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**FLORA AND FAUNA
ASSESSMENT FOR LONGWALL
201-204 EXTRACTION PLAN**

Ashton Coal

FINAL

September 2016



FLORA AND FAUNA ASSESSMENT FOR LONGWALL 201-204 EXTRACTION PLAN

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Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Ashton Coal

Project Director: Allison Riley
Project Manager: Shaun Corry
Report No. 3776/R01/V5
Date: September 2016



Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au



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1.0 Introduction

Ashton Coal Operations Ltd (ACOL) commissioned Umwelt (Australia) Pty Limited (Umwelt) to prepare a Flora and Fauna Assessment for the Extraction Plan (EP) for mining longwalls 201-204 in the Upper Lower Liddell (ULLD) Seam (herein referred to as the EP Area). The location of the EP Area is approximately 14 kilometres northwest of Singleton, NSW (refer to **Figure 1**). The landscape generally consists of undulating hills dominated by open grasslands and floodplains of the lower reaches of Bowman's Creek. Remnant woodland occurs in the south-eastern portion of the EP Area, referred to as the Southern Conservation Area. The EP Area has predominantly been used historically for grazing of livestock.

Substantial ecological monitoring, survey and assessment have been undertaken at the Ashton site since 2003. Since the 2003 Ecological Assessment, subsequent ecological surveys have identified a total of 24 fauna species listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). No flora species listed under the TSC and EPBC Act have been recorded within the EP Area.

Mining at ACOL is approved under Development Consent DA309-11-2001i and referral of the Project to the Commonwealth department of the environment determined that the project was not deemed a 'controlled action' in accordance with the provisions of the EPBC Act.

This Flora and Fauna Assessment has been prepared by Umwelt to review predicted impacts against those approved in the Development Consent for the Ashton Coal Project DA309-11-2001i and consider the impacts of predicted subsidence within the EP Area on native flora and fauna species, including endangered populations, endangered and vulnerable ecological communities and their habitats. Terrestrial vegetation communities, flora and fauna species and fauna habitat, and aquatic flora and fauna species and habitat present in the EP Area have been identified and considered as part of the impact assessment.

The objectives of the Flora and Fauna Assessment were to:

- Review the flora and fauna species and communities occurring within the EP Area
- Identify any threatened flora and fauna species, endangered populations, endangered ecological communities, or their habitats, within the EP Area, particularly those listed under the TSC Act, NSW *Fisheries Management Act 1994* (FM Act), and the EPBC Act
- Review predicted impacts against those approved in the Development Consent for the Ashton Coal Project DA309-11-2001i
- Identify the potential impact of mining on any threatened flora and fauna species, endangered populations, Threatened Ecological Communities (TECs), or their habitats recorded in the EP Area and
- Provide management options to minimise ecological impacts associated with mining.

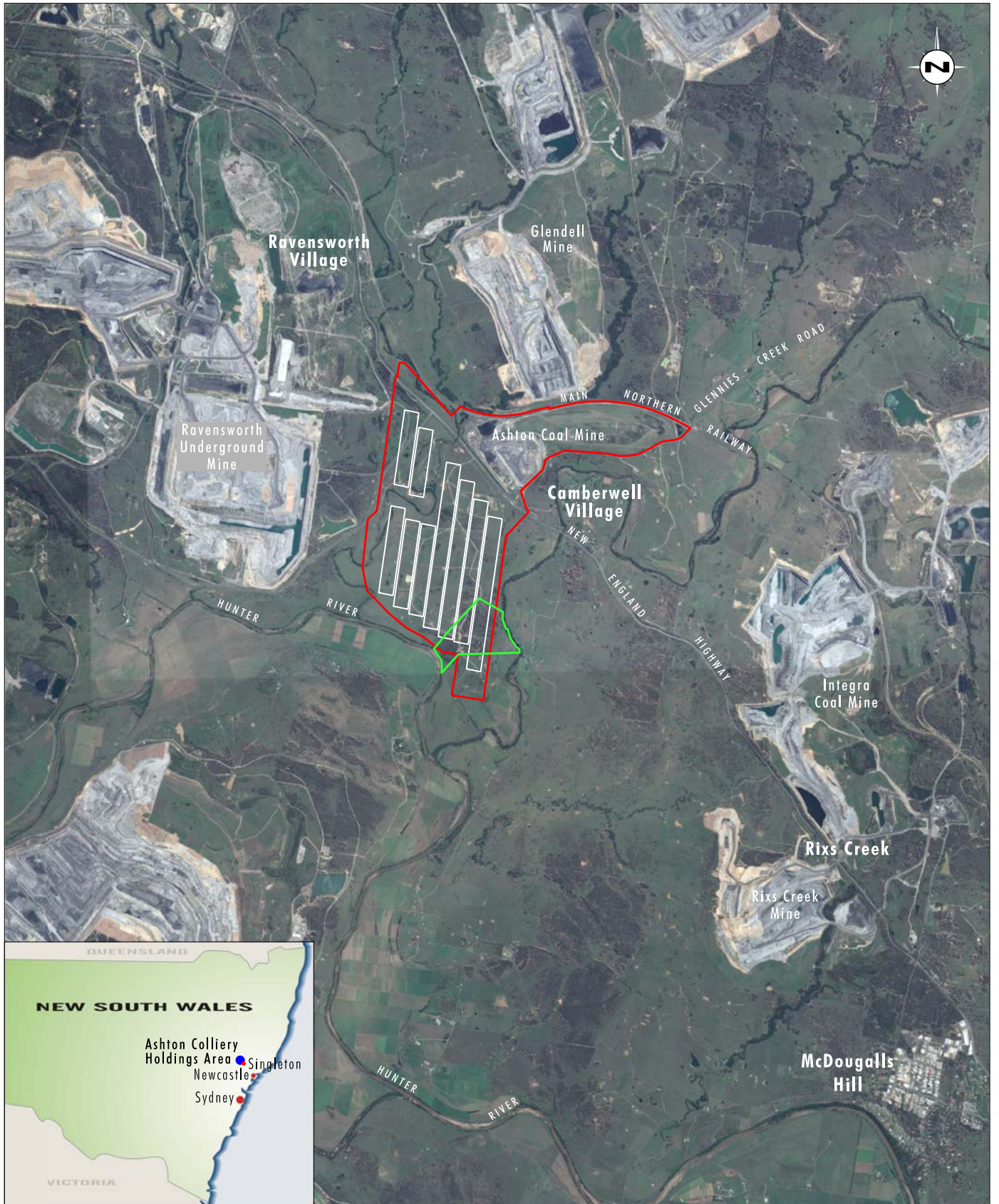


Image Source: Google Earth - Sinclair Knight Merz (2015)
 Data Source: Ashton Coal (2016), LPI (2009)

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Legend

- Ashton Colliery Holdings Area
- VCA Boundary
- Longwall Panel

FIGURE 1
 Locality Plan

2.0 Biodiversity Context

A detailed review of relevant reports and vegetation mapping relevant to the EP Area, as well as searches of relevant ecological databases was undertaken to identify the full range of species, populations and communities occurring in the EP Area. The following ecological reports were reviewed:

- ACOL Flora and Fauna (Biodiversity) Management Plan (AECOM 2012)
- ACOL Bi-Annual Fauna Monitoring Reports 2006 – 2015
- ACOL Weed Monitoring Reports 2014 – 2015 and
- ACOL Environmental Impact Assessment (EIS) and Modifications.

In addition, an updated search of the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database was undertaken to identify all potential threatened species, endangered populations and TECs with the potential to occur in the EP Area.

2.1 Vegetation Communities

The following vegetation communities have been identified within the EP Area and are shown on **Figure 2**:

- Central Hunter Box-Ironbark Woodland EEC

This community occurs as patches across the EP Area, including within the Southern Conservation Area. Approximately 33 hectares of this community occurs within the EP Area. The community is an open grassy woodland dominated by bullock (*Allocasuarina luehmannii*), and the sub-dominant narrow-leaved ironbark (*Eucalyptus crebra*) and grey box (*E. moluccana*). The understorey is sparse and generally consists of *Acacia amblygona*, *Daviesia genistifolia*, white wattle (*Acacia linifolia*), African boxthorn (*Lycium ferocissimum*) and turkey bush (*Eremophila deserti*). The ground cover is relatively depauperate of species, with occasional three-awned spear grass (*Aristida vagans*), barbed wire grass (*Cymbopogon refractus*), plume grass (*Dichelachne rara*), weeping grass (*Microlaena stipoides*), pale mat-rush (*Lomandra glauca*), poison rock fern (*Cheilanthes sieberi*) and kidney weed (*Dichondra repens*).

- Derived Grassland

Approximately 166 hectares of this community occurs within the EP Area. Commonly occurring native species in this community include cane speargrass (*Aristida ramosa*), bamboo speargrass (*Austrostipa verticillata*) and cupgrass (*Eriochloa pseudoacrotricha*), while exotic species include *Paspalum dilatatum*, lucerne (*Medicago sativa*), Rhodes grass (*Chloris gayana*) and rye grass (*Lolium* sp.). Scattered trees among this community include bullock (*Allocasuarina luehmannii*), narrow-leaved ironbark (*Eucalyptus crebra*) and grey box (*E. moluccana*), which occasionally have African boxthorn (*Lycium ferocissimum*) at the base.

2.2 Endangered Populations

The *Eucalyptus camaldulensis* (river red gum) in the Hunter Catchment endangered population known to occur downstream of the Bowmans Creek diversion and outside the EP Area. Management of this endangered population forms part of the existing Flora and Fauna (Biodiversity) Management Plan for the approved underground mining activities. No other endangered populations are known to occur in the EP Area.

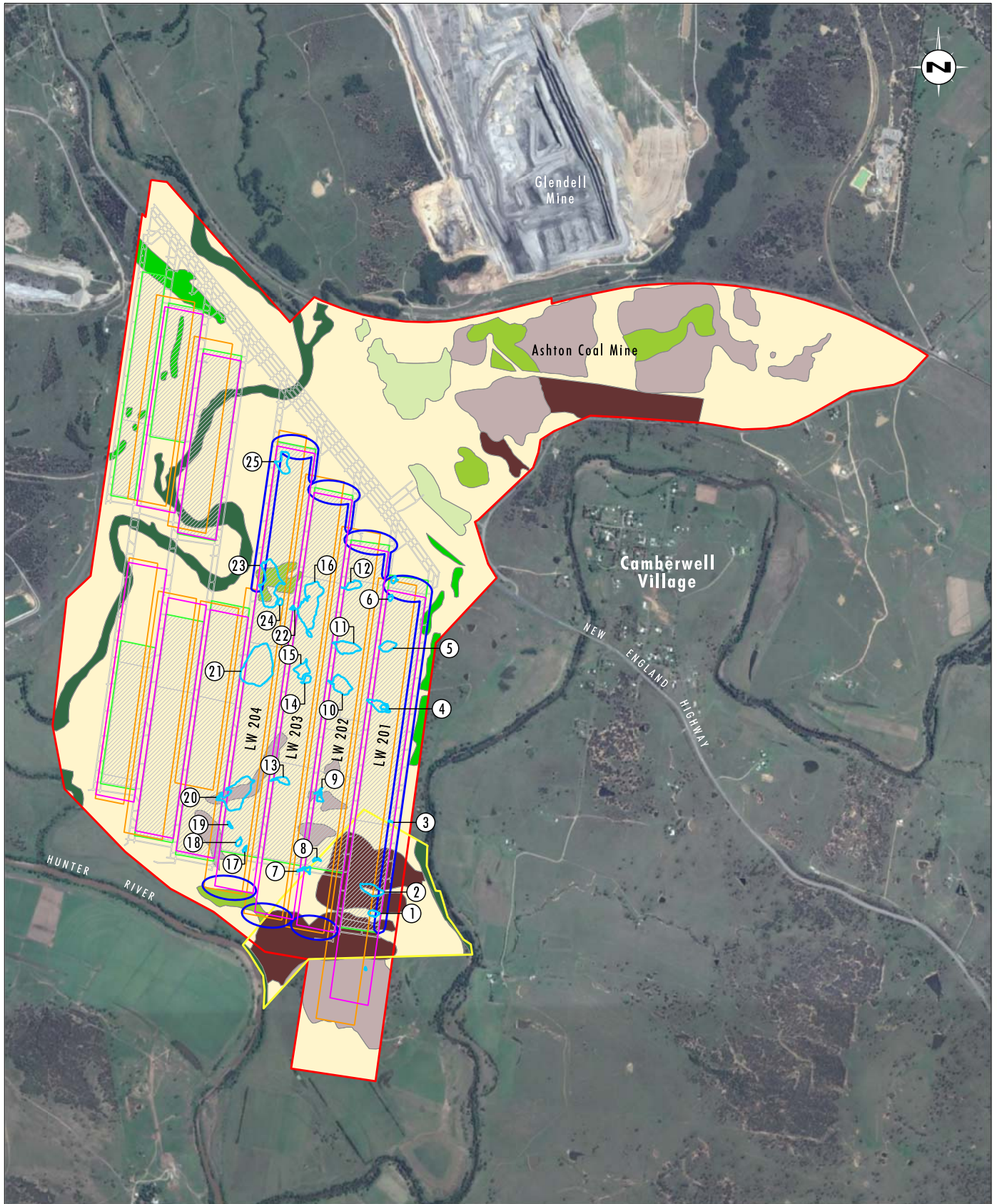


Image Source: Google Earth/CNES/Astrium (Nov/2015)
 Data Source: Ashton Coal (2016), SCT (2016)

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Legend

- | | |
|--|---|
| Ashton Colliery Holdings Area | Bull Oak (Closed) |
| VCA Boundary | Bull Oak (Open) |
| Longwall Panel | Grassland |
| Potential Ponding | Riparian |
| Stacked Goaf Edges | Tree Revegetation |
| PG Seam Goaf Outline | Woodland (Closed) |
| ULD Seam Goaf Outline | Woodland (Open) |
| ULLD Seam Goaf Outline | |

FIGURE 2

Vegetation Communities

2.3 Threatened Flora and Fauna Species

The broad fauna habitat types of grassland and woodland occur within the EP Area are representative of the broad habitat types within the surrounding region. All habitats in the region have been extensively cleared or modified for agriculture, largely for cattle grazing. Communities occurring on floodplains and more fertile soils in the Hunter Valley floor have been most extensively cleared (Peake 2006). Because of the widespread clearing of habitats in the region, those remaining contain important refuges for a number of fauna species, many of which are now threatened due to habitat loss and fragmentation.

Woodland and forests of the central Hunter Valley floor support a range of fauna species. These habitats are characterised by a dry environment with little or no standing water. Habitat is provided by a moderately open canopy and a sclerophyllous understorey that ranges from very dense to sparse, while the ground cover is generally sparse and dominated by grasses and forbs.

Grassland habitats are dominated by a range of native and naturalised perennial grasses and forbs. The health and integrity of the vegetation largely corresponds with the grazing history, particularly grazing intensity with many grassland habitats formed as a result of the clearing of woodland well over 100 years ago. The grass and forb dominated groundcover includes log and stump cover that provides habitat for grassland mammals (small and large), birds and terrestrial reptile species. The highly scattered trees throughout the grassland provided nesting, roosting and perching habitat for bird species, roosting habitat for some micro-bat species and shade for larger grazing mammal species.

No threatened flora species have been recorded in the EP Area during previous surveys. A total of 20 threatened fauna species have been recorded, or are considered likely to occur within the EP Area. Threatened fauna species previously recorded at, or immediately adjacent to the EP Area are shown on **Figure 3** and include:

- hooded robin (*Melanodryas cucullata cucullata*)
- grey-crowned babbler (*Pomatostomus temporalis temporalis*)
- speckled warbler (*Chthonicola sagittatus*)
- turquoise parrot (*Neophema pulchella*)
- flame robin (*Petroica phoenicea*)
- scarlet robin (*Petroica boodang*)
- barking owl (*Ninox connivens*)
- spotted harrier (*Circus assimilis*)
- black-breasted buzzard (*Hamirostra melanosternon*)
- little eagle (*Hieraaetus morphnoides*)
- masked owl (*Tyto novaehollandiae*)
- large-eared pied bat (*Chalinolobus dwyeri*)
- eastern bentwing bat (*Miniopterus schreibersii oceanensis*)

- greater broad-nosed bat (*Scoteanax rueppellii*)
- yellow-bellied sheath-tail bat (*Saccolamimus flaviventris*)
- large-footed myotis (*Myotis macropus*)
- eastern freetail-bat (*Mormopterus norfolkensis*)
- grey-headed flying-fox (*Pteropus poliocephalus*)
- squirrel glider (*Petaurus norfolcensis*)
- brush-tailed phascogale (*Phascogale tapoatafa*).

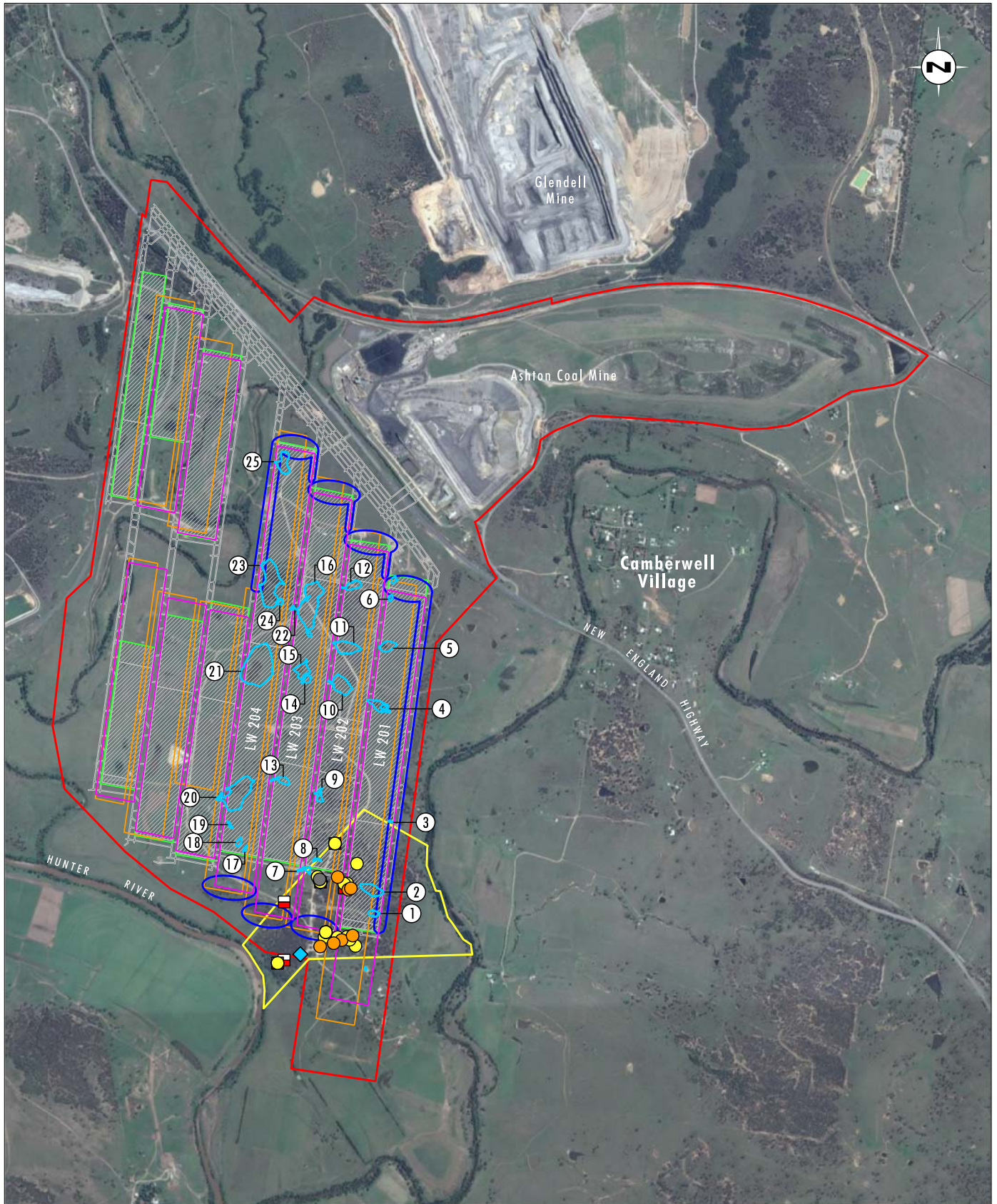


Image Source: Google Earth/CNES/Astrium (Nov/2015)
 Data Source: Ashton Coal (2016), SCT (2016)

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- | | |
|--|---|
| Ashton Colliery Holdings Area | Brush-tailed phascogale |
| VCA Boundary | Eastern bentwing-bat |
| Longwall Panel | Greater broad-nosed bat |
| Potential Ponding | ● Grey-crowned babbler (eastern subspecies) |
| Stacked Goaf Edges | ● Grey-crowned Babbler Nest |
| PG Seam Goaf Outline | ● Masked owl |
| ULD Seam Goaf Outline | |
| ULLD Seam Goaf Outline | |

FIGURE 3

Threatened Species Locations

3.0 Biodiversity Impacts

3.1 Predicted Impacts

A summary of the key predicted subsidence impacts, as they relate to biodiversity, is provided below. A detailed assessment of subsidence impacts is provided in the Subsidence Assessment for the Extraction Plan for LW201-204 in the Upper Lower Liddell Seam (SCT 2016). Impacts that have the potential to result in ecological implications include:

- Potential for substantial cracking / stepping associated with the stacked edges of the longwall panels for the different seams (refer to **Figure 4**). Cracking and stepping in these areas is likely to require surface remediation works which would impact any native vegetation occurring in these areas.
- Increased areas and depth of ponding. Pond 23 (as shown on **Figure 4**) is located in natural watercourses adjacent to Bowmans Creek and will impact remnant woodland. Drainage works are proposed to minimise some ponding areas and this will include re-contouring and drains. Pond 23 is expected to develop in the two parallel drainage lines and link into a single pond with depths of 2.5-3.5m in places. Any remediation works involving construction of drainage channels would be extensive because the two drainage channels are likely to be required. Increased ponding may result in adverse impacts to remnant vegetation and die back would like occur in any areas of remnant woodland in this area.
- Ponding is predicted along existing access tracks and remediation works would be required in these areas. These works have the potential to impact small areas of remnant vegetation adjacent to these areas.
- Remediation works are likely to be required on existing dams. These works have the potential to impact small areas of remnant vegetation or aquatic habitat associated with these areas.
- Surface cracking expected to occur in two remnant woodlands: the Voluntary Conservation Area and a small area of woodland area adjacent to a tributary of Bowmans Creek near the middle of Longwall 204. In both areas, surface cracking will typically be at the location of previous cracks and surface remediation works are likely to be required. These works have the potential to impact small areas of remnant vegetation adjacent to these areas.

The Subsidence Assessment for the Extraction Plan for LW201-204 in the Upper Lower Liddell Seam (SCT 2016) predicts that there will be no impacts on the Hunter River or Bowmans Creek and minimal impacts are predicted for the Hunter River Alluvium. Therefore, it is assumed there will be minimal impact on any groundwater dependent ecosystems (GDEs) or other vegetation communities occurring on the alluvium outside of the direct subsidence impact areas and no further assessment is provided.

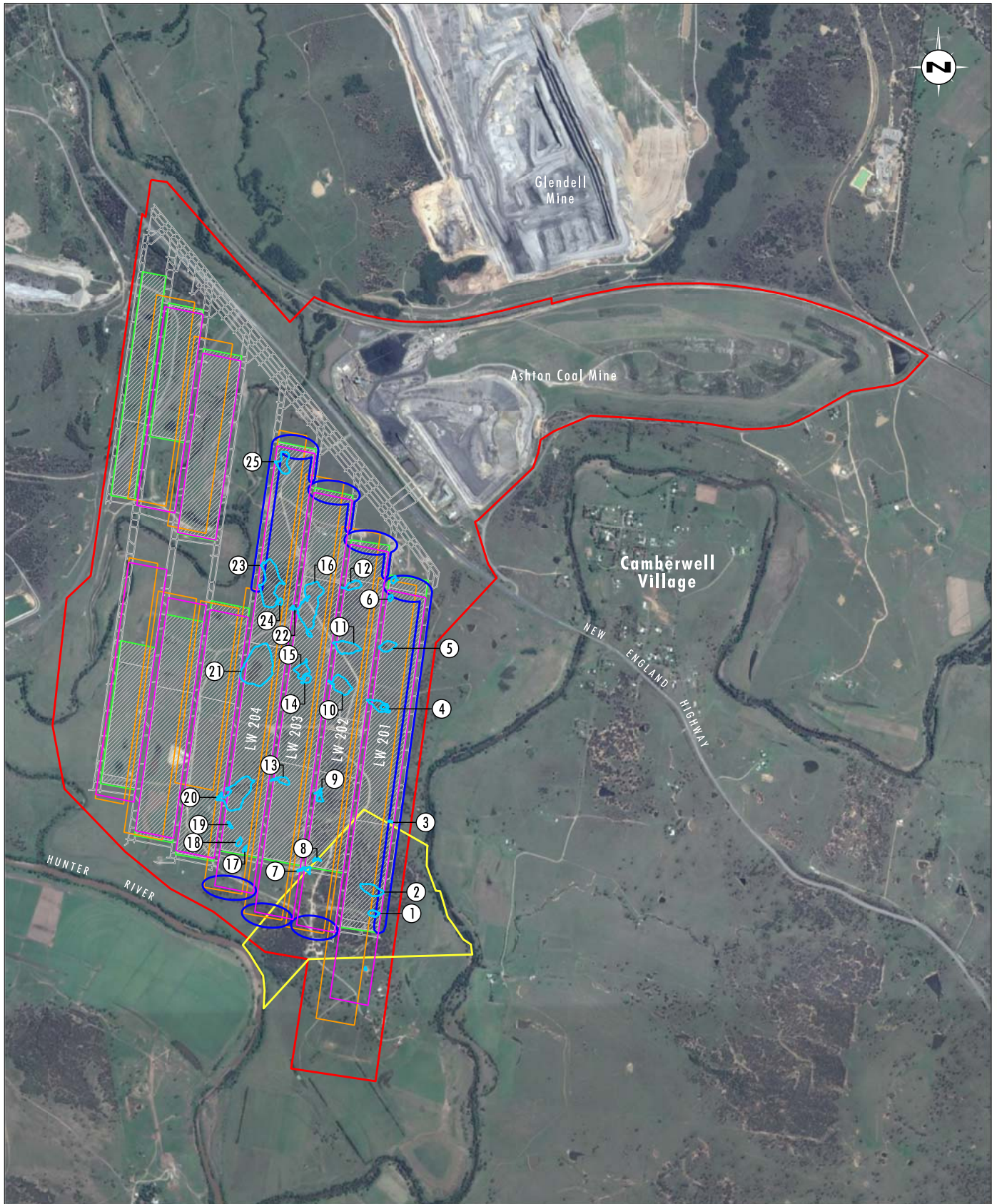


Image Source: Google Earth/CNES/Astrium (Nov/2015)
 Data Source: Ashton Coal (2016), SCT (2016)

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Legend

- ▬ Ashton Colliery Holdings Area
- ▬ VCA Boundary
- ▬ Longwall Panel
- ▬ Potential Ponding
- ▬ Stacked Goaf Edges
- ▬ PG Seam Goaf Outline
- ▬ ULD Seam Goaf Outline
- ▬ ULLD Seam Goaf Outline

FIGURE 4

Impact Areas from Potential Ponding and Stacked Goaf Edges

3.2 Ecological Impact Assessment

The subsidence assessment surface impacts associated with mining longwalls 201-204 are not expected to be substantially different compared to the impacts that were successfully managed during mining in the previous two seams (SCT 2016) and are consistent with the approved impacts in the Development Consent for the Ashton Coal Project DA309-11-2001i. Biannual ecological monitoring of EP Area since 2006 has identified no evidence of adverse post mining impacts on the extent of threatened species and threatened ecological communities occurring within the EP Area (refer to **Figure 5**).

Subsidence impacts associated with ponding and cracking/stepping that are likely to require remediation works will be required across approximately 13 hectares of Box - Ironbark Woodland EEC, with the majority of predicted subsidence impact occurring within derived grassland areas. Based on the outcomes of the Subsidence Assessment for the Extraction Plan for LW201-204 in the Upper Lower Liddell Seam (SCT 2016) that determined that predicted impacts are not expected to be substantially different compared to the impacts that were successfully managed during mining in the previous two seams (SCT 2016), the proposed mining of the ULLD in longwalls 201-204 is considered unlikely to have significant adverse impacts on known or potentially occurring threatened species, threatened ecological communities, endangered populations or migratory species that currently or could occur within the EP Area.

As identified on **Figure 3**, the VCA is expected to be impacted however, as subsidence predictions are not expected to be substantially different compared to the impacts that were successfully managed during mining in the previous two seams (SCT 2016), the ecological values associated with the VCA are not expected to be adversely affected.

The objective of s.5A of the EP&A Act, the *assessment of significance*, is to improve the standard of consideration afforded to threatened species, populations and ecological communities, and their habitats through the planning and assessment process, and to ensure that the consideration is transparent. The s.5A assessment of significance test has been used in a due diligence context to determine the overall significance of the impacts associated with mining the ULLD seam from longwalls 201-204 on threatened species and EECs known or predicted to occur in the EP Area (refer to **Table 3.1**).

The EP Area is not expected to provide habitat for an important population of an EPBC Act listed species, as described the Commonwealth Significant Impact Guidelines (DoE 2013) and therefore the predicted subsidence associated with mining the ULLD in longwalls 201-204 is considered unlikely to have significant adverse impacts on known or potentially occurring threatened species, threatened ecological communities, endangered populations or migratory species that currently or could occur within the EP Area.

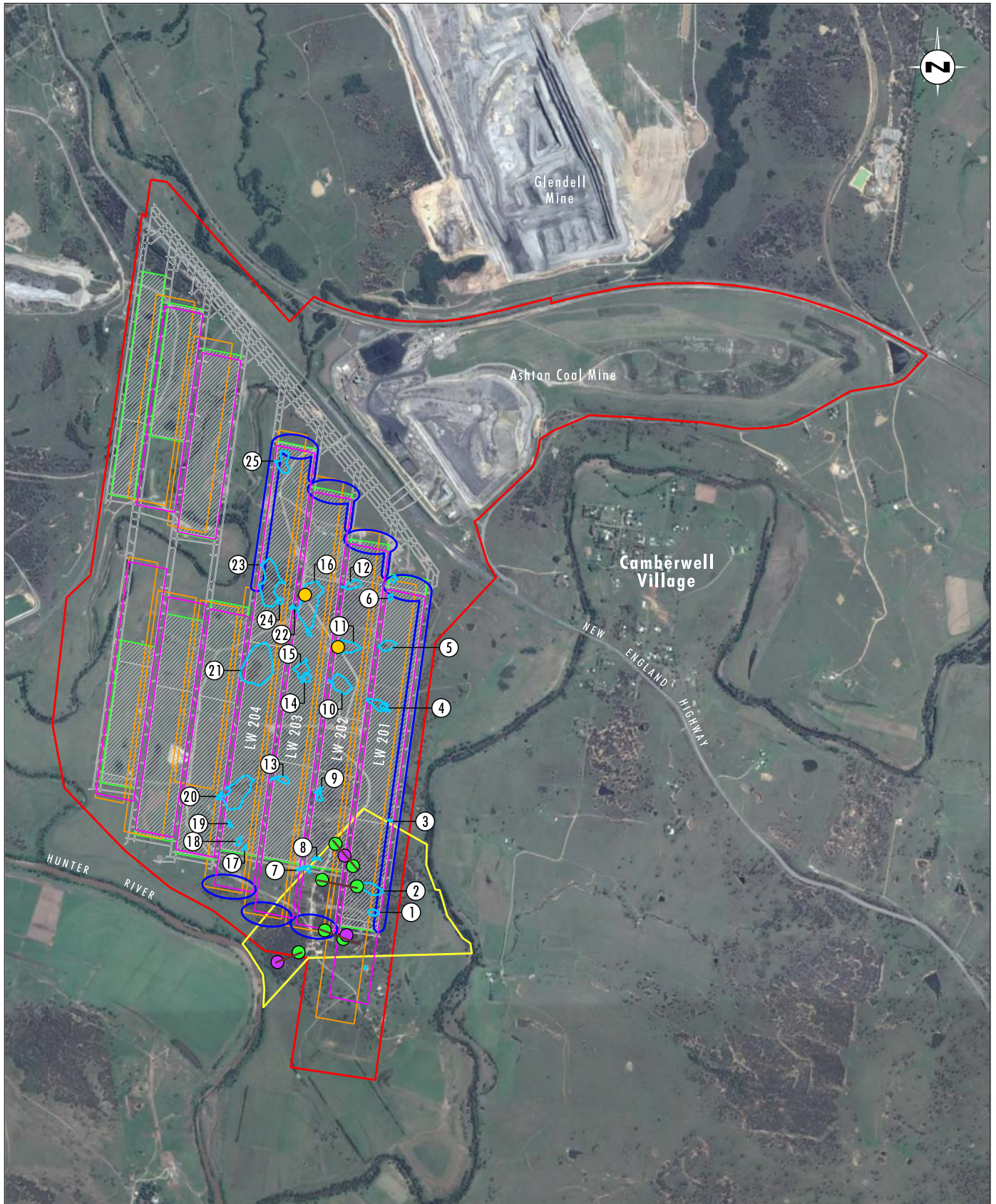


Image Source: Google Earth/CNES/Astrium (Nov/2015)
 Data Source: Ashton Coal (2016), SCT (2016)

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Legend

- ▬ Ashton Colliery Holdings Area
- ▬ VCA Boundary
- ▬ Longwall Panel
- ▬ Potential Ponding
- ▬ Stacked Goaf Edges
- ▬ PG Seam Goaf Outline
- ▬ ULD Seam Goaf Outline
- ▬ ULLD Seam Goaf Outline
- Drift Fence Line
- Frog Survey Dam
- Remote Camera
- ▬ Transect Line

FIGURE 5

Fauna Monitoring Locations

Table 3.1 Assessment of Significance

Matters for Consideration	Comment
<p>In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.</p>	<p>Mining the ULLD seam from longwalls 201-204 is unlikely to have an adverse effect on the life cycle of threatened species such that a viable local population of the species is likely to be placed at risk of extinction.</p>
<p>In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.</p>	<p>Mining the ULLD seam from longwalls 201-204 is unlikely to have an adverse effect on the life cycle of a species that constitutes an endangered population such that a viable local population of the species is likely to be placed at risk of extinction.</p>
<p>In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:</p> <p>is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction; or</p> <p>is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction</p>	<p>Mining the ULLD seam from longwalls 201-204 is not likely to have an adverse effect on the extent of an ecological community such that its local occurrence is likely to be placed at risk of extinction.</p> <p>The proposed action is not likely to substantially and adversely modify the composition of an ecological community such that its local occurrence is likely to be placed at risk of extinction.</p>
<p>In relation to the habitat of a threatened species, population or ecological community:</p> <p>the extent to which habitat is likely to be removed or modified as a result of the action proposed</p> <p>whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action; and</p> <p>the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality</p>	<p>Mining the ULLD seam from longwalls 201-204 would impact approximately 13 hectares of woodland habitat.</p> <p>The above impact is expected to not result in an area of habitat becoming fragmented or isolated from other areas of habitat.</p> <p>The predicted impacts are not expected to remove, modify, fragment or isolate an area of threatened species habitat such that the long-term survival of threatened species, populations or ecological communities in the locality is placed at risk.</p>
<p>whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)</p>	<p>There is no critical habitat listed under the TSC Act in the vicinity of the EP Area. Mining the ULLD seam from longwalls 201-204 will not result in a direct or indirect impact on critical habitat.</p>

Matters for Consideration	Comment
whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan	The mining the ULLD seam from longwalls 201-204 is expected to contravene the objectives of relevant recovery and threat abatement plans as habitat disturbance is likely to occur.
whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.	Mining the ULLD seam from longwalls 201-204 will not exacerbate the operation of, or increase the impact of key threatening processes operating within the EP Area.

4.0 Summary and Recommendations

As detailed above, the predicted surface impacts resulting from a third seam of mining are not expected to be significantly different compared to the impacts that were successfully managed during mining in the previous two seams (SCT 2016). Annual ecological monitoring conducted throughout the mining of the previous two seams has not identified any substantial differences between the ecological values of the EP Area post mining. Mining of the ULLD seam is considered unlikely to have a significant impact on any known or potentially occurring threatened species, threatened ecological communities, endangered populations or migratory species listed under the TSC Act or the EPBC Act based on the subsidence predictions provided by SCT (2016). Notwithstanding, below are some general recommendations to further minimise the potential impacts.

ACOL has an existing program of ecological monitoring which commenced in 2006. The monitoring program includes annual flora and riparian monitoring and biannual fauna monitoring. It is recommended that the monitoring program is continued to monitor the ecological values across the EP Area and to identify any unpredicted adverse impacts and make recommendation for ongoing management, if required.

ACOL should ensure that any proposed substantial subsidence remediation works are undertaken in accordance with the Flora and Fauna Management Plan and associated Vegetation Clearance Protocol.

5.0 References

AECOM (2012) Ashton Coal Project Flora and Fauna (Biodiversity) Management Plan

(DoE) Department of the Environment (2013) Significant Impact Guidelines 1.1 – Matters of National Environmental Significance

Enright Land Management (2015) Ashton Coal – Completed Weed Control Report 2014

ERM (2006) Ashton Coal Bi-annual Fauna Monitoring 2006 Autumn Census

ERM (2007a) Ashton Coal Bi-annual Fauna Monitoring 2006 Spring Census

ERM (2007b) Ashton Coal Bi-annual Fauna Monitoring 2007 Autumn Census

ERM (2007c) Ashton Coal Bi-annual Fauna Monitoring 2007 Spring Census

ERM (2008a) Ashton Coal Bi-annual Fauna Monitoring 2008 Autumn Census

ERM (2009a) Ashton Coal Bi-annual Fauna Monitoring 2008 Spring Census

ERM (2009b) Ashton Coal Bi-annual Fauna Monitoring 2009 Autumn Census

ERM (2010) Ashton Coal Bi-annual Fauna Monitoring 2009 Spring Census

HLA Envirosiences (2001) Environmental Impact Statement Ashton Coal Project

Pacific Environmental Associates (PEA) (2010) Ecological Monitoring June 2010-Ashton Coal Operations.

Pacific Environmental Associates (PEA) (2011) Ecological Monitoring Spring 2010 and Autumn 2011-Ashton Coal Operations

Pacific Environmental Associates (PEA) (2012) Ecological Monitoring Summer 2012 and Winter 2012-Ashton Coal Operations

Pacific Environmental Associates (PEA) (2013) Ashton Coal Operations Ecological Fauna monitoring- Autumn and Spring 2013

Pacific Environmental Associates (PEA) (2014) Ashton Coal Operations Bi-annual Fauna Monitoring Report- winter and summer 2014

Peake, T, C, (2006) *The Vegetation of the Central Hunter Valley, New South Wales. A Report on the Findings of the Hunter Remnant Vegetation Project*. Hunter – Central Rivers Catchment Management Authority, Paterson.

SCT (2016) Subsidence Assessment for the Extraction Plan for LW201-204 in the Upper Lower Liddell Seam

Umwelt (Australia) (2016) Ashton Coal 2015 Fauna Monitoring Program Report.



Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

Perth

PO Box 8177
Subiaco East WA 6008
33 Ventnor Avenue
West Perth WA 6005

Ph. 08 6260 0700

Canberra

PO Box 6135
56 Bluebell Street
O'Connor ACT 2602

Ph. 02 6262 9484

Sydney

50 York Street
Sydney NSW 2000

Ph. 1300 793 267

Brisbane

GPO Box 459
Brisbane QLD 4001

Ph. 1300 793 267