

Oceanic Coal Australia Limited

West Wallsend Colliery Continued Operations Project Response to Submissions

November 2010

West Wallsend Colliery Continued Operations Project Response to Submissions

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

Oceanic Coal Australia Limited

Project Director:	Barbara Crossley	
Project Manager:	Kirsty Davies	
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2/20 The Boulevard
PO Box 838
Toronto NSW 2283

Ph: 02 4950 5322
Fax: 02 4950 5737
Email: mail@umwelt.com.au
Website: www.umwelt.com.au

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1.0 Introduction

This document has been prepared in response to a request from the Director-General in accordance with section 75H(6) of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) that West Wallsend Colliery (WWC) prepare a response to the issues raised during the public exhibition period of Environmental Assessment (EA) for the West Wallsend Colliery Continued Operations Project (the Project). The EA for WWC was exhibited from 27 July 2010 to 27 August 2010. This report outlines WWC's Response to Submissions and focuses on the issues raised during the public exhibition period.

1.1 West Wallsend Colliery Continued Operations Project

The Project seeks to provide for continuation of mining operations and related ancillary surface infrastructure in CCL 718, 725 and ML 1451, for the continued operation of the existing surface facilities, the construction of the proposed Mining Services Facility. The Project application also seeks to enable continued operations under one consolidated approval that will cover the remaining operations of WWC.

A new planning approval is required for two small portions of the continued underground mining area at WWC. The current approval for mining in these areas relies on the savings provisions of the Lake Macquarie Local Environmental Plan (LEP, 2004), which enables underground mining to be undertaken, without development consent, where an existing mining lease (ML) is related to an existing mining operation. The savings provisions expire on 16 December 2010 and hence WWC will require a new approval for mining within these areas. Considering this timing imperative, WWC seeks urgent consideration of this Response to Submissions and progressions of determination of the Project.

The key features of the Project are outlined below in **Table 1.1**.

Table 1.1 – Key Features of the Project

Major Project Components/Aspects	Proposed Operations
Limits on Extraction	Up to 5.5 Mtpa Run of Mine (ROM)*
Estimated Mine Life	Approximately 12 to 15 years of mining
Operating Hours	24 hours per day, 7 days per week
Number of Employees	Approximately 390 full time equivalents
Mining Methods	Underground Mining – longwall method
Mining Areas	All existing and proposed mining within CCL 718, 725 and ML 1451
Infrastructure	Existing West Wallsend Pit Top infrastructure Existing No. 2, No. 3 Vent Shafts and existing ballast borehole Existing Longwall 11 borehole facility Proposed future ventilation infrastructure and minor surface infrastructure Proposed Mining Services Facility

* Allows for variations in production schedule

It is important to note that no current limits exist for coal production at WWC. As outlined in **Table 1.1**, the peak potential production rate for the Project is 5.5 million tonnes per annum (Mtpa).

There is no planned major modification to the existing WWC pit top facilities as a result of the Project. Minor surface facility upgrades may be required over time as mining progresses. At this stage, this includes the addition of a proposed demountable training building, additional service boreholes, minor works associated with the water re-use project and noise mitigation measures. The proposed Mining Services Facility seeks to improve efficiency of delivery of materials to the underground operations by reducing the travel distance underground. It is proposed to be located approximately 6 kilometres south-west of the existing pit top facilities close to Wakefield Road, as shown on **Figure 1.1**. The Mining Services Facility will be comprised of a 20 metre by 35 metre compound housing the facility and a constructed access road off Wakefield Road. It will be located in an existing disturbed area between Wakefield Road and the F3 Freeway, currently comprised of an access area and regrowth vegetation. The Mining Services Facility is proposed to be used for a range of services including a ballast and concrete borehole (providing materials for use underground) and for the provision of solcenic oil for use underground. Power to the services facility will be provided by an extension of the existing powerline which is adjacent to Wakefield Road.

As underground mining progresses additional ancillary surface infrastructure associated with continued mining operations may also be required, including the installation of additional ventilation infrastructure and potential gas injection infrastructure. The locations of this infrastructure will be determined as mining progresses, with appropriate planning, to minimise environmental impacts, consultation and management strategies to be implemented for each new facility.

Whilst no further coal mining in the former workings of WWC is proposed as part of this Project, the former workings have been included in the project application boundary to provide a consolidated approval for all workings within the WWC holding, as requested by DI&I. This will provide for any future works required in those existing mining areas, such as ongoing maintenance works and work associated with mine closure.

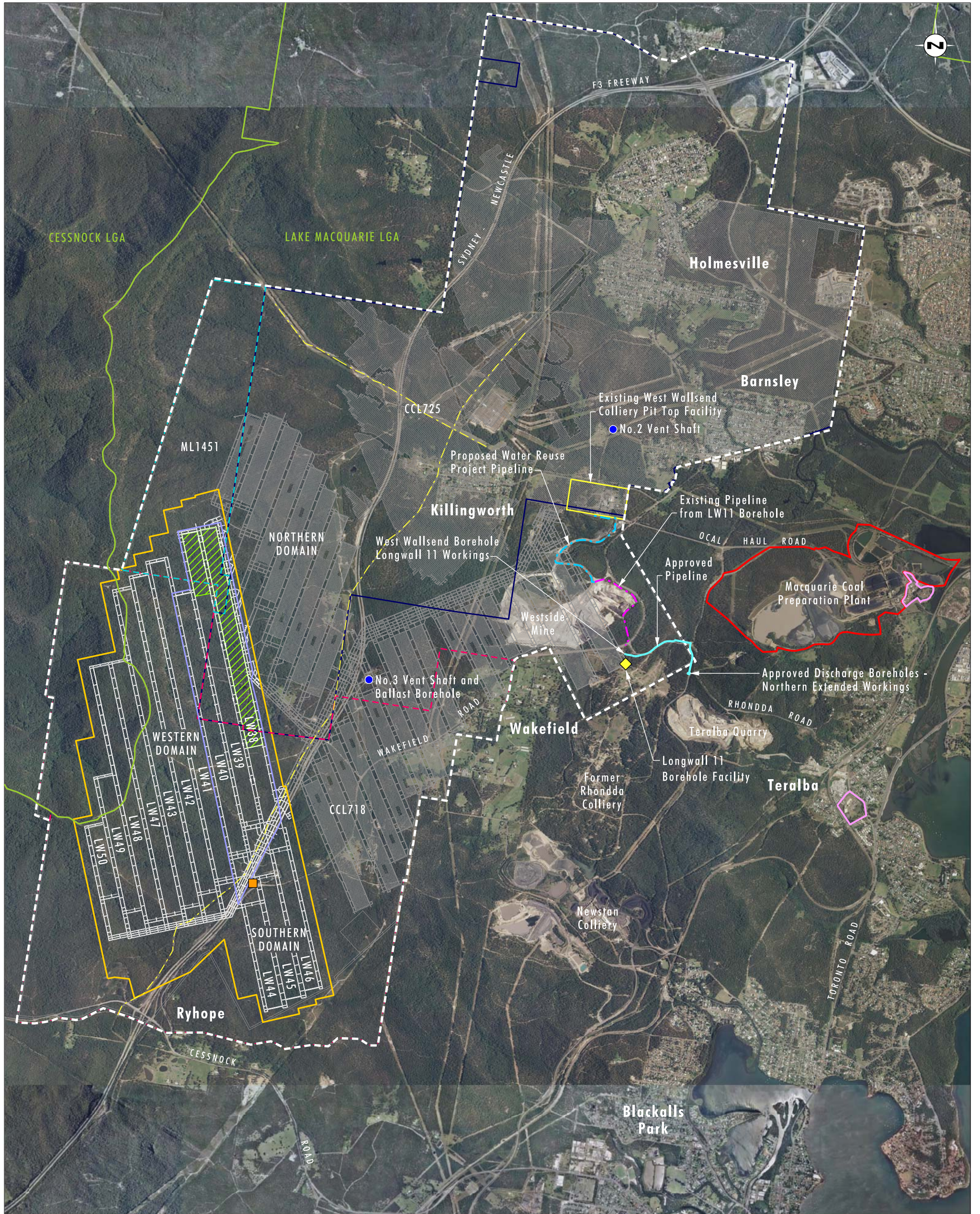
As a result of the detailed environmental studies for this Project, significant changes have been made to the original project design. These changes relate to noise control improvements at the WWC pit top and substantial modifications to the continued underground mining area to avoid significant Aboriginal archaeological features and areas with low depth of cover that may have resulted in adverse groundwater impacts.

We note that since the EA was lodged, underground mining of LW 38 has been completed and mining is progressing in LW 39, as shown on **Figure 1.1**.

1.2 Summary of Issues Raised in Submissions

The Department of Planning (DoP) advised that a total of seven submissions were received during the EA exhibition period. Six of the submissions were from government agencies including the Department of Environment, Climate Change and Water (DECCW), Department of Industry and Investment (I&I NSW), NSW Office of Water (NOW), Hunter-Central Rivers Catchment Management Authority (CMA) and Lake Macquarie City Council (LMCC). Issues raised in these submissions are addressed in detail in **Sections 2.1 to 2.5** of this report. In addition a submission was received from the NSW Roads and Traffic Authority (RTA) which has no objection to the Project and did not raise any issues to be addressed as part of this report.

A submission was also received from the Construction, Forestry, Mining and Energy Union (CFMEU). The submission did not raise any issues to be addressed as part of the Project and strongly supported the Project.



Source: OCAL, Google Earth 2008

0 0.5 1.0 2.0 km
1:40 000

Legend

- | | | |
|---|---|--|
| CCL725 | Former Underground Workings | Services Easement |
| CCL718 | Approved SMP Area | |
| ML1451 | Teralba Colliery Areas | |
| Existing West Wallsend Colliery Pit Top Facilities | Local Government Area | |
| Continued Underground Mining Area | Project Application Area | |
| Proposed Underground Workings in the West Borehole Seam | Proposed Mining Services Facility | |
| Longwall Progression as of 1st November 2010 | Longwall 11 Borehole Facility | |

File Name (A3): R13_V1/2553_402.dgn

FIGURE 1.1

West Wallsend Colliery Continued
Operations Project Area

DoP advised that no community or other stakeholder submissions were received on the Project.

It is also noted that while the exhibition period completed on 27 August 2010, the NOW and I&I NSW Subsidence submissions were not received until 7 October 2010.

1.3 Report Structure

This response to submissions report has been prepared by Umwelt (Australia) Pty Limited (Umwelt) on behalf of WWC to address the key issues raised through the submissions received on the EA through the public exhibition period. Matters raised by each submission are addressed individually for submissions received from organisations. For each issue, the theme of the issue raised is noted in bold, followed by a response in normal type.

A revised Statement of Commitments for the Project, addressing the issues raised in the submissions as discussed in the following sections, is included in **Appendix 1**. The changes made to the Statement of Commitments in response to the submissions received are highlighted in **Appendix 1** as tracked changes.

DECCW's submission also included draft Environment Protection Licence (EPL) conditions. These conditions are included in **Appendix 2** together with the suggested changes to the draft EPL conditions.

2.0 Response to Submissions

2.1 NSW Office of Water

2.1.1 Water Legislation

2.1.1.1 Water Management Act 2000

The Part 5 licence held by West Wallsend Colliery under the Water Act 1912 does not extend to authorise any abstraction or displacement of groundwater/surface water from the Hunter unregulated alluvium, which is administered under the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009 (WSPHUA) and the *Water Management Act 2000*.

WWC currently holds no licences under the *Water Management Act 2000*. The Project does not propose to extract any groundwater from alluvial aquifers and it is not planned to increase dewatering from current levels. The Project does not propose to extract surface water from the surrounding streams or rivers.

Extraction of water from a runoff harvesting dam requires an unregulated river access license nominating an approval for a runoff harvesting dam, unless the dam is within the maximum harvestable right dam capacity for the property on which it is located, in which case no licences or approvals are required. There are several existing sediment dams located at the WWC pit top site. These dams include clean water catch dams for control of upstream runoff/flooding and sediment dams. The water captured in the sediment dams will either be used for dust suppression or discharged to downstream watercourses. No new runoff harvesting dams are proposed for the Project.

Consequently the mining activities to be undertaken will be consistent with the requirements of the Hunter Unregulated and Alluvial Water Sources Sharing Plan 2009.

2.1.1.2 Hunter Unregulated and Alluvial Water Sharing Plan

The WSPHUA covers both North Lake Macquarie Water Source and Wallis Creek Water Source and under the Water Management Act the proponent is not permitted to intercept or displace any waters from either of those water sources without obtaining sufficient water access licence entitlement to cover any water loss from them. The proponent is also required to manage their impacts according to any relevant rules in the WSPHUA.

The *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (WSPHUA) commenced on 1 August 2009. The sections of the project application area within the catchments flowing into Lake Macquarie (i.e. that lie to the east of the Sugarloaf Range) fall within the North Lake Macquarie Water Source and the sections of the project application area that lie within the catchment area of Bangalow Creek (i.e. to the west of the Sugarloaf Range) fall within the Wallis Creek Water Source.

NOW has indicated that WWC is not permitted to intercept or displace any waters from either the North Lake Macquarie Water Source or the Wallis Creek Water Source without obtaining sufficient water access licence entitlements to cover any water loss from them. NOW also indicate that WWC is also required to manage their impacts according to any relevant rules in the WSPHUA.

From previous correspondence NOW appear to have two main areas of concern in regard to potential capture of water accounted for under the WSPHUA. These areas include:

- surface water within the 1st and 2nd order streams above the areas of low depth of cover; and
- alluvium associated with the 1st and 2nd order streams.

Stream Systems in the Continued Underground Mining Area

As discussed in Section 2.1 of the Surface Water Assessment of the EA, the Western and Southern domains of the continued underground mining area are located within the catchment areas of Cockle Creek, Diega Creek, Palmers Creek (including Boggy Hole Creek) and Bangalow Creek (refer to **Figure 2.1**). All of these creeks are ephemeral creeks as flow is only present for a short period after rainfall events.

Cockle Creek and Palmers Creek drain to Lake Macquarie while Bangalow Creek flows to the western side of the Sugarloaf Range and is part of the Wallis Creek system. Wallis Creek is a tributary of the Hunter River.

The watercourses within the predicted subsidence zone are listed in **Table 2.1**. Watercourse ordering has been carried out in accordance with the Strahler ordering system as described in *NSW Government Gazette no. 37* on 24 March 2006 page 1500 and *Guidelines for Management of Stream Systems in Coal Mining Developments Hunter Valley* (DWE, undated). Watercourse ordering is a hierarchical numbering system based on the degree of branching within a waterway and provides an indication of the complexity of a creek system and its potential catchment contribution.

Table 2.1 – Watercourses within the Predicted Subsidence Zone

Creek	Stream Order within Predicted Subsidence Affection Zone
Cockle Creek	1 st order
Diega Creek	2 nd order
Palmers Creek	2 nd order ²
Boggy Hole Creek	Not undermined
Wallis Creek	Not undermined
Bangalow Creek	1 st order

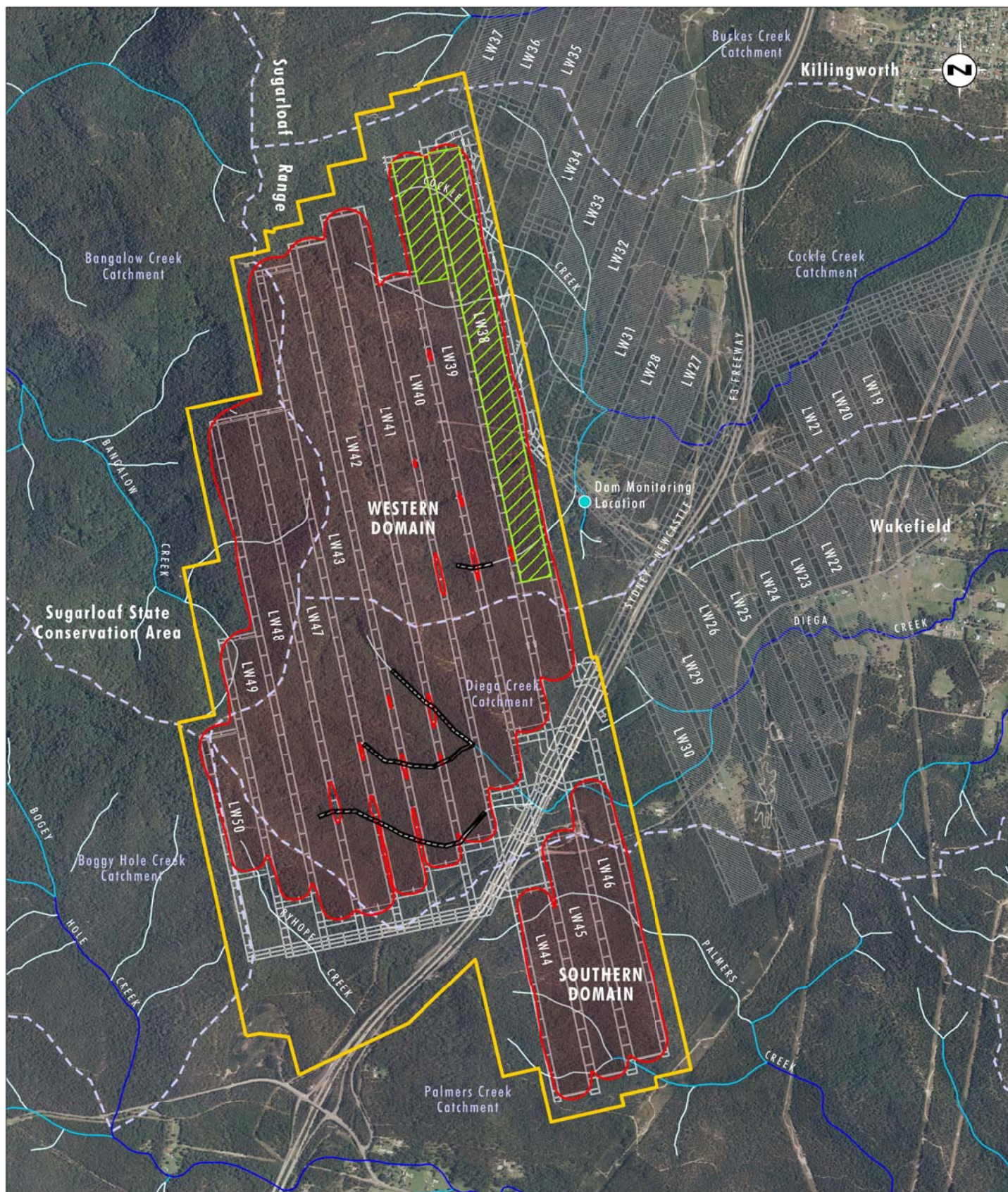
Note 1: DWE (undated) classifies watercourses using the Strahler stream order system in order to understand the potential catchment contribution of the watercourse. The Strahler ordering system begins in the headwaters of watercourses, with first order watercourses merging to form second order watercourses, second order watercourses merging to form third order watercourses, and so on. DWE (undated) divides watercourses orders into three categories:

- Category 1 – usually intermittent and consisting of first or second order streams;
- Category 2 – third and higher order rivers that drain into primary catchment rivers;
- Category 3 – these watercourses are major rivers and their primary tributaries and associated alluvial groundwater zones.

Note 2: Unnamed tributary of Palmers Creek

As shown in **Table 2.1** the watercourses within the predicted subsidence affection zone of the continued underground mining area are 1st order and 2nd order streams.

The *NSW Government Gazette no. 37* on 24 March 2006 page 1500 indicates that 1st order and 2nd order streams are not “rivers” for the purposes of legislation because these 1st or 2nd order streams do not maintain a permanent flow of water and do not at any time carry flows emanating from a 3rd, 4th or higher order stream.



Source: OCAI - Aerial Photograph, Longwall Layout
LPI - Drainage Lines

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1:30 000

Legend

- Continued Underground Mining Area
- Proposed Underground Workings in the West Borehole Seam
- Longwall Progression as of 1st November 2010
- Former Underground Workings
- Predicted Subsidence Affection Zone
- Catchment Boundary

- Potential Surface Cracking Area 1st Order Drainage line
- 1st Stream Order
- 2nd Stream Order
- 3rd Stream Order

FIGURE 2.1

Predicted Subsidence Affection Zone
within the Continued
Underground Mining Area

To the east of the West Wallsend continued underground mining area near Lake Macquarie, Cockle Creek is a perennial stream with a broad floodplain and significant alluvial aquifer. However, within the continued underground mining area, the upper reaches of Cockle Creek comprise a series of ephemeral channels, which only flow after consistent rainfall. Although stream flows in the lease area are intermittent, the creek beds in the upper reaches are steep and confined, and in the lower reaches are broad valleys with alluvial deposits. This is similar for Diega Creek which is a tributary of Cockle Creek.

As discussed in the Groundwater Assessment (Aurecon, 2010) (refer to Appendix 7 of the EA) Palmers Creek catchment lies to the south of Cockle Creek catchment and underlies a small portion of the southern portion of the proposed continued underground mining area. The valley of Palmers Creek comprises a broad alluvial terrace which contains one major aquifer. The groundwater in this aquifer is utilised for stock and domestic purposes via several boreholes. This aquifer is outside the continued underground mining area, and the mine plan has been designed to ensure there is a barrier of approximately 200 metres between the workings and the aquifer.

Alluvial sediments within the continued underground mining area are extremely limited in extent, although more extensive areas lie in lower catchment areas to the east and south of the project area (refer to **Figure 2.2**).

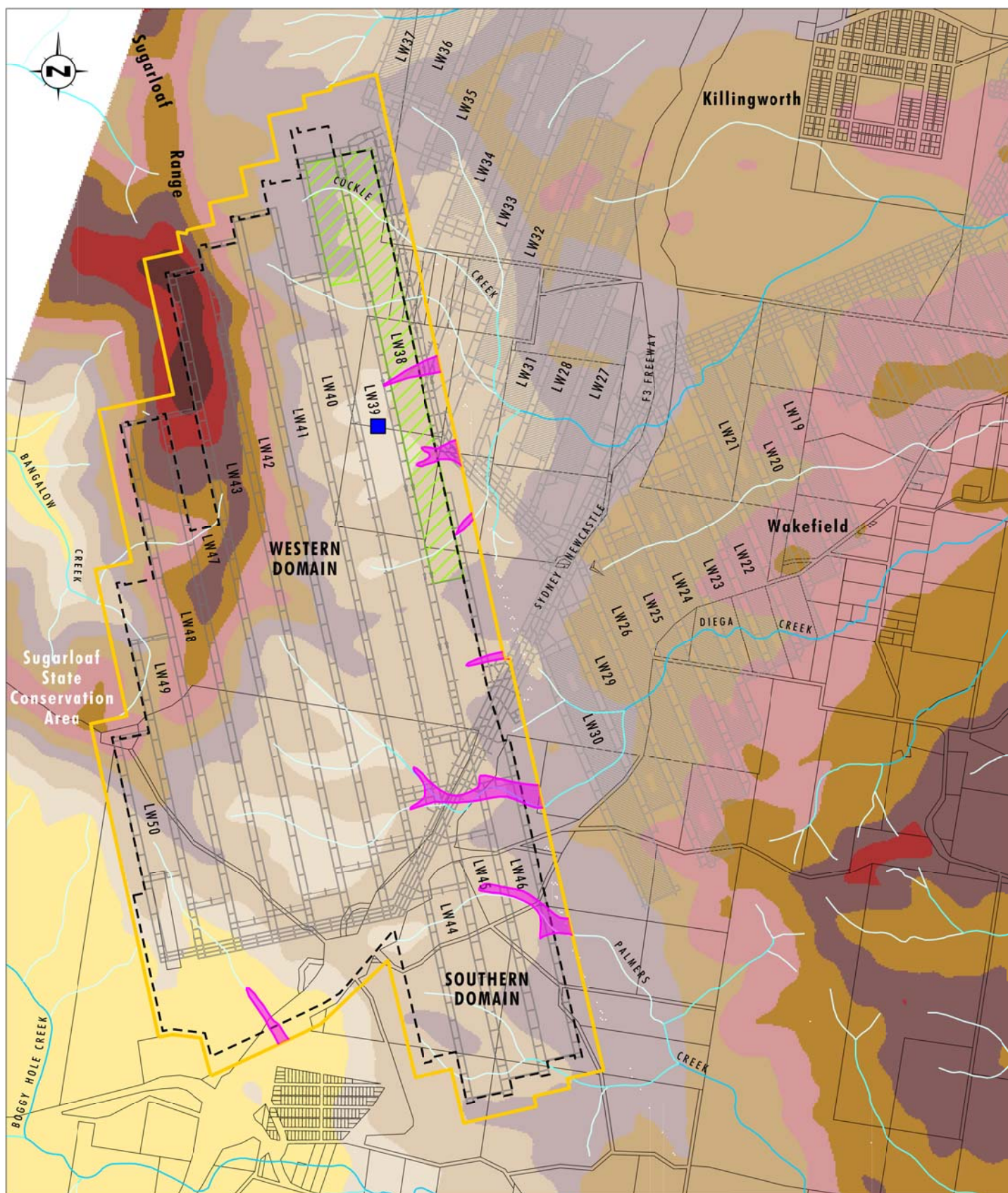
As discussed in the Groundwater Appendix of the EA, alluvial investigation programs in Cockle Creek have indicated that the alluvium is up to 15 metres thick in the valley of Cockle Creek in the central eastern edge of the continued underground mining area, and comprises mostly clayey sand and sandy clay with occasional clean sand and gravelly bands. No single major aquifer has been identified in the deposits, however the alluvium contains a series of water-bearing sand horizons, interbedded with less permeable clay lenses. Groundwater inflows to the boreholes generally occurred during drilling when one of these sand horizons was intersected. Because of the variable composition and excessive fines content in the alluvium, its overall permeability is not likely to be high, and yields from any water bores would generally be expected to be low.

The investigations concluded that the alluvium in Cockle Creek in the continued underground mining area does not contain a significant aquifer, and that the alluvial groundwater resource in this area is of minor significance, due to its variable quality, and limited volume.

In the Palmers Creek catchment, investigations into the alluvium have also occurred. This area is to the south of the predicted subsidence zone. The investigations confirmed that the alluvium in Ryhope Creek is relatively thin but is similar to that intersected in Cockle Creek. It comprises mostly clayey sand and sandy clay with occasional gravelly bands. No single major aquifer was identified in the deposits, however the alluvium contains occasional water-bearing sand horizons, interbedded with less permeable clay lenses.

The investigation in Palmers Creek intersected alluvial material to depth of 5 metres, where refusal was reached in a gravelly band. While no major alluvial aquifer was located, water bearing sand and gravel zones were intersected, including the gravel layer at the base of the bores. These zones are probably fed from the major aquifer zone which is known to exist in the much thicker alluvial deposits, to the south of the main Palmers Creek channel at this location.

In summary, the continuous underground mining area includes alluvium in stream valleys, but does not contain significant aquifers.



Source: OCAL - Aerial Photograph, Longwall Layout
LPI - Drainage Lines

0 0.5 1.0 1.5 km
1:30 000

Legend

- Existing West Wallsend Colliery Pit Top Facilities
- Continued Underground Mining Area
- Proposed Underground Workings in the West Borehole Seam
- Longwall Progression as of 1st November 2010
- Former Underground Workings
- Previously Approved Longwall Layout Boundary in Western and Southern Domains
- Drainage Line
- Proposed Monitoring Bore
- Extent of Alluvium within the Continued Underground Mining Area

1st Stream Order	
2nd Stream Order	
3rd Stream Order	
Depth of Cover Range (m):	
5 - 70	215 - 250
70 - 100	250 - 285
100 - 145	285 - 320
145 - 180	320 - 355
180 - 215	355 - 390

FIGURE 2.2

Depth of Cover and Extent of
Alluvium within the Continued
Underground Mining Area

Surface Water Assessment

The subsidence assessment, undertaken for the EA by DGS, indicates that direct hydraulic connection to the surface due to sub-surface fracturing is considered possible between 70 metre and 100 metre depths, and unlikely where cover depths are greater than 100 metres. In areas with a depth of cover less than 100 metres a torturous pathway may be created through the overburden strata from the surface to the mining strata. When this occurs, there is potential that surface runoff may be provided with a torturous flow path from the surface to the underground mining operation. The result could be the potential capture of surface flows into the underground mining operation.

Minor, localised, sub-surface flow re-routing may occur along creek beds due to surface cracking along exposed rock bar areas and re-surfaces downstream of the affected area. This behaviour usually only occurs where shallow surface rock is present. The drainage lines within the continued underground mining area are generally steep and ephemeral with clayey/sandy beds with some rock boulders potentially forming flow controls. Lower reaches outside the continued underground mining area are generally characterised by broad channels with alluvial soils. Although there is a possibility, as discussed in the EA, of sub-surface fracturing causing stream capture and subsequent re-emergence in downstream reaches, based on the soil landscapes and geology of the area this is considered unlikely.

As discussed in the EA, if cracking does occur through the surface soil layers this cracking may potentially be self healing as over time as it is likely that fine grained material will gradually fill surface cracks and reduce the hydraulic conductivity of immediate surface strata. Self healing of cracks has occurred previously after mining in the Northern domain and currently forms one of the remediation strategies used by WWC.

Any potential surface cracking would be identified as part of the WWC surface water monitoring program. Surface cracking, resulting in stream capture or re-emergence, would be remediated using similar methods as discussed in the Surface Water Assessment and **Section 2.2.2**.

As discussed in the EA, there are four reaches of 1st order watercourses and one reach of 2nd order watercourse that are proposed to be undermined in areas where the depth of cover is less than 100 metres (refer to **Figure 2.2**). The depth of cover to the proposed underground mining in these areas ranges between 70 metres and 100 metres. There are no watercourses within the predicted subsidence zone that have a depth of cover less than 70 metres.

Each of the watercourses in the areas of lower depths of cover (i.e. <100 metres) are listed in **Table 2.2** and shown on **Figure 2.2**.

Table 2.2 – Summary of Watercourses where Depth of Cover <100 metres

Description	Watercourse Order	Typical Upstream Longitudinal Channel Grade	Relevant Longwall(s)	Catchment Area draining to (hectares)	Minimum Depth of Cover (metres)
Southern tributary of Cockle Creek	1 st	3%	39 and 40	46	95
Northern tributary of Diega Creek	1 st	8%	41 and 42	63	95
Central tributary of Diega Creek	1 st	6%	41, 42 and 43	28	90

Table 2.2 – Summary of Watercourses where Depth of Cover <100 metres (cont)

Description	Watercourse Order	Typical Upstream Longitudinal Channel Grade	Relevant Longwall(s)	Catchment Area draining to (hectares)	Minimum Depth of Cover (metres)
Central tributary of Diega Creek	2 nd	6% ¹	41	5 (96 ¹)	95
Southern tributary of Diega Creek	1 st	4%	41, 42, 43, 47 and 48	97	78

Note 1: Including upstream characteristics, i.e. longitudinal channel grade and catchment area.

The North Lake Macquarie water source of the WSPHUA has an area of 271 km² (i.e. 27,100 hectares). The catchment areas upstream of the areas of low depth of cover (i.e. <100 metres) where possibly interconnective cracking will occur total 239 hectares (refer to **Table 2.2**). This is equivalent to less than 1 per cent of the total area of the North Lake Macquarie water source.

There are no watercourses proposed to be undermined within the Wallis Creek water source where the depth of cover is less than 100 metres.

As shown in **Table 2.2**, three of the reaches have minimum depth of cover of 95 metres, one 90 metres and the other 75 metres. In addition, each of the reaches has steep longitudinal channel grades (i.e. ranging between 4 per cent and 8 per cent).

It is considered that in the areas where it is possible to potentially get interconnective cracking (i.e. depth of cover <100 metres) based on the steep longitudinal grade of the watercourses, the relatively small upstream catchment areas and the program of monitoring and remediation proposed, if interconnective cracking occurs it will capture surface flows only during storm events as the watercourses are ephemeral and for a short period of time (i.e. <3 months) as a result of monitoring and subsequent active or passive (i.e. self healing) remediation. In addition, it should be noted that the areas with lower depths of cover proposed to be undermined equate to less than 1 per cent of the area of the North Lake Macquarie water source.

Alluvial Groundwater Assessment

As discussed in the EA there are two fingers of alluvial deposits that will be undermined by the project. Both of these alluvial fingers are considered to contain relatively low volumes of groundwater. The characteristics of these alluvial deposits are listed in **Table 2.3** and shown on **Figure 2.2**.

Table 2.3 – Summary of Alluvial Deposits within the Predicted Subsidence Zone

Description	Watercourse Order	Relevant Longwall(s)	Range in Depth of Cover (metres)
Tributary of Diega Creek – upstream section	2 nd	40	105 to 110
Tributary of Diega Creek – downstream section	2 nd	46	130 to 155
Tributary of Palmers Creek	1 st	46	110 to 150

As discussed in Section 5.4.2.4 of the EA, previous assessment and subsequent monitoring at WWC indicated that the underground mining of Longwalls 27, 28 and 31, in the lower depths of cover areas, there was no indication from the observation bores of any connection between the mine and the alluvium.

Groundwater monitoring results indicated that any disruption to the groundwater levels attributable to the mining of Longwalls 27, 28 and 31 was temporary and generally limited to a period of a few months at most. In the majority of monitoring bores, the groundwater table returned to levels consistent with that which would be expected, given the climatic conditions. The major influence on groundwater levels during the first part of the monitoring period was the prevailing drought conditions. This effect has also been noted in groundwater bores on other monitoring projects.

As outlined in Section 8.2 of the Groundwater Assessment, in addition to Longwalls 27, 28 and 31, there have been numerous other longwall panels extracted beneath alluvial deposits at the WWC to date with no long-term adverse impacts evident on the groundwater regime. This gives a good indication that the likely height of fracturing above these workings is within the predicted range. In particular, there have been at least ten panels extracted from beneath the Cockle Creek alluvium and ten panels from beneath Diega Creek. In both of these creek valleys there have been minor temporary hydrogeological impacts observed, but the long-term hydrogeological regime in the alluvium in both creeks appears to be unaffected.

Previous mining experience in the region, in addition to the results of available monitoring, support the predictions of the likely height of the zone of interconnected fracturing above the mine.

In addition to the monitoring proposed in the EA, WWC intend to install a monitoring bore within the goaf of Longwall 39 within the lower depth of cover area to the north. This area will be undermined prior to undermining of any watercourses in areas where the depth of cover is less than 100 metres. The depth of cover where the monitoring bore is proposed to be installed is approximately 95 metres. It is proposed to use this monitoring bore to gain additional confirmation of the height of sub-surface fracturing, to be used in addition to previous monitoring data assist in confirming the potential risk to stream systems in areas where the depth of cover is less than 100 metres.

As all of the alluvial deposits within the predicted subsidence zone lie in regions with depths of cover greater than 100 metres it is considered that the potential for connection between the surface and the underground workings will be unlikely.

WWC commit to ongoing review of potential depth of cover impacts associated underground mining using their existing and proposed monitoring and management systems as discussed in the EA and statement of commitments (refer to Commitment 6.3.4). This ongoing process will ensure that WWC monitor surface and sub-surface responses to mining and meet the requirements of the WSPHUA.

2.1.2 Water Supply and Water Balance

The West Wallsend Colliery has applied for a variation to their Part 5 groundwater licence, for an increase in volume from 360ML to 1000ML. they justify that the increase in licence will not necessarily increase the volume of water being extracted from the West Wallsend Colliery workings as water was previously also being extracted from another borehole at their surface facilities.

West Wallsend Colliery has not provided any volumes that were extracted from the older borehole to confirm the expectation that the volume of water extracted will not

increase nor is there any record of a licence for the older (now decommissioned) borehole.

In addition to the above licensing issue, the detail provided in the 2008 AEMR water balance did not sufficiently account for the volumes of groundwater extraction at the mine. While the 2009 AEMR does provide groundwater volumes extracted in the site water balance, the past AEMR's and the lack of clear justification for the Part 5 licence variation create uncertainty regarding West Wallsend's ability to accurately calculate site water balances.

As such, NOW requires accurate reporting of water balances comparing the predicted and actual take of water and a statutory requirement that all groundwater extraction is licensed. Conditions regarding the reporting of site water balance have been recommended in Attachment B.

West Wallsend Colliery currently holds one licence under the *Water Act 1912* for extraction of groundwater from the hard/fractured rock aquifers. This licence (20BL169793) permits extraction of up to 360 ML in any 12 month period. WWC has applied for a variation to this licence to increase the extraction limit to 1000 ML in any 12 month period. The licence variation was submitted to NOW on 1 June 2009.

Between 1969 and June 2008 WWC extracted groundwater from the underground workings at the Pit Top Facility on The Broadway at Killingworth. These extractions were via an old unlicensed borehole. Surplus water extracted from this borehole was previously discharged to Burkes Creek via a licensed discharge point (EPL No. 1360). The use of this borehole to extract surplus groundwater from the underground workings has been stated in WWC AEMRs since at least 2000. No extraction of surplus groundwater from the underground workings has occurred via this borehole since July 2008, however this borehole is still to be maintained as an operational contingency should the Longwall 11 pump fail.

Surplus groundwater from the underground workings is currently extracted via a borehole located at Longwall 11. A licence for this borehole was issued on 12 August 2005 (20BL169793). This licence permits extraction of up to 360 ML of groundwater in any 12 month period commencing 1 July.

The borehole at Longwall 11 is approximately 2 kilometres south-east of the Pit Top Facility.

Since July 2008 all surplus groundwater from the underground workings has been extracted via the borehole at Longwall 11. This was initiated in response to the Pollution Reduction Program being placed on West Wallsend Colliery by the then Department of Environment and Climate Change (DECC). As such, an alternative arrangement for the handling and disposal of minewater was sought, via Longwall 11 to Westside Colliery.

On 1 June 2009, WWC applied to Department of Water and Energy (DWE) (now NSW Office of Water (NOW)) to vary licence 20BL169793 to increase the limit of water extraction 1000 ML per 12 month period. In addition, in this application WWC requested to vary the licence to permit water extracted under this licence to be supplied to Metromix Quarry.

The historical water balance for the WWC has been used to determine the volume of groundwater required to be extracted. This volume includes all surplus groundwater to be extracted. As discussed in the Surface Water Assessment, during 2009 WWC extracted approximately 900 ML of surplus groundwater from the underground workings. This has been calculated considering inflows and outflows to the underground workings. WWC predicts a total groundwater extraction of 1000 ML per year will be required to service the underground mining operations. This extraction is primarily expected to occur via the borehole at Longwall 11. However, it is possible that extractions may also occur via the

borehole at the Pit Top Facility during equipment maintenance or failure, at the borehole at Longwall 11. The ability to extract surplus groundwater via the borehole at the Pit Top Facility or via the borehole at Longwall 11 will provide a contingency for the operation.

As noted previously, WWC has applied for a variation to this licence to increase the extraction limit to 1000 ML in any 12 month period. The licence variation was submitted to NOW on 1 June 2009.

Since submission of the variation application WWC has received correspondence from NOW on 12 August 2010 indicating that *“NOW accepts that the situation is difficult for OCAL to demonstrate compliance with the licensing arrangement, and grants approval to continue operations until such time as the variation in the licence volume is granted”*.

The 2008 AEMR for West Wallsend Colliery was submitted to DWE on 8 May 2009. NOW responded on 5 June 2009 requesting additional information regarding groundwater extractions, specifically in relation to the licence conditions. The information requested by DWE was provided on 19 June 2009.

WWC have undertaken, as demonstrated in the 2009 AEMR and outlined in the EA, to monitor the water management system in accordance with NOW Guidelines. As such, based on the data provided in the 2009 AEMR and the EA, it is apparent that WWC has a good working knowledge of the on-site water management system and their reporting requirements.

Based on previous water balance reporting, as detailed above, and future underground mining operations, WWC has requested a licence increase to 1000 ML per annum. WWC request that NOW approve and issue this licence variation as soon as possible.

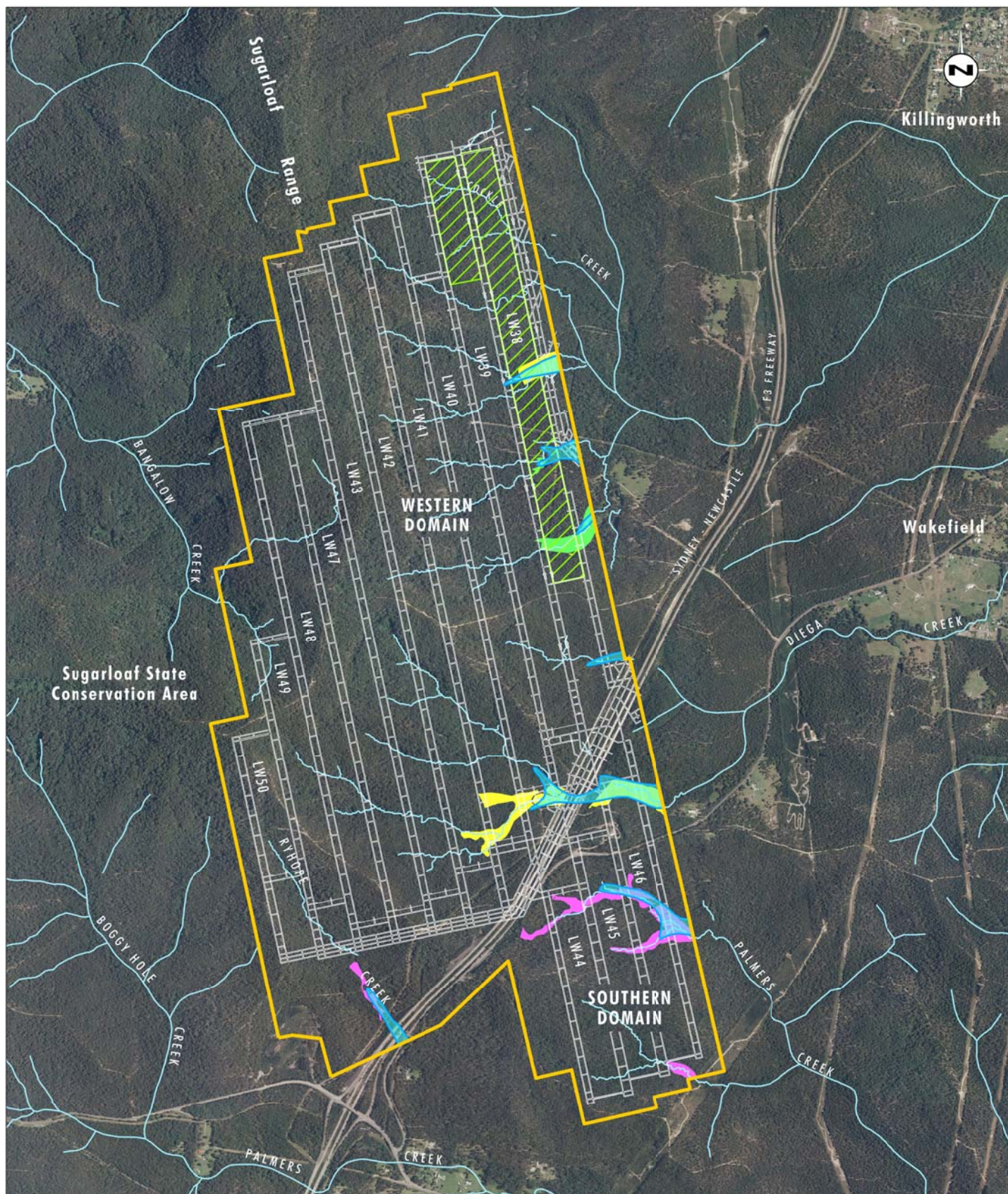
2.1.3 Groundwater Impacts

Although the alluvial deposits have been identified as limited and not connected, the ecological reliance on groundwater by GDE's needs to be protected, as such the conditions relating to GDE water source monitoring specified in Attachment B addresses these issues.

Three vegetation communities in the continued underground mining area are considered likely to be dependent on groundwater resources: Alluvial Tall Moist Forest EEC (covering 12 hectares); Swamp Mahogany Paperbark Forest EEC (covering 3 hectares); and Riparian Paperbark Peppermint Forest (covering 10 hectares). A freshwater wetland was also identified in the continued underground mining area. This wetland was extensively investigated as part of the Aboriginal Archaeology Assessment (refer to Appendix 12 of the Environmental Assessment). This wetland is considered to be fed by surface water and is not considered to be GDE (Umwelt 2008).

The potential GDEs located within the continued underground mining area are generally associated with tributaries of Cockle Creek, Diega Creek and Palmers Creek (refer to **Figure 2.3**). As recognised, there are limited alluvial deposits located in the continued underground mining area. As all of the alluvial deposits within the predicted subsidence zone lie in regions with depths of cover greater than 100 metres it is considered that the potential for connection between the surface and the underground workings will be unlikely.

The assessment of hydrogeological risk concluded that risks to the groundwater regime in Palmers Creek were negligible, the risks in Diega Creek and Central Creek were low to very low and the risks in Cockle Creek and Ryhope Creek were low, following the modification to the mine plan.



Source: OCAL, Google Earth 2008

0 0.5 1.0 1.5 km
1:30 000

Legend

- Continued Underground Mining Area
- Proposed Underground Workings in the West Borehole Seam
- Longwall Progression as of 1st November 2010
- Extent of Alluvium within the Continued Underground Mining Area
- Alluvial Tall Moist Forest
- Swamp Mahogany-Paperbark Forest
- Riparian Paperbark-Peppermint Forest

FIGURE 2.3

Potential Groundwater Dependent Ecosystems
and Extent of Alluvium within
Continued Underground Mining Area

It should be noted that undermining of potential GDEs on Cockle Creek tributaries within Longwall 38 has already been completed.

Details on proposed monitoring for GDEs are discussed further in **Section 2.1.4** below.

2.1.4 Groundwater Dependent Ecosystems

As there are groundwater dependent EECs in the mining area where subsidence will occur, there remains potential risk to the health of these communities as a result of mining impacts. Therefore monitoring is warranted but not sufficiently detailed in the EA. NOW has provided conditions in Attachment B to identify the risk to GDE's through a preliminary monitoring program that will be assessed by NOW.

The surface water assessment has identified locations where there is a potential for surface water ponding to occur. In these areas, the potential surface ponding is expected to be confined to the existing channels and no out-of-channel ponding is expected as a result of the predicted subsidence. Ponding is expected to disperse through evaporation and seepage, however periods of extended ponding may occur during wet periods.

Due to the expected containment of ponding to the existing stream channels, surface water impacts on vegetation communities and fauna habitats are expected to be minimal. In channel environments where there is a higher potential of in-channel ponding occurring, the channels currently comprise sandy beds with limited in-stream vegetation due to the ephemeral nature of the drainage lines. Riparian vegetation is well adapted to periods of extended wetting, and changes to the structural or floristic diversity of riparian communities as a result of in-channel ponding are not expected. Riparian vegetation has not been shown to be significantly impacted by minor changes to the ponding regime of drainage lines within the northern domain (Umwelt 2006; 2007;2009), and similarly, habitats within the western and southern domains are not expected to be substantially affected due to predicted minor changes in surface water ponding.

These results indicate that it is unlikely that the project will result in a significant negative impact on the identified GDEs: Alluvial Tall Moist Forest EEC; Swamp Mahogany Paperbark Forest EEC; and Riparian Paperbark Peppermint Forest.

Any remediation works required to rectify surface water ponding is not expected to be substantial based on previous experience at WWC. Due to the limited remediation works undertaken as part of the existing operations, any future remediation works are expected to also be limited in extent and be able to be undertaken either by hand or small earthmoving equipment, e.g. bobcat, in accessible areas. As such, the remediation works are not likely to significantly impact on the occurrence of riparian or aquatic vegetation within the predicted subsidence affectation zone or in downstream creeklines.

As detailed in Section 5.5 of the Ecology Assessment, a monitoring program has been formulated in order to confirm the assessment outcomes and check for any unexpected adverse impacts on GDEs. The monitoring program will include:

- continuation of existing monitoring in Cockle Creek;
- establishment of two additional monitoring bores in the Diega Creek alluvium;
- establishment of three monitoring bores in the Ryhope Creek alluvium, outside the continued underground mining area;

- continuation of existing monitoring in the Palmers Creek alluvium, outside the continued underground mining area; and
- inclusion of ecological monitoring locations within GDEs.

The continued underground mining area is not expected to result in an adverse impact on groundwater resources, and similarly alluvial aquifers are not expected to be adversely impacted. The only potential impact on GDEs is from ponding, which is expected to be minimal.

2.1.5 Surface Water

A weathered rock aquifer connected to Diega Creek is presumed to extend beyond bankfull channel limit. As the shallowest depth of cover exists where the longwall panel encroaches closest to Diega Creek and predicted subsidence may be up to 2.45m, the proposal is considered to have a significant risk of connective fracture for the proposed longwall configuration to the extent that there would be a substantial loss of water from Diega Creek. As such, conditions have been recommended in Attachment B for an adaptive mine layout.

As outlined in Section 2.4.1.2 of the Surface Water Assessment, Diega Creek is a fourth order (category two) stream and one of its second order (and associated first order) tributaries flow in a south-easterly direction above the Western domain. This second order tributary of Diega Creek, which occurs within the continued underground mining area, is ephemeral and only flows for short periods following rainfall.

As outlined in Section 3.2.2 of the Groundwater Assessment, the available data indicates that the weathered rock aquifer is largely non-existent or has a minor significance within the continued underground mining area. As a result, the risk of any adverse impacts from the mining will be negligible. The evidence indicates that, where the weathered rock aquifer exists in the region, it is of minimal importance, due to its poor yield and continuity.

As discussed above and in the EA, it is considered that the impacts of the proposed underground mining on the stream systems of the predicted subsidence area, including surface waters and interconnected alluvial systems, will be low. In addition, WWC has included in the EA and statement of commitments comprehensive management and monitoring programs within the predicted subsidence area.

Further comments regarding the adaptive mine plan are provided in **Section 2.1.6**.

During the consultation period between the Test of Adequacy (TOA) and the exhibition of the EA, some issues were addressed but the EA was placed on public exhibition before NOW was satisfied that all surface water assessment information had been provided. The outstanding surface water information required includes:

- (a) Geomorphic description of streams and rivers within and downstream of the project site (i.e. river style, geomorphic energy regime to bankfull discharge);**
- (b) Long profile survey along each watercourse to be subsided to the nearest stable (i.e. rock) control point upstream and downstream, on an appropriately expanded scale, with stable rock control points;**
- (c) Nature of bedload material and estimated stream power relationships along each watercourse to be subsided;**

- (d) Effective bank full discharge volume, velocity and tractive stress under pre- and post-subsidence conditions. Velocities under pre and post subsidence modelled for 2, 10 and 20 year ARI;**
- (e) Change in stream velocity and stream power relationships under subsided conditions against threshold limits to bedload transport;**
- (f) Location and nature of geomorphic controls through each longwall trough and upstream to the nearest geomorphologically stable control (i.e. presence of rock controls);**
- (g) Nomination of critical thresholds to stream incision for each longwall panel and means to limit subsidence impacts to below threshold limits;**
- (h) Mitigation measures to prevent/limit incision and subsequent degradation of stream channels for each longwall and the cumulative subsidence envelope.**

A condition has been recommended (Attachment B) for these investigations to be completed and supplied to NOW for review prior to project approval.

WWC acknowledges that the points listed above were raised during NOW's adequacy review of the EA in correspondence dated 28 May 2010. A meeting was held with NOW on 3 June 2010 to discuss the Project, unfortunately this meeting occurred prior to WWC receiving NOW's test of adequacy comments. The parties present from NOW at the meeting on 3 June 2010 included Fergus Hancock, Jennifer Gerrard and Jodie Dabovic.

A number of the issues identified in the correspondence from NOW dated 28 May 2010 were raised at the meeting on 3 June 2010. However, it should also be noted that several issues, that NOW has also raised in other correspondence since this date, were not raised at this meeting. Specifically at this meeting, NOW did not raise or discuss in any detail the items raised in the correspondence dated 28 May 2010 in regard to the Surface Water Assessment. Items raised by NOW regarding surface water at the meeting on 3 June 2010 were in regard to concerns that subsidence monitoring of pre-mining top of bank survey would be undertaken, in particular along the second order section of Diega Creek above Longwall 46 immediately downstream of the F3 Freeway. In addition, NOW commented that they would like additional information regarding potential stream erosion. The information, included in the Surface Water Assessment, regarding velocities were discussed and WWC committed to further strengthening of the commitments made in regard to surface water monitoring, including potential geomorphologic responses.

At the meeting on 3 June 2010, NOW requested additional information to assist their review process, which was provided.

Minutes from the meeting held on 3 June 2010 were forwarded to Fergus Hancock at NOW on 18 June 2010 via email. Fergus responded in a letter dated 27 June 2010 indicating that Umwelt's minutes were "an accurate record of issues and outcomes to NOW's response to test of adequacy to the proposal". However, in this letter NOW requested that additional information was forwarded to NOW, in addition to the information discussed at the original meeting.

In correspondence dated 29 June 2010, DoP requested that the EA include the following:

- effects on streamflow velocities both within and downstream of the site;
- the nature of stream bed material and stream power relationship along each watercourse predicted to be impacted;

- pre-subsidence and post-subsidence long profile surveys of each watercourse predicted to be impacted; and
- mitigation measures at each longwall panel to prevent or limit stream or channel cracking.

Following receipt of the comments from NOW and DoP, the EA was amended to include additional information in order to address NOW's concerns. The EA was amended to include:

- details on streamflow velocity changes for the 5 year and 100 year Average Recurrence Interval (ARI) storm events;
- pre-subsidence and post-subsidence long profile surveys for impacted watercourses;
- additional commitments to undertaking requested works, including geomorphologic monitoring.

The amended documentation was provided to NOW and DoP on 9 July 2010. No comment from NOW was received on the amended documentation prior to DoP declaring the EA adequate and placing the EA on exhibition.

Subsequent to the EA being placed on public exhibition, WWC received further correspondence from NOW dated 23 July 2010. NOW indicated that they required the geomorphologic investigations to be undertaken as part of the EA and not post determination, as committed to by WWC.

A meeting with Fergus Hancock (NOW) was held on 12 August 2010, in reference to the correspondence received on 23 July 2010. From the meeting, there was an in principle agreement that the requested geomorphologic investigations could be undertaken post determination given that any project approval was appropriately conditioned to the satisfaction of NOW.

As discussed in **Section 2.1.6**, WWC has committed to undertaking the additional surface water investigation outlined above. WWC request that the requirements for these investigations be included in the Project Approval, allowing that they can be undertaken following determination as part of the extraction plan process.

It should be noted that with the exception of minor areas in LW 39, which is currently being mined, and LW 40 (planned to be mined in 2011 and 2012), the main areas of potential subsidence affectation and potential cracking are predicted to occur in the southern portions of LWs 41, 42, 43, 47 and 48 (refer to **Figure 2.1**), which are not planned to be mined until at least 2012.

Further, we note that alluvial areas in LW38 shown on **Figure 2.3** have already been undermined, and mining will not progress to the further identified alluvium in the southern end of LW 40 and in LWs 44-46 until at least May 2012.

2.1.6 NOW Recommended Condition of Approval

General

1. That all statements of commitments be adopted as project approval conditions except where specific conditions recommended by NOW require an earlier timeframe.

WWC expect that the intent of the Statement of Commitments standing, except where project approval conditions supersede the Statement of Commitments, will be a fundamental part of the project approval conditions.

Adaptive Mine Plan

2. NOW requires an adaptive mine layout to avoid the potential for substantial quantities of water to drain from Diega Creek and its associated surficial/alluvial/weathered rock groundwater's into the West Borehole workings. This must incorporate a modified mine plan to step back from Diega Creek by a distance consistent with the '*Management of Stream/Aquifer Systems in Coal Mining Developments 2005*' guideline, in order to avoid the high risk zone of disturbance to, or loss of, connected alluvial/weathered rock groundwater's, and associated groundwater-dependent ecosystems (GDE). This complies with the *Principles of the Water Management Act 2000*, and recommendations of the NSW Groundwater Quantity and Groundwater Dependent Ecosystem Policies.

The Guidelines for Management of Stream / Aquifer Systems in Coal Mining Developments – Hunter region have been written taking into account the statutory regime established by the *Water Management Act 2000*. It is understood NSW Office of Water (NOW) use it as a guide in determining development approvals and associated conditions.

As discussed in the EA and the Surface Water Appendix of the EA, and **Section 2.1.1.2** the watercourses in the continued underground mining area are order 1 and order 2 streams (i.e. category 1 streams). Category 1 streams are defined by the guideline (DWE, undated) as:

Category 1. These streams are usually intermittent, and consist primarily of first and second order watercourses. These watercourses primarily drain smaller catchment areas, and flow only after very intense storms or during prolonged wet weather periods. Catchment area is generally less than 200 hectares. Groundwater resource for these watercourses is regarded as minimal, and is not further assessed for protection in these guidelines.

The watercourses proposed to be undermined, as described in **Section 2.1.1.2**, meet the description of category 1 streams as provided by the Guideline (DWE, undated).

The guidelines (DWE, undated) also state that *"underground mining developments must develop their mine plan to avoid unnecessary impact on first and second order streams. Longwall panel locations and orientation, extraction sequence and panel width should be defined in terms of risks to stream degradation."*

As discussed in the EA following the completion of preliminary studies significant changes were made to the proposed mining layout. These included changes to the mine plan to minimise potential impact on the low depth of cover areas in the vicinity of Ryhope Creek has resulted in a loss of approximately 2.4 Mt of coal resource. WWC and Xstrata believe that these changes will ensure that future mining is able to be managed in such a way as to meet current community and environmental expectations.

The modifications to the mine plan to address the above factors, have been made with careful consideration to developing a mine plan which is both economically feasible but also sensitive to the surface features above the proposed longwall mining area.

The Guidelines for undermining of Category 1 streams (DWE, undated) indicate that a buffer zone is not necessarily required for Category 1 streams.

As discussed in **Section 2.1.1.2**, WWC has committed to installation of an additional monitoring bore over Longwall 39 in an area of lower depth of cover, to assist in confirming this conclusion.

Based on the required outcomes of the guidelines and the studies undertaken for the EA, it is considered that it is unlikely that any loss of connected alluvial groundwaters will occur as a result of the proposed underground mining due to the nature of the alluvial deposits and the depth of cover. It is also considered that the proposed underground mining will have negligible impact on the GDEs associated with the alluvial areas to be undermined.

It follows that an adaptive mine layout is not required.

Surface Water Investigations

3. Additional surface water investigations need to be undertaken and submitted to NOW for assessment prior to project approval and are to include the following:

- (a) Geomorphic description of streams and rivers within and downstream of the project site (i.e. river style, geomorphic energy regime to bankfull discharge);**
- (b) Long profile survey along each watercourse to be subsided to the nearest stable (i.e. rock) control point upstream and downstream, on an appropriately expanded scale, with stable rock control points;**
- (c) Nature of bedload material and estimated stream power relationships along each watercourse to be subsided;**
- (d) Effective bank full discharge volume, velocity and tractive stress under pre- and post-subsidence conditions. Velocities under pre and post subsidence modelled for 2, 10 and 20 year ARI;**
- (e) Change in stream velocity and stream power relationships under subsided conditions against threshold limits to bedload transport;**
- (f) Location and nature of geomorphic controls through each longwall trough and upstream to the nearest geomorphologically stable control (i.e. presence of rock controls);**
- (g) Nomination of critical thresholds to stream incision for each longwall panel and means to limit subsidence impacts to below threshold limits; and**
- (h) Mitigation measures to prevent/limit incision and subsequent degradation of stream channels for each longwall and the cumulative subsidence envelope.**

WWC has committed to undertaking the additional surface water investigation outlined above. WWC request that the requirements for these investigations be included in the Project Approval, allowing that they can be undertaken following determination as part of the extraction plan process.

Water Management Plan

4. The proponent shall prepare and implement a Water Management Plan to the satisfaction of the Director-General. This plan must:
- (a) Be prepared in consultation with NOW by a suitable qualified expert whose appointment has been approved by the Director-General;
 - (b) Be submitted to the Director-General prior to project approval or otherwise agreed by the Director-General; and
 - (c) Include:
 - I. An updated site water balance, which includes but is not limited to details of water sources and security of water supply, site water use and management, off site water transfers, groundwater levels pre and post subsidence, measures to minimise water use and maximises reuse of saline and contaminated waters.
 - II. A surface water monitoring program that includes:
 - Detailed baseline data of surface water flows and water quality in the watercourses that could be affected by the project for a minimum of 2 years coinciding with the groundwater and ecological monitoring for Groundwater Dependent Ecosystems (GDE's);
 - Surface water impact assessment criteria, including trigger levels for investigating potentially adverse surface water impacts' of the project; and
 - A program to monitor surface water flows and quality in the watercourses that could be affected by the project.
 - III. A groundwater monitoring program that include:
 - Baseline data of groundwater levels, yield and quality in the region, and privately-owned groundwater bores, which could be affected by the project;
 - Groundwater impact assessment criteria, including trigger levels based upon analysis of baseline data for groundwater, surface water and ecology; and
 - IV. A surface and groundwater response plan which described the measures and/or procedures that would be implemented to:
 - Respond to any exceedences of the surface and groundwater assessment criteria;
 - Mitigate and/or offset any adverse impacts on groundwater dependent ecosystems or riparian vegetation located within and adjacent to the site.

WWC has committed to preparing and implementing a Water Management Plan. Our expectation is that the project approval condition will require this to be prepared in consultation with DECCW and NOW and to the satisfaction of DoP.

Groundwater Impacts Report

5. The Proponent shall provide an annual report of alluvial and hard rock groundwater levels. This report shall:

- (a) Be provided to the NSW Office of Water (NOW) and the Department in the AEMR each year following the reporting period;**
- (b) Include interpreted drawdown levels resulting from exiting and/or ongoing mining operations of the project;**
- (c) Include trend analysis of alluvial and weathered/hard rock groundwater levels and those associated with groundwater dependent ecosystems against rainfall and mining operations for pre and post subsidence;**
- (d) Account for any drawdown loss of alluvial groundwater or river flows to the satisfaction of the Director-General;**
- (e) Assessment of depressurisation of coal measures will be undertaken by a suitable qualified hydrogeologist and results reported in the AEMR.**

WWC anticipate that groundwater reporting would be included within project approval conditions relating to Water Management Plan, specifically the groundwater monitoring program. As included in the Statement of Commitments, WWC has committed to the following:

- 6.5.1 WWC will continue to maintain the existing groundwater monitoring network and also undertake regular analysis of groundwater monitoring data to compare predicted and actual groundwater impacts. This will include groundwater make in the underground operations.
- 6.5.2 Prior to commencement of longwall mining in Longwall 46, WWC will review the need for establishment of alluvial monitoring in Diega Creek and Central Creek in consultation with NOW and to the satisfaction of DoP.
- 6.5.3 Within 12 months of project approval, WWC will submit for the approval of the Director General an updated Groundwater Monitoring Program for the Project. The program will be prepared in consultation with NOW and will include development of relevant trigger levels and response procedures to manage identified monitoring and/or predicted trends.
- 6.5.4 The monitoring network and monitoring program will be reviewed on an annual basis to determine ongoing suitability and any proposed changes will be discussed in the Annual Environmental Management Report (AEMR).

The intent of the conditions recommended by NOW appear to be generally consistent with the commitments made by WWC, and are expected to be covered by DoP approval conditions.

6. Preliminary Groundwater Dependent Ecosystem Monitoring

- (a) The GDE monitoring program is to be developed in consultation with NOW;**
- (b) Establish monitoring bores of groundwater quality and groundwater levels for all GDEs and the wetland currently identified in the mining area;**
- (c) Monitoring water quality monthly and water levels daily for a minimum of 2 years in all bores coinciding with surface water and ecology monitoring;**

(d) Submit a report of the monitoring and outcomes within one month of the completion of monitoring program to NOW for review and assessment of longer term monitoring requirements.

As previously discussed, WWC has committed to implementing a monitoring program that has been formulated in order to confirm the assessment outcomes and check for any unexpected adverse impacts on GDEs. The monitoring program will include:

- continuation of existing monitoring in Cockle Creek;
- establishment of two additional monitoring bores in the Diega Creek alluvium;
- establishment of three monitoring bores in the Ryhope Creek alluvium, outside the continued underground mining area;
- continuation of existing monitoring in the Palmers Creek alluvium, outside the continued underground mining area; and
- inclusion of ecological monitoring locations within GDEs.

It is not proposed to establish monitoring bores in the vicinity of the wetland present within the continued underground mining area. This wetland, or wet soak, was extensively investigated as part of the Aboriginal Archaeology Assessment. It was concluded that the wet soak is an entirely natural feature which persists because of the presence of minor claystone units in the locale geological strata (Umwelt 2008). This wetland is considered to be fed by surface water and is not a groundwater dependent ecosystem. Due to its Aboriginal cultural significance, the Western Domain mine plan was modified to avoid impact to this site.

Regular monitoring of water quality and water levels will be undertaken of monitoring bores implemented or associated with groundwater dependent ecosystems.

WWC propose to include the groundwater dependent ecosystem monitoring program within the Water Management Plan. It is assumed that groundwater dependent ecosystem monitoring results would be made available to NOW through the Annual Environmental Management Report or equivalent process.

7. Site Water Supply and Balance

(a) In addition to site water balance in the water management plan, an annual comparison between the reporting period site water balance inflow and outflows and the previous periods to be reported in the AEMR. This is to include comment on any substantial increases/decreases in inflows and outflows, comparison between measured and predicted inflows (pre and post subsidence) and detail water use efficiency achieved during the reporting period and any project that have contributed to improved site water efficiency and reuse of saline and contaminated water;

(b) Annual review of management of segregation of contaminated, sediment laden and clean water volumes.

It is considered that site water balance reporting would be adequately covered in project approval conditions relating to the Water Management Plan. WWC has committed to the preparation and implementation of a Water Management Plan, which would include a Site Water Balance. The site water balance will include:

- details of:
 - sources and security of water supply;
 - water use onsite;
 - water management onsite; and
 - offsite water transfers;
- description of what measures would be implemented to minimise potable water use onsite.

It is considered that the requirements above could adequately be addressed in the proposed Water Management Plan for the Project.

2.2 Department of Environment, Climate Change and Water

2.2.1 Subsidence and Water Resource Impacts

Page v of Appendix 5A states that *“Creek flows may be re-routed to below-surface pathways and re-surfacing downstream of the mining extraction limits in these areas.”* No prediction has been made of where the lost water will re-surface.

The mitigation measures proposed are to monitor the changes, wait for possible self closing of cracks and take remedial action after impacts occur. Post impact repair measures on cracked stream beds have met with mixed success in recent years in NSW and have often required significant vegetation clearances for vehicles access and caulking works to be carried out.

Minor, localised, sub-surface flow re-routing has the potential to occur along creek beds due to surface cracking along exposed rock bar areas and re-surfaces downstream of the affected area. This behaviour usually only occurs where shallow surface rock is present. The drainage lines within the continued underground mining area are generally steep and ephemeral with clayey/sandy beds with some rock boulders potentially forming flow controls. Lower reaches outside and downstream of the continued underground mining area are generally characterised by broad channels with alluvial soils. Although there is a possibility, as discussed in the EA, of sub-surface fracturing causing stream capture and subsequent re-emergence in downstream reaches, based on the soil landscapes and geology of the area this is considered unlikely.

As outlined in Section 3.5.4 of the Surface Water Assessment, a comprehensive monitoring regime will be implemented to monitor drainage lines for potential subsidence impacts.

The proposed monitoring and remediation protocols are consistent with the existing monitoring strategies used on site and will be included in the new SMP or equivalent process for the continued underground mining area to ensure that surface water impacts are minimised. Further discussion on procedures to minimise vegetation clearance associated with this work is provided later in this section.

In our submission of 17 June 2010 on adequacy of the Draft EA, DECCW raised these same issues and requested serious consideration be given to avoiding undermining areas with low depth of cover under streams. These recommendations were not adopted by the proponent.

Detailed discussion on this issue is also provided in the response to the NOW submission in **Section 2.1**. Direct connection between the surface and the underground workings has the highest potential to occur in areas of low depth of cover (i.e. <70 metres) to the seam. The potential for direct hydraulic connection to the surface, due to sub-surface fracturing, is considered possible between 70 metres and 100 metres depth of cover. However direct connection to the surface is unlikely to occur where cover depths are greater than 100 metres.

As outlined in the EA, significant modifications to the mine plan have been made to minimise potential impact on the low depth of cover areas in the vicinity of Ryhope Creek, which were considered to have potential risk for connective cracking. The mine plan modifications avoided areas with a depth of cover of less than 70 metres and have resulted in the loss of approximately 2.4 Mt of coal resource. Areas of depth of cover between 70 and 100 metres, where cracking is considered possible, are located in discrete areas in the mining area. In areas where it is possible to potentially get interconnective cracking (i.e. depth of cover between 70 and 100 metres) there are steep longitudinal grades on the watercourses, relatively small upstream catchment areas and the program of monitoring and remediation proposed, will ensure interconnective cracking will capture surface flows only during storm events as the watercourses are ephemeral and for a short period of time (i.e. <3 months) as a result of monitoring and subsequent active or passive (i.e. self healing) remediation.

Furthermore, as all of the alluvial deposits within the predicted subsidence zone lie in regions with depths of cover greater than 100 metres it is considered that the potential for connective cracking between the surface alluvial areas and the underground workings will be unlikely.

The modification to the mine plan to address the low depth of cover issues, has been made following extensive consultation and with careful consideration to developing a mine plan which is both economically feasible but also sensitive to the surface features within the proposed continued underground mining area. WWC believes that these changes will ensure that future mining is able to be managed in such a way as to meet current community and environmental expectations.

2.2.2 Surface Water Impacts

The Environmental Assessment Requirements provided by DECCW noted that the EA must assess “the expected water quality of all proposed discharges assessed in accordance with the Guidelines for Fresh and Marine Water Quality (ANZECC 2000)”.

We also noted “DECCW is especially concerned with heavy metal and salt discharges from the premises. The concentrations of metals and salinity in discharge waters should be directly compared with those in the receiving waters and Lake Macquarie using the Guidelines for Fresh and Marine Water Quality (ANZECC 2000). All impacts on receiving waters should then be assessed.”

As discussed in Section 4.1.3 and Section 4.1.4 of the Surface Water Assessment, WWC currently transfers/disposes of water from site by three methods, as follows:

- effluent transfers to MCPP;
- licensed discharge point under EPL No. 1360 to Burkes Creek; and
- groundwater extraction under 20BL169793 and transfer to Westside Mine.

WWC has one licensed discharge point (EPA Point 2) under EPL No. 1360. The licensed discharge point (EPA Point 2) is currently only used for discharge of surplus site water runoff from the WWC pit top site. Prior to June 2008 surplus underground mine water was pumped to the surface at the pit top and also discharged via EPA Point 2 to Burkes Creek.

Since June 2008, surplus underground mine water is pumped via the Longwall 11 borehole to Westside Mine. This water is extracted from the underground operations under licence 20BL169793. This water is then discharged to Cockle Creek in accordance with the Westside EPL.

Water quality is monitored at EPA Point 2 discharge point (Drain A), and upstream of and downstream of the discharge point in Burkes Creek. Water quality is analysed monthly (during discharge) for pH, EC and TSS. Historical data for July 2006 to June 2008 indicates that pH and conductivity have historically been within the discharge limits (i.e. electrical conductivity (EC) <10,000 µS/cm, and pH between 6.5 to 9.0). There was one water quality exceedance at EPA Point 2 (i.e. Drain A) in August 2006, when 100 mg/L of total suspended solids (TSS) was recorded (licence limit of total suspended solids (TSS) <50 mg/L). This exceedance was the result of a significant rainfall event in the preceding days. This exceedance was reported to the Department of Environment and Conservation (DEC) (now DECCW) and in the 2006 AEMR.

In response to DECCW's request for further information on heavy metals, additional monitoring at the WWC pit top site was undertaken on a monthly basis from May 2009 to October 2009 to determine the levels of heavy metals in Burkes Creek. This additional monitoring has been undertaken at the request of DECCW and is part of a wider catchment investigation of the level of suspended solid, heavy metal and salt concentrations in mine water discharges to Lake Macquarie. During this period, WCC monitored arsenic, chromium, manganese, selenium and zinc upstream of the discharge location, downstream of the discharge location and in the discharge water (i.e. Drain A). A summary of the results of this monitoring are shown in **Table 2.4**.

Table 2.4 – Range in Surface Water Monitoring Results for Heavy Metals in Burkes Creek

Analyte	Burkes Creek Upstream (µg/L)	Drain A (µg/L)	Burkes Creek Downstream (µg/L)	ANZECC Guidelines ¹ (µg/L)
Arsenic	<5	<5	<5	24
Chromium	<5 to 7	<5 to 6	<5 to 7	1
Manganese	24 to 849	12 to 42	18 to 811	1900
Selenium	<5	<5	<5	5
Zinc	16 to 40	13 to 35	12 to 55	8

Note 1: ANZECC Trigger values for slightly to moderately disturbed systems (ANZECC, 2000).

The monitoring results for heavy metals in Burkes Creek indicate that:

- arsenic levels are below ANZECC (2000) guidelines and do not appear to be influenced by discharges from WWC;
- chromium levels are above ANZECC (2000) guidelines, however these levels do not appear to be influenced by discharges from WWC as the monitoring for all three locations is similar;
- manganese levels are below ANZECC (2000) guidelines and these levels appear to decrease downstream of the discharge point;
- selenium levels are within ANZECC (2000) guidelines and do not appear to be influenced by discharges from WWC; and
- zinc levels are above ANZECC (2000) guidelines, however these levels do not appear to be influenced by discharges from WWC as the levels recorded in the discharges from WWC as less than those recorded in the creek system.

The variations in the monitoring results are considered to be the result of natural fluctuations in water quality. In summary, the monitoring indicates discharges from the WWC pit top facility have not influenced heavy metal concentrations in Burkes Creek.

Surplus water from Westside Mine is discharged via two licensed discharge points to Burkes Creek and Cockle Creek. The primary discharge location is at EPA Point 16 to Cockle Creek approximately 300 metres upstream of the confluence of Cockle Creek and Diega Creek. At EPA Point 16, Westside Mine are licensed under EPL No. 4033 to discharge up to 14,000 kL/day (except when 5 day rainfall total exceeds 50 mm). Discharge limits at EPA Point 16 are similar to those at EPA Point 2 at WWC (except when 5 day rainfall total exceeds 50 mm) and include, pH between 6.5 and 8.0, TSS <50 mg/L and electrical conductivity is less than 10,000 μ S/cm. In addition, Westside EPL No. 4033 has an annual mass limit on total suspended solids of 10,400 kg.

Excess mine water is discharged from the underground via the borehole at Longwall 11 to Westside Mine. The water is then discharged via EPA Point 4 under the Westside Mine EPL. The Westside Mine EPL was varied in December 2009 to include heavy metal monitoring at EPA Point 4. In accordance with the EPL, monitoring is undertaken monthly during discharge events. The catchment upstream of Westside Mine is largely undeveloped except for minor rural residential holdings and transport corridors. Westside Mine is also located upstream of the residential and industrial areas of Barnsley, Edgeworth and Boolaroo.

Table 2.5 - Range in Surface Water Monitoring Results for Heavy Metals in Cockle Creek

Analyte	Cockle Creek Upstream (μ g/L)	Cockle Creek EPA Point 4 (μ g/L)	Cockle Creek Downstream (μ g/L)	ANZECC Guidelines ¹ (μ g/L)
Arsenic	10 to 720	3 to 20	<5 to 20	24
Chromium	<5 to 6	<5 to 16	<5 to 9	1
Manganese	-	27 to 345	-	1900
Selenium	<5 to 7	<5 to 20	5 to 53	5
Zinc	10 to 76	<5 to 80	14 to 66	8

The monitoring results for heavy metals at Westside Mine for Cockle Creek indicate that:

- arsenic levels are below ANZECC (2000) guidelines and do not appear to be influenced by discharges from Westside Mine;
- chromium levels are above ANZECC (2000) guidelines, however this is possibly due to the limit of the testing undertaken. These levels do not appear to be influenced by discharges from Westside Mine;
- manganese levels are below ANZECC (2000) guidelines and do not appear to be influenced by discharges from Westside Mine;
- selenium levels are within ANZECC (2000) guidelines and do not appear to be influenced by discharges from Westside Mine; and
- zinc levels are above ANZECC (2000) guidelines, however these levels do not appear to be influenced by discharges from Westside Mine as the levels recorded in the discharges from Westside Mine are below the ANZECC (2000) guidelines for all but one reading during October 2009 and are considerably lower than those recorded in the creek system.

In addition, the monitoring of heavy metals for the water extracted and discharged from the borehole at Longwall 11 indicates:

- levels for arsenic, manganese and selenium are all below ANZECC (2000) guidelines and are similar to the receiving waters of Cockle Creek;
- chromium levels in the water are recorded as <5 µg/L compared to ANZECC (2000) guidelines of 1 µg/L. These results are limited by the analysis methods;
- zinc levels in the water are all below ANZECC (2000) guidelines, except for one reading in October 2009.

WWC proposes to continue to include monitoring of heavy metals in discharge and receiving waters as part of the future surface water and groundwater monitoring programs.

WWC proposes to continue to discharge surplus groundwater via the borehole at Longwall 11 and Westside Mine. When Westside Mine enters its closure phase it is anticipated that the WWC and Westside Mine EPL may be consolidated.

As such all discharges from WWC will continue in the future to be licensed under an EPL. In addition, WWC proposes to include a program for monitoring of heavy metals in the Water Management Plan.

Both DECCW's Environmental Assessment Requirements and our submission on adequacy dated 17 June 2010 requested inclusion of a detailed Water Management Plan providing cumulative water balance modelling and assessment incorporating:

- **Maximum on-site reuse of wastewater together with adequate water storages to minimise discharge of pollutants from the premises at all times; and**
- **Details of all measures employed to minimise all water discharges from the premises at all times.**

A predictive water balance model for the Project was developed based on the model developed for the existing water balance. WWC has a water surplus prior to discharge and

transfer, with surplus water being generated within the underground workings and the surface facilities at the WWC pit top. As outlined in the EA, WWC are undertaking investigations to maximise on-site water reuse of wastewater and reduce the discharges of saline mine water to freshwater streams in the region.

WWC have committed to the preparation and implementation of a detailed Water Management Plan. Commitment 6.6.1 from the EA is reproduced below.

- 6.6.1 Within 12 months of project approval, WWC will submit for the approval of the Director General an updated Water Management Plan for the Project. The Plan will be prepared in consultation with NOW and will include a Surface Water Monitoring Program, Groundwater Monitoring Program, Sediment and Erosion Control Plan and Subsidence Remediation Monitoring Program.

The Water Management Plan would include all management and mitigation measures outlined in the EA. The Water Management Plan would also include detailed water balance modelling including the onsite reuse of wastewater.

It is noted that DECCW has proposed that the Water Management Plan be prepared for the Project as part of the EA. WWC is an existing operation, currently operating under an existing Water Management Plan. Furthermore, WWC has committed to preparing a Water Management Plan for the Project. DECCW has previously been provided the existing Water Management Plan to review as part of a review of the WWC EPL. While the EPL was amended to include heavy metal monitoring, DECCW did not provide any comment on the existing Water Management Plan during the review process. It is suggested that the preparation of the Water Management Plan for the Project be conditioned as part of the Project Approval. Any condition should allow WWC to prepare the Water Management Plan and submit in an appropriate timeframe after determination.

The final EA provides a description of the existing water management regime and proposes to transfer some water to the Metromix Quarry but DECCW does not consider this is likely to result in a net reduction of discharged waters.

In December 2000, DEC (now DECCW) added a Pollution Reduction Program (PRP) requirement to EPL No. 4033. The PRP was subsequently removed from the EPL in 2004. The aim of the PRP was to reduce the discharge of saline mine water to freshwater streams in the region, including Cockle Creek and Burkes Creek. In response to the PRP, WWC has undertaken detailed investigations into mine water management.

As a result of these investigations WWC is proposing to transfer excess mine water to Metromix Quarries, located on Rhondda Road at Teralba. Metromix propose to use the transferred mine water as process water which will result in a reduction in the combined water discharged into the Lake Macquarie catchment from WWC and Metromix.

A Development Application has been approved by LMCC for the construction of the transfer pipeline and discussions are currently being held with DECCW, Coal and Allied, Westside Mine and Metromix to determine the licensing arrangements for the transfer.

The reuse strategy of Metromix is complementary to the strategy being proposed by WWC to increase water reuse onsite, which will therefore reduce potable water consumption. Any reductions in discharges obtained through the reuse of water by Metromix will therefore be in addition to any savings made through water reuse by WWC, with a net effect of reducing the total discharge of water from WWC.

Surplus water from Westside Mine is discharged via two licensed discharge points to Burkes Creek and Cockle Creek. The primary discharge location is at EPA Point 16 to Cockle Creek

approximately 300 metres upstream of the confluence of Cockle Creek and Diega Creek. At EPA Point 16, Westside Mine are licensed under EPL No. 4033 to discharge up to 14,000 kL/day (except when 5 day rainfall total exceeds 50 mm). Discharge limits at EPA Point 16 are similar to those at EPA Point 2 at WWC (except when 5 day rainfall total exceeds 50 mm) and include, pH between 6.5 and 8.0, TSS <50 mg/L and electrical conductivity is less than 10,000 µS/cm. In addition, Westside EPL No. 4033 has an annual mass limit on total suspended solids of 10,400 kg.

WWC propose to continue to discharge surplus groundwater via the borehole at Longwall 11 and Westside Mine. When Westside Mine enters their closure phase it is anticipated that the WWC and Westside Mine EPL may be consolidated.

As such all discharges from WWC will continue in the future to be licensed under an EPL. In addition, WWC proposes to include a program for monitoring of heavy metals in the Water Management Plan.

The magnitude of any reduction in discharge volumes will be determined by monitoring in accordance with the discharge licence.

The EA also proposes future investigations into shandying mine and potable water sources for on-site re-use and desktop investigations into salt concentrations. While these proposals are supported they fall short of the detailed Water Management Plan requested by DECCW. Accordingly, DECCW is unable to determine if the mine will operate in accordance with best management practices for coal mines in NSW.

In response to requests by DECCW and in accordance with Xstrata's environmental goals under the XCN sustainability program, WWC has also undertaken detailed investigations into options for reducing the use of potable water and discharge to Cockle Creek. The majority of the potable water demand on site is for process water in the underground mining operation. The water in the underground operations is used at the longwall (approximately 75 per cent), for longwall emulsions (approximately 4 per cent) and for development units and dust suppression (approximately 21 per cent).

WWC are currently assessing an option to reduce the volume of potable water used on site by shandying potable water with mine water for re-use on site. To date, WWC has reviewed the available data for underground mining water used at other Xstrata operations and has determined, based on electrical conductivity data that the most appropriate mixing percentage would be approximately 40/60 mine water to potable water. As a result, WWC has determined that shandying mine water to potable water is potentially sustainable.

As outlined in Section 5.5.2.1 of the EA, WWC has committed to completing a series of investigations within 12 months of the Project Approval, including:

- a more detailed desktop investigation of the various salt concentrations at other Xstrata operations and relevance to WWC;
- trialling shandying percentages based on the more detailed investigations of salts; and
- determining the most appropriate shandying percentage taking into consideration potential water quality impacts on the life and maintenance of the underground mining equipment.

Additionally, the optimal water re-use strategy confirmed by the investigations will be implemented within two years of Project Approval. If the investigations indicate that shandying potable water with mine water for re-use on site is not viable, WWC will

investigate the feasibility of other options for mine water treatment and re-use, e.g. reverse osmosis.

WWC has included these commitments in the Statement of Commitments provided in the EA, as produced below.

- 6.6.2 WWC will complete a series of investigations within 12 months of Project Approval, including:
- a more detailed desktop investigation of the various salt concentrations at other Xstrata operations and relevance to WWC;
 - trialling shandying percentages based on the more detailed investigations of salts; and
 - determining the most appropriate shandying percentage taking into consideration potential water quality impacts on the life and maintenance of the underground mining equipment.
- 6.6.3 The optimal water re-use strategy confirmed by the investigations will be implemented within two years of Project Approval. If the investigations indicate that shandying potable water with mine water for re-use on site is not viable, WWC will investigate the feasibility of other options for mine water treatment and re-use e.g. reverse osmosis.

The re-use of mine water as process water is also considered to reduce the volume of water that will be required to be discharged or transferred off site.

Since submitting the EA for exhibition, WWC have engaged a consulting engineering company to undertake feasibility/design work on the water re-use strategy. The water re-use project is a complicated, multifaceted program which will require considerable planning and infrastructure including pipelines, pumps, drainage and telemetry. Early feasibility studies indicate that the 40/60 mine water to potable water target may be achievable which would provide a significant reduction to WWC's potable water use. WWC are anticipating this project will be a multi-million dollar project (in the order of \$4-8 million), a significant water use efficiency project. Given the complexity of the water re-use project, and the lead time associated with these capital works, an implementation period of two years is considered warranted.

DECCW is concerned about loss of water from watercourses and increased minewater make as a result of hydraulic connection between surface and goaf. DECCW could not see a quantified reference to increased minewater make within the EA and notes with concern the potential for direct hydraulic connection between the surface and the coal seam in areas where mining occurs at depths between 70-100 m.

The subsidence assessment, undertaken for the EA by DGS, indicates that direct hydraulic connection to the surface due to sub-surface fracturing is considered possible between 70 metre and 100 metre depths of cover and unlikely where cover depths are greater than 100 metres. In areas with a depth of cover less than 100 metres a torturous pathway may be created through the overburden strata from the surface to the mining strata. When this occurs, there is potential that surface runoff may be provided with a torturous flow path from the surface to the underground mining operation. The result could be the potential capture of surface flows into the underground mining operation.

Although there is a possibility, as discussed in the EA, of sub-surface fracturing causing stream capture and subsequent re-emergence in downstream reaches, based on the soil landscapes and geology of the area this is considered unlikely.

As discussed in the EA, if cracking does occur through the surface soil layers this cracking may potentially be self healing as over time as it is likely that fine grained material will gradually fill surface cracks and reduce the hydraulic conductivity of immediate surface strata. Self healing of cracks has occurred previously after mining in the Northern domain and currently forms one of the remediation strategies used by WWC.

As outlined in **Section 2.1.1.2**, it is considered that in the areas where it is possible to potentially get interconnective cracking (i.e. depth of cover <100 metres) based on the steep longitudinal grade of the watercourses, the relatively small upstream catchment areas and the program of monitoring and remediation proposed, if interconnective cracking occurs it will capture surface flows only during storm events as the watercourses are ephemeral and for a short period of time (i.e. <3 months) as a result of monitoring and subsequent active or passive (i.e. self healing) remediation.

As all of the alluvial deposits within the predicted subsidence zone lie in regions with depths of cover greater than 100 metres it is considered that the potential for connective cracking between the surface and the underground workings will be unlikely.

As a consequence of the above, there is likely to be only minimal interconnective cracking and therefore the potential for the capture of surface water in the underground operation is limited. Whilst some of the mining area will have a depth of cover that may lead to connective cracking, the steep terrain, small catchment area and ephemeral nature of the streams in this area mean that the opportunity for streamflows to infiltrate into the underground workings is very limited.

As outlined in Section 3.5.4 of the Surface Water Assessment, a comprehensive monitoring regime will be implemented to monitor drainage lines for potential subsidence impacts.

The proposed monitoring and remediation protocols are consistent with the existing monitoring strategies used on site and will be included in the new SMP or equivalent process for the continued underground mining area to ensure that surface water impacts are minimised.

Given that the area of low depth of cover also occur almost entirely within government conservation reserve, the impacts caused by subsidence and potential subsequent impacts caused by remediation of subsidence (new access tracks construction etc), make undermining this area highly undesirable.

While there are no areas with a depth of cover less than 70 metres within the continued underground mining area, there are a few small areas of 70 metres to 100 metres depth of cover (84 hectares, representing less than 11% of the total mining area) within the continued underground mining area, as shown in **Figure 2.2**. As outlined previously, the areas of depth of cover between 70 and 100 metres, where cracking is considered possible, are located in discrete areas in the mining area.

As addressed earlier in this section, whilst some of the mining area will have a depth of cover that may lead to connective cracking, the steep terrain, small catchment area and ephemeral nature of the streams in this area mean that the opportunity for streamflows to infiltrate into the underground workings is very limited. Surface cracking within creek beds will be monitored as part of ongoing subsidence monitoring. In areas where surface cracking occurs, remediation works, including self healing mechanisms, surface tilling and grouting, will be undertaken to fill the cracks at the surface and limit potential ingress of surface runoff into the proposed underground mining operations. As any cracking will appear very rapidly on the surface after longwall mining, regular checking and resealing of in channel cracks will be undertaken. These progressive resealing works will significantly reduce the potential for loss of surface flows due to subsidence cracking.

Based on subsidence predictions and experience from previous mining at WWC, it is expected that subsidence remediation works will be limited to tracks, where there is a potential public risk. It is not expected that substantial subsidence remediation works will be required in areas of intact vegetation.

In the event that subsidence remediation within intact vegetation is required, it would be necessary to remove elements of the canopy, shrub and ground layers to allow for access for earthmoving machinery. The remediation of surface cracking within forest vegetation communities would be managed, however, to reduce the amount of vegetation that would be disturbed or removed as a result of earthworks. In order to achieve this, small earthmoving machinery would be used in these areas as much as possible. The use of small machinery will reduce the potential to require the clearing of small tree, shrub and other vegetation layers. It is considered unlikely that mature trees will need to be cleared to complete the required subsidence remediation; however, in the unlikely circumstances where it is required, clearing would be undertaken in accordance with WWC's detailed pre-clearance procedure.

The EA indicated high velocity flows in creeks as a result of the steep slopes of the Sugarloaf Range, as well as dispersive soils in bed and bank materials. DECCW notes from the EA the potential for increased erosion rates as a result of subsidence impacts.

As discussed in Section 2.3 of the Surface Water Assessment, the soil characteristics and site inspections indicate that the creek lines are potentially all subject to erosion with the potential for erosion being increased where vegetation cover is absent. The drainage lines in the predicted subsidence affectation zone range in condition, with some sections of drainage lines currently showing signs of significant erosion.

Modelling of potential changes in peak velocities was undertaken in the Surface Water Assessment (refer to Section 3.5.1). Modelling results indicate that the existing drainage lines are typically subject to velocities in the range of approximately 1.0 m/s to approximately 2.5 m/s during major storm events (i.e. a 100 year Average Recurrence Interval (ARI) storm event) and approximately 0.5 m/s to approximately 1.5 m/s during minor storm events (i.e. a 5 year ARI storm event). Velocities lower than 1.5 m/s to 2.3 m/s are typically non-scouring in vegetated channels. Some scouring and erosion may occur with higher velocities or when vegetative cover is absent.

As outlined in Section 3.5.1 of the Surface Water Assessment, post subsidence modelling indicates that the maximum predicted increases in velocities range up to approximately 0.3 m/s during the 5 year ARI storm event and up to approximately 0.34 m/s during the 100 year ARI storm event.

Modelling of the typical drainage line indicates that there will be some minor changes to the predicted post-mining velocities during both major and minor storm events with the landform changes as a result of the predicted subsidence. The modelling indicates that underground mining may result in some areas of erosion and deposition occurring within the drainage lines. However, the potential impacts that these modelled changes could have on the creek channels, based on the modelling, are expected to be minor.

DEECW is keen to ensure that erosion and sedimentation issues within the area are not exacerbated by this proposal but could not find within the EA proposed ameliorative/management measures (apart from inspections) to deal with increased erosion.

The EA needs to address actual erosion control measures that will be implemented should the inspection regime identify specified erosion occurring.

The erosion and sediment control measures that will be implemented to counter potential erosion and sediment impacts caused by mining will be undertaken in accordance with soil and water management techniques outlined in *Managing Urban Stormwater: Soils and Construction* (the Blue Book) Volume 1 (Landcom, 2004) and Volume 2 (DECC, 2008). As outlined in Section 5.5.4.2 of the EA, specific controls will include:

- ensuring the erosion and sediment controls are installed as a first step within the works program;
- limiting access tracks into works areas, including use of existing access tracks where possible;
- where disturbance is required ensure that the disturbance is minimal;
- construction and regular maintenance of sediment fences downslope of disturbed areas;
- applying gypsum, where required, to reduce the dispersibility of subsoils;
- prompt revegetation of disturbed areas; and
- where new access tracks are required, construction of these in accordance with *Guidelines for the planning, construction and maintenance of tracks* published by Department of Land and Water Conservation (1994), including:
 - construction of access tracks along the contour where possible (i.e. limit grade changes);
 - minimising disturbance of existing ground, e.g. where possible limiting works to slashing vegetation when constructing tracks;
 - limiting construction of access tracks across existing drainage lines;
 - maintaining vegetation buffers between access tracks and watercourses where possible;
 - ensuring tracks are free draining; and
 - including cross fall and outfall drainage, where required, to prevent concentration of runoff.

The Draft Guidelines for Management of Stream Systems in Coal Mining Developments, Hunter Valley (DWE, undated) recommends that remediation measures on impacted streams include:

- prevention of bed scouring and subsequent incision into the stream bed;
- stabilisation of the stream banks; and
- sealing of bed cracks and fractures.

Monitoring for evidence of subsidence induced scouring, bank instability and cracking is included as part of the ongoing monitoring program outlined in the EA (refer to Section 5.5.4.1 of the EA). If any of these issues are identified as a result of subsidence, proper remediation actions will be undertaken as per the recommendations contained in the Draft Guidelines. This may include:

- placing of rock armouring or rip-rap in sections of the streambed that are identified as being at increased risk of scouring and bank incisions;
- placing of rock bars to reduce the water velocity within the stream;
- prompt revegetation and rehabilitation of streambanks to prevent further erosion;
- sealing of cracks, where practicable, using methods approved by the DECCW and I&I NSW.

In addition, prior to the commencement of mining, the potential geomorphological response of each watercourse to mine subsidence will be reviewed using the guidelines included in *River Hydrology and Energy Relationships – Design Notes for the Mining Industry* (DWE, November 2007) (refer to Section 5.5.4.1 of the EA). This will include descriptions of the existing bed controls, and the estimation of changes to stream power due to subsidence which may induce additional erosion and channel instability. This review will highlight additional monitoring that may need to be included in the ongoing monitoring program, and identify specific areas that may require mitigation measures to prevent erosion and scouring to streambeds.

2.2.3 Noise Impacts

DECCW notes that the No.3 vent shaft and the mining services facility are proposed facilities, whilst all remaining noise sources are existing.

The No. 3 ventilation shaft is an existing infrastructure component of WWC established in 1999 (refer to **Figure 1.1** and **Plate 1**), which will continue to be used as part of the Project.

The Project has been designed to utilise the existing WWC infrastructure including the existing pit top facilities, Longwall 11 borehole facility, ballast borehole and No. 2 and No. 3 Vent shafts. Whilst no changes to this existing surface infrastructure are proposed as part of the Project, a new mining services facility, potential ventilation and minor borehole infrastructure are also proposed to be constructed, as described in Section 2.2.1 of the EA.

DECCW would require the implementation of an effective Noise Management Plan to reduce noise emissions down to the criteria over time.

As outlined in Section 5.7.5 of the EA, WWC has committed to a number of mitigation measures to reduce noise emissions from the Project. Commitment 6.8.3 in the EA, states that WWC will develop and implement a Noise Monitoring Program for the approval of the Director General. In response to DECCW's request, WWC propose to amend this commitment to prepare a Noise Management Plan, which would include noise monitoring protocols. The Noise Management Plan will also include attended noise monitoring to assess compliance with the PSNLs. The following changes are proposed in order to meet DECCW's request:

6.8.1 Within 12 months of project approval, WWC will submit for the approval of the Director General a Noise Management Plan for the Project. The Plan will:

- (a) describe the noise mitigation measures that would be implemented to ensure compliance with relevant conditions of approval; and
- (b) will include a Noise Monitoring Program that:



PLATE 1
No.3 Vent Shaft

- includes attended monitoring to assess compliance with the Project Specific Noise Levels; and
- Includes a protocol for determining exceedances of the relevant conditions of approval.

The EA predicts that noise from Vent Shaft No 2 operating at its current 30% capacity would exceed the PSNL by up to 7dB(A) during the night time at receiver R7, located close be at Barnsley. This issue therefore needs to be resolved by one of the following options:

- a) Further noise remediation measures be proposed be the proponent so the PSNL can be complied with at receiver R7 under meteorological conditions as per the Industrial Noise Policy; or**
- b) Consent condition be inserted requiring a negotiated agreement between the proponent and the R7 landowner.**

As indicated in the Noise Impact Assessment, the current operation of the No. 2 Vent Fan exceeds the target PSNLs at the closest receiver location R7. The magnitude of the exceedance in the single residential receiver (R7) adjacent to the No. 2 Vent Fan, is up to 7 dB under the worst case meteorological conditions.

In order to achieve the target PSNLs at receiver location R7, it will be necessary to implement a range of noise mitigation controls to reduce the noise levels generated by the fan. The selection and implementation of noise mitigation controls will be dependent on the future operational requirement of No. 2 Vent Fan and performance of the vent fan against the target PSNLs at location in the surrounding region.

Since the EA was submitted, WWC have negotiated a private agreement with the impacted resident. If there is a requirement to increase the current capacity of Vent Fan No.2, WWC will renegotiate the private agreement.

Since the EA was submitted, WWC has engaged a noise attenuation consultant to maintain and upgrade current noise attenuation devices at the No. 2 Vent Fan. The attenuation upgrades are expected to reduce noise generated from the No. 2 Vent Fan.

Noise associated with the construction of the mining services facility should have been assessed against a criteria derived from background plus 5dB(A) under the Industrial Noise Policy, however the EA has derived construction criteria from the now-outdated Chapter 171 of the Environmental Noise Control Manual.

The DECCW recognises that construction activities associated with the Mining Services Facility could potentially generate higher noise levels than those of the actual operation. The INP (DECCW, 2000) does not cover construction activities and the Interim Construction Noise Guideline (DECCW, 2009) does not cover construction activities associated with mining developments. Historically Section 171 of the *Environmental Noise Control Manual* (ENCM) EPA, 1994 was used to assess construction noise levels. For a construction program that would take between 4 to 26 weeks the expectation was that the LA10, 15 minute construction noise levels would be less than the background LA90 noise levels plus 10 dB. For construction activities that take longer than 26 weeks the expectation was that the LA10, 15 minute construction noise levels would be less than the background LA90 noise levels plus 5 dB.

The expectation of the *Interim Construction Noise Guideline* (DECCW, 2009) is that the LAeq, 15 minute construction noise levels would be less than the background LA90 noise levels plus 5 dB. Application of the INP intrusiveness model would also suggest the LAeq, 15 minute construction noise levels should be less than the background LA90 noise levels plus 5 dB.

In lieu of clear guidelines regarding mining related construction activities, the ENCM (EPA, 1994) was used to assess construction noise levels for the proposed Mining Services Facility. The predicted noise impacts for the construction phase of the proposed Mining Services Facility activities indicated the LA_{10, 15 minute} construction noise levels would be less than 30 dB(A) under calm and adverse weather conditions. The suggested noise criteria was a LA_{eq, 15 minute} of 55 dB(A).

If the *Interim Construction Noise Guideline* (DECCW 2009) was used for the assessment of the construction phase of the proposed Mining Services Facility the criteria would have been a LA_{eq, 15 minute} of 50 dB(A). The predicted noise impacts for the construction phase of the proposed Mining Services Facility activities of less than 30 dBA and are well below this criteria.

If the INP (DECCW, 2000) intrusiveness criteria was used for the assessment of the construction phase of the proposed Mining Services Facility the criteria would have been a LA_{eq, 15 minute} of 50 dB(A). The predicted noise impacts for the construction phase of the proposed Mining Services Facility activities of less than 30 dBA are well below this criteria.

As noted above, in lieu of clear guidance from DECCW and DoP regarding mining related construction activities, the Noise Impact Assessment for the Project assessed the construction noise levels for the proposed Mining Services Facility based on the ENCM (EPA, 1994). Because the predicted noise impacts for the construction phase of the mining services facility activities are well below criteria that could be derived from the ENCM (EPA, 1994), the *Interim Construction Noise Guideline* (DECCW 2009) and INP (DECCW, 2000) intrusiveness criteria the Noise Impact Assessment did not seek to clarify the conflicting advice from DECCW and DoP regarding the assessment of construction noise levels from mining related activities. In this case, the Project can meet all guideline levels irrespective of which is applied.

2.2.4 Threatened Species and Biodiversity

2.2.4.1 Flora and Fauna Surveys

Section 3.5 of the EA indicates that the fauna survey was undertaken 'generally' in accordance with DECCW's guidelines. DECCW requests clarification of how our guidelines were met, for both flora and fauna, in accordance with the DECCW's survey guidelines.

DECCW requests that, given the significance of the site as a State Conservation Area, the surface ponding impacts noted in Section 5.2.2 and Figure 5.2 of the EA, as well as clearing and ongoing subsidence related impacts, the proponent clarify how the guidelines have, or have not been met, in relation to flora and fauna surveys.

A detailed survey methodology was designed and completed in order to gain a thorough understanding of the ecological features of the continued underground mining area. The methods include a detailed literature review of relevant reports and vegetation mapping, as well as searches of relevant ecological databases. Information gathered from the literature reviews and database searches was then used to design a field survey program to survey and map vegetation communities, and to target threatened species, endangered populations, TECs, and their habitats.

Reference was made to the relevant DECCW flora and fauna survey guidelines when designing the field survey, with appropriate survey methodologies selected that maximised the opportunities of identifying the full suite of flora and fauna species (and vegetation communities) that occur within the project area.

Table 2.6 summarises the survey effort undertaken during flora and fauna surveys within the project area. Vegetation mapping has been undertaken previously within the SCA by Bell and Driscoll (2009). The vegetation mapping undertaken for the Project built upon the existing mapping. The combination of semi-quantitative plots based surveys and meander transects targeting threatened species and delineating vegetation community boundaries is considered sufficient to map the vegetation communities occurring within the project area that were not mapped as part of the SCA vegetation mapping (Bell and Driscoll 2009) and to ground truth the previous vegetation mapping of the SCA. Fauna surveys resulted in the identification of a total of 112 vertebrate fauna species within the continued underground mining area, comprising 33 mammal species, 68 bird species, five reptile species and six amphibian species. This diversity of fauna species demonstrates the adequacy of the fauna surveys undertaken.

Table 2.6 - Adequacy of Survey Effort with respect to DECCW Guidelines

	Survey Effort Employed in EA	Adequacy of survey effort with respect to DECCW Guidelines
Vegetation and Threatened Flora Species Survey		
Vegetation Quadrats	30 vegetation quadrats	Adequate
Vegetation Transects	11 transects	Adequate
Fauna Survey		
Diurnal Birds	8 x 2 hectare surveys for one person hour each; and 17 x 20 minutes additional surveys. 13.6 person hours total survey effort	Adequate
Nocturnal Birds, Mammals and Reptiles	11 nocturnal call playback sessions; 10 x 2 hectare surveys totalling 20 person hour walking spotlighting; 15 kilometres additional driving spotlighting; and 2 kilometres additional walking spotlighting.	Adequate
Small Mammal Trapping	368 trap nights using Elliot 'A' traps; 360 trap nights using Elliot 'B' traps; and 1400 nights of hair funnels.	Adequate
Large Mammal trapping	60 trap nights using wire cage traps.	Less than guideline level of 72 trap nights
Arboreal Mammal Trapping	160 trap nights using Elliot 'B' traps; and 560 nights of hair funnels.	Adequate
Micro-bat Surveys	12 Anabat echolocation surveys totalling 24 nights; and 7 harp trap surveys totalling 14 nights.	Adequate
Diurnal Herpetological Surveys	8 x 2 hectare search areas lasting one person hour; and 17 x 20 minute additional surveys. 13.6 person hours total survey effort	Adequate
Fauna Habitat Assessment	25 habitat assessments	Adequate

Table 2.6 - Adequacy of Survey Effort with respect to DECCW Guidelines (cont)

	Survey Effort Employed in EA	Adequacy of survey effort with respect to DECCW Guidelines
SEPP 44 Koala Habitat Assessment	30 SEPP 44 koala habitat assessments	Adequate
Aquatic Assessment	10 creekline transects	Adequate

The surveys conducted in the project area are considered to adequately meet the requirements set out in the flora and fauna guidelines, with the exception of the survey effort recommended for cage trapping. The DECCW Guideline recommends that a minimum of 72 cage trap nights are employed while surveys of the project area utilised data gained through the employing of 60 trap nights. Cage trapping specifically targets the presence of the threatened spotted-tailed quoll (*Dasyurus maculatus*) as this species was previously recorded in the project area and expected to range across all habitats within the project area, additional trapping beyond 60 trap nights was not considered necessary to determine its presence in the area, i.e. it was known to occur and the assessment assumed this was the case.

2.2.4.2 Threatened Species Assessment

Based on DECCWs '*Atlas of NSW Wildlife*' database, DECCW also notes the following additional species which have been recorded on the subject site, or on lands with similar habitat immediately adjacent (within 2 km radius) to the direct impact areas: *Angophora inopina*, *Cryptostylis hunteriana*, *Callistemon linearifolius* and Brown Treepcreeper. DECCW is of the opinion that these species should also be assessed in any threatened species assessment, including appropriate targeted surveying, which must be conducted in accordance with DECCW guidelines.

Each of the species identified above were included in the threatened species assessment as they were recorded within 10km of the project area (refer to Appendix 6 of the EA). All threatened flora species known or considered likely to occur in the local area were appropriately targeted during flora surveys, in accordance with DECCW guidelines, as described in Section 3.3.2 of the Ecology Assessment.

Flora surveys were undertaken between 8 and 12 December 2008, 20 and 23 January 2009 and 4 March 2009. The locations of the flora survey sites are identified on Figure 3.1 of the Ecology Assessment. The vegetation mapping of the Sugarloaf SCA (Bell and Driscoll 2009) (that covered most of the continued underground mining area), was ground-truthed during December 2009. This ground-truthing was completed via the conduct of rapid assessment points.

Vegetation mapping of the SCA by Bell and Driscoll (2009) included the sampling and analysis of 1469 Rapid Data Points and 68 systematic flora plots while an additional 30 systematic vegetation quadrats and 9.5 kilometres of targeted threatened flora transects were sampled by Umwelt during the EA flora surveys. The objectives of these threatened flora transects were to:

- search for threatened flora species and their habitats;
- assist in the delineation of vegetation communities;

- enable greater coverage of the continued underground mining area than would be achieved by plot-based sampling alone; and
- contribute to floristic knowledge of the continued underground mining area.

Comprehensive surveys of the floristic composition of the project area has been undertaken by Bell and Driscoll (2009) and Umwelt. Targeted threatened flora transects and systematic plot surveys over a variety of seasons failed to identify the presence of *Angophora inopina*, *Cryptostylis hunteriana* or *Callistemon linearifolius*.

While *Angophora inopina*, *Cryptostylis hunteriana* and *Callistemon linearifolius* were not recorded in the project area, potential habitat for each species was identified and the species' were included in the assessment of threatened species detailed in Appendix A of the Ecology Assessment. Considering the minimal disturbance to the continued underground mining area, the Ecology Assessment determined there is no potential impact on these species.

With respect to the brown tree creeper (eastern subsp) (*Climacteris picumnus victoriae*), the threatened species assessment in Appendix A of the Ecology Report included an assessment of this species. The brown tree creeper has been recorded on the NSW Atlas of NSW Wildlife, approximately one kilometre to the west of the project area, associated with the dryer environments on the western slopes of the Watagan Mountains. The species' preference for drier forests, woodlands and scrubs with fallen branches; river red gums on watercourses and around lake-shores; paddocks with standing dead timber; and margins of denser wooded areas; without a dense understorey makes the habitats of the project area marginal and therefore unlikely to provide a significant area of habitat for this species. Comprehensive diurnal bird surveys were undertaken in the project area, specifically targeting all threatened bird species known to occur in the local area, and the species was not identified.

The threatened species assessment (Appendix A of the Ecology Assessment) concludes that considering the minimal disturbance to the continued underground mining area, there is no potential for an impact on the brown tree creeper in the Project area.

With respect to *Cryptostylis hunteriana*, this species can only be confirmed/detected when flowering, and as such, DECCW recommends that appropriate targeted surveying be conducted during November, which appears to be the dominant flowering period for the Central Coast populations.

It is noted that targeted threatened flora species transects were not undertaken during the most appropriate timeframe for the identification of *Cryptostylis hunteriana*. As such, a precautionary approach to the likelihood of the species occurring in the project area was taken and the species was considered as potentially occurring in the Continued Underground Mining Area (refer to Section 4.3.1 and Table 4.2 of the Ecology Assessment).

As outlined in Section 4.3.1 of the Ecology Assessment, *Cryptostylis hunteriana* was not recorded during surveys for the Project or by extensive surveys undertaken by Bell and Driscoll (2009). *Cryptostylis hunteriana* was recorded on the NSW Atlas of NSW Wildlife, approximately 500 metres to the south-east of the project area. While this species has not been recorded in the continued underground mining area, it was assessed for its potential to occur in the continued underground mining area, based on its known distribution and habitat requirements. Considering the minimal disturbance to the continued underground mining area, there is no potential for an impact on this species.

As the species has been considered as potentially occurring in the project area and assessed as such, additional surveys of the project area within November are not considered necessary.

WWC will undertake ecological monitoring within the continued underground mining area which will build upon the existing ecological monitoring program. In the event that further threatened species are identified within the monitoring locations the monitoring program will incorporate surveys to adequately assess and monitor these species, where appropriate. This will include targeted seasonal surveys in addition to regular monitoring, where appropriate.

2.2.4.3 Clearing Vegetation

It is stated that 0.5 hectares of disturbed land adjacent to the F3 Freeway and Wakefield Road will be removed for construction of proposed mining services facility. It is unclear whether the disturbed area contains any intact native vegetation, what condition it is in and whether or not it represents potential habitat for threatened species.

The proposed Mining Services Facility is proposed to be constructed on land owned by LMCC. The site has been previously disturbed by the construction of both Wakefield Road and the F3 Freeway. The site is currently composed of disturbed areas adjacent to Wakefield Road and some re-growth vegetation.

Disturbed areas, including the location of the proposed mining services facility, are described in Section 4.2.16 of the Ecology Assessment. Disturbed Areas represent areas that have been previously cleared, and are dominated by a mixture of weed species and native species. Areas mapped as disturbed do not represent naturally occurring vegetation communities and do not contain intact native vegetation. Disturbed Areas are considered to be in very poor condition due to such influencing factors as edge effects, removal of native vegetation, weed infestations, rubbish dumping and proximity to infrastructure such as powerline easements and roads.

Species located within the proposed Mining Services Facility included the weed species lantana (*Lantana camara*), purpletop (*Verbena bonariensis*), cobblers pegs (*Bidens pilosa*) and fleabane (*Conyza* sp.), with native species of adjacent intact vegetation communities occurring.

Due to the highly disturbed and poor condition of the disturbed areas, the proposed Mining Services Facility is not expected to provide habitat for the range of threatened flora and fauna species known to occur in the vicinity of the project area.

The clearing associated with ancillary infrastructure, such as ventilation shafts and associated access tracks and power lines described in section 5.2.3, has not been quantified. Based on the proponents mining activities within the surrounding area, DECCW considers that the clearing required to construct and operate these facilities could be estimated.

A range of potential other minor ancillary mining infrastructure will be required above the continued underground mining area including access tracks, service boreholes and gas drainage and flaring facilities. The exact location and number of these minor facilities will be determined as the project progresses, depending on operational needs, coal seam gas make, geological conditions, safety considerations and other mining and environmental variables. The final locations will be determined as part of the detailed mine planning process for each set of panels and will be included in the Mining Operations Plan (MOP), or equivalent, and SMP provided to I&I NSW prior to their construction.

As outlined in Section 5.11.2 of the Ecology Assessment, It may be necessary to disturb some areas of native vegetation for the construction of these surface facilities. Where this is unavoidable, areas containing significant ecological features such as known threatened species habitat, or hollow-bearing trees will be avoided. Where it will be necessary to disturb areas of native vegetation for these types of infrastructure, the following due diligence processes will be implemented:

- due-diligence inspections will be completed by a suitably qualified ecologist to identify any significant ecological features at identified potential infrastructure sites and to advise of any required management and mitigation measures;
- disturbance to native vegetation communities will be limited to the minimum area required;
- areas of known ecological significance will be avoided where possible (that is, areas containing known records of threatened species, endangered populations and TECs. Hollow-bearing trees should be retained, where possible);
- appropriate disturbance setbacks to known or identified significant ecological features will be established where possible; and
- pre-clearance surveys of any sites containing hollow-bearing trees or significant habitat features.

Due diligence inspections will ensure that only the minimum area required for surface infrastructure developments will be cleared and that flora and fauna species (including threatened species), will not be significantly impacted.

As discussed, WWC are unable to confirm the exact location or number of these minor facilities as it is dependent on a number of factors which may not be confirmed until mining progresses through the continued underground mining area. If required, we note that the proposed ventilation infrastructure is in the form of ventilation using boreholes and does not require the extent of infrastructure associated with the existing upcast shaft (i.e. No. 3 Vent Shaft, discussed in **Section 2.2.3** and shown on **Plate 1**). As discussed in the EA, these activities are located in an area that offers the opportunity to minimise disturbance, not all groundwater is removed and large trees are not felled, and sensitive vegetation is protected, where practicable. The size and configuration of potential ventilation downcast boreholes would be similar to current exploration borehole sites, including associated access tracks of a similar nature.

Remediation works may require vegetation disturbance described as the removal of elements of the canopy, shrub and ground layers to allow access for earthmoving machinery. Again, the EA fails to quantify the impact and utilise the precautionary approach by including these impacts in the overall potential vegetation loss from the proposal.

Based on subsidence predictions and experience from previous mining at WWC, it is expected that subsidence remediation works will be limited to tracks, where there is a potential public risk. It is not expected that subsidence remediation works will generally be required in areas of intact vegetation.

In the event that subsidence remediation within intact vegetation is required, it would be necessary to remove elements of the canopy, shrub and ground layers to allow for access for earthmoving machinery. The remediation of surface cracking within forest vegetation communities would be managed, however, to reduce the amount of vegetation that would be

disturbed or removed as a result of earthworks. In order to achieve this, small earthmoving machinery would be used in these areas as much as possible. The use of small machinery will reduce the potential to require the clearing of small tree, shrub and other vegetation layers. It is considered unlikely that mature trees will need to be cleared to complete the required subsidence remediation; however, in the unlikely circumstances where it is required, clearing would be undertaken in accordance with WWCs detailed pre-clearance procedure.

In forest areas, shrub and ground layers will be the items that would be most significantly impacted by remediation activities. Regular monitoring of remediated woodland areas will be required to ensure that the shrub and ground layers regenerate from the soil seed bank following subsidence remediation works. WWC will assist the revegetation of these sites through the planting of native shrub and ground cover species if natural regeneration process are not successful. Species selection will be undertaken to ensure the long term viability of the revegetation works and the preservation of the floristic diversity within this vegetation formation.

In the event that cracks are observed, options for remediation works will be assessed and implemented. The exact location of the potential subsidence cracks cannot be accurately determined at this stage and therefore a detailed management process is outlined in Section 5.3.4 of the EA.

In the event that unpredicted, adverse impacts on ecological values are identified during management and monitoring of the continued underground mining area, WWC will respond to the issues identified. WWC will investigate appropriate remediation and mitigation requirements, in consultation with the relevant government authorities and in the event that significant impacts on identified ecological values are identified and cannot be adequately remediated, WWC will engage a suitably qualified and experienced ecologist to prepare a Biodiversity Offset Strategy in consultation with DECCW and DoP.

A copy of the proponents detailed pre-clearance procedure was not provided within the documentation and therefore DECCW cannot assess its adequacy.

A copy of the WWC pre-clearance procedure is provided in **Appendix 3**.

2.2.4.4 Impacts on Riparian Vegetation

DECCW has photographic evidence of previous impacts of subsidence within Diega Creek resulting in subsequent loss of the riparian vegetation as a result of ponding. These impacts need to be recognised by the proponent with adequate offsets proposed to mitigate this loss.

WWC undermined section of Diega Creek in Longwalls 21 to 26, 29 and 30 from 1994 to 2004. Mine subsidence in the previously undermined area resulted in a change of gradient Diega Creek. The change in the stream gradient resulted in a process of levelling through bed erosion, to re-establish equilibrium of the bed level. This natural process occurs in the majority of ephemeral streams, such as Burkes Creek and Cockle Creek to the north of Diega Creek.

The tributaries of Diega Creek are ephemeral and only flow for short periods following rainfall. Regular pools of permanent or semi-permanent water are present in the reaches downstream of the continued underground mining area, which have previously been undermined.

Subsidence induced surface cracking has previously occurred in the vicinity of Diega Creek. Throughout 2007, above rainfall was recorded. The groundwater levels in the Diega Creek monitoring bores during 2007 increased, indicating that lower groundwater levels previously

recorded within Diega Creek were related to below average rainfall for the proceeding years and not due to any significant, long-term impact from the mining. There is no evidence to indicate a hydraulic connection between the surface and the mine workings.

WWC has undertaken several management measures with respect to potential mining impacts affecting Diega Creek in consultation with the relevant stakeholders. These management measures have included:

- ongoing consultation with the local community and relevant government agencies;
- surface cracking remediation works;
- funding and assistance for the development of a Rivercare Plan;
- fencing of the riparian corridor to exclude livestock;
- extensive native vegetation planting of the riparian zone (undertaken by local landcare group);
- surveys of creek centrelines to define sediment levels and creek gradients;
- the installation of groundwater monitoring bores; and
- the provision of rainfall and groundwater monitoring data to landowners.

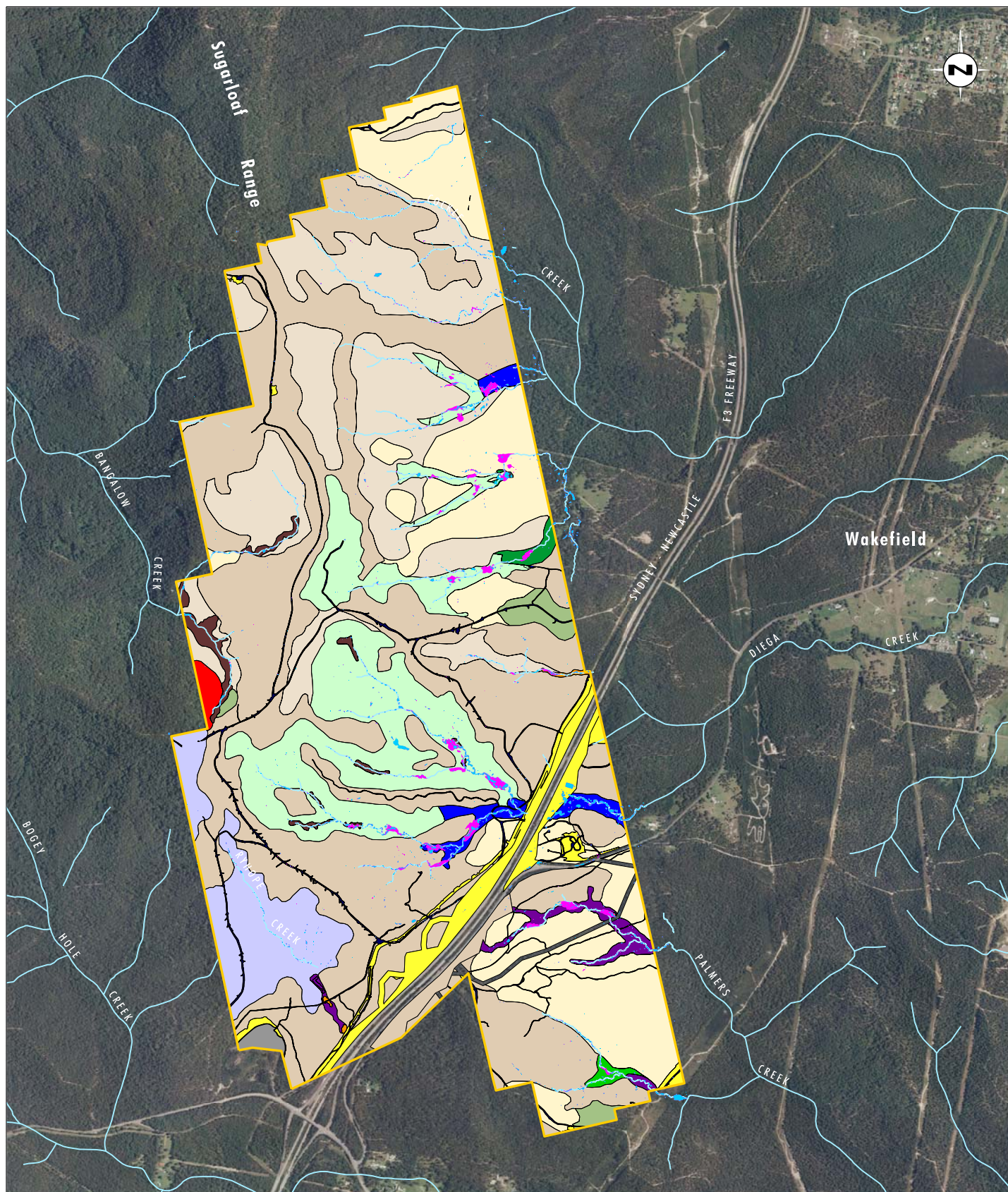
The loss of riparian vegetation along Diega Creek cannot be solely attributed to the impacts resulting from mine subsidence. Whilst subsidence is a contributing factor, it should be considered in conjunction with other factors such as poor land use practices. Through the management measures implemented by WWC, there has been a demonstrated improvement in the health of the riparian system.

DECCW requests that the proponent clearly describes the actual (maximum) loss of vegetation predicted for the project and clearly specifies where, and what, vegetation types/habitats will be removed and/or adversely affected.

Assessment of vegetation communities to be impacted has concluded that approximately 1.8 hectares of Alluvial Tall Moist Forest EEC occurs within the predicted surface water ponding impact zone (refer to **Figure 2.4**), as well as 0.45 hectares of Swamp Mahogany Paperbark Forest. These communities are not expected to be significantly impacted however, as the community is adapted to 'wet' conditions and the ponding is expected to be of short duration only due to natural seepage and evaporation.

As suggested by DoP, WWC propose to offset potential ponding impacts on Alluvial Tall Moist Forest EEC and Swamp Mahogany Paperbark Forest through targeted stream remediation projects, determined in consultation with DECCW, to remediate/revegetate equivalent areas of riparian vegetation in other sections of degraded streams in the SCA.

As the exact nature of the impacts on vegetation and threatened species as a result of the project are unknown prior to mining it is not possible to prepare a suitable Biodiversity Offset package prior to mining. It is not possible to state what vegetation communities and habitats will be affected until the location of ancillary infrastructure is known or until potential subsidence impacts are identified. The EA includes strong and clear commitments to the minimisation of impacts on vegetation communities and threatened species and includes a Due Diligence process that is designed to identify adverse impacts on ecological values as a result of mining. The Due Diligence process includes the provision for the determination of



Source: OCAL - Aerial Photograph
LPI - Drainage Lines
Bell & Driscoll 2009 - Vegetation Communities

0 0.5 1.0 1.5 km
1:30 000

Legend

- | | | |
|-----------------------------------|---|---|
| Continued Underground Mining Area | Coastal Foothills Spotted Gum-Ironbark Forest | Sugarloaf Uplands Smooth-barked Apple Forest |
| Drainage Line | Coastal Ranges Dry Blackbutt Forest | Sugarloaf Uplands Dry Spotted Gum-Ironbark Forest |
| Alluvial Tall Moist Forest | Coastal Ranges Mesic Peppermint Forest | Pre-mining Ponding |
| Cleared Land | Coastal Warm Temperate Rainforest | Post-mining Ponding |
| Disturbed - Regrowth | Freemans Peppermint-Apple-Bloodwood Forest | |
| Swamp Mahogany-Paperbark Forest | Hunter Valley Moist Spotted Gum-Ironbark Forest | |
| Coastal Wet Gully Forest | Regenerating Freemans Peppermint-Apple-Bloodwood Forest | |
| Mesic Paperbark Thicket | Riparian Paperbark-Peppermint Forest | |

File Name (A4): R13_V1/2553_412.dgn

FIGURE 2.4

**Vegetation Communities and
Potential Ponding within the
Continued Underground Mining area**

appropriate Biodiversity Offsets, in consultation with DECCW and DoP, in the event of unpredicted, adverse impacts.

2.2.4.5 Subsidence Impacts

In order for DECCW to assess whether or not previous ecological studies are adequate with respect to our guidelines, DECCW requires copies of all the ecological monitoring reports used/cited in the EA.

The previous ecological monitoring reports used and/or cited will be provided to DECCW. These reports include:

- Umwelt (Australia) Pty Limited (2005). West Wallsend Colliery Biodiversity Monitoring Report – 2005. Report prepared for Oceanic Coal Australia Limited.
- Umwelt (Australia) Pty Limited (2006). West Wallsend Colliery Biodiversity Monitoring Report – 2006. Report prepared for Oceanic Coal Australia Limited.
- Umwelt (2006a) Review of Environmental Factors for the Western Domain, West Wallsend Colliery, December 2006. Prepared for Oceanic Coal Australia Limited.
- Umwelt (2006b) Hydrology and Ecology Assessment for the Western Domain, West Wallsend Colliery (December 2006). Prepared for Oceanic Coal Australia Limited.
- Umwelt (2006c) Hydrology, Ecology and Archaeology Assessment for the Southern Domain, West Wallsend Colliery (December 2006). Prepared for Oceanic Coal Australia Limited.
- Umwelt (Australia) Pty Limited (2007). West Wallsend Colliery Biodiversity Monitoring Report – 2007. Report prepared for Oceanic Coal Australia Limited.
- Umwelt 2008. West Wallsend Colliery Biodiversity Monitoring Report - 2008. Unpublished report prepared for Oceanic Coal Australia Limited.
- Bell, S.A.J. & Driscoll, C. (2006) Vegetation Mapping of Watagans National Park and Jilliby State Conservation Area. Summary Report to Parks & Wildlife Division, Department of Environment and Conservation. January 2006.
- Bell, S. & Driscoll, C. (2008a) Vegetation Mapping of Lake Macquarie LGA: Stage 1 – Wyee to Cooranbong. Unpublished Draft report and map to Lake Macquarie City Council.
- Bell, S. & Driscoll, C. (2008b) Revised Vegetation Mapping of Wyong LGA: Stage 1 – West of F3 Freeway. Unpublished report and map to Wyong Shire Council.
- Bell, S.A.J. & Driscoll, C. (2009) Vegetation and Floristics of Sugarloaf State Conservation Area, Lake Macquarie, New South Wales. Unpublished Draft report and map for the Department of Environment, Climate Change and Water.

Indirect subsidence impacts (other than ponding) cannot be quantified at this stage, however, in conjunction with the vegetation removal required for ancillary infrastructure DECCW considers that compensatory mechanisms should be provided prior to commencement of the continued operations in order to mitigate these impacts.

Surface cracking may occur as a result of mine subsidence from the extraction of the longwall panels. Surface cracking has the potential to impact upon a range of surface features, both natural and built.

Remediation of surface cracks will be required above the continued underground mining area, mainly in publicly accessible areas. The surface cracks, which will be identified during the subsidence inspections, will be remediated where a significant risk to public safety exists, typically on access tracks within the SSCA.

The remediation will be undertaken in accordance with the existing PSSMP and Subsidence Crack Remediation procedure. Typically the remediation involves the backfilling with inert fill and compaction of the affected area. The remediation of surface cracking within forest vegetation communities would be managed, however, to reduce the amount of vegetation that would be disturbed or removed as a result of earthworks. In order to achieve this, small earthmoving machinery would be used in these areas as much as possible. The use of small machinery will reduce the potential to require the clearing of small tree, shrub and other vegetation layers. Furthermore appropriate rehabilitation strategies, including the use of endemic species and erosion/sediment control measures will be employed in the remediation works, where necessary.

As stated in Section 5.11.2 of the Ecology Assessment, in the event that unpredicted, adverse impacts on ecological values are identified during management and monitoring of the continued underground mining area, WWC will respond to the issues identified and engage appropriate experts where required. WWC will investigate appropriate remediation and mitigation requirements, in consultation with the relevant government authorities and in the event that significant impacts on identified ecological values are identified and cannot be adequately remediated, WWC will engage a suitably qualified and experienced ecologist to prepare a Biodiversity Offset Strategy in consultation with DECCW and DoP. Given that such areas are likely to be minor in area, it is proposed that rather than focussing on land base offsetting, this strategy could focus on 'in kind' offsetting by remediation or rehabilitation of equivalent areas of disturbed or poor condition vegetation within the SCA.

It is acknowledged in the EA that surface deformation will lead to ponding and flooding of EECs. This may adversely impact on sensitive communities, groundwater dependent ecosystems and associated threatened species habitat.

The surface water assessment has identified locations where there is a potential for surface water ponding to occur. In these areas, the potential surface ponding is expected to be confined to the existing channels and no out-of-channel ponding is expected as a result of the predicted subsidence. Ponding is expected to disperse through evaporation and seepage, however periods of extended ponding may occur during wet periods.

An assessment of the impact of ponding in vegetation communities has concluded that approximately 1.8 hectares of Alluvial Tall Moist Forest EEC occurs within the surface water ponding impact zone and approximately 0.45 hectares Swamp Mahogany Paperbark Forest (refer to **Figure 2.4**).

Due to the expected containment of ponding to the existing stream channels, surface water impacts on vegetation communities and fauna habitats are expected to be minimal. In channel environments where there is a higher potential of in-channel ponding occurring (refer

to **Figure 2.4**), the channels mainly comprise sandy beds with limited in-stream vegetation due to the ephemeral nature of the drainage lines. Riparian vegetation is well adapted to periods of extended wetting, and changes to the structural or floristic diversity of riparian communities as a result of in-channel ponding are not expected. Riparian vegetation has not been shown to be significantly impacted by minor changes to the ponding regime of drainage lines within the northern domain (Umwelt 2006; 2007;2009), and similarly, habitats within the western and southern domains are not expected to be substantially affected due to predicted minor changes in surface water ponding.

These results indicate that it is unlikely that the project will result in a significant negative impact on the identified GDEs: Alluvial Tall Moist Forest EEC; Swamp Mahogany Paperbark Forest EEC; and Riparian Paperbark Peppermint Forest.

Any remediation works required to rectify surface water ponding is not expected to be substantial based on previous experience at WWC. Due to the limited remediation works undertaken as part of the existing operations, any future remediation works are expected to also be limited in extent and be able to be undertaken either by hand or small earthmoving equipment, e.g. bobcat, in accessible areas. As such, the remediation works are not likely to significantly impact on the occurrence of riparian or aquatic vegetation within the predicted subsidence affectation zone or in downstream creeklines.

Surface tilt may lead to accelerated stream bed or stream bank erosion, and the loss of riparian habitats, such as pools and riffles, which are important features for threatened species.

Accelerated erosion may lead to increased water pollution, turbidity and loss of water quality which may also affect long-term suitability as habitat. Stream bank erosion may result in physical damage to riparian EECs and groundwater dependent ecosystems.

The tributaries within the continued underground mining area are typically ephemeral creek systems with flows only occurring in the creeks during storm events or after prolonged rainfall, however regular pools of permanent or semi-permanent water are present in the downstream reaches of most of the tributaries. There are several drainage lines within the predicted subsidence affectation zone. As indicated Section 3.5 of the Surface Water Assessment, the drainage lines occurring within the predicted subsidence affectation zone are first and second order.

As discussed in Section 2.3 of the Surface Water Assessment, the soil characteristics and site inspections indicate that the creek lines are potentially all subject to erosion with the potential for erosion being increased where vegetation cover is absent. The drainage lines in the predicted subsidence affectation zone range in condition with some sections of drainage lines currently showing signs of significant erosion.

Modelling of potential changes in peak velocities was undertaken in the Surface Water Assessment (refer to Section 3.5.1). Modelling results indicate that the drainage lines are typically subject to velocities in the range of approximately 1.0 m/s to approximately 2.5 m/s during major storm events (i.e. a 100 year Average Recurrence Interval (ARI) storm event) and approximately 0.5 m/s to approximately 1.5 m/s during minor storm events (i.e. a 5 year ARI storm event). Velocities lower than 1.5 m/s to 2.3 m/s are typically non-scouring in vegetated channels. Some scouring and erosion may occur with higher velocities or when vegetative cover is absent.

Modelling of the typical drainage line indicates that there will be some minor changes to the predicted post-mining velocities during both major and minor storm events with the landform changes as a result of the predicted subsidence. The modelling indicates that underground

mining may result in some areas of erosion and deposition occurring within the drainage lines. However, the potential impacts that these modelled changes could have on the creek channels, based on the modelling, are expected to be minor.

A comprehensive monitoring regime will be implemented to monitor drainage lines for potential subsidence impacts. The proposed monitoring and remediation protocols are consistent with the existing monitoring strategies used on site and will be included in the new SMP or equivalent process for the continued underground mining area to ensure that surface water impacts are minimised. The monitoring and remediation procedures may include but not be limited to:

- visual inspection and recording (including photographic records at least every 50 metres) of stream bed and bank condition and riparian vegetation along the second order drainage line, including collection of baseline data and monitoring during and post mining operations;
- monitoring of geomorphological response of each watercourse to the predicted subsidence, as follows:
 - prior to mining review the potential geomorphological response of each watercourse to the predicted subsidence using the guidelines included in *River Hydrology and Energy Relationships – Design Notes for the Mining Industry* published by Department of Water and Energy (November 2007) and the methods described below;
 - for each watercourse within the continued underground mining area:
 - describe the existing (i.e. pre-mining) watercourse characteristics including bed controls using approaches outlined in AUSRIVAS (Australian River Assessment System);
 - calculate the stream power for the existing and predicted subsidence conditions;
 - determine threshold limits of stream power for incision and bed load deflation, taking into consideration existing stream stability, surface and substrate soil conditions and stream grades;
 - refine the detailed monitoring program, including monitoring of:
 - any bed control points;
 - areas where subsidence may increase the stream power above the determined threshold limits potentially causing channel erosion/instability;
 - monitoring may include long section and cross section surveys, photographic records and/or methods outlined in AUSRIVAS;
 - investigate and implement any remediation required to mitigate potential impacts of changes in stream power as a result of underground mining activities;
 - during and post mining, monitor watercourses, in accordance with the detailed monitoring program.

2.2.4.6 Adequate Provision of Offsets/Compensatory Habitat

DECCW notes that any vegetation removal as a result of remediation works will require offsetting.

As stated in Section 5.11.2 of the Ecology Assessment, in the event that unpredicted, adverse impacts on ecological values are identified during management and monitoring of the continued underground mining area, WWC will respond to the issues identified and engage appropriate experts where required. WWC will investigate all appropriate

remediation and mitigation requirements, in consultation with the relevant government authorities and in the event that significant impacts on identified ecological values are identified and cannot be adequately remediated, WWC will engage a suitably qualified and experienced ecologist to prepare a Biodiversity Offset Strategy in consultation with DECCW and DoP. As noted in **Section 2.2.4.5**, given that such areas are likely to be minor in area, it is proposed that rather than focussing on land base offsetting, this strategy could focus on 'in kind' offsetting by remediation or rehabilitation of equivalent areas of disturbed or poor condition vegetation within the SCA.

Furthermore, in the instances where adequate surveys are not undertaken to determine absence/presence of threatened species, DECCW would expect a precautionary approach be adopted and appropriate offset/compensatory habitat measures are provided.

As previously stated, a precautionary approach to the likelihood of species occurring in the project area was taken as part of the Ecology Assessment. As such, in some instances species were considered as potentially occurring in the Continued Underground Mining Area without being recorded in the project area previously. As particular species have been considered as potentially occurring in the project area they have subsequently been assessed as such.

If, during the Due Diligence process outlined above, adequate surveys for threatened species cannot be undertaken due to seasonal or timing limitations, a precautionary approach to the presence/absence of threatened species will be undertaken. The Due Diligence process will determine the requirement for appropriate offset / compensatory habitat measures and WWC will engage a suitably qualified and experienced ecologist to prepare a Biodiversity Offset Strategy in consultation with DECCW and DoP.

Offsets aimed at mitigating vegetation loss are required up front and need to be identified and assessed in the EA.

Offsets will require the proponent to consider adequate conservation in perpetuity, appropriate management regimes, and financial security with respect to ongoing management.

As the exact nature of the impacts on vegetation and threatened species as a result of the project are unknown prior to mining it is not possible to prepare a suitable Biodiversity Offset package prior mining. The EA includes strong and clear commitments to the minimisation of impacts on vegetation communities and threatened species and includes a Due Diligence process that is designed to identify adverse impacts on ecological values as a result of mining. The Due Diligence process includes the provision for the determination of appropriate Biodiversity Offsets, in consultation with DECCW and DoP, in the event of unpredicted, adverse impacts.

Due to the level of disturbance, WWC is not proposing to provide a land based offset. As predictable vegetation loss will be associated with potential ponding impacts, WWC are proposing to undertake creek remediation within the SSCA. WWC will either undertake these works in consultation with the DECCW/NPWS or provide funding for the works to be undertaken. WWC believe that undertaking such works would be more beneficial than providing a land based offset for the potential ponding impacts associated with the Project.

As stated above, in the event that unpredicted, adverse impacts on ecological values are identified during management and monitoring of the continued underground mining area, WWC will respond to the issues identified and engage appropriate experts where required. WWC will investigate all appropriate remediation and mitigation requirements, in consultation with the relevant government authorities and in the event that significant impacts on the

ecological values of the SCA are identified and cannot be adequately remediated, WWC will engage a suitably qualified and experienced ecologist to prepare a Biodiversity Offset Strategy in consultation with DECCW and DoP.

Section 2.2 of the EA states that Palmers Creek will not be undermined. However, many other Figures and sections of the EA clearly show proposed longwall mining beneath Palmers Creek.

As discussed in Section 2.4.4 of the Surface Water Assessment, Palmers Creek is a fifth order (category 3) stream and two first order tributaries and one second order tributary flow in a south-easterly direction above the Southern domain within the predicted subsidence affectation zone (refer to **Figure 2.1**). The main channel of Palmers Creek will not be undermined as part of the continued underground mining operations. The Palmers Creek tributaries proposed to be undermined are ephemeral and only flow for short periods following rainfall, however some pools of semi-permanent water are present in the reaches downstream of the predicted subsidence affectation zone.

2.2.5 Aboriginal Cultural Heritage

DECCW notes that the mining proposal will potentially impact on an area that is exceptionally rich and significant in Aboriginal cultural heritage (ACH) values within SSCA. Therefore, DECCW supports the request from the Aboriginal community for further investigations of the ACH values to fully inform the consent authority of the significance of the area prior to determination.

A comprehensive Aboriginal cultural heritage and archaeological assessment was undertaken for the Project in consultation with five registered Aboriginal stakeholder groups. The Aboriginal stakeholder groups involved were Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC), Awabakal Local Aboriginal Land Council (ALALC), Awabakal Traditional Owners Aboriginal Corporation (ATOAC), Cacatua Cultural Consultants (CCC) and Koompahtoo Local Aboriginal Land Council (KLALC). KLALC closed towards the end of the consultation program and New South Wales Aboriginal Land Council (NSWALC) took on the responsibility of the KLALC area during the closing stages of the EA before handing that responsibility on to ALALC. All consultation in relation to the former KLALC area is now to be undertaken with ALALC.

The principal aims of the Aboriginal cultural heritage assessment were to identify and record the Aboriginal cultural heritage and archaeological values of the continued underground mining area and to assess the significance and any potential impacts of the proposal on these values. The Aboriginal stakeholder groups were involved in all facets of the assessment including consultation during development of the survey strategy and participation in field survey, site identification and recording and provision of advice to WWC which was taken into account in the early mine planning stage. Of importance, the registered Aboriginal stakeholders had extensive involvement in the preparation of the assessment report. Numerous meetings were held with the Aboriginal stakeholder groups during the report preparation process. At the request of the Aboriginal stakeholders, these were held with the individual groups, separately, resulting in more than 13 full days of detailed face to face consultation and very valuable contribution from the groups to the writing of the text of the cultural heritage assessment, with the statements of cultural values and feedback from the groups on all aspects of the assessment incorporated directly into the report, in their own words.

Overall the continued underground mining area and the identified landscape features and Aboriginal archaeological sites it contains were assessed as having high to extremely high Aboriginal cultural significance, archaeological significance varying from low to moderate to high and moderate to high archaeological research potential. WWC acknowledges the

Aboriginal cultural and archaeological significance/research potential of the Sugarloaf State Conservation Area (SSCA) and the broader Sugarloaf Range area. The assessment by the Aboriginal stakeholders of the cultural significance of particular sites and landscape features and to a lesser extent the archaeological values drove substantial changes to the mine plan and the development of a very comprehensive cultural heritage offset program.

Of initial concern in relation to the DECCW submission was that it stated that WWC must undertake 'further investigation of the Aboriginal Cultural Heritage values to fully inform the consent authority of the significance of the area prior to determination'.

As discussed in the meeting with DECCW and DoP on 6 October 2010, WWC is proposing to provide an additional commitment to undertake further Aboriginal Cultural Heritage value investigations after determination. As expressed at the meeting, the process of undertaking further investigations of Aboriginal Cultural Heritage values would of necessity be a very lengthy process better undertaken over a number of years, rather than over a short period time 'prior to determination'. It is therefore, proposed that WWC will enter into consultation with the registered Aboriginal stakeholders in relation to a culturally appropriate manner in which to proceed with the Aboriginal Cultural Heritage values investigations that is agreeable to and endorsed by all four registered Aboriginal stakeholder groups.

WWC understands that it may be necessary to afford each of the groups the opportunity to drive and participate in a separate Aboriginal Cultural Heritage investigation of their choice or in a component of a combined investigation. WWC believes it will be necessary for there to be a person involved that facilitates this process that is not a member/affiliated with of any of the registered Aboriginal stakeholder groups. The scope of work for the facilitator will be to ensure the project retains momentum and that an outcome is achieved that is satisfactory to the DECCW and that it is hoped is of great value to the Awabakal and Aboriginal and non-Indigenous community.

WWC commits to undertaking consultation with the registered Aboriginal stakeholders in relation to the form the Aboriginal Cultural Heritage values investigation may take.

In conclusion, WWC will commit to the provision of funding to a total of up to \$250,000 for further Aboriginal Cultural Heritage values investigations. The specific nature of the investigation will be subject of further consultation with the registered Aboriginal stakeholders and endorsement by the DECCW.

Statement of Commitments 6.10.5

DECCW recommends the commitment to provide the registered stakeholders with further offset packages be clarified, in consultation with all registered stakeholders, prior to project approval.

It is suggested that this comment can be addressed through a more detailed description of the commitments already made by WWC to each of the groups and can be incorporated into a more acceptable package to the registered Aboriginal stakeholders with the addition of the commitment to the provision of funding for the additional Aboriginal Cultural Heritage investigations.

Based on Aboriginal cultural and archaeological significance and potential subsidence impacts, WWC has developed a multi-faceted management strategy for the Project, including the following in relation to sites and landscape features of very high to extremely high cultural significance:

- undertaking significant mine plan modifications to protect several sites of extremely high Aboriginal cultural significance. The modifications were made following consultation with the registered Aboriginal stakeholders in order to protect two grinding groove sites of extremely high Aboriginal cultural and high archaeological significance (Palmers Creek Grinding Grooves 1 #38-4-1007 and 2), an artefact scatter associated with a wet soak of very high to extremely high Aboriginal cultural and low to moderate archaeological significance (Western Domain 5 - #38-4-0993 - wet soak with artefact scatter site) and four landscape features of high to extremely high Aboriginal cultural value (a stone arch and three rockshelter sites). The mine plan changes also reduced the level of predicted impact to a third grinding groove site of extremely high Aboriginal cultural and high archaeological significance (Palmers Creek Grinding Grooves 3). These mine plan changes have resulted in the sterilisation of approximately 2 million tonnes of coal resource;
- provision of \$200,000 over the life of the project to assist in the management of Aboriginal cultural and archaeological sites/values within the SSCA and which will provide for greater participation of the registered Aboriginal stakeholders in that management;
- in consultation with the Aboriginal stakeholders developing a program of monitoring and reporting of subsidence impacts on landscape features of Aboriginal cultural value and Aboriginal archaeological sites;
- if monitoring finds that at least three of the Diega Creek Grinding Groove sites 2 through 6 do not suffer from impacts that cause cracking of the sandstone within the area of the sandstone platform containing the grooves and within 1 metre of any groove, WWC will be able to go ahead with subsidence of Diega Creek Grinding Grooves 1. If this is not possible because 3 or more of the Diega Creek Grinding Grooves 2 to 6 sites have cracked within the specified site area, WWC will commit to protecting Diega Creek Grinding Grooves 1 from damage related to subsidence;
- funding a program of additional survey within the SSCA in consultation with the registered Aboriginal stakeholders and the NPWS/DECCW, in order to be able to demonstrate Intergenerational Equity in relation to the seven Bangalow Creek Grinding Groove sites. If further survey cannot demonstrate that similar sites can be conserved elsewhere, WWC will commit to protecting the Bangalow Creek Grinding Grooves sites from damage related to subsidence;
- providing each of the registered stakeholders additional stakeholder requested offset packages to the value of \$25,000 for funding towards specific cultural heritage projects that were proposed by these groups as part of the EA process; and
- preparation of an Aboriginal Cultural Heritage Management Plan (ACHMP) for the project that is consistent with the Aboriginal cultural and archaeological management commitments made in the *Aboriginal Cultural heritage and Archaeological Assessment West Wallsend Colliery Continued Operations Project* report and the Submissions to DoP.

2.2.6 Air Impact Assessment

DECCW also assessed air issues and agrees with the EA that predicted suspended particulate concentrations and dust deposition levels from the project would comply with relevant DECCW air quality goals at all affected receivers. It is considered that impacts and appropriate monitoring can be adequately managed by implementation of appropriate conditions of consent, or additions to Environmental Protection Licence 1360.

WWC anticipate that the Project, if approved, would be required to meet the relevant air quality goals, as outlined in **Table 2.7**.

Table 2.7 - DECCW Assessment Criteria for Particulate Matter Concentrations

Pollutant	Standard/Goal	Averaging Period	Agency	Goal Type
Deposited dust	4 g/m ² /month	Annual mean	DECCW	Cumulative
Total suspended particulate matter (TSP)	90 µg/m ³	Annual mean	National Health & Medical Research Council	Cumulative
Particulate matter <10 µm (PM ₁₀)	50 µg/m ³	24-hour maximum	DECCW	Project Specific
	30 µg/m ³	Annual mean	DECCW long-term reporting goal	Cumulative
	50 µg/m ³	(24-hour average, 5 exceedances permitted per year)	National Environment Protection Council	Project Specific

The results of the air quality assessment have identified that the Project will meet the relevant air quality criteria at all residential receiver locations. The dust emissions from the Project are relatively small due to coal production being sourced from underground operations.

As outlined in Section 5.6.5 of the EA, WWC will continue dust deposition monitoring at existing stations located at WWC, and within Barnsley and Killingworth for the life of the Project to track changes in on-site and ambient dust deposition rates against the goals outlined in **Table 2.7**. WWC will also undertake 24-hour PM₁₀ monitoring for the life of the Project using the existing PM₁₀ HVAS monitor at Wakefield.

2.2.7 DECCW Recommended Conditions of Approval

Noise Management Plans

The proponent must prepare and implement an Operational Noise and Vibration Management Plan that covers all premises based on activities and transport operations. The plan must include but need not be limited to:

- (a) Copy of the Project Noise Impact Assessment;
- (b) Copy of the Project Approval under which the development operations;
- (c) All measures necessary to satisfy the limits in L6.1 at all times;

- (d) A system that allows for periodic assessment of Best Management Practice (BMP) and Best Available Technology Economically Achievable (BATEA) that has the potential to reduce noise levels from the facility to not exceed the PSNL;
- (e) Effective implementation of identified BMP and BATEA measures, where considered feasible and reasonable;
- (f) Measures to monitor noise performance and respond to complaints;
- (g) Measures for community consultation including site contact details;
- (h) Noise monitoring and reporting procedures.

As stated in **Section 2.2.3**, WWC will commit to the preparation and implementation of a Noise Management Plan. It is noted, however, that the condition recommended by DECCW currently refers to an 'Operation Noise and Vibration Management Plan'. WWC operates an underground mining operation and does not currently conduct any blasting. It is suggested that Vibration be removed from the recommended condition.

Traffic Noise Management Strategy

A Traffic Noise Management Strategy (TNMS) must be developed by the proponent, prior to commencement of construction activities, to ensure that feasible and reasonable noise management strategies for vehicle movements associated with the construction of the mining services facility are identified and applied, that include but are not necessarily limited to the following:

- **Driver training to ensure that noise practices such as the use of compression engine breaks are not unnecessarily used near sensitive receivers;**
- **Best noise practice in the selection and maintenance of vehicles fleets;**
- **Movement scheduling where practicable to reduce impacts during sensitive times of the day;**
- **Communication and management strategies for non licensee/proponent owned and operated vehicles to ensure the provision of the TNMS are implemented;**
- **A system of audited management practices that identifies non conformances, initiates and monitors corrective and preventative action (including disciplinary action for breaches of noise minimisation procedures) and assesses the implementation and improvement of the TNMS;**
- **Specific procedures for drivers to minimise impacts at identified sensitive receivers;**
- **Clauses in conditions of employment, or in contracts, of drivers that require adherence to the noise minimisation procedures and facilitate effective implementation of the disciplinary actions for breaches of the procedures.**

WWC have committed to the preparation of a Construction Traffic Management Plan. It is envisaged that the requirements outlined in the proposed Traffic Noise Management Strategy could be included in the Construction Traffic Management Plan.

Aboriginal Cultural Heritage Management Plan

The proponent shall develop an Aboriginal Cultural Heritage Management Plan (ACHMP) for the project prior to any works commencing. The ACHMP is to be developed, implemented and monitored in collective consultation with the registered Aboriginal stakeholders and DECCW National Parks and Wildlife Service (Sugarloaf State Conservation Area draft PoM). The plan must include procedures for ongoing Aboriginal consultation and involvement, management of any recorded sites within the project area, detail's of proposed mitigation and management strategies; including additional investigations (surface and sub-surface), salvage activities, monitoring, procedures for the identification and management of previously unrecorded sites (excluding human remains), identification and management of any proposed cultural heritage conservation area(s) and details of any long term management strategy for any Aboriginal objects salvaged through the development process.

WWC has committed to the preparation of an ACHMP for the project that is consistent with the Aboriginal cultural and archaeological management commitments made in the EA. The ACHMP will provide detailed management strategies for all identified Aboriginal archaeological sites and landscape features of Aboriginal cultural value located within the proposed continued underground mining area.

The ACHMP will also review and revise as required/where appropriate, Aboriginal heritage management protocols from previous consents and approvals, to provide WWC with a single, consolidated framework for managing Aboriginal cultural heritage (for details please refer to Appendix H of Appendix 12 of the EA). The ACHMP will also clearly identify the responsibilities of all parties involved: WWC, registered Aboriginal stakeholders, archaeologists, NPWS/DECCW; and designate timeframes for required Aboriginal heritage management works.

The ACHMP will be in operation throughout the life of the proposed continued underground mining project. The aim of the ACHMP is to ensure WWC meet the requirements of the Project Approval which is expected to include:

- details of the proposed implementation of, and methodology for, the conservation offset strategy;
- a detailed salvage program for Aboriginal archaeological sites within the proposed continued underground mining area including isolated finds, artefact scatters (if subsidence remediation works are required in the site areas) and the Cockle Creek Rockshelter with Artefacts and PAD;
- a detailed description of the mitigation measures that would be undertaken for all Aboriginal archaeological sites and landscape features of Aboriginal cultural value within the proposed continued underground mining area prior to and/or following subsidence;
- a detailed description of the measures that would be implemented to protect Aboriginal archaeological sites and landscape features of Aboriginal cultural value for the life of the project;
- a detailed methodology for inspection of locations proposed for surface ventilation infrastructure construction and future exploration boreholes;
- a description of the measures that would be implemented if any new Aboriginal sites/artefacts or skeletal remains are discovered during works associated with the Project;

- the provision of Aboriginal cultural awareness training for relevant WWC personnel and for contractors as part of the induction process; and
- a protocol for the ongoing consultation and involvement of the Aboriginal stakeholder groups and NPWS/DECCW in the conservation and management of Aboriginal cultural heritage within the proposed continued underground mining area.

Endorsement of the proposal for an ACHMP has been provided by the relevant registered Aboriginal stakeholders.

The condition proposed by the DECCW appears to be consistent with the commitments made by WWC in regards to the ACHMP. However, it is noted that DECCW has proposed that the ACHMP be prepared for the Project prior to any works commencing. WWC is an existing operation, currently operating under an approved SMP. It is suggested that the condition should allow WWC to prepare the ACHMP and submit in an appropriate timeframe after determination.

Given the expected detail required for the ACHMP and the extensive timeframe required for an appropriate level of consultation and involvement of the Aboriginal stakeholders it is suggested that within 12 months of project approval would be an appropriate timeframe.

2.3 Department of Industry and Investment

2.3.1 Mining Titles

I&I NSW understands that the proponent will submit a mining lease application for the proposed Mining Services Facility. I&I NSW supports the consolidation of existing mining titles where possible.

WWC currently holds Mining Leases (CCL 718, CCL 725 and ML 1451) over the entire continued underground mining area. A new surface mining lease will be required for the proposed Mining Services Facility.

WWC will consult with I&I NSW in regards to exploring opportunities to consolidate existing and required Mining Leases.

Following implementation of the Mining Amendment Act 2008 and Mining Regulation 2010, all existing sublease arrangements will become null and void. New sublease arrangements will have to be registered with the department.

WWC will register sublease arrangements with I&I NSW.

2.3.2 Rehabilitation

I&I NSW recommends that the following conditions be incorporated into the planning approval, if granted:

Rehabilitation Plan

The proponent must prepare and implement a Rehabilitation and Environmental Management Plan (REMP) to the satisfaction of the Director General I&I NSW. The REMP must:

- a. be prepared in accordance with I&I NSW guidelines and in consultation with relevant agencies and stakeholders;**
- b. be submitted and approved by the Director General I&I NSW prior to the commencement of construction;**

- c. address all aspects of rehabilitation and mine closure, including final landuse assessment, rehabilitation objectives, domain objectives, completion criteria and rehabilitation monitoring.

As discussed in Section 4.2.2 of the EA, WWC currently operates under an approved Mining Operations Plan (MOP) and Subsidence Management Plan (SMP) for the existing operations. WWC had committed to preparing and submitting to I&I NSW, new MOPs and SMPs, or any other future relevant management requirements under the Mining Act, as mining progresses WWC will need to meet the relevant requirements of I&I NSW and DoP.

2.3.3 Steep Slopes and Cliff Lines of the Sugarloaf Range

The proponent's subsidence impact assessment in the EA proposed a range of impact management strategies which are largely related to managing public safety and remediation of cracking. It is not clear as to whether the proposed management strategies can effectively manage the risk of slope stability impacts visible to the public.

As outlined in the Subsidence Assessment and Section 5.2.3.3 of the EA, the continued underground mining area in the Western Domain contains areas of steep slopes (15 to 30 degrees). The steep slopes are associated with the main Sugarloaf Range and the associated ridge spurs, predominantly across Longwalls 39 to 48, as shown in **Figure 2.5**.

Figure 2.5 shows that there are several low height cliffs (classified as >45 degrees) ranging from 2 metres to 15 metres in height. These cliffs are predominantly located on the north-easterly facing ridges of the main Sugarloaf Range.

Potential views of existing cliff lines within the continued underground mining area are generally restricted to sections of the F3 Freeway or long distance views. The visibility of the cliff lines within the continued underground mining area are predominantly shielded by the vegetation of the SSCA. The continued underground mining area lies beneath an expansive tract of native vegetation associated with the Sugarloaf Range linking the Watagan Mountains to Mount Sugarloaf. The views of the Sugarloaf Ranges that are generally seen from the F3 freeway, i.e. from the Newcastle Interchange heading south, are areas to the north of the continued underground mining area which will not be impacted by the Project.

The Subsidence Assessment identified potential impacts on cliff lines and steep slopes within the continued underground mining area, including:

- general slope instability (translational/rotational sliding) of cliff lines and steep slopes;
- local instability of cliff lines and steep slopes due to cracking, toppling failures and erosion; and
- rock fall movements from cliff lines and down slopes (falling, bouncing and rolling boulders) from cliffs and steep slopes.

The above impacts also occur due to natural weathering processes, however these effects may be accelerated by mine subsidence. It is considered that the potential for steep soil slope failure after mining would be 'High' for the predicted tilts, strains and cracks but may be reduced to 'Medium' potential overall, due to the high density of vegetation within the continued underground mining area. It has been suggested that there may be some public views available if slope failure was to occur, particularly from commuters on the F3 Freeway.

Due to the restricted potential for views associated with the cliff lines within the continued underground mining area, three representative viewing locations were selected for further

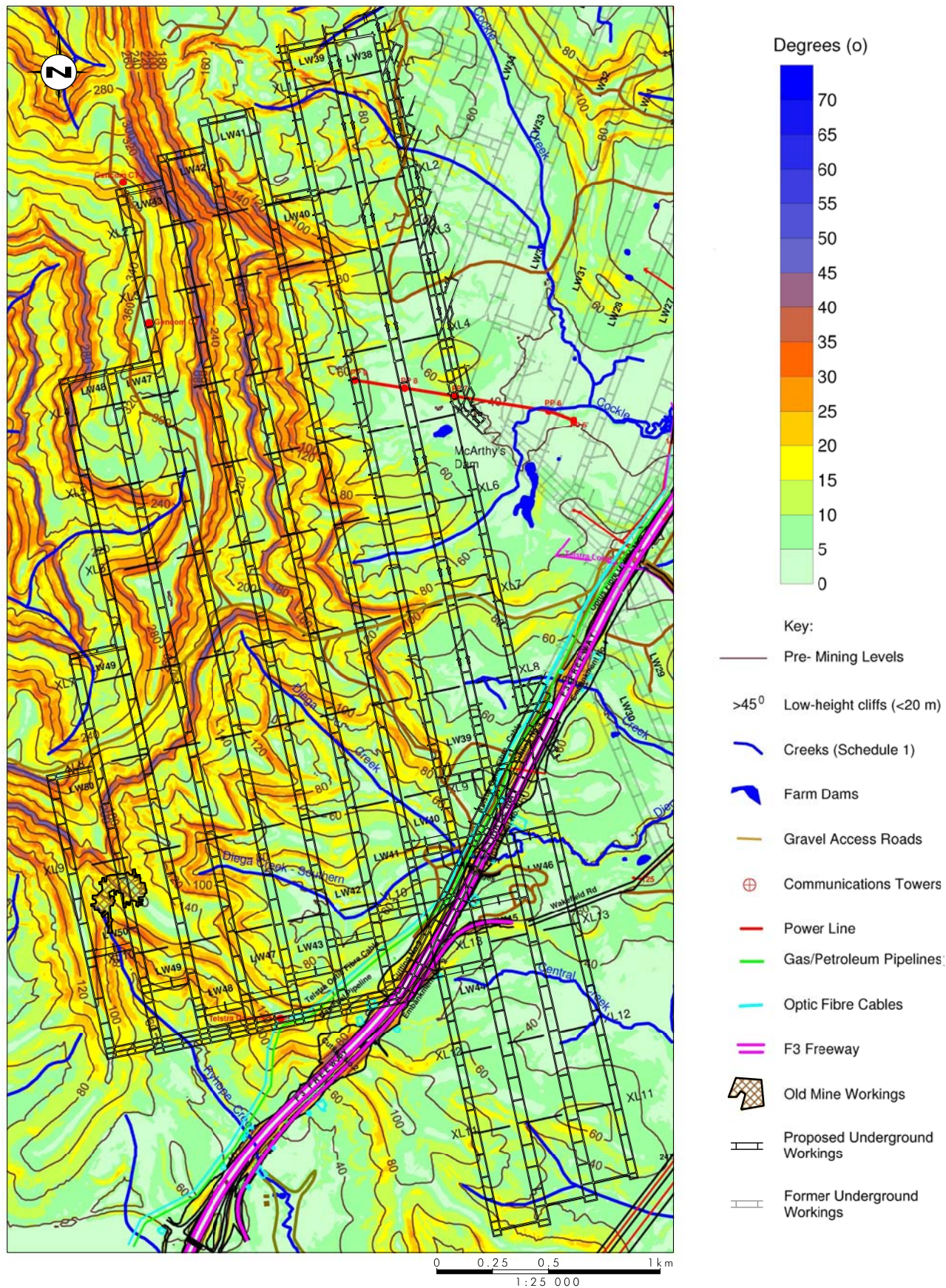


FIGURE 2.5

Pre-mining Surface Slopes within the
Continued Underground Mining Area

detailed visual assessment completed using transect analysis. The visual transect locations are shown in **Figure 2.6** and are briefly described as follows:

- Transect 1 – view from the F3 Freeway at the Burkes Creek crossing, approximately 3.5 kilometres north east from the cliff lines within the continued underground mining area;
- Transect 2 – view from the residential area of Killingworth, approximately 3.75 kilometres north east from cliff lines within the continued underground mining area; and
- Transect 3 – view from the F3 Freeway at the Cockle Creek crossing, approximately 2.5 metres east from the cliff lines within the continued underground mining area.

Figure 2.7 indicates that there would be some potential obscured views from the Burkes Creek Crossing along the F3 Freeway. If slope failure was to occur within the continued underground mining area it is anticipated that there would be negligible impact on the visual amenity to commuters of the F3 Freeway or visual receivers north east of the continued underground mining area. Any views from the F3 Freeway would be short in duration and consistent with the general visual amenity to road commuters.

As shown in **Figure 2.7**, cliff lines within the continued underground mining area are not visible from the residential area of Killingworth. Any potential views of the cliff lines from this location are shielded by vegetation and topography. If slope failure was to occur, it is anticipated that there would be negligible impact on the visual amenity to the visual receivers in Killingworth or other residential areas to the north east of the continued underground mining area.

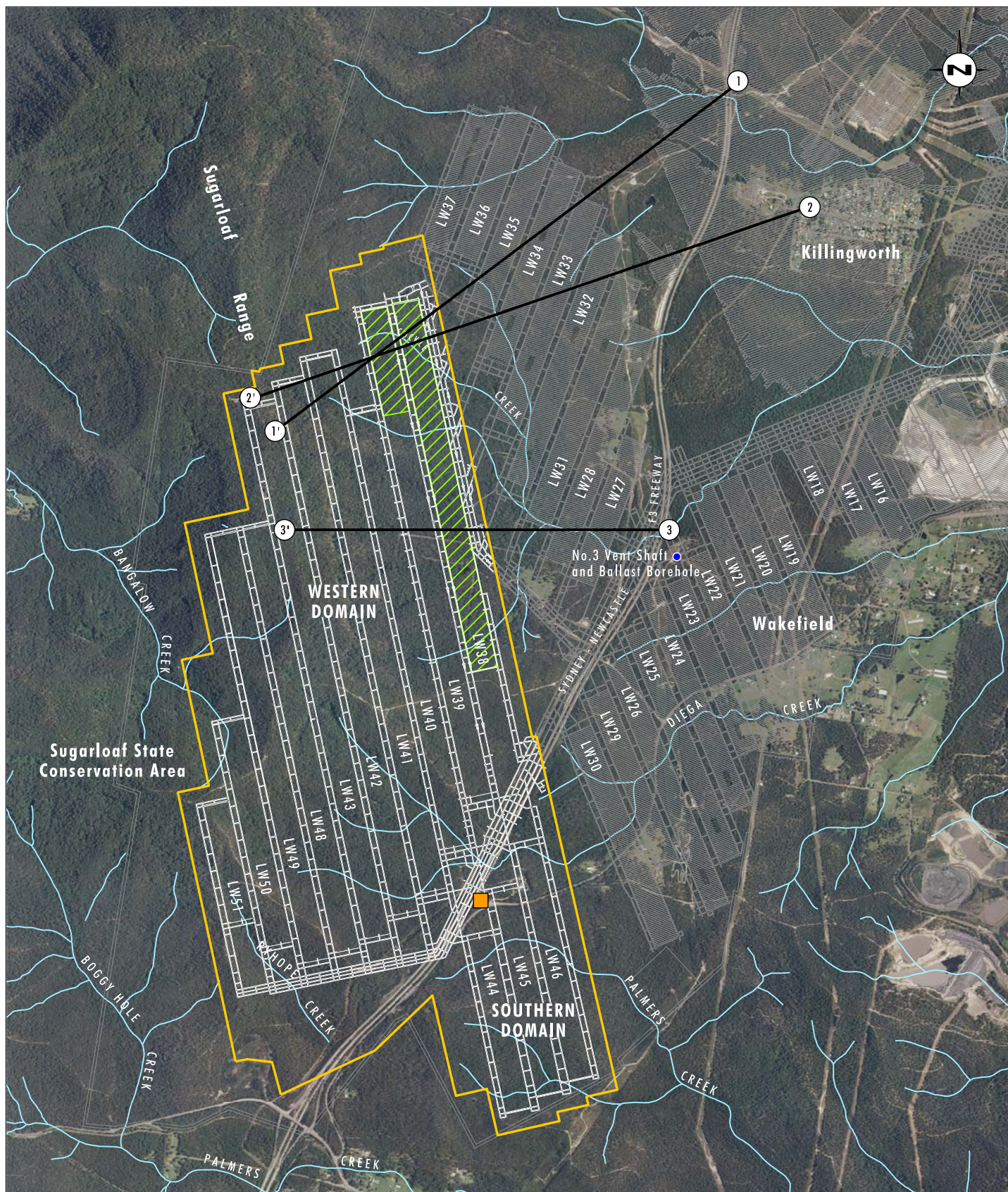
Limited views of existing cliff lines within the continued underground mining area are available from the Cockle Creek crossing along the F3 Freeway. Any views from this location are generally obscured by the existing vegetation (refer to **Figure 2.7**). It is anticipated, in the event of slope failure, there would be minimal impact to the visual amenity of road commuters. While the views may be slightly intensified as a result of slope failure, the existing vegetation would continue to obscure views. Furthermore, any views from this section of the F3 Freeway would be limited to commuters and would be of a short duration due to travelling speeds.

The Subsidence Assessment indicated that the consequence of a slope failure is likely to be localised and unlikely to impact on slope aesthetics or public safety. Given the existing vegetation cover within the SSCA, any slope stability issues associated with the Project are not expected to be visually intrusive and are considered consistent with the surrounding visual environment. Any visual impacts to road commuters will be short in duration and are not considered inconsistent with the current visual amenity from the F3 Freeway. The cliff lines are not visible from residential areas immediately surrounding the continued underground mining area due to topography and vegetation screening. Views of the cliff lines may be available from other receivers, however these views would be long distance (i.e. greater than 15 kilometres) and obscured due to topography and vegetation.

2.3.4 Areas of Low Depth of Cover

Any alluvial aquifers and/or watercourses located in areas where the depth of cover is less than the critical limits for hydraulic connection need to be identified and assessed in consultation with the Office of Water.

Surface cracking with direct hydraulic connection to the underground mining area is most likely to occur below ephemeral drainage lines where overburden depths are less than 70 metres and may possibly occur where overburden depths are between 70 metres and 100 metres (DGS, 2009). As outlined in Section 3.6 of the Surface Water Assessment, the



Source: OCAL - Aerial Photograph, Longwall Layout
LPI - Drainage Lines, DEC AHIMS

0 0.5 1.0 2.0 km
1:35 000

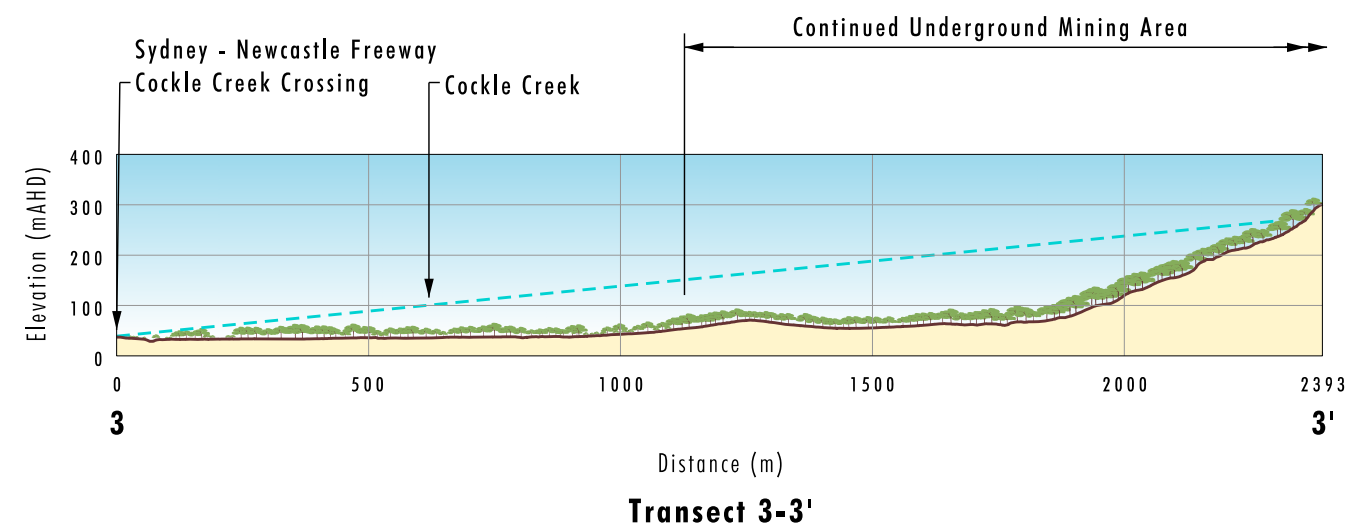
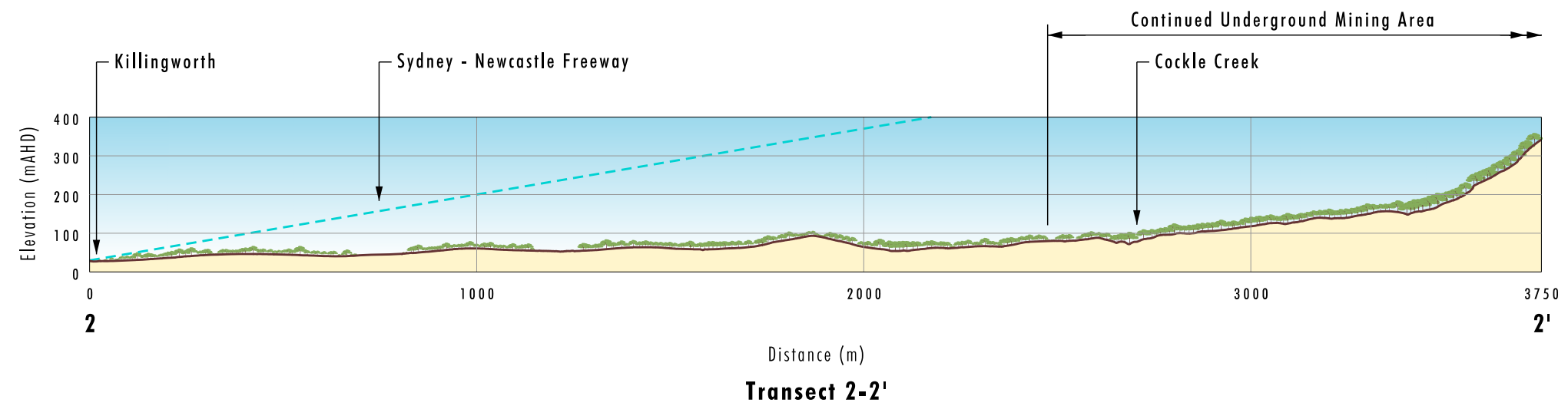
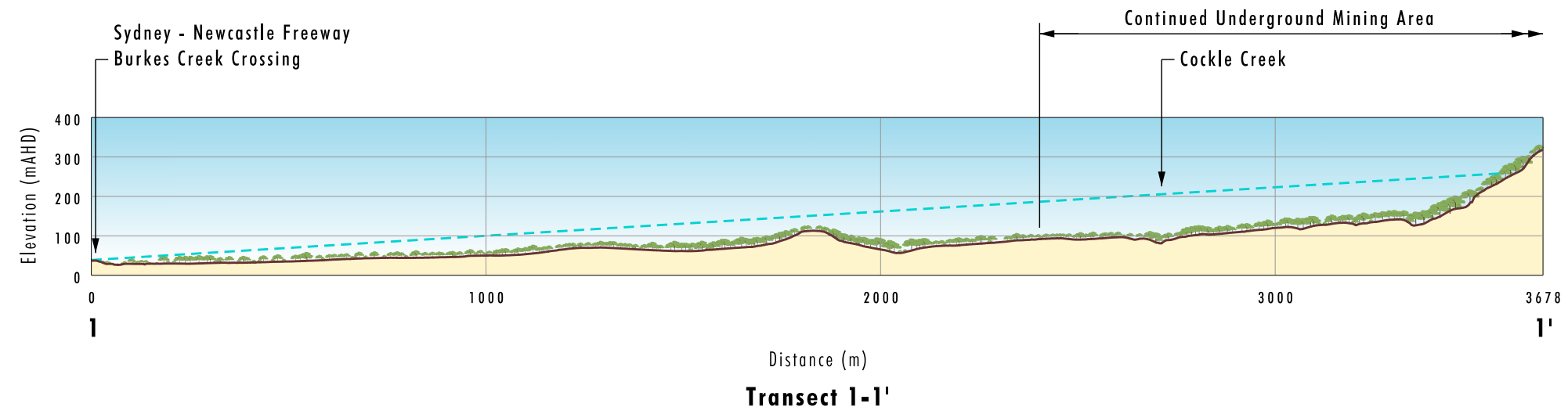
Legend

- Continued Underground Mining Area
- Proposed Underground Workings in the West Borehole Seam
- Longwall Progression as of 1st November 2010
- Former Underground Workings
- Visual Transect Line
- Drainage Line
- Proposed Mining Services Facility

File Name (A4): R13_V1/2553_406.dgn

FIGURE 2.6

Visual Transect Locations



Legend

- Existing Landform
- Existing Tree
- Line of Sight

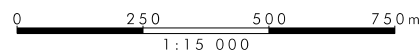


FIGURE 2.7
Visual Transects
1-1', 2-2' and 3-3'

potential for interconnective cracking is limited to a small area. As previously stated, WWC has modified the mine plan to remove any areas where depth of cover is less than 70 metres. As shown in **Figure 2.2**, there are only 1st and 2nd order ephemeral drainage lines present within areas with a depth of cover between 70 and 100 metres.

Surface cracking within creek beds will be monitored as part of ongoing subsidence monitoring. In areas where surface cracking occurs, remediation works, including self healing mechanisms, surface tilling and grouting, will be undertaken to fill the cracks at the surface and limit potential ingress of surface runoff into the proposed underground mining operations. As any cracking will appear very rapidly on the surface after longwall mining, regular checking and resealing of in channel cracks will be undertaken. These progressive resealing works will significantly reduce the potential for loss of surface flows due to subsidence cracking. As previously stated, the areas with a depth of cover between 70 and 100 metres represent less than 11% of the total mining area.

There are no alluvial aquifers present in the areas with a depth of cover less than 100 metres within the continued underground mining area, refer to **Figure 2.2**.

2.3.5 Infrastructure

Most of the infrastructure that may be affected by subsidence is subject to subsidence management activities in relation to previous and current mining approvals. It is important that the subsidence management strategies being employed by the proponent continue.

As outlined in Section 5.2.4 of the EA, in the majority of cases the proposed subsidence management strategies are based on the existing subsidence management strategies that are currently employed by WWC in consultation with the respective stakeholders. These management strategies have been progressively refined over the approximately 20 years of longwall mining at WWC.

Table 5.2 from the EA provides a summary of the proposed subsidence management measures WWC have committed to implementing throughout the life of the Project.

Although the F3 Freeway is outside the angle of draw there must be strategies in place to manage abnormal subsidence movements beyond the angle of draw which have been observed at the site previously.

As shown on **Figure 1.1**, the F3 Freeway and adjacent services easement bisects the continued underground mining area in a north-south orientation. The mine plan has been designed to protect the F3 freeway and adjacent services easement from adverse subsidence impact.

While the mine plan has been designed to ensure the F3 Freeway is outside the angle of draw, it is still exposed to some potential far field subsidence movements. Far field movements are generally towards the extracted longwall. Displacement monitoring is undertaken along the F3 Freeway to compare the actual far field movement experienced compared to that predicted (Strata 2006).

WWC has developed a management plan in consultation with the RTA to provide mechanisms through which the subsidence impacts at WWC can be managed in a manner to provide a safe, serviceable and repairable F3 Freeway during the mining period and subsequent subsidence period. The management strategies include:

- the development of a suitable, specific monitoring and response plans with the respective service stakeholders in the F3 corridor (i.e. RTA, AGL etc);
- conduct periodic subsidence monitoring of the F3 Freeway and the services easement, including the following:
 - pre-mining surveys and condition assessments of the F3 Freeway pavement edges, drainage structures, cuttings and approach roads;
 - visual inspections of the Northbound and Southbound pavement of the F3 Freeway during mining periods;
 - post mining surveys and condition assessment of the F3 Freeway pavement edges, drainage structures, cuttings and Archery Road;
 - conduct a review of monitoring data after the completion of each longwall panel; and
 - conduct a pre and post mining risk assessment on the Freeway fill embankments.

2.4 Lake Macquarie City Council

2.4.1 Flora and Fauna

It is recommended that monitoring specifically target those areas and species/habitats that may be adversely impacted by subsidence from the proposed longwall mining, in particular, habitat that occurs in and adjacent to riparian zones such as hollow bearing trees, that in turn support threatened fauna along/adjacent to watercourses and riparian zones along watercourses that support threatened amphibians.

Targeted seasonal surveys in addition to regular monitoring are also recommended.

As outlined in Section 6.0 of the Ecology Assessment, WWC propose to build upon its previous monitoring schedule as mining progresses. Sites will be added to the monitoring schedule with the advancement of mining into each new longwall and sites will be removed from the monitoring schedule once it can be demonstrated that subsidence impacts have resulted in no discernable impact on the vegetation and fauna characteristics of the sites.

Sites will be preferentially located in areas where subsidence impacts are predicted to be greatest, and will be monitored on a regular basis. While all species may be impacted by potential subsidence to some degree, species dependent on drainage lines and those with low mobility and small home ranges would be most significantly impacted, such as amphibians and reptiles. Targeted monitoring has been demonstrated previously at WWC, where diurnal reptile surveys, nocturnal amphibian surveys and opportunistic recordings of all other species have been included in the monitoring program, as outlined in Section 6.2 of the Ecology Assessment. As previously stated, the proposed monitoring program will continue to build upon the previous monitoring program.

In the event that further threatened species are identified within the monitoring locations the monitoring program will incorporate surveys to adequately assess and monitor these species, where appropriate. This will include targeted seasonal surveys in addition to regular monitoring, where appropriate.

It is stated in Section 5.11.2 and 5.11.3 that following the observation of cracking events and where the presence of weed species is observed that various mitigation/remediation techniques will be implemented in order to ameliorate these respective issues. There is no mention of specific information in relation to timing of

these events. It is recommended that in order to minimise impact on breeding bird species that proposed remediation actions be subject to an ecological risk assessment and be undertaken in order to minimise the impact on native avifauna, particular threatened species.

As discussed in Section 5.11.3 of the EA, the presence of weed species has the potential to substantially reduce the ecological value of natural areas. Lantana (*Lantana camara*) was identified as a significant weed in many of the drainage lines occurring in the proposed underground mining area. The species was also identified by Bell and Driscoll (2009) as a significant weed of riparian areas. The presence of weed species within the proposed underground mining area has the potential to significantly decrease the value of vegetation and habitat to native species, particularly threatened species.

WWC have committed to periodic inspections of the drainage lines within the areas affected by proposed underground mining to determine the need for weed control and appropriate weed control methods will be employed within areas of remediation. These inspections will be undertaken in accordance with existing monitoring procedures.

While WWC endeavour to undertake necessary remediation activities as soon as practicable, any remediation activities that are undertaken within the SSCA, need to be done so in consultation with DECCW/NPWS.

2.4.2 Noise

According to the report, every effort will be made to achieve the operational acoustic targets, occupants at Charlton Street, Barnsley (location 7), will receive noise levels above the criteria. In this regard, as suggested by the mining company, discussions with the owners will need to be entered into to achieve an agreed outcome.

As discussed in **Section 2.2.3** of this report, WWC has a negotiated private agreement with the affected landholder.

2.4.3 Licence/Lease Agreements

A condition to be included in any consent granted that all necessary licence/lease agreements from Lake Macquarie City Council to enable the construction and operation of the Mining Service Facility within the road reserve of Wakefield Road to be obtained prior to the commencement of works.

The proposed Mining Services Facility is located on land owned by Lake Macquarie City Council (LMCC). In principle agreement has been reached with LMCC in relation to the construction of the facility. As outlined in Section 1.4.2 of the EA, WWC have committed to developing a lease arrangement prior to construction of the proposed Mining Services Facility.

In respect to LMCC's request, WWC propose to update the Statement of Commitments to include the following:

- 6.1.3 WWC will obtain all necessary licence/lease arrangements from Lake Macquarie City Council prior to the construction of the Mining Services Facility.

2.4.4 Traffic

Consideration of the traffic management facilities on Wakefield Road at the Mining Services Facility entrance to be approved by Councils Local Traffic Committee prior to implementation. Plans should be submitted to Council and have any proposed signage (such as the mentioned Trucks signs) on the plan.

As indicated in Section 5.11.4 of the EA, the proposed Mining Services Facility will require the construction of a new intersection with Wakefield Road. In accordance with the recommendations of the traffic assessment, the design and operation of the Mining Services Facility intersection will provide for:

- onsite turning and parking provisions to ensure all vehicles are stopped away from the deceleration and merge lanes, and to ensure that all vehicles enter and depart the Mining Services Facility in a forward direction;
- a 60 to 70 metre deceleration lane and 50 to 60 metre merge lane be provided;
- access restriction, specifically that heavy vehicles enter the Mining Services Facility exclusively from the south, and depart exclusively to the north. Light vehicle access from the north will be provided, based on the very low number of turning vehicles; and
- signage on both approaches to the Mining Services Facility notifying of Warning: Truck Entering, and Truck Access Ahead.

The final design of the new intersections associated with the Mining Services Facility will be prepared in consultation with LMCC and will require an approval from LMCC under the Roads Act, as stated in Commitment 6.12.1 of the EA. Additionally, WWC will amend Commitment 6.12.1 to ensure construction works will not commence prior to LMCC approval, as provided below:

6.12.1 WWC will consult with LMCC on the final design of the new intersection associated with the proposed Mining Services Facility. This intersection will require LMCC approval under the Roads Act prior to commencement of these works. The intersection design will include appropriate deceleration and merge lanes, and signage.

As requested, WWC will provide all relevant design specification and traffic management details to LMCC. The plans submitted to LMCC will include proposed signage for both approached to the Mining Services Facility.

Furthermore, WWC have committed to preparing a construction traffic management plan for the proposed Mining Services Facility. The plan would be developed in consultation with LMCC and the Community Consultative Committee (CCC) and submitted prior to construction activities.

The matter be referred to the RTA at the time of the Traffic Committee investigation to review the speed limit through this area to be determined if 90km/h is appropriate.

The Mining Services Facility site is bordered by Wakefield Road to the east, and the F3 Freeway to the west. All access to the Mining Services Facility will be from Wakefield Road, which at this location had a speed limit of 90 km/h. The speed limit changes to 80 km/h to the north near Archery Road.

An assessment of the proposed Mining Services Facility, based on current traffic conditions, was undertaken as part of the Traffic Assessment (Appendix 14 of the EA). The assessment

found that the proposed Mining Services Facility access points would provide appropriate sight distance between the access points and oncoming traffic flows in Wakefield Road.

As identified in the Traffic Assessment, the issue of lowering the speed limit along Wakefield Road to a uniform 80 km/h has been raised by local residents. While it is acknowledged that a decrease in speed limit would further improve the sight distance provisions, the Mining Services Facility itself does not warrant a reduction in speed limit along Wakefield Road.

The determination of speed limits is a matter for LMCC and the RTA. WWC do not have any authorisation in determining speed limits on public roads.

2.4.5 Creeks and Watercourses

The environmental assessment acknowledges that hydraulic connection may occur where subsidence results in cracking and there is less than 70 metres cover depth. The surface water assessment (Appendix 8) fails to identify those sections of the watercourse where this situation occurs.

Further, it is stated that mining will be 'limited' in these areas. Greater definition of the term 'limited' is required to adequately determine the likely impact on the affected watercourses.

However, it is recommended that no mining be undertaken where there is less than 70 metres cover depth due to the known risk of this activity and the potential impact on downstream flow regimes.

Figure 2.2 shows the range of depth of cover throughout the continued underground mining area. Significant modification to the mine plan has been undertaken to avoid areas of low depth of cover (i.e. <70 metres). No longwall mining operations are proposed to be undertaken below 70 metres depth of cover.

There are no watercourses within the continued underground mining area proposed to be undermined with a depth of cover less than 70 metres (refer to **Figure 2.2**).

At cover depths between 70 and 100 metres more frequent monitoring should be undertaken than that prescribed for watercourses with greater cover depths across the site.

The potential for direct hydraulic connection to the surface, due to sub-surface fracturing, is considered possible between 70 metres and 100 metres depth of cover. However direct connection to the surface is unlikely to occur where cover depths are greater than 100 metres.

While there are no areas with a depth of cover less than 70 metres within the continued underground mining area, there are several small areas of 70 metres to 100 metres depth of cover within the continued underground mining area, as shown in **Figure 2.2**. These areas may be subject to direct hydraulic connection with the underground mine workings. Due to both the potential surface water impacts and potential mine safety issues, these cracks may require immediate remediation. The presence of these cracks will be monitored as part of the subsidence monitoring program. In the event that such cracks are observed, options for re-sealing of the cracks will be assessed and implemented. As outlined in Section 5.2.4.2 of the EA, a detailed Subsidence Survey Monitoring Program has been developed for the Project. WWC acknowledges that a higher intensity of monitoring is required within the areas where depth of cover ranges between 70 metres and 100 metres. The monitoring program will involve the following:

- the installation of subsidence survey points to monitor potential subsidence impacts on the identified surface features;
- conducting visual inspections within the continued underground mining area to assess potential subsidence impacts and to identify any potential remediation that may be required;
- installation of monitoring for potential sub-surface impacts on groundwater; and
- post mining interrogation of aerial photography.

The results of the monitoring program will be communicated to the respective stakeholders in accordance with the previously discussed SMPs and used to refine the ongoing management of subsidence as the Project progresses.

The environmental assessment acknowledges a likely increase in erosion due to the increased water velocities associated with subsidence. Whilst on-site remediation strategies are identified (reactive bank stabilisation), there are no strategies identified to manage the impacts of erosion on downstream watercourses and waterbodies. Given the known risk, proactive measures should be undertaken to manage the likely increase in sediment prior to flows exiting the site.

As discussed in **Section 2.1**, modelling of the typical drainage line indicates that there will be some minor changes to the predicted post-mining velocities during both major and minor storm events with the landform changes as a result of the predicted subsidence. The modelling indicates that underground mining may result in some areas of erosion and deposition occurring within the drainage lines in the continued underground mining area.

As listed in the Section 3.5.1 of the Surface Water Assessment the surface water modelling of Diega Creek indicates that there would be negligible increases in velocities downstream of the continued underground mining area as a result of the predicted subsidence. Modelling indicates that peak velocities during the 5 year Average Recurrence Interval (ARI) storm event would remain at 0.91 m/s and during the 100 year ARI storm event would increase by approximately 0.02 m/s to 1.68 m/s (i.e. an increase of approximately 1 per cent).

However, the potential impacts that these modelled changes could have on the creek channels, based on the modelling, are expected to be minor.

As outlined in Section 3.5.4 of the Surface Water Assessment, the proposed monitoring and remediation protocols are consistent with the existing monitoring strategies used on site and will be included in the new SMP or equivalent process for the continued underground mining area to ensure that surface water impacts are minimised.

It is also proposed to undertake monitoring of geomorphological response of each watercourse to the predicted subsidence, as follows:

- prior to mining review the potential geomorphological response of each watercourse to the predicted subsidence using the guidelines included in *River Hydrology and Energy Relationships – Design Notes for the Mining Industry published by Department of Water and Energy* (November 2007) and the methods described below;
- for each watercourse within the continued underground mining area:
 - describe the existing (i.e. pre-mining) watercourse characteristics including bed controls using approaches outlined in AUSRIVAS (Australian River Assessment System);

- calculate the stream power for the existing and predicted subsidence conditions;
- determine threshold limits of stream power for incision and bed load deflation, taking into consideration existing stream stability, surface and substrate soil conditions and stream grades;
- refine the detailed monitoring program, including monitoring of:
 - any bed control points;
 - areas where subsidence may increase the stream power above the determined threshold limits potentially causing channel erosion/instability;
 - monitoring may include long section and cross section surveys, photographic records and/or methods outlined in AUSRIVAS;
- investigate and implement any remediation required to mitigate potential impacts of changes in stream power as a result of underground mining activities;
- during and post mining, monitor watercourses, in accordance with the detailed monitoring program.

As part of the geomorphological monitoring, it may be possible to identify strategies to be undertaken prior to longwall mining. These strategies would be detailed in the SMP or equivalent process.

2.4.6 Stormwater Management

A condition to be included in any consent granted that a stormwater management plan be submitted to Lake Macquarie City Council prior to the commencement of works for the Mining Service Facility within the road reserve of Wakefield Road.

The proposed Mining Services Facility, located on Wakefield Road, is located within the catchment area of Palmers Creek.

During the construction of the Mining Services Facility, all works and the erosion and sediment controls will be inspected on a regular basis to ensure that all required controls are in place and effective. Following the completion of construction works, the work area will be inspected in accordance with WWC's current inspection program and after any significant rainfall events until revegetation and stabilisation of drainage structures are complete.

The Mining Services Facility will be bunded in accordance with AS 1940 – 2004: *The Storage and Handling of Flammable and Combustible Liquids*. Clean water captured in the bund will be released to the downstream drainage systems. Any contaminated water will be removed by a licensed contractor. WWC will provide an onsite spill kit for use in a spill emergency. On site personnel will be trained in spill management techniques.

In response to LMCC's request, WWC will incorporate a Stormwater Management Plan for the proposed Mining Services Facility in the Water Management Plan for the Project.

2.5 Hunter-Central Rivers Catchment Management Authority

2.5.1 Native Vegetation

The Statement of Commitments for ecological considerations (Section 6.4) also refers to Appendix 6 for "ecological assessment impact mitigation strategy" commitments to be included in a Biodiversity and Land Management Plan. It appears that the strategies in Appendix 6 are the same as those listed under "due diligence" in

Statement of Commitments section – the only notable difference is the inclusion of an undertaking to employ an ecologist to develop an offset strategy, with relevant government agencies, if required. This undertaking should be documented in the Statement of Commitments directly.

As noted, both the Ecology Assessment and EA main text provide details of the Impact Mitigation Strategy. The Impact Management Strategy has been developed to maintain or improve ecological features and functions within the continued underground mining area, in order to mitigate the impacts associated with mining in the continued underground mining area.

As outlined in the EA, the exact locations for the construction of various minor surface infrastructure facilities such as ventilation infrastructure and associated services cannot be known at this stage of the Project and it may be necessary to disturb some areas of native vegetation for the construction of these surface facilities. In this event, WWC have developed a due diligence process in order to minimise impacts associated with ancillary infrastructure. Where it will be necessary to disturb areas of native vegetation for these types of infrastructure, the following due diligence processes will be implemented:

- due-diligence inspections will be completed by a suitably qualified ecologist to identify any significant ecological features at identified potential infrastructure sites and any required management and mitigation measures;
- disturbance to native vegetation communities will be limited to the minimum area required;
- areas of known ecological significance will be avoided where possible (that is, areas containing known records of threatened species, Endangered Populations and TECs. Hollow-bearing trees should be retained, where possible);
- appropriate disturbance setbacks to known or identified significant ecological features will be established where possible; and
- pre-clearance surveys of any sites containing hollow-bearing trees or significant habitat features.

Due diligence inspections will ensure that only the minimum area required for surface infrastructure developments will be cleared and that flora and fauna species, including threatened species will not be significantly impacted.

In the event that unpredicted, adverse impacts on ecological values are identified during management and monitoring of the continued underground mining area, WWC will respond to the issues identified and engage appropriate experts where required. WWC will investigate all appropriate remediation and mitigation requirements, in consultation with the relevant government authorities and in the event that significant impacts on identified ecological values are identified and cannot be adequately remediated, WWC will engage a suitably qualified and experienced ecologist to prepare a Biodiversity Offset Strategy in consultation with DECCW and DoP.

WWC will update the Statement of Commitments to include the following:

- 6.4.3 In the event that significant impacts on identified ecological values are identified and cannot be adequately remediated, WWC will engage a suitably qualified and experienced ecologist to prepare a Biodiversity Offset Strategy in consultation with DECCW and DoP.

2.5.2 Surface Water

The report indicated that there is the possibility for several creeks to be diverted through surface cracking but are predicted to re-emerge further downstream. The impacts on waterways between the divergence underground and the re-emergence have not been adequately addressed. The report does not indicate the predicted length of stream that would be “dry”, nor for how long. These impacts need to be investigated and mitigated or offset as required.

Although there is a possibility, as discussed in the EA, of sub-surface fracturing causing stream capture and subsequent re-emergence in downstream reaches, based on the soil landscapes and geology of the area this is considered unlikely. For further details on this issue, refer to **Section 2.1.1.2** and **Section 2.2.1**.

As outlined in Section 3.5.4 of the Surface Water Assessment, a comprehensive monitoring regime will be implemented to monitor drainage lines for potential subsidence impacts.

The proposed monitoring and remediation protocols are consistent with the existing monitoring strategies used on site and will be included in the new SMP or equivalent process for the continued underground mining area to ensure that surface water impacts are minimised.

2.5.3 Erosion and Sediment

Erosion sites (on slopes and waterways) and sediment movement need to be monitored and mitigated to ensure no net increase in sediment entering waterways or Lake Macquarie.

The CMA notes that increased erosivity within waterways is intended to be monitored, however, it is recommended that an Erosion and Sediment Control Plan be developed which includes erosion from steep slopes as well as downstream sediment loads.

Surface water quality monitoring at WWC will continue for the life of the Project. Existing water monitoring and reporting programs will be reviewed and incorporated into the Water Management Plan for WWC following Project Approval, as outlined in Commitment 6.6.1 of the EA. This plan will address all aspects of the ongoing management and monitoring of water at WWC and will include surface and groundwater monitoring programs and a sediment and erosion control plan.

The Sediment and Erosion Control Plan, which will form part of the Water Management Plan, will include the extensive measures outlined in the EA, including erosion from steep slopes as well as downstream sediment loads. As outlined in Section 5.5.4.2 of the EA, the erosion and sediment control measures proposed to be incorporated into infrastructure construction, primarily the proposed mining services facility, and potential subsidence remediation works during the Project include:

- clearly identifying and delineating areas required to be disturbed and ensuring that disturbance is limited only to those areas, clearing vegetation only as required to achieve the works and minimising machinery disturbance outside of these areas;
- construction of erosion and sediment controls prior to the commencement of any substantial construction or earth works;
- limiting the number of roads and tracks established;

- constructing diversion drains upslope of areas to be disturbed to convey clean runoff away from disturbed areas;
- construction and regular maintenance of sediment fences downslope of disturbed areas, including the construction sites for sediment dams, diversion drains and catch drains;
- seeding and controlled fertilising of disturbed areas to provide for rapid grass cover establishment. Areas will be seeded with a grass mix specific to the needs of the area to be revegetated;
- regular inspections of all works and immediately after significant rainfall events to ensure sediment and erosion controls are performing adequately;
- regular maintenance of erosion control works and rehabilitated areas; and
- provision for the repair or redesign of sediment and erosion controls that are not performing adequately, as soon as practicable.

Construction and remediation plans will detail the specific inspection, maintenance and revegetation requirements for the construction and remediation works proposed. These control measures will be set out in a detailed Erosion and Sediment Control Plan for the Project, to be prepared as part of the proposed water management plan.

The Mining Services Facility will be bunded in accordance with AS 1940 – 2004: *The Storage and Handling of Flammable and Combustible Liquids*. Clean water captured in the bund will be released to the downstream drainage systems. Any contaminated water will be removed by a licensed contractor. WWC will provide an onsite spill kit for use in a spill emergency. On site personnel will be trained in spill management techniques.

3.0 References

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- Umwelt, 2010. *West Wallsend Colliery Continued Operations Project Environmental Assessment*
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- Umwelt, 2010. *Surface Water Assessment West Wallsend Colliery Continued Operations Project*

APPENDIX 1

Revised Statement of Commitments

Appendix 1 - Revised Statement of Commitments

Revised Statement of Commitments

The Statement of Commitments included in the EA has been revised to consider the issues raised in the response to submissions. The revised Statement of Commitments details the measures proposed by WWC for environmental mitigation, management and monitoring of the Project.

If approval is granted under Part 3A of the EP&A Act Project, WWC will commit to the following controls.

6.1 Compliance with the EA

- 6.1.1 To carry out the development for the Project generally in accordance with the Project Application and this EA report.

Surrender of Redundant Development Consents

- 6.1.2 On completion of underground mining of the currently approved SMP area, WWC will seek to surrender all other development consents that relate to activities that are adequately covered in the new Project Approval.

Lease Arrangements

- 6.1.3 WWC will obtain all necessary licence/lease arrangements from Lake Macquarie City Council prior to the construction of the Mining Services Facility.

6.2 Life of Mine Operations, Production and Concept Mine Plan

Project Life

- 6.2.1 The project approval life will be for 15 years from Project Approval. Closure and rehabilitation activities will be undertaken in accordance with an approved Mining Operations Plan, or other relevant approval under the Mining Act or equivalent, at the time of closure. These works may extend beyond the 15 year operations approval life.

Production Limits

- 6.2.2 The Project will produce up to 5.5 Mtpa of ROM coal.

Hours of Operation

- 6.2.3 Mining and associated activities for the Project may be undertaken 24 hours a day, seven days a week.
- 6.2.4 Construction of the Mining Surfaces Facility will generally be undertaken between 7.00 am and 6.00 pm daily. Construction activities may occur outside these hours when WWC is satisfied that such activities are inaudible at nearest private residences.

Refinement of Mine Plan

- 6.2.5 Any refinements to the conceptual mine plan outlined in this EA report will be detailed and assessed as part of SMPs and MOPs or other relevant process.
- 6.2.6 The locations of ancillary surface infrastructure required to support underground mining will be documented and detailed within the SMPs and MOPs (or other relevant process) required for WWC to continue its mining and associated activities, in consultation with relevant stakeholders.

6.3 Subsidence

- 6.3.1 A comprehensive SMP (or Extraction Plan) will be developed for the Project to provide detailed guidance for subsidence management. This plan will be developed based on the existing SMP and will cover subsidence predictions, provide detailed subsidence management measures to be implemented as part of the ongoing operations and monitoring strategies for the continued underground mining area.
- 6.3.2 The SMP will also include revised stakeholder SMPs that have been established with each of the identified stakeholders within the continued underground mining area. These plans will be prepared in consultation with relevant stakeholders and specify subsidence predictions and specific management measures for natural and man-made surface features.
- 6.3.3 Remediation and rehabilitation of mining related subsidence impacts will be carried out, as detailed in **Section 5.2.4**, as soon as practicable following subsidence using methods specified in relevant SMPs.
- 6.3.4 A detailed Subsidence Survey Monitoring Program has been developed for the Project and is outlined in **Appendix 5**. The monitoring program will be implemented and the results used to refine the ongoing management of subsidence as the Project progresses.

6.4 Ecology

- 6.4.1 WWC will develop a Biodiversity and Land Management Plan which will be implemented and include the commitments in the Ecological Assessment impact mitigation strategy (refer to **Appendix 6**) and to guide the ongoing management of ecological values identified in the continued underground mining area.
- 6.4.2 Minor surface infrastructure facilities such as ventilation infrastructure and associated services may require some areas of native vegetation to be disturbed. Where this is unavoidable, all effort will be made to avoid areas containing significant ecological features such as known threatened species habitat, or hollow-bearing trees. Where it will be necessary to disturb areas of native vegetation for these types of infrastructure, the following due diligence processes will be implemented:
- due diligence inspections will be completed by a suitably qualified ecologist;
 - disturbance to native vegetation communities will be limited to the minimum area required;

- areas of known ecological significance will be avoided where possible (that is, areas containing known records of threatened species, Endangered Populations and TECs. Hollow-bearing trees will be retained, where possible);
- appropriate disturbance setbacks to known or identified significant ecological features will be established where possible;
- pre-clearance surveys of any sites containing hollow-bearing trees or significant habitat features; and
- should such infrastructure be required in the SSCA, the placement of such infrastructure will be determined in consultation with DECCW.

6.4.3 In the event that significant impacts on identified ecological values are identified and cannot be adequately remediated, WWC will engage a suitably qualified and experienced ecologist to prepare a Biodiversity Offset Strategy in consultation with DECCW and DoP. Given that such areas are likely to be minor in area, it is proposed that rather than focussing on land base offsetting, this strategy could focus on 'in kind' offsetting by remediation or rehabilitation of equivalent areas of disturbed or poor condition vegetation within the SCA.

6.4.43 The results of the ecological monitoring and management measures will be reviewed annually and reported in the AEMR. Management measures will be adapted, as required, on the basis of monitoring outcomes.

6.5 Groundwater

- 6.5.1 WWC will continue to maintain the existing groundwater monitoring network and also undertake regular analysis of groundwater monitoring data to compare predicted and actual groundwater impacts. This will include groundwater make in the underground operations.
- 6.5.2 Prior to commencement of longwall mining in Longwall 46, WWC will review the need for establishment of alluvial monitoring in Diega Creek and Central Creek in consultation with NOW and to the satisfaction of DoP.
- 6.5.3 Within 12 months of project approval, WWC will submit for the approval of the Director General an updated Groundwater Monitoring Program for the Project. The program will be prepared in consultation with NOW and will include development of relevant trigger levels and response procedures to manage identified monitoring and/or predicted trends.
- 6.5.4 The monitoring network and monitoring program will be reviewed on an annual basis to determine ongoing suitability and any proposed changes will be discussed in the Annual Environmental Management Report (AEMR).

6.6 Surface Water

- 6.6.1 Within 12 months of project approval, WWC will submit for the approval of the Director General an updated Surface Water Management Plan for the Project. The Plan will be prepared in consultation with NOW and will include a Surface Water

Monitoring Program, Groundwater Monitoring Program, Sediment and Erosion Control Plan and Subsidence Remediation Monitoring Program.

- 6.6.2 The existing Water Management System will continue to be used to control and treat runoff from the WWC pit top site with surface runoff directed to the water management system dams for use as dust suppression or discharge.
- 6.6.3 WWC will complete a series of investigations within 12 months of Project Approval, including:
- a more detailed desktop investigation of the various salt concentrations at other Xstrata operations and relevance to WWC;
 - trailing shandying percentages based on the more detailed investigations of salts; and
 - determining the most appropriate shandying percentage taking into consideration potential water quality impacts on the life and maintenance of the underground mining equipment.
- 6.6.4 The optimal water re-use strategy confirmed by the investigations will be implemented within two years of Project Approval. If the investigations indicate that shandying potable water with mine water for re-use on site is not viable, WWC will investigate the feasibility of other options for mine water treatment and re-use e.g. reverse osmosis.
- 6.6.5 A comprehensive monitoring regime will be implemented to monitor drainage lines and the locations identified in **Figure 5.12** for potential subsidence impacts. Monitoring procedures will include:
- monitoring of vertical and horizontal subsidence along order drainage lines as determined in consultation with the DI&I;
 - monitoring, measuring and recording (e.g. photographic records) of the extent and magnitude of any surface cracking along the second order drainage line and first order drainage lines in depths of cover less than 100 metres that may occur during and post mining operations. If works are required (sealing of cracks), methods approved by the DECCW and DI&I would be adopted;
 - visual inspection and recording of stream bed and bank condition and riparian vegetation along the second order drainage line, including collection of baseline data and monitoring during and post mining operations;
 - monitoring of geomorphological response of each watercourse to the predicted subsidence, as follows:
 - prior to mining review the potential geomorphological response of each watercourse to the predicted subsidence using the guidelines included in River Hydrology and Energy Relationships – Design Notes for the Mining Industry published by Department of Water and Energy (November 2007) and the methods described below;
 - for each watercourse within the continued underground mining area:
 - describe the existing (i.e. pre-mining) watercourse characteristics including bed controls using approaches outlined in AUSRIVAS (Australian River Assessment System);

- calculate the stream power for the existing and predicted subsidence conditions;
 - determine threshold limits of stream power for incision and bed load deflation, taking into consideration existing stream stability, surface and substrate soil conditions and stream grades;
 - refine the monitoring program, including monitoring of:
 - any bed control points;
 - areas where subsidence may increase the stream power above the determined threshold limits potentially causing channel erosion/instability;
 - monitoring may include long section and cross section surveys, photographic records and/or methods outlined in AUSRIVAS;
 - investigate and implement any remediation required to mitigate potential impacts of changes in stream power as a result of underground mining activities;
- during and post mining, monitor watercourses, in accordance with the developed monitoring program;
- ongoing monitoring and maintenance will be necessary for any areas requiring surface mitigation works to facilitate effective rehabilitation.

6.7 Air Quality

6.7.1 WWC will continue to implement existing dust controls, including:

- the use of manually-operated water sprays for unpaved areas and for the paved ring road at the WWC pit top, used by trucks transporting coal to MCPP via the private haul road;
- periodic sweeping of the haul road and other paved areas to reduce road surface silt loadings; and
- use of loading flaps during truck loading at the surface bin to restrict dust.

6.7.2 Within 12 months of project approval, WWC will submit for the approval of the Director General an Environmental Monitoring Program for the Project, which will include an Air Quality Monitoring Program. The Air Quality Monitoring Program will include dust deposition, TSP and PM₁₀ monitoring at existing stations located at WWC, and within Barnsley and Killingworth for the life of the Project.

6.7.3 WWC will also undertake 24-hour PM₁₀ monitoring for the life of the project using the existing Westside Mine PM₁₀ HVAS monitor at Wakefield or an alternate location, otherwise agreed with DoP.

6.8 Noise

6.8.1 Noise emissions from the Project, when measured within 30 metres of a private residence, will not exceed the predicted worst case noise levels as outlined in **Section 5.7** unless a specific agreement is reached with the landholder in regard to noise impacts at that residence.

6.8.2 WWC will undertake mitigation of the breaker and No. 2 ventilation shaft to improve existing noise impacts associated with its operation. WWC will also investigate whether there are any feasible opportunities for further noise reduction at Killingworth.

6.8.3 Within 12 months of project approval, WWC will submit for the approval of the Director General a Noise Management Plan for the Project. The Plan will:

(a) describe the noise mitigation measures that would be implemented to ensure compliance with relevant conditions of approval; and

(b) will include a Noise Monitoring Program that:

- includes attended monitoring to assess compliance with the Project Specific Noise Levels; and

6.8.3• includes a protocol for determining exceedances of the relevant conditions of approval. Within 12 months of project approval, WWC will submit for the approval of the Director General an Environmental Monitoring Program for the Project, which will include a Noise Monitoring Program. The Noise Monitoring Program will include attended monitoring to assess compliance with the Project Specific Noise Levels.

6.9 Greenhouse Gases

6.9.1 WWC will continue to implement its ESAP, to investigate and implement, where feasible, GHG and energy management and mitigation initiatives during the operation and decommissioning of the Project.

6.9.2 WWC will report its greenhouse and energy performance via legislative reporting requirements.

6.10 Aboriginal Archaeology

6.10.1 WWC has committed to modify the mine plan to protect the following sites of Aboriginal cultural and archaeological significance:

- the stone arch;
- one rockshelter in the Bangalow Creek catchment;
- two rockshelter sites in the Cockle Creek catchment;
- Palmers Creek Grinding Grooves 1 and 2;

- the Western Domain 5 (#38-4-0993 - wet soak with artefact scatter site);
 - modification of the mine plan to lessen the probability of impact to the Palmers Creek Grinding Grooves 3 site.
- 6.10.2 WWC has committed to providing \$200,000.00 over the life of the project to assist with the management of Aboriginal cultural and archaeological sites/values within the SSCA.
- 6.10.3 WWC has committed to fund a program of monitoring and reporting of subsidence impacts on landscape features of Aboriginal cultural value and Aboriginal archaeological sites recorded within the proposed continued underground mining area.
- 6.10.4 If monitoring finds that at least three of the Diega Creek Grinding Groove sites 2 through 6 do not suffer from impacts that cause cracking of the sandstone within the area of the sandstone platform containing the grooves and within 1 metre of any groove, WWC will be able to go ahead with subsidence of Diega Creek Grinding Grooves 1. If this is not possible because 3 or more of the Diega Creek Grinding Grooves 2 to 6 sites have cracked within the specified site area, WWC will commit to protecting Diega Creek Grinding Grooves 1 from damage related to subsidence.
- 6.10.5 WWC has committed to funding a program of further survey within the SSCA in consultation with the Aboriginal stakeholders and the NPWS/DECCW, the purpose of the survey is to meet the requirements of Intergenerational Equity in relation to the potential subsidence impacts to Bangalow Creek 1, 2, 3, 4, 5, 6 and #38-4-0461 Grinding Grooves.
- 6.10.6 WWC has committed to providing each of the registered stakeholders additional stakeholder requested offset packages to the value of \$25,000 for funding towards specific cultural heritage projects that were proposed by these groups as part of the EA process~~WWC is committed to providing each of the registered stakeholders a further offset package.~~
- 6.10.7 WWC will commit to the provision of funding to a total of up to \$250,000 for further Aboriginal Cultural Heritage values investigations. The specific nature of the investigation will be subject of further consultation with the registered Aboriginal stakeholders and endorsement by the DECCW.
- 6.10.8 Within 12 months of project approval, WWC will prepare an ACHMP for the project that is consistent with the Aboriginal cultural and archaeological management commitments made in this report and includes the following matters:-
- details of the proposed implementation of, and methodology for, the conservation offset strategy;
 - a detailed salvage program for Aboriginal archaeological sites within the proposed continued underground mining area including isolated finds, artefact scatters (if subsidence remediation works are required in the site areas) and the Cockle Creek Rockshelter with Artefacts and PAD;
 - a detailed description of the mitigation measures that would be undertaken for all Aboriginal archaeological sites and landscape features of Aboriginal cultural value within the proposed continued underground mining area prior to and/or following subsidence;

- a detailed description of the measures that would be implemented to protect Aboriginal archaeological sites and landscape features of Aboriginal cultural value for the life of the project;
- a detailed methodology for inspection of locations proposed for surface ventilation infrastructure construction and future exploration boreholes;
- a description of the measures that would be implemented if any new Aboriginal sites/artefacts or skeletal remains are discovered during works associated with the Project;
- the provision of Aboriginal cultural awareness training for relevant WWC personnel and for contractors as part of the induction process; and
- a protocol for the ongoing consultation and involvement of the Aboriginal stakeholder groups and NPWS/DECCW in the conservation and management of Aboriginal cultural heritage within the proposed continued underground mining area.

6.10.3

6.11 Historic Heritage

- 6.11.1 WWC will map the recorded historic heritage sites on relevant project drawings and plans used during subsidence remediation works to provide that their presence is considered in planning such works. Impacts to such sites will be avoided during subsidence remediation works.
- 6.11.2 WWC personnel involved in subsidence remediation works will be briefed about the location of the recorded heritage items and their heritage status in an induction prior to conducting work in the continued underground mining area.
- 6.11.3 WWC will undertake inspections of historical heritage sites following the completion of undermining the recorded historic heritage sites. If subsidence cracks are identified in the vicinity of the identified sites they will be remediated as soon as practicable, except where any remediation works may result in further adverse impacts.

6.12 Traffic and Transport

- 6.12.1 WWC will consult with LMCC on the final design of the new intersection associated with the proposed Mining Services Facility. This intersection will require LMCC approval under the Roads Act prior to commencement of these works. The intersection design will include appropriate deceleration and merge lanes, and signage.
- 6.12.2 Prior to the commencement of construction activities associated with the Mining Services Facility, WWC will prepare a construction traffic management plan in consultation with LMCC and the CCC.
- 6.12.3 WWC will consult with LMCC to determine relevant funding to have the road markings at the intersection of Wakefield Road and The Broadway repainted to appropriately delineate control and lane lines.

- 6.12.4 No haulage of coal will be undertaken on public roads, except in the case of emergency and as approved by the Director General.

6.13 Visual

- 6.13.1 WWC will maintain and implement a range of visual controls to screen views of the Mining Services Facility and minimise the visual impacts, including:
- where possible, trees will be retained to maintain visual amenity;
 - planting of vegetation screening, where necessary, to shield the proposed Mining Services Facility; and
 - all buildings and infrastructure potentially visible to the public, including the proposed Mining Services Facility, will be coloured in suitably natural tones, where practicable.

6.14 Waste

- 6.14.1 The management of waste materials generated by the construction and operation of the Project will be managed through the design; procurement of materials and purchasing; identification and segregation of reusable and recyclable materials; processing materials for recycling; and considering environmental impacts for waste removal processes, as outlined in the existing Waste Management Plan.

6.15 Community

- 6.15.1 WWC will continue to prepare and distribute a community newsletter to surrounding residences every six months.
- 6.15.2 WWC will continue to engage the community regarding the Project and operations in general through a Community Consultative Committee, as considered appropriate by Department of Planning.

6.16 Decommissioning and Mine Closure

- 6.16.1 A detailed closure planning process will be undertaken for the Project five years prior to cessation of mining.
- 6.16.2 Decommissioning of the mining operations and surface facilities associated with the Project will occur progressively throughout the life of the Project, in accordance with conditions of the relevant mining titles and existing closure plan. This will include progressive decommissioning of mine entries, ventilation fans, ventilation shafts, borehole facilities and associated surface facilities, where no longer required. A decommissioning plan will be prepared for each stage as part of the MOP process and provided to DI&I for approval prior to the commencement of decommissioning works.

6.17 Environmental Management, Monitoring, Auditing and Reporting

Annual Environmental Management Report

6.17.1 WWC will prepare an Annual Environmental Management Report for the Project.

Independent Environmental Audit

6.17.2 Three years after commencement of the Project mining operations, and every five years thereafter, WWC will commission and pay the full cost of an Independent Environmental Audit of the Project in consultation with the Director-General of DoP. A copy of the audit report will be provided to the Director-General of DoP, DI&I, DECCW.

APPENDIX 2

EPL Conditions

Appendix 2 – Draft EPL Conditions

The draft Environment Protection Licence (EPL) conditions were included in the DECCW's submissions. The conditions are reproduced in full below and WWC comments and suggested amendments as tracked changes noted below each condition.

Issue

L6.1 Noise from the premises must not exceed the sound pressure level (noise) limits presented in the Table below. Note the limits represent the sound pressure level (noise) contribution from the premises, at the nominated receiver locations in the table.

Noise Limits (dB(A))

Location	Day	Evening	Night	
	LAeq, 15 minutes, dB(A)	LAeq, 15 minutes, dB(A)	LAeq, 15 minutes, dB(A)	LA1, (1 minute) or LA maximum
R1 – 48 The Trongate Killingworth	39	39	39	45
R2 – 2 The Trongate Killingworth	41	41	41	48
R3 – 50 Charlton St Barnsley	40	40	40	45
R4 – 15 Bendigo St Barnsley	41	41	41	45
R5 – off Charlton St (15 Charlton St) Barnsley	37	37	37	45
R6 – 94 Northville Dr Barnsley	35	35	35	45
Any residence in Wakefield	35	35	35	45

Note: Assessment locations are as shown in Figure 5.1 of "Noise Assessment" contained within the "Environmental Assessment West Wallsend Colliery Continued operations Project", dated July 2010 and prepared by Umwelt (Australia) Pty Ltd for Oceanic Coal Australia Limited.

Response

WWC agrees with the above draft EPL condition.

Issue

L6.2 For the purpose of Condition 6.1:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm;
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holiday's.

L6.3 Noise from the premises is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of the dwelling where the dwelling is more than 30 metres from the boundary, to determine compliance with the noise level limits in Condition L6.1.

Noise from the premises is to be measured at 1m from the dwelling façade to determine compliance with the L_{A1} (1 minute) noise level in L6.1.

Where it can be demonstrated that direct measurement of noise from the premises is impractical, the DECCW may accept alternative means of determining compliance. See Chapter 11 of the NSW Industrial Noise Policy.

The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.

L6.4 The noise emission limits identified in Condition L6.1 apply under meteorological conditions of:

- Wind speed up to 3m/s at 10 metres above ground level; or
- Temperature inversion conditions of up to 3°C/100m and wind up to 2m/s at 10 metres above the ground.

Response

WWC agrees with the above draft EPL conditions.

Issue

Hours of Construction

L6.5 All construction work at the premises must be conducted between 7am and 6pm Monday to Friday and between 8am to 1pm Saturdays and at no time on Sundays and public holidays, unless inaudible at any residential premises.

Response

WWC agrees with the above draft EPL condition.

Issue

U1.1 Pollution Reduction Program 1 – Revised Water Management Plan

Submit a Revised Water Management Plan (RWMP), to the EPA taking into consideration best management practices for coal mining operations. The RWMP should include, but need not be limited to, the following:

- (a) A water management system that implements industry best management practice in separating the “clean” and “dirty” water streams into 2 discrete drainage systems. Dirty water refers to all waters on the premises that have come into physical contact with coal, or mined carbonaceous materials. clean waters refer to rain run-off waters that have never come into contact with coal, or mind carbonaceous materials;
- (b) A revised water balance and water storage plan for the premises that has the following objectives;
 - (i) Minimising all water discharges from the premised at any time by efficient water management methods, such as maximising all opportunities for on-site water use, spray irrigation and water storage;
 - (ii) Minimising all discharges of “dirty water” from the premises at any time;

(iii) Ensuring that activities undertaken by the mine do not pollute waters.

Implementation of the RWMP on the premises must be completed within 12 months of the finalisation of the Revised Water Management Plan.

The EPA will use the information in the RWMP to further revise the water discharge and monitoring conditions in the licence.

Response

As discussed in **Section 2.2.2**, WWC have committed to the preparation and implementation of a detailed Water Management Plan.

The Water Management Plan would include all management and mitigation measures outlined in the EA. The Water Management Plan would also include detailed water balance modelling including the onsite reuse of wastewater.

It is expected that the project approval condition will require this to be prepared in consultation with DECCW and NOW and to the satisfaction of DoP.

It is of particular concern that DECCW are considering using the water management plan as the driver to consider changes to water discharge conditions, as such conditions are a fundamental part of the statutory controls for the mine and any significant changes could affect mine feasibility.

Issue

U1.2 Pollution Reduction Program 2 – Noise Amelioration Works – ~~Enclose~~ Coal Breaker

By 30 September 2011 the proponent must undertake the works necessary to ~~enclose~~ the coal breaker such that a noise reduction of 10 dBA at the source is achieved. By 30 September 2011 the proponent must supply DECCW with a report from a noise consultant demonstrating that the works described above have been achieved.

Response

As discussed in Section 5.7.5.1 of the EA, WWC is committed to mitigating the noise impact from the coal breaker by approximately 10 dB by enclosing the existing coal breaker.

WWC agrees with the draft EPL condition.

Issue

U1.3 Pollution Reduction Program 3 – Noise Management Plan

The proponent must submit a Noise Management Plan to DECCW by 30 November 2011 identifying methodologies that will be employed on the premises to reduce noise emissions down to the project specific noise criteria detailed in the Noise Impact Assessment contained within the *“Environmental Assessment, West Wallsend Colliery Continued Operations Project July 2010”*.

Response

As outlined in **Section 2.2.3**, WWC has committed to preparing and implementing a Noise Management Plan in response to DECCW's request.

It is expected that the project approval condition will require this to be prepared in consultation with DECCW and to the satisfaction of DoP.

APPENDIX 3

West Wallsend Colliery Pre Clearance Procedure



ACN 003 856 782

Manager & Agent of the Macquarie Coal Joint Venture

EMS-P-004

PROCEDURE FOR CLEARANCE FOR WORK

1.0 Purpose

The purpose of this procedure is to facilitate that the required environmental approvals have been received and appropriate pollution controls implemented prior to any changes to existing activities / processes or proposed new projects. This procedure facilitates that ecological features, Aboriginal sites and surface infrastructure are not impacted by OCAL's operations without the relevant environmental approvals being obtained prior to the disturbance.

2.0 Scope

This procedure applies to West Wallsend Colliery, Macquarie Coal Preparation Plant, Westside Mine and Teralba Colliery. As a minimum, this procedure is applicable to:

- new activities requiring approval from a government authority;
- any changes to the mining operation outside of the approved mining plan;
- extension and or alteration to emplacement areas;
- subsidence impact remediation / rehabilitation works;
- any surface works which result in any surface disturbance to soil or vegetation e.g. new mining strips, access tracks;
- alterations or additions to surface infrastructure including plant and equipment or pollution control activities;
- installation of survey lines;
- pollution control maintenance activities e.g. dam cleaning.
- exploration or drilling activities including maintenance of existing access tracks; and
- significant alteration to underground activities that may directly or indirectly cause potential environmental impacts (e.g. significant alteration to underground water management system).

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3.0 Procedure

3.1 Roles and Responsibilities

The roles and responsibilities of OCAL personnel in relation to this Clearance for Work Procedure are outlined in **Table 3.1** below.

Table 3.1 – Roles and Responsibilities

Role	Responsibility
Operations / Site Managers	<ul style="list-style-type: none">• To ensure that adequate resources are available for the implementation of this procedure
OCAL Environment and Community Coordinator	<ul style="list-style-type: none">• To facilitate that the requirements of this procedure are implemented,• To nominate environmental controls to be implemented for operational changes / clearing activities,• To provide training so that all personnel are aware of the requirements of this procedure.
OCAL Project Managers / Site Environmental Supervisors	<ul style="list-style-type: none">• To ensure that a Clearance for Work Form is completed, if required, for their nominated project, in accordance with this procedure.

3.2 Determining Whether This Procedure is Applicable

1. Prior to any changes to existing activities/processes or proposed new projects, the OCAL Project Manager is to consider **Section 2** and **Appendix 1**, to determine whether a clearance for work form is required to be completed.
2. Based on the examples outlined in **Appendix 1**, if it is determined by the OCAL Project Manager that the Clearance for Work procedure is not required to be undertaken, work may proceed in accordance with the site Environmental Management Manual (EMM).

Alternatively, if the OCAL Project Manager is unsure whether a clearance for work form is required, the OCAL Project Manager is to consult with the OCAL Environment and Community Coordinator. The final decision on whether the procedure is applicable is to be made by the OCAL Environment and Community Coordinator.

3.3 Environmental Assessment

1. The Environment and Community Coordinator is to facilitate that the activity is assessed in accordance with **EMS-P-001-Ongoing Identification of Aspects and Impacts**.
2. The Environment and Community Coordinator is to facilitate that the necessary approvals have been obtained prior to the commencement of work.
3. The Environment and Community Coordinator, in consultation with the OCAL Project Manager, is to develop and implement strategies (including an inspection program) to eliminate or minimise the environmental risks / impacts prior to the commencement of work.

3.4 Clearance for Work Form

- In consultation with the Environment and Community Coordinator, the OCAL Project Manager must complete a clearance for work form (EMS-APX-008-F-003 – See **Appendix 2**) prior to the commencement of work. The form is to be signed by the Operations / Site Manager, the OCAL Environment and Community Coordinator and the OCAL Project Manager.
- The completed clearance for work form must be forwarded to the Environment and Community Coordinator where the forms are stored in the relevant site EMM.
- A clearance for work form is valid for two months from the date of the Operations / Site Manager's signature. If work has not commenced within this time, a new clearance for work form is required to be completed.
- Any changes to work outside the original scope of works, as identified on the clearance for work form, requires the completion of a new clearance for work form.
- The Environment and Community Coordinator will keep a central register of clearance for work forms for future reference.

4.0 Review

This Clearance for Work Procedure is to be reviewed every two years, or earlier as required. The reviews will reflect changes in environmental requirements, technology or operational procedures. Detailed in **Table 4** below is a summary of the changes which were during the relevant review of the procedure.

Table 4 - Summary of amendments to EMS-P-005

Revision	Review Date	Section	Amendment
2	Jul 2008	2.0	Addition of additional activities requiring the completion of a Clearance for Work Form (i.e. subsidence repair works, extension/alteration to emplacement areas etc.).
2	Jul 2008	3.1	Review of Roles and Responsibilities.
2	Jul 2008	3.4	Review of procedure for completing Clearance for Work Forms, including the requirement to keep a central register of completed forms.
3	Dec 2008	2.0	Change of 'new surface works' to 'any surface works' to capture all clearing activities.
3	Dec 2008	3.2	Addition of requirement for OCAL ECC to have final decision on whether procedure is applicable.

5.0 Definitions

Environmental Aspect: refers to an element of an organisation's activities, products or services, which can have a beneficial or adverse impact on the environment.

Environmental Impact: refers to the change, which takes place in the environment as a result of the aspect.

OCAL Project Manager: refers to the OCAL employee that is responsible for the co-ordination of the project / work.

6.0 References

EMS-P-002-Internal & External Communication

EMS-P-003-Document Control

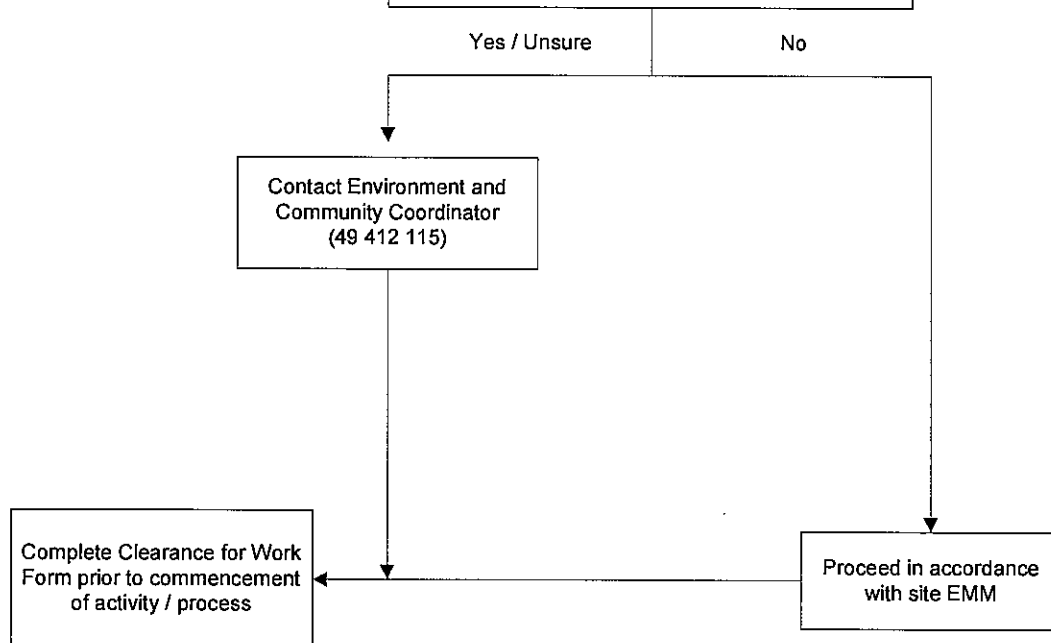
HSEC STD1.02 – Risk Management

Oceanic Coal Australia Limited – Environmental Management System			
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Appendix 1 – Clearance for Work Applicability

Clearance for Work Applicability

- new activities requiring approval from a government authority;
- any changes to the mining operation outside of the approved mining plan;
- subsidence impact remediation / rehabilitation works;
- extension and or alteration to emplacement areas;
- new surface works which result in any surface disturbance to soil or vegetation e.g. new mining strips;
- alterations or additions to surface infrastructure including plant and equipment or pollution control activities;
- installation of survey lines;
- pollution control maintenance activities e.g. dam cleaning.
- exploration or drilling activities including maintenance of existing access tracks; and
- significant alteration to underground activities that may directly or indirectly cause potential environmental impacts (e.g. significant alteration to underground water management system).



Examples of potential environmental incidents which may result from a failure to complete the form include:

- Clearance of vegetation outside approved areas resulting in non-compliance with operating conditions or disturbance of significant species or habitat;
- Destruction of Aboriginal artefacts without necessary Consent to Destroy Permits;
- Community complaints due to increased noise, vibration or dust levels or a significant degradation in visual amenity as a result of changes to plant or equipment;
- Increased pollution off-site and potential liabilities due to an alteration to the pollution control system; and
- Demolition of heritage buildings without the relevant approvals.

Appendix 2 – Clearance for Work Form

OCEANIC COAL AUSTRALIA LIMITED			
FORM 3 – CLEARANCE FOR WORK			
Activity:			
Scope of Works:			
Clearance for Work No:		Location of Work (Plan attached Y/N):	
Name of OCAL Project Manager:		Contact Phone:	
Pre-Work Environmental Checklist		Yes	No
			Not Applicable
Environmental Assessment			
Has the work site, including access tracks been assessed in terms of containing:			
• areas of high social/community consideration?			
• areas of high in agricultural or pastoral values?			
• high conservation values?			
• important heritage values?			
• important Aboriginal cultural or archeological values?			
• important water resources?			
• Important flora and fauna species/communities?			
• potential for acid sulphate soils to be disturbed?			
• risks from plant disease, weeds or feral animals?			
• entry or other restrictions (e.g. State or Federal Departments, local government authority, landowner/lessee)?			
Have alternative work sites been assessed with the aim to minimise potential environmental impacts?			
Has an environmental program been developed to implement the actions identified in the environmental risk assessment in order to eliminate or minimise potential environmental impacts?			
Has an environmental management plan been completed to protect or minimise damage to those parts of the work site (including access tracks) having high environmental, social or other values?			
Has suitable equipment been selected to minimise the environmental impacts on the work site?			
Has a suitable water resource been identified for water cart purposes?			
Have pre-work site photographs been taken?			
Has the area to be cleared at the work site been marked to prevent unnecessary clearing?			
Has the requirement for erosion and sediment controls (e.g. sediment fencing, windrows) been considered. If required, these controls are to be put in place prior to the commencement of work.			
Have applicable approvals been reviewed to determine limits on hours of work?			
Has a JSA or risk assessment, including environmental risks, been completed? If not, this must be completed prior to commencement of works. Attach a copy of the completed JSA to the back of this form.			

Pre-Work Environmental Checklist	Yes	No	Not Applicable
Communication			
Has the relevant approvals/agreements been granted from:			
• Department of Primary Industries?			
• Department of Water and Energy?			
• Department of Environment and Climate Change (Parks and Wildlife Division)			
• Department of Environment and Climate Change (Climate Change and Environment Protection Group)			
• Local Council?			
• State Forests?			
• Public Utilities (water supply, electricity, gas/fuel, roads etc.)?			
• Landholder/Lessee/Land User?			
• Aboriginal Stakeholders?			
• Other community members who may be affected?			
• Other stakeholders?			
Have the relevant stakeholders been contacted regarding the commencement of work?			
Has an Environmental Officer Inspection Checklist been implemented to determine whether the work team is conducting the operation in compliance with the site EMM and regulatory conditions?			
Has the company's 'community enquiries line' details been issued to the relevant stakeholders?			
Contractor Management			
Has the completed contract containing agreed environmental responsibilities been received from the contractor?			
Has the contractor provided suitably qualified personnel?			
Has the contractor's team been inducted?			
Have emergency contact details and response procedures been issued to the contractors?			
Has the Head Contractor been issued with the relevant Environmental Control Plans and regulatory conditions (if applicable)?			
Has pre-work inspections been conducted on all vehicles in terms of environmental acceptability (e.g. free of fuel/oil leaks, free of seeds and mud, mufflers and safety gear well maintained, dust and noise control devices well maintained)?			
Summary of Environmental Controls to be Implemented (Permit sign off over page)			

Summary of Environmental Controls to be Implemented cont.		
OCAL Project Manager Signature	Date:	
Environment and Community Coordinator Signature	Date:	
Operations Manager / Site Manager Authorisation	Date:	
Note: This form is valid for 2 months from the date of the Site Manager's signature. If work has not commenced within this time, a new Clearance for Work Form is required to be completed.		

**Umwelt (Australia) Pty Limited
2/20 The Boulevard
PO Box 838
Toronto NSW 2283**

**Ph. 02 4950 5322
Fax 02 4950 5737**