

Aboriginal Cultural Heritage Management Plan

Dendrobium Colliery Longwall 18

Lake Cordeaux Catchment LGA: Wollongong City Council

Prepared for South32 – Illawarra Metallurgical Coal Pty Ltd

Prepared by Niche Environment and Heritage | 9 February 2021



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Niche Environment and Heritage Pty Ltd (ACN 137 111 721)
Enquiries should be addressed to Niche Environment and Heritage
PO Box 2443, Parramatta NSW 1750, Australia
Email: info@niche-eh.com

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1. Introduction

Illawarra Metallurgical Coal (IMC) a wholly owned subsidiary of South32 Limited (South32) operates Dendrobium Mine, located in the Southern Coalfield of New South Wales, west of Wollongong and the Illawarra Escarpment and to the east of Bargo.

IMC has proposed to extract Longwall (LW) 18 (The Project) within Area 3B of the Dendrobium Mine, Consolidated Coal Lease (CCL) 768, under the Development Consent 60-03-2001 (DA 60-03-2001). The proposed LW 18 (Figure 1 and Figure 2) is below approximately 415 hectares of largely undisturbed bushland and watercourses of the Avon River Catchment inside the WaterNSW Metropolitan Special Area. LW 18 is located to the south of approved LW 9-17 and to the south-west of LW 6, 7, 8 and 19 (not approved at the time of writing). Lake Avon is located to the east and Wongawilli Creek to the west, and is defined by the 600 metre (m) boundary around proposed LW 18, which forms this Project (MSEC 2020). The Project comprises the continuation, upgrade and extension of underground coal mining operations at Dendrobium Mine Area 3B.

1.1 Purpose and scope

In accordance with Condition 6, Schedule 3 of the Development Consent, this Aboriginal Cultural Heritage Management Plan (ACHMP) has been prepared as a component of the LW 18 Subsidence Management Plan (SMP) to manage the potential environmental consequences of extracting LW 18 on Aboriginal cultural heritage sites or values.

This report presents an Aboriginal Cultural Heritage Management Plan (ACHMP) to accompany the LW 18 SMP application. This report has been developed to manage Aboriginal cultural heritage sites and objects under in accordance with:

- *National Parks and Wildlife Act 1974* (NPW Act);
- *Environmental Planning and Assessment Act 1979* (EP&A Act); and
- Aboriginal Heritage Impact Permit (AHIP) #1132005 that encompasses LW 18.

IMC has engaged Niche Environment and Heritage (Niche) to assist with the development of this ACHMP.

LW 18 (hereafter referred to as the ‘Subject Area’) (Figure 1) is defined as the surface area that could be affected by the extraction of the proposed LW 18. The Subject Area is located at the southern end of Area 3B and is defined as a minimum, as the surface area enclosed by the: 35 degree (°) angle of draw line from the extents of the proposed LW 18: the predicted incremental 20 mm subsidence contour due to the extraction of the proposed longwall; natural features within 600 m of the extent of the longwall mining area plus any features that are expected to experience either far-field horizontal movements or valley related effects, which could be sensitive to these movements (MSEC 2020:ii).

Table 1. Overall void length of LW 18 (Source MSEC 2020)

Longwall	Overall void length including installation heading (m)	Overall void width including first workings (m)	Overall tailgate chain pillar width (m)
LW18	1018	305	45

LW 18 is proposed to be extracted from the Wongawilli Coal Seam and has been shortened from its original length of 2,053 m, as adopted in report number (MSEC 459), and the original SMP Application for LW 9 - 18. Initially the western end of LW 18 was shortened by 60 m and the eastern, finishing end by 65 m. The

finishing end has now been shortened by an additional 910 m which will provide an overall void length of LW 18, as 1018 m (Table 1) and adopted in this ACHMP.

There are three Aboriginal cultural heritage sites that have been identified within the Subject Area based on the 35° angle of draw and predicted 20 mm subsidence contour (Appendix 2). These Aboriginal cultural heritage sites comprise two sandstone Shelters with Art and Deposit, Upper Avon 36 (AHIMS ID# 52-2-1772) and Dendrobium 8 (AHIMS ID# 52-2-3068). Dendrobium 7 comprises a sandstone Shelter with Art, Deposit and Axe Grinding Grooves (AHIMS ID# 52-2-2248).

Aboriginal cultural heritage site Upper Avon 36, (AHIMS ID# 52-2-1772) is not expected to experience valley related upsidence or compressive strain due to valley closure, as these occur near the valley base, rather than along the valley sides. The potential for impacts on site Upper Avon 36 (AHIMS ID# 52-2-1772) is therefore considered to be very low.

Aboriginal cultural heritage sites Dendrobium 7 (AHIMS ID# 52-2-2248) and Dendrobium 8 (AHIMS ID# 52-2-3068) are located above or adjacent to the chain pillar between LW 17 and LW 18. The extraction of these longwalls is likely to result in fracturing of the exposed bedrock along the ridgelines and, where the rock is marginally stable, and could then result in rockfalls or instabilities. The fracturing and rock falls could adversely impact the rock shelters located adjacent to the proposed longwall. The potential for adverse impacts on Aboriginal cultural heritage sites Dendrobium 7 (AHIMS ID# 52-2-2248) and Dendrobium 8 (AHIMS ID# 52-2-3068) has been assessed as unlikely (i.e. less than 10 %) for each of these sites. However, it is possible that these sites could experience fracturing resulting in spalling or rock-falls.

Further detail on the assessment of Aboriginal cultural heritage sites is detailed in the *Longwalls 9 to 18: Heritage Impact Assessment* (Biosis Research 2012) and MSEC (2020).

1.2 Structure of the Aboriginal Cultural Heritage Management Plan

The remainder of this ACHMP is structured as follows:

Section 2: Describes the review and update of this ACHMP.

Section 3: Outlines the statutory requirements applicable to this ACHMP.

Section 4: Provides a revised assessment of the potential subsidence impacts and environmental consequences for LW 18.

Section 5: Describes the consultation protocol.

Section 6: Details the performance measures and indicators that will be used to assess the Project.

Section 7: Outlines the baseline data for Aboriginal cultural heritage sites.

Section 8: Describes supplementary fieldwork and pre-clearance surveys to be undertaken.

Section 9: Describes the monitoring program and provides the detailed Trigger Action Response Plan (TARP).

Section 10: Describes the management, remediation and mitigation measures that will be implemented to reduce potential impacts on Aboriginal cultural heritage.

Section 11: Provides a Contingency Plan to manage any unpredicted impacts and their consequences.

Section 12: Describes the program to collect baseline data for future Extraction Plans.

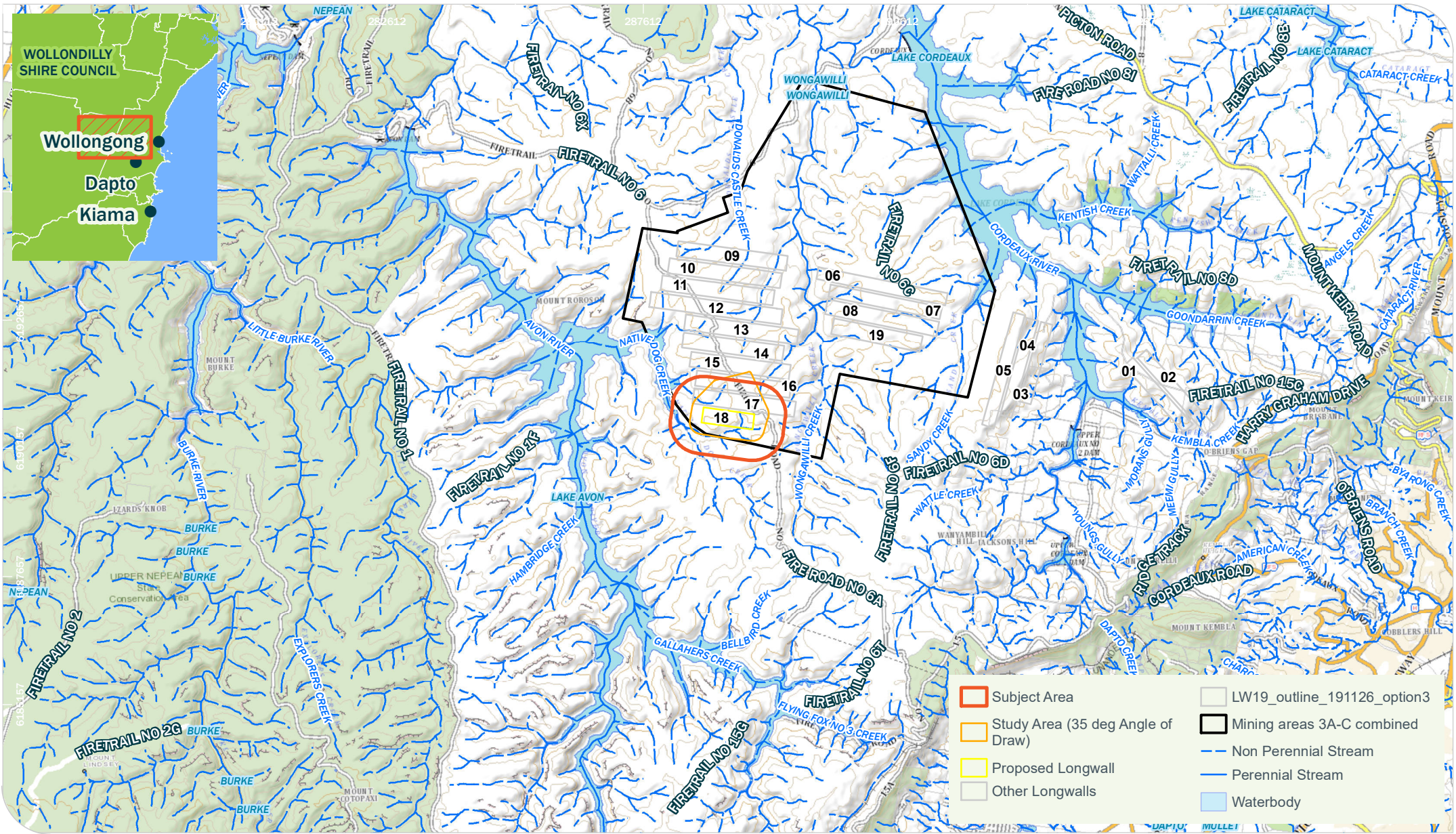
Section 13: Describes the annual review and improvement of environmental performance.

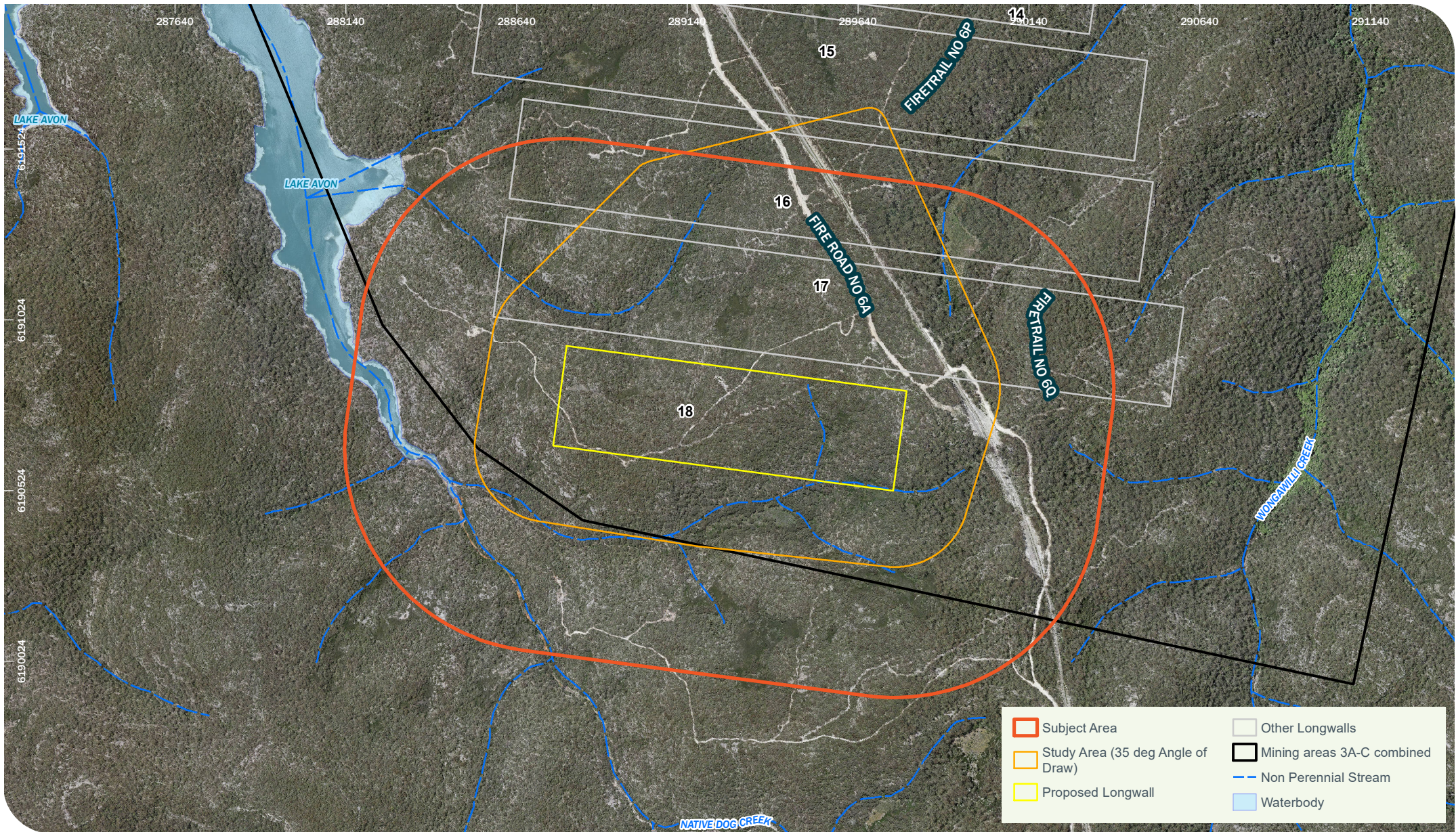
Section 14: Outlines the management and reporting of incidents.

Section 15: Outlines the management and reporting of complaints.

Section 16: Outlines the management and reporting of non-compliances with statutory requirements.

Section 17: Lists the references cited in this ACHMP.





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2. Aboriginal Cultural Heritage Management Plan Review and Update

2.1 Overview

In accordance with Condition 2A, Schedule 8 of the Development Consent, this ACHMP will be reviewed within three months of the:

- a) submission of an incident report under condition 4 of Schedule 8;
- b) submission of an Annual Review under condition 5 of schedule 8;
- c) submission of an Independent Environmental Audit under condition 6 of schedule 8; or
- d) approval of any modification of the conditions of this consent, the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant.

If necessary, to either improve the environmental performance of the development or cater for a modification, this ACHMP will be revised to the satisfaction of the Secretary and submitted to the Secretary for approval within six weeks of the review. The revision status of this ACHMP is indicated on the title page of each copy. The distribution register for controlled copies of this ACHMP is described in Section 2.2.

2.2 Access to Information

In accordance with Condition 11, Schedule 8 of the Development Consent, 'Access to Information', IMC will make this ACHMP publicly available on the IMC, South32 website. IMC recognises that various regulators have different distribution requirements, both in relation to whom documents should be sent and in what format. Any publicly available version of this ACHMP will have specific site location information and personal information of stakeholders removed.

3. Statutory Requirements

3.1 Introduction

IMC's statutory obligations are contained in:

- (i) the conditions of the Development Consent;
- (ii) relevant licences and permits, including conditions attached to mining leases; and
- (iii) other relevant legislation.

These are described below.

3.2 Environmental Planning and Assessment Act Approval

Condition 2, Schedule 8 of the Dendrobium Dendrobium Development Consent requires the preparation of a Management Plan as a component of all SMP(s). Condition 2, Schedule 8 states that:

Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:

(a) a summary of relevant background or baseline data;

(b) details of:

(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);

(ii) any relevant limits or performance measures and criteria; and

(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;

(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;

(d) a program to monitor and report on the:

(i) impacts and environmental performance of the development; and

(ii) effectiveness of the management measures set out pursuant to condition 2(c);

(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;

(f) a program to investigate and implement ways to improve the environmental performance of the development over time;

(g) a protocol for managing and reporting any:

(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);

(ii) complaint;

(iii) failure to comply with statutory requirements; and

(h) a protocol for periodic review of the plan.

In addition, Conditions 2 and 3, Appendix 4 of the Development Consent outlines management plan requirements that are applicable to the preparation of this ACHMP. Table 2 indicates where each component of the conditions is addressed within this ACHMP.

Table 2: Management Plan Requirements

Development Consent Condition	ACHMP Section
Condition 2, Schedule 8	
Management Plan Requirements	
2. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:	
(a) a summary of relevant background or baseline data;	Sections 4, 7 and 8
(b) details of:	
(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Sections 2 and 3
(ii) any relevant limits or performance measures and criteria; and	Section 6
(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	Section 6
(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;	Sections 3, 4, 5, 6, 7, 8, 9, 10, 11 and 13
(d) a program to monitor and report on the:	
(i) impacts and environmental performance of the development; and	Sections 9, 11 and 13
(ii) effectiveness of the management measures set out pursuant to condition 2(c);	Sections 9, 10 and 13
(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Section 11
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 13
(g) a protocol for managing and reporting any:	
(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);	Sections 14 and 16
(ii) complaint;	
(iii) failure to comply with statutory requirements; and	Section 15
(h) a protocol for periodic review of the plan.	Section 16
Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.	Section 13
REVISION OF STRATEGIES, PLANS AND PROGRAMS	
2A. Within three months of the:	
(a) submission of an incident report under condition 4 of Schedule 8;	
(b) submission of an Annual Review under condition 5 of Schedule 8;	Section 14
(c) submission of an Independent Environmental Audit under condition 6 of Schedule 8; or	Section 13
(d) approval of any modification of the conditions of this consent,	
the suitability of existing strategies, plans and programs required under this consent must be reviewed by the Applicant.	Section 2
If necessary, to either improve the environmental performance of the development or cater for a modification, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Secretary and submitted to the Secretary for approval within six weeks of the review.	

Development Consent Condition	ACHMP Section
<p>Note: This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.</p>	
<p>Commitment 2, Appendix 4</p> <p>2. Subsidence Impact – Monitoring</p> <p>Pre, during and post mining subsidence impact monitoring will be undertaken in accordance with the approved Subsidence Management Plan. The monitoring component of the Subsidence Management Plan includes but is not necessarily limited to:</p> <p>...</p> <ul style="list-style-type: none"> • Subsidence movement of natural and man made features <p>...</p> <ul style="list-style-type: none"> • Aboriginal cultural heritage sites 	<p>Sections 4, 7, 8, 9, 10</p> <p>Sections 4 and 9</p> <p>Sections 4.4, 7, 8, 9 and 10</p>
<p>Commitment 3, Appendix 4</p> <p>3. Subsidence Impact – Avoidance, Mitigation and Rehabilitation</p> <p>If the monitoring program identifies impacts to natural features that exceed those predicted, the following contingent measures will be implemented.</p> <p><i>Aboriginal Places of Cultural Significance - Archaeological sites</i></p> <p>Predicted Impacts: Unlikely that the sites will sustain structural impacts. Empirical data suggests the probability of impacts to a site is less than 10%.</p> <p>Avoidance & Mitigation: Baseline, active subsidence and post mining monitoring. Appropriate consultation.</p> <p>Impacts Exceeding Those Predicted: Change in shelter conditions not attributable to natural weathering or preservation – cracking or exfoliation of art panel, movement of existing planes and joints at panel, block fall within shelter or overhang, shelter or overhang collapse.</p> <p>Contingent Measure: Site and event specific mitigation and rehabilitation will be developed with appropriate Aboriginal representatives, Heritage NSW (Formerly DECC in the approval) and WaterNSW. Techniques may involve installing artificial drip lines, detailed recording of art, stabilising and cleaning rock faces.</p>	<p>Sections 4, 5, 6, 7, 8, 9, 10 and 11</p> <p>Sections 10 and 11</p>

3.3 Licences, permit and leases

In addition to the Development Consent, all activities at or in association with the Dendrobium Mine will be undertaken in accordance with the following licences, permits and leases which have been issued or are pending issue:

- The conditions of mining leases issued by Mining, Exploration and Geosciences (MEG) (previously known as the NSW Division of Resources and Geoscience) under the *NSW Mining Act, 1992* Dendrobium Mining Lease (ML) 1510 and ML 1566 and Consolidated Coal Lease (CCL) 768.
- Development Consent (DA) 60-03-2001, issued by the Department of Planning, Industry and Environment (DPIE) on 20 November 2002 with an expiry date of 21 December 2023.
- The Dendrobium Mining Operations Plan FY 2016 and FY 2022, also DOC19/681058 issued on 19 August 2019, approved by MEG.
- The conditions of Environment Protection Licence (EPL) No. 3241 issued by the NSW Environment Protection Authority under the *NSW Protection of the Environment Operations Act, 1997*. Revision of the EPL will be required prior to the commencement of IMC activities that differ from those currently licensed.
- The prescribed conditions of specific surface access leases within CCL 768 for the installation of surface facilities as required.
- Water Approval 10WA118772, issued on 1 July 2013 by the Natural Resource Access Regulator.
- WaterNSW Access Consent F2020/1545, issued on March 2020.
- Water Access Licences (WALs) issued by the then Department of Industry – Water (now DPIE-Water) under the *NSW Water Management Act, 2000*, including WAL 36473, WAL 37465, WAL 42385 and WAL 42386 under the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011.
- Mining and workplace health and safety related approvals granted by the NSW Resources Regulator and WorkCover NSW.
- Supplementary approvals obtained from WaterNSW for surface activities within the Metropolitan Special Area (e.g. fire road maintenance activities).

3.4 Other legislation

IMC will conduct the Project consistent with the Development Consent and any other legislation that is applicable to an approved DA under the EP&A Act. The following Acts may be applicable to the conduct of the Project:

- *Biodiversity Conservation Act, 2016*
- *Biosecurity Act, 2015*
- *Contaminated Land Management Act, 1997*
- *Crown Land Management Act, 2016*
- *Dams Safety Act, 2015*
- *Dangerous Goods (Road and Rail Transport) Act, 2008*
- *Energy and Utilities Administration Act, 1987*

- *Fisheries Management Act, 1994*
- *Mining Act, 1992*
Protection of the Environment Operations Act, 1997
- *Rail Safety (Adoption of National Law) Act, 2012*
- *Roads Act, 1993*
- *Water Act, 1912*
- *Water Management Act, 2000*
- *Water NSW Act, 2014*
- *Work Health and Safety Act, 2011; and*
- *Work Health and Safety (Mines and Petroleum Sites) Act, 2013.*

Relevant licences or approvals required under these Acts will be obtained as required.

4. Revised assessment of potential environmental consequences

4.1 Longwall 18 extraction layout

The layout of the proposed LW 18 is shown in Figure 1 and Figure 2, and the Provisional Extraction Schedule for LW 18 is detailed in Table 3. The longwall is proposed to be extracted from the Wongawilli Seam. The length of longwall extraction excluding the installation heading is approximately 9 m less than the overall void length provided i.e. approximately 1,009 m. The longwall face width excluding the first workings is 295 m. LW 18 will be extracted towards the main headings (i.e. retreat mining from the west towards the east) within the Wongawilli Seam. LW 18 has been shortened from its original length of 2,053 m, as adopted in Report No. MSEC459 and the original SMP Application for LW 9 to LW 18. Initially, the commencing (i.e. western) end was shortened by 60 m and the finishing (i.e. eastern) end was shortened by 65 m. Report No. MSEC992 was based on this modified longwall length of 1,928 m. The finishing end has now been shortened by an additional 910 m, now providing an overall void length of 1,018 m.

Table 3: Provisional Extraction Schedule

Longwall	Estimated Start Date	Estimated Duration	Estimated Completion Date
LW 18	October 2021	6 Months	March 2022

The total cumulative predicted subsidence effects, subsidence impacts and/or environmental consequences at the completion of the Project are considered in the Dendrobium Area 3 Project Environmental Assessment (Project EA) (IMC, 2007) and the Dendrobium Area 3B LW 18 Subsidence Management Plan (Project SMP) (South32 IMC 2020), and the cumulative subsidence effects, subsidence impacts and/or environmental consequences on Aboriginal cultural heritage will be assessed in future SMPs.

4.2 Relevant Information Since Development Consent

A Heritage Impact Assessment was completed by Biosis Research in 2012 for Dendrobium Area 3B LW 9 to 18, and End of Panel Monitoring Assessments for LW 9 to 15 were undertaken by Biosis Research and Niche Environment and Heritage up until 2020, to monitor the impacts and environmental consequences of Project related subsidence on Aboriginal cultural heritage sites. The monitoring programs were undertaken by a suitably qualified archaeologist (with experience in rock art recording and management) and representatives of the Aboriginal stakeholders.

IMC acknowledges that all Aboriginal cultural heritage sites are culturally significant to the Aboriginal people who have a traditional connection to Country. All Aboriginal cultural heritage sites have been monitored for subsidence impacts by the observation and recording of any and all changes at the sites over the monitoring period

Archaeological monitoring programs undertaken by Sefton between 1990 and 2000 have continued in the Southern Coalfield at the majority of underground mine sites. Monitoring programs have been undertaken at the Dendrobium Mine and at Tower, Appin, West Cliff, Elouera, Cordeaux, Tahmoor and Metropolitan Collieries. During the past 17 years monitoring programs have been developed and implemented using a similar methodology to Sefton (2000) by Biosis Research (2008, 2009a, 2009b, 2009c, 2011, 2013, 2015), Gun and Kayandel Archaeological Services (2007), Kayandel Archaeological Services (2008, 2012), Niche Environment and Heritage (2011, 2012, 2013a, 2013b, 2013c, 2014a, 2014b, 2014c, 2015a, 2015b, 2015c, 2016a, 2016b, 2016c 2017a, 2017b, 2019, 2020) and Sefton (2000, 2002a, 2002b, 2002c).

Initial baseline recording is completed on those Aboriginal cultural heritage sites that are identified by subsidence consultants as having potential to be affected by subsidence. Site types that are subject to baseline recording in the Southern Coalfield include sandstone shelter sites with art and or potential archaeological deposit, stone artefacts deposits, engravings and sandstone platforms that include engravings (often of animals, humans, anthropomorphic figures and ancestral beings) and or axe grinding grooves.

At the completion of baseline recording, Aboriginal cultural heritage sites are often monitored a second time in line with the individual projects monitoring requirements, generally within 3 months of the completion of a longwall extraction. Monitoring programs are generally continued in this fashion until the Aboriginal cultural heritage site is no longer subject to subsidence movements.

Within the Southern Coalfield, a total of 206 Aboriginal cultural heritage sites have been monitored since 1990 (Regal and Reeves 2017). Of the 206 Aboriginal cultural heritage sites monitored (Table 4), 24 Aboriginal cultural heritage sites were identified as having impacts or changes that may be attributable to subsidence, environmental factors or a combination of both. The observed impacts at each Aboriginal cultural heritage site were as follows:

Table 4: Aboriginal cultural heritage sites within the Southern Coalfield observed to have subsidence related changes during monitoring programs.

AHIMS No.	Site Code	Site Type	Subsidence Related Changes
52-2-0094	Flat Rock Creek 4	Shelter with Art	Opening of existing bedding planes, along the roof/rear wall and minor roof fall.
52-2-0106	Flat Rock Creek 10	Shelter with Art	Cracks in rear wall, potential for altered seepage to impact art – mitigation with an artificial drip line.
52-2-0089	Flat Rock Creek 11	Shelter with Art	Exfoliation and block fall at rear wall.
52-2-0154	Flat Rock Creek 49	Shelter with Art	Minor block fall from rear wall and ceiling.
52-2-0258	Flat Rock Creek 27	Sandstone platform with engraving and axe grinding grooves	Crack in sandstone platform.
52-2-0176	Flat Rock Creek 152	Shelter with Art	Cracking and minor block fall at rear wall.
52-2-1638	Browns Road Site 24	Shelter with Art	Minor block fall at rear wall.
52-2-1625	Browns Road Site 10	Shelter with Art	Cracking and minor blockfall at rear wall.
Number could not be confirmed	Wedderburn Road 1	Shelter with Art	Cracking in floor and rear wall.
52-2-1300	Wedderburn Road 2	Shelter with Art	Opening of crack in back wall.
52-2-1162	Stokes Creek Site 67	Shelter with Art	Opening of the bedding plane above the art and increased water seepage as a result.
52-2-2252	Dendrobium 4	Shelter with Art	Opening of crack along the back wall.
52-2-0195	Flat Rock Creek 34	Shelter with Art	Horizontal cracking visible on the ceiling of the shelter. Cracking occurred over the most southern hand stencil on the back panel. Crack across hand stencil 40cm long. Crack along roof of the shelter 1-2.5 m off ground, and 5 m long.
52-2-3083	Flat Rock creek 281	Shelter with Art	Thin cracking adjacent to the hand stencil at the northern end of the shelter.

AHIMS No.	Site Code	Site Type	Subsidence Related Changes
52-2-3086	Flat Rock Creek 284	Shelter with Art	Fractured a corner of a buttress-like formation on the rear wall.
52-2-2243	Georges River No. 2	Shelter with Art	Thin vertical cracking in the shelter ceiling, adjacent to the art panel.
52-2-0396	Flat Rock Creek 15	Shelter with Art	The large vertical fissure in the central back wall had increased in width (opened) and shifted laterally.
52-2-2244	Georges River No. 3	Shelter with Art and Axe Grinding Grooves	Opening of the horizontal bedding plane, cracking and exfoliation along the back wall.
Number could not be confirmed	Met 1	Shelter with Art	Vertical
52-2-0826	Flat Rock Creek 176	Shelter with Art	Vertical cracking at the northern and southern ends of the shelter.
52-2-3077	Flat Rock Creek 275	Shelter with Art	The horizontal bedding plane joints at the back of the shelter have been noted as opening, three hairline cracks have formed, running vertical from the bedding plane.
52-2-3486	Flat Rock Creek 301	Shelter with Art	A large crack was observed running east to west along the entire rock platform. Crack is approximately 3.08 m to the north of the grinding groove and is approximately 25 m long and continues past the rock platform.
52-2-1626	Browns Site 11	Shelter with Art	<p>The shelter with art site was previously monitored as part of the LW 14 End of Panel reporting (Niche 2019). The main area of cracking caused by subsidence related effects due to extraction of LW 14 was observed in the southern floor area of the shelter. The diagonal cracking measured to an approximate length of 70 cm and a width of 3 cm. The Art Panels located at the northern extent of the shelter were not impacted. The latest inspection identified new subsidence related impacts due to the extraction of LW 15.</p> <p>Impacts to the south of the shelter consist of seven vertical and diagonal cracks to the floor of the shelter and two instances of minor block fall, summarised as follows:</p> <ol style="list-style-type: none"> 1. Vertical cracking measuring 76 x 2 cm. 2. Diagonal cracking with minor block fall at termination measuring 180 x 6 cm. 3. Diagonal cracking with deviations measuring 110 x 3.5 cm. The left side of the cracked sandstone has slipped upwards during convergence. 4. Vertical cracking with diagonal deviations resulting in further minor cracks at the base of the shelter measuring 90 x 0.1 cm. 5. Diagonal cracking measuring 112 x 2 cm with minor block fall observed at termination point. 6. General area of rock fracturing located small sandstone platform at the base of

AHIMS No.	Site Code	Site Type	Subsidence Related Changes
			<p>the shelter measuring approximately 46 x 200 cm. Many minor cracks, exfoliation and opening of joints (3 cm wide) are present.</p> <p>7. Diagonal cracking visible in shallow sandy loam deposit in floor measuring approximately 30 cm in length. New areas of joint opening and fissuring were observed in areas surrounding the two Art Panels to the north of the shelter. The Art Panels were in moderate condition and have not been directly affected by joint opening or fissuring, although change of seepage patterns may further erode opened joints which may lead to direct impacts to the Art panels after large rain events.</p>
52-2-3645	DM21	Shelter with Art	<p>The landscape surrounding the shelter site has experienced a range of subsidence impacts from the extraction of LW 15, such as localised rockfalls to the upper ridge lines (South32 2020). The northern exterior of the shelter has experienced fracturing as a result of subsidence from the extraction of LW 15. Four main instances of vertical and diagonal cracking were observed. The largest crack at the base of the ridgeline measures 3.7 cm in width.</p> <p>The interior cavern of the shelter did not have any direct impacts from subsidence. The monitoring point of natural fissures did not have any further separation in comparison to previous monitoring. It was observed that Art Panels have substantially faded in comparison to baseline recording. Vegetation surrounding the shelter is notably reduced from archaeological observations of the shelter. The reduction of vegetation may have resulted in the interior of the shelter being increasingly exposed to natural erosive elements.</p>

The results of the monitoring programs have been used to assess the Aboriginal heritage sites subsidence impact performance measure:

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

For the purpose of measuring performance against the Aboriginal cultural heritage subsidence impact performance measure (Section 6), Aboriginal cultural heritage sites are considered to be “affected by subsidence impacts” if they exhibit one or more of the following consequences that cannot be attributed to natural weathering or deterioration (Sefton 2000, Regal and Reeves 2017):

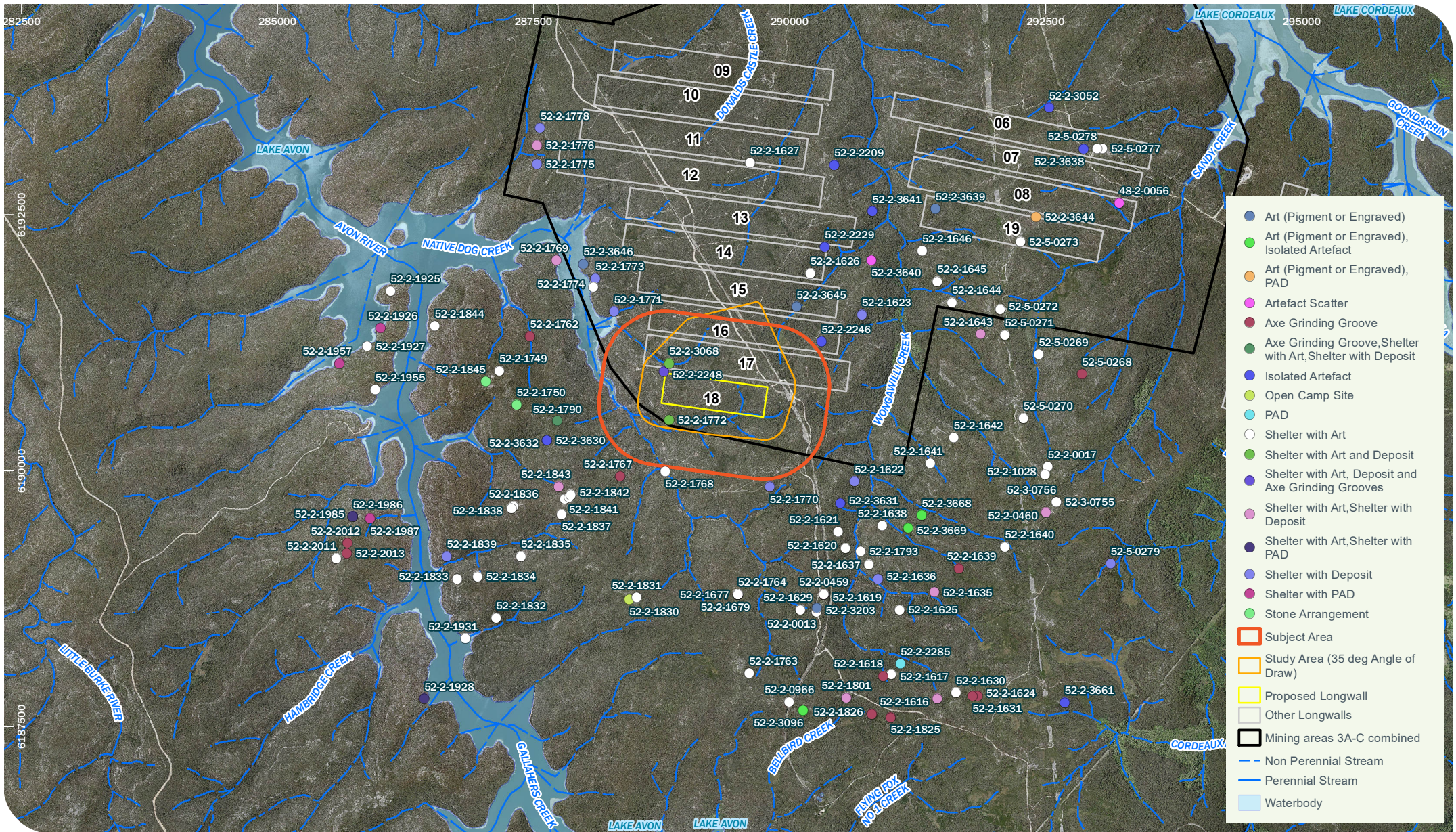
- overhang collapse;
- cracking of sandstone Aboriginal art or grinding grooves; and/or
- rock fall that damages a site, including Aboriginal art.

Of the 206 Aboriginal cultural heritage sites monitored since 1990, 24 Aboriginal cultural heritage sites were identified as having impacts or changes that may be attributable to subsidence, environmental factors induced by mining or a combination of both. This number equates to approximately 11% of all Aboriginal cultural heritage sites monitored (Regal and Reeves 2017). Of the 24 Aboriginal cultural heritage sites 22 sustained structural effects to either the sandstone shelter or the sandstone platform. Eight Aboriginal cultural heritage sites sustained environmental effects, while the effects of 2 Aboriginal cultural heritage sites could not be attributed decisively as either subsidence or environmental.

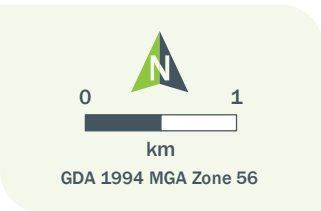
Of the 24 Aboriginal cultural heritage sites, two Sandstone Shelter with Art sites (Table 4, shaded) have been identified as having impacts attributable to subsidence. Flat Rock Creek 34, AHIMS ID# 52-2-0195 and Flat Rock Creek 281, AHIMS ID# 52-2-3083 have been noted as having adverse consequences on Aboriginal cultural heritage values as a result of underground mining. These adverse consequences were cracking that occurred across or adjacent to the art panels (not classified as impacts under the Trigger Action Response Plan). The cracks adjacent to art panels have caused changes to water seepage above the panel, causing water flow to redirect over the art. This indicates that the percentage of Aboriginal cultural heritage sites with impacts to art panels in this instance is approximately 1% of the 144 sites with art assessed across the Southern Coalfield; considerably less than the 10% originally predicted to be affected by subsidence impacts by Sefton (2000) within the mining area.

The results of the monitoring to date are consistent with the potential subsidence impacts and environmental consequences predicted in the Project EA, where it was expected that the majority of identified Aboriginal cultural heritage sites would experience no significant change, particularly when compared to natural weathering processes unrelated to mining and given the conservative nature of the subsidence predictions.

The potential for vehicle-generated dust in the WaterNSW Metropolitan Special Area or rare minor blasting events underground (which is undertaken at significant depths) to impact on Aboriginal cultural heritage sites in the underground mining area is very low. Vehicle access in the WaterNSW Metropolitan Special Area is via formed tracks and existing fire trails. IMC personnel and contractors are required to observe speed limits when using the fire trails, which limits the amount of dust generated. In most cases Aboriginal cultural heritage sites are distant from the tracks and fire trails, and therefore are not subject to direct exposure to any dust generated by vehicles using the tracks and fire trails.



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Niche PM: Renee Regal
 Niche Proj. #: 6261
 Client: Illawarra Metallurgical Coal Pty Ltd

Location of AHIMS Sites Dendrobium Longwall 18 Aboriginal Cultural Heritage Management Plan

Figure 3

4.3 Environmental risk assessment

The development of an impact prediction methodology has attempted to provide reasonably accurate subsidence impact predictions to shelter sites, which, in combination with a cultural heritage significance assessment, is then used to provide appropriate avoidance, mitigation and management recommendations (generally subsidence monitoring and response plans). The risk of impact criteria adopted for the purposes of this assessment are shelter size (volume), the presence of water seepage, maximum predicted subsidence movement and the presence/absence of art. Risk categories are from moderate to negligible and reflect subsidence effect occurrence and actual impacts to heritage values from subsidence effects monitored to date. A description of risk categories and criteria is provided in Table 5.

The subsidence risk assessment for Aboriginal sites in the Project Area is presented in Table 7. This assessment includes all the parameters considered in Sefton’s 2000 Principle Components Analysis and subsidence predictions provided by MSEC (MSEC 2012: 75). This additional information is provided for comparison purposes only. The assessment of risk was made using the criteria outlined in Table 5. A summary of potential impacts is provided in Table 5 and accounts for variability of subsidence effects by indicating that none or partial harm may occur. To date no impacts from subsidence effects have resulted in a total loss of heritage values and this is reflected in the consequence of harm column.

Table 5: Subsidence Risk Categories and Criteria.

Category	Description	Criteria
Moderate	Moderate chance of subsidence effects occurring. Impacts to heritage values are possible.	<ul style="list-style-type: none"> The shelter has an art panel present. The shelter has a volume greater than 50 cubic metres. The shelter has joints or bedding plans subject to water seepage. Maximum predicted subsidence is greater than 300mm.
Low	Low chance of subsidence effects occurring. Impacts to heritage values unlikely	<ul style="list-style-type: none"> The shelter has a volume greater than 50 cubic metres. Maximum predicted subsidence is greater than 300mm.
Very Low	Very low chance of subsidence effects occurring. Impacts to heritage values are highly unlikely.	<ul style="list-style-type: none"> The shelter has a volume less than 50 cubic metres and maximum predicted subsidence is greater than 300mm. The shelter has a volume more than 50 cubic metres and maximum predicted subsidence is less than 300mm.
Negligible	Impacts to heritage values are unlikely and if they did occur would normally be indistinguishable from natural environmental effects.	<ul style="list-style-type: none"> The shelter has a volume less than 50 cubic metres. Maximum predicted subsidence is less than 300mm, tensile strain predictions are <0.5mm/m and compressive strain estimates are <0.01mm/m.

4.4 Aboriginal Cultural Heritage Sites

A total of three Aboriginal cultural heritage sites are located within the LW 18 35° angle of draw and/or predicted 20 mm subsidence contour (Table 6). The Aboriginal cultural heritage sites are recorded on the Heritage Information Management System (AHIMS): Upper Avon 36 (AHIMS ID# 52-2-1772), Dendrobium 7 (AHIMS ID# 52-2-2248) and Dendrobium 8 (AHIMS ID# 52-2-3068). The Aboriginal cultural heritage sites

identified within 600 m of LW 18 secondary extraction are shown on (Figure 3) and a summary is provided in Table 6. All three sites are sandstone Shelters with Art and Deposit, with one of the sandstone shelters also containing an Axe Grinding Groove. The Aboriginal cultural heritage sites are of high to low archaeological significance (Table 6). There are no other identified Aboriginal heritage sites located within the study area based on the 600 m boundary.

The location of the Aboriginal cultural heritage sites relative to LW 18 are Upper Avon 36 (AHIMS ID# 52-2-1772) 200 m south of the LW 18 maingate, Dendrobium 7 (AHIMS ID# 52-2-2248) directly above the chain pillar between LW 17 and LW 18 and Dendrobium 8 (AHIMS ID# 52-2-3068) directly above LW 17 and immediately adjacent to the longwall maingate.

Table 6: Aboriginal Heritage Sites within 600 m of LW 18 Secondary Extraction

AHIMS No.	Site Code	Site Type	Archaeological Significance Rating
52-2-1772	Upper Avon 36	Shelter with Art and Deposit	High - This shelter site has both art and archaeological deposit. It has been indicated by Biosis (2012: 54) that the five stone artefacts on the deposit surface suggests potential for further material within the undisturbed grey-brown sandy loam, estimated to be 20cm deep. The two panels of art assemblage contain six recognisable motifs, which include charcoal outline and infill anthropomorphic figures, charcoal outline and infill macropod and bird, charcoal outline and infill anthropomorphic figure with hair and material culture items. All motifs are large and have eyes. The shelter site affords rarity value and is generally representative of charcoal and ochre motif art for the study area and region.
52-2-2248	Dendrobium 7	Shelter with Art, Deposit and Axe Grinding Groove	Low - This is a shelter with art which consists of a single indeterminate charcoal outline and infill motif. The poor condition of the art is due to lichen and mould growth on the art panel. This shelter with art is a poorly preserved example of the most common site and art type, with no remarkable characteristics.
52-2-3068	Dendrobium 8	Shelter with Art and Deposit	Low – This shelter with art consists of a single indeterminate solid charcoal motif. The art is in poor condition due to white mould and lichen growth, water seepage and exposure to sunlight and weathering on the art panel. Biosis (2012:59) has indicated this site to be poorly preserved and an example of the most common site and art type, with no remarkable characteristics.

Cultural Significance

IMC acknowledges that the entire Subject Area has cultural significance for Aboriginal people. The contemporary view held by Aboriginal people asserts that all Aboriginal objects and sites are important within the region due to their traditional connection and interconnectivity with the natural landscape and past occupation of the region.

The Subject Area is located on the traditional country of the Dharawal nation. Tindale (1940, 1974) considered Dharawal/Tharawal boundaries to extend from Botany Bay in the north, west to Appin, and far south to Nowra and Goulburn. The coastal plains and escarpment around Wollongong were inhabited by

the Wadi Wadi, a tribe/subgroup of Dharawal-speakers (Tindale 1940:194-195, DEC, 2005:3). Other named groups of the Dharawal language group are thought to include the Gweagal, Norongerraga, Illawarra, Tagary, Wandeanega, Wodi Wodi and Ory-ang-ora (Tindale 1974). Attenbrow (Attenbrow 2010:35) points out that such boundary mapping, undertaken as it was in the nineteenth century, is indicative at best, however, there appears to be reasonably strong agreement between those who have mapped language boundaries that the area is Dharawal country. Dharawal people distinguished themselves as Fresh Water, Bitter Water or Salt Water depending on where in the wider language boundary their traditional lands were – the inland hills and valleys, the plateaus and swamps or the coastal plain respectively (DEC, NSW, 2005:6)

Past Aboriginal land use of the Subject Area can be re-traced using contemporary comments from Aboriginal people, previously recorded archaeological resources, historical observations of early settlers and surveyors, (though the inherent bias present in historical European observations must be recognised).

Aboriginal cultural heritage sites within the Woronora Plateau remain in relatively undisturbed environment with a relatively high density of sites, many being a highly visual cultural resource which creates a strong sense of place and cultural identity. It has been identified in the previous Dendrobium Area 3 Archaeological and Cultural Heritage Assessment (Biosis Research, 2007) that all Aboriginal cultural heritage sites located within Dendrobium Area 3 are of cultural significance to the Illawarra Local Aboriginal Land Council, Korewal Elouera Jerrunga and Cubbitch Barta Native Title Claimants Aboriginal Corporation. It is important that comment on the area is provided directly by members of the Aboriginal community.

Aboriginal cultural heritage sites identified as having particular cultural significance by the Aboriginal community representatives are located within 600 m of LW 18 proposed secondary extraction. These sites are located within the LW 18 35° angle of draw and/or predicted 20 mm subsidence contour, and are, Aboriginal cultural heritage sites Upper Avon 36 (AHIMS ID# 52-2-1772, Shelter with Art and Deposit), Dendrobium 7 (AHIMS ID# 52-2-2248, Shelter with Art, Deposit and Axe Grinding Groove), and Dendrobium 8 (AHIMS ID# 52-2-3068, Shelter with Art and Deposit). Notwithstanding, the broader cultural values described above are considered in relation to the monitoring and management of known Aboriginal cultural heritage sites (e.g. when developing potential remediation or mitigation measures [Section 10]).

4.4.1 Revised Subsidence Predictions

The subsidence predictions for LW 18 in relation to Aboriginal cultural heritage sites within the 35° angle of draw and/or predicted 20 mm subsidence contour have been prepared by MSEC (2020).

Three Aboriginal cultural heritage sites are located within the Subject Area and within the LW 18, 35° angle of draw and predicted 20 mm subsidence contour, Upper Avon 36, (AHIMS ID# 52-2-1772), Dendrobium 7, (AHIMS ID# 52-2-2248) and Dendrobium 8, (AHIMS ID# 52-2-3068). There are no additional sites that are located within the Subject Area based on the 600 m boundary.

Aboriginal cultural heritage site Upper Avon 36 (AHIMS ID# 52-2-1772) is located outside the mining area at a distance of 200 m from the proposed LW 18. It is predicted that Upper Avon 36 (AHIMS ID# 52-2-1772) will experience less than 20 mm vertical subsidence due to the mining of LW 18. While Upper Avon 36 (AHIMS ID# 52-2-1772) could experience low level vertical subsidence, it is not expected to experience measurable tilts, curvatures and strains (MESC 2020:49). The potential for impacts on Aboriginal cultural heritage site Upper Avon 36 (AHIMS ID# 52-2-1772) is therefore considered to be very low.

In addition, Aboriginal cultural heritage site Upper Avon 36 (AHIMS ID# 52-2-1772) and Aboriginal cultural heritage Dendrobium 7 (AHIMS ID# 52-2-2248) are also located on the sides of ridgelines and are not expected to experience valley related effects. The maximum predicted total valley related effects in the

location of Aboriginal cultural heritage Dendrobium 7 (AHIMS ID# 52-2-2248) are 450 mm upsidence and 550 mm closure. However, Aboriginal cultural heritage site Dendrobium 7 (AHIMS ID# 52-2-2248) is located on the valley side and is unlikely to experience the valley related upsidence or the compressive strain due to valley closure that occur near the valley base (MSEC 2020:90).

Aboriginal cultural heritage sites Dendrobium 7 (AHIMS ID# 52-2-2248) and Dendrobium 8 (AHIMS ID# 52-2-3068) are located above or adjacent to the chain pillar between LW 17 and LW 18. The Aboriginal cultural heritage site Dendrobium 8 (AHIMS ID# 52-2-3068) is located above LW 17, immediately adjacent to the longwall maingate.

The extraction of LW 18 is likely to result in fracturing of the exposed bedrock along the ridgelines and, where the rock is marginally stable, could then result in rockfalls or instabilities. The fracturing and rock falls could adversely impact the sandstone shelters located adjacent to proposed LW 18.

The potential for adverse impacts on Aboriginal cultural heritage sites Dendrobium 7 (AHIMS ID# 52-2-2248) and Dendrobium 8 (AHIMS ID# 52-2-3068) has been assessed as unlikely (i.e. less than 10 %) for each of these Aboriginal cultural heritage sites. However, it is possible that these sites could experience fracturing resulting in spalling or rock falls.

Table 7 details the revised subsidence predictions for the Subject Area (at the completion of LW 18).

Further detail on the assessment of cultural heritage sites is detailed in the *Longwalls 9 to 18: Heritage Impact Assessment* (Biosis 2012) and Subsidence Predictions and Impact Assessments report (MSEC 2020).

Table 7: Revised Subsidence Predictions for LW 18 Aboriginal Heritage Sites

Aboriginal Heritage Sites ¹	Maximum Predicted Subsidence ² (mm)	Maximum Predicted Tilt ³ (mm)	Maximum Predicted Hogging Curvature ⁴ (km ⁻¹)	Maximum Predicted Sagging Curvature ⁴ (km ⁻¹)
Upper Avon 36 (AHIMS ID# 52-2-1772)	<20	<0.5	<0.01	<0.01
Dendrobium 7 (AHIMS ID# 52-2-2248)	200	6	0.16	<0.01
Dendrobium 8 (AHIMS ID# 52-2-3068)	775	20	0.08	0.06

¹ Aboriginal heritage sites within the 35° angle of draw of LW 18 and/or predicted 20 mm subsidence contour.

² Subsidence refers to vertical displacements of the ground.

³ Tilt is the change in the slope of the ground as a result of differential subsidence, and is calculated as the change in subsidence between two points divided by the distance between those points.

⁴ Curvature is the second derivative of subsidence, the rate of change of tilt, and is calculated as the change in tilt between two adjacent sections of the tilt profile divided by average length of those sections.

4.4.2 Revised Assessment of Potential Subsidence Impacts and Environmental Consequences

The LW 18 SMP Subsidence Assessment (MSEC 2020) provided a description of the impacts on Aboriginal cultural heritage sites (including open sites and sandstone overhang sites) in the Southern Coalfield as a consequence of longwall mining. The following provides a summary of potential impact mechanisms and any changes to the predicted subsidence impacts and environmental consequences due to the revised subsidence predictions for LW 18.

Sandstone overhang Aboriginal cultural heritage sites

There are three (3) sandstone overhang Aboriginal cultural heritage sites located within the 35° angle of draw and/or predicted 20 mm subsidence contour of LW 18. As outlined previously these sites are Upper Avon 36 (AHIMS ID#52-2-1772), Dendrobium 7 (AHIMS ID# 52-2-2248) and Dendrobium 8 (AHIMS ID#52-2-3068). Overhang sites can potentially be impacted by the cracking of sandstone. Where cracking is coincident with an overhang, it is possible there could be cracking of art panels, isolated rock fall as the result of mining, or in rare cases, overhang collapse.

The majority of the Aboriginal cultural heritage sites are located above solid coal and based on the low magnitudes of the predicted subsidence parameters, impacts to these sites resulting from the extraction of LW 18 are considered unlikely (MSEC 2020). Surface fracturing of the bedrock can occur outside the longwall layouts, however such fracturing is minor and isolated and the likelihood of fracturing impacting the Aboriginal cultural heritage sites outside the longwall layouts is considered to be low (MSEC 2020).

In addition to the above, Section 10.2 provides an additional assessment (including tabulation of additional risk factors) for Aboriginal cultural heritage sites of high archaeological significance and/or particular Aboriginal cultural significance. Notwithstanding the above and the assessments presented in Sections 4.2, 4.3 and 4.4, a monitoring program will be implemented to monitor the impacts and consequences of Project related subsidence on Aboriginal cultural heritage sites (see Section 9). The monitoring includes Aboriginal cultural heritage sites of low, moderate or high scientific (archaeological) significance.

5. Consultation Protocol

5.1 Identification of Aboriginal Stakeholders

For the purpose of this ACHMP, Aboriginal stakeholders are defined as being those Aboriginal groups/parties who have previously registered an interest in being consulted in relation to the Project and its associated AHIP, as outlined in Biosis 2012. These Aboriginal stakeholders include the following:

- Bellambi Aboriginal Tent Embassy
- Cubbitch Barta Native Title Claimants
- Illawarra Local Aboriginal Land Council
- Korewal Elouera Jerrungurah Tribal Elders Council
- Kullila Welfare and Housing Aboriginal Corporation
- Northern Illawarra Aboriginal Corporation
- Tocumwall
- Wadi Wadi Coomaditchie Aboriginal Corporation
- Mr Gary Caines (Individual)

5.2 Aboriginal Stakeholder Participation

IMC is committed to maintaining ongoing consultation with Aboriginal stakeholders throughout the life of the Project; however, it is the responsibility of Aboriginal stakeholders to ensure that up-to-date contact details (full name, postal address, telephone number, and where possible, email address) are provided to IMC.

5.2.1 Involvement of Aboriginal Stakeholders in fieldwork

The number of participants in an effective field team is governed by a number of safety, logistic and access considerations, including:

- **Safety:** a large group can be difficult to keep together when moving through dense vegetation in steep terrain as is the case across the majority of the Project underground mining area. Large groups move slowly (especially through dense vegetation and in steep terrain) and can prevent a rapid response (i.e. evacuation) to imminent dangers that can often be encountered in the Project underground mining area (e.g. bush fire warnings and electrical storms).
- **Logistics:** Participant numbers are limited by vehicle availability and safety restrictions. The isolated nature of the area above the Project underground mining area requires the use of vehicles for efficient field work.
- **Access Restrictions:** Areas within the Project underground mining area are located within a WaterNSW Schedule One special area. Public access is controlled in this area to protect water quality and ecological integrity (WaterNSW and OEH, 2015). Excessive access into this area is not consistent with the WaterNSW's Special Areas Strategic Plan of Management (WaterNSW and OEH, 2015).

Aboriginal stakeholders will be invited to attend relevant scheduled fieldwork in consideration of the above. Scheduled fieldwork to which Aboriginal stakeholders may be invited to attend includes:

- Aboriginal heritage monitoring (Section 9);
- supplementary fieldwork (Section 8); and
- the planning for and/or implementation of management and mitigation measures (Section 10).

Invitations to attend scheduled fieldwork will be provided in writing with at least 5 business days' notice. Dates for undertaking fieldwork will be subject to consultation with Aboriginal stakeholders and archaeologists.

Prior to undertaking fieldwork, all participating Aboriginal stakeholders and archaeologists will be required to comply with the workplace health and safety requirements of IMC. These requirements include the provision of copies of current relevant insurances (i.e. public liability and workers compensation) and appropriate personal protection equipment.

All IMC staff and contractors (including Aboriginal stakeholders and archaeologists) may be subject to random drug and alcohol testing. All IMC staff and contractors (including Aboriginal stakeholders and archaeologists) must be able bodied and fit to undertake the work required.

5.2.2 Ongoing consultation with Aboriginal Stakeholders

IMC will maintain a consultation log to record all correspondence with Aboriginal stakeholders (e.g. emails, telephone calls, letters, meeting minutes, etc.) see (Appendix A 3).

Aboriginal stakeholders will be invited to comment on relevant draft documentation regarding the management of Aboriginal cultural heritage, if and when required.

Where the ACHMP is amended or modified, Aboriginal stakeholders and HeritageNSW will be provided with a reasonable opportunity to comment on the amendments before the revised version is adopted. In the context of this ACHMP, an amendment or modification would include any change that affects the management of Aboriginal cultural heritage associated with IMC. Examples of amendments or modifications in the context of this ACHMP include:

- Any change to the monitoring program methodology (e.g. monitoring frequency or parameters).
- Any change to the available remediation or mitigation measures (e.g. proposed use of a new engineering technology to reduce potential consequences).
- Any change to the surface disturbance protocol.

A review request and draft copy of this ACHMP (version D3) was sent to the Aboriginal stakeholders identified in Section 5.1 on 2 December 2020. No responses were received aside from a phone call from Cubbitch Barta on 3 December 2020, who said they needed more time to review the document.

5.3 Aboriginal Stakeholder Access Protocol

In addition to scheduled field activities, Aboriginal stakeholders may apply to WaterNSW or other landholders for access to Aboriginal cultural heritage sites within the larger Project area (e.g. for personal, spiritual or cultural reasons). IMC will endeavour to facilitate the requested access, consistent with personnel workplace health and safety requirements and associated landholder requirements.

6. Performance measures and indicators

Condition 12 of the Development Consent required IMC to do the following in relation to Aboriginal cultural Heritage:

The SMPs under Condition 12 must include an Aboriginal Heritage Management Plan, which must include a:

- (a) description of known Aboriginal heritage sites*
- (b) protocol for the ongoing consultation and involvement of the Aboriginal community in the conservation and management of Aboriginal heritage*
- (c) description of the measures that would be implemented to protect Aboriginal sites generally, including measures that would be implemented to secure, analyse and record sites at risk of subsidence and;*
- (d) description of the measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the development.*

Aboriginal sites are subject to ongoing natural deteriorating processes unrelated to mining, including impacts from tree roots, natural weathering or deterioration, natural cracking of sandstone and inappropriate visitor behaviour (Lambert, 1989; Reeves and Regal, 2017). Limited long term studies have been undertaken on subsidence impacts to overhangs in the NSW Southern Coalfield and as the internal structures of overhangs (e.g. existing bedding planes, joints, cracking and seepage) are not always observable, not all risks to shelters from mining can be identified. This makes it sometimes problematic to clearly differentiate between subsidence impacts and natural impacts.

Section 9 describes the monitoring program and detailed TARP that will be used to assess the Project against the Aboriginal cultural heritage sites' subsidence impacts.

There are three (3) Aboriginal heritage sites within the LW 18 Subject Area (see Figure 3). The Subject Area is defined by the 35° angle of draw and/or predicted 20 mm subsidence contour of LW 18, and is shown on (Figure 1) of this ACHMP.

As described in Section 10, in the event that any subsidence impact is recorded, the implementation of the appropriate management, remediation and/or mitigation measures would be required in consultation with Heritage NSW and the Aboriginal stakeholders. In the event the Aboriginal cultural heritage sites experience subsidence impacts, IMC will notify the DPIE, Heritage NSW and Aboriginal stakeholders as soon as practicable after IMC becomes aware of the impacts and the Contingency Plan (Section 11) will be implemented.

As indicated in Section 4.2, IMC acknowledges that all Aboriginal cultural heritage sites are culturally significant to the Aboriginal people who have a traditional connection to Country.

7. Baseline Data

Baseline recording of Aboriginal cultural heritage sites for LW 9-18 has been conducted by Biosis Research (2012) with additional baseline recording for the sites associated with LW 18 completed on 12 and 13 November 2020 by Rebecca Chalker (Cubbitch Barta Native Title Claimants), Kayla Williams (Illawarra Local Aboriginal Land Council) and John Phillips (Tocumwall) Renée Regal and Wendy Van Der Spoel (Aboriginal Heritage Consultant - Niche Environment and Heritage). This additional recording data has been used to amend the relevant AHIMS site cards, with updates to the site cards for Upper Avon 36 (AHIMS ID#52-2-1772), Dendrobium 7 (AHIMS ID#52-2-2248) and Dendrobium 8 (AHIMS ID#52-2-3068) submitted by Niche Environment and Heritage on 1 February 2021.

All the currently known Aboriginal archaeological sites within Dendrobium Area 3B have been subject to baseline recording at the level appropriate for registration on the Aboriginal Heritage Information Management System (AHIMS) at Heritage NSW. The purpose detailed is to:

- Mitigate the risk of potential impact through more detailed archival recording of all Aboriginal cultural heritage sites (Shelter with Art, Deposit and/or Axe Grinding Groove sites, Axe Grinding Groove Sites and Engraving Sites).
- Provide a set of baseline records for the monitoring program.

A monitoring regime established by Sefton (2000) and amended and continued by Biosis Research (2007), and further implemented by Niche Environment and Heritage (2009 to date) has proven effective in observing changes to Aboriginal cultural heritage shelter sites due to subsidence movements.

Previous Aboriginal cultural heritage sites that were subject to detailed baseline recording within Dendrobium 3B (where the sites were able to be relocated) are summarised in Table 4 and listed in Table 8 below.

Table 8: Aboriginal Cultural Heritage Sites Subject to Previous Baseline Recording Dendrobium 3B

AHIMS ID No.	Site Name	Site Type
52-2-1562	Donald Castle Creek Site 1; Cordeaux Catchment Area	Shelter with Art
52-2-1623	Browns Road Site 8	Shelter with Deposit
52-2-1626	Browns Road Site 11	Shelter with Art
52-2-1627	Browns Road Site 12	Shelter with Art
52-2-1628	Browns Road Site 13	Shelter with Art
52-2-1771	Upper Avon 35	Shelter with Deposit
52-2-1772	Upper Avon 36	Shelter wit Art
52-2-1773	Upper Avon 37	Shelter with Deposit
52-2-1774	Upper Avon 38	Shelter wit Art
52-2-1775	Upper Avon 39	Shelter with Deposit

AHIMS ID No.	Site Name	Site Type
52-2-1776	Upper Avon 40	Shelter with Art and Deposit
52-2-1778	Upper Avon 41	Shelter with Deposit
52-2-2208	Dendrobium 1	Shelter with Deposit
52-2-2209	Dendrobium 2	Shelter with Art
52-2-2229	SITE 1 – DB1	Shelter with Art
52-2-2246	Dendrobium 6	Isolated Artefact
52-2-2248	Dendrobium 7	Shelter with Art, Deposit and Grinding Groove
52-2-3068	Dendrobium 8	Shelter with Art and Deposit
52-2-3640	DM 16	Shelter with Art
52-2-3641	DM 17	Shelter with Deposit
52-2-3645	DM 21	Shelter with Art and Deposit
52-2-3646	DM 22	Shelter with Art
52-2-3878	DM 2	Shelter with Deposit

Table 9: Aboriginal Cultural Heritage Sites Subject to Baseline Recording for LW 18

AHIMS ID No.	Site Code	Site Type
52-2-1772	Upper Avon 36	Shelter with Art and Deposit
52-2-2248	Dendrobium 7	Shelter with Art, Deposit and Axe Grinding Groove
52-2-3068	Dendrobium 8	Shelter with Art and Deposit

Three Aboriginal cultural heritage sites (Table 9) that have been subject to baseline recording for LW 18, and are located within 600 m of LW 18 secondary extraction,.

The baseline recording of Aboriginal cultural heritage sites for the Dendrobium Mine has been previously provided to the DPIE, HeritageNSW and Aboriginal stakeholders (and are available on request).

The baseline records include:

- a photographic record of each Aboriginal cultural heritage site
- detailed scaled plans of each Aboriginal cultural heritage site including physical characteristics and features; and
- detailed information regarding the dimensions, composition and features of the site.

8. Supplementary fieldwork and pre-clearance surveys

8.1 Supplementary fieldwork/investigation

Supplementary Aboriginal cultural heritage fieldwork may be undertaken over the life of the Project to inform the management and monitoring of Aboriginal cultural heritage sites.

8.2 Recording and registering new Aboriginal Cultural Heritage Sites

Any previously unrecorded Aboriginal cultural heritage sites identified during fieldwork (e.g. baseline recording, supplementary fieldwork, pre-clearance surveys, monitoring, follow-up inspections to assess the effectiveness of mitigation/management/remediation measures, etc.) would be recorded using the standard Heritage NSW site card. This information would be submitted to the Heritage NSW for registration on the AHIMS database. Any previously unrecorded sites would also be subject to subsidence risk and impact assessments, and an archaeological and Aboriginal cultural significance assessment in consultation with Aboriginal stakeholders. Any previously unrecorded Aboriginal cultural heritage sites would be managed in accordance with the requirements of this ACHMP.

9. Monitoring

A monitoring program will be implemented to monitor subsidence impacts and environmental consequences of Project related subsidence on Aboriginal cultural heritage sites.

Monitoring of the LW 18 Aboriginal heritage sites will be undertaken as a component of this ACHMP

Monitoring of Dendrobium 3B Aboriginal cultural heritage sites, at which previous monitoring indicates continued change due to mining induced subsidence following the completion of Dendrobium 3B longwalls will be monitored as a component of this ACHMP.

Aboriginal cultural heritage sites Upper Avon 36 (AHIMS ID# 52-2-1772), Dendrobium 7 (AHIMS ID# 52-2-2248) and Dendrobium 8 (AHIMS ID# 52-2-3068) will be monitored as part of the End of Panel process (Figure 2). Monitoring of these Aboriginal cultural heritage sites will also be undertaken for LW 18 as described below.

All Aboriginal cultural heritage sites located within the 35° angle of draw and/or predicted 20 mm subsidence contour of LW 18 will be monitored (Table 6, Table 9 and Figure 3).

Round 1. Baseline monitoring will be undertaken prior to the extraction of LW 18 and will include all Aboriginal cultural heritage sites within the LW 18, 35° angle of draw and/or predicted 20 mm subsidence contour (Tables 7 and 9).

Round 2. Monitoring will be undertaken within 6 months following the completion of LW 18 and will include all Aboriginal cultural heritage sites within the LW 18 35° angle of draw and/or predicted 20 mm subsidence contour (Tables 7 and 9) as part of the End of Panel assessment.

Round 3. Monitoring will be undertaken as part of a final End of Panel assessment 12 months after the completion of LW 18, and will include all Aboriginal cultural heritage sites within the LW 18 35° angle of draw and/or predicted 20 mm subsidence contour (Tables 7 and 9).

Table 10: LW 18 Aboriginal Cultural Heritage Sites Monitoring Schedule

Aboriginal Cultural Heritage Site	Round 1 <i>Baseline archival recording</i>	Round 2 <i>Impact assessment recording</i>	Round 3 <i>Final impact assessment recording</i>
Upper Avon 36 AHIMS ID# 52-2-1772	Observational and photographic monitoring in consultation with stakeholders	Six (6) months after each predicted subsidence movement at the Aboriginal cultural heritage site (that is when a longwall makes its closest traverse to the site), and/or (if the longwall is to finish mining within six (6) months	Twelve (12) months after each predicted subsidence movement at the Aboriginal cultural heritage site (that is when a longwall makes its closest traverse to the site), and/or (if the longwall is to finish mining within six (6) months
Dendrobium 7 AHIMS ID# 52-2-2248	Observational and photographic monitoring in consultation with stakeholders	Six (6) months after each predicted subsidence movement at the Aboriginal cultural heritage site (that is when a longwall makes its closest traverse to the site), and/or (if the longwall is to finish mining within six (6) months	Twelve (12) months after each predicted subsidence movement at the Aboriginal cultural heritage site (that is when a longwall makes its closest traverse to the site), and/or (if the longwall is to finish mining within six (6) months
Dendrobium 8 AHIMS ID# 52-2-3068	Observational and photographic monitoring in consultation with stakeholders	Six (6) months after each predicted subsidence movement at the Aboriginal cultural heritage site (that is when a longwall makes its closest traverse to the site), and/or (if the longwall is to finish mining within six (6) months	Twelve (12) months after each predicted subsidence movement at the Aboriginal cultural heritage site (that is when a longwall makes its closest traverse to the site), and/or (if the longwall is to finish mining within six (6) months

The monitoring team will include a suitably qualified archaeologist (with experience in rock art recording and management) and representatives of the Aboriginal stakeholders (where available) (Section 5.1).

Specific details that will be recorded during the monitoring program include (but are not limited to):

- the date of monitoring;
- the location of longwall extraction (i.e. the longwall chainage) at the time of monitoring;
- comparison of the physical characteristics of the site at the time of monitoring against the previous monitoring and the baseline record (detail/quantify any changes observed);
- inspections of rock surfaces for cracking and/or exfoliation and/or blockfall since the previous monitoring and against the baseline record;
- inspection of art motifs for damage or deterioration since the previous monitoring and against the baseline record;
- identification of any natural weathering processes that may result in deterioration (e.g. fire, vegetation growth and water seepage);
- detailed description and quantification of any changes noted during the completion of the above tasks
- a photographic record of any changes noted during monitoring (taken at the same position and distance as baseline record to allow comparison over time);
- whether any follow-up actions are required to be considered (e.g. implementation of management or initiation of the Contingency Plan, etc.); and
- any other relevant information.

An example monitoring pro forma detailing the minimum recording requirements during monitoring is provided as (Table 11).

A summary of the information collected during monitoring will be recorded and reported in accordance with the Development Consent conditions. At the completion of monitoring, a report will be prepared and distributed to the Heritage NSW and each of the Aboriginal stakeholders. The report will include the following:

- a map of the area and the location of Aboriginal cultural heritage sites monitored;
- a table outlining the dates on which each site was monitored and which Aboriginal stakeholders were present;
- a table outlining Aboriginal cultural heritage sites at which change has been noted and the nature and degree of change;
- a summary of comments made by Aboriginal stakeholders present during monitoring regarding: - the degree and nature of change to Aboriginal cultural heritage sites; and - proposed recommendations.
- general observations made during the monitoring; and
- recommendations for future monitoring.

The monitoring results will be used to assess the Project against the Aboriginal cultural heritage sites (Section 6) in accordance with the detailed TARP provided in Table 12.

As described in Section 10, in the event that any subsidence impact is recorded during monitoring, the implementation of appropriate management, remediation and/or mitigation measures would be required in consultation with the Heritage NSW and the Aboriginal stakeholders. In addition, the AHIMS site card for any Aboriginal cultural heritage site affected by subsidence impacts will be updated and submitted to the Heritage NSW for registration on the AHIMS database. In the event the subsidence impact performance measure is exceeded, the Contingency Plan outlined in Section 11 will be implemented.

Table 11: Monitoring Pro-forma



Niche Environment and Heritage
PO Box W36 Parramatta NSW 2150
T 02 9689 2098 F 02 4017 0071
E info@niche-eh.com ABN 19 137 111 721

6261
South32 - IMC
LW 18 Monitoring
Site Recording Form

Site Name:

Date:

Overview					
Site type		MGAE		MGAN	
Previous Recording		Date			
STOP! Take a minute to assess the site and situation					
ASSESS SAFETY AND STABILITY OF SHELTER OR PLATFORM BEFORE ENTERING					
Changes since last monitoring observation/recording					
YES		NO			
Currently WET or DRY?		Notes:			
Quick check of changes observed					
Vertical Crack(s)		Horiz Crack(s)		Diagonal Crack(s)	
Opening of joint(s)		Lateral movement of planes		Exfoliation	
Block fall		Granular loss		Mineral efflorescence	
Change in seepage		Vegetaion - macro		Vegetation - micro	
Floor crack(s)		Exterior Context effected		Art panel effected?	
Describe the changes observed					
Overall					
Art surfaces					
Proposed mitigation or actions required					
Describe					

9.1 Aboriginal Cultural Heritage Site Monitoring (Trigger Action Response Plan)

The Trigger Action Response Plan (TARP) (Table 12) contains the Corrective Management Actions (CMA) for Aboriginal cultural heritage sites as outlined in the Dendrobium Area 3B SMP. As per the TARP, Upper Avon 36 (AHIMS ID# 52-2-1772), Dendrobium 7 (AHIMS ID #52-2-2248) and Dendrobium 8 (AHIMS ID#52-2-1623) will be monitored in accordance with this.

Table 12: Trigger Action Response Plan – Aboriginal Cultural Heritage Sites Monitoring for LW 18

Feature	Performance Measures	Actions as a result of performance measure rating
Upper Avon 36 (AHIMS ID#52-2-1772) Dendrobium 7 (AHIMS ID #52-2-2248) Dendrobium 8 (AHIMS ID#52-2-3068)	Observational and photographic monitoring in consultation with stakeholders (completed by this assessment).	None.
	<p><u>Level 1</u></p> <p>Change in shelter conditions not attributable to natural weathering or preservation; mineral growth of micro-organism growth (as observed by comparing pre-mining photographs with post-subsidence/ mining photographs).</p> <p>Changes external to the shelter that affect the site context (e.g. ground cracking, boulder slumping, rock and/or tree falls).</p>	<p>Continue monitoring program.</p> <p>Condition assessment and photographic record.</p> <p>Notify RAPs and HeritageNSW within 24 hours of any confirmed changes to the conditions of Aboriginal cultural heritage sites, as outlined in Section 6.2.4 of the Dendrobium Area 3B ACHA (Biosis 2012) in accordance with Condition 8 of AHIP #1132005.</p> <p>Notify relevant specialists and key stakeholders (e.g. Aboriginal community groups), outlined in Section 21.3 of the Dendrobium Area 3B Subsidence Management Plan).</p> <p>Summarise impacts and report in the End of Panel report and Annual Review.</p>
	<p><u>Level 2</u></p> <p>Change in shelter conditions not attributable to natural weathering or preservation- change in drip line or seepage, cracking or exfoliation of overhang or shelter, movement or opening of existing planes and joints in panel, block fall within shelter or overhang, shelter or overhang collapse.</p>	<p>Actions as stated for Level 1.</p> <p>Modify monitoring program if necessary.</p> <p>Trigger the development of site management plan to mitigate effects in consultation with Registered Aboriginal Parties and Landowner (WaterNSW).</p> <p>Notify RAP's of damages caused from mining.</p> <p>Notify Heriatge NSW and complete Aboriginal Site Impact Recording Forms (ASIRF) for damaged sites.</p>
	<p><u>Level 3</u></p> <p>Level 2 impacts at greater frequency than predicted.</p> <p>Level 2 impacts attributable to mining remote from the mining area.</p>	<p>Actions stated for Level 2.</p> <p>Notify Heritage NSW, DPIE, WaterNSW, other resource managers and relevant technical specialists and seek advice on any Corrective Management Actions (CMA) required.</p> <p>Site visits with stakeholders if required.</p> <p>Review monitoring program and notify if necessary, within 1 month.</p> <p>Implement increased monitoring if required within 2 weeks.</p> <p>Develop site CMA in consultation with key stakeholders within 1 month, (pending stakeholder availability) and seek approvals.</p> <p>Completion of works following approvals.</p> <p>Issue CMA report within 1 month of works completion.</p> <p>Conduct initial follow up monitoring and reporting within 2 months of CMA completion.</p> <p>Review the relevant TARP and Management Plan in consultation with key stakeholders.</p>

10. Management, Remediation and Mitigation Measures

10.1 Management and Remediation Measures

Following monitoring within six (6) and twelve (12) months of the completion of LW 18, IMC will assess the need for implementation of appropriate management and/or remediation measures.

Examples of management and remediation measures are provided in Table 13. Development and implementation of these measures will be assessed on a case-by-case basis and will acknowledge that whilst the measures may reduce the risk of impact and consequence, they can also have the potential to cause substantial damage to Aboriginal cultural heritage sites and their settings.

Table 13: Potential Management and Remediation Measures

Consequence	Potential Management and Remediation Measures	
	Measure	Description
Increased seepage with the potential to impact art	Seepage control techniques	<ul style="list-style-type: none"> Installation of an artificial dripline (e.g. silicone dripline) to direct increased moisture/water seepage away from art panels.
Reduction in the stability of a sandstone overhang due to substantial cracking or block fall	Stabilisation techniques	<ul style="list-style-type: none"> Installation of artificial rock support (e.g. rock bolts, cable bolts, cement sprays [e.g. shotcrete], injection of a binding agent [PUR or similar]). Installation of standing supports (e.g. timber props, timber cogs, sandbags and metal [hydraulic] props). Scaling/dislodgement/removal of remaining loose rock.
	Salvage	<ul style="list-style-type: none"> Archaeological salvage of artefacts for safekeeping and storage and/or display at a suitable location in consultation with the RAPs.
Impacts on aesthetic values due to cracking	Restoration of aesthetic values	<ul style="list-style-type: none"> Use of cosmetic treatments (e.g. in the form of coloured grout or similar) to restore aesthetic values.
Cracking of sandstone at open sites, threatening grinding grooves or engraved art	Strain reduction techniques	<ul style="list-style-type: none"> Installation of a stress relief slot or stress focus notch.

The development of management and/or remediation measures will be determined in consultation with Heritage NSW and the RAPs and with regard to the specific circumstances of the subsidence impact (e.g. the location, nature and extent of the impact) and the assessment of consequences.

If proposed, the implementation of any invasive techniques (e.g. stabilisation, stress relief/focus slots, use of material for aesthetic restoration, etc.) will also be developed in consultation with WaterNSW or other relevant landowners.

Follow-up inspections will be conducted to assess the effectiveness of implemented management and/or remediation measures and the requirement for any additional measures. The specific timing and nature of follow-up inspections/additional monitoring will be dependent on the nature of the management and/or remediation measures implemented. Any management and/or remediation measures implemented will be reported in the Annual Review (Section 13).

10.2 Mitigation Measures

10.2.1 Mitigation Measure Consideration and Implementation Process

As part of the development of Subsidence Management Plans (and on an ongoing basis during mining), IMC will consider the requirement for development and implementation of Aboriginal cultural heritage mitigation measures. The aim of the mitigation measures is to reduce the potential for substantial impacts and consequences to Aboriginal cultural heritage sites of high archaeological significance and/or particular Aboriginal cultural significance.

The development of mitigation measures will be determined with regard to the specific circumstances of individual Aboriginal cultural heritage sites, including accessibility, size and spatial extent, nature of predicted subsidence impacts and consequences, and level of damage or disturbance (to the Aboriginal cultural heritage site or its setting) associated with implementing the measure(s). The consideration of mitigation measures will acknowledge that while they may reduce the risk of consequence to the site, they also have the potential to cause substantial damage to the Aboriginal cultural heritage site and its settings (including impacts to Aboriginal cultural settings). Other potential environmental impacts associated with implementation of mitigation works (e.g. vegetation clearing) will also be considered.

Examples of potential mitigation measures currently available are provided in Table 13.

Any proposed mitigation measures will be developed and implemented (if considered appropriate) in consultation with Heritage NSW, Aboriginal stakeholders and the relevant landowner (WaterNSW).

If mitigation measures are implemented, follow-up inspections will be conducted to assess the effectiveness of mitigation measures and to determine the requirement for any additional measures. The specific nature of follow-up inspections/additional measures will be dependent on the specific nature of the mitigation measure(s) implemented and their success.

A summary of the development process and success of implemented mitigation measures will be reported in the Annual Review (Section 13).

10.2.2 Consideration of Mitigation Measures for Longwall 18

Three Aboriginal cultural heritage sites are located within LW 18 35° angle of draw and/or predicted 20 mm subsidence contour (Figure 3). Aboriginal cultural heritage site Upper Avon 36 (AHIMS ID# 52-2-1772) is of high archaeological significance and of particular Aboriginal cultural significance. Aboriginal cultural heritage sites Dendrobium 7 (AHIMS ID# 52-2-2248) and Dendrobium 8 (AHIMS ID# 52-2-3068) are of low archaeological significance and are of particular Aboriginal cultural significance.

IMC acknowledges that all Aboriginal cultural heritage sites are of cultural significance to the Aboriginal people who have a traditional connection to Country.

Previous monitoring, studies and experience from the Woronora Plateau and greater Southern Coalfield have identified several site characteristics/features as being most relevant when assessing the risk of environmental consequence to an Aboriginal cultural heritage site from subsidence impacts. These characteristics include (Sefton, 2000 and 2004; Regal and Reeves 2017; MSEC,2020):

- overhang volume – > 50 cubic metres increases the risk of negative consequence;
- presence of existing water seepage – damage to art from water is more likely if existing seepage is present

- location in relation to a drainage line – Aboriginal cultural heritage sites located in valley bottoms can experience valley closure mechanisms and increased risk of cracking
- location in relation to goaf – location of Aboriginal cultural heritage sites relative to the goaf influences the level of subsidence impacts experience
- overhang formation process – block-fall type overhangs are more likely to have roof or rear wall damage due to subsidence impacts
- depth of cover – increased depth of cover reduces subsidence impacts and consequences; and
- presence of existing joints and bedding planes – subsidence movements may be dissipated through existing joints and bedding planes rather than the creation of new cracks.

Mine Subsidence Engineering Consultants (MSEC) was engaged by IMC to conduct a geotechnical risk assessment of the Aboriginal cultural heritage sites of high archaeological significance and/or particular Aboriginal cultural significance in order to inform the potential implementation of mitigation measures to reduce the potential for substantial impacts and consequences to the Aboriginal cultural heritage sites. The geotechnical risk assessment report (MSEC 2020) is provided in Appendix 3 and considers the above characteristics and the potential for damage at each Aboriginal cultural heritage site.

Based on the information provided in the geotechnical risk assessment and in consideration of the potential damage caused by the implementation of available techniques, mitigation measures are not proposed for Aboriginal cultural heritage sites within the LW 18 35° angle of draw and/or predicted 20 mm subsidence contour.

Future longwalls have the potential to result in additional subsidence movements at Aboriginal cultural heritage sites associated with LW 18 or the previous mining areas within the Dendrobium 3B mining area. As part of the development of the future SMPs, IMC will review the potential impacts and environmental consequences to Aboriginal cultural heritage sites and re-consider the development and implementation of mitigation measures if required.

As described above, the development and implementation of any mitigation measures will be undertaken in consultation with Heritage NSW, the RAPs and relevant landowners (WaterNSW).

10.3 Surface Disturbance Protocol

The surface disturbance protocol aims to avoid accidental damage to Aboriginal cultural heritage sites located in close proximity to surface disturbance works. As described in Section 8, pre-clearance surveys will be undertaken (as needed) to identify the most appropriate location for required Project infrastructure.

This protocol will apply to surface disturbance works (e.g. exploration works, installation/operation/maintenance of surface infrastructure, construction/maintenance of access tracks, monitoring and stream restoration) proposed to be located close to any known Aboriginal cultural heritage site(s).

Surface disturbance works will be undertaken in consideration of the following:

1. Avoidance of impact to Aboriginal cultural heritage sites will be the primary management measure, where practicable.
2. To avoid accidental damage to Aboriginal cultural heritage sites located close to surface disturbance works, appropriate demarcation will be implemented (e.g. fencing, sign-posting or temporary flagging).

3. Where avoidance is not practicable, an Aboriginal Cultural Heritage Assessment with RAP consultation will be completed in accordance with the OEH (2011) *Guide to Investigating, assessing and reporting on Aboriginal cultural heritage in NSW* and the DECW (2010) *Aboriginal cultural heritage consultation requirements for proponents*.

10.4 Human Skeletal Material Protocol

Burial sites can have high cultural significance to Aboriginal communities and culturally appropriate management of burial sites is a high priority for the Aboriginal community. “Aboriginal remains” are defined in the *National Parks and Wildlife Act, 1974* as:

... the body or the remains of the body of a deceased Aboriginal person, but does not include:

- (a) body or the remains of a body buried in a cemetery in which non-Aboriginal persons are also buried, or*
- (b) a body or the remains of a body dealt with or to be dealt with in accordance with a law of the State relating to medical treatment or the examination, for forensic or other purposes, of the bodies of deceased persons.*

No burial or potential burial sites have been identified in the Project underground mining area. Nor are they considered likely to be identified in the future due to the shallow soil profiles present on the Woronora Plateau. Notwithstanding, the following steps will be carried out in the event that suspected Aboriginal human skeletal material is encountered within the Project underground mining area:

- surface works in the immediate vicinity of the skeletal material will cease;
- Environment Line will be contacted as soon as practicable by phone (131 555) or email (info@environment.nsw.gov.au);
- the DPIE, Heritage NSW, NSW Police and Aboriginal stakeholders will be informed as soon as practicable; and
- the identified skeletal remains will not be disturbed until the NSW Police and Heritage NSW have inspected the remains and authorised their disturbance.

10.5 Cultural Awareness Program

IMC will include a cultural awareness program as part of inductions aimed at minimising the potential for accidental damage to Aboriginal cultural heritage. The Aboriginal cultural awareness program will provide:

- an overview of the Aboriginal cultural heritage management program;
- an overview of the consultation protocol (Section 5);
- an overview of mitigation, management and remediation measures (Section 10);
- simple criteria and procedures for artefact and human bone recognition;
- actions to follow if human skeletal material is encountered (Section 10. 4); and
- personnel to contact for more information or assistance.

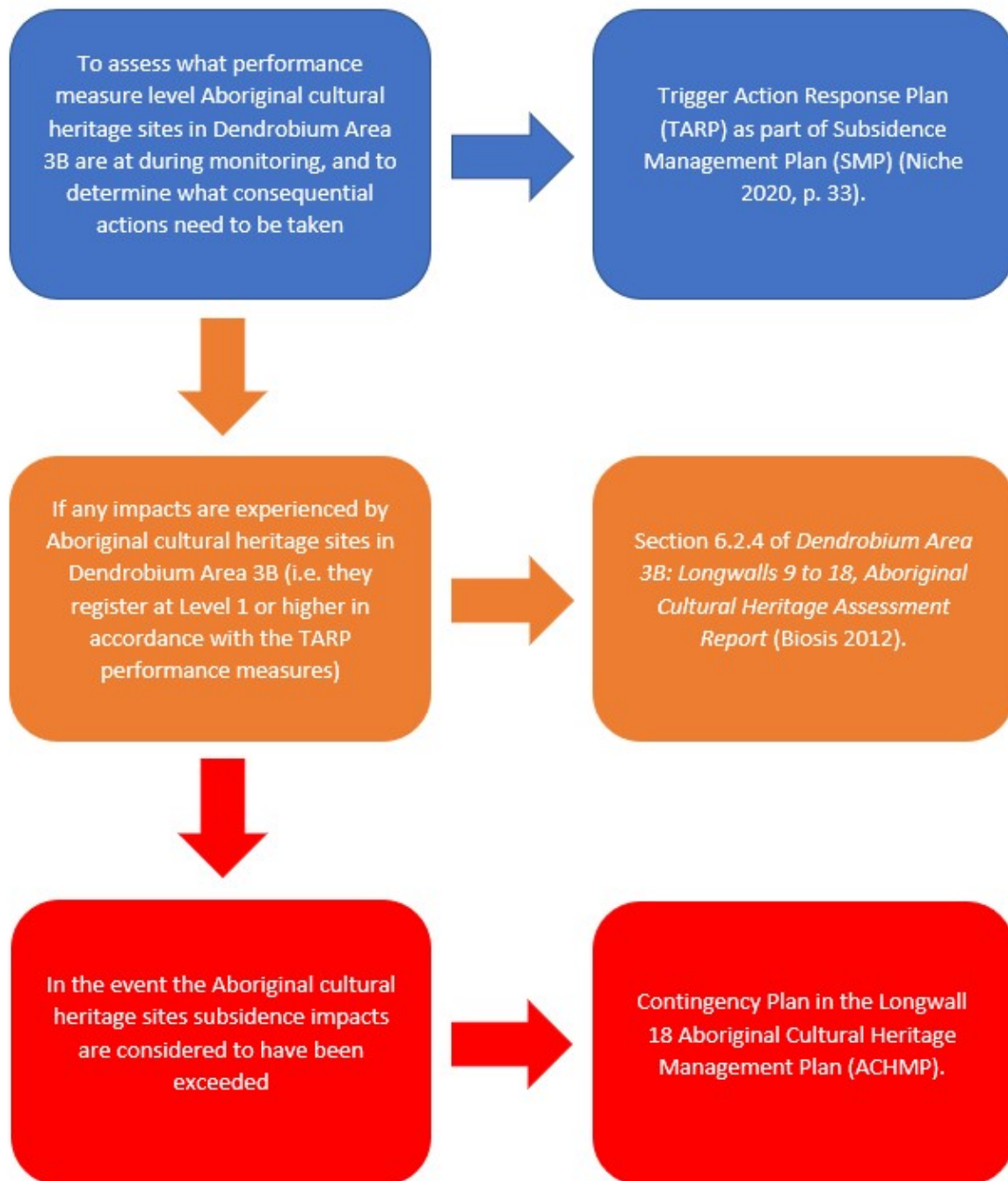
11. Contingency Plan

In the event the Aboriginal cultural heritage sites subsidence impacts detailed in Section 6 of this ACHMP are considered to have been exceeded, IMC will implement the following Contingency Plan:

- The exceedance will be reported to the Approvals Manager within 24 hours.
- The exceedance will be recorded consistent with the monitoring program described in Section 9 of this HMP.
- IMC will report the exceedance to the DPIE, Heritage NSW and RAPs within 24 hours of IMC becoming aware of the exceedance.
- IMC will conduct an investigation to evaluate the potential contributing factors. The investigation will:
 - compare and critically analyse measured versus predicted subsidence parameters;
 - review measured subsidence parameters against the observed impact; and
 - review the subsidence monitoring program and update the program where appropriate, in consultation with Heritage NSW and the RAPs.
- IMC will identify an appropriate course of action with respect to the identified impact(s), in consultation with specialists, relevant agencies and RAPs, as necessary. For example:
 - proposed management and/or mitigation measures (Section 10); and
 - a program to review the effectiveness of the management and/or mitigation measures.
- IMC will submit the proposed course of action to Heritage NSW for approval, in accordance with the AHIP.
- IMC will implement the approved course of action to the satisfaction of Heritage NSW.

For detail on the relationships between the response plans relevant to LW 18, refer to Table 14.

Table 14: Flow chart of response plans relevant to LW 18



12. Future Subsidence Management Plans for Dendrobium

In accordance with Condition 7, Schedule 3 of the Development Consent, IMC has collected baseline data for future SMPs. The collection of baseline data has included:

- photographic records;
- detailed scaled plans including physical characteristics and features; and
- detailed information regarding the dimensions, composition and features.

Prior to the commencement of secondary extraction associated with the next SMP (i.e. LW 19 on), baseline data will be obtained for Aboriginal cultural heritage sites located within the relevant 35° angle of draw and/or predicted 20 mm subsidence contour of the SMP longwall layout.

In addition to the baseline data collection, consideration of the environmental performance and management measures in accordance with the review(s) conducted as part of this ACHMP will inform the appropriate type and frequency of monitoring of the Aboriginal cultural heritage sites relevant to the next SMP.

13. Annual Review and Improvement of Environmental Performance

In accordance with Condition 5, Schedule 8 of the Development Consent, IMC will conduct an Annual Review of the environmental performance of the Project by the end of September each year, and for at least three (3) years following the cessation of mining at the development. IMC must submit an Annual Review to the Secretary, CCC and relevant agencies reviewing the environmental performance.

The Annual Review will relate to the previous financial year and specifically address the environmental performance of the ACHMP and will:

- identify the standards and performance measures that apply to the Project
- describe the development (including any rehabilitation) that was carried out in the previous financial year
- describe the Project (including any rehabilitation) that is proposed to be carried out in the current financial year
- include a summary of the complaints received during the past year, and compare this to the complaints received in the previous years
- include a summary of the monitoring results for the Project during the past year
- include a comprehensive review of the monitoring results and complaints records of the Project over previous financial year, including a comparison of these results against the:
 - relevant statutory requirements, limits or performance measures/criteria,
 - requirements of any plan or program required under this consent,
 - monitoring results of previous years, and
 - relevant predictions in the documents listed in condition 2 of Schedule 2.
- identify any non-compliance or incident which occurred in the previous financial year, and describe what actions were (or are being) taken to rectify the the non-compliance and avoid reoccurrence
- evaluate and report on:
 - the effectiveness of the noise and air quality management systems, and
 - compliance with the performance measures, criteria and operating conditions in this consent.
- identify any trends in the monitoring data over the life of the Project:
 - identify any discrepancies between the predicted and actual impacts of the Project, and analyse the potential cause of any significant discrepancies, and
 - describe what measures will be implemented over the next financial year to improve the environmental performance of the Project.

Copies of the Annual review must be submitted to the affected Councils and made available to the CCC and any interested person upon request.

14. Incidents

An incident is defined as a set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in the Development Consent.

The reporting of incidents will be conducted in accordance with Condition 3 and 4, Schedule 8 of the Development Consent. IMC will notify the Secretary of the DPIE:

- within 24 hours of detecting the occurrences of an incident that causes (or may cause) material harm to the environment. IMC must notify the Department and any other relevant agencies of the incident;
- within seven days of notifying the Department and other relevant agencies of such an incident, IMC must provide the Department and these agencies with a written report that;
 - describes the date, time and nature of the incident;
 - identifies the cause (or likely cause) of the incident;
 - describes what action has been taken to date; and
 - describes the proposed measures to address the incident.

15. Complaints

A protocol for managing and reporting of complaints has been developed by IMC as a component of the Dendrobium Mine Environmental Management Strategy (EMS) (DENMP0039 version 5.0, 2019) and *Handling Community Complaints, Enquiries & Disputes Procedure (IHP0112)*, and is described below.

Section 2.6 of the EMS states that:

Managing community enquiries and complaints is a form of community consultation where the company invites, receives and addresses community enquiries and complaints. One of the main mechanisms for dealing with enquiries/complaints is the use of a community call line.

2.6.1. Community Call Line

To record stakeholder enquiries/complaints in relation to Illawarra Coal's mining operations, a community call line has been established. The number is 1800 102 210.

The procedure for dealing with community concerns and enquiries is detailed in the Handling Community Complaints, Enquiries & Disputes Procedure (IHP0112). The Community Call Line is staffed 24 hours per day, seven days per week. The calls received are referred to a South32 representative who contacts the caller within 24 hours of the call being lodged to discuss details of the call. The caller is then informed of any results of ongoing investigations undertaken as a result of the complaint, including the results of any applicable environmental monitoring.

All legitimate complaints and associated actions are recorded and reported in accordance with South32 requirements. Interactions with persons including responses to concerns, enquiry/complaint outcomes, agreements and commitments are documented and maintained in the South32 document management system and the Stakeholder Database.

The availability of the community information line is promoted locally through community newsletters.

2.6.2. Dispute Resolution Process

In the event that an issue cannot be resolved between the South32 representative and complainant, the issue is escalated within South32. The escalation of the issue is aligned with the risk associated with the nature of the complaint.

In the event that the matter remains unresolved, it may be appropriate that the matter be taken to third-party mediation (e.g. Subsidence Advisory NSW, DPE, EPA or other relevant agencies) in order to achieve an outcome.

IMC is responsible for maintaining a complaints register recording all complaints, in accordance with Section 2.6 of the EMS; Condition 11, Schedule 8 of the Development Consent; and the *Handling Community Complaints, Enquiries & Disputes Procedure (IHP0112)*. For each complaint, the following information will be recorded in the complaints register:

- date and time of complaint;
- method by which the complaint was made;
- personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;

- nature of the complaint;
- the action(s) taken by IMC in relation to the complaint, including any follow-up contact with the complainant; and
- if no action was taken by IMC, the reason why no action was taken.

The South32 IMC Manager of Corporate Affairs will be responsible for the management of complaints and ensuring access to information, as stated in Section 2.4 of the EMS. In accordance with Condition 11, Schedule 8 of the Development Consent and Section 2.5.4 of the EMS, the complaints register will be made publicly available on the South32 website (<https://www.south32.net/>) and updated on a monthly basis. As per Condition 5, Schedule 8 of the Development Consent, a summary of complaints received during the past year will be submitted to the Secretary, CCC and relevant agencies as part of the Annual Review, alongside a comparison of the complaints received in previous years.

16. Non-Compliances with Statutory Requirements

A protocol for the managing and reporting of non-compliances with statutory requirements has been developed as a component of IMC's Dendrobium Mine EMS. Section 2.7 of the EMS states:

2.7.1. Non-Compliance, Corrective Action and Preventative Action

Non-compliance, corrective actions and preventative actions are managed in accordance with the Event Management Procedure (ICHP0098), Event Reporting and Investigation Trigger Action Response Plan (ICHTARP0002) and Corrective Action and Effectiveness Review Procedure (ICHP0107). These documents, which relate to all South32 Illawarra Metallurgical Coal operations, detail the processes utilised with respect to event reporting and identification of non-conformances/non-compliances, the application of appropriate corrective action(s) to address non-conformances/non-compliances and the establishment of preventative actions to avoid non-conformances/non-compliances. The key elements of the process include:

- *Identification of non-conformances and/or non-compliances;*
- *Recording of non-conformances and/or non-compliances;*
- *Evaluation of the non-conformance and/or non-compliance to determine specific corrective and preventative actions;*
- *Assigning of corrective and preventative actions to the responsible person; and*
- *Review of corrective actions to confirm the status and effectiveness of the actions.*

Corrective and preventative actions address the cumulative impacts of the mining operations. Subsidence modelling at Dendrobium Mine uses the Incremental Profile Method. This method uses a database of past movements/measurements to calibrate the subsidence model. The model predicts subsidence movements for each longwall (incremental) as well as all other longwalls and other influences on subsidence movements, including any adjacent, overlying or underlying workings (cumulative). Ground and surface water modelling takes into account all other mining operations and other activities which impact water resources. Integrated mine planning considers these cumulative impacts by adopting mine design and subsidence monitoring and management programs to ensure conditions of consent and performance measures are met.

2.7.2. Notification of Environmental Incidents to Government Authorities

In accordance with Condition 3 of Schedule 8 of the Development Consent and Condition R2 of EPL 3241, South32 Illawarra Metallurgical Coal is to notify the DPE, EPA and other relevant agencies of any incident that causes (or may cause) material harm to the environment. The EPA is to be notified immediately following detection by telephoning 131 555 and the DPE by emailing compliance@planning.nsw.gov.au within 24 hours of detection. Within 7 days of these notifications, a written report is to be provided to DPE and other relevant agencies (in accordance with Condition 4 of Schedule 8 of the Development Consent) and the EPA (in accordance with Condition R2.2 of the EPL).

As outlined in Section 6.3 of the Dendrobium Area 3B SMP, compliance with all approvals, plans and procedures will be the responsibility of all personnel (staff and contractors) employed at or in association with Dendrobium Mine operations. Regular inspections, internal audits and initiation of any remediation/rectification work in relation to this Plan will be undertaken by the Principal Approvals.

Non-conformities, corrective actions and preventative actions are managed in accordance with the following process:

- Identification and recording of non-conformance and/or non-compliance;
- Evaluation of the non-conformance and/or non-compliance to determine specific corrective and preventative actions;
- Corrective and preventative actions to be assigned to the responsible person;
- Management review of corrective actions to ensure the status and effectiveness of the actions; and
- An Annual Review will be undertaken to assess IMC's compliance with all conditions of the Dendrobium Development Consent, Mining Leases and other approvals and licenses.

An independent environmental audit will be undertaken in accordance with Schedule 8, Condition 6 of Development Consent 60-03-2001 to review the adequacy of strategies, plans or programs under these approvals and if appropriate, recommend actions to improve environmental performance. The independent environmental audit will be undertaken by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary of DPIE.

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Appendix 1: Dendrobium Longwall 18 Baseline Recording Data

1.1 Upper Avon 36 (AHIMS ID#52-2-1772)

This Shelter with Art and Deposit is situated in the upper slopes at the base of a continuous sandstone ridgeline, 20 to 30 m north of Native Dog Creek. This site was first recorded by Mrs Caryl Sefton and the Illawarra Prehistory Group (1995), and later by Biosis Research (2012).

The shelter was formed by blockfall in antiquity and cavernous weathering. It is a wide, shallow cavern with a high roof, and the living floor space within it measures approximately 50 m squared. The shelter floor consists of a combination of yellow sandy deposit and large areas of exposed sandstone, and the eastern half of the shelter floor is approximately one (1) m higher than the western half. A scattering of six stone artefacts was found in the shelter, consisting of three (3) bipolar quartz flakes one (1) chert flake, one (1) silcrete flake and one (1) silcrete flaked piece.

The art in this shelter consists of three panels in relatively good condition, although there is evidence of waterwash, lichen growth and weathering of the art surfaces. The art is very large, and is located at the eastern end of the shelter on the rear wall. Panel 1 consists of three (3) charcoal outline with infill anthropomorphic figures and one (1) charcoal outline with infill large macropod, likely a kangaroo. Panel 2 contains one (1) indeterminate charcoal outline with infill, one (1) charcoal outline with infill bird, one (1) charcoal outline with infill human figure with hair and tools depicted, and one (1) charcoal outline with red ochre infill and charcoal criss-cross infill, portraying a large male frontal human figure with arms up. Panel 3 is the smallest, and contains one (1) indeterminate charcoal outline with infill. All human figures whose faces can be seen in the art at this site have eyes featured.

The site has been disturbed by wombat burrowing, ants and spiders. There is evidence of waterwash, lichen growth, granular loss, exfoliation and fissuring at the site.

1.1.1 Recording images – site overview



Figure 1: View of the shelter at Upper Avon 36 (AHIMS ID#52-2-1772), facing west.



Figure 2: Partial view of the shelter interior at Upper Avon 36 (AHIMS ID#52-2-1772), facing west. Art Panel 2 and 3 are visible on the rear wall, and the protruding corner of the wall can be seen toward the left.



Figure 3: View of back wall shelter at Upper Avon 36 (AHIMS ID#52-2-1772), facing west.



Figure 4: Detail of Panel 1 motifs 1 and 2 at Upper Avon 36 (AHIMS ID#52-2-1772), with the raised right arm of motif 2 seen to the far right.



Figure 5: Detail of Art Panel 2 motifs 5 and 6 and Panel 3 motif 7 at Upper Avon 36 (AHIMS ID#52-2-1772).



Figure 6: Detail of artefacts 1 to 6 found at Upper Avon 36 (AHIMS ID#52-2-1772).

Upper Avon 36
Niche Environment & Heritage
52-2-1772 RR WV MC RC
13/11/20

N

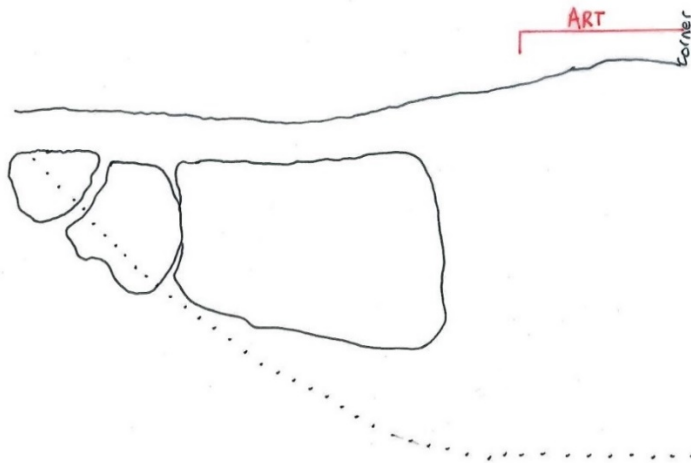



Figure 7: Plan of Upper Avon 36 (AHIMS ID#52-2-1772). Continued in Figure 5.

Upper Avon 36
Niche Environment & Heritage
52-2-1772 RR, WV, MC, RC
13/11/20

N


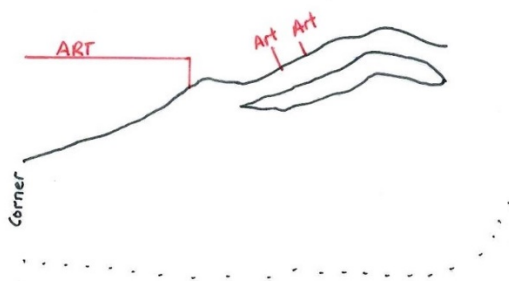



Figure 8: Plan of Upper Avon 36 (AHIMS ID#52-2-1772) continued.

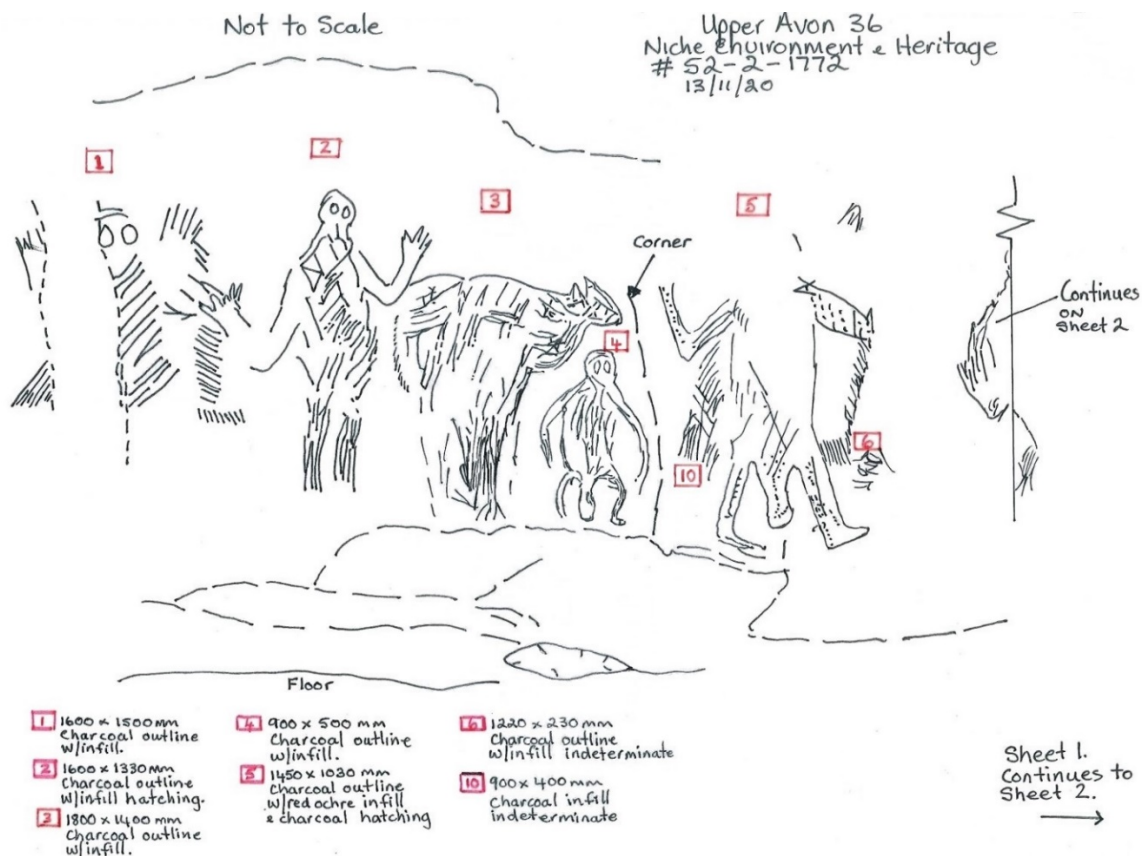


Figure 9: Not to scale drawing of art at Upper Avon 36 (AHIMS ID#52-2-1772), Panels 1 and 2. Continued in Figure 10.

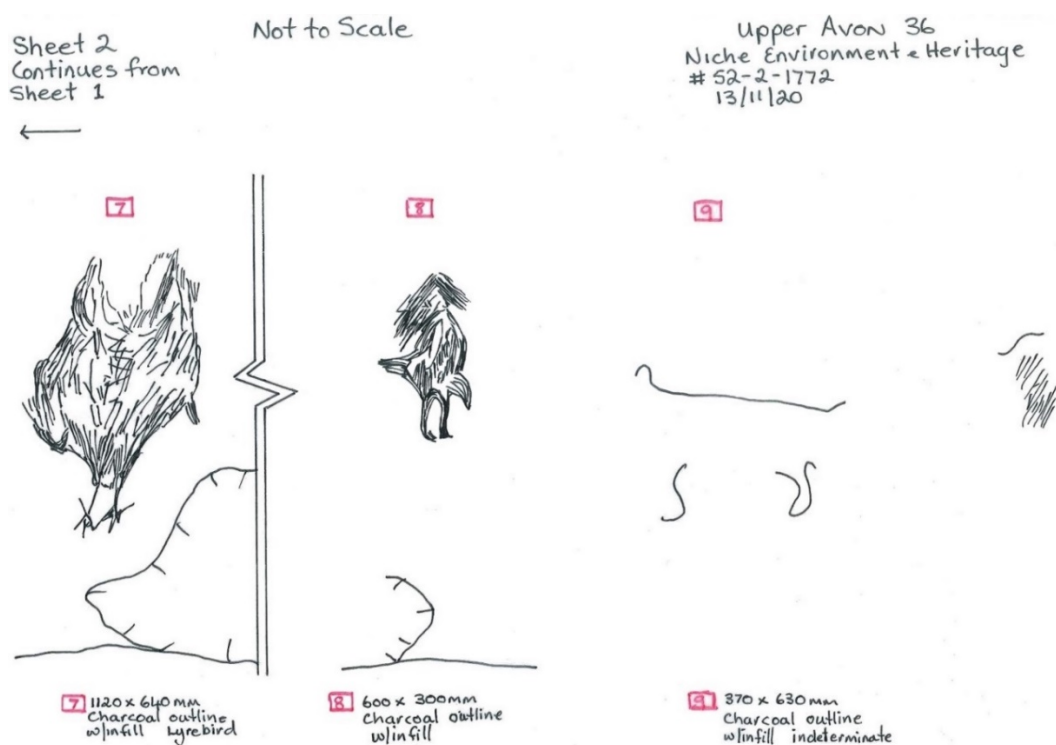


Figure 10: Not to scale drawing of art at Upper Avon 36 (AHIMS ID#52-2-1772), Art Panel 2 continued and Panel 3.

1.1.2 Aboriginal heritage site information for Upper Avon 36 (AHIMS ID# 52-2-1772)

Table 1: Recording data for Upper Avon 36 (AHIMS ID#52-2-1772)

Overview					
Site type	Shelter with Art and Deposit	Corrected MGAE	0288898	Corrected MGAN:	6190405
Previous Recording	Sefton and the IPG, 1995	Date	13/11/2020		
Site Details					
Width	26 m	Depth	4.26 m	Height	7.8 m
Orientation	181° S	Floor area	10 m x 5 m	Floor condition	Good
Location in Landscape	At the base of a continuous sandstone ridgeline.				
Shelter Exterior/formation	Shelter formed by blockfall in antiquity and cavernous weathering.				
Shelter interior	Large sandstone overhang shelter containing artefacts and a large art surface. The shelter floor consists of a combination of sandy deposit and large areas of exposed sandstone. The eastern half of the shelter floor is approximately 1 m higher than the western half. The shelter is very wide, but is comparatively not very deep.				
Distance to water	20 – 30 m north of Native Dog Creek	Landform	Continuous upper ridgeline		
Setting	Upper valley slopes, continuous sandstone overhang				
Archaeological Deposit					
Deposit	Yes	Describe	25 cm yellow sandy deposit from shelter weathering		
Visible artefacts?	Yes	Where?	Dripline	How many?	6
Art					
Art surfaces	Art is very large, and is located at the eastern end of the shelter on the rear wall. Art surfaces are in good condition, although there is evidence of waterwash, lichen growth and weathering of the art surfaces.				
Art condition	Good.				
Art overview	<p>Panel 1 Motif 1 – Charcoal outline and striped infill depicting anthropomorphic figure.</p> <p>Panel 1 Motif 2 – Charcoal outline and striped infill, frontal human figure with hands raised.</p> <p>Panel 1 Motif 3 – Charcoal outline and infill, depicting a macropod (likely a kangaroo).</p> <p>Panel 1 Motif 4 – Charcoal outline with infill, male frontal figure with arms down.</p> <p>Panel 2 Motif 5 – Charcoal outline with red ochre infill and charcoal criss-cross infill. Male frontal human figure with arms up, feet and penis prominent, and head not clearly visible.</p> <p>Panel 2 Motif 6 – Charcoal outline and infill, indeterminate form.</p> <p>Panel 2 Motif 7 – Charcoal outline with infill, depicting a bird (possibly a lyrebird).</p> <p>Panel 2 Motif 8 – Charcoal outline and infill human figure, with hair and tools depicted.</p> <p>Panel 3 Motif 9 – Charcoal outline and infill, indeterminate form.</p>				
Damage/threats					
Waterwash	Yes	Graffiti	No	Macro vegetals	Yes, lichen
Animals	Yes, Wombats	Salt/granular loss	Yes	Fissuring	Yes
Insects	Yes, Spiders and Ants	Spalling/exfoliation	Yes	Other	
Fire	No	Block fall	Yes, in antiquity		

Table 2: Artefact Assemblage for Upper Avon 36 (AHIMS ID#52-2-1772)

ID	Artefact Type	Material Type	Form	Cortex Type	Cortex %	Platform (flakes)	Term (flakes)	Retouch Type	Scar Direction (cores)	Scar # (cores)	Platform # (cores)	Length (mm)	Width (mm)	Thickness (mm)	Comments
1	Flaked Piece	Silcrete	-	-	-	1	-	-	-	-	-	19	14	5	-
2	Flake	Silcrete	-	-	-	1	-	-	-	-	-	20	8	3	-
3	Flake	Chert	-	-	40	1	-	-	-	-	-	20	16	4	-
4	Flake	Quartz	Bipolar	-	-	2	-	-	-	-	-	18	10	2	-
5	Flake	Quartz	Bipolar	-	-	2	-	-	-	-	-	13	9	2	-
6	Flake	Quartz	Bipolar	-	-	2	-	-	-	-	-	10	7	2	-

Table 3: Recording data for art surfaces present at Upper Avon 36 (AHIMS ID#52-2-1772)

Motif No.	Type	Form	Media	Colour	Measurement (cm)
Panel 1					
1	Outline with striped infill	Anthropomorphic figure	Charcoal	Black	16 x 15
2	Outline with striped infill	Frontal human figure with hands raised	Charcoal	Black	16 x 14
3	Outline with infill	Macropod, likely a kangaroo	Charcoal	Black	18 x 14
4	Outline with infill	Male frontal human figure with arms down	Charcoal	Black	9 x 5
Panel 2					
5	Outline with infill and criss-cross infill	Male frontal human figure with arms up, feet and penis prominent, head not clearly visible	Charcoal and red ochre	Black and red	14.5 x 10.3
6	Outline with infill	Indeterminate	Charcoal	Black	12.2 x 2.3
7	Outline with infill	Bird, possibly a lyrebird	Charcoal	Black	11.2 x 6.4
8	Outline with infill	Human figure, with hair and tools depicted	Charcoal	Black	6 x 3
Panel 3					
9	Outline with infill	Indeterminate	Charcoal	Black	3.7 x 6.3

Note: The eyes are featured on all human figures whose faces can be seen in the drawings.

1.2 Dendrobium 7 (AHIMS ID#52-2-2248)

This Shelter with Art, Deposit and Axe Grinding Groove is situated in a continuous sandstone ridgeline, 20 m from tributary LA2 of Lake Avon. This site was previously recorded by Biosis in 2012.

The shelter has been formed by cavernous weathering and blockfall in antiquity. It is a wide, shallow cavern with a low roof, and the living floor space within it measures approximately 21 m squared. The shelter floor consists of sandy silt formed by the chemical weathering of the shelter, and a total of five (5) artefacts were visible in two (2) separate areas within the dripline. There is a one (1) Axe Grinding Grooves located on the site floor just outside the dripline of the shelter, on a small area of exposed sandstone. One of the grinding grooves is heavily worn, measuring 22 cm long by 4 cm wide (see Figure 8). The other grinding groove has been partially formed by the dripline of the shelter, and measures 18 cm long by 3 cm wide.

The art in this shelter consists of three panels in very poor condition due to weathering processes. Panels 1 and 3 are both charcoal outline with infill indeterminates, with Panel 1 measuring 20 cm by 10 cm and Panel 3 measuring 50 cm by 25 cm. Panel 2 is a charcoal line forming a sickle moon shape, measuring 15 cm across by 0.5 to 1 cm wide.

There is evidence of waterwash and spalling along the back wall of the cavern, along with fire damage to the shelter ceiling. The site has been disturbed by wombats, wasps and spiders, and lichen growth is affecting the art panels. Granular loss, exfoliation and heavy natural fissuring are also affecting the site, and block fall has occurred there in antiquity.

1.2.1 Recording images – site overview



Figure 11: General view of the shelter at Dendrobium 7 (AHIMS ID#52-2-2248), facing east.



Figure 12: View of the rear wall of the shelter at Dendrobium 7 (AHIMS ID#52-2-2248), facing south.



Figure 13: Detail of axe grinding grooves on floor of shelter at Dendrobium 7 (AHIMS ID#52-2-2248).



Figure 14: Three (3) of the five (5) artefacts found at Dendrobium 7 (AHIMS ID#52-2-2248).

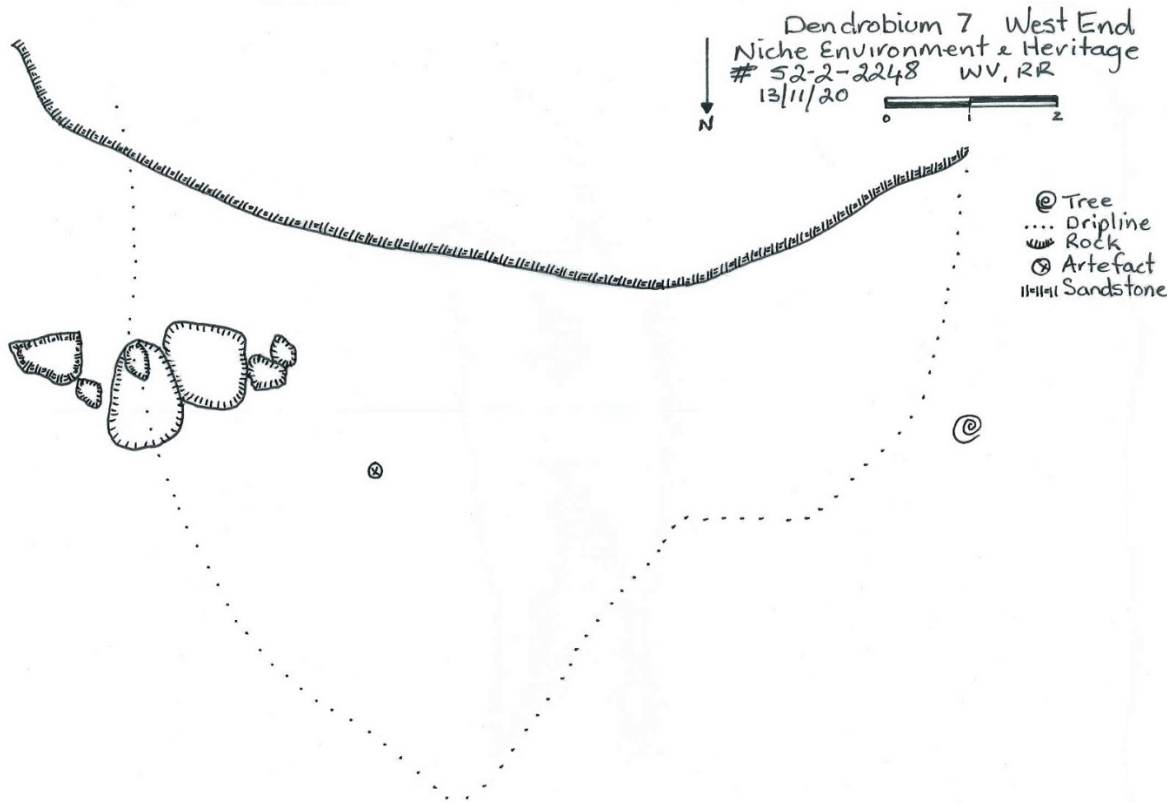


Figure 15: Plan of Dendrobium 7 (AHIMS ID#52-2-2248), western end. Continued in Figure 13.

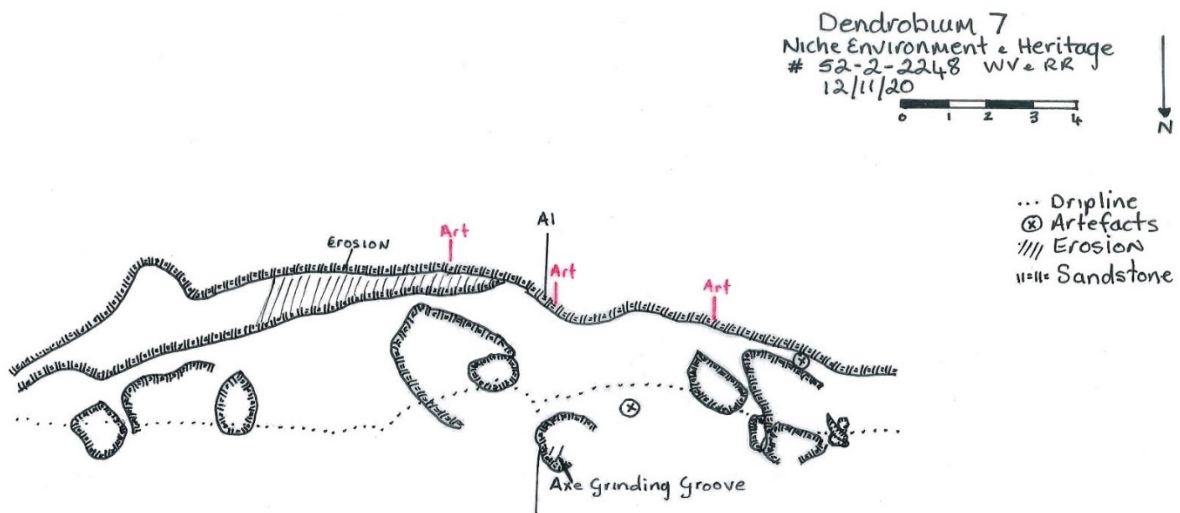


Figure 16: Plan of Dendrobium 7 (AHIMS ID#52-2-2248), eastern end.

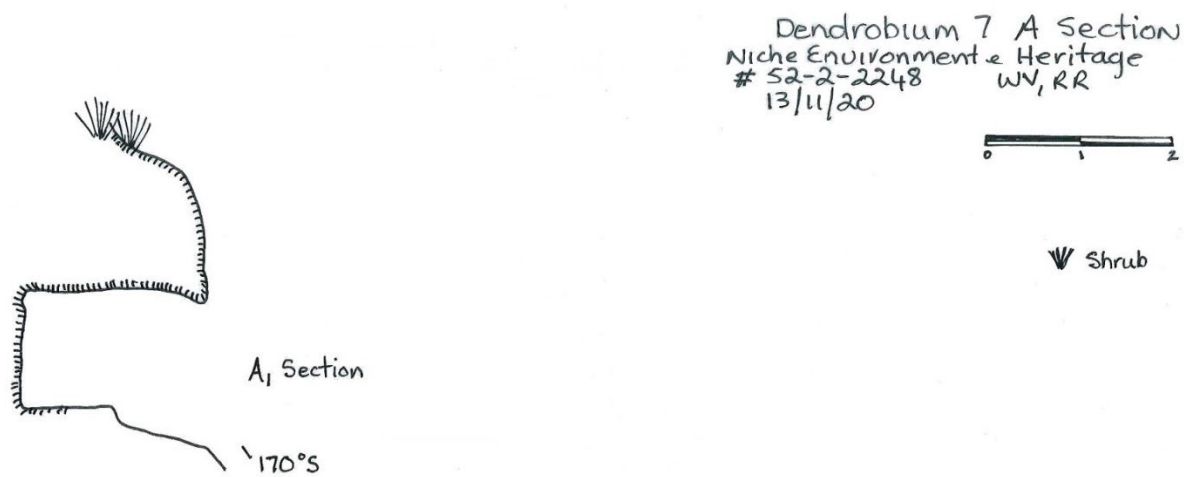


Figure 17: Section of Dendrobium 7 (AHIMS ID#52-2-2248).



Figure 18: Photograph of Art Panel 3 motif 1 at Dendrobium 7 (AHIMS ID#52-2-2248).

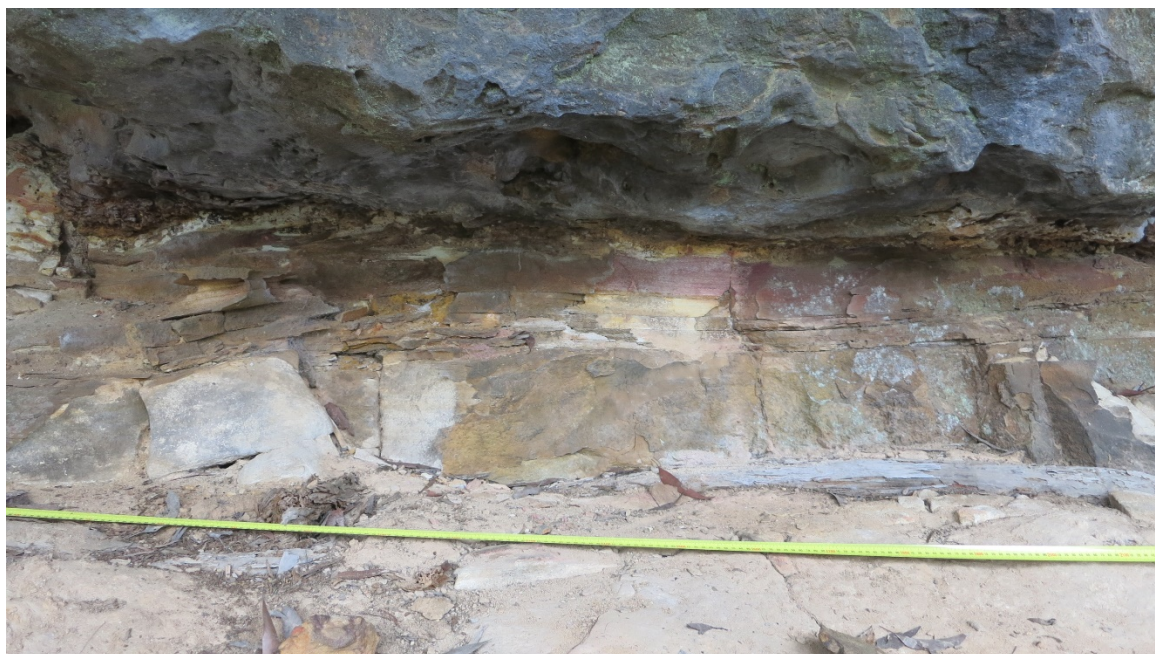


Figure 19: Photograph of cracking under Art Panel 3 motif 1 at the rear of Dendrobium 7 (AHIMS ID#52-2-2248).



Figure 20: Photograph of crack at the eastern end of the shelter at Dendrobium 7 (AHIMS ID#52-2-2248).



Figure 21: Photograph of natural cracking at western end of the shelter at Dendrobium 7 (AHIMS ID#52-2-2248).



Figure 22: Photograph of cracking and bedding planes at eastern end of the shelter at Dendrobium 7 (AHIMS ID#52-2-2248).



Figure 23: Photograph of vertical cracking at the western end of Dendrobium 7 (AHIMS ID#52-2-2248).



Figure 24: Photograph of cracking above Art Panel 3 motif 1 at Dendrobium 7 (AHIMS ID#52-2-2248).

1.2.2 Aboriginal heritage site information for Dendrobium 7 (AHIMS ID#52-2-2248)

Table 4: Recording data for Dendrobium 7 (AHIMS ID#52-2-2248)

Overview					
Site type	Shelter with Art, Deposit and Axe Grinding Groove	Corrected MGAE	0288812	Corrected MGAN:	6190980
Previous Recording	Biosis, 2012	Date	12/11/2020		
Site Details					
Width	20 m	Depth	3 m	Height	1.5 m
Orientation	174° S	Floor area	3 m x 7 m	Floor condition	Good
Location in Landscape	Continuous sandstone ridgeline.				
Shelter Exterior/formation	Shelter formed by blockfall in antiquity and cavernous weathering.				
Shelter interior	Sandstone overhang shelter containing artefacts, art and 2 axe grinding grooves. The shelter floor consists of a sandy silt deposit formed by the chemical weathering of the shelter. The shelter is very wide, but is comparatively not very deep.				
Distance to water	20 m LA 2 of Lake Avon	Landform	Continuous ridgeline		
Setting	Continuous sandstone overhang				
Archaeological Deposit					
Deposit	Yes	Describe	Sandy silt deposit forming from chemical weathering		
Visible artefacts?	Yes	Where?	2 separate areas within dripline	How many?	5
Art					
Art surfaces	3 panels with 3 motifs.				
Art condition	Poor, very weathered				
Art overview	Art consists of 3 panels with 3 motifs, all which are charcoal indeterminates. There is hairline cracking under panels 2 and 3, which is naturally forming. Macroflora growth is affecting all 3 art panels.				
Damage/threats					
Waterwash	Yes, along back wall	Graffiti	No	Macro vegetals	Yes, lichen
Animals	Yes, Wombats	Salt/granular loss	Yes	Fissuring	Yes, heavily cracking (naturally occurring)
Insects	Yes, Spiders and Wasps	Spalling/exfoliation	Yes, along back wall	Other	1 x axe grinding groove
Fire	Yes, ceiling	Block fall	Yes, in antiquity		

Table 5: Recording data for art surfaces present at Dendrobium 7 (AHIMS ID#52-2-2248)

Motif No.	Type	Form	Media	Colour	Measurement (cm)
Panel 1					
1	Outline with infill	Indeterminate	Charcoal	Black	20 x 10
Panel 2					
2	Panel line	Sickle moon shape	Charcoal	Black	15 x 1
Panel 3					
3	Outline with infill	Indeterminate	Charcoal	Black	50 x 25

1.3 Dendrobium 8 (AHIMS ID#52-2-3068)

This Shelter with Art and Deposit is situated in a continuous sandstone ridgeline, 20 m the nearest water source. This site was previously recorded by Biosis in 2012.

Like the other two sites undergoing baseline recording for Longwall 18, this shelter has been formed by cavernous weathering and blockfall in antiquity. It is a wide, relatively shallow cavern with a living floor space measuring approximately 35.7 m squared. The shelter floor consists of orange brown sandy silt, and a total of two (2) artefacts were visible at the site. Both were complete flakes, one made of petrified wood and the other of volcanic stone (Figure 13). The art in this shelter was consisted of a charcoal outline with in infill indeterminate.

There is evidence of waterwash along the rear of the shelter interior, and salts and granular loss are occurring on the rear area of the roof. The shelter interior has been partially affected by fire, and the site is experiencing spalling and fissuring.

1.3.1 Recording images – site overview



Figure 25: General view of the shelter at Dendrobium 8 (AHIMS ID#52-2-3068), facing west.



Figure 26: General view of the shelter at Dendrobium 8 (AHIMS ID#52-2-3068), facing east.



Figure 27: View of the shelter interior at Dendrobium 8 (AHIMS ID#52-2-3068), facing west.



Figure 28: Detail of the two (2) artefacts found at Dendrobium 8 (AHIMS ID#52-2-3068).

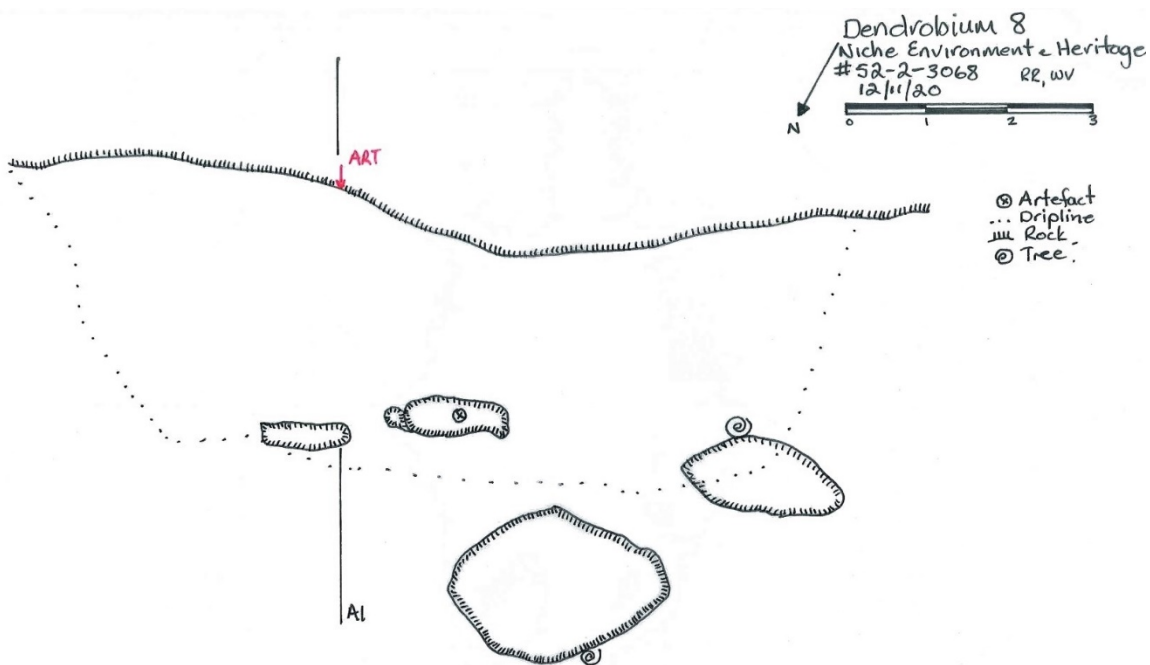


Figure 29: Plan of Dendrobium 8 (AHIMS ID#52-2-3068).

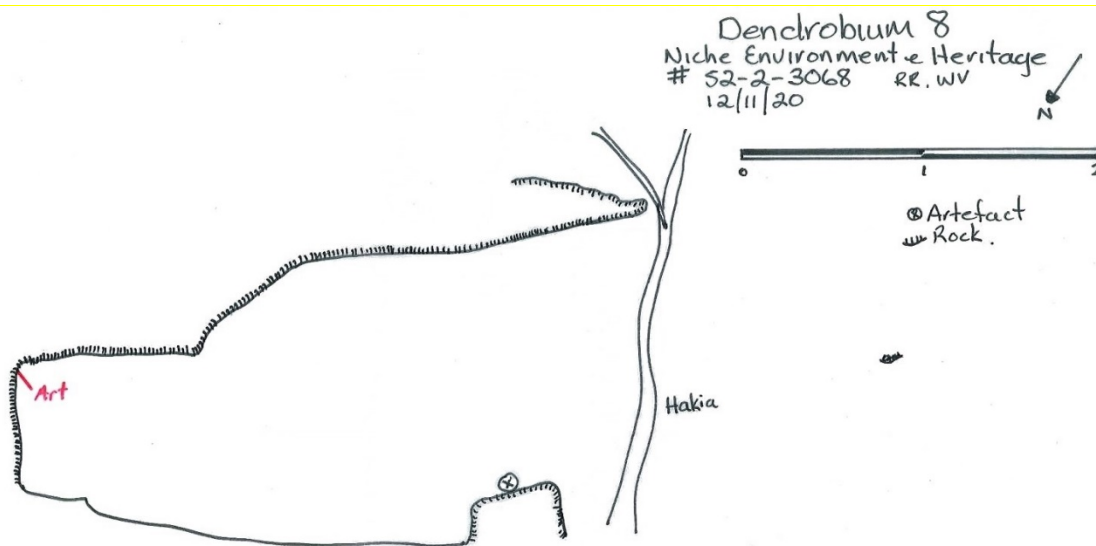


Figure 30: Section of Dendrobium 8 (AHIMS ID#52-2-3068).

1.3.2 Aboriginal heritage site information for Dendrobium 8 (AHIMS ID#52-2-3068)

Table 6: Recording data for Dendrobium 8 (AHIMS ID#52-2-3068)

Overview					
Site type	Shelter with Art and Deposit	Corrected MGAE	0288843	Corrected MGAN:	6191000
Previous Recording	Biosis, 2012	Date	12/11/2020		
Site Details					
Width	1.5 m	Depth	3.5 m	Height	1.5 m
Orientation	315° NW	Floor area	11.5 m x 3.10 m	Floor condition	Good
Location in Landscape	Continuous sandstone ridgeline, 50 m east of Dendrobium 7 (AHIMS ID#52-2-2248).				
Shelter Exterior/formation	Formed by blockfall in antiquity and cavernous weathering.				
Shelter interior	Sandstone overhang shelter containing artefacts and art. The shelter floor consists of an orange brown sandy silt deposit, and the cavern is wide and relatively shallow.				
Distance to water	20 m	Landform	Continous ridgeline		
Setting	Continuous sandstone overhang				
Archaeological Deposit					
Deposit	Yes	Describe	Orange brown sandy silt		
Visible artefacts?	Yes	Where?	Shelter floor	How many?	2 complete flakes: 1 of petrified wood, and 1 of volcanic stone.
Art					
Art surfaces	Poor				
Art condition	Poor				
Art overview	Panel 1 Motif 1- Charcoal indeterminate, along the backwall at the northern end of the shelter.				
Damage/threats					
Waterwash	Yes, along back wall of shelter	Graffiti	No	Macro vegetals	No
Animals	No	Salt/granular loss	Yes, roof at the rear of the shelter	Fissuring	Yes
Insects	Yes, Spiders and Wasps	Spalling/exfoliation	Yes	Other	
Fire	Yes	Block fall	Yes, in antiquity		

Table 7: Recording data for art surfaces present at Dendrobium 8 (AHIMS ID#52-2-3068)

Motif No.	Type	Form	Media	Colour	Measurement (cm)
Panel 1					
1	Outline with infill	Indeterminate	Charcoal	Black	20 x 5

Appendix 2: Glossary and List of Abbreviations

Term or abbreviation	Definition
Aboriginal cultural heritage	The tangible (objects) and intangible (dreaming stories, legends and places) cultural practices and traditions associated with past and present-day Aboriginal communities.
ACHA	Aboriginal Cultural Heritage Assessment.
ACHMP	Aboriginal Cultural Heritage Management Plan.
Aboriginal object(s)	The legal definition for material Aboriginal cultural heritage under the NSW <i>National Parks and Wildlife Act 1974</i> .
Aboriginal stakeholders	Members of a local Aboriginal land council, registered holders of Native Title, Aboriginal groups or other Aboriginal people who may have an interest in the Project.
AHIP	Aboriginal Heritage Impact Permit.
Angle of draw	<p>This is a subsidence engineering term used to define the limits of the subsidence movements in a landscape caused by mine workings, that leads to vertical displacement on the surface.</p> <p>The angle of draw is determined through a series of geometric parameters in which the angle between two lines drawn from the edge of the mine workings. One being a vertical line, and the other a line to the limit of vertical displacement on the surface. Because surface movements can also be caused by natural effects such as seasonal variations or drought leading to swelling or shrinkage of near-surface soil and sediment, it can be very difficult to identify where vertical movement due to mining ceases. Therefore, it is standard practice to specify a limiting value for vertical displacement which might be attributable to mining. In New South Wales, this value is usually 20 mm of vertical subsidence. It should be noted that, in some environments, up to 50 mm or more of vertical movement may occur due to seasonal climatic changes.</p>
Archaeology	The scientific study of material traces of human history, particularly the relics and cultural remains of past human activities.
Archaeological deposit	A layer of soil material containing archaeological objects and/or human remains.
Archaeological investigation	The process of assessing the archaeological potential of an impact area by a qualified archaeologist.
Archaeological site	An area that contains surface or sub-surface material evidence of past human activity in which material evidence (artefacts) of past activity is preserved.
Artefact	An object made by human agency (e.g. stone artefacts).
Assemblage	<p>A group of artefacts found in close association with one another.</p> <p>Any group of items designated for analysis that exist in spatial and/or vertical context – without any assumptions of chronological or spatial relatedness.</p>
Avoidance	A management strategy which protects Aboriginal sites within an impact area by avoiding them totally in development.
Heritage NSW	Heritage NSW, of the Department of Premier and Cabinet (DPC). Previously known as the Biodiversity Conservation Division (BCD) of the Department of Planning, Industry and Environment, which was priorly known as the Office of Environment and Heritage (OEH).

Term or abbreviation	Definition
CCC	Community Consultative Committee
CCL	Consolidated Coal Lease
Code of Practice	<i>Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.</i>
CMA	Corrective Management Actions.
Cumulative impacts	Combination of individual effects of the same kind due to multiple actions from various sources over time.
DA	Development Approval (same as Development Consent).
DCP	Development Control Plan.
DECCW	The Department of Conservation, Climate Change and Water, then known as the Office of Environment and Heritage, now known as Heritage NSW.
DPIE	Department of Planning, Industry and Environment, NSW.
Drainage	Natural or artificial means for the interception and removal of surface or subsurface water.
DRG	NSW Resources and Geoscience, of the Department of Planning and Environment Cluster. Now known as Mining, Exploration and Geosciences (MEG).
EA / Project EA	Project Environmental Assessment.
EMS	Dendrobium Mine Environmental Management Strategy (DENMP0039, version 5.0, 2019).
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979.</i>
EPL	Environment Protection Licence.
Flake	A piece of stone detached from a core, displaying a bulb of percussion and striking platform.
FY	Financial Year.
Harm	With regard to Aboriginal objects this has the same meaning as the <i>NSW National Parks and Wildlife Act 1974.</i>
Heritage NSW	Heritage NSW, of the Department of Premier and Cabinet. Previously known as the Office of Environment and Heritage (OEH), and the Department of Conservation, Climate Change and Water (DECCW) priorly.
HMP	Heritage Management Plan.
ILALC	Illawarra Local Aboriginal Land Council
IMC	The proponent; South32–Illawarra Metallurgical Coal
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
Impact area	An area that requires archaeological investigation and management assessment.
In situ	Latin words meaning ‘on the spot, undisturbed’.
Isolated artefact / find	A single artefact found in an isolated context.
Landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land – built, planted and natural topographical and ecological features.
Landform	Any one of the various features that make up the surface of the earth.

Term or abbreviation	Definition
LEP	Local Environmental Plan.
LW	Longwall.
Management plans	Conservation plans which identify short- and long-term management strategies for all known sites recorded within a (usually approved) Subject Area.
MEG	Mining, Exploration and Geosciences Department NSW.
Methodology	The procedures used to undertake an archaeological investigation.
Mitigation	To address the problem of conflict between land use and site conservation.
ML	Mining Lease.
MSEC	Mine Subsidence Engineering Consultants Pty Ltd.
NPW Act	National Parks and Wildlife Act 1974.
NPW Regulation	National Parks and Wildlife Regulation 2009.
OEH	Office of Environment and Heritage NSW, previously known as the Department of Conservation, Climate Change and Water (DECCW). Now called Heritage NSW.
Open camp site	An archaeological site situated within an open space (e.g. archaeological material located on a creek bank, in a forest, on a hill, etc.).
PAD	Potential Archaeological Deposit. A location considered to have a potential for subsurface archaeological material.
RAP	Registered Aboriginal Party.
SHI	State Heritage Inventory
Statutory controls	Control or regulation provided for by legislation.
Site recording	The systematic process of collecting archaeological data for an archaeological investigation.
Site	A place where past human activity is identifiable.
SMP	Subsidence Management Plan.
Spit	A unit of archaeological excavation with an arbitrary assigned measurement of depth and extent.
Survey coverage	A graphic and statistical representation of how much of an impact area was surveyed and therefore assessed.
TARP	Trigger Action Response Plan.
WA	Water Approval.
WAL	Water Access Licence.

Appendix 3: Consultation Log Example

Example of headings in the LW 18 ACHMP Consultation Log:

Date of consultation	Stage	Type of consultation	Name	Stakeholder group associated with	Notes	Actions required / response	Niche Personnel
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The following pages contain examples of letters sent out to RAPs as part of the Project’s Consultation Protocol (outlined in Section 5).

28 October 2020

To whom it may concern,

Re: Dendrobium Area 3B, Longwall 18, Aboriginal Cultural Heritage Management Plan (Niche ref# 6261)

South32 Illawarra Metallurgical Coal (IMC) have developed a Subsidence Management Plan (SMP) application for the proposed Longwall 18. In accordance with the Dendrobium Area 3B Development Consent (DA 60-03-2001) an Aboriginal Cultural Heritage Management Plan is required for the following Aboriginal Heritage Information Management System (AHIMS) sites (Figure attached):

- Upper Avon 36 (AHIMS ID# 52-2-1772)
- Dendrobium 7 (AHIMS ID# 52-2-2248)
- Dendrobium 8 (AHIMS ID# 52-2-3068)

As a Registered Aboriginal Party (RAP) identified as part of the Biosis Research (2007) *Dendrobium Area 3 Archaeological and Cultural Heritage Assessment* and subsequent Aboriginal Heritage Impact Permit (AHIP) #1132005. I am writing on behalf of IMC to invite your group to participate in the field assessment and additional baseline recording requested by Heritage NSW Department of Premier and Cabinet to be included within the Aboriginal Cultural Heritage Management Plan.

The site inspection will be conducted on Wednesday 4 November 2020 and Thursday 5 October 2020. Payment for attendance will be \$800.00 exc. GST. Public Liability and Workers Compensation insurances will need to be supplied for a representing individual prior to the site inspection.

While attending site, the following PPE will be required:

- Hard hat
- Gloves
- Long sleeves/long pants
- Sturdy lace up boots, above the ankle
- Sunglasses or safety glasses
- Sun hat

Other:

- Bring sufficient water and food for hiking
- Fit for work- free of any injuries, free from the effects of drugs and alcohol, well rested.



Niche Environment and Heritage
PO Box 2443 North Parramatta NSW 1750
T 02 9630 5658 F 02 4017 0071
E info@niche-eh.com ABN 191 37 111 721
Excellence in your environment

If you would like to attend, please forward your insurances through by **5pm 2 November 2020** in writing to:

Ms Renée Regal
Team Leader- NSW Heritage
Niche Environment and Heritage
PO Box 2443
North Parramatta NSW 1750
Tel: 0488 224 758
Email: rregal@niche-eh.com

Yours sincerely,

Renée Regal
Team Leader- NSW Heritage
Niche Environment and Heritage

2 December 2020

To whom it may concern,

Re: Dendrobium Area 3B, Longwall 18, Aboriginal Cultural Heritage Management Plan (Niche ref# 6261)

On behalf of South 32 Illawarra Metallurgical Coal, thank you for your input to the Aboriginal community consultation for the Dendrobium Mine Area 3B Longwall 18 Aboriginal Cultural Heritage Management Plan.

In accordance with the Heritage NSW (formerly the Office of Environment and Heritage) *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010), please find attached the Draft Aboriginal Cultural Heritage Management Plan (ACHMP) for your review and comment. If you have any comments, suggestions or queries regarding the report, please contact Niche Environment and Heritage by **5pm on Wednesday 9th December 2020**.

Please direct all correspondence to Renée Regal (contact details provided below) at your earliest convenience.

Ms Renée Regal
Team Leader, NSW Heritage
Niche Environment and Heritage
PO Box 31
Fairy Meadow NSW 2519
Tel: 0488 224 758
Email: rregal@niche-eh.com

Yours sincerely,



Renée Regal
Team Leader- NSW Heritage
Niche Environment and Heritage

Contact Us

Niche Environment and Heritage

02 9630 5658
info@niche-eh.com

NSW Head Office – Sydney
PO Box 2443 North Parramatta
NSW 1750 Australia

QLD Head Office – Brisbane
PO Box 540 Sandgate
QLD 4017 Australia

Sydney
Brisbane
Cairns
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Illawarra
Coffs Harbour
Central Coast
Gold Coast
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Our services

Ecology and biodiversity

Terrestrial
Freshwater
Marine and coastal
Research and monitoring
Wildlife Schools and training

Heritage management

Aboriginal heritage
Historical heritage
Conservation management
Community consultation
Archaeological, built and landscape values

Environmental management and approvals

Impact assessments
Development and activity approvals
Rehabilitation
Stakeholder consultation and facilitation
Project management

Environmental offsetting

Offset strategy and assessment (NSW, QLD, Commonwealth)
Accredited BAM assessors (NSW)
Biodiversity Stewardship Site Agreements (NSW)
Offset site establishment and management
Offset brokerage
Advanced Offset establishment (QLD)