



Longwall 205 - 208 Extraction Plan
Flora and Fauna Assessment

Ashton Coal Operations Limited

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Abbreviations

Abbreviation	Description
ACOL	Ashton Coal Operations Ltd
ACP	Ashton Coal Project
BC Act	NSW <i>Biodiversity Conservation Act 2006</i>
DPIE	NSW Department of Planning, Industry and Environment
EA	Environmental Assessment
EIS	Environmental Impact Statement
ELA	Eco Logical Australia
EP	Extraction Plan
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FFA	Flora and Fauna Assessment
FM Act	NSW <i>Fisheries Management Act 1994</i>
GDEs	Groundwater Dependent Ecosystems
LW	Longwalls
MOD 6	Modification 6
TECs	Threatened Ecological Communities
ULLD	Upper Lower Liddell

1. Introduction

Eco Logical Australia Pty Ltd (ELA) was engaged by Ashton Coal Operations Ltd (ACOL) to undertake a Flora and Fauna Assessment (FFA) for the Extraction Plan (EP) for mining longwalls (LW) 205-208 in the Upper Lower Liddell (ULLD) Seam at the Ashton Coal Project site (ACP) (herein referred to as the EP Area).

Ecological monitoring, surveys and assessments undertaken within the ACP Development Consent boundary since 2003 have identified a total of 24 fauna species listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). No flora species listed under the BC Act and EPBC Act have been recorded during ecological surveys.

Mining at ACP is approved under Development Consent DA309-11-2001i (DA) and referral of the Project to the Commonwealth Department of the Environment (now Department of Agriculture, Water and the Environment) determined that the project was not deemed a 'controlled action' in accordance with the provisions of the EPBC Act.

This FFA has been undertaken to review the impacts of predicted subsidence from mining LW205-208 on native flora and fauna species against those approved in the Development Consent for the ACP (DA309-11-2001i). This includes impacts on threatened and protected flora and fauna species, populations and ecological communities and their habitats. Terrestrial vegetation communities, flora and fauna species and populations and 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 FFA were to:

- Review the flora and fauna species and communities occurring within the EP Area
- Identify any threatened and protected flora and fauna species, populations and ecological communities, or their habitats, within the EP Area listed under the BC Act, NSW *Fisheries Management Act 1994* (FM Act), and the EPBC Act
- Identify the potential impact of mining LW205-208 on any threatened and protected flora and fauna species, populations and ecological communities, or their habitats recorded in the EP Area
- Review predicted impacts against those approved in the Development Consent for the ACP DA309-11-2001i
- Make recommendations resulting from the assessment, including suggested monitoring, mitigation and management strategies.

1.1 Study Area

The EP Area is approximately 14 kilometres northwest of Singleton, NSW (Figure 1). The landscape generally consists of undulating hills, dominated by open grasslands and floodplains of the lower reaches of Bowmans Creek. Bowmans Creek has been diverted in two locations to allow mining of LW205-208. The previous alignments of Bowmans Creek overlay LW 206B and LW 207A and are lined with riparian vegetation. The EP Area has predominantly been used historically for grazing of livestock.

LW205-208 are located in areas where shallower seams have already been mined.

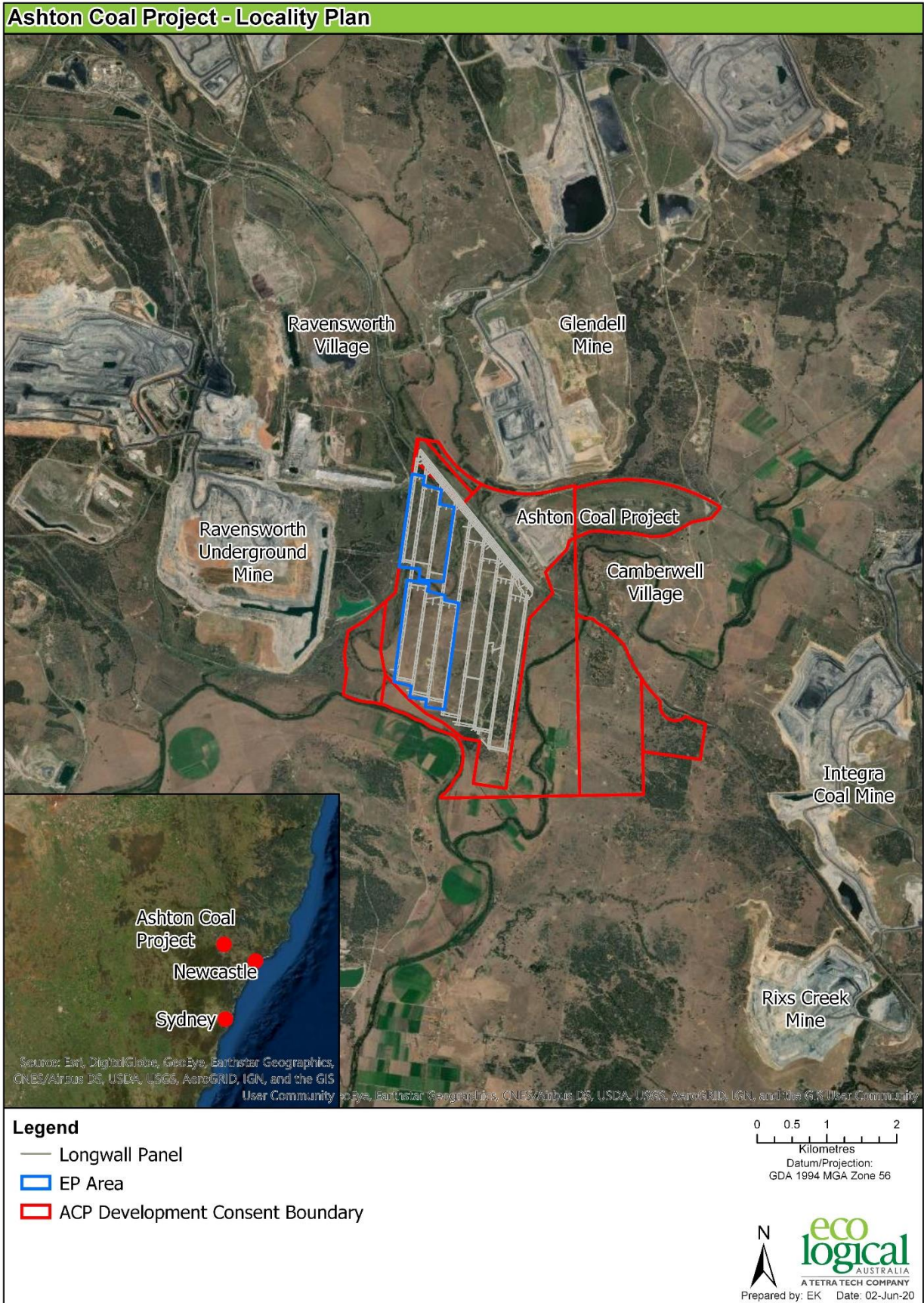


Figure 1: Ashton Coal Project Locality Plan

2. Biodiversity Context

A review of reports and vegetation mapping relevant to the EP Area, as well as searches of the relevant ecological databases was undertaken to identify the potential presence of any threatened and protected flora and fauna species, populations and ecological communities listed under the BC Act, FM Act and the EPBC Act likely to be present within the EP Area. The following databases and reports were reviewed:

- EPBC Act Protected Matters Search for Matters of National Environmental Significance using a radius of 10 km around coordinates -32.47, 151.06
- BioNet (Wildlife Atlas) search for threatened species/populations listed under the NSW BC Act previously recorded within 10 km around coordinates -32.47, 151.06
- ACP Flora and Fauna Management Plan (ACOL 2017a)
- ACP Annual Review Reports from 2005 up to and including 2018 (ACOL 2005, ACOL 2006, ACOL 2008a, ACOL 2008b, ACOL 2009, ACOL 2010, ACOL 2011, ACOL 2013, ACOL 2014, ACOL 2015, ACOL 2016, ACOL 2017b, ACOL 2018, ACOL 2019)
- Flora and Fauna Assessment for Longwalls 201-204 Extraction Plan (Umwelt 2016)
- ACP Environmental Impact Statement (EIS) (HLA Envirosiences 2001) and Modifications
- Sharing and Enabling Environmental Data (SEED) BioNet Vegetation Map Collection.

2.1 Vegetation Communities

The following vegetation communities have been identified within the EP Area (NSW Department of Planning, Industry and Environment [DPIE] 2020a and 2020b) and are shown in Figure 2:

PCT 1603 - Narrow-leaved Ironbark - Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter

Approximately 1.84 hectares of this community occurs within the EP Area as a small patch in the southern section of LW205. This community is an open grassy woodland dominated by *Allocasuarina luehmannii* (Bull Oak), and the sub-dominant *Eucalyptus crebra* (Narrow-leaved Ironbark) and *E. moluccana* (Grey Box). The understorey is sparse and generally consists of *Acacia amblygona* (Fan Wattle), *Daviesia genistifolia* (Broom Bitter Pea), *A. linifolia* (White Wattle), *Lycium ferocissimum* (African Boxthorn) and *Eremophila deserti* (Turkeybush). The ground cover is relatively depauperate of species, with occasional *Aristida vagans* (Threeawn Speargrass), *Cymbopogon refractus* (Barbed Wire Grass), *Dichelachne rara*, *Microlaena stipoides* (Weeping Grass), *Lomandra glauca* (Pale Mat-rush), *Cheilanthes sieberi* (Poison Rock Fern) and *Dichondra repens* (Kidney Weed). This community is associated with the Threatened Ecological Community (TEC) Central Hunter Grey Box—Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions, which is listed as an Endangered Ecological Community (EEC) under the BC Act.

PCT 1731 - Swamp Oak - Weeping Grass – grassy riparian forest of the Hunter Valley

This community runs along the creek line within the EP Area, mainly above LW206 and LW207. Approximately 9.26 hectares of this community occurs within the EP Area. This community is dominated by *Casuarina glauca* (Swamp Oak), with typically no mid-stratum and shrubs occurring as isolated individuals. The ground stratum is typically grassy, with *Microlaena stipoides*, *Cynodon dactylon* (Common Couch), *Oplismenus aemulus* (Australian Basket Grass) and *Austrostipa verticillata* (Slender Bamboo Grass), with a number of forbs such as *Dichondra repens* (Kidney Weed) and *Lobelia purpurascens* (Whiteroot).

Derived Grassland of NSW South Western Slopes

Approximately 16.43 ha of this community occurs within the EP Area. Commonly occurring native species in this community include *Aristida ramosa* (Purple Wiregrass), *Austrostipa verticillata* (Slender Bamboo Grass) and *Eriochloa pseudoacrotricha* (Early Spring grass), while exotic species include *Paspalum dilatatum*, *Medicago sativa* (Lucerne), *Chloris gayana* (Rhodes Grass) and *Lolium* sp. Scattered trees among this community include *Allocasuarina luehmannii*, *E. crebra* and *E. moluccana*.

The remainder of the EP Area consists of non-native vegetation.

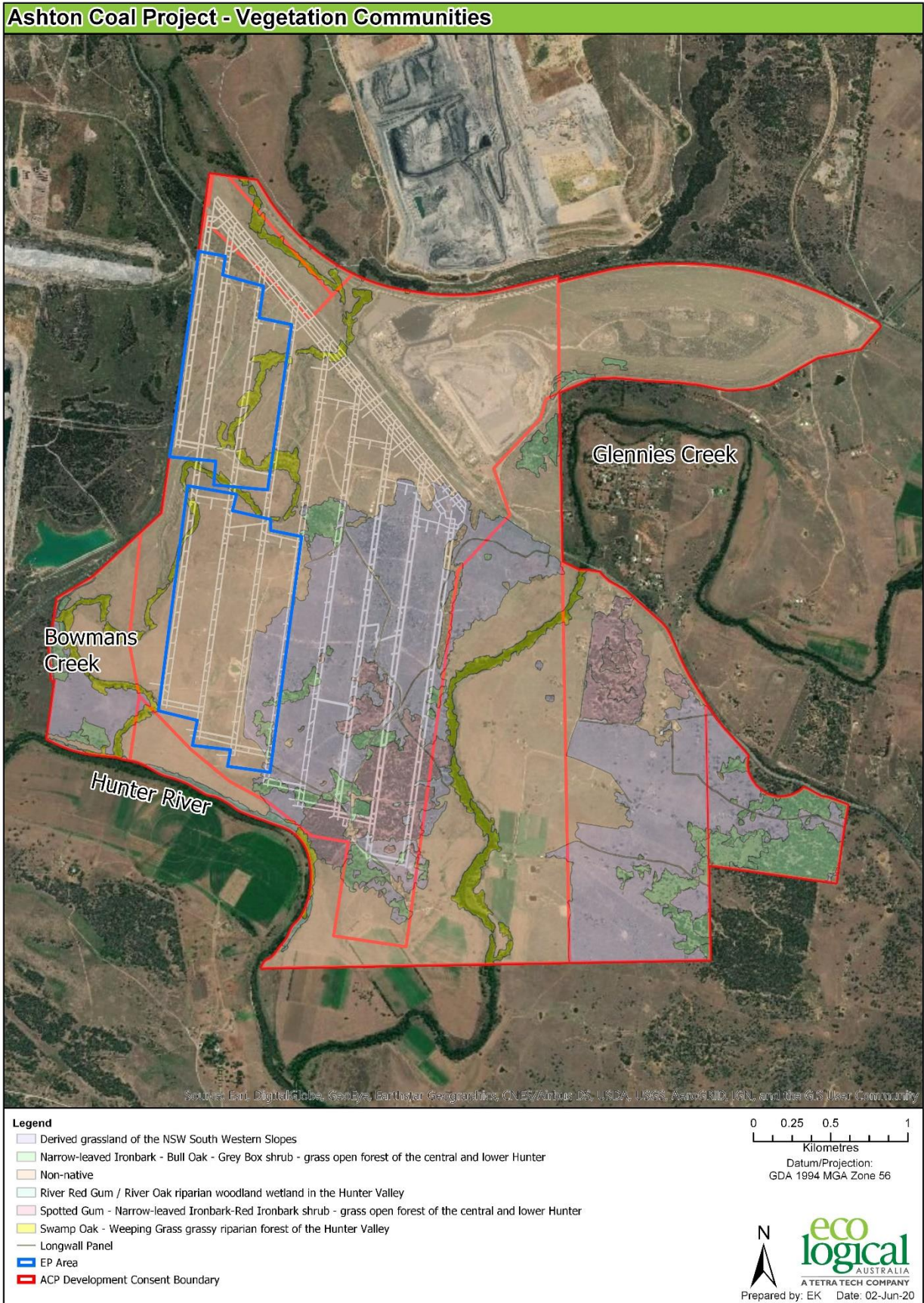


Figure 2: Ashton Coal Project Vegetation Communities

2.2 Endangered Populations

The *Eucalyptus camaldulensis* (River red gum) in the Hunter Catchment endangered population is known to occur just outside the EP area, adjacent to LW 206 and LW 207 (Figure 3). This endangered population is managed under the existing Flora and Fauna Management Plan (ACOL 2017a) for the approved underground mining activities. No other endangered populations are known to occur in the EP Area.

2.3 Threatened Flora and Fauna Species

No threatened flora species have been recorded within the EP Area during previous surveys.

The broad fauna habitat types of grassland and woodland which occur within the EP Area are representative of the habitat types within the surrounding area. All native habitats in the region have been extensively cleared or modified for agriculture, largely for cattle grazing. Therefore, the remaining native habitat provides important refuges for a number of fauna species, many of which are threatened due to habitat loss and fragmentation.

A total of 24 threatened fauna species have been recorded, or are considered likely to occur, within the ACP. Seven threatened and protected fauna species have been recorded within, or immediately adjacent to the EP Area (**Figure 3**), including:

- White-bellied sea-eagle (*Haliaeetus leucogaster*) (Listed as vulnerable under the BC Act)
- Spotted harrier (*Circus assimilis*) (Listed as vulnerable under the BC Act)
- Speckled warbler (*Chthonicola sagittatus*) (Listed as vulnerable under the BC Act)
- Grey-crowned babbler (*Pomatostomus temporalis temporalis*) (Listed as vulnerable under the BC Act)
- Large bent-winged bat (*Miniopterus orianae oceanensis*) (Listed as vulnerable under the BC Act)
- Brush-tailed phascogale (*Phascogale tapoatafa*) (Listed as vulnerable under the BC Act)
- Rainbow bee-eater (*Merops ornatus*) (Listed as a protected migratory species under the EPBC Act).



Figure 3: Threatened species locations within and immediately adjacent to EP Area

3. Biodiversity Impacts

3.1 Predicted Impacts

A detailed assessment of subsidence impacts is provided in the Subsidence Assessment for the EP for LW205-208 in the ULLD Seam (SCT 2020). The ULLD seam makes up the third seam to be mined at the ACP, and therefore, predicted impacts include cumulative subsidence movements. A summary of the key predicted subsidence impacts, as they relate to biodiversity, is provided below:

- Potential for substantial cracking / stepping associated with the stacked edges of the longwall panel for the different seams, at a cumulative depth of up to 5.8m.
- Potential for ponding above the northern and southern parts of LW 205 and 206A and over most of LW 207A. Runoff is expected to pond in the two natural billabongs and a section of the main channel of Bowmans Creek excised by the eastern diversion channel. Drainage works are proposed in SCT (2020) to minimise some ponding areas and will involve reshaping the surface after subsidence and construction of drainage channels to create a chain-of-ponds flow pathways along natural drainage lines to Bowmans Creek. This strategy is expected to be effective for ponds 28, 30, 31 (LW205), 33 (LW206A) and 43 and 44 (LW207A). Construction of drainage channels would potentially impact native vegetation occurring in these areas (Figure 4).
- A large pond is expected to form over the southern part of LW206A and 207A (Pond 32). SCT (2020) state that management of this ponding would require a cut to the Hunter River approximately 4m deep and several hundred metres long if it follows an existing drainage line or a deeper cut if an alternative route to the river is selected. Construction works would potentially impact native vegetation occurring in this area.
- Areas either side of the northern culvert on Lemington Road that drain to the northern billabong via a man-made drainage channel constructed as part of the Lemington Road diversion works are likely to pond. Increased ponding may result in impacts to remnant vegetation. SCT (2020) state that increasing the depth of the existing channel and constructing new drainage channels would likely reduce the depth of ponding. Construction works would potentially impact native vegetation within the area.
- Increased water level in the billabongs and excised section of Bowmans Creek are expected. The increased water level may result in impacts to remnant vegetation and die back would likely occur in any areas of remnant woodland in this area. Earthworks to cut a new drainage channel from Pond 45 are recommended by SCT (2020) to minimise these impacts. Earthworks would potentially impact native vegetation within the area.
- Cracking of dam walls and tilting of disused sedimentation ponds located above LW208 is predicted, with potential loss of water from the ponds. The intended use of these ponds is as farm dams/wildlife habitat, and SCT (2020) state that these impacts are likely to be repairable through the use of earthworks to maintain the current and intended usage. These works have the potential to impact native remnant vegetation within these areas.

The impacts on flora and fauna of the diversion of Bowmans Creek and revised longwall mine layout under approved Modification 6 (MOD6) are described in the *Bowmans Creek Diversion Environmental Assessment* (EA) (Evans and Peck 2009). SCT (2020) predicts that impacts to the natural section of Bowmans Creek and diversions channels during mining of LW205-208 are expected to be imperceptible and consistent with, or less than, impacts forecast in the MOD6 EA (Evans and Peck 2009). The EA concluded it was very unlikely there would be any impact on groundwater dependent ecosystems (GDEs), which at the time of writing the EA included stands of *Eucalyptus camaldulensis* associated with these water courses. It is noted that since the preparation of the EA, updated mapping of GDE for the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (NSW) shows there are no high priority GDEs within and surrounding the EP Area. *E. camaldulensis* is known to be an adaptable species and will respond to water availability by using a combination of groundwater, surface water and soil moisture (Jones et. al. 2020).

Therefore, it is assumed there will be minimal impact on any GDEs or other vegetation communities occurring on the alluvium outside of the direct subsidence impact areas and no further assessment is provided.

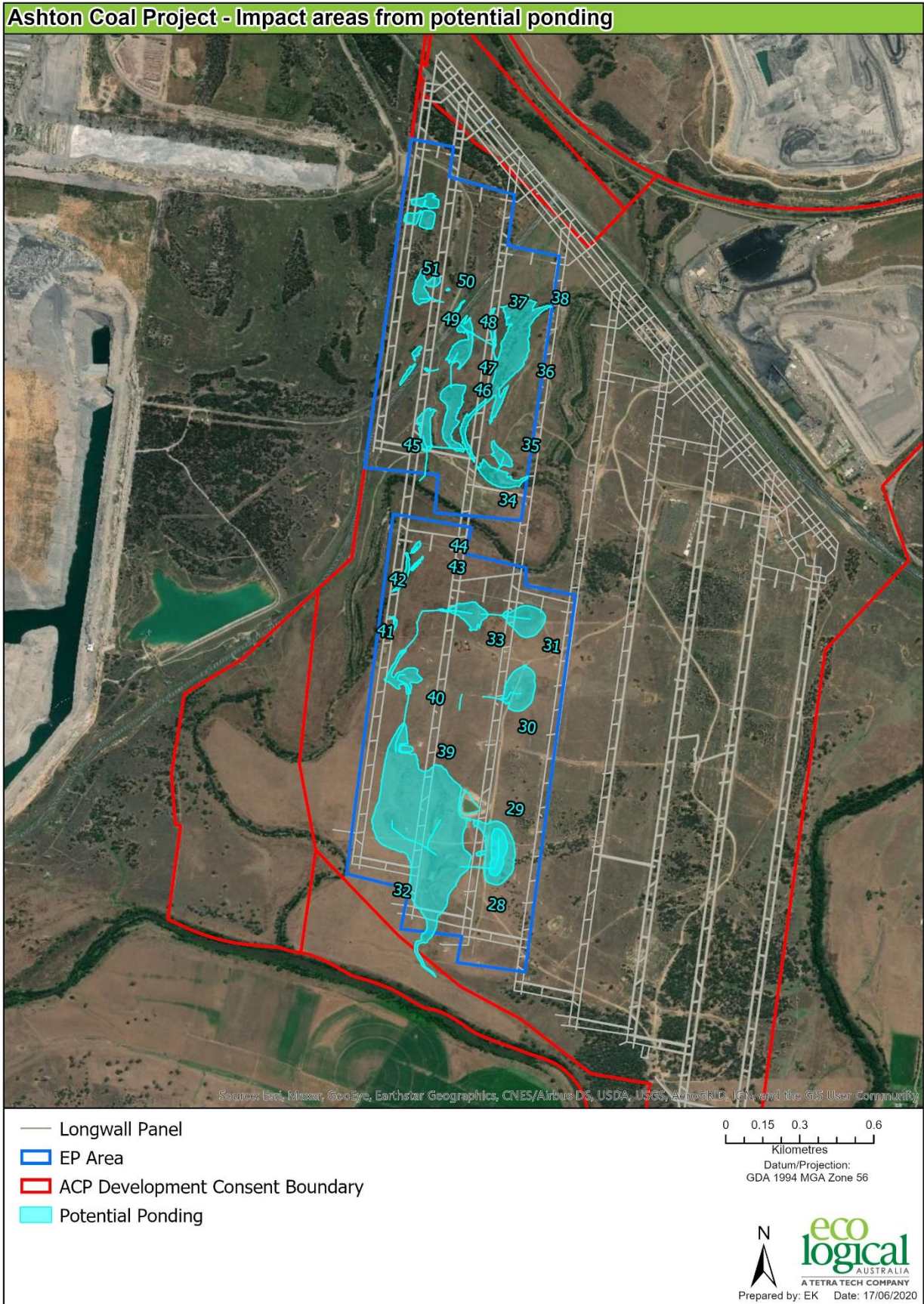


Figure 4: Impact areas from potential ponding for LW205-208

3.2 Ecological Impact Assessment

The maximum values of cumulative vertical subsidence forecast for the LW 205-208 EP are consistent with forecasts in previous assessments for approval modification or for extraction plans (SCT 2020). The values of tilt and strain forecast for LW 205-208 are consistent with those forecast for two and three seams of mining in DA 309-11-2001i (MOD6) for the Bowmans Creek Diversion EA.

The subsidence impacts associated with mining LW 205-208 are not expected to be substantially different to those from LW105-107 (SCT 2020). These impacts have been successfully managed during mining and similar management strategies to mitigate and remediate management impacts from mining LW205-208 are expected to be equally effective. Biannual ecological monitoring of the ACP since 2006, which include targeted surveys for the grey-crowned babbler, hooded robin and speckled warbler within all areas of potential habitat within the subsidence impact area, have identified no evidence of adverse post-mining impacts on the extent of threatened species and threatened ecological communities occurring within the EP Area.

Subsidence impacts associated with ponding and cracking/stepping that are likely to require remediation works occur across approximately 4 hectares of Swamp Oak – Weeping Grass grassy riparian forest, with the majority of predicted subsidence impacts occurring within non-native vegetation. It is considered unlikely that the proposed mining of the ULLD in LW205-208 will have significant adverse impacts on known or potentially occurring threatened and protected flora and fauna species, populations and ecological communities that currently or could occur within the EP Area. This is based on the conclusion of SCT (2020) that predicted impacts are not expected to be substantially different compared to the impacts during mining of LW105-107, and the knowledge that those impacts were successfully managed.

The objective of s.5A of the NSW *Environmental Planning and Assessment Act 1979* (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 LW 205-208 on threatened species and EECs known or predicted to occur in the EP Area (refer to **Table 1**).

Table 1: Assessment of Significance

Matters for Consideration	Comment
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>The proposal involves underground mining, with potential impacts of ponding, and the associated construction impacts for remediation works.</p> <p>Due to the highly mobile nature of threatened species present within the EP Area, mining the ULLD seam from LW 205-208 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>

Matters for Consideration	Comment
<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>The endangered population <i>Eucalyptus camaldulensis</i> population in the Hunter catchment is present just outside the EP Area. Ponding impacts are not predicted to impact this area, and mining the ULLD seam from LW 205-208 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> <ul style="list-style-type: none"> (i) 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 (ii) 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>PCT 1603 is associated with an EEC and is located above the southern section of LW205. Ponding is not predicted to impact this community, and mining the ULLD seam from LW 205-208 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> <ul style="list-style-type: none"> (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and (ii) 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 (iii) 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>Approximately 11 ha of woodland habitat occurs above LW 205-208, which includes riparian vegetation and grassy open forest.</p> <p>The impacts from mining, associated ponding and cracking are not expected to 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 BC Act in the vicinity of the EP Area. Mining the ULLD seam from LW 205-208 will not result in a direct or indirect impact on critical habitat.</p>
<p>Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan</p>	<p>A main threat for most threatened species located within the EP Area is loss, degradation and fragmentation of habitat. Potential ponding and associated remediation works predicted to occur from mining the ULLD seam from LW 205-208 is expected to result in habitat disturbance. Disturbance is predicted to occur mainly in non-native vegetation and derived native grassland (DNG).</p>
<p>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</p>	<p>Mining the ULLD seam from LW 205-208 will not result in the operation of, or increase to, the impact of a key threatening process within the EP Area. Ponding and associated remediation works have the potential to impact native vegetation, however due to the small amount of habitat impacted, it is unlikely to increase the impact of a key threatening process.</p>

4. Summary and Recommendations

The predicted surface impacts resulting from mining LW 205-208 are not expected to be significantly different compared to the impacts that were successfully managed during mining in LW 105-107 (SCT 2020). Annual ecological monitoring conducted throughout the mining of the previous two seams in the same location has not identified adverse post mining impacts on the extent of threatened species and TECs occurring within the EP Area. Based on the subsidence predictions provided by SCT (2020) and the continued implementation of management strategies to mitigate and remediate management impacts as documented in ACOL (2017a), 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 BC Act or the EPBC Act.

ACOL has identified a number of management and mitigation measures required to fulfil approval conditions that are summarised in Table 6 of the *Flora and Fauna Management Plan* (ACOL 2017a). These actions can be categorised into:

- Monitoring;
- Management; and
- Response (based on a series of specific triggers).

ACOL initiated a program of ecological monitoring that commenced in 2006. Current procedures for flora and fauna monitoring and threatened species habitat management are detailed in Sections 4.3 and 4.4 respectively of the *Flora and Fauna Management Plan* (ACOL 2017a). It is recommended that the monitoring and management programs are continued to monitor for and address potential impacts on the ecological values across the EP Area.

ACOL has developed a guiding set of criteria / protocols that nominate circumstances under which mitigation measures would be required based on the outcomes of the monitoring. A Trigger Action Response Plan (TARP) for biodiversity that considers subsidence impacts is presented in Table 7 of the *Flora and Fauna Management Plan* (ACOL 2017a). These triggers have been reviewed and are considered appropriate to address the protection of threatened species, TECs, endangered populations or migratory species and essential fauna habitat.

ACOL must ensure that any proposed substantial subsidence remediation works are undertaken in accordance with the *Flora and Fauna Management Plan* (ACOL 2017a) and any vegetation clearing required to undertake these works is conducted in accordance with the associated Vegetation Clearance Protocol detailed in Appendix C of the *Flora and Fauna Management Plan* (ACOL 2017a).

5. References

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