation land use objectives and completion criteria.*

9.2 REHABILITATION STRATEGY – SURFACE FACILITIES AREA

The Metropolitan Coal Rehabilitation Strategy has been developed to be a concise framework document which describes the development of rehabilitation objectives and completion criteria for the preferred future landuse for the surface facilities area following the completion of mining activities. Detailed rehabilitation plans for the surface facilities area will be developed over the life of the Project and will be presented in the Mine Closure Plan and future revisions of the Rehabilitation Strategy.

As various factors will influence the landuse options available for the surface facilities area following the completion of mining activities, it is not possible for Metropolitan Coal to define a final landuse option (and associated final rehabilitation objectives and completion criteria) at this stage of the Project life. The final landuse and associated final rehabilitation objectives and completion criteria will be documented in future Metropolitan Coal MOP and the Mine Closure Plan as part of the Mining, Rehabilitation and Environmental Management Process. The Metropolitan Coal MOP has been prepared for the operating period 2012 to 2019.

Disturbance areas at the Metropolitan Coal surface facilities area are minimal and have remained relatively unchanged for many years. The surface facilities area includes roads, facilities (e.g. the CHPP, administration buildings and workshops), stockpiles (coal and reject stockpiles), railroads, water storages and infrastructure. The surface facilities area is an active operational area, which will be required for the entire mine life.

Figure 24 shows the designated rehabilitation zones (1 to 7) that are currently available for rehabilitation at the surface facilities area. Rehabilitation activities to date have included active planting of native vegetation, primarily around the boundary of the site, and the removal or control of introduced species and weed species. During the reporting period, weed control has been undertaken across the designated rehabilitation zones. No buildings were renovated or removed during the reporting period.

9.3 REHABILITATION MANAGEMENT – UNDERGROUND MINING AREA

9.3.1 Rehabilitation of Surface Disturbance Areas

Some surface disturbance areas will be able to be rehabilitated during the life of the Project (e.g. monitoring sites no longer required), while other surface disturbance areas will likely remain until after the completion of mining operations.

No surface disturbance areas in the underground mining area were rehabilitated during the reporting period as the majority of disturbance pertains to the installation and ongoing maintenance of environmental monitoring sites which are a life of mine asset. These sites will be rehabilitated to appropriate standards following cessation of mining.

9.3.2 Stream Remediation Measures

Waratah Rivulet

In accordance with Condition 1, Schedule 6 of the Project Approval, Metropolitan Coal is required to achieve the rehabilitation objective, *restore surface flow and pool holding capacity as soon as reasonably practicable,* for Waratah Rivulet, between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir.

Stream remediation is initiated at pools/rock bars on Waratah Rivulet between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir if the water level in a pool falls below its cease to overflow level (i.e. stops overflowing), except as a result of climatic conditions.

As a result of previous mining, the water levels in pools upstream of Flat Rock Crossing (i.e. Pools A to G) and immediately downstream of Flat Rock Crossing (Pool G1) have previously been impacted by mine subsidence as described in the Metropolitan Coal Rehabilitation Management Plan (i.e. the pool water level has fallen below the cease to flow level). Metropolitan Coal identified that the water level in Pool N fell below the cease to flow level in early September 2012.

The results of pool water level monitoring on the Waratah Rivulet for the reporting period are described in Section 6.1.2. In summary, all pools on Waratah Rivulet remained above their cease to flow levels or exhibited natural behaviour (i.e. pools that do not have ‘solid’ rock-bar controls) during the reporting period, except Pool G.

Stream remediation activities have previously been undertaken at Pools A and F on the Waratah Rivulet. The rock bars at Pools A and F are considered to largely control the pools located upstream of these rock bars. As a result, Metropolitan Coal anticipates that the restoration of surface flow and pool holding capacity at Pools A and F will restore the surface flow and pool holding capacity of pools between Flat Rock Swamp and Pool F. Metropolitan Coal will assess whether stream remediation is required at any additional pools/rock bars between Flat Rock Swamp and Pool F once stream remediation activities at Pools A and F have been completed and a significant period of drier climatic conditions has been experienced. Notwithstanding, pools between Pool A and Pool F did not cease to flow during the reporting period.

During the reporting period, Metropolitan Coal conducted brush matting (using locally collected vegetative material) and installed sediment controls (coir logs and sandbags) at Pools A and F, to encourage the regeneration of native vegetation and for erosion control.

During the reporting period, Metropolitan Coal conducted stream remediation activities at Pools F and G. Stream remediation activities at Pool F included the drilling and injection of grout (polyurethane resin) to create a grout curtain, hydraulic pressure testing, down hole calliper survey to inform and verify the grouting works, and the implementation of a variety of environmental management measures. Aesthetic remediation activities at Pool F were also undertaken during the reporting period.

Stream remediation activities conducted at Pool G during the reporting period included the identification of the fracture network by test drilling, hydraulic pressure testing and down hole calliper survey, and drilling and injection of polyurethane resin to create a grout curtain. Stream remediation activities at Pool G will be completed in the next reporting period.

Eastern Tributary

In accordance with Condition 1, Schedule 6 of the Project Approval, Metropolitan Coal is required to achieve the rehabilitation objective, *restore surface flow and pool holding capacity as soon as reasonably practicable,* for the Eastern Tributary, between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir.

Stream remediation will be initiated at pools/rock bars on Eastern Tributary between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir if the assessment of monitoring results indicates the subsidence impact performance measure:

> *Negligible environmental consequences over at least 70% of the stream length (that is, no diversion of flows, no change in the natural drainage behaviour of pools, …)*

has been exceeded.

The results of pool water level monitoring on the Eastern Tributary for the reporting period are described in Section 6.1.2. Stream remediation of Eastern Tributary pools between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir was not triggered during the reporting period.

9.4 CATCHMENT IMPROVEMENT WORKS

Catchment improvement works conducted by Metropolitan Coal during the reporting period include the rehabilitation of a former quarry on Fire Road 9H and the rehabilitation of a disused access track to the Darkes Forest Mine (a historic mine located to the south of Metropolitan Coal).

Rehabilitation activities at the former quarry on Fire Road 9H primarily focused on the maintenance and control of annual weed species. Additional brush matting was also conducted in areas of low regeneration potential.

Rehabilitation activities for the disused access track to the Darkes Forest Mine during the reporting period have included the control of perennial and herbaceous weed species including Whiskey Grass (*Andropogon virginicus*) and Crofton Weed (*Ageratina adenophora*). To reduce the impact of grazing Rusa Deer on newly regenerating native plant species, locally collected brush matting material was also placed on the access track. To date, approximately half of the access track to the Darkes Forest Mine has been brush matted.

9.5 ASSESSMENT OF ENVIRONMENTAL PERFORMANCE

An assessment of the environmental performance of rehabilitation management during the reporting period is provided in Table 13.

Table 13
Assessment of Environmental Performance – Rehabilitation

Monitoring Component		Performance Indicator, Rehabilitation Objective and/or Project Approval Condition	Indicator, Objective or Condition Met?	Comments
Other land affected by the Project Performance Indicator		*Redundant equipment/infrastructure items have been removed.* *The site is neat and tidy (i.e. it does not contain any rubbish).* *No weed management measures are required.* *No erosion or sediment control measures are required.* *Where appropriate, native vegetation is naturally regenerating or active revegetation is establishing.* *No further active revegetation measures are required.*	Not currently applicable	Not currently applicable during the reporting period as no rehabilitation of surface distribution areas in the underground mining area has been conducted. Once a surface disturbance area is no longer being utilised, Metropolitan Coal will use the Rehabilitation Management Plan – Surface Disturbance Register to monitor the performance of the measures implemented to rehabilitate surface disturbance areas.
Stream Remediation Performance Indicator		*Analysis of water level recession rates for a pool indicates a similar pool behaviour to that which existed prior to being impacted by subsidence.*	To be determined	While stream remediation activities have been completed at Pools A and F on the Waratah Rivulet and the water levels in both pools have remained above their cease to flow levels throughout the reporting period, an assessment against the rehabilitation performance indicator won't be made until a significant period of drier climatic conditions has been experienced.
Rehabilitation Objectives (Project Approval Table 11, Condition 1 Schedule 6)	*Surface Facilities Area*	*Set through condition 2 below.*	Yes	The rehabilitation objective for the surface facilities area is addressed in the Metropolitan Coal Rehabilitation Strategy.
	Waratah Rivulet, between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir	*Restore surface flow and pool holding capacity as soon as reasonably practicable.*	To be determined	Metropolitan Coal will assess surface flow and pool holding capacity using the results of the assessment of the Stream Remediation Performance Indicator for the completed stream remediation activities at Pools A and F once a significant period of drier climatic conditions has been experienced.
	Eastern Tributary, between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir		Yes	Stream remediation activities to restore surface flow and pool holding capacity have not been required on the Eastern Tributary to date.
	Cliffs	*Ensure that there is no safety hazard beyond that existing prior to mining.*	Yes	No safety hazard associated with cliffs was identified during the reporting period.
	Other land affected by the Project	*Restore ecosystem function, including maintaining or establishing self sustaining native ecosystems:* • *comprised of local native plant species; with* • *a landform consistent with the surrounding environment.*	Not currently applicable	The Rehabilitation Management Plan – Surface Disturbance Register will be used to manage the implementation of rehabilitation measures. The performance indicator for other land affected by the Project will be used to monitor the performance of rehabilitation measures being implemented.

Table 13 (Continued)
Assessment of Environmental Performance – Rehabilitation

Monitoring Component		Performance Indicator, Rehabilitation Objective and/or Project Approval Condition	Indicator, Objective or Condition Met?	Comments
Rehabilitation Objectives (Project Approval Table 11, Condition 1 Schedule 6) (Continued)	*Built features*	*Repair/restore to pre-mining condition or equivalent.*	Yes	Assessed through the Metropolitan Coal Built Features Management Plans. No impacts to built features were recorded during the reporting period.
	Community	*Minimise the adverse socio-economic effects associated with mine closure including the reduction in local and regional employment.*	Not currently applicable	The socio-economic effects associated with mine closure will be addressed in the Metropolitan Coal Mine Closure Plan and will be considered in consultation with the local community (through the Community Consultative Committee [CCC]) when determining the final landuse option.
		Ensure public safety.	Yes	Assessed through the Metropolitan Coal Public Safety Management Plan for the underground mining area and in the Metropolitan Coal Rehabilitation Strategy for the surface facilities area.
Rehabilitation Strategy – Surface Facilities Area (Project Approval Condition 2, Schedule 6)		*2. By the end of October 2011, the Proponent shall prepare a Rehabilitation Strategy for the surface facilities area to the satisfaction of the Director-General. This strategy must:* *(a) be prepared by a team of suitably qualified and experienced experts whose appointment has been endorsed by the Director-General;* *(b) be prepared in consultation with relevant stakeholders, including the WCC and the CCC;* *(c) investigate options for the future use of the area upon the completion of mining;* *(d) describe and justify the proposed rehabilitation strategy for the area; and* *(e) define the rehabilitation objectives for the area, as well as the proposed completion criteria for this rehabilitation.*	Yes	-
Progressive Rehabilitation (Project Approval Condition 3, Schedule 6)		*3. To the extent that mining operations permit, the Proponent shall carry out rehabilitation progressively, that is, as soon as reasonably practicable following the disturbance.*	Yes	-

Table 13 (Continued)
Assessment of Environmental Performance – Rehabilitation

Monitoring Component	Performance Indicator, Rehabilitation Objective and/or Project Approval Condition	Indicator, Objective or Condition Met?	Comments
Rehabilitation Management Plan (Project Approval Condition 4, Schedule 6)	*4. The Proponent shall prepare and implement a Rehabilitation Management Plan for the project to the satisfaction of the Executive Director Mineral Resources. This plan must be prepared in consultation with the relevant stakeholders, and submitted to DRE for approval prior to carrying out any second workings in the mining area.* *Note: In accordance with condition 12 of schedule 2, the preparation and implementation of Rehabilitation Management Plans is likely to be staged, with each plan covering a defined area (or domain) for rehabilitation. In addition, while mining operations are being carried out, some of the proposed remediation or rehabilitation measures may be included in the detailed management plans that form part of the Extraction Plan. If this is the case, however, then the Proponent will be required to ensure that there is good cross-referencing between the various management plans.*	Yes	-
Catchment Improvement Works (Project Approval Condition 5, Schedule 6)	*5. The Proponent shall:* *(a) pay SCA $100,000 by the end of 2011 to carry out catchment improvement works within the Woronora catchment area; or* *(b) carry out catchment improvement works within this area that have an equivalent value to the satisfaction of SCA.*	Yes	Metropolitan Coal conducts catchment improvement works in the Woronora catchment area in accordance with Condition 5(b), Schedule 6 of the Project Approval (refer Section 9.4).
Offsets (Project Approval Condition 6, Schedule 6)	*6. If the Proponent exceeds the performance measures in Table 1 of this approval, and either* *(a) The contingency measures implemented by the Proponent have failed to remediate the impact; or* *(b) The Director-General determines that it is not reasonable or feasible to remediate the impact,* *then the Proponent shall provide a suitable offset to compensate for the impact to the satisfaction of the Director-General.* *Note: Any offsets required under this condition must be proportionate with the significance of the impact.*	Not applicable	Metropolitan Coal has not exceeded any of the subsidence impact performance measures in Table 1, Condition 1, Schedule 2 of the Project Approval.

10 COMMUNITY

Metropolitan Coal engages with the Helensburgh community and strives to maintain positive relationships with stakeholders given the extensive history shared between the mine and township. Generations of locals have worked at the mine and it is widely accepted that the operation is an integral component of the Helensburgh community.

The operational workforce (comprising employees and on-site contractors) was required to be reduced by approximately 25% during the reporting period for Metropolitan Coal's transition to a five day production schedule. The majority of workers reside in the local area or within 50 km of the mine. As far as practicable, the mine seeks to employ local contractors, supply companies and services during the course of its operations.

Metropolitan Coal has also continued to provide sponsorship and/or donations to the local community. Metropolitan Coal's proactive community engagement program aims to work in partnership with the community for mutually beneficial and sustainable outcomes, and achieves this by the development of specific community programs as discussed below.

10.1 COMMUNITY ENGAGEMENT ACTIVITES AND INITIATIVES

Community Consultative Committee

Four CCC meetings were held during the reporting period (25 February, 15 July, 14 October and 9 December 2015). These meetings facilitated Metropolitan Coal consultation and engagement with community members on matters of general business and the environmental performance of the operation.

A new Independent Chair for the CCC was approved by the DP&E in January 2015. A report on the progress of the CCC in 2015 was provided to the Secretary of the DP&E in April 2016 and a copy of the letter is provided as Appendix N.

Community Consultative Centre

Metropolitan Coal has continued to open its shopfront in the Helensburgh central business district on Tuesday's and Thursday's to provide the community with information about the mine. The Community Consultative Centre provides members of the community an opportunity to discuss the mine's operation, raise any issues or concerns, and offer suggestions with personnel from Metropolitan Coal. Members from the Metropolitan CCC have also been present at the Centre at designated times to provide a resident's take on the mine's operations. The centre has been well utilised by the community and the initiative has proven valuable for the mine and the community.

Community and Environment Newsletters

Metropolitan Coal distributed a Community Newsletter in December 2015 (via letterbox drop) to provide an update on Metropolitan Coal's operations and mine activities. The newsletter included information on the scale-back of production in 2015, the associated changes in employee and contractor numbers and the transition from a seven to a five day roster in response to current market conditions. The newsletter also described the reduction in truck movements through Helensburgh, the installation of additional dust sprays, the status of underground coal reject emplacement and the latest noise management measures. The newsletter also included relevant contact details such that further communication could be facilitated with the community.

10.2 COMMUNITY CONTRIBUTIONS

In addition to the community engagement programs discussed above, Metropolitan Coal has made a number of significant donations to support the community of Helensburgh and the greater Illawarra region throughout 2015. All donation requests were assessed on their individual merit and funding was distributed accordingly.

In total, community donations and sponsorship during 2015 amounted to over $100,000 and included the following:

- Ongoing sponsorship of the Helensburgh Tigers Rugby League Football Club.
- Donation to the Coalminers Cup (a Helensburgh Junior Rugby League Football Club competition).
- Sponsorship of the Stephen Holmes Memorial Rugby League Match 2015 between the Northern Suburbs Bulldogs and the Metropolitan Pit Ponies.
- Donation to the Thirroul Butchers Old Boys annual football competition.
- Individual donations to local or regional sportspeople (e.g. state representative netball umpire, BMX athletes) or community members (e.g. funds to fight cancer).
- Continued support to the Holy Cross Primary School's Yulunga Garden Program.
- Donation to the Holy Cross Primary School to support their annual fete.
- Donation to Helensburgh Public School for works on the playground.
- Donation towards installation of synthetic turf in the playground at Stanwell Park Public School.
- Ongoing support for the Helensburgh Stanwell Park Surf Life Saving Club, Bulli Surf Life Saving Club and the Era Surf Life Saving Club.
- Ongoing sponsorship of the Komplete Kaos Robot Club to fund children's participation in the FIRST LEGO League World Festival held in St Louis.
- Ongoing sponsorship of the Razzamatazz Children's Show for special needs children and their families, through the Rotary Club of Fairy Meadow.
- Donation to the YMCA Swimathon, a fundraiser to provide swimming lessons to disadvantaged children.
- Donation to the Bulli Police Citizens Youth Club for the renovation of boxing facilities.
- Donation to 'Carols in the Burgh' for community Christmas Carols in Helensburgh.
- Provision of funds to the Dymocks Children's Charities to purchase books for local childcare centres.

10.3 COMMUNITY COMPLAINTS

A protocol for the management and reporting of complaints has been developed as a component of Metropolitan Coal's Environmental Management Strategy. A dedicated telephone number for the provision of comments or complaints is maintained by Metropolitan Coal (1800 115 003) and is displayed on signage at an entrance to the mine. Metropolitan Coal records and responds to all complaints and maintains a complaints register on its website. A number of concerns or queries were also raised with personnel at the Community Consultative Centre, or by telephone.

During the reporting period, one complaint was received on an afternoon in October 2015 from a neighbouring resident concerned with a truck's use of exhaust brakes while driving down the Colliery entrance road. Investigation of the incident indicated the truck was carrying heavy equipment to the site which necessitated the use of the exhaust brakes to effectively control the vehicle on the steep gradient while entering site. Very few complaints have been received on an annual basis since the Project was approved in June 2009 and typically have related to noise, dust and/or traffic.

11 INDEPENDENT ENVIRONMENTAL AUDIT

In accordance with Condition 8, Schedule 7 of the Project Approval, an Independent Environmental Audit of the Project was commissioned by the end of December 2014 and conducted from May to December 2015 by a team of experienced and independent experts endorsed by the Secretary of Planning. Metropolitan Coal received the final Independent Environmental Audit report in January 2016. The Independent Environmental Audit included a detailed review and verification of water monitoring results.

The key outcomes of the Independent Environmental Audit are described in the Audit Report's Executive Summary, a copy of which is provided in Appendix O. In accordance with Condition 9, Schedule 7 of the Project Approval, Metropolitan Coal provided a copy of the Independent Environmental Audit to the Secretary of Planning, together with Metropolitan Coal's response to the recommendations contained in the Audit Report in February 2016. The response is available on the Peabody website (http://www.peabodyenergy.com).

In relation to the recommendation made in the Independent Environmental Audit regarding the Research Program *Significance of Chain Pillars on Simulated Groundwater Pressures*, the program will be progressed before the preparation of the next Extraction Plan.

In relation to the recommendation made in the Independent Environmental Audit regarding biodiversity, in the event the Littlejohn's Tree Frog is recorded in amphibian surveys for the Project, Metropolitan Coal will develop a winter survey/monitoring program specific to this species. The program will be included in an appropriate Biodiversity Management Plan.

In relation to the recommendation made in the Independent Environmental Audit regarding subsidence reporting and valley closure measurement data, MSEC has provided clarification in relation to the recommendations and will modify the text in future end of panel reports to improve clarity in relation to subsidence measurements.

12 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

Noise

Metropolitan Coal has identified non-compliances at two representative monitoring locations with respect to the Noise Impact Assessment Criteria (Condition 1, Schedule 4 of the Project Approval) and an administrative non-compliance with respect to the associated Notification of Landowners (Condition 1, Schedule 5 of the Project Approval).

It is noted that conclusive identification of these sustained noise non-compliances was not determined until Quarter 1 of 2016. In addition, further analysis is required in order to determine if sustained non-compliances with the Noise Impact Assessment Criteria may also be anticipated at any residences on adjacent privately-owned land on Oxley Place or Parkes Street or on more than 25% of any adjacent privately-owned land. It is Metropolitan Coal's intention to notify all relevant landholders at the same time (for reasons of equity) following this analysis.

It is noted that these locations were experiencing daytime, evening and night-time operational noise levels from the Metropolitan Coal Mine that were materially higher than the levels recorded in the current reporting period prior to the approval of the Project in June 2009, and a range of operational noise control measures has been implemented since that time (Section 6.2.1).

During the reporting period, one noise complaint was received on an afternoon in October 2015 from a neighbouring resident concerned with a truck's use of exhaust brakes while driving down the Colliery entrance road. Investigation of the incident indicated the truck was carrying heavy equipment to the site which necessitated the use of the exhaust brakes to effectively control the vehicle on the steep gradient while entering site. Given the proximity of the major surface facilities to the nearby private residences (Figure 20) this is considered to be a very low number of noise complaints.

Notwithstanding, in accordance with Section 9 of the Metropolitan Coal Noise Management Plan, the Contingency Plan will be implemented as follows:

- Metropolitan Coal has commissioned a Sound Power Level review and remodelling of noise emissions to examine potential additional noise controls and identify the specific residences on adjacent privately-owned land on Oxley Place and Parkes Street that are estimated to be exceeding the Noise Impact Assessment Criteria (and to identify any adjacent properties that are estimated to be exceeding this criteria on more than 25% of privately-owned land) (i.e. determine a relationship between the quarterly monitoring locations and nearby residences).
- Metropolitan Coal will notify those residences where exceedances of the Noise Impact Assessment Criteria are likely to be sustained in accordance with the requirements of Condition 1, Schedule 5 of the Project Approval (i.e. locations to be identified by the modelling described above) and action other relevant elements of the Metropolitan Coal Noise Management Plan Contingency Plan.
- Metropolitan Coal will examine potential additional noise controls and implement any additional reasonable and feasible at source controls.

It is anticipated that sustained non-compliances with respect to the Noise Impact Assessment Criteria could also be expected at proximal residences over the next reporting period. Metropolitan Coal will seek to consult with the DP&E with respect to these criteria.

The extensive and long running noise control program has reduced noise emissions at nearby residences, however, the number of remaining material, reasonable and feasible noise controls is diminishing and the Noise Impact Assessment Criteria may not be achievable in the medium to long term.

Air Quality

Metropolitan Coal has identified an administrative non-compliance with respect to Condition M2 *Requirement to monitor concentrations of pollutants discharged*, of EPL No. 767. As described in Table 2 and Section 6.2.2, sampling was not able to be conducted at all monitoring points at the frequencies described in Conditions M2.1 and M2.2 of EPL No. 767. Specifically:

- The dust deposition gauge located at the Helensburgh Public School (DG9) was unable to be collected in January 2015 due to locked gates preventing access (during school closure).
- The dust deposition gauges include a bottle which captures the dust between collection periods. When inspected, samples from dust gauges, DG4 and DG8 (in February 2015) and DG3 (in December 2015), were unable to be collected as the bottle was broken and no sample was recoverable.

- The dust deposition gauge (DG7) located at 32 Old Station Road, is on private property. In August 2015, the property owner instructed Metropolitan Coal that they no longer wished to host a depositional dust gauge at the property. Following further consultation with Metropolitan Coal, the owner agreed to continue to host the gauge on their property and sampling recommenced in November 2015.
- One day of data was missing on 10 July 2015 due to HVAS equipment failure.

In relation to the administrative non-compliances recorded against EPL No. 767, Metropolitan Coal has determined the following management measures. Specifically:

- Metropolitan Coal has reached an agreement with the Helensburgh Public School to allow contractor access to DG9 during holiday periods.
- In the event that the broken dust deposition gauge bottles are determined to be caused by vandalism, Metropolitan Coal may undertake an investigation to move or more effectively secure the monitoring points.
- Metropolitan Coal will continue to consult with the property owner at 32 Old Station Road (DG7), should any future concerns be raised.
- In the event of ongoing sampling failures, Metropolitan Coal will repair or replace the HVAS unit.

13 ACTIVITIES PROPOSED IN THE NEXT REPORTING PERIOD

Longwall 25 and Longwall 26 will be completed in April 2016 and September 2016, respectively. Longwall 27 will commence in October 2016 (Figure 6).

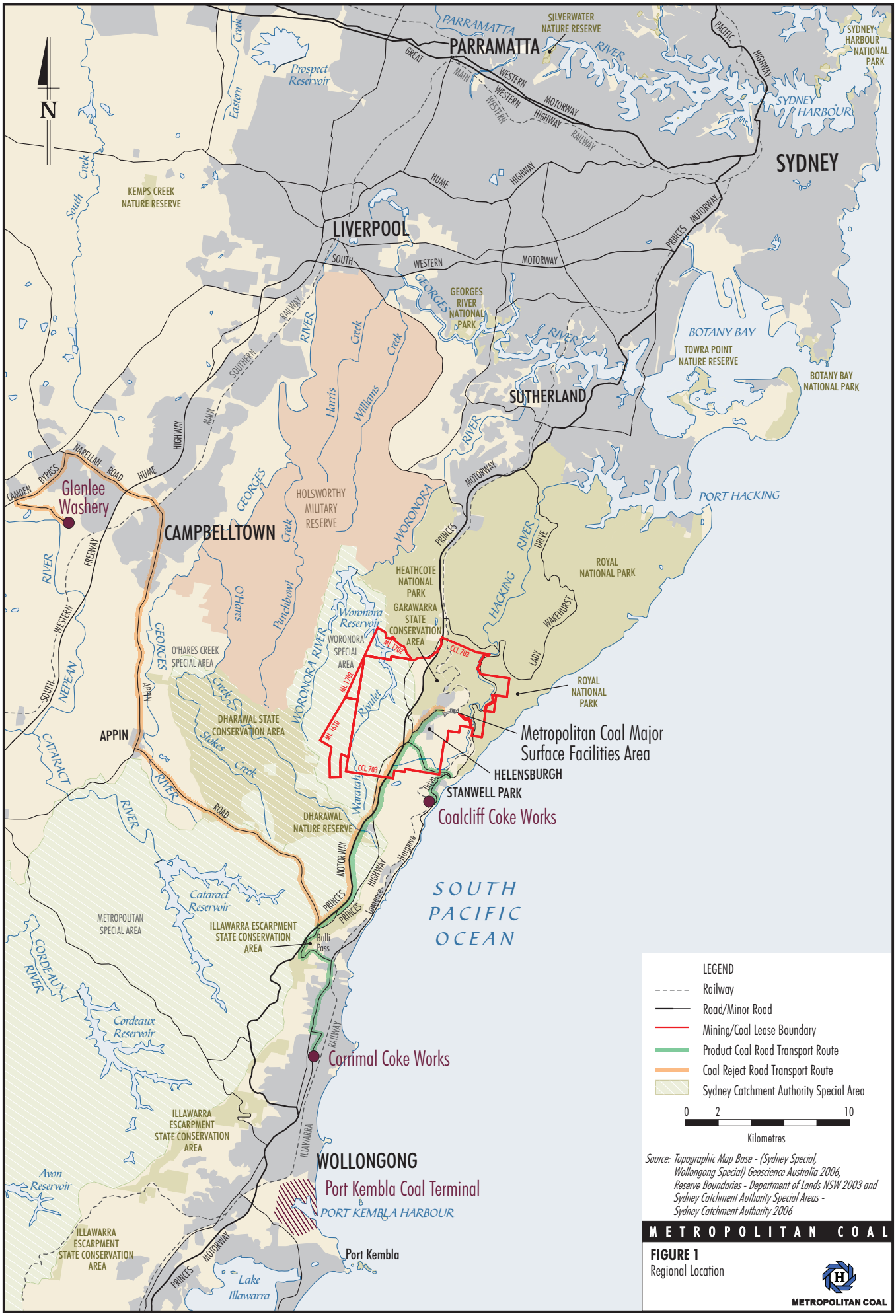
In the next reporting period, the following activities will be conducted:

- The Metropolitan Coal Noise Management Plan Contingency Plan will be implemented as follows:
  - Metropolitan Coal has commissioned a Sound Power Level review and remodelling of noise emissions to examine potential additional noise controls and identify the specific residences on Oxley Place and Parkes Street that are estimated to be exceeding the Noise Impact Assessment Criteria (and to identify any adjacent properties that are estimated to be exceeding this criteria on more than 25% of privately-owned land) (i.e. determine a relationship between the quarterly monitoring locations and nearby residences).
  - Metropolitan Coal will notify those residences where exceedances of the Noise Impact Assessment Criteria are likely to be sustained in accordance with the requirements of Condition 1, Schedule 5 of the Project Approval (i.e. locations to be identified by the modelling described above) and action other relevant elements of the Metropolitan Coal Noise Management Plan Contingency Plan, following further consultation with DP&E.
  - Metropolitan Coal will examine potential additional noise controls and implement any additional reasonable and feasible at source controls.
- Metropolitan Coal will commence the transport of coal reject to the Lend Lease Calderwood Urban Development Project for the beneficial re-use of coal reject as fill material and anticipates that transport of coal reject will commence by the end of July 2016. Metropolitan Coal will continue its ongoing consultation with the WCC regarding the potential for coal rejects to be beneficially re-used at the Helensburgh Landfill. Further testwork of the coal reject material will be conducted in this regard.

- The Turkey's Nest Dam will be upgraded and a new sediment catch pit installed to improve the efficiency of the water management system. Metropolitan Coal anticipates that the upgrades to the Turkey's Nest Dam and installation of the new sediment catch pit will be ongoing throughout 2016.
- Metropolitan Coal will install a transect of groundwater piezometers overlying the 300 series longwalls, and anticipates that installation will be completed by the end of September 2016. Metropolitan Coal will also install groundwater piezometers within a selection of swamps overlying Longwalls 301-303, and anticipates that installation will be completed by the end of July 2016.
- Stream remediation activities will be conducted at Pool G on the Waratah Rivulet. Metropolitan Coal anticipates that, weather permitting, the stream remediation activities at Pool G will be completed by the end of July 2016.
- Catchment improvement works will continue in the Woronora catchment area, namely, rehabilitation of the former quarry on Fire Road 9H and rehabilitation of the disused access track to the Darkes Forest Mine. Weather permitting, catchment improvement works in the Woronora catchment area will be undertaken as required throughout 2016.

Metropolitan Coal will review, and if necessary, revise the strategies, plans and programs required under the Project Approval within three months following the submission of this Annual Review to the satisfaction of the Secretary of the DP&E.

FIGURES

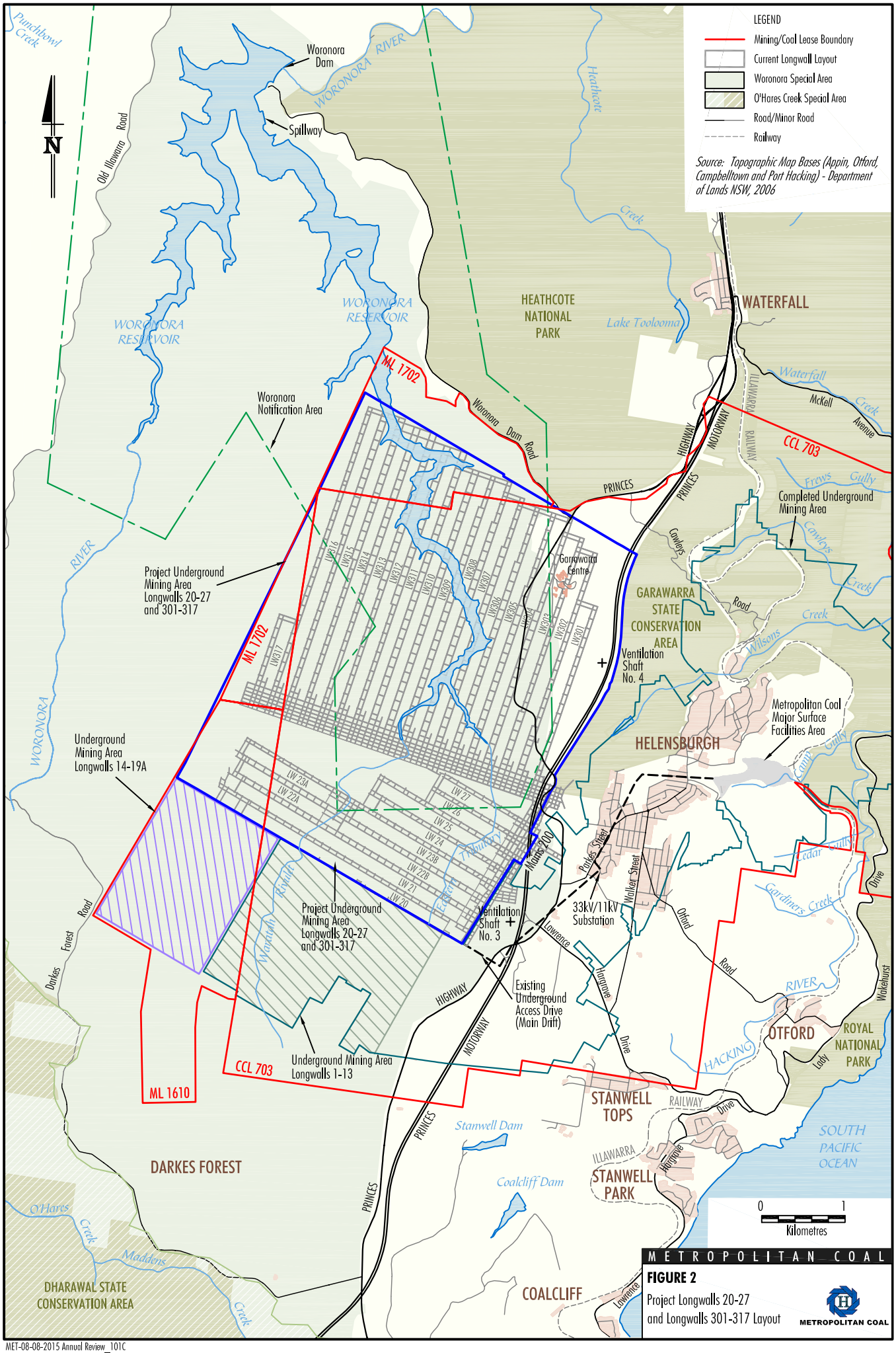


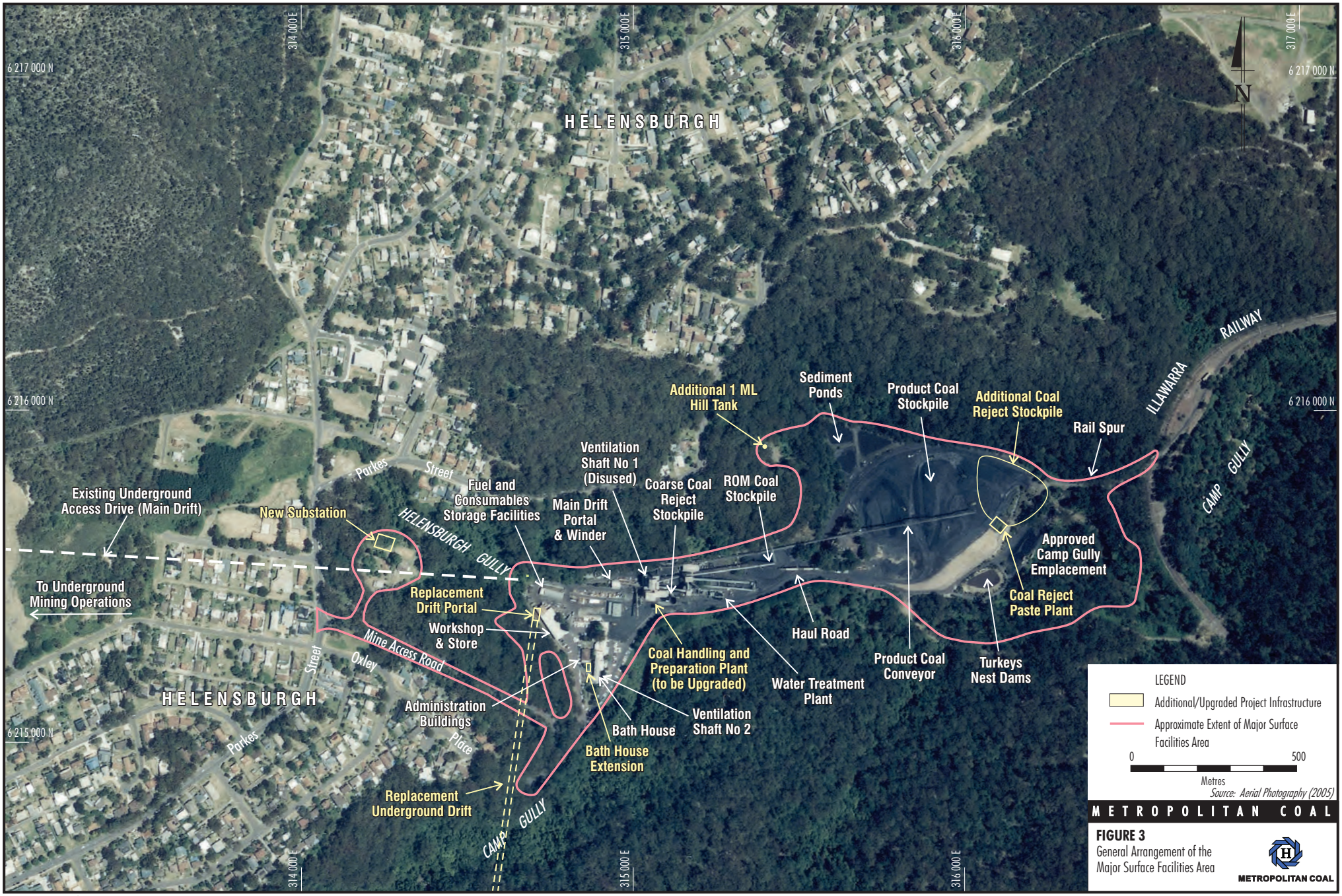
Source: Topographic Map Base - (Sydney Special, Wollongong Special) Geoscience Australia 2006, Reserve Boundaries - Department of Lands NSW 2003 and Sydney Catchment Authority Special Areas - Sydney Catchment Authority 2006

METROPOLITAN COAL

FIGURE 1
Regional Location

METROPOLITAN COAL

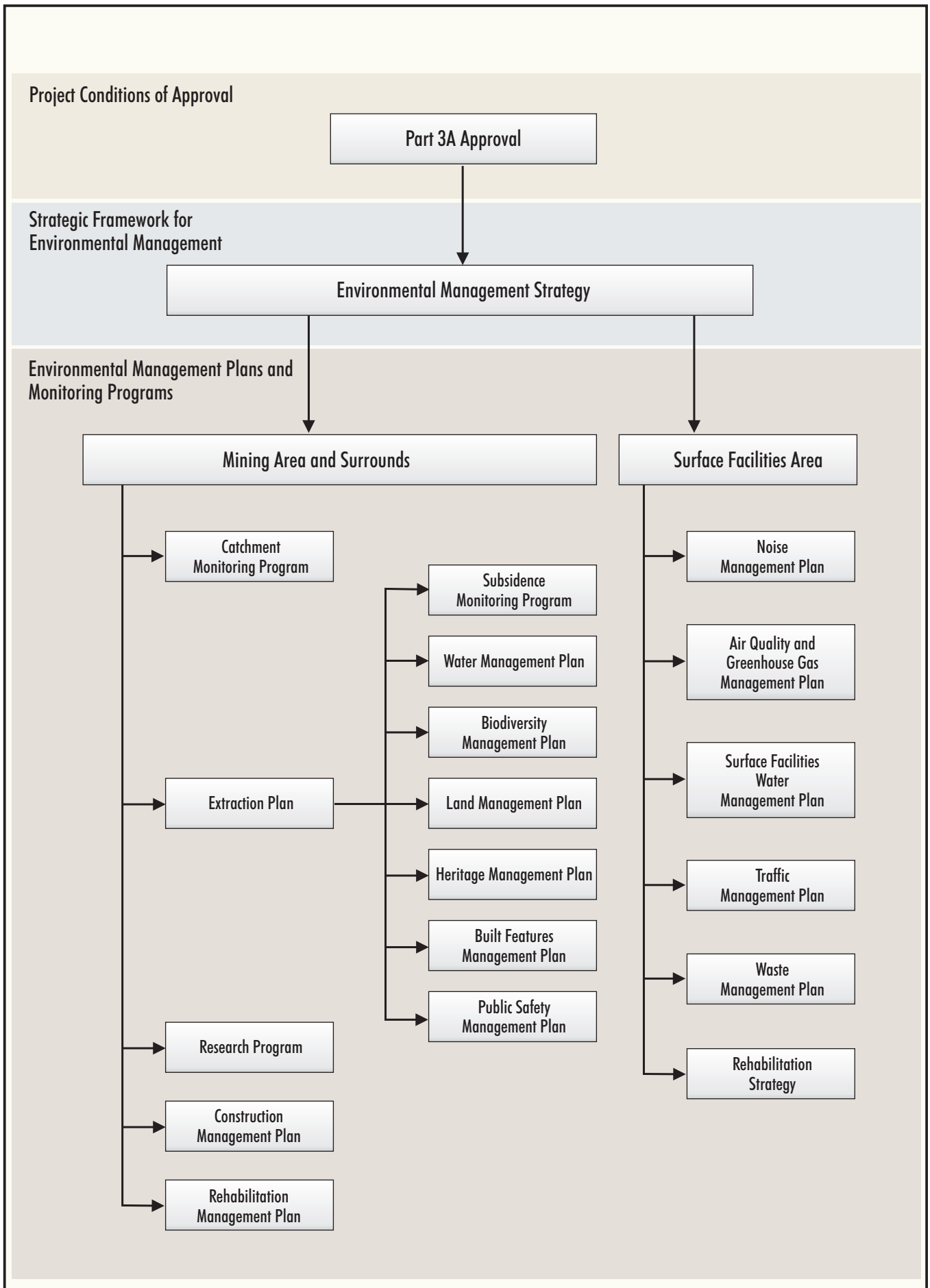

LEGEND
Mining/Coal Lease Boundary
Current Longwall Layout
Woronora Special Area
O'Hares Creek Special Area
Road/Minor Road
Railway
Source: Topographic Map Bases (Appin, Otford, Campbelltown and Port Hacking) - Department of Lands NSW, 2006
N
Punchbowl Creek
Woronora Dam
Spillway
WORONORA RIVER
Old Illawarra Road
WORONORA RESERVOIR
WORONORA RESERVOIR
Heathcote Creek
HEATHCOTE NATIONAL PARK
Lake Toolooma
WATERFALL
ML 1702
Woronora Notification Area
Woronora Dam Road
HIGHWAY
MOTORWAY
ILLAWARRA RAILWAY
PRINCES
Waterfall Creek
McKell Avenue
CCL 703
Frews Gully
Completed Underground Mining Area
Cowleys Creek
Project Underground Mining Area Longwalls 20-27 and 301-317
Garrawarra Centre
GARAWARRA STATE CONSERVATION AREA
Road
Wilsons Creek
Ventilation Shaft No. 4
Metropolitan Coal Major Surface Facilities Area
HELENSBURGH
Camp Gully
Underground Mining Area Longwalls 14-19A
Parkes Street
Walker Street
33kV/11kV Substation
Cedar Gully
Gardiners Creek
Drive
Otford Road
Ventilation Shaft No. 3
Lawrence Hargrave Drive
Existing Underground Access Drive (Main Drift)
RIVER
Wollondilly
Darkes Forest Road
Project Underground Mining Area Longwalls 20-27 and 301-317
Underground Mining Area Longwalls 1-13
CCL 703
ML 1610
OTFORD
ROYAL NATIONAL PARK
HACKING
Lady Wakehurst Drive
STANWELL TOPS
RAILWAY
Stanwell Dam
SOUTH PACIFIC OCEAN
ILLAWARRA
STANWELL PARK
Coaldcliff Dam
DARKES FOREST
O'Hares Creek
Maddens Creek
DHARAWAL STATE CONSERVATION AREA
COALCLIFF
Lawrence Hargrave Drive
0
1
Kilometres
METROPOLITAN COAL
FIGURE 2
Project Longwalls 20-27 and Longwalls 301-317 Layout
METROPOLITAN COAL



METROPOLITAN COAL

FIGURE 3
General Arrangement of the Major Surface Facilities Area

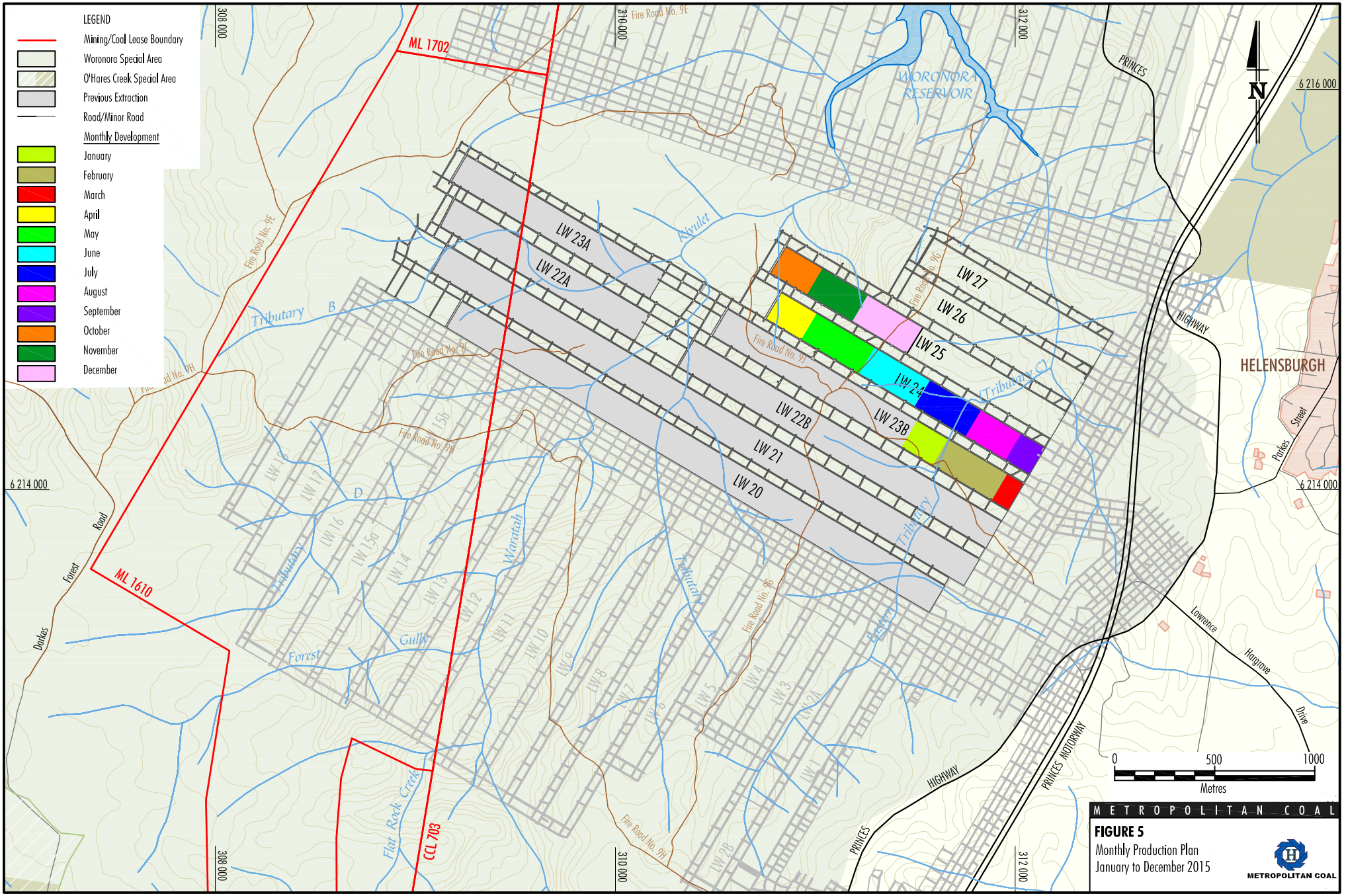
METROPOLITAN COAL



METROPOLITAN COAL

FIGURE 4
Environmental Management Structure

METROPOLITAN COAL



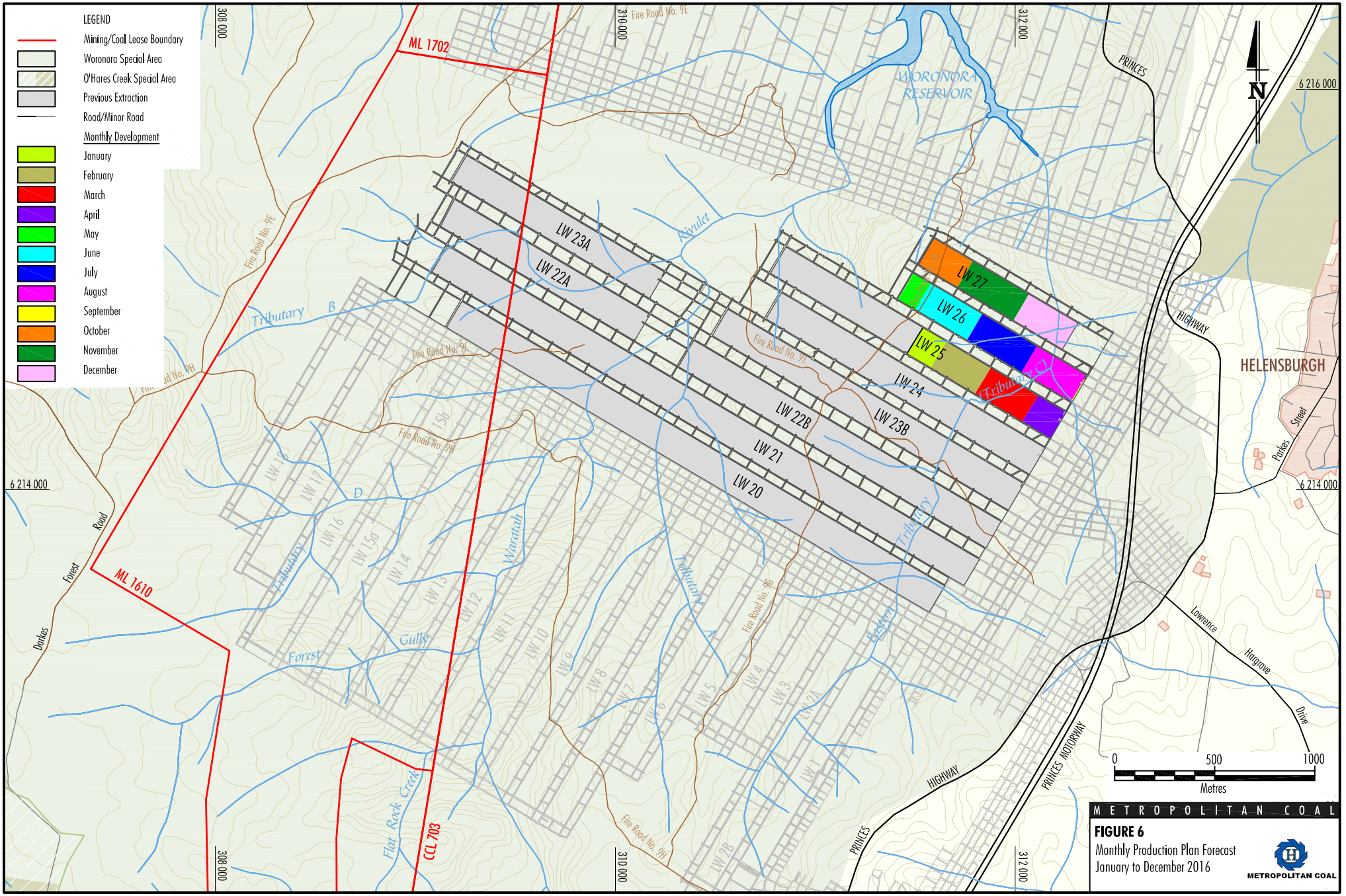
METROPOLITAN COAL

FIGURE 5

Monthly Production Plan
January to December 2015

METROPOLITAN COAL

MET-08-08-2015 Annual Review_111D



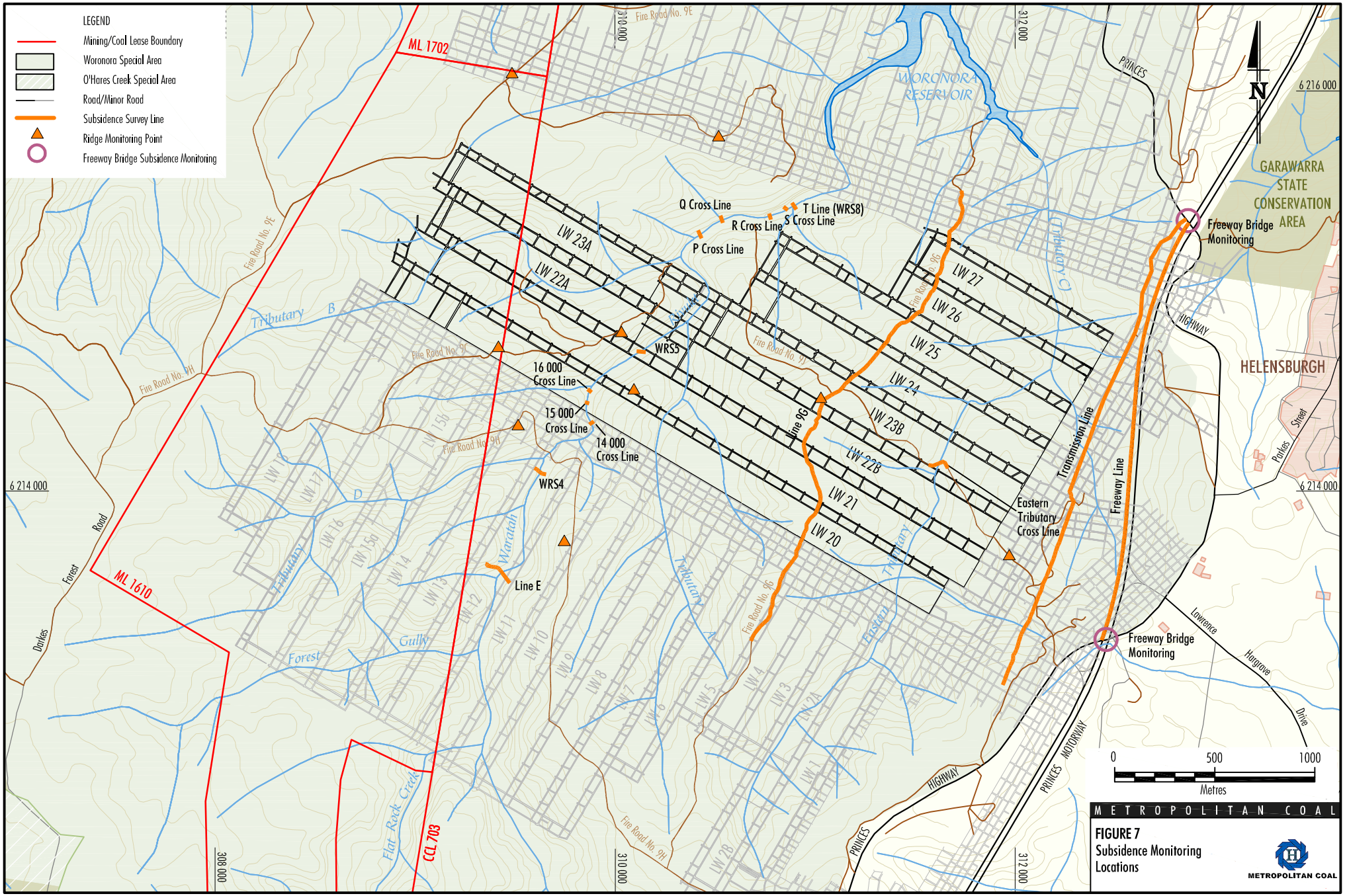
METROPOLITAN COAL

FIGURE 6

Monthly Production Plan Forecast
January to December 2016

METROPOLITAN COAL

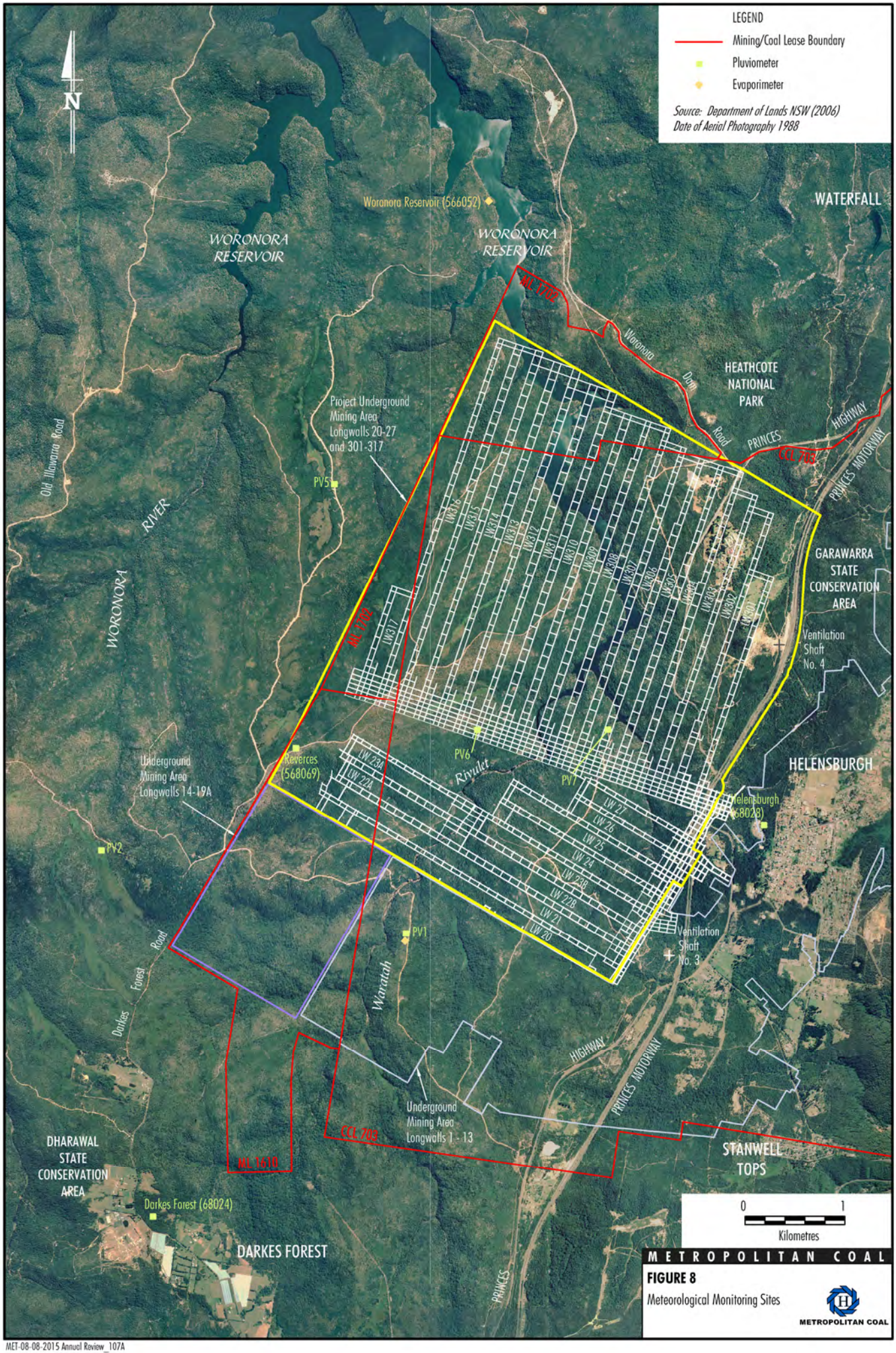
MET-08-08-2015 Annual Review_112D

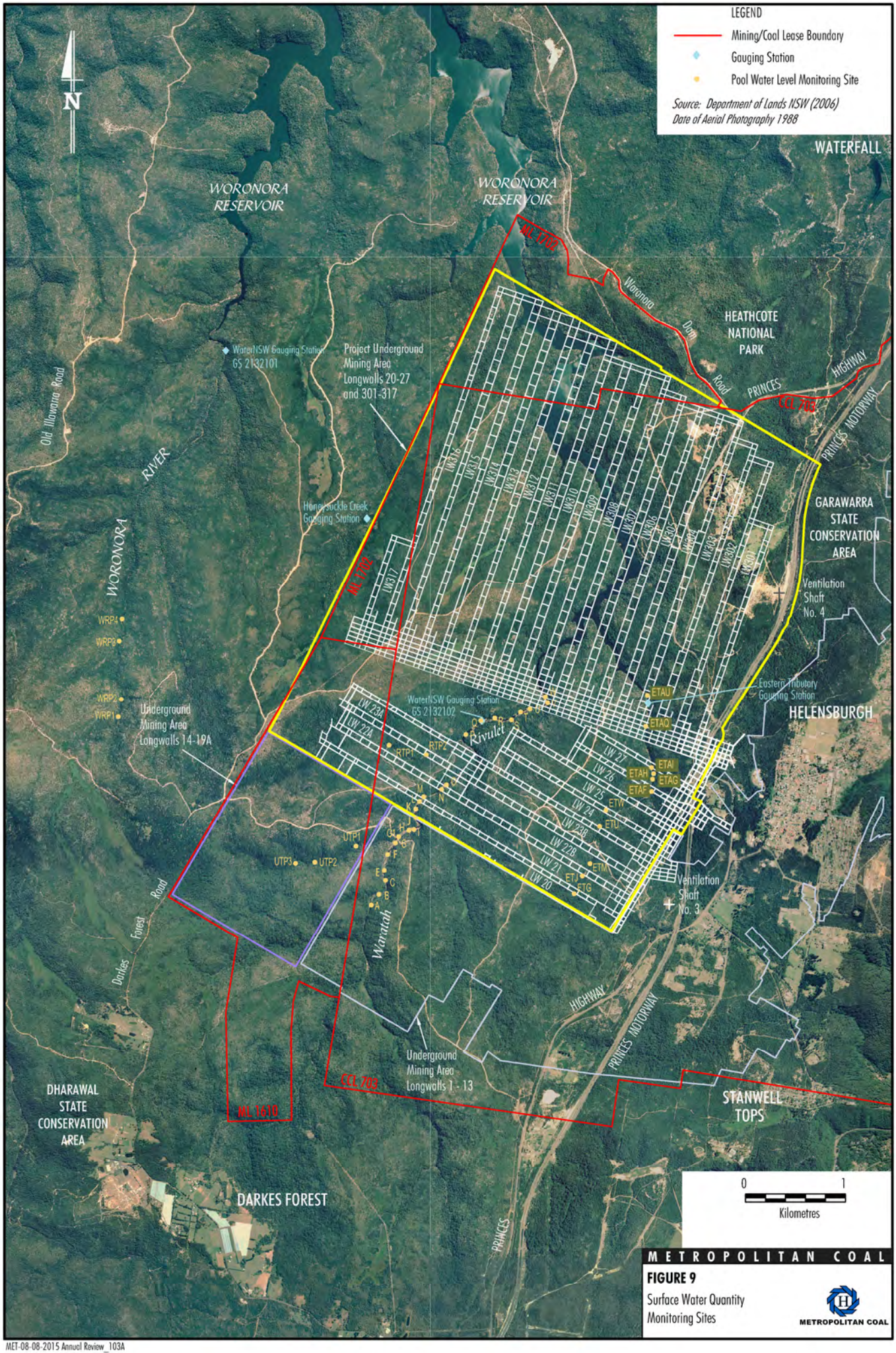


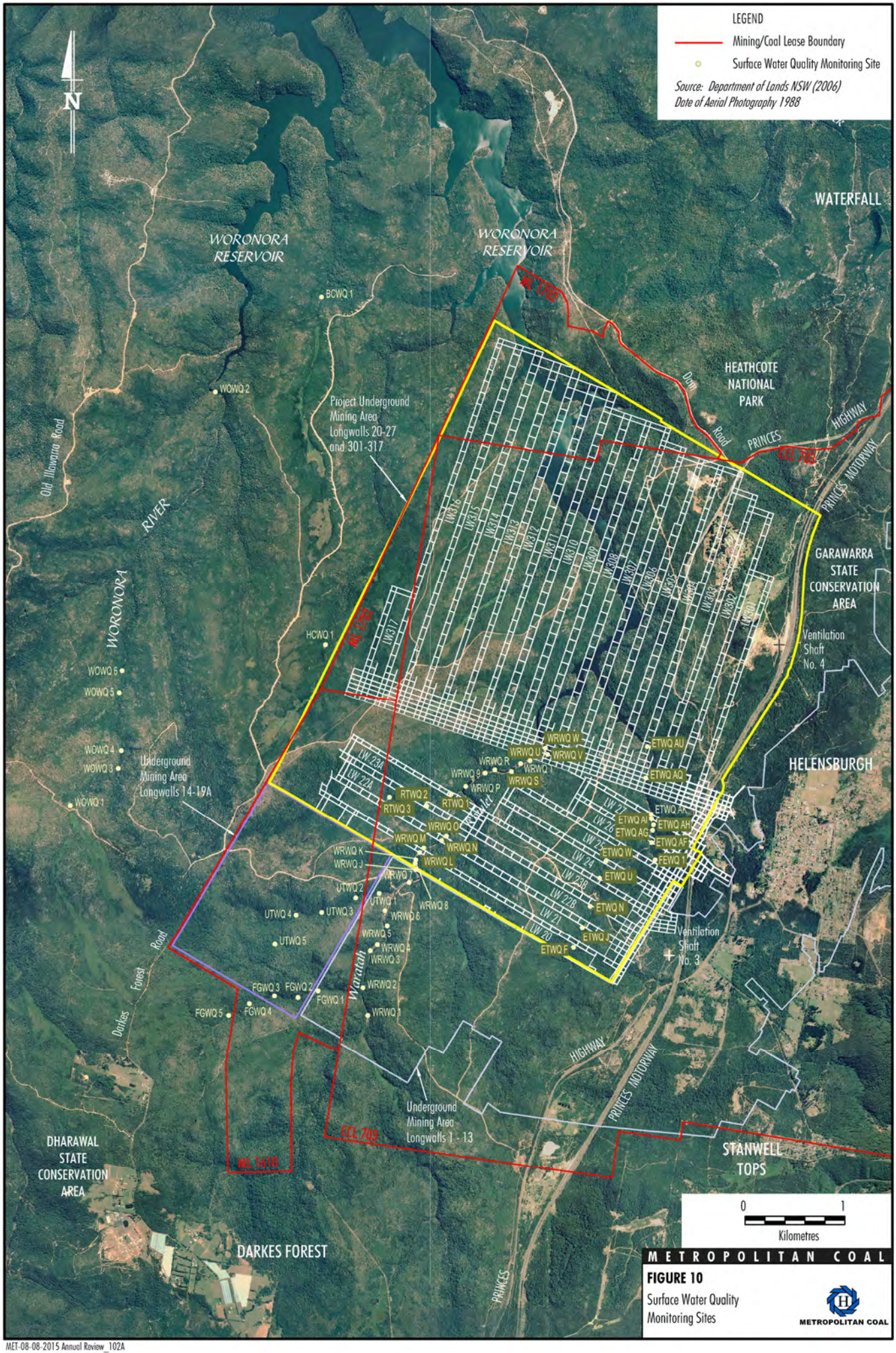
METROPOLITAN COAL

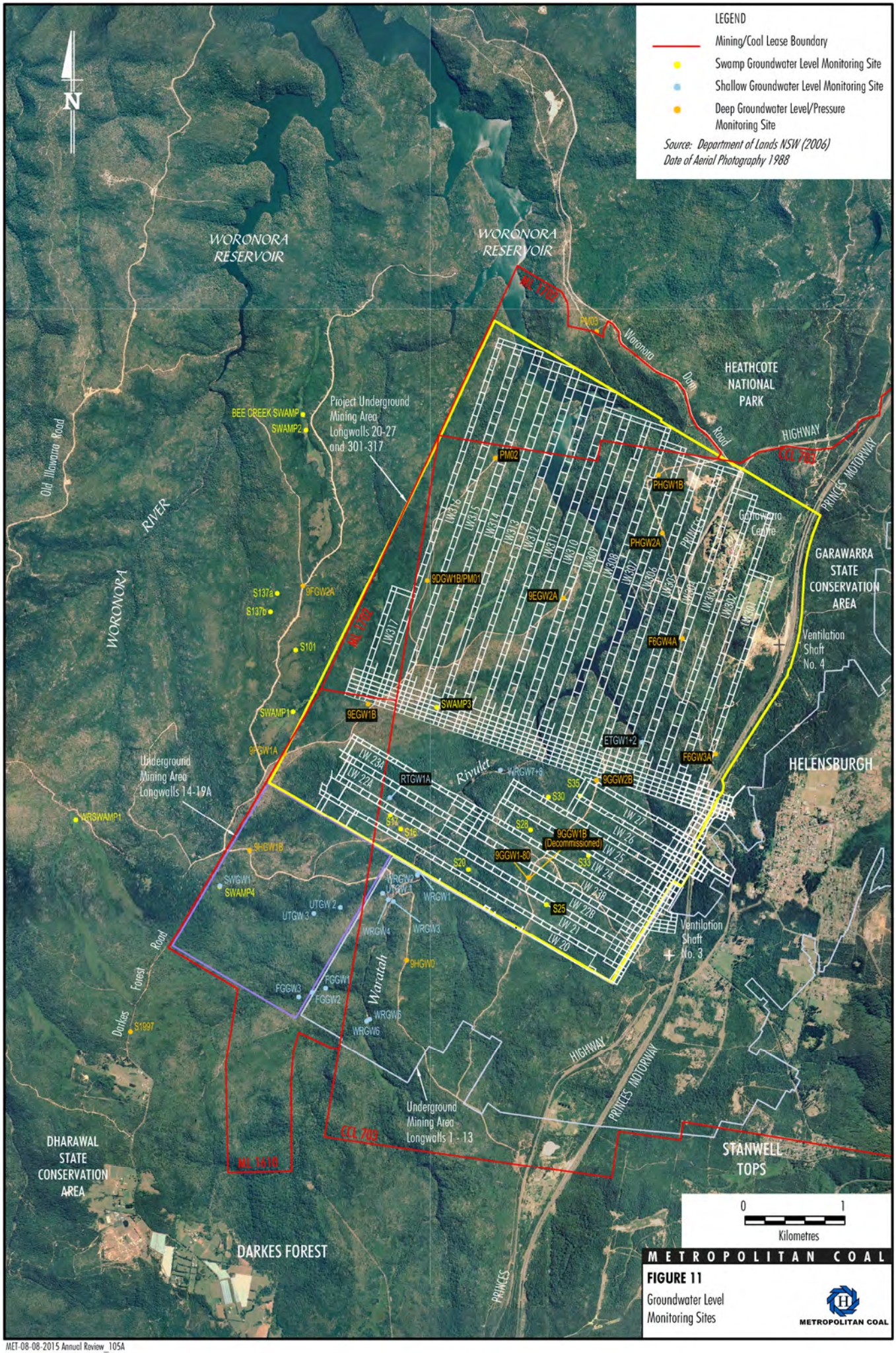
FIGURE 7
Subsidence Monitoring Locations

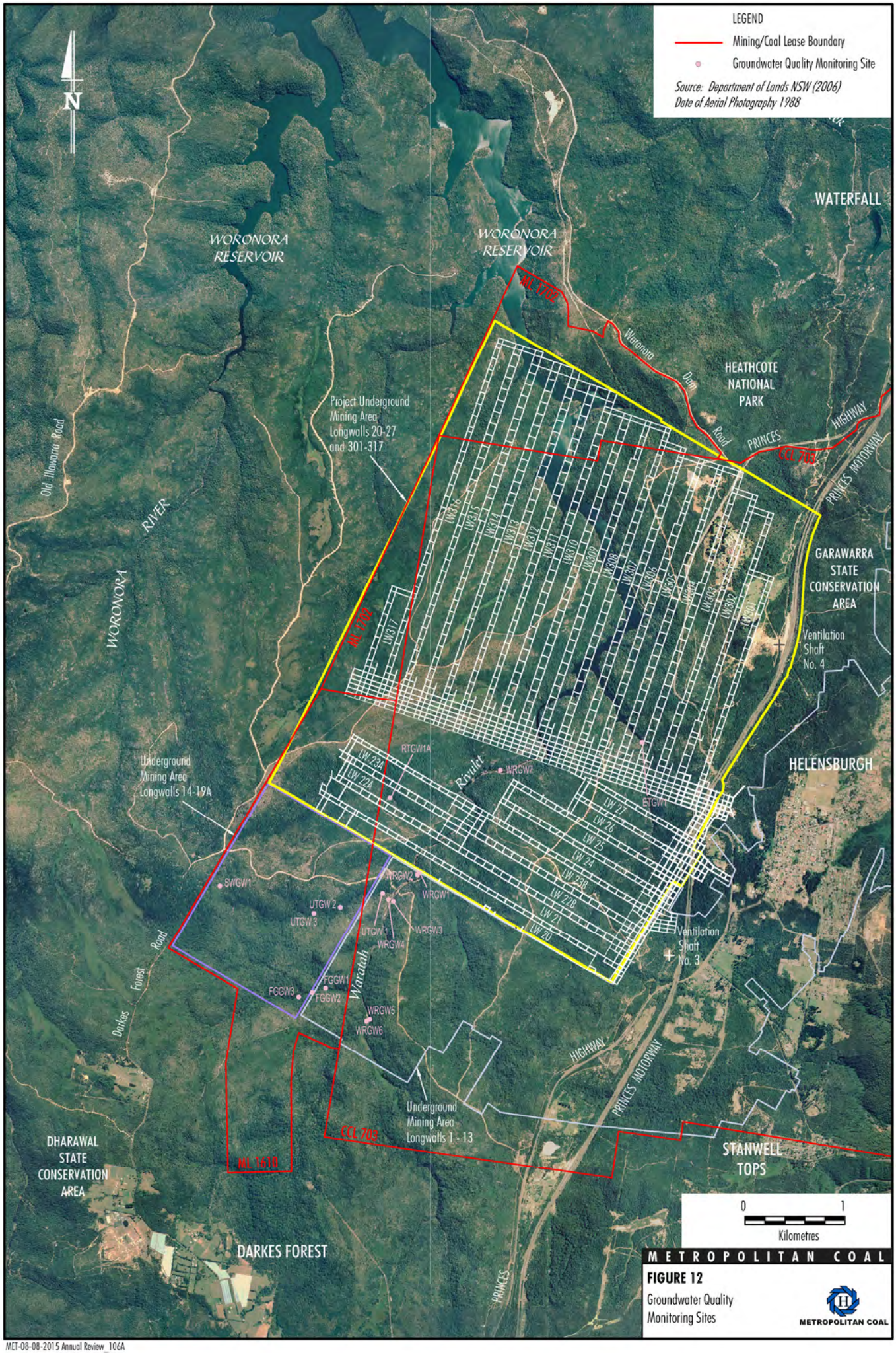
METROPOLITAN COAL


LEGEND
Mining/Coal Lease Boundary
Pluviometer
Evaporimeter
Source: Department of Lands NSW (2006)
Date of Aerial Photography 1988
N
WORONORA RESERVOIR
WORONORA RESERVOIR
Woronora Reservoir (566052)
WATERFALL
HEATHCOTE NATIONAL PARK
Woronora Dam Road
PRINCES HIGHWAY
PRINCES MOTORWAY
CCL 703
ML 1702
ML 1578
Project Underground Mining Area Longwalls 20-27 and 301-317
PV5
Old Illawarra Road
WORONORA RIVER
GARAWARRA STATE CONSERVATION AREA
Ventilation Shaft No. 4
Underground Mining Area Longwalls 14-19A
Reverces (568069)
PV6
Rivulet
PV7
HELENSBURGH
Helensburgh (68028)
PV2
PV1
Waratah
Darkes Forest Road
Ventilation Shaft No. 3
Underground Mining Area Longwalls 1 - 13
DHARAWAL STATE CONSERVATION AREA
ML 1610
CCL 709
STANWELL TOPS
Darkes Forest (68024)
DARKES FOREST
0
1
Kilometres
METROPOLITAN COAL
FIGURE 8
Meteorological Monitoring Sites
METROPOLITAN COAL


LEGEND
Mining/Coal Lease Boundary
Gauging Station
Pool Water Level Monitoring Site
Source: Department of Lands NSW (2006)
Date of Aerial Photography 1988
N
WORONORA RESERVOIR
WORONORA RESERVOIR
WATERFALL
ML 1609
Woronora Dam Road
HEATHCOTE NATIONAL PARK
PRINCES HIGHWAY
CCL 703
PRINCES MOTORWAY
Old Illawarra Road
WaterNSW Gauging Station GS 2132101
Project Underground Mining Area Longwalls 20-27 and 301-317
RIVER
WORONORA
Honeysuckle Creek Gauging Station
ML 1708
GARAWARRA STATE CONSERVATION AREA
Ventilation Shaft No. 4
WRP4
WRP3
WRP2
WRP1
Underground Mining Area Longwalls 14-19A
WaterNSW Gauging Station GS 2132102
Eastern Tributary Gauging Station
HELENSBURGH
Rivulet
RTP1
RTP2
UTP1
UTP2
UTP3
Waratah
Darkes Forest Road
Ventilation Shaft No. 3
HIGHWAY
PRINCES MOTORWAY
Underground Mining Area Longwalls 1 - 13
CCL 703
ML 1610
DHARAWAL STATE CONSERVATION AREA
STANWELL TOPS
DARKES FOREST
PRINCES
0
1
Kilometres
METROPOLITAN COAL
FIGURE 9
Surface Water Quantity Monitoring Sites
METROPOLITAN COAL


LEGEND
Mining/Coal Lease Boundary
Surface Water Quality Monitoring Site
Source: Department of Lands NSW (2006)
Date of Aerial Photography 1988
N
WORONORA RESERVOIR
WORONORA RESERVOIR
WATERFALL
HEATHCOTE NATIONAL PARK
GARAWARRA STATE CONSERVATION AREA
HELENSBURGH
STANWELL TOPS
DHARAWAL STATE CONSERVATION AREA
DARKES FOREST
Project Underground Mining Area Longwalls 20-27 and 301-317
Underground Mining Area Longwalls 14-19A
Underground Mining Area Longwalls 1 - 13
Ventilation Shaft No. 4
Ventilation Shaft No. 3
ML 1702
CCL 703
ML 1610
BCWQ 1
WOWQ 2
HCWQ 1
WOWQ 6
WOWQ 5
WOWQ 4
WOWQ 3
WOWQ 1
RTWQ 2
RTWQ 3
RTWQ 1
UTWQ 2
UTWQ 1
UTWQ 4
UTWQ 3
UTWQ 5
FGWQ 3
FGWQ 2
FGWQ 1
FGWQ 5
FGWQ 4
WRWQ W
WRWQ U
WRWQ V
WRWQ R
WRWQ T
WRWQ S
WRWQ Q
WRWQ P
WRWQ O
WRWQ M
WRWQ N
WRWQ K
WRWQ J
WRWQ L
WRWQ 7
WRWQ 8
WRWQ 6
WRWQ 5
WRWQ 4
WRWQ 3
WRWQ 2
WRWQ 1
ETWQ AU
ETWQ AQ
ETWQ AK
ETWQ AI
ETWQ AH
ETWQ AG
ETWQ AF
FEWQ 1
ETWQ W
ETWQ U
ETWQ N
ETWQ J
ETWQ F
LW 316
LW 315
LW 314
LW 313
LW 312
LW 311
LW 310
LW 309
LW 308
LW 307
LW 306
LW 305
LW 304
LW 303
LW 302
LW 301
LW 317
LW 23A
LW 22A
LW 27
LW 26
LW 25
LW 24
LW 23B
LW 22B
LW 21
LW 20
Old Illawarra Road
Forest Road
Darkes
Waratah
RIVER
WORONORA
Dam
Road
PRINCES HIGHWAY
PRINCES MOTORWAY
0
1
Kilometres
METROPOLITAN COAL
FIGURE 10
Surface Water Quality Monitoring Sites
METROPOLITAN COAL


LEGEND
Mining/Coal Lease Boundary
Swamp Groundwater Level Monitoring Site
Shallow Groundwater Level Monitoring Site
Deep Groundwater Level/Pressure Monitoring Site
Source: Department of Lands NSW (2006)
Date of Aerial Photography 1988
N
WORONORA RESERVOIR
WORONORA RESERVOIR
ML 1702
PM03
Woronora Dam Road
HEATHCOTE NATIONAL PARK
HIGHWAY
CCL 703
PRINCES MOTORWAY
Project Underground Mining Area Longwalls 20-27 and 301-317
BEE CREEK SWAMP
SWAMP2
Old Illawarra Road
PM02
PHGW1B
PHGW2A
Gatehouse Centre
GARAWARRA STATE CONSERVATION AREA
RIVER
WORONORA
9DGW1B/PM01
9EGW2A
ML 1372
S137a
9FGW2A
S137b
S101
F6GW4A
Ventilation Shaft No. 4
SWAMP1
9EGW1B
SWAMP3
9FGW1A
ETGW1+2
F6GW3A
HELENSBURGH
Underground Mining Area Longwalls 14-19A
RTGW1A
Rivulet
WRGW7+8
S35
9GGW2B
S30
WRSWAMP1
S14
S16
S28
9GGW1B (Decommissioned)
9GGW1-80
S33
9HGW1B
S29
SWGW1
SWAMP4
WRGW2
UTGW1
WRGW1
UTGW 2
UTGW 3
S25
WRGW4
WRGW3
Ventilation Shaft No. 3
9HGW0
Waratah
FGGW3
FGGW1
FGGW2
WRGW5
WRGW6
Darkes Forest Road
S1997
HIGHWAY
PRINCES MOTORWAY
Underground Mining Area Longwalls 1 - 13
CCL 709
ML 1610
DHARAWAL STATE CONSERVATION AREA
STANWELL TOPS
DARKES FOREST
PRINCES
0
1
Kilometres
METROPOLITAN COAL
FIGURE 11
Groundwater Level Monitoring Sites
METROPOLITAN COAL

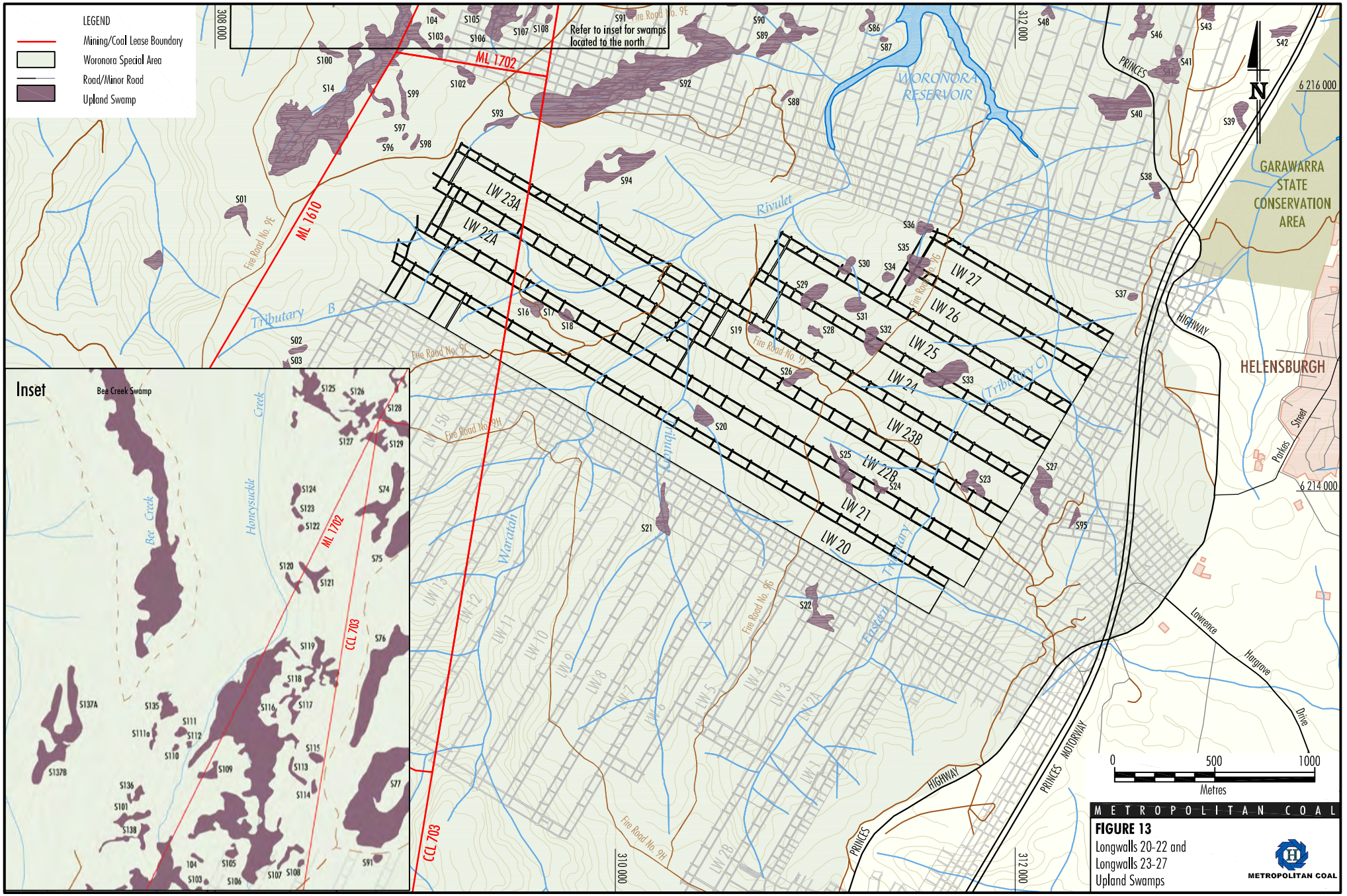


METROPOLITAN COAL

FIGURE 12

Groundwater Quality Monitoring Sites

METROPOLITAN COAL



METROPOLITAN COAL

FIGURE 13

Longwalls 20-22 and Longwalls 23-27 Upland Swamps

METROPOLITAN COAL

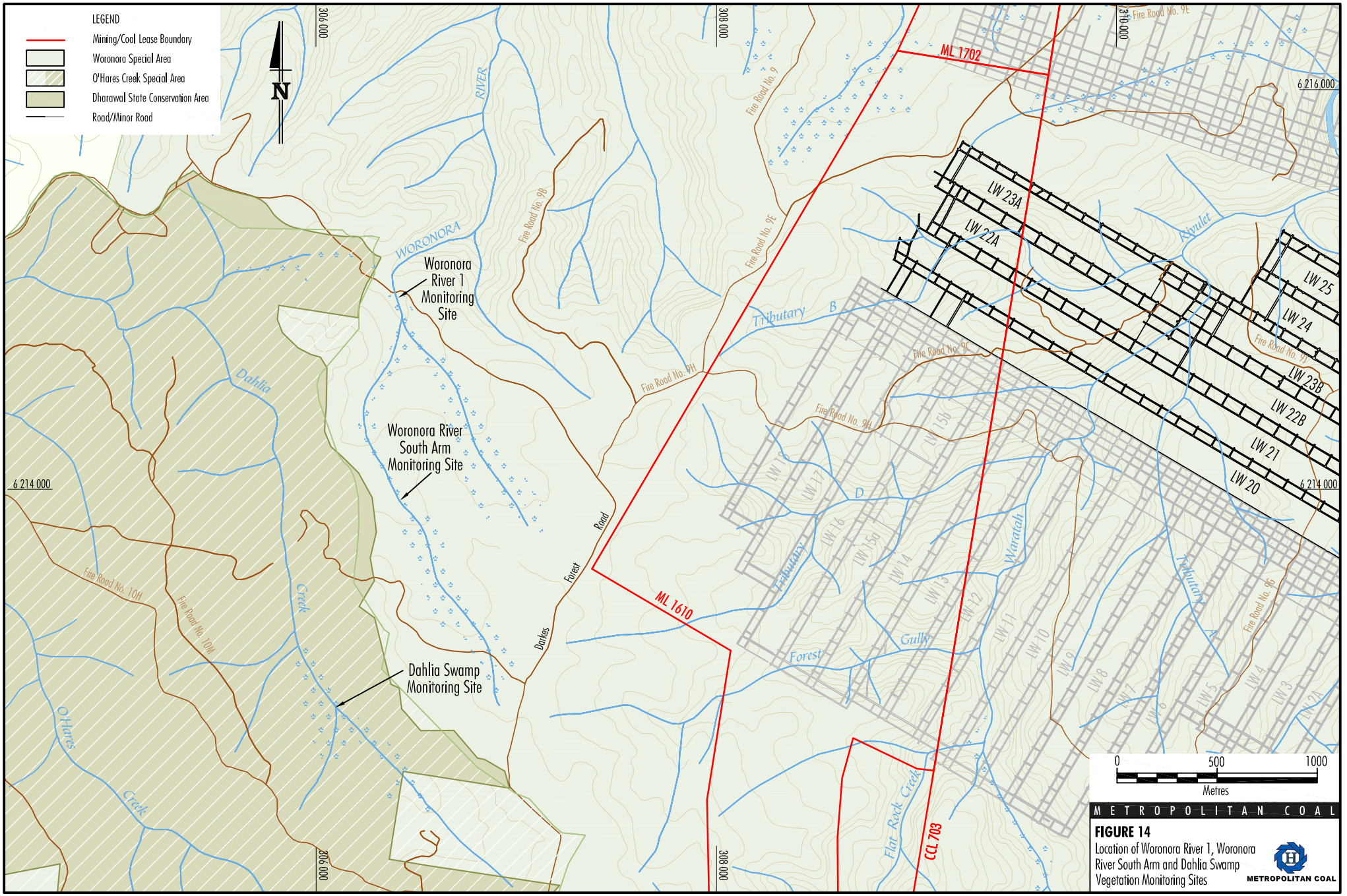
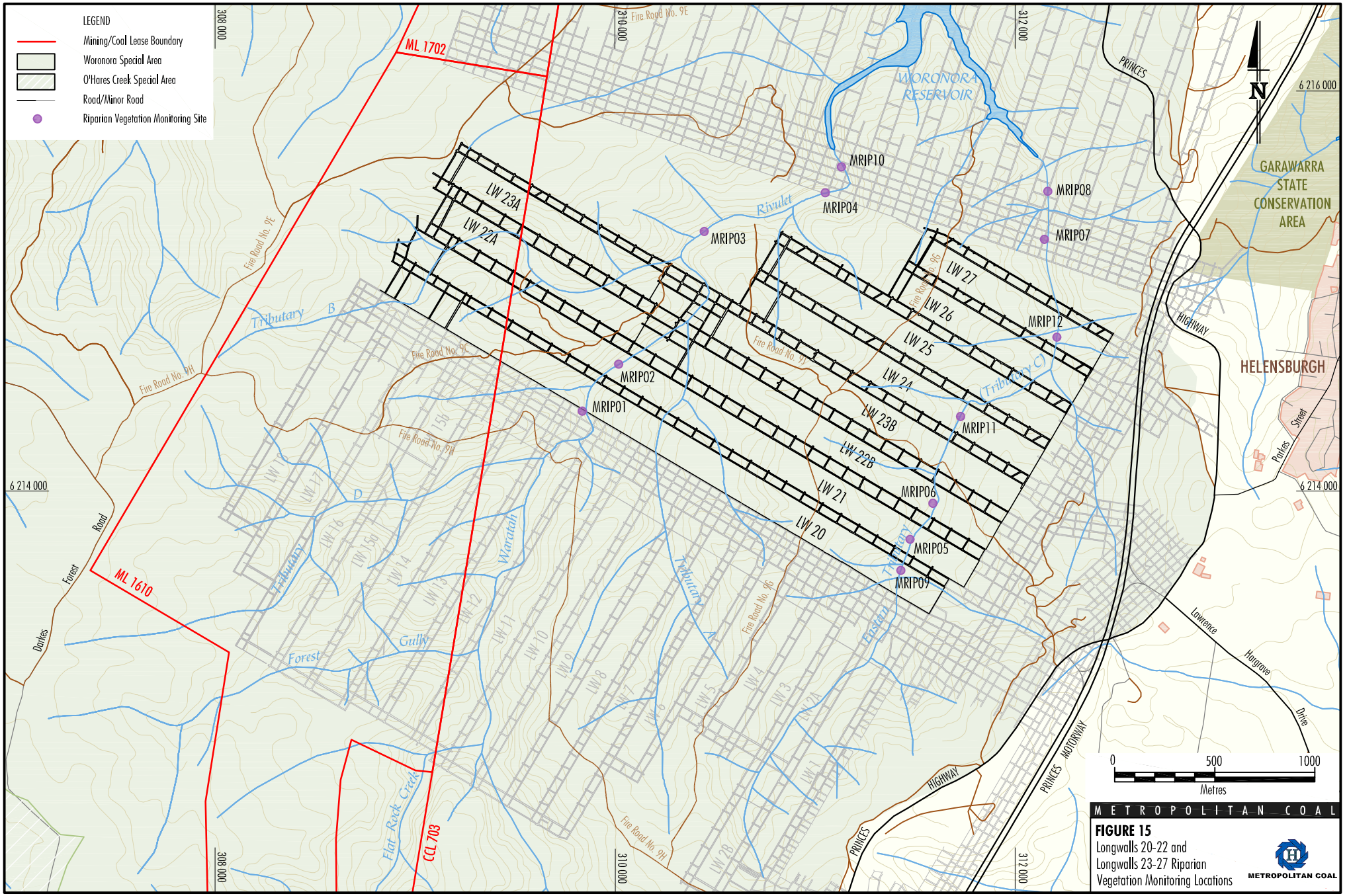
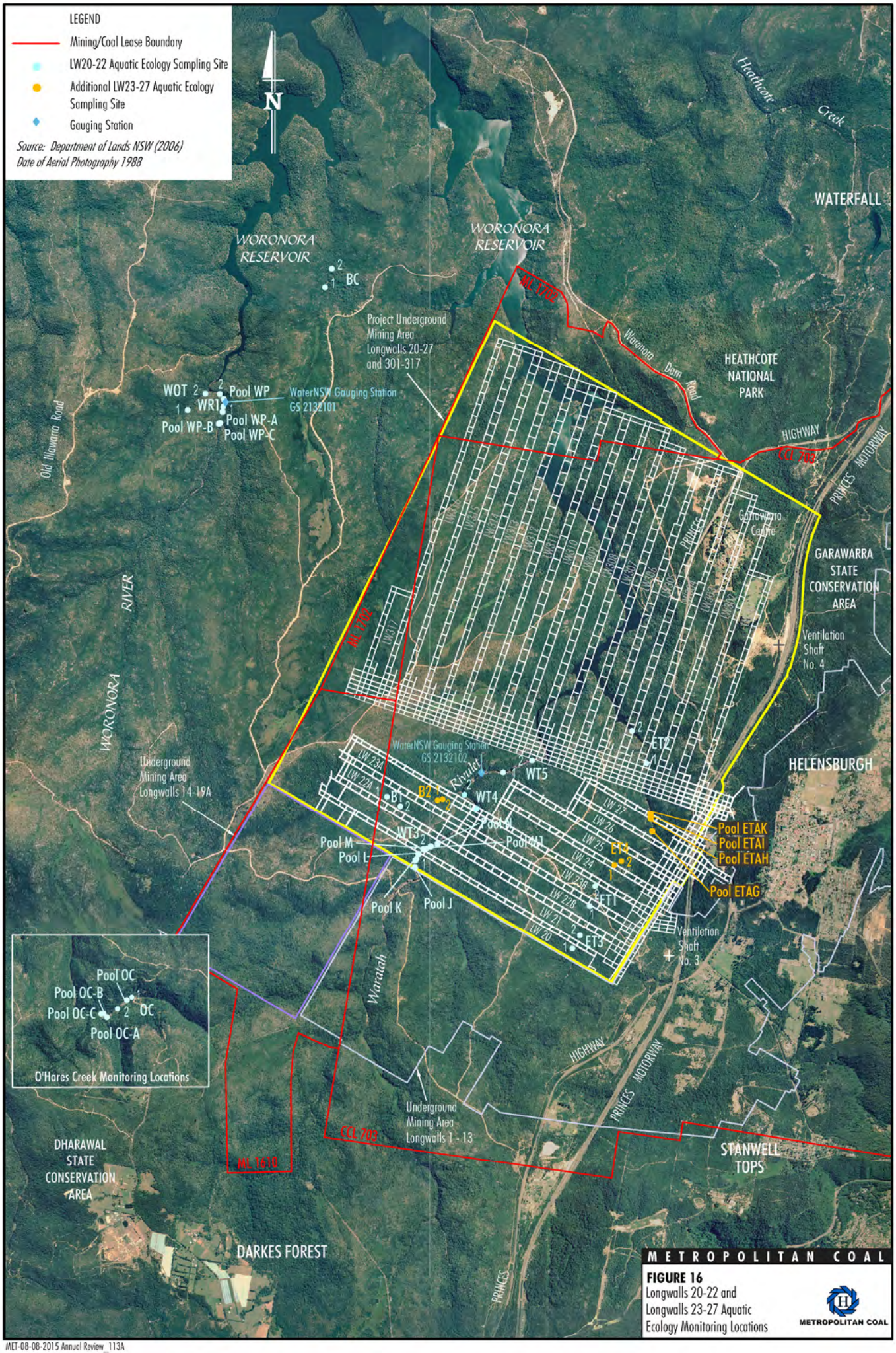


FIGURE 14
Location of Woronora River 1, Woronora River South Arm and Dahlia Swamp Vegetation Monitoring Sites

METROPOLITAN COAL

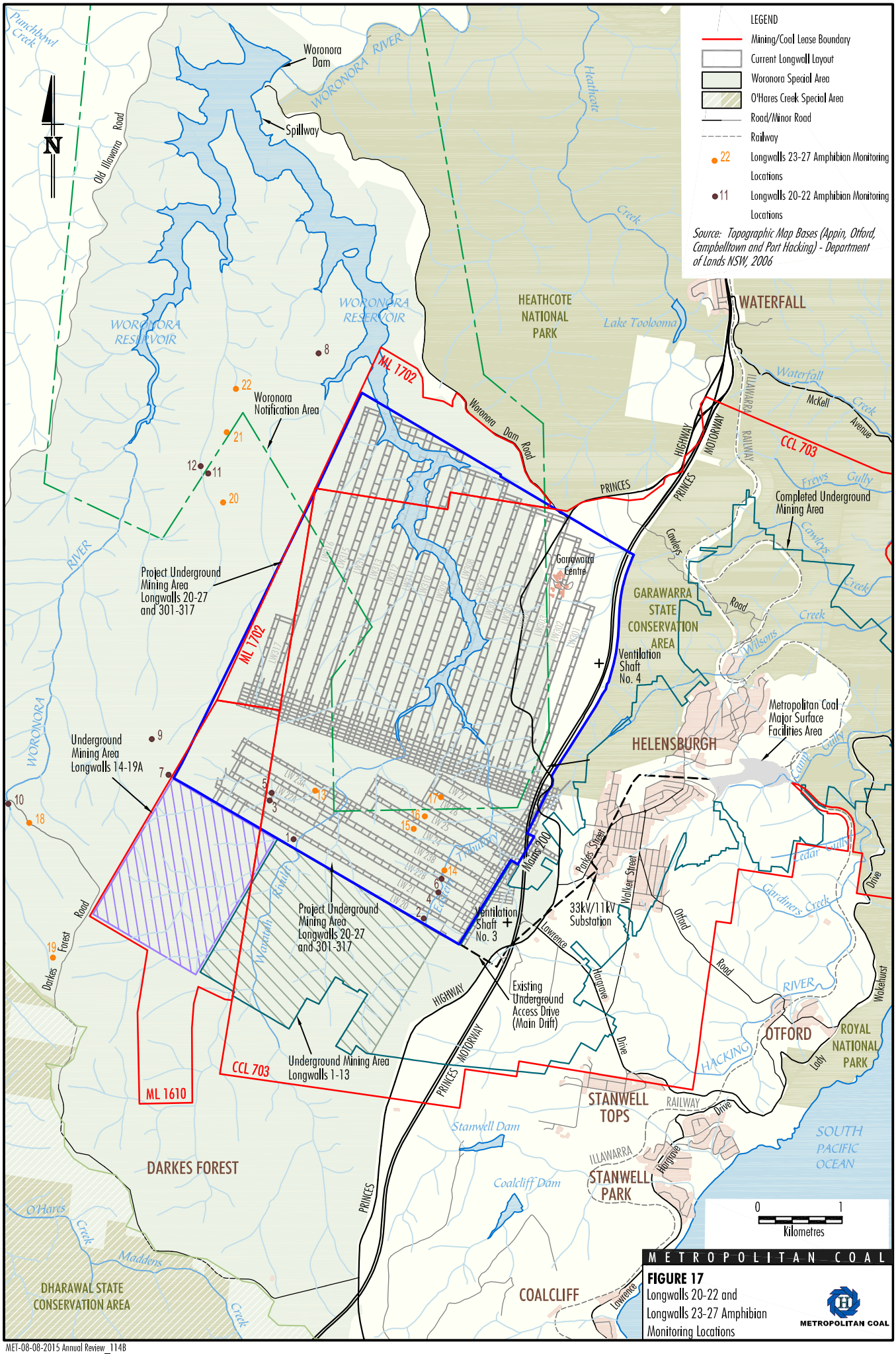

LEGEND
Mining/Coal Lease Boundary
Woronora Special Area
O'Hares Creek Special Area
Road/Minor Road
Riparian Vegetation Monitoring Site
ML 1702
ML 1610
CCL 703
308 000
310 000
312 000
6 216 000
6 214 000
WORONORA RESERVOIR
GARAWARRA STATE CONSERVATION AREA
HELENSBURGH
PRINCES HIGHWAY
PRINCES MOTORWAY
Parkes Street
Lawrence Hargrave Drive
Fire Road No. 9E
Fire Road No. 9K
Fire Road No. 9H
Fire Road No. 9J
Fire Road No. 9G
Fire Road No. 9L
Rivulet
Tributary B
Tributary C
Tributary D
Tributary A
Eastern Tributary
Marcatah Gully
Flat Rock Creek
Darkes Forest Road
LW 23A
LW 22A
LW 27
LW 26
LW 25
LW 24
LW 23B
LW 22B
LW 21
LW 20
MRIP01
MRIP02
MRIP03
MRIP04
MRIP05
MRIP06
MRIP07
MRIP08
MRIP09
MRIP10
MRIP11
MRIP12
0
500
1000
Metres
METROPOLITAN COAL
FIGURE 15
Longwalls 20-22 and
Longwalls 23-27 Riparian
Vegetation Monitoring Locations
METROPOLITAN COAL

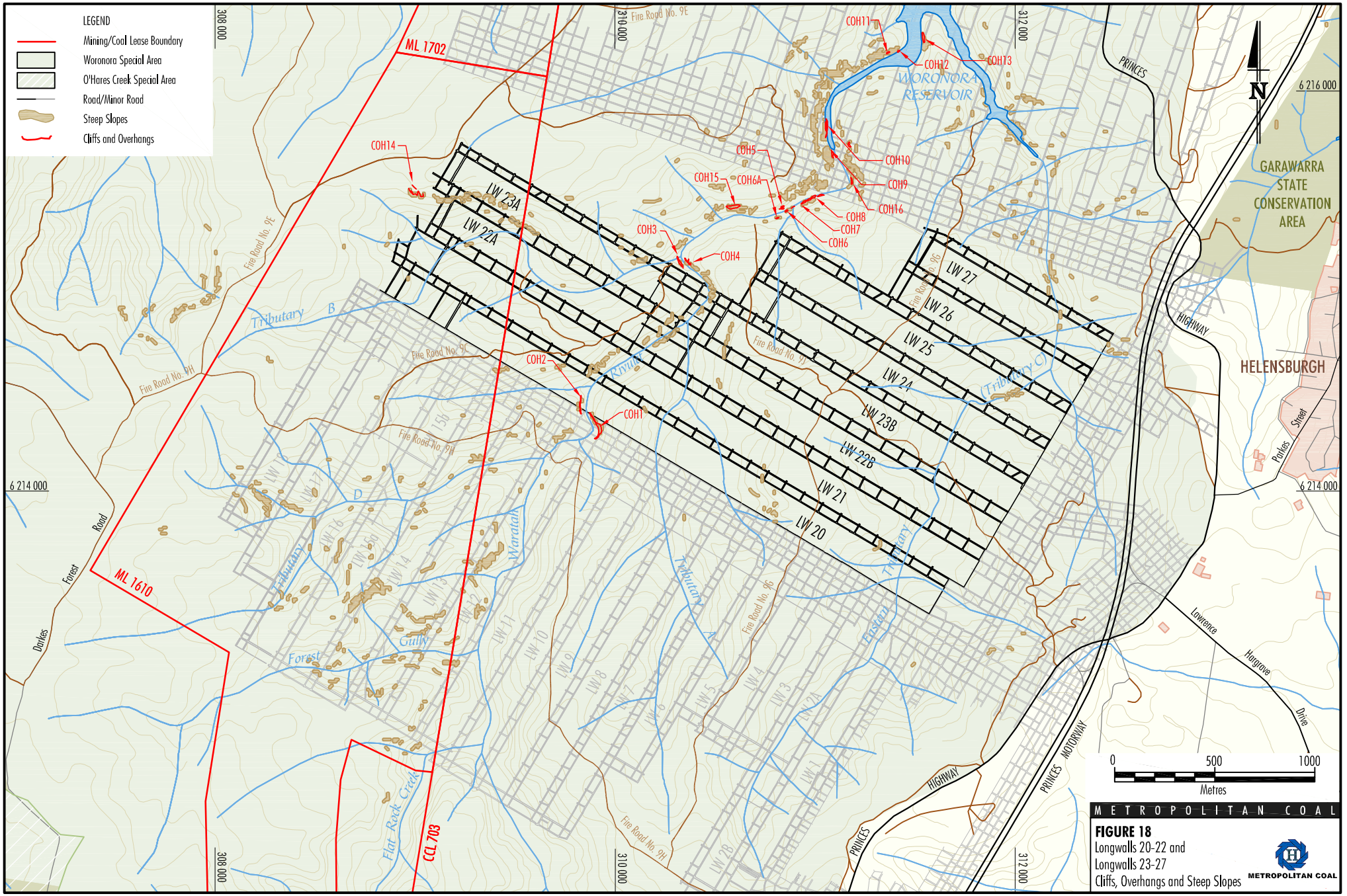


METROPOLITAN COAL

FIGURE 16
Longwalls 20-22 and Longwalls 23-27 Aquatic Ecology Monitoring Locations

METROPOLITAN COAL

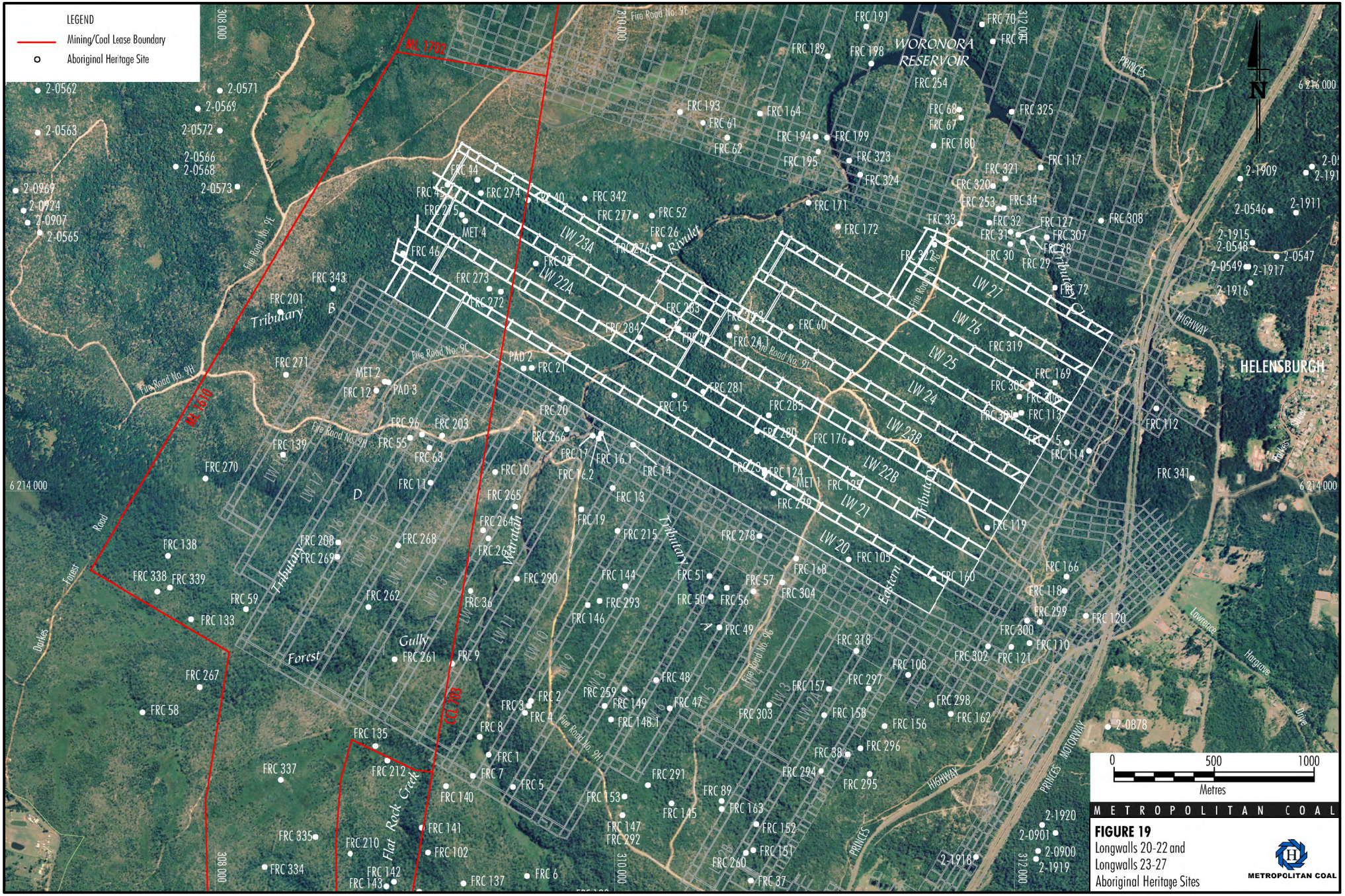

LEGEND
Mining/Coal Lease Boundary
Current Longwall Layout
Woronora Special Area
O'Hares Creek Special Area
Road/Minor Road
Railway
22 Longwalls 23-27 Amphibian Monitoring Locations
11 Longwalls 20-22 Amphibian Monitoring Locations
Source: Topographic Map Bases (Appin, Otford, Campbelltown and Port Hacking) - Department of Lands NSW, 2006
N
Woronora Dam
Spillway
WORONORA RIVER
Heathcote Creek
Punchbowl Creek
Old Illawarra Road
WORONORA RESERVOIR
HEATHCOTE NATIONAL PARK
Lake Toolooma
WATERFALL
Waterfall Creek
McKell Avenue
ILLAWARRA RAILWAY
HIGHWAY
MOTORWAY
PRINCES
CCL 703
Frews Gully
Completed Underground Mining Area
Cowleys Creek
Garrawarra Centre
GARAWARRA STATE CONSERVATION AREA
Wilsons Creek
Ventilation Shaft No. 4
Metropolitan Coal Major Surface Facilities Area
HELENSBURGH
Project Underground Mining Area Longwalls 20-27 and 301-317
ML 1702
Woronora Dam Road
Woronora Notification Area
Underground Mining Area Longwalls 14-19A
Waratah Rivulet
Mains 200
Parkes Street
Walker Street
33kV/11kV Substation
Ventilation Shaft No. 3
Lawrence
Hargrave
Otford Road
Gardiners Creek
Cedar Gully
Drive
Wakehurst
RIVER
OTFORD
ROYAL NATIONAL PARK
Existing Underground Access Drive (Main Drift)
Underground Mining Area Longwalls 1-13
ML 1610
CCL 703
STANWELL TOPS
RAILWAY
Stanwell Dam
SOUTH PACIFIC OCEAN
ILLAWARRA
STANWELL PARK
Coalcliff Dam
DARKES FOREST
Darkes Forest Road
O'Hares Creek
Maddens Creek
DHARAWAL STATE CONSERVATION AREA
COALCLIFF
0
1
Kilometres
METROPOLITAN COAL
FIGURE 17
Longwalls 20-22 and Longwalls 23-27 Amphibian Monitoring Locations
METROPOLITAN COAL

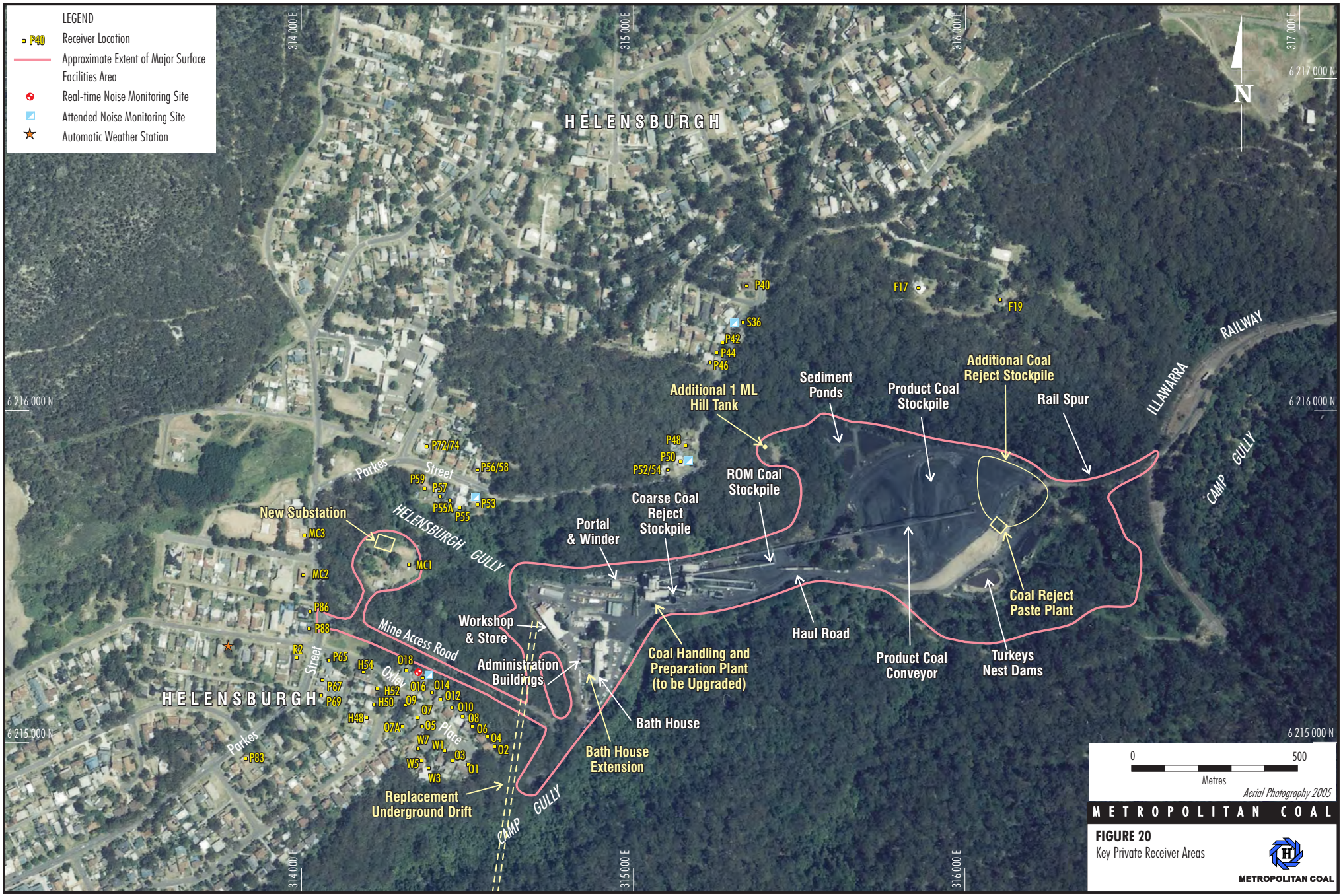


METROPOLITAN COAL

FIGURE 18
Longwalls 20-22 and
Longwalls 23-27
Cliffs, Overhangs and Steep Slopes

METROPOLITAN COAL


LEGEND
Mining/Coal Lease Boundary
Aboriginal Heritage Site
ML 1709
ML 1610
WORONORA RESERVOIR
HELENSBURGH
Fire Road No. 9E
Fire Road No. 9C
Fire Road No. 9H
Fire Road No. 9I
Fire Road No. 9G
LW 23A
LW 22A
LW 27
LW 26
LW 25
LW 24
LW 23B
LW 22B
LW 21
LW 20
Rivulet
Tributary B
Tributary C
Tributary D
Eastern Tributary
Waratah Gully
Forest
Flat Rock Creek
PRINCES HIGHWAY
PRINCES MOTORWAY
Lawrence Hargrave Drive
Parkes Street
Dukes Road
Forest
308 000
310 000
312 000
6 214 000
6 216 000
0
500
1000
Metres
N
METROPOLITAN COAL
FIGURE 19
Longwalls 20-22 and Longwalls 23-27
Aboriginal Heritage Sites
METROPOLITAN COAL



MET-08-08-2015 Annual Review_010A

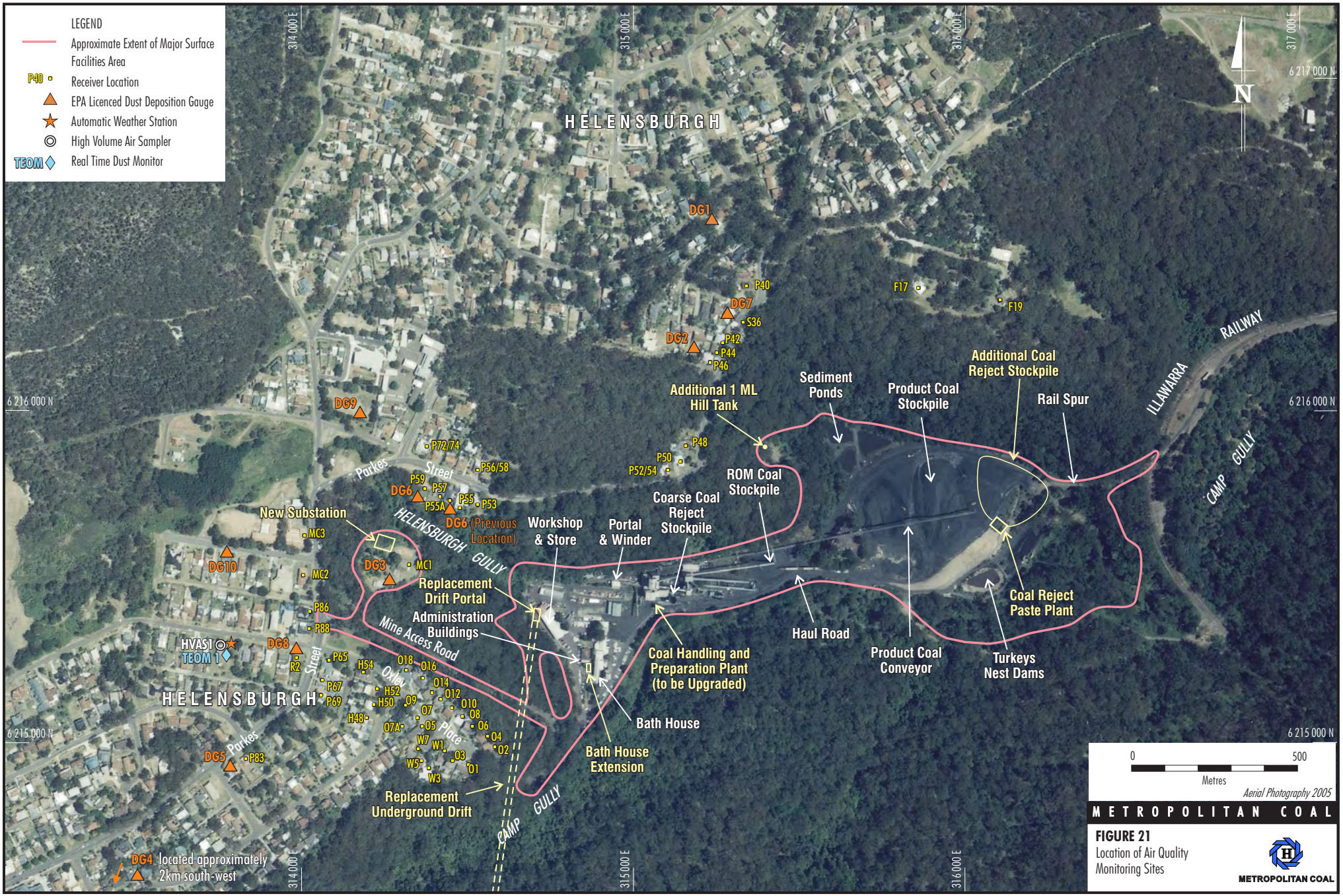


FIGURE 21
Location of Air Quality Monitoring Sites

METROPOLITAN COAL

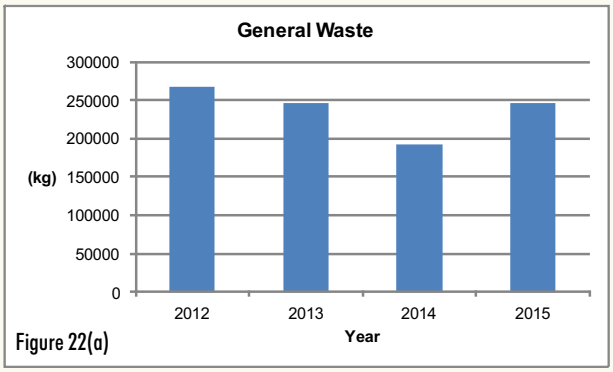


Figure 22(a)

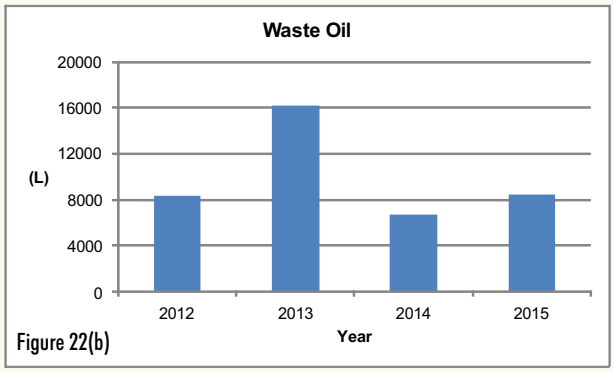


Figure 22(b)

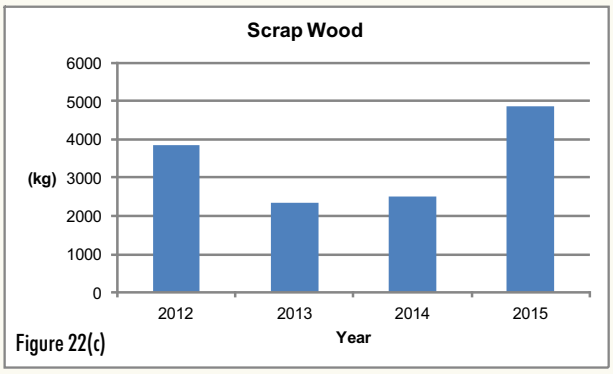


Figure 22(c)

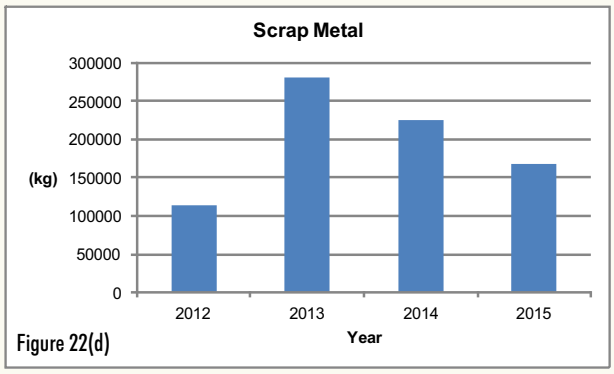


Figure 22(d)

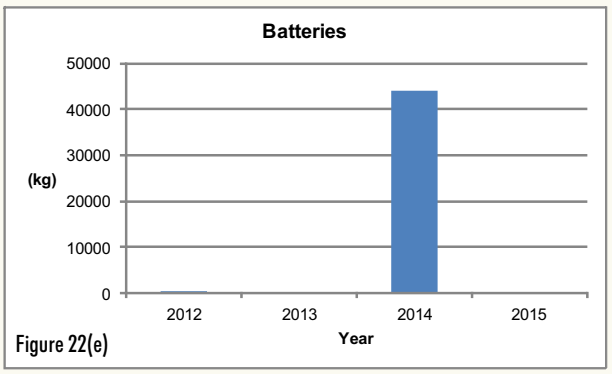


Figure 22(e)

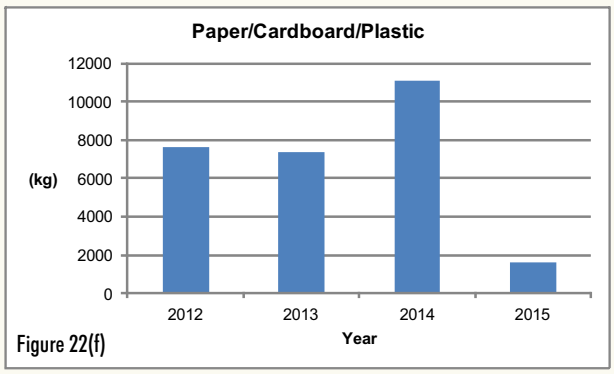


Figure 22(f)

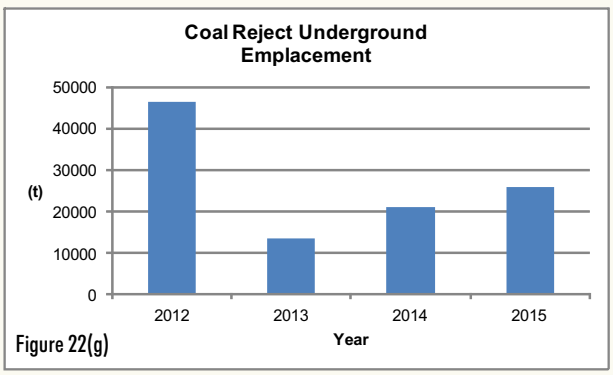


Figure 22(g)

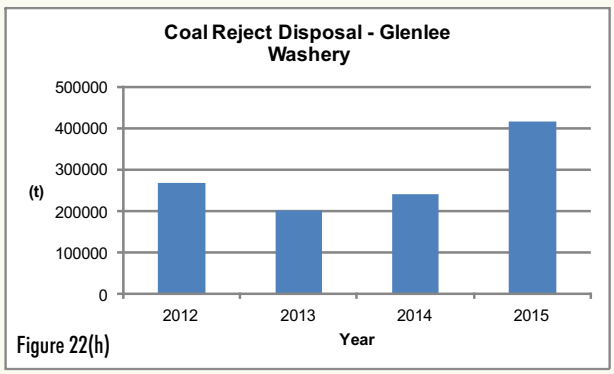


Figure 22(h)

METROPOLITAN COAL

FIGURE 22
Comparison of Waste Generated and Recycled in 2015 with Previous Years

METROPOLITAN COAL

LEGEND

- Water Pipeline
- Camp Gully Water Extraction Pipeline
- Licensed Discharge Point
- Water Quality Monitoring
- Volume Monitoring

Note: Site D is located approximately 2.3 km upstream of Site A

0 50 100 150 200 250
Metres

Source: Metropolitan Coal (2014)
Date of Aerial Photography October 2014

METROPOLITAN COAL

FIGURE 23
Metropolitan Coal's Water Sources and Key Infrastructure

METROPOLITAN COAL

FIGURE 24
Rehabilitation Zones Currently Available at the Surface Facilities Area

METROPOLITAN COAL

APPENDIX A

METROPOLITAN COAL ANNUAL SURFACE WATER REVIEW 2015

AVAILABLE ON CD

APPENDIX B

METROPOLITAN COAL 2015 ANNUAL REVIEW GROUNDWATER MONITORING AND ENVIRONMENTAL PERFORMANCE ASSESSMENT

AVAILABLE ON CD

APPENDIX C

METROPOLITAN COAL LONGWALLS 20-22
VEGETATION MONITORING – AUTUMN 2015

AVAILABLE ON CD

APPENDIX D

METROPOLITAN COAL LONGWALLS 23-27
VEGETATION MONITORING – AUTUMN 2015

AVAILABLE ON CD

APPENDIX E

METROPOLITAN COAL SWAMP 20 AND RIPARIAN VEGETATION THREATENED FLORA ASSESSMENTS, OCTOBER 2015

AVAILABLE ON CD

APPENDIX F

METROPOLITAN COAL SWAMP 20 AND RIPARIAN VEGETATION THREATENED FAUNA ASSESSMENTS, OCTOBER 2015

AVAILABLE ON CD

APPENDIX G

METROPOLITAN COAL LONGWALLS 20-22
AQUATIC ECOLOGY MONITORING REPORT – AUTUMN 2015

AVAILABLE ON CD

APPENDIX H

METROPOLITAN COAL LONGWALLS 23-27
AQUATIC ECOLOGY MONITORING REPORT – AUTUMN 2015

AVAILABLE ON CD

APPENDIX I

METROPOLITAN COAL LONGWALLS 20-22
AMPHIBIAN MONITORING REPORT – SPRING/SUMMER 2014

AVAILABLE ON CD

APPENDIX J

METROPOLITAN COAL LONGWALLS 23-27
AMPHIBIAN MONITORING REPORT – SPRING/SUMMER 2014

AVAILABLE ON CD

APPENDIX K

LONGWALLS 23-27 ROUND 1 MONITORING OF ABORIGINAL HERITAGE SITES

AVAILABLE ON CD

APPENDIX L

2015 QUARTERLY NOISE MONITORING COMPLIANCE SUMMARY

AVAILABLE ON CD

APPENDIX M

AIR QUALITY MONITORING AND ENVIRONMENTAL PERFORMANCE ASSESSMENT REPORT

AVAILABLE ON CD

APPENDIX N

LETTER FROM THE INDEPENDENT CHAIR OF THE COMMUNITY CONSULTATIVE COMMITTEE TO THE SECRETARY OF THE DEPARTMENT OF PLANNING AND ENVIRONMENT

Metropolitan Coal Community Consultative Committee

Correspondence to:
The Chair
PO Box 6017
LAKE MUNMORAH NSW 2259

Email: lisaandrews.ic@gmail.com
Mobile No: 0401 609 693

8 April 2016

Ms Carolyn McNally
Secretary
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Dear Ms McNally

Metropolitan Coal Community Consultative Committee

In accordance with the Department's Guidelines for the Operation of Community Consultative Committees, below is a brief summary of the committee's undertakings throughout 2015.

I am pleased to report that Peabody Energy continue to consult with the community at a high level with four meetings held over the calendar year, being February, July, October and December.

Metropolitan Coal is a long running underground coal mining operation, with a history dating back to the 1880's, producing metallurgical coking coal. The CCC benefits from a large cross section of members from various backgrounds; all of whom bring their own level of expertise and enthusiasm by providing valuable input into the success of the consultation process.

As is often the case, voluntary members are hardworking contributors to the community at large and not limited to one activity. Whilst they have competing opinions, there is a consistent strong interest in environmental performance and the mitigation of noise and dust from the site, as well as the potential impact on water quality from the mine's operations.

Peabody Energy Australia, present quarterly reports to the CCC on its activities in accordance with its conditions of consent and the following approved management plans:

- Air Quality & Greenhouse Gas
- Water Management
- Mine Noise
- Traffic
- Pollution Response
- Rehabilitation, etc.

One of the highlights of 2015 was a tour arranged by staff, to the Port Kembla Coal Terminal, where members were shown around the facility and information was provided on the loading process, capacity, environmental controls and markets. This was an important process for the members to understand where the coal extracted from the mine was bound for and the control procedures that are in place. It was clear that the employment opportunities and money being spent in the region has a major effect on the local economy.

With the overall downturn of the coal industry, like most companies Peabody Energy have needed to decrease employee numbers and reduce some of its commercial undertakings, however despite this, they have continued to provide a commitment to the community consultation process by delivering comprehensive reports, staff time and interesting topics for the benefit of the CCC.

Peabody Energy Australia continues to work effectively and efficiently in partnership with the community, providing a forum for constructive collaboration and liaison for the benefit of all.

Attached, for your information, is the most recent newsletter produced by Peabody Energy for the community of Helensburgh.

Yours faithfully

Lisa Andrews
INDEPENDENT CHAIRPERSON

Attachment: Newsletter

APPENDIX O

INDEPENDENT ENVIRONMENTAL AUDIT EXECUTIVE SUMMARY

Executive Summary

The Project Approval granted for the Metropolitan Coal Project on 8 September 2010, requires an Independent Environmental Audit of compliance to satisfy the requirements of Project Approval 08-0149 Schedule 7 condition 8. This Independent Environmental Audit was conducted by Trevor Brown & Associates in May 2015.

The Independent Environmental Audit findings indicate that Metropolitan Coal is generally operating in compliance with Project Approval 08_0149, Environment Protection Licence 767 and Consolidated Mining Lease CML 2, conditions of approval.

The summarised findings of the Independent Environmental Audit conducted in May 2015 are:

Environmental Management Strategy and Environmental Management Plans

The Environmental Management Strategy prepared under Project Approval 08_0149 Schedule 7 condition 1, satisfies the requirements of Project Approval condition and generally addresses the elements of ISO 14001 and provides a sound basis for the environmental management of the project.

Environmental Management Plans

The approved Environmental Management Plans have been developed in compliance with the requirements of Project Approval Schedule 7 condition 2 and the specific Project Approval conditions for the Metropolitan Coal Project mining areas and surrounds and the surface facilities area.

Catchment Monitoring Program

The Catchment Monitoring Program was prepared in accordance with Project Approval 08_0149 Schedule 3 condition 2 and approved by DP&I on 14 November 2011. Revisions of the Catchment Monitoring Program were approved on 29 May 2013 and 25 August 2014. The extensive surface water and groundwater monitoring network implemented by Metropolitan Coal provides a sound program for the assessment of environmental performance of water management in the underground mining area within the Woronora Special Area. The monitoring and assessment of Project impacts on surface water and groundwater resources within the Woronora Special Area, described in the Catchment Monitoring Program, is consistent with the programs described in the Extraction Plan - Water Management Plans. To date no statistically detectable impacts on threatened species, populations or ecological communities have been recorded from the various monitoring programs. It thus appears that Metropolitan Coal has satisfied the requirements of the Project Approval in relation to these matters.

Extraction Plans – Subsidence Assessment

The Extraction Plans for the Metropolitan Coal underground mining have been prepared in accordance with the Environmental Assessment and subsidence predictions are presented in each Extraction Plan and the documents approved prior to commencement of the nominated Long-walls. Based on the review of the of the Project Approval conditions, Extraction Plans, AEMR documents for 2012 to 2014 and End of Panel Reports for long-walls 21 and 22, it is concluded that the Metropolitan Mine has complied with the conditions for mine subsidence impact management for the 2012 to 2014 audit period. The information being collected is considered adequate for meeting the adaptive management objectives of current and future Extraction Plan standards and allows for the review and assessment of necessary mitigation or remediation strategies should environmental impact exceedances occur. Actual subsidence and impact predictions at surface features within the area of influence of mining have generally been less than or consistent with the Environmental Assessment predictions.

Biodiversity

Project Approval Schedule 3 Condition 1, requires that Metropolitan Coal to demonstrate the environmental performance of the project in relation to several specific ecological values. During the period of this audit (August 2011 to December 2014), Metropolitan Coal was operating in a manner compliant with the requirements of Project Approval 08_0149.

Research Programs

The Metropolitan Coal Research Program has been developed in accordance with the requirements of Project Approval 08_0149 Schedule 3 condition 9, and the program approved by DP&I on 27 May 2011. The research programs are continuing with funding and co-operation of Metropolitan Coal.

Noise

The Noise Management Plan was prepared to satisfy Project Approval 08_0149 Schedule 4 condition 8 and approved by DoP on 26 August 2010. The Noise Management Plan was revised to include minor amendments and inclusion of a real-time noise performance monitor on 25 August 2014. The $LA_{eq(15minute)}$ results for the quarterly surveys of September 2012 to December 2014 indicated the long term mine related noise levels at the monitoring locations have been lowered over this period due to works on the CHPP to upgrade the cladding and reduce the area of openings in the façade. The noise survey conducted in March 2015 indicated that noise levels at the monitoring locations were compliant with the noise impact criteria in Project Approval 08_0149 Schedule 4 conditions 1, 2 and 3.

Air

The Air Quality and Greenhouse Gas Management Plan prepared to satisfy Project Approval 08_0149 Schedule 4 condition 13, was approved by DP&I on 14 April 2011 and provides satisfactory procedures and mitigation measures to mage dust generation and dispersion from the Metropolitan Coal surface facilities area activities. The reported dust deposition and PM10 monitoring results between 2012 and 2014 were compliant with the air quality criteria listed in Project Approval Schedule 4 condition 11.

Site Water Balance

A site water balance was developed for the Metropolitan Coal Mine Project as part of the Environmental Assessment (2008) and the water balance model is used as a forward planning tool for the operation of the project. The site water balance is monitored and reviewed annually to optimise water usage and assess performance and validate predictions related to the water management system.

Surface Water

A Surface Facilities Water Management Plan was prepared in consultation with DWE and DECCW to satisfy Project Approval 08_0149 Schedule 4 condition 15, and approved by DoP on 14 April 2011. The water management at the surface facilities area and two ventilation sites has been conducted in accordance with the Surface Facilities Water Management Plan. The review of surface water quality records required to satisfy EPL 767 criteria indicated compliance for all water discharged from the surface facilities area between August 2011 and December 2014.

Groundwater

The information reviewed indicates the impact of the project on the groundwater regime is within the bounds of the impacts predicted by the Environmental Assessment and subsequent updates to the groundwater model. The proponent has developed the management plans required by the Project Approval and is complying with the commitments made within these plans. The management plans require frequent monitoring of groundwater levels/quality, and six monthly verification of the groundwater model. This level of rigour is appropriate given the sensitive nature of the project area. The environmental performance of the project with regards to

groundwater management is considered to be of a very high standard, particularly given the onerous nature of the approval conditions.

Water-Related Data Review

This review of Metropolitan Mine's publically available surface water quality data carried out as part of the audit process and found that, for the analytes of concern at key monitoring sites:

- the raw data and laboratory reports have been accurately transcribed into spreadsheet form;
- the water quality data presented in the plots and tables in AR2012, AR2013 and AR2014 accurately reflects the raw data; and
- the water quality data presented in the plots and tables in AR2012, AR2013 and AR2014 has been appropriately interpreted.

It was noted that there were some discrepancies in the calculation of the baseline mean plus one standard deviation and the baseline mean plus two standard deviations. These discrepancies resulted in the over reporting of some exceedances of water quality data but did not result in any exceedances not being reported.

Erosion and Sediment Control

The management of erosion and sediment control on the Metropolitan Coal surface facilities area and the areas of the Woronora Special Area where potential subsidence impacts may or have occurred, is assessed and managed in accordance with the various Extraction Plans, Water Management Plans, and Biodiversity Management Plans developed for the project. The visual inspections conducted during this audit confirmed that Metropolitan Coal procedures and mitigation measures were satisfactorily managing surface runoff from disturbed areas and controlling loss of sediment to the environment.

Transport

The transport of coal from the Metropolitan Colliery by rail to Port Kembla and by road to local customers (i.e. Corrimal and Coalcliff Coke Works), did not exceed the approved production rate of 3.2 million tonnes in a calendar year, between 2011 and 2015. Road transport of product coal to the Corrimal and Coalcliff Coke Works ceased in 2014 with closure of the coke works. All product coal is currently transported by rail.

Approximately 15% of the ROM coal processed in the CHPP is separated to the coal reject streams. The majority of this coal reject material is transported from the Metropolitan Colliery site by truck to the Glenlee Washery.

Rehabilitation

A Rehabilitation Strategy was developed as a framework document that describes the development rehabilitation objectives and completion criteria for the future land-use of the surface facilities area following the completion of mining activities. A Rehabilitation Management Plan (RMP-R01-E being approved by DTIRIS DRE on 22 May 2014) describes the rehabilitation objectives and performance indicators to be met in accordance with Project Approval 08_0149 Schedule 6 condition 1. Metropolitan Coal is operating in a manner consistent with the Project Approval 08_0149 condition rehabilitation requirements.

Offsets

The monitoring of the areas identified in Project Approval 08_0149 Schedule 6 condition 1 - Table 11 between August 2011 and December 2014 has not indicated the exceedance of any performance measure set by Metropolitan Coal for assessment of the status of each Domain. The remediation measures undertaken by Metropolitan Coal to address the impact identified at Pools A and F on the Waratah Rivulet, are considered to have mitigated the identified impact at Pools A and F, so no offset is currently considered to be required.

Annual Reviews

The Independent Environmental Audit reviewed each Annual Review and verified the reported summary information for each environmental aspect in relation to the operation and activities at the Metropolitan Coal

Project site and documentation. It is concluded that the Annual Reviews are a true and accurate summary of the status of the Metropolitan Coal Project environmental status for each of the reporting periods.