METROPOLITAN COAL LONGWALLS 301-303

HERITAGE MANAGEMENT PLAN




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LONGWALLS 301-303

HERITAGE MANAGEMENT PLAN

Revision Status Register

Section/Page/ Annexure	Revision Number	Amendment/Addition	Distribution	DP&E Approval Date
All	HMP-R01-A	Original – Draft for Consultation	OEH, Aboriginal Stakeholders, DP&E	-
All	HMP-R01-B	Minor amendments to reflect comments received on Version A and revised Longwalls 302 and 303 layout	OEH, Aboriginal Stakeholders, DP&E	-
Figure 3	HMP-R01-C	Minor amendment to Figure 3	OEH, Aboriginal Stakeholders, DP&E	-

November 2016

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1 INTRODUCTION

Metropolitan Coal is a wholly owned subsidiary of Peabody Energy Australia Pty Ltd (Peabody). Metropolitan Coal was granted approval for the Metropolitan Coal Project (the Project) under section 75J of the New South Wales (NSW) *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 22 June 2009. A copy of the Project Approval is available on the Peabody website (http://www.peabodyenergy.com).

The Project comprises the continuation, upgrade and extension of underground coal mining operations and surface facilities at Metropolitan Coal. The underground mining longwall layout is shown on Figure 1. Following the anticipated completion of Longwall 27 in 2017, Longwalls 301, 302 and 303 (herein referred to as Longwalls 301-303) define the next mining sub-domain within the Project underground mining area (Figures 1 and 2).

1.1 PURPOSE AND SCOPE

In accordance with Condition 6, Schedule 3 of the Project Approval, this Heritage Management Plan (HMP) has been prepared as a component of the Metropolitan Coal Longwalls 301-303 Extraction Plan to manage the potential environmental consequences of the Extraction Plan on Aboriginal heritage sites or values.

The relationship of this HMP to the Metropolitan Coal Environmental Management Structure and to the Metropolitan Coal Longwalls 301-303 Extraction Plan is shown on Figure 3.

This HMP includes post-mining monitoring and management of the Aboriginal heritage sites subject to the two previously approved Metropolitan Coal Heritage Management Plans for Longwalls 20-22 and Longwalls 23-27. That is, the Metropolitan Coal Longwalls 20-22 and Longwalls 23-27 Heritage Management Plans will be superseded by this document following the completion of Longwall 27, consistent with the recommended approach in the NSW Department of Planning and Environment (DP&E) and NSW Division of Resources and Energy (DRE) (2015) *Guidelines for the Preparation of Extraction Plans*.

In accordance with Condition 6, Schedule 3 of the Project Approval, this HMP has been prepared by Metropolitan Coal and Niche Environment and Heritage, with assistance from Mine Subsidence Engineering Consultants (MSEC).

1.2 STRUCTURE OF THE HERITAGE MANAGEMENT PLAN

The remainder of the HMP is structured as follows:

Section 2: Describes the review and update of the HMP.

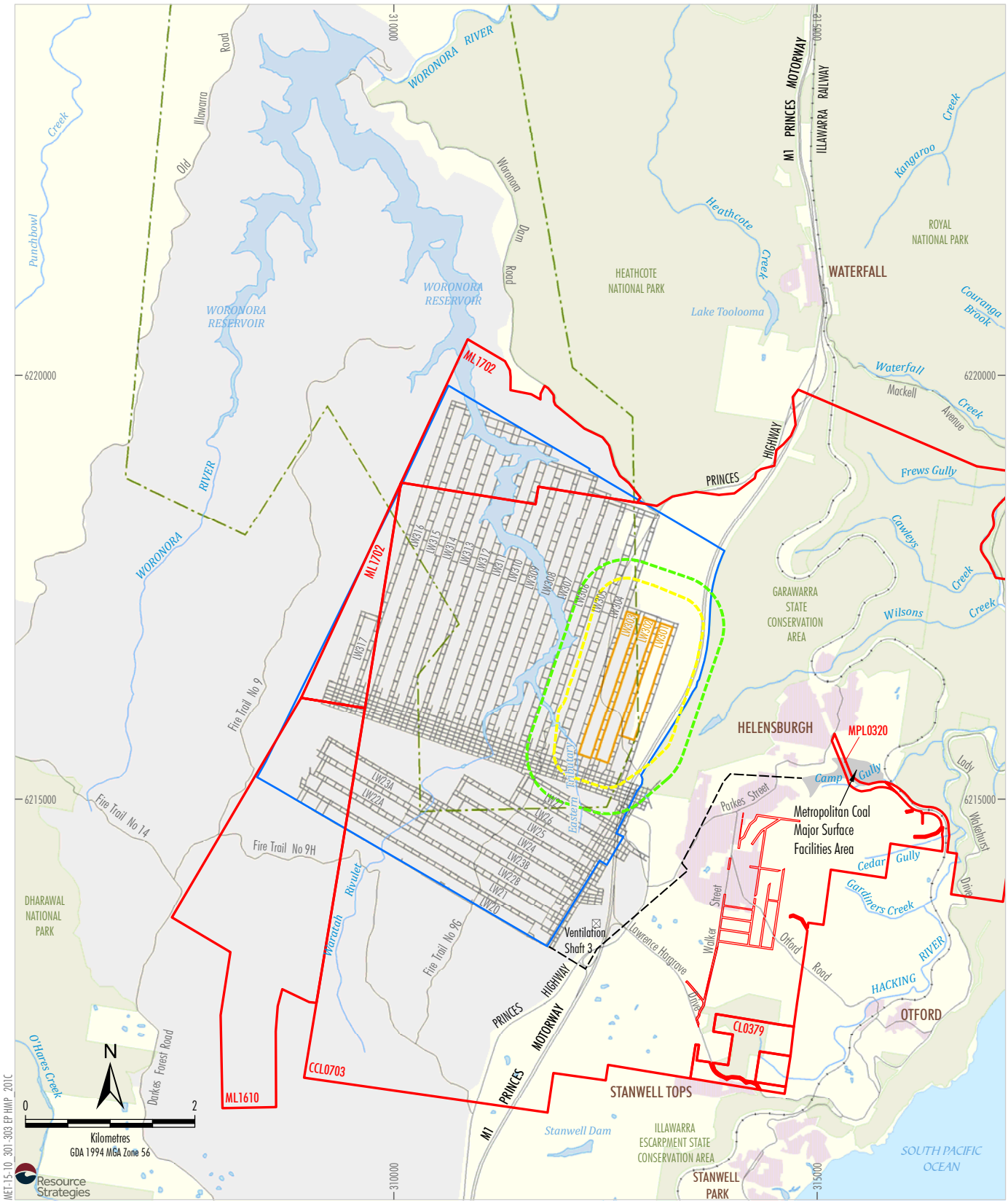
Section 3: Outlines the statutory requirements applicable to the HMP.

Section 4: Provides a revised assessment of the potential subsidence impacts and environmental consequences for Longwalls 301-303.

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 heritage sites.



LEGEND

- Mining Lease Boundary
- Woronora Special Area
- Railway
- Project Underground Mining Area Longwalls 20-27 and 301-317
- Longwalls 301 - 303 Secondary Extraction
- 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
- 600 m from Secondary Extraction of Longwalls 301-303
- Woronora Notification Area
- Existing Underground Access Drive (Main Drift)

Source: Land and Property Information (2015); Department of Industry (2015); Metropolitan Coal (2016); MSEC (2016)

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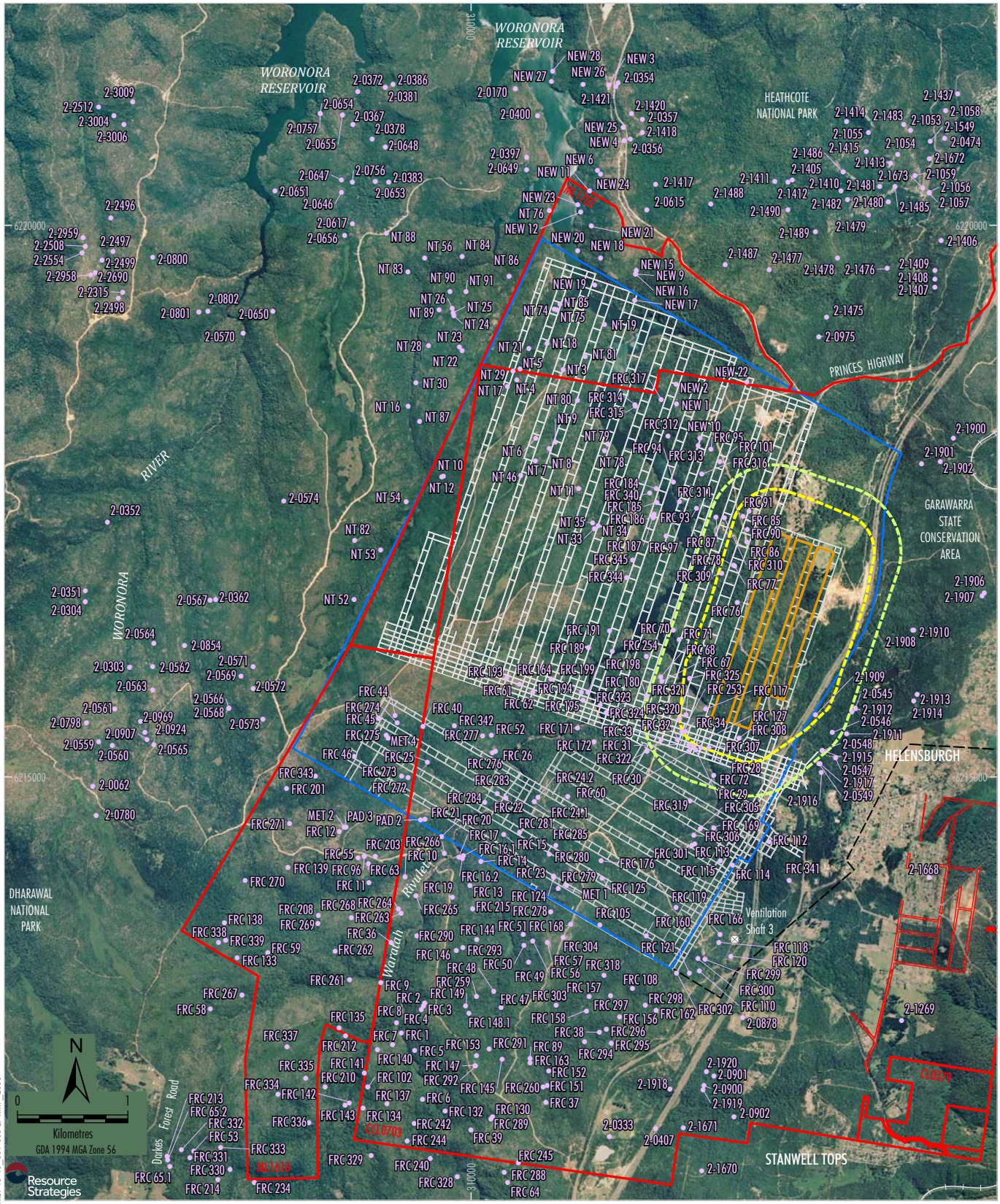
Project Longwalls 20 - 27 and Longwalls 301 - 317 Layout

Figure 1



LEGEND

- Mining Lease Boundary
- Railway
- Project Underground Mining Area Longwalls 20-27 and 301-317
- Longwalls 301 - 303 Secondary Extraction
- 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
- 600 m from Secondary Extraction of Longwalls 301-303
- Existing Underground Access Drive (Main Drift)
- Aboriginal Heritage Site

Source: Land and Property Information (2015); Date of Aerial Photography 1998; Department of Industry (2015); Metropolitan Coal (2016); MSEC (2016); Illawarra Prehistory Group (2007; 2008); AHIMS (2007); Kayandel Archaeological Services (2006; 2007; 2008); Niche Environment and Heritage (2013)

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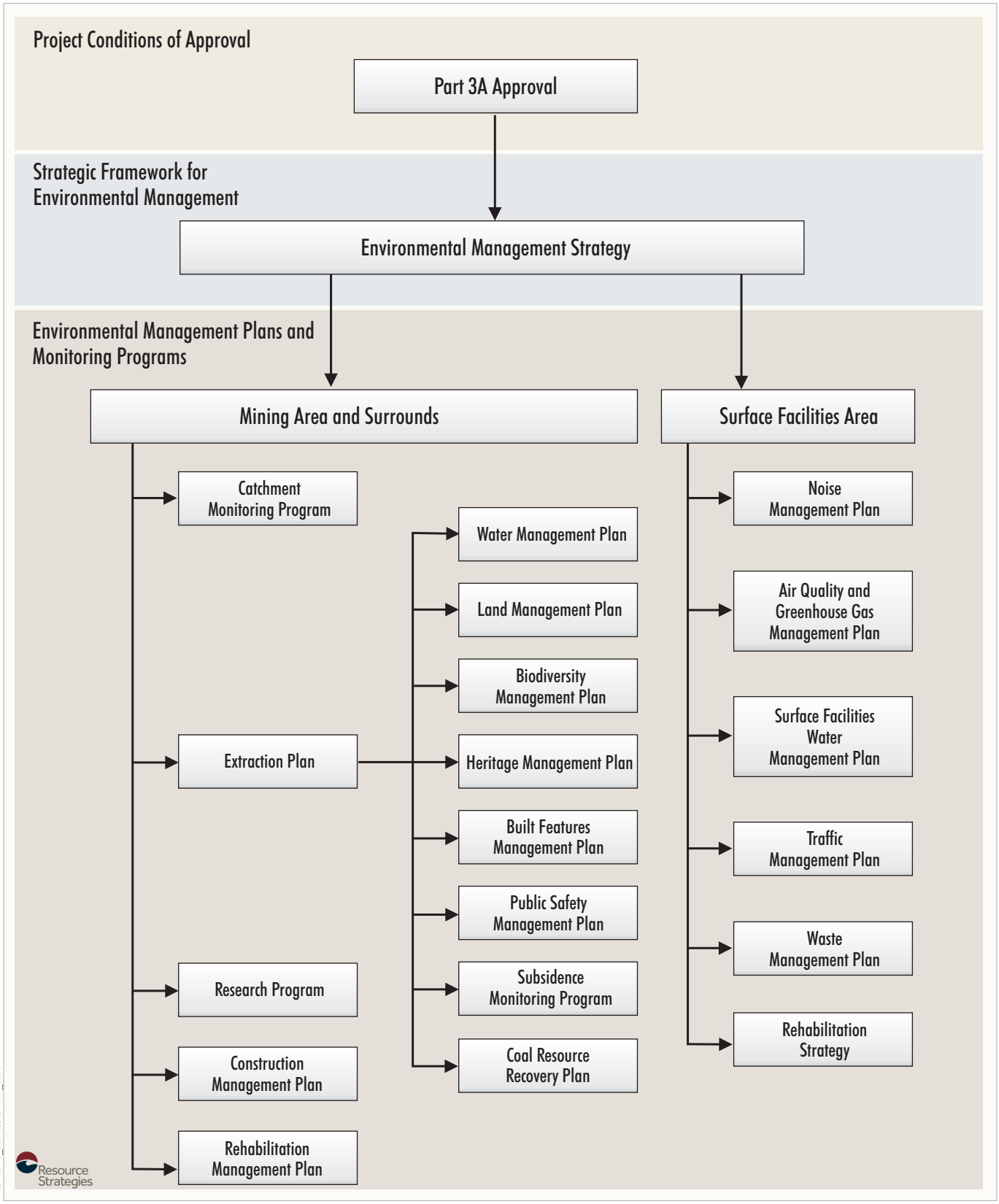
Known Aboriginal Heritage Sites Within Project Underground Mining Area and Surrounds

Figure 2



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Environmental Management Structure

Figure 3

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

Section 9: Describes the monitoring program.

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

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

Section 12: Describes the Trigger Action Response Plan (TARP) management tool.

Section 13: Describes the program to collect baseline data for future Extraction Plans.

Section 14: Describes the annual review and improvement of environmental performance.

Section 15: Outlines the management and reporting of incidents.

Section 16: Outlines the management and reporting of complaints.

Section 17: Outlines the management and reporting of non-compliances with statutory requirements.

Section 18: Lists the references cited in this HMP.

2 HERITAGE MANAGEMENT PLAN REVIEW AND UPDATE

In accordance with Condition 4, Schedule 7 of the Project Approval, this HMP will be reviewed within three months of the submission of:

- an audit under Condition 8, Schedule 7;
- an incident report under Condition 6, Schedule 7;
- an annual review under Condition 3, Schedule 7; and

if necessary, revised to the satisfaction of the Director-General (now Secretary) of the DP&E to ensure the HMP is updated on a regular basis and to incorporate any recommended measures to improve environmental performance.

This HMP will also be reviewed within three months of approval of any Project modification and if necessary, revised to the satisfaction of the DP&E.

The revision status of this HMP is indicated on the title page of each copy. The distribution register for controlled copies of the HMP is described in Section 2.1.

2.1 DISTRIBUTION REGISTER

In accordance with Condition 10, Schedule 7 of the Project Approval, 'Access to Information', Metropolitan Coal will make the HMP publicly available on the Peabody website. A hard copy of the HMP will also be maintained at the Metropolitan Coal site.

Metropolitan Coal recognises that various regulators have different distribution requirements, both in relation to whom documents should be sent and in what format.

An Environmental Management Plan and Monitoring Program Distribution Register has been established in consultation with the relevant agencies and infrastructure owners that indicates:

- to whom the Metropolitan Coal plans and programs, such as the HMP, will be distributed;
- the format (i.e. electronic or hard copy) of distribution; and
- the format of revision notification.

Metropolitan Coal will make the Distribution Register publicly available on the Peabody website.

Metropolitan Coal will be responsible for maintaining the Distribution Register and for ensuring that the notification of revisions is sent by email or post as appropriate.

In addition, Metropolitan Coal employees with local computer network access will be able to view the controlled electronic version of this HMP on the Metropolitan Coal local area network. Metropolitan Coal will not be responsible for maintaining uncontrolled copies beyond ensuring the most recent version is maintained on Metropolitan Coal's computer system and the Peabody website.

3 STATUTORY REQUIREMENTS

Metropolitan Coal's statutory obligations are contained in:

(i) the conditions of the Project Approval;

(ii) relevant licences and permits, including conditions attached to mining leases; and

(iii) other relevant legislation.

These are described below.

3.1 EP&A ACT APPROVAL

Condition 6(f), Schedule 3 of the Project Approval requires the preparation of a HMP as a component of Extraction Plan(s) for second workings. Condition 6(f), Schedule 3 states:

> ***SECOND WORKINGS***
>
> ***Extraction Plan***
>
> *6. The Proponent shall prepare and implement an Extraction Plan for all second workings in the mining area to the satisfaction of the Director-General. This plan must:*
>
> *…*
>
> *(f) include a:*
>
> *…*
>
> - *Heritage Management Plan, which has been prepared in consultation with OEH and the relevant Aboriginal groups, to manage the potential environmental consequences of the Extraction Plan on heritage sites or values;*

In addition, Condition 2, Schedule 7 and Condition 7, Schedule 3 of the Project Approval outline management plan requirements that are applicable to the preparation of the HMP. Table 1 indicates where each component of the conditions is addressed within this HMP.

Table 1
Management Plan Requirements

Project Approval Condition	HMP Section
Condition 2, Schedule 7	
2. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
a) detailed baseline data;	Section 7
b) a description of:	
• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 3
• any relevant limits or performance measures/criteria;	Section 6
• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures;	Section 6
c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Sections 6, 9, 10, 11 and 12
d) a program to monitor and report on the:	Sections 9, 10 and 14
• impacts and environmental performance of the project;	
• effectiveness of any management measures (see c above);	
e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 11
f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Sections 9 and 14
g) a protocol for managing and reporting any;	
• incidents;	Section 15
• complaints;	Section 16
• non-compliances with statutory requirements; and	Section 17
• exceedances of the impact assessment criteria and/or performance criteria; and	Sections 10, 11 and 17
h) a protocol for periodic review of the plan.	Sections 2 and 14
Condition 7, Schedule 3	
7. In addition to the standard requirements for management plans (see condition 2 of schedule 7), the Proponent shall ensure that the management plans required under condition 6(f) above include:	
a) a program to collect sufficient baseline data for future Extraction Plans;	Section 13
b) a revised assessment of the potential environmental consequences of the Extraction Plan, incorporating any relevant information that has been obtained since this approval;	Section 4
c) a detailed description of the measures that would be implemented to remediate predicted impacts; and	Section 10
d) a contingency plan that expressly provides for adaptive management.	Section 11

3.2 LICENCES, PERMITS AND LEASES

In addition to the Project Approval, all activities at or in association with Metropolitan Coal 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 the DRE, within the NSW Department of Industry, Skills and Regional Development (NSW Department of Industry) under the NSW *Mining Act, 1992* (e.g. Consolidated Coal Lease [CCL] 703, Mining Lease [ML] 1610, ML 1702, Coal Lease [CL] 379 and Mining Purpose Lease [MPL] 320).
- The *Metropolitan Coal Mining Operations Plan 1 October 2012 to 30 September 2019* approved by the DRE.
- The conditions of Environment Protection Licence (EPL) No. 767 issued by the NSW Environment Protection Authority (EPA) under the NSW *Protection of the Environment Operations Act, 1997*. Revision of the EPL will be required prior to the commencement of Metropolitan Coal activities that differ from those currently licensed.
- The prescribed conditions of specific surface access leases within CCL 703 for the installation of surface facilities as required.
- Water Access Licences (WALs) issued by the NSW Department of Primary Industries – Water under the NSW *Water Management Act, 2000*, including WAL 36475 under the *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011* and WAL 25410 under the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011.*
- Mining and workplace health and safety related approvals granted by NSW Department of Industry and WorkCover NSW.
- Supplementary approvals obtained from WaterNSW (previously the Sydney Catchment Authority [SCA]) for surface activities within the Woronora Special Area (e.g. fire road maintenance activities).

3.3 OTHER LEGISLATION

Metropolitan Coal will conduct the Project consistent with the Project Approval and any other legislation that is applicable to an approved Part 3A Project under the EP&A Act.

The following Acts may be applicable to the conduct of the Project (Helensburgh Coal Pty Ltd [HCPL], 2008):

- *Contaminated Land Management Act, 1997;*
- *Crown Lands Act, 1989;*
- *Dams Safety Act, 1978;*
- *Dangerous Goods (Road and Rail Transport) Act, 2008;*
- *Energy and Utilities Administration Act, 1987;*
- *Fisheries Management Act, 1994;*
- *Mining Act, 1992;*
- *Noxious Weeds Act, 1993;*
- *Protection of the Environment Operations Act, 1997;*
- *Rail Safety (Adoption of National Law) Act, 2012;*

- *Roads Act, 1993;*
- *Threatened Species Conservation Act, 1995;*
- *Sydney Water Catchment Management Act, 1998;*
- *Water Act, 1912;*
- *Water Management Act, 2000;*
- *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 LONGWALLS 301-303 EXTRACTION LAYOUT

Longwalls 301-303 and the area of land within 600 metres (m) of Longwalls 301-303 secondary extraction are shown on Figures 1, 2 and 4. Longwall extraction will occur from north to south. The longwall layout includes 163 m panel widths (void) with 45 m pillars (solid).

The provisional extraction schedule for Longwalls 301-303 is provided in Table 2.

Table 2
Provisional Extraction Schedule

Longwall	Estimated Start Date	Estimated Duration	Estimated Completion Date
Longwall 301	April 2017	6 months	September 2017
Longwall 302	November 2017	7 months	May 2018
Longwall 303	June 2018	7 months	December 2018

The layout for Longwalls 301-303 (i.e. 163 m panel widths [void] and 45 m pillars [solid]) will be trialled to build on the experience and dataset obtained from Longwalls 20-27. The outcomes of the trial will be used to inform the potential for a similar mine layout to be applied to the next Extraction Plan (i.e. Longwall 304 onwards). The assessment of the trial longwall layout is described in Section 13.1.

The future Extraction Plans will consider the cumulative subsidence effects, subsidence impacts and/or environmental consequences on Aboriginal heritage. Note that the total cumulative predicted subsidence effects, subsidence impacts and/or environmental consequences at the completion of the Project are considered in the Metropolitan Coal Project Environmental Assessment (Project EA) (HCPL, 2008) and the Preferred Project Report (HCPL, 2009).

4.2 RELEVANT INFORMATION OBTAINED SINCE PROJECT APPROVAL

Aboriginal heritage monitoring programs have been implemented at Metropolitan Coal for Longwalls 20-22 (from 2010 to 2014; Round 1, 2 and 3 surveys) (Kayandel Archaeological Services, 2012; Niche Environment and Heritage, 2013, 2015) and Longwalls 23-27 (from 2015; Round 1 and 2 surveys) (Niche Environment and Heritage, 2016a, 2016b) to monitor the impacts and environmental consequences of Project related subsidence on Aboriginal heritage sites. The monitoring program is undertaken by a suitably qualified archaeologist (with experience in rock art recording and management) and representatives of the Aboriginal stakeholders.

Metropolitan Coal acknowledges that all Aboriginal heritage sites are considered to be culturally significant to the Aboriginal people who have a traditional connection to Country. All Aboriginal 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.

Of the 53 Aboriginal heritage sites that have been subject to monitoring for Longwalls 20-22 and Longwalls 23-27 (at the time of development of this HMP), six have been determined to have changes due to mining induced subsidence.

Five Aboriginal heritage sites (FRC 15, FRC 281, FRC 283, FRC 284 and MET 1) have been determined to have changes due to mining induced subsidence from Longwalls 20-22 (Figure 2). The observed impacts at each site were as follows:

- Site FRC 15 – vertical cracking, not coincident with any art.
- Site FRC 281 – multiple cracks running either through or adjacent to the motifs (although the majority of art showed no damage or changes).
- Site FRC 283 – cracking of the rear wall of the shelter, not coincident with any art.
- Site FRC 284 – fracturing of the rear wall of the shelter and exfoliation, not coincident with any art.
- Site MET 1 – two vertical cracks along the rear wall and ceiling of the shelter, not coincident with any art.

One Aboriginal heritage site (FRC 176) has been determined to have changes due to mining induced subsidence from Longwalls 23-27 (Figure 2), where vertical cracking along the northern and southern ends of the shelter was observed. However this cracking was not coincident with any art (Niche Environment and Heritage, 2016a, 2016b).

The results of the monitoring program 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 heritage subsidence impact performance measure (Section 6), Aboriginal 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:

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

Of the sites at which changes due to mining induced subsidence have occurred, only site FRC 281 has been affected by subsidence impacts as a result of cracking of sandstone that coincides with Aboriginal art. This means that less than 1% of sites within the mining area have been affected by subsidence impacts at the time of development of this HMP (Niche Environment and Heritage, 2016b) (Section 6).

In addition to the changes recorded as a result of mining induced subsidence, natural weathering processes can also result in changes/deterioration of Aboriginal heritage sites. For example, a large block fall was recorded at the southern end of site FRC 24.1 during the Round 2 monitoring for Longwalls 23-27. This change was observed to be due to natural water seepage and vegetation growth (including *Todea Barbara* and *Microsorum scandens*) along the bedding plane where it joins to the roof of the shelter (Niche Environment and Heritage, 2016b). Other examples of natural weathering include micro- and macro-vegetation growth, chemical erosion, fire damage and exfoliation of surfaces (Niche Environment and Heritage, 2016b).

The results of the monitoring to date are consistent with the potential subsidence impacts and environmental consequences predicted in the Project EA and the Preferred Project Report, where it was expected that the majority of identified Aboriginal 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.

4.3 ENVIRONMENTAL RISK ASSESSMENT

An Environmental Risk Assessment (ERA) was conducted for four of the key component plans of the Metropolitan Coal Longwalls 301-303 Extraction Plan[1] *viz.* Water Management Plan, Land Management Plan, Biodiversity Management Plan and this HMP to give appropriate consideration to risk assessment and risk management in accordance with the DP&E and DRE (2015) *Guidelines for the Preparation of Extraction Plans*.

The suitably qualified and experienced experts endorsed by the Secretary of the DP&E for the preparation of the Metropolitan Coal Longwalls 301-303 Extraction Plan participated in the ERA[2].

The ERA process involved the key steps described below.

Review of Relevant Documentation

In preparation for the ERA workshop, the ERA participants reviewed a number of documents relevant to the risk assessment. This included (but was not limited to):

- The *Environmental Risk Analysis* (SP Solutions, 2008) conducted for the Project EA (Appendix O of the Project EA).
- The Preferred Project Report. During the NSW Government's assessment phase of the Project EA, and in recognition of concerns raised by key stakeholders during the formal Planning Assessment Commission (PAC) assessment process, HCPL considered it appropriate to reduce the proposed extent of the original Project longwall mining area (i.e. Longwalls 20-44).

[1] Individual risk assessments have been undertaken separately for the Metropolitan Coal Longwalls 301-303 Built Features Management Plan and the Metropolitan Coal Longwalls 301-303 Public Safety Management Plan, and are reported in their respective documents.

[2] Participants included Mr Peter DeBono (Mine Subsidence Engineering Consultants, Subsidence), Dr Noel Merrick (HydroSimulations, Groundwater), Mr Lindsay Gilbert (Hydro Engineering & Consulting, Surface Water), Dr David Goldney (Cenwest Environmental Services, Fauna), Dr Colin Bower (FloraSearch, Flora), Mr Jamie Reeves (Niche Environment and Heritage, Heritage), Mr Joshua Hunt (Resource Strategies, Land), Mr Jon Degotardi (Metropolitan Coal) and Mr Ryan Pascoe (Metropolitan Coal).

This reduction in the extent of longwall mining resulted in a significant reduction to the extent of potential subsidence effects to the Waratah Rivulet and the Eastern Tributary and a reduction in the consequential potential environmental impacts.

- The revised subsidence predictions and assessments for the approved changes to the first workings layout for Longwalls 301-303 (Metropolitan Coal, 2016a).
  - Following further mine planning investigations, Metropolitan Coal identified that significant operational efficiencies and consequently a significant economic benefit would be achieved by rotating the first workings of Longwalls 301-317 to be square with the 300 Mains (a rotation of approximately six degrees). The Secretary of the DP&E approved the revised first workings in accordance with Condition 5, Schedule 3 of the Project Approval on 20 April 2015.
  - On 5 May 2016, Metropolitan Coal requested the approval of the Secretary of the DP&E to further amend the first workings layout for Longwalls 301-303. The proposed changes to the first workings layout for Longwalls 301-303 were as follows:
    - Longwall 301 – reduce the panel void length from 1,680 metres (m) to 1,428 m, with no change to the tailgate pillar dimensions.
    - Longwall 302 – reduce the panel void length from 2,637 m to 1,954 m, with a reduction in the tailgate pillar width by 25 m for approximately 608 m of the panel length.
    - Longwall 303 – reduce the panel void length from 2,760 m to 2,122 m, with a reduction in the tailgate pillar width by 25 m for approximately 728 m of the panel length.

  The changes to the first workings layout for Longwalls 301-303 described above were approved by the Secretary of the DP&E on 16 June 2016.[3]

Risk Identification

The participants were asked to identify any additional (specific) issues/risks and/or changes to previously assessed levels of risk in preparation for the ERA workshop.

ERA Workshop

The ERA workshop for Longwalls 301-303 was conducted on 21 June 2016 via teleconference. The ERA workshop was facilitated by an independent specialist, Operational Risk Mentoring.

While the general consensus of the workshop participants was the additional (specific) issues/risks were broadly assessed and ranked as part of the previous *Environmental Risk Analysis* (SP Solutions, 2008), it was considered warranted to assess some specific potential environmental issues (upland swamps and the Eastern Tributary) in further detail focusing on Longwalls 301-303, considering experience to date based on Longwalls 20-27 and other surrounding mines. These were assessed using the same probability, consequence and risk rankings tables as those used in the *Environmental Risk Analysis* (SP Solutions, 2008). The risk rankings undertaken during the ERA indicated that those ranked for Longwalls 301-303 were within the "low" range and the outcomes could continue to be integrated into the overall management systems so that they are effectively reviewed, implemented and monitored (Metropolitan Coal, 2016b).

The ERA indicated that there was no change in the previously assessed risk to Aboriginal heritage sites (Metropolitan Coal, 2016b).

[3] Note that in September 2016 and subsequent to the completion of the Environmental Risk Assessment, Metropolitan Coal made further revisions to the lengths of Longwalls 302 and 303. The panel void length of Longwall 302 was reduced from 1,954 m to 1,775 m, and the panel void length of Longwall 303 was reduced from 2,122 m to 1,788 m.

ERA Report Review

All ERA participants were asked to review the draft report that was prepared to summarise the outcomes of the risk assessment workshop. Participants' comments were incorporated into the final Metropolitan Coal (2016b) report.

This HMP has been prepared to provide for the effective management of subsidence risks.

4.4 ABORIGINAL HERITAGE SITES

The Aboriginal heritage sites identified within 600 m of Longwalls 301-303 secondary extraction are shown on Figure 4 and a summary is provided in Table 3[4].

Table 3
Aboriginal Heritage Sites within 600 m of Longwalls 301-303 Secondary Extraction

AHIMS No.	Site Code	Site Type	Archaeological Significance Rating[1]	Sites of Particular Cultural Significance[2]
52-2-0154 52-2-0342* 52-2-0539*	FRC 28	Sandstone overhang with art, artefacts, deposit and/or grinding grooves	Moderate	-
52-2-0155 52-2-0193*	FRC 29	Sandstone overhang with art and PAD	Low	-
52-2-0200 52-2-0339*	FRC 30	Sandstone overhang with art and artefacts	Low	-
52-2-0722	FRC 31	Sandstone overhang with art, artefacts and deposit	Moderate	-
52-2-0194	FRC 32	Open site with grinding grooves only	High	-
52-2-0188 52-2-0325*	FRC 33	Open site with grinding grooves only	Low	-
52-2-0195	FRC 34	Sandstone overhang with art, artefacts and deposit	Low	-
52-2-0185	FRC 67	Sandstone overhang with artefacts and deposit	Low	-
52-2-0186 52-2-0326*	FRC 68	Sandstone overhang with art, artefacts and deposit	High	-
52-2-0192	FRC 70	Sandstone overhang with art, artefacts and deposit	Moderate	-
52-2-3510	FRC 71	Sandstone overhang with art only	Low	-
52-2-0199	FRC 72	Sandstone overhang with art, artefacts, deposit and/or grinding grooves	Moderate	-
52-2-0887	FRC 76	Sandstone overhang with art only	Low	-
52-2-0330 52-2-0886*	FRC 77	Sandstone overhang with art, artefacts and deposit	Low	-

[4] Site 2-0346 (AHIMS 52-2-0346) was described and assessed for potential subsidence impacts in the Project EA (HCPL, 2008; Kayandel Archaeological Services, 2008) and was reported as being located over Longwall 302. During the baseline recording for Longwalls 301-303, Niche Environment and Heritage undertook a detailed site inspection. Despite searches of all possible locations (based on descriptions in the AHIMS site card and previous assessment reports) and the surrounding area, the site was unable to be relocated in the area described by its previous recorded location. Niche Environment and Heritage has assessed the site record and determined that it refers to the same site as site FRC 93 and hence is located outside of 600 m of Longwalls 301-303 secondary extraction. This site is not considered further in this HMP.

Table 3 (Continued)
Aboriginal Heritage Sites within 600 m of Longwalls 301-303 Secondary Extraction

AHIMS No.	Site Code	Site Type	Archaeological Significance Rating[1]	Sites of Particular Cultural Significance[2]
52-2-0885	FRC 78	Sandstone overhang with art only	Low	-
52-2-0883	FRC 85	Sandstone overhang with art, artefacts and deposit	Moderate	-
52-2-0207 52-2-0898*	FRC 86	Sandstone overhang with art only	Low	-
52-2-0899	FRC 87	Sandstone overhang with art, artefacts and deposit	Low	-
52-2-0869	FRC 90	Sandstone overhang with artefacts and deposit	Low	-
52-2-0870	FRC 91	Sandstone overhang with art, artefacts and deposit	Low	-
52-2-0739	FRC 117	Sandstone overhang with art and PAD	Low	-
52-2-0203 52-2-0414*	FRC 127	Sandstone overhang with art only	Low	-
52-2-0828	FRC 180	Sandstone overhang with art only	Low	-
52-2-0738	FRC 253	Open site with grinding grooves only	Low	-
52-2-3498	FRC 307	Open site with grinding grooves only	Low	-
52-2-3499	FRC 308	Sandstone overhang with art only	Low	-
52-2-3501	FRC 309	Sandstone overhang with artefacts and deposit	Low	-
52-2-3500	FRC 310	Sandstone overhang with art only	Low	-
52-2-3451	FRC 320	Sandstone overhang with artefacts and deposit	Low	-
52-2-3452	FRC 321	Sandstone overhang with art, artefacts and deposit	Low	-
52-2-3466	FRC 325	Sandstone overhang with art only	Low	-
52-2-0546	2-0546	Sandstone overhang with deposit and art	-	-
52-2-0548	2-0548	Open artefact scatter	-	-
52-2-1909	2-1909	Overhang with art	-	-
52-2-1915	2-1915	Overhang with art	-	-

[1] Sources include: Kayandel Archaeological Services (2006; 2007; 2008) and information available on NSW Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) Site Cards.

[2] As determined by the Aboriginal stakeholders as part of the Project Aboriginal Cultural Heritage Assessment (Kayandel Archaeological Services, 2008).

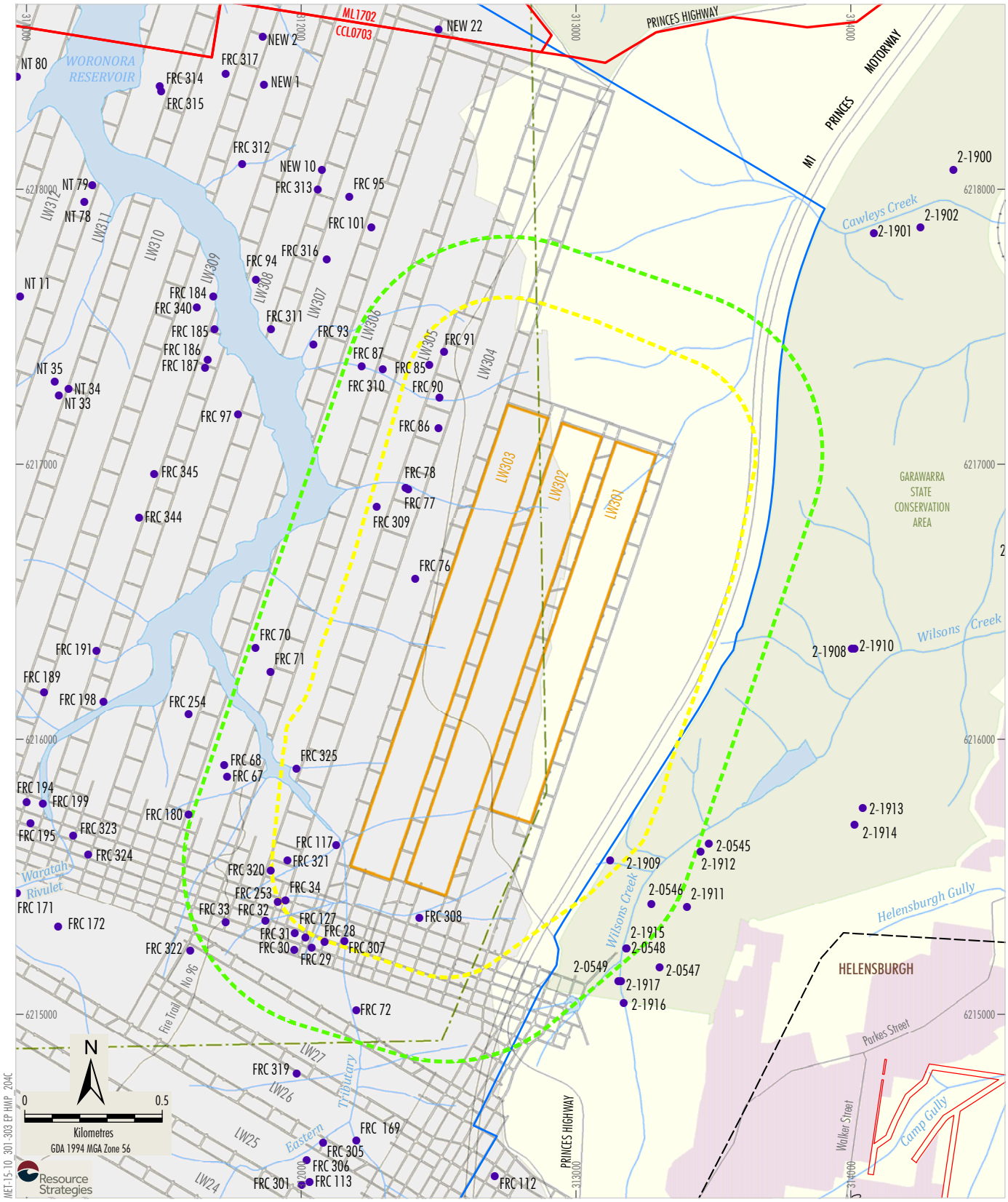
* Single Aboriginal heritage site registered more than once on the AHIMS database (Illawarra Prehistory Group, 2007).

PAD – Potential Archaeological Deposit.

4.4.1 Revised Subsidence Predictions

The subsidence predictions for Longwalls 301-303 in relation to Aboriginal heritage sites within the 35° angle of draw and/or predicted 20 mm subsidence contour have been prepared by MSEC (2016). Table 4 compares the revised subsidence predictions for the Longwalls 301-303 Extraction Plan with the subsidence predictions for the Preferred Project Layout (at the completion of Longwall 303).

There is a slight increase in the maximum predicted vertical subsidence at five of the Aboriginal heritage sites based on the Extraction Plan layout. There is an increase of 25 mm at site FRC 76 and of 10 mm at sites FRC 77, FRC 78, FRC 308 and FRC 309 (Table 4). The predicted tilt and curvatures based on the Extraction Plan layout are either the same or less than those based on the Preferred Project Layout (Table 4).



LEGEND

- Mining Lease Boundary
- Woronora Special Area
- Railway
- Project Underground Mining Area Longwalls 20-27 and 301-317
- Longwalls 301 - 303 Secondary Extraction
- 35° Angle of Draw and/or Predicted 20 mm Subsidence Contour
- 600 m from Secondary Extraction of Longwalls 301-303
- Existing Underground Access Drive (Main Drift)
- Woronora Notification Area
- Aboriginal Heritage Site

Source: Land and Property Information (2015); Department of Industry (2015); Metropolitan Coal (2016); MSEC (2016); Illawarra Prehistory Group (2007; 2008); AHIMS (2007); Kayandel Archaeological Services (2006; 2007; 2008); Niche Environmental and Heritage (2013)

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Longwalls 301 - 303
Known Aboriginal Heritage Sites

Figure 4

Table 4
Revised Subsidence Predictions for Longwalls 301-303 Aboriginal Heritage Sites

Aboriginal Heritage Sites[1]	Maximum Predicted Subsidence[2] (mm)		Maximum Predicted Tilt[3] (mm/m)		Maximum Predicted Hogging Curvature[4] (km^{-1})		Maximum Predicted Sagging Curvature[4] (km^{-1})		Maximum Predicted Conventional Tensile Strain[5] (mm/m)		Maximum Predicted Conventional Compressive Strain[5] (mm/m)	
	PPL (LW301-303)[6]	Extraction Plan Layout (LW301-303)[7]	PPL (LW301-303)[6]	Extraction Plan Layout (LW301-303)[7]	PPL (LW301-303)[6]	Extraction Plan Layout (LW301-303)[7]	PPL (LW301-303)[6]	Extraction Plan Layout (LW301-303)[7]	PPL (LW301-303)[6]	Extraction Plan Layout (LW301-303)[7]	PPL (LW301-303)[6]	Extraction Plan Layout (LW301-303)[7]
Open Sites												
FRC 307	20	20	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
Sandstone Overhangs												
2-1909	<20	<20	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 34	<20	<20	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 76	100	125	1.0	0.5	0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 77	40	50	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 78	40	50	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 85	40	<20	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 86	60	60	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 90	60	30	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 91	50	<20	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 117	200	50	2.0	1.0	<0.01	<0.01	0.02	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 308	30	40	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 309	20	30	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 321	<20	<20	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5
FRC 325	30	30	<0.5	<0.5	<0.01	<0.01	<0.01	<0.01	<0.5	<0.5	<0.5	<0.5

Source: After MSEC (2016).

1 Aboriginal heritage sites within the Longwalls 301-303 35° angle of draw 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.

[5] Conventional strain based on 15 times curvature. Strain is the relative differential horizontal movements of the ground. Tensile strains occur where the distance between two points increases and compressive strains occur when the distance between two points decreases.

[6] PPL – after completion of Longwall 303 of the Preferred Project Layout.

[7] Extraction Plan Layout – after completion of Longwall 303 of the Extraction Plan layout (Longwalls 301-303).

mm = millimetres

mm/m= millimetres per metre

km^{-1} =1/kilometres

The grinding groove site (FRC 307) is located in the base of the Eastern Tributary and is likely to experience valley closure due to the extraction of Longwalls 301 to 303. The predicted total closure at this site is 150 mm, however the compressive strain due to valley closure is predicted to be less than 1.0 mm/m.

Based on the revised subsidence predictions, Section 4.4.2 provides a revised assessment of predicted subsidence impacts and environmental consequences on Aboriginal heritage sites.

4.4.2 Revised Assessment of Potential Subsidence Impacts and Environmental Consequences

The Project EA Subsidence Assessment (MSEC, 2008) provided a description of the general impacts on Aboriginal heritage sites (including open sites and sandstone overhang sites) in the Southern Coalfield as a consequence of longwall mining.

The maximum predicted subsidence parameters for the Aboriginal heritage sites, based on the Extraction Plan Layout, are similar to or slightly less than the maxima predicted based on the Preferred Project Layout. At some locations the predicted subsidence parameters are slightly higher than the parameters for the Preferred Project Layout, however the differences do not change the impact assessment provided in the Project EA or the Preferred Project Report.

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 Longwalls 301-303.

Open Sites

One open site is located within the Longwalls 301-303 35^{o} angle of draw and/or predicted 20 mm subsidence contour, namely site FRC 307 (an open site with grinding grooves). Open sites have the potential to be impacted by the cracking of sandstone resulting from mine subsidence.

Site FRC 307 is located approximately 250 m from the nearest longwall. Based on the predicted subsidence parameters described in Section 4.4.1, potential subsidence impacts to this site are considered unlikely (MSEC, 2016).

Sandstone Overhang Sites

There are 14 sandstone overhang sites located within the Longwalls 301-303 35^{o} angle of draw and/or predicted 20 mm subsidence contour. Overhang sites can potentially be impacted by the cracking of sandstone. Where cracking is coincident with an overhang, it is possible there could be an isolated rock fall as the result of mining, or in extreme cases, collapse (MSEC, 2016).

Of the 14 sites with overhangs, six have art only and eight have art and/or artefacts and/or PAD. All of the overhang sites are located above solid coal. That is, none are located directly over Longwalls 301-303. Based on the very low magnitude of predicted subsidence parameters, impacts to these sites resulting from the extraction of Longwalls 301-303 are considered unlikely. 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 heritage sites outside the longwall layouts is considered to be low (MSEC, 2016).

5 CONSULTATION PROTOCOL

5.1 IDENTIFICATION OF ABORIGINAL STAKEHOLDERS

For the purpose of this HMP, Aboriginal stakeholders are defined as being those Aboriginal groups/parties who have previously registered an interest in being consulted in relation to the Project or who have been involved on an ongoing basis at Metropolitan Coal. These Aboriginal stakeholders include the following:

- Cubbitch Barta Native Title Claimants;
- Illawarra Local Aboriginal Land Council;
- Korewal Elouera Jerrungurah Tribal Elders Corporation;
- Mr Gary Caines;
- La Perouse Botany Bay Aboriginal Corporation;
- Woronora Plateau Gundungara Elders Councils;
- Northern Illawarra Aboriginal Collective, including representatives from:
  - Wadi Wadi Coomaditchie Aboriginal Corporation;
- Tharawal Local Aboriginal Land Council; and
- Wodi Wodi Elders Corporation.

5.2 ABORIGINAL STAKEHOLDER PARTICIPATION

Metropolitan Coal 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 Metropolitan Coal.

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 Metropolitan Coal's workplace health and safety requirements. These requirements include the provision of copies of current relevant insurances (i.e. public liability and workers compensation) and appropriate personal protection equipment.

All Metropolitan Coal staff and contractors (including Aboriginal stakeholders and archaeologists) may be subject to random drug and alcohol testing. All Metropolitan Coal 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

Metropolitan Coal will maintain a consultation log to record all correspondence with Aboriginal stakeholders (e.g. emails, telephone calls, letters, meeting minutes, etc.).

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

Aboriginal stakeholders will be notified of any material changes to the HMP. In the context of this HMP, a material change would include any change that affects the management of Aboriginal cultural heritage associated with Metropolitan Coal. Examples of a material change in the context of this HMP 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.

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 heritage sites within the larger Project area (e.g. for personal, spiritual or cultural reasons). Metropolitan Coal will endeavour to facilitate the requested access, consistent with personnel workplace health and safety requirements and associated landholder requirements.

6 PERFORMANCE MEASURES AND INDICATORS

The Project Approval requires Metropolitan Coal to achieve the Aboriginal heritage sites subsidence impact performance measure outlined in Table 1 of Condition 1, Schedule 3 of the Project Approval:

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

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). Limited long term studies have been undertaken on subsidence impacts to overhangs in the NSW Southern Coalfields and as the internal structures of overhangs (e.g. existing bedding, cracking and seepage) are not always observable, not all risks to shelters from mining can be identified. This makes it problematic to clearly differentiate between subsidence impacts and natural impacts.

Section 9 describes the monitoring program that will be conducted to assess the Project against the subsidence impact performance measure. As described in Section 9, a Heritage Management Plan – Subsidence Impact Register (Appendix 2) will be used to progressively monitor the cumulative number and percentage of Aboriginal heritage sites affected by subsidence impacts. For the purpose of measuring performance against the Aboriginal heritage subsidence impact performance criteria, sites are considered to be "affected by subsidence impacts" if they exhibit one or more of the following consequences that cannot be attributed to natural weathering or deterioration:

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

There are 142 Aboriginal heritage sites (141 sites identified in the Project EA and one new site [MET 4] identified during Round 2 monitoring for Longwalls 20-22) within the mining area. The mining area is defined by the Project Approval and is shown on Figure 1 of this HMP (labelled as Project Underground Mining Area Longwalls 20-27 and 301-317).

In the event the Aboriginal heritage sites subsidence impact performance measure is exceeded, Metropolitan Coal will notify the DP&E, OEH and Aboriginal stakeholders as soon as practicable after Metropolitan Coal becomes aware of the exceedance and the Contingency Plan (Section 11) will be implemented. As described in Section 10, in the event that any subsidence impact is recorded, consideration would be given to implementing appropriate management, remediation and/or mitigation measures in consultation with the OEH and the Aboriginal stakeholders.

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

7 BASELINE DATA

Baseline recording of Aboriginal heritage sites for Longwalls 20-22 and Longwalls 23-27 has been conducted by Kayandel Archaeological Services or Niche Environment and Heritage. The sites that were subject to detailed baseline recording (where the sites were able to be relocated) are listed in Table 5.

A number of the Aboriginal heritage sites that have been subject to baseline recording for Longwalls 23-27 are located within 600 m of Longwalls 301-303 secondary extraction. These sites are shaded in Table 5.

Table 5
Aboriginal Heritage Sites Subject to Previous Baseline Recording

Sites Subject to Baseline Recording for Longwalls 20-22				
FRC 10	FRC 12	FRC 13	FRC 14	FRC 15
FRC 16.1	FRC 16.2	FRC 17	FRC 19	FRC 20
FRC 21	FRC 22	FRC 23	FRC 24.1	FRC 24.2
FRC 25	FRC 26	FRC 40	FRC 44	FRC 45
FRC 46	FRC 49	FRC 50	FRC 51	FRC 52
FRC 55	FRC 56	FRC 57**	FRC 60	FRC 63
FRC 96	FRC 105	FRC 108	FRC 110	FRC 113
FRC 114	FRC 115	FRC 118	FRC 119	FRC 120
FRC 121	FRC 124	FRC 125	FRC 156	FRC 157
FRC 160	FRC 162	FRC 166	FRC 168**	FRC 176
FRC 203	FRC 215	FRC 265	FRC 266	FRC 272
FRC 273	FRC 274	FRC 275	FRC 276	FRC 277
FRC 278	FRC 279	FRC 280	FRC 281	FRC 283
FRC 284	FRC 285	FRC 297	FRC 298	FRC 299
FRC 300	FRC 301	FRC 302	FRC 304	FRC 306**
FRC 318	FRC 342	FRC 343	MET 1	MET 2
PAD 2	PAD 3	MET 4*		
Sites Subject to Baseline Recording for Longwalls 23-27				
FRC 62	FRC 112	FRC 169	FRC 171	FRC 172
FRC 305	FRC 319	FRC 322	FRC 28	FRC 29
FRC 30	FRC 31	FRC 32	FRC 33	FRC 34
FRC 67	FRC 68	FRC 72**	FRC 117	FRC 127
FRC 180**	FRC 194	FRC 195	FRC 199	FRC 253
FRC 307	FRC 308	FRC 320	FRC 321	FRC 323
FRC 324				

Sites located within 600 m of Longwalls 301-303 secondary extraction.

* Site MET 4 was recorded during Round 2 monitoring for Longwalls 20-22. This site has been registered on AHIMS and has been subject to monitoring.

** Despite extensive searches, this site was unable to be relocated during baseline recording.

Baseline recording of 14 Aboriginal heritage sites (i.e. sites located within 600 m of Longwalls 301-303 secondary extraction not subject to baseline recording for Longwalls 23-27) has been conducted by Niche Environment and Heritage for Longwalls 301-303[5]. The sites subject to baseline recording for Longwalls 301-303 are listed in Table 6.

[5] Detailed baseline recording of sites 2-0546, 2-0548, 2-1909 and 2-1915 was not completed for this HMP. Sites 2-0546, 2-0548 and 2-1915 are located outside of the 35° angle of draw and predicted 20 mm subsidence contour (Figure 4). Site 2-1909 is predicted to experience less than 20 mm of subsidence, less than 0.5 mm of tilt, and less than 1.01 km^{-1} hogging and sagging curvature (MSEC, 2016). Notwithstanding, site cards have been completed and registered on the AHIMS database for all of these sites.

Table 6
Aboriginal Heritage Sites Subject to Baseline Recording for Longwalls 301-303

Sites Subject to Baseline Recording for Longwalls 301-303				
FRC 70	FRC 71	FRC 76	FRC 77	FRC 78
FRC 85	FRC 86	FRC 87	FRC 90	FRC 91
FRC 93*	FRC 309	FRC 310	FRC 325	

* As indicated in Table 4, this site is located outside of 600 m of Longwalls 301-303 secondary extraction. However, this site was subject to baseline recording following a detailed search for previously reported site 2-0346 (which has been confirmed to be a duplicate of FRC 93 with erroneous coordinates) and hence has been included in the baseline record in Appendix 1 for completeness.

The baseline record for the 14 Aboriginal heritage sites is provided in Appendix 1. The baseline record includes:

- a photographic record of each Aboriginal heritage site;
- detailed scaled plans of each 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 heritage fieldwork may be undertaken over the life of the Project to inform the management and monitoring of Aboriginal heritage sites.

8.2 PRE-CLEARANCE SURVEYS

Pre-clearance surveys may be required to be undertaken in the Project underground mining area to identify the most appropriate location for required Project infrastructure. Pre-clearance surveys will involve the following:

1. Developing an inventory of surface infrastructure required and conducting an initial desktop risk assessment based on the location of known sites.
2. Undertaking a pre-clearance survey (if required[6]) of the proposed site(s) for surface infrastructure by an appropriately qualified and experienced archaeologist.
3. Assessing potential impacts to nearby Aboriginal heritage site(s) based on the results of the pre-clearance surveys and determining the most appropriate location for required surface infrastructure.
4. Where practicable, surface infrastructure will be located so as to avoid or minimise impacts to Aboriginal heritage sites. If impacts cannot be avoided, appropriate management and/or mitigation measures will be undertaken (Section 10).

Where Aboriginal heritage sites are located close to required surface disturbance works, the surface disturbance protocol (described in Section 10.3) will be undertaken.

[6] A pre-clearance survey would not be required if the area has been previously surveyed or if, in the opinion of an appropriately qualified archaeologist, contains limited archaeological potential.

8.3 RECORDING AND REGISTERING NEW ABORIGINAL HERITAGE SITES

Any previously unrecorded Aboriginal 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 OEH site card. This information would be submitted to the OEH for registration on the AHIMS database. Any previously unrecorded sites would also be subject to archaeological and cultural significance assessment, in consultation with Aboriginal stakeholders. Any previously unrecorded sites would be managed in accordance with the requirements of this HMP.

9 MONITORING

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

Monitoring of the Longwalls 20-27 Aboriginal heritage sites at which previous monitoring indicates continued change due to mining induced subsidence, will be monitored as a component of this HMP. The sites that show continued change due to mining induced subsidence will be determined by the Round 5 monitoring survey for Longwalls 23-27. The Round 5 monitoring survey for Longwalls 23-27 will be undertaken between 3 and 6 months following the completion of Longwall 27 (consistent with the existing Longwalls 23-27 HMP). The Aboriginal heritage sites that show continued change will be monitored within three months of the completion of Longwall 303.

All sites located within the Longwalls 301-303 35º angle of draw and/or predicted 20 mm subsidence contour, with the exception of sites FRC 76 and FRC 117, are predicted to experience maximum tilts, curvatures and strains that are less than typical magnitudes of subsidence survey accuracy (i.e. conventional tilt of less than 0.5 mm/m, conventional curvature of less than 0.01 km^{-1} hogging and sagging). The maximum predicted subsidence at these sites at the completion of Longwall 303 extraction is 125 mm at site FRC 76, with predicted subsidence being 60 mm or less at all other sites (as detailed in Table 4 in Section 4.4.1). The majority of these Aboriginal heritage sites are located to the west of Longwall 303, overlying Longwalls 304 and 305 (Figure 4). Detailed baseline recording has been completed for these sites and is provided in Appendix 1. These sites will be monitored as a component of the next Extraction Plan.

Monitoring of the following Aboriginal heritage sites will be undertaken for Longwalls 301-303, within three months of the completion of Longwall 303 (Figure 4):

- FRC 76 (sandstone overhang with art only).
- FRC 117 (sandstone overhang with art and PAD).

Monitoring of sites FRC 76 and FRC 117 will also be undertaken as a component of the next Extraction Plan (i.e. Longwall 304 onwards).

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.

A summary of the information collected during monitoring will be recorded in the Heritage Management Plan – Subsidence Impact Register (Appendix 2) and reported in accordance with the Project Approval conditions. At the completion of monitoring, a report will be prepared and distributed to the OEH and each of the Aboriginal stakeholders. The report will include the following:

- a map of the area and the location of Aboriginal heritage sites monitored;
- a table outlining the dates on which each site was monitored and which Aboriginal stakeholders were present;
- a table outlining 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 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 subsidence impact performance measure described in Section 6. The Heritage Management Plan – Subsidence Impact Register (Appendix 2) will be used to progressively monitor and document the total number and cumulative percentage of Aboriginal heritage sites against the subsidence impact performance measure (Section 6). In the event the subsidence impact performance measure is exceeded, the Contingency Plan outlined in Section 11 will be implemented.

As described in Section 10, in the event that any subsidence impact is recorded during monitoring, consideration will be given to implementing appropriate management, remediation and/or mitigation measures in consultation with the OEH and the Aboriginal stakeholders.

An example monitoring *pro forma* detailing the minimum recording requirements during monitoring is provided as Table 7.

Table 7
Monitoring Pro-forma

Site Details						
Site Name				AHIMS Site Number		
Site Type						
GPS Details (GDA94)	Easting			Northing		
Recording Details						
Baseline Recording				Date/time		
Previous Monitoring				Date/time		
Current Monitoring				Date/time		
Archaeological Features						
Previously Identified						
Re-recorded						
Additional Located	(attach recording form)					
Site Condition						
Overall						
Rock surfaces						
Archaeological Feature/s						
Change in vegetation, erosion, soil level or hydrological features						
Observed Change						
Change Type	(e.g. cracking, collapse, exfoliation, segmented detachment, step cracking, platform separation, increased moisture flow)					
Location	(map location of damage within site)					
Dimensions (mm)	Length		Width		Depth/Height	
Comments	(e.g. has the archaeological feature been affected? is the damage new? has damage increased since previous monitoring?)					
Observed Natural Disturbance Processes						
Insects			Weathering			
Animals			Water-wash			
Vegetation			Exfoliation			
Microvegetals			Salts			
Siltation						
Comments						
Recommendations						
Further Monitoring						
Management						
Attach photographs and drawings of changes in site condition, subsidence damage, natural damage and any additional archaeological features. Photos should be taken from the same position and distance as the baseline record to allow comparison over time.						

10 MANAGEMENT, REMEDIATION AND MITIGATION MEASURES

10.1 MANAGEMENT AND REMEDIATION MEASURES

Following completion of monitoring (Section 9), Metropolitan Coal will assess the need for implementation of appropriate management and/or remediation measures.

Examples of potential management and remediation measures are provided in Table 8. 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 heritage sites and their settings.

Table 8
Potential Management and Remediation Measures

Consequence	Potential Management and Remediation Measures	
	Measure	**Description**
Increased seepage with the potential to impact art.	Seepage control techniques.	• 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.	• 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.	• Salvage of artefacts for safekeeping and storage and/or display at a suitable location in consultation with the Aboriginal community.
Impacts on aesthetic values due to cracking.	Restoration of aesthetic values.	• 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.	• Installation of a stress relief slot or stress focus notch.

The development of management and/or remediation measures will be determined in consultation with the OEH and the Aboriginal stakeholders 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 14).

10.2 MITIGATION MEASURES

10.2.1 Mitigation Measure Consideration and Implementation Process

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

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 heritage site from subsidence impacts. These characteristics include (Sefton, 2000 and 2004; Biosis Research 2007 and 2009; MSEC, 2007 and 2008):

- overhang volume – >50 cubic metres (m^3) 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 – sites located in valley bottoms can experience valley closure mechanisms and increased risk of cracking;
- location in relation to goaf – location of sites relative to the goaf influences the level of subsidence impacts experienced;
- 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.

The development of mitigation measures will be determined with regard to the specific circumstances of individual sites, including accessibility, size and spatial extent, nature of predicted subsidence impacts and consequences, and level of damage or disturbance (to the 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 site and its settings (including impacts to cultural setting). 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 9.

Table 9
Potential Consequences and Mitigation Measures

Consequence	Potential Mitigation Measures	
	Measure	**Description**
Existing seepage with the potential to increase and threaten art due to subsidence movements.	Seepage control techniques.	• Installation of an artificial dripline (e.g. silicone dripline) to direct increased moisture/water seepage away from art panels if it eventuates.
Reduction in the stability of an overhang due to substantial cracking or block fall.	Stabilisation techniques.	• 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.
Potential cracking of sandstone associated with art or grinding grooves.	Strain reduction techniques.	• Installation of a stress relief slot or stress focus notch.

Any proposed mitigation measures will be developed and implemented (if considered appropriate) in consultation with OEH, Aboriginal stakeholders and the relevant landowner (e.g. 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 14).

10.2.2 Consideration of Mitigation Measures for Longwalls 301-303

No Aboriginal heritage sites of high archaeological significance are located within the 35^{o} angle of draw and/or predicted 20 mm subsidence contour of Longwalls 301-303 (Figure 4).

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

Consultation with representatives of the Aboriginal community regarding the cultural significance of the Project area and known Aboriginal heritage sites was undertaken during the surveys and inspections for the Project EA (Kayandel Archaeological Services, 2008). Aboriginal heritage sites that have previously been identified as being of special cultural interest or of particular cultural significance within the Project underground mining area are described in Appendix H of the Project EA. It is noted that at the time of the Project EA no sites or areas of particular cultural significance were identified within the area bound by the Longwalls 301-303 35^{o} angle of draw and/or predicted 20 mm subsidence contour.

Based on the above, and in consideration of potential damage caused by the implementation of the above described techniques, mitigation measures are not proposed for Aboriginal heritage sites within the Longwalls 301-303 35º angle of draw and/or predicted 20 mm subsidence contour.

Future longwalls have the potential to result in additional subsidence movements at Aboriginal heritage sites associated with Longwalls 301-303 or the previous mining areas (i.e. Longwalls 23-27). As part of the development of the future Extraction Plans, Metropolitan Coal will review the potential impacts and environmental consequences to Aboriginal 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 OEH, the Aboriginal stakeholders and relevant landowners (e.g. WaterNSW).

10.3 SURFACE DISTURBANCE PROTOCOL

The surface disturbance protocol aims to avoid accidental damage to Aboriginal 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 heritage site(s).

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

1. Avoidance of impact to Aboriginal heritage sites will be the primary management measure, where practicable.
2. To avoid accidental damage to Aboriginal 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, a comprehensive baseline record will be developed and consideration of salvage will be undertaken in consultation with Aboriginal stakeholders prior to disturbance.

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) 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;
- the DP&E, OEH, 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 OEH have inspected the remains and authorised their disturbance.

10.5 CULTURAL AWARENESS PROGRAM

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

- an overview of the cultural heritage management program;
- an overview of the consultation protocol (Section 5);
- an overview of the pre-clearance surveys (Section 8) and surface disturbance protocol (Section 10.3);
- 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 heritage sites subsidence impact performance measure detailed in Section 6 of this HMP is considered to have been exceeded, Metropolitan Coal will implement the following Contingency Plan:

- The exceedance will be reported to the Manager – Technical Services and/or the Manager – Safety & Environmental Services within 24 hours.
- The exceedance will be recorded in the Heritage Management Plan – Subsidence Impact Register (Appendix 2) consistent with the monitoring program described in Section 9 of this HMP.
- Metropolitan Coal will report the exceedance to the DP&E, OEH and Aboriginal stakeholders as soon as practicable after Metropolitan Coal becomes aware of the exceedance.
- Metropolitan Coal 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 OEH and the Aboriginal stakeholders.

- Metropolitan Coal will identify an appropriate course of action with respect to the identified impact(s), in consultation with specialists, relevant agencies and Aboriginal stakeholders, 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.
- Metropolitan Coal will submit the proposed course of action to the DP&E for approval.
- Metropolitan Coal will implement the approved course of action to the satisfaction of the DP&E.

In accordance with Condition 6, Schedule 6 of the Project Approval, Metropolitan Coal will provide a suitable offset to compensate for the impact to the satisfaction of the Secretary of DP&E if either the contingency measures implemented by Metropolitan Coal have failed to remediate the impact or the Secretary of the DP&E determines that it is not reasonable or feasible to remediate the impact.

A Contingency Plan Check List has been developed and is provided in Appendix 3.

12 TARP – MANAGEMENT TOOL

The framework for the various components of the HMP are summarised in the HMP - Trigger Action Response Plan (TARP) shown in Table 10. The HMP-TARP illustrates how the various predicted subsidence impacts, monitoring components, performance measures, and responsibilities are structured to achieve compliance with the relevant statutory requirements, and the framework for management and contingency actions.

The TARP system provides a simple and transparent snapshot of the monitoring of environmental performance and, where required, the implementation of management and/or contingency measures.

13 FUTURE EXTRACTION PLANS

In accordance with Condition 7, Schedule 3 of the Project Approval, Metropolitan Coal will collect baseline data for future Extraction Plans. The collection of baseline data will include:

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

As described in Section 7, detailed baseline recording has been completed for a number of sites located to the west of Longwall 303, including sites FRC 70, FRC 71, FRC 76, FRC 77, FRC 78, FRC 85, FRC 86, FRC 87, FRC 90, FRC 91, FRC 93, FRC 309, FRC 310 and FRC 325. The baseline record for these sites is provided in Appendix 1.

Prior to the commencement of secondary extraction associated with the next Extraction Plan (i.e. Longwall 304 onwards), baseline data will be obtained for Aboriginal heritage sites located within the relevant 35^{o} angle of draw and/or predicted 20 mm subsidence contour of the Extraction Plan 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 HMP will inform the appropriate type and frequency of monitoring of the Aboriginal heritage sites relevant to the next Extraction Plan.

Table 10
HMP Trigger Action Response Plan

Condition	Baseline Conditions	Predicted Impacts	Management/Mitigation Measures	Restoration/Contingency Phase
Trigger	• Aboriginal heritage sites in variable condition. Some sites exhibit varying degrees of natural cracking, erosion, seepage, weathering etc. • Baseline record (as described in Section 7).	• Cracking of sandstone at open sites. • Cracking and/or exfoliation of sandstone, blockfall, displacement, breakage and/or collapse of sandstone overhang sites.	• Review whether observed impacts are consistent with predicted impacts in consideration of the specific circumstances of the predicted subsidence impact (e.g. the location, nature and extent of the impact) and the assessment of consequences, in accordance with Section 10.	• Ten percent (10%) of Aboriginal heritage sites in the mining area are affected by subsidence impacts (as described in Section 6).
Action	Establish baseline data, including: • Photographic record and mapping of Aboriginal heritage sites. • Detailed scaled plans of each site including physical characteristics and features. • Detailed information regarding the dimensions, composition and features of the site.	• Conduct monitoring as per Section 9. • Update the 'Heritage Management Plan – Subsidence Impact Register'. • Assess the consequences of the subsidence impact. • Assess the need for management/mitigation measures in accordance with Section 10.	• Implement management/mitigation measures, as required, in accordance with Section 10.	• Implement the Contingency Plan as per Section 11.
Frequency	• Prior to commencement of secondary extraction within the specific mining area.	<u>Identified Aboriginal Heritage Sites:</u> • Conduct monitoring as per Section 9. • Opportunistic visual inspections as part of routine works conducted in the catchment.	• As required, in accordance with Section 10.	• As required, in accordance with Section 11.
Position of Decision Making	• Manager – Technical Services. • Manager – Safety & Environmental Services.	• Manager – Technical Services. • Manager – Safety & Environmental Services.	• Manager – Technical Services. • Manager – Safety & Environmental Services.	• General Manager.

13.1 ASSESSMENT OF TRIAL LONGWALL LAYOUT FOR LONGWALLS 301-303

As described in Section 4.1, the layout for Longwalls 301-303 (i.e. 163 m panel widths [void] and 45 m pillars [solid]) will be trialled to build on the experience and dataset obtained from Longwalls 20 to 27. The outcomes of the trial will be used to inform the potential for a similar mine layout to be applied to the next Extraction Plan (i.e. Longwall 304 onwards).

Following the completion of Longwall 301, and during the mining of Longwall 302, Metropolitan Coal will review the available Aboriginal heritage site monitoring results and assess the changes to, and impacts on, Aboriginal heritage sites that have been recorded.

14 ANNUAL REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

In accordance with Condition 3, Schedule 7 of the Project Approval, Metropolitan Coal will conduct an Annual Review of the environmental performance of the Project by the end of March each year.

The Annual Review will specifically address the environmental performance of the HMP and will:

- describe the works carried out in the past year, and the works proposed to be carried out over the next year;
- include a comprehensive review of the monitoring results and complaints records of the Project over the past year, including a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the Project EA, Preferred Project Report and Extraction Plan;
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- 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 year to improve the environmental performance of the Project.

As described in Section 2, this HMP will be reviewed within three months of the submission of an Annual Review, and revised where appropriate.

The Annual Review will be made publicly available on the Peabody website in accordance with Condition 10, Schedule 7 of the Project Approval.

15 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 Project Approval.

The reporting of incidents will be conducted in accordance with Condition 6, Schedule 7 of the Project Approval. Metropolitan Coal will notify the Secretary of the DP&E and any other relevant agencies of any incident associated with the Project as soon as practicable after Metropolitan Coal becomes aware of the incident. Within seven days of the date of the incident, Metropolitan Coal will provide the Secretary and any relevant agencies with a detailed report on the incident.

16 COMPLAINTS

A protocol for the managing and reporting of complaints has been developed as a component of Metropolitan Coal's Environmental Management Strategy and is described below.

The Manager – Safety & Environmental Services is responsible for maintaining a system for recording complaints.

Metropolitan Coal will maintain public signage advertising the telephone number on which environmental complaints can be made. The Manager – Safety & Environmental Services is responsible for ensuring that the currency and effectiveness of the service is maintained. Notifications of complaints received are to be provided as quickly as practicable to the Manager – Safety & Environmental Services.

Complaints and enquiries do not have to be received via the telephone line and may be received in any other form. Any complaint or enquiry relating to environmental management or performance is to be relayed to the Manager – Safety & Environmental Services as soon as practicable. All employees are responsible for ensuring the prompt relaying of complaints. All complaints will be recorded in a complaints register.

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 Metropolitan Coal in relation to the complaint, including any follow-up contact with the complainant; and
- if no action was taken by Metropolitan Coal, the reason why no action was taken.

The Manager – Safety & Environmental Services is responsible for ensuring that all complaints are appropriately investigated, actioned and that information is fed back to the complainant, unless requested to the contrary.

In accordance with Condition 10, Schedule 7 of the Project Approval, the complaints register will be made publicly available on the website and updated on a monthly basis. A summary of complaints received and actions taken will be presented to the Community Consultative Committee as part of the operational performance review.

17 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 Metropolitan Coal's Environmental Management Strategy and is described below.

Compliance with all approvals, plans and procedures will be the responsibility of all personnel (staff and contractors) employed on or in association with Metropolitan Coal, and will be developed through promotion of Metropolitan Coal ownership under the direction of the General Manager.

The Manager – Technical Services and/or Manager – Safety & Environmental Services will undertake regular inspections, internal audits and initiate directions identifying any remediation/rectification work required, and areas of actual or potential non-compliance.

As described in Section 15, Metropolitan Coal will notify the Secretary of the DP&E and any other relevant agencies of any incident associated with Metropolitan Coal as soon as practicable after Metropolitan Coal becomes aware of the incident. Within seven days of the date of the incident, Metropolitan Coal will provide the Secretary of the DP&E and any relevant agencies with a detailed report on the incident.

A review of Metropolitan Coal's compliance with all conditions of the Project Approval, mining leases and all other approvals and licences will be undertaken prior to (and included within) each Annual Review. The Annual Review will be made publicly available on the Peabody website.

Additionally, in accordance with Condition 8, Schedule 7 of the Project Approval, an independent environmental audit will be undertaken by the end of December 2011, and a minimum of once every three years thereafter. A copy of the audit report will be submitted to the Secretary of the DP&E and made publicly available on the Peabody website. The independent audit will be undertaken by an appropriately qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary of the DP&E.

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APPENDIX 1

LONGWALLS 301-303 BASELINE RECORD – ABORIGINAL HERITAGE SITES

niche
Environment and Heritage

Longwalls 301 to 303 Metropolitan Colliery

Baseline recording

Prepared for Metropolitan Coal Pty Ltd

4 August 2016

Document control

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Project office:	Illawarra- South Coast
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Project Manager:	Renée Regal
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Locations

Sydney

Central Coast

Illawarra

Armidale

Newcastle

Mudgee

Port Macquarie

Brisbane

Cairns

Cover photograph: unnamed tributary that feeds into the Woronora dam stored water, facing north towards FRC 325.

Executive summary

Project outline

This report presents the baseline recording of 14 Aboriginal heritage sites by Niche Environment and Heritage in July 2016 for Longwalls 301 to 303. These sites were previously considered in the Aboriginal Cultural Heritage Assessment prepared by Kayandel Archaeological Services to support the Metropolitan Coal Project Environmental Assessment. As required by the Metropolitan Coal Longwalls 23-27 Heritage Management Plan (and Condition 7, Schedule 3 of Project Approval [08_0149]), these sites have been subject to baseline recording prior to secondary extraction of Longwall 27 at the Metropolitan Colliery, located near Helensburgh, New South Wales.

Further baseline information such as additional photos, field notes and drawings is also kept in an electronic format by Metropolitan and Niche Environment and Heritage.

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1. Introduction

1.1 Background

Metropolitan Coal is a wholly owned subsidiary of Peabody Energy Australia Pty Ltd. The Metropolitan Coal Project (the Project) comprises the continuation, upgrade and extension of underground coal mining operations and surface facilities at Metropolitan Coal, near Helensburgh, New South Wales (NSW). Metropolitan Coal was granted approval for the Project under Section 75J of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 22 June 2009.

In accordance with Condition 7, Schedule 3 of Project Approval (08_0149), and as required by the approved Metropolitan Coal Longwalls 23-27 Heritage Management Plan, Metropolitan Coal is required to collect baseline data for future Extraction Plans.

Metropolitan Coal commissioned Niche Environment and Heritage Pty Ltd (Niche) to complete these works for the colliery. This report describes the methods and results of the baseline recording program that was undertaken on the 4, 6 and 13 July 2016 by Renée Regal (Senior Heritage Consultant), Caitlin Marsh (Archaeologist) and Luke Benbow (Archaeologist) of Niche. This report has been prepared by Renée Regal with the internal review being undertaken by Jamie Reeves (Senior Heritage Consultant/Director, Niche).

1.2 Project methods

An intensive pedestrian survey was undertaken to relocate known Aboriginal heritage sites requiring baseline recording for Longwalls 301-303. Once known sites were identified, they were checked against the original AHIMS site card details to confirm their accuracy, their current condition noted, photographed, together with any additional features and/or artefacts.

The methods undertaken for the baseline recording program were consistent with the requirements outlined in the Metropolitan Coal Longwalls 23-27 Heritage Management Plan, and were as follows:

- A photographic record of each of the Aboriginal heritage sites.
- Detailed scaled plans of each site including physical characteristics and features.
- Detailed information regarding the dimensions, composition and features of the site.

The baseline recording undertaken for Longwalls 301 to 303 included the use of the following methods:

- Shelter setting and context photography.
- Shelter and art panel panorama photography.
- Art panel detail off-set distance photography.
- Art panel key sketches and motif identification.
- Preparation of scale plans – sections and plans (multiple cross sections for complex sites).
- Shelter characteristic, features and monitoring points recording – position and detail photography.
- Post-processing including photo interpretation.
- Post-processing including compilation of site records.

1.3 Project outcomes and sites subject to baseline recording

The Aboriginal heritage sites subject to baseline recording for Longwalls 301-303 are presented in Table 1. All sites were relocated and subject to detailed baseline recording during this assessment.

Table 1: Sites subject to baseline recording for Longwalls 301-303.

Site name	AHIMS number	Site features	Archaeological significance[1]
Flat Rock Creek 70 (FRC 70)	52-2-0192	Shelter with art, artefacts and deposit	Moderate
Flat Rock Creek 71 (FRC 71)	52-2-3510	Shelter with art	Low
Flat Rock Creek 76 (FRC 76)	52-2-0887	Shelter with art	Low
Flat Rock Creek 77 (FRC 77)	52-2-0330 and 52-2-2886*	Shelter with art, artefacts and deposit	Low
Flat Rock Creek 78 (FRC 78)	52-2-0885	Shelter with art	Low
Flat Rock Creek 85 (FRC 85)	52-2-0883	Shelter with art, artefacts and deposit	Moderate
Flat Rock Creek 86 (FRC 86)	52-2-0207 and 52-2-0898*	Shelter with art	Low
Flat Rock Creek 87 (FRC 87)	52-2-0899	Shelter with art, artefacts and deposit	Low
Flat Rock Creek 90 (FRC 90)	52-2-0869	Shelter with artefacts and deposit	Low
Flat Rock Creek 91 (FRC 901	52-2-0870	Shelter with art, artefacts and deposit	Low
Flat Rock Creek 93 (FRC 93)	52-2-0346, 52-2-0198 and 52-2-0872*	Shelter with art	Low
Flat Rock Creek 309 (FRC 309)	52-2-2-3501	Shelter with and deposit	Low
Flat Rock Creek 310 (FRC 310)	52-2-3500	Shelter with art	Low
Flat Rock Creek 325 (FRC 325)	52-2-3466	Shelter with art	Low

* Single Aboriginal heritage site registered more than once on the AHIMS database (Illawarra Prehistory Group, 2007).

1. Sources include: Kayandel Archaeological Services (2006, 2007, 2008) and information available on NSW Office of Environment and Heritage AHIMS site cards.

AHIMS – Aboriginal Heritage Information Management System

Monitoring point photographs depicting the horizontal bedding planes, as well as natural weathering processes present within each shelter have also been taken for relevant sites. Copies of these photographs are held by the colliery as well as Niche and will be used in conjunction with the below report for the future monitoring of these sites.

The baseline records for each of the sites listed in Table 1 are presented in Section 2 of this report.

2. Archaeological site baseline recording

2.1 Flat Rock Creek 70 (FRC 70, AHIMS # 52-2-0192)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering. The original AHIMS site card describes a bipolar quartz flake (15 x 10 x 7 millimetres [mm]), located within the dripline of the shelter, however this artefact was not relocated during this baseline recording. The art located at this shelter is in very poor condition and heavily faded. The human full front figures originally identified by Sefton (during the initial recording of the site) could not be relocated during this baseline recording, and five of the charcoal indeterminate lines also could not be identified.

2.1.1 FRC 70 baseline recording data

Table 2: Baseline recording data for FRC 70.

Overview					
Site type	Shelter with art, artefacts and deposit	Corrected MGAE	311834	Corrected MGAN	6216331
Previous Recording	Site card – Caryll Sefton, Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	16.80m	Depth	4.9m	Height	4.2m
Orientation	283° West	Floor area	36 m^2	Floor condition	Good
Location in Landscape	5 ridge lines east off Waratah Rivulet.				
Shelter exterior/formation	Natural & chemical weathering.				
Shelter interior	There is a large termite hill at the southern end of the shelter, there has been no disturbance to the floor surface by animals.				
Distance to water	150m	Landform	Ridge		
Setting	Continuous ridgeline				
Archaeological Deposit					
Deposit	Yes	**Describe**	Sandy loam, approximately 45cm deep.		
Visible artefacts?	No[1]	Where?	Not relocated	How many?	Not relocated
Art					
Art surfaces	Heavily faded since last recorded, mineral loss and exfoliation quite severe around the panels – see photos. A number of the motifs are no longer identifiable as what they were previously recorded as for the site card.				
Art Condition	Very poor condition and heavily faded, could only be identified in certain light as a result.				
Art Overview	See motif sheet - 7 panels.				
Damage/threats					
Waterwash	Yes – not near art panel	**Graffiti**	Yes – not near art	**Macro vegetals**	No
Animals	Wombat	**Salt/granular loss**	Yes – chemical weathering eastern end	**Fissuring**	No
Insects	Yes – old wasp nest	**Spalling/exfoliation**	Yes – on art & panel 4 drawn in exfoliation	**Other**	Micro vegetal fungi located across the art panels
Fire	Yes – on exterior of shelter from bushfire	**Block fall**	In antiquity		

1. The original AHIMS site card identified one bipolar quartz flake.

Table 3: Baseline recording data for art surfaces present within FRC 70.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1					
1	Indeterminate	Lines	Ochre	Red	34 x 8cm
Panel 2[1]					
1	Indeterminate	Infill	Ochre/charcoal	White, black and red	98 x 28cm
2	Macropod[2]	Outline	Charcoal	Black	56 x 24cm
Panel 3					
1	Indeterminate	Lines	Charcoal	Black	40 x 34cm
2	Macropod	Outline	Charcoal	Black	57 x 58cm
3	Indeterminate	Lines	Charcoal	Black	17 x 18cm
Panel 4[5]					
1	Indeterminate	Lines	Charcoal	Black	23 x 14cm
Panel 5[3,6]					
1	Graffiti Indeterminate	Lines/words?	Charcoal	Black	150 x 27cm
Panel 6					
1	Indeterminate	Snake/eel?	Charcoal	Black	200 x 40cm
Panel 7[4]					
1	Indeterminate	Lines	Charcoal	Black	10 x 17cm
2	Indeterminate	Lines	Charcoal	Black	45 x 40cm

1. Natural exfoliation noted over panel.

2. Art observed to be very worn.

3. There was no clear picture taken of the graffiti lines at Panel 5, as they can only be seen in certain light and could not be picked up during the photography of the other art panels at this site.

4. The indeterminate charcoal drawings identified in Panel 7 could only be seen in certain light and could not be picked up during the photography of the art panels during this baseline recording.

5. Motif drawn in natural exfoliation.

6. The macropod from Panel 3 is visible to the left in Plate 10.

2.1.2 Baseline recording images – site overview

Plate 1: External context image of FRC 70. View north.

Plate 2: External context image of FRC 70. View south.

2.1.3 Baseline recording plans – site overview

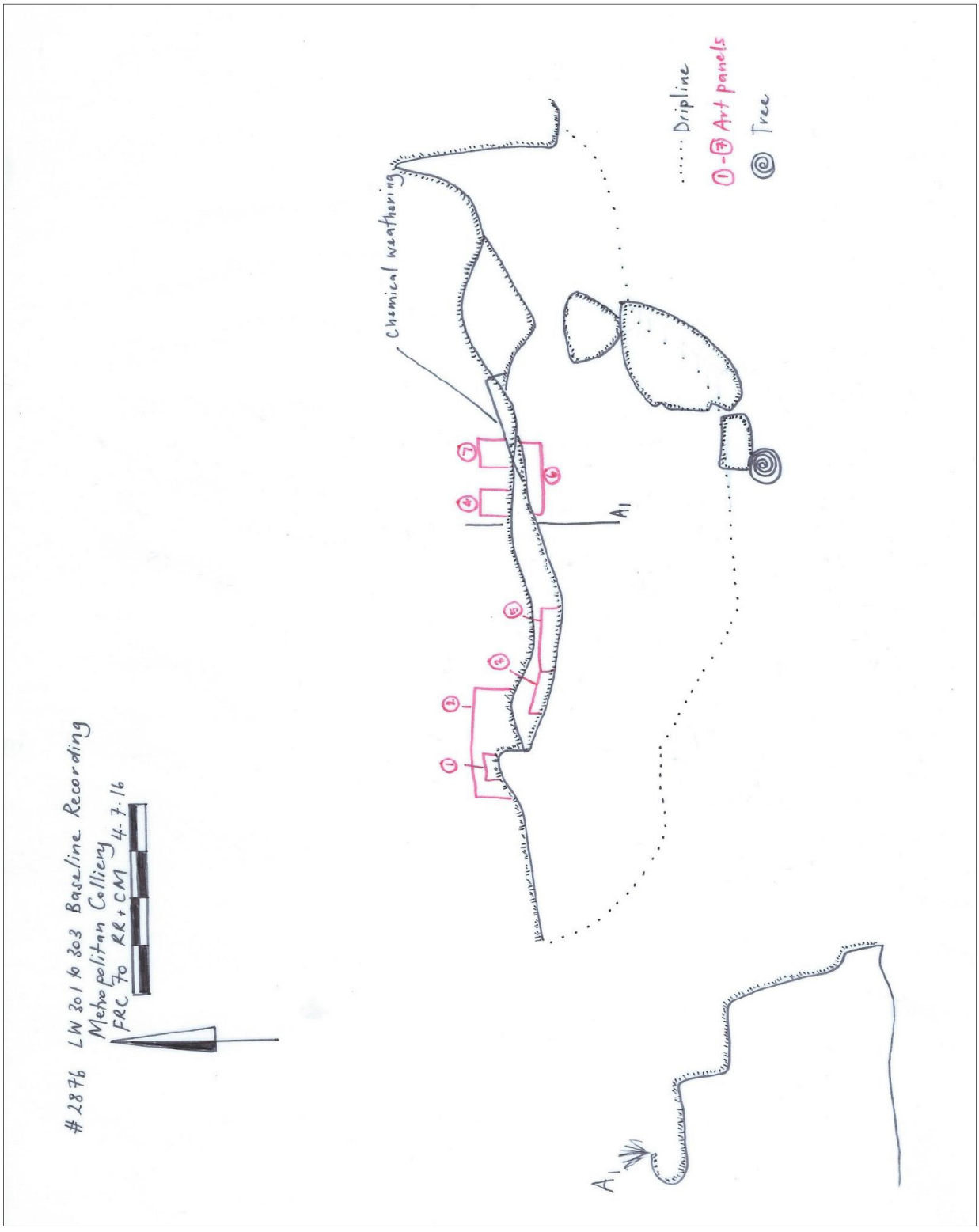

Figure 1: Plan and A1 Section of FRC 70.

2.1.4 Baseline recording images – detailed panel recording

Panel 1

Plate 3: FRC 70 Overview of Panel 1, view east.

Plate 4: FRC 70 Panel 1, Motif 1.

Panel 2

Plate 5: Overview of FRC 70 Panel 2. View east.

Plate 6: Image of FRC 70 Panel 2, Motif.

Plate 7: Image of FRC 70 Panel 2, Motif 2.

Panel 3

Plate 8: Overview of FRC 70 Panel 3, located below Panel 2. View east.

Panel 4

Plate 9: General photograph of FRC 70, Panel 4, Motif 1. View north east.

Panel 5

Plate 10: General photograph of graffiti at FRC70, Panel 5.

Panel 6

Plate 11: Overview of FRC 70 Panel 6, located below Panels 4 and 7. View north east.

2.2 Flat Rock Creek 71 (FRC 71, AHIMS# 52-2-3510)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering. The art located at this shelter is in very poor condition and heavily faded since being recorded by Sefton (during initial recording of the site). Only the macropod artwork could be relocated during this baseline recording, the charcoal indeterminate identified by Sefton could not be relocated as it has faded since the original AHIMS recording.

2.2.1 FRC 71 baseline recording data

Table 4: Baseline recording data for FRC 71.

Overview					
Site type	Shelter with art	Corrected MGAE	311888	Corrected MGAN	6126246
Previous Recording	Site card- Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	10m	Depth	4.8m	Height	4.2m
Orientation	176° SW	Floor area	38 m^2	Floor condition	Good
Location in Landscape	5 ridgelines east off Waratah Rivulet, the same ridgeline as FRC 70.				
Shelter exterior/formation	Cavernous weathering.				
Shelter interior	Moist, heavy microvegetal growth all over the ceiling and wall of the shelter.				
Distance to water	150m	Landform	Ridge		
Setting	Continuous ridgeline				
Archaeological Deposit					
Deposit	Yes	**Describe**	Brown loamy sand, approximately 50 cm deep.		
Visible artefacts?	n/a	Where?	n/a	How many?	n/a
Art					
Art surfaces	Lower half of a macropod, on the near wall. Below this graffiti that says '1938 FS'. To the left of this further graffiti that says 'J. Potter' all graffiti in charcoal.				
Art Condition	Poor condition				
Art Overview	1 motif, lower half of a macropod.				
Damage/threats					
Waterwash	No water flow, but very moist	**Graffiti**	Yes	**Macro vegetals**	Yes – in the floor
Animals	No	**Salt/granular loss**	Yes	**Fissuring**	Yes
Insects	No	**Spalling/exfoliation**	Yes – honey combing on the ceiling	**Other**	Mould/microvegetals along the ceiling and back wall
Fire	No	**Block fall**	Yes – at the east end		

Table 5: Baseline recording data for art surfaces present within FRC71.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1[1]					
1	Animal	Lower half of macropod	Charcoal outline	Black	-

Note: Measurements of this artwork were unable to be obtained during this baseline recording as the artwork is located high on the upper rear wall of the shelter.

1. Art observed to be very faded and in poor condition due to microvegtal growth within the shelter.

2.2.2 Baseline recording images – site overview

Plate 12: External vortex image of FRC 71. View west.

2.2.3 Baseline recording plans – site overview

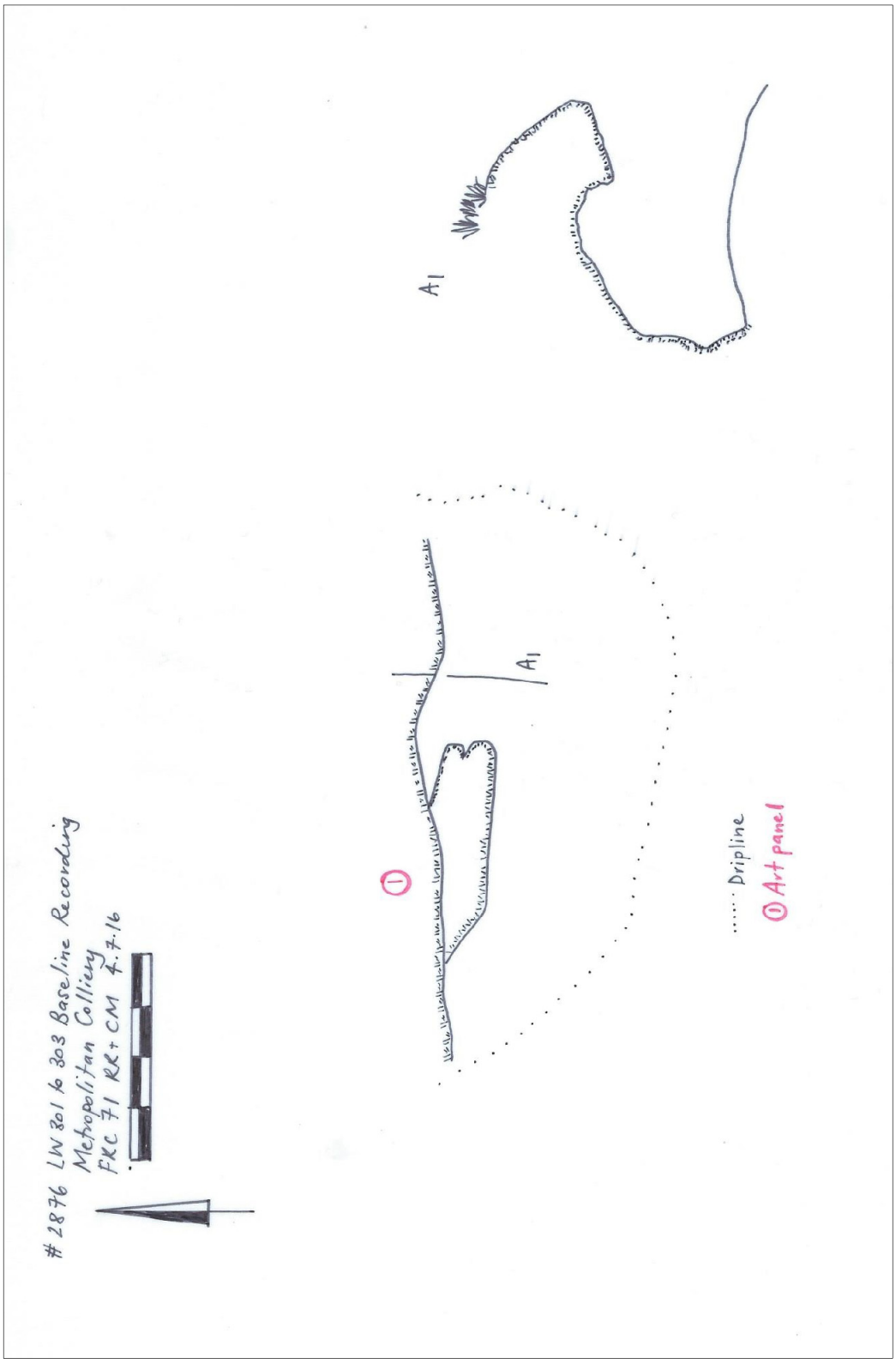

Figure 2: Plan and A1 Section of FRC 71.

2.2.4 Baseline recording images – detailed panel recording

Panel 1

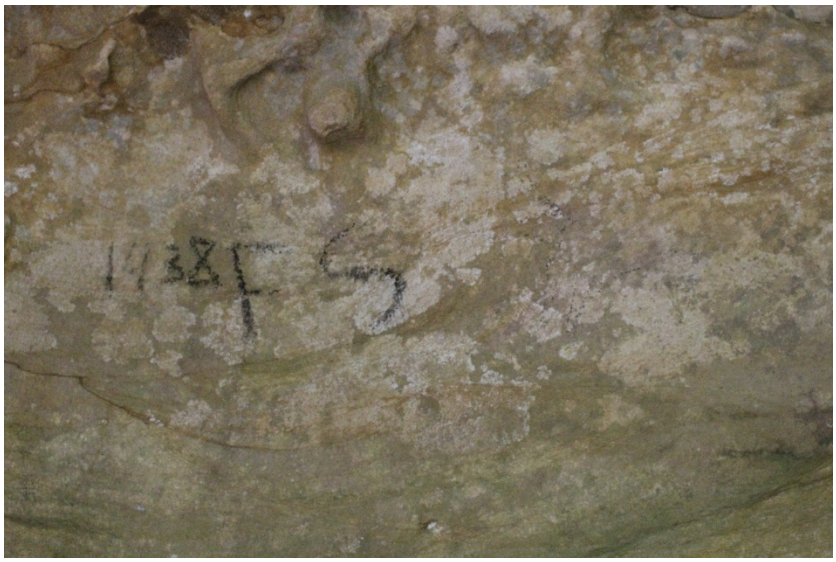

Plate 13: Overview of FRC 71 Panel 1, Motif 1 to the left of the graffiti.

2.3 Flat Rock Creek 76 (FRC 76, AHIMS# 52-2-0887)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall. The art located at Panels 1 through to 5 at this shelter is in very poor condition and heavily faded, due to water wash and macrovegetal growth occurring along the shelters horizontal bedding planes. Eight of the previously identified charcoal indeterminates (during initial site recording) could not be relocated during this assessment due to water wash and fading.

2.3.1 FRC 76 baseline recording data

Table 6: Baseline recording data for FRC 76.

Overview					
Site type	Shelter with art	Corrected MGAE	312415	Corrected MGAN	6216583
Previous Recording	Site card – Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	35m	Depth	4.6m	Height	3m
Orientation	270° West	Floor area	Very limited-6m^2	Floor condition	Poor
Location in Landscape	50m off the Princes Highway.				
Shelter exterior/formation	Cavernous weathering and block fall in antiquity.				
Shelter interior	Very wet with a lot of microvegetal growth.				
Distance to water	400m east of Rivulet	Landform	Ridgeline		
Setting	Continuous ridgeline				
Archaeological Deposit					
Deposit	No	**Describe**	No		
Visible artefacts?	No	**Where?**	No	**How many?**	No
Art					
Art surfaces	Six panels of art, all in poor condition except for the macropods on panel 6 - see motif sheet. Heavy microvegetal growth and water wash over art surfaces.				
Art Condition	Excellent condition 3 macropods and indeterminate lines at panel 6. The remaining 5 panels poor condition.				
Art Overview	Generally poor condition.				
Damage/threats					
Waterwash	Yes – lots of seepage to the north-east of the panel	**Graffiti**	No	**Macro vegetals**	Yes – microvegetals, very damp
Animals	No	**Salt/granular loss**	Yes	**Fissuring**	No
Insects	No	**Spalling/exfoliation**	Yes	**Other**	No
Fire	Yes – on the roof above panel 1	**Block fall**	Yes – in antiquity		

Table 7: Baseline recording data for art surfaces present within FRC 76.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1					
1	Animal	Outline macropod	Charcoal	Black	60 x 15cm
2[1]	Indeterminate	Infill	Charcoal	Black	30 x 20cm
3[1]	Indeterminate	Infill	Charcoal	Black	40 x 20cm
Panel 2[2]					
1	Seed	Outline	Charcoal	Red	10 x 3cm
2	Seed	Outline	Charcoal	Black	11 x 3cm
3	Seed	Outline	Charcoal	Black	10 x 3cm
4	Seed	Outline	Charcoal	Black	8 x 3cm
5	Seed	Outline	Charcoal	Black	11 x 3cm
6	Seed	Outline	Charcoal	Black	8 x 3cm
7[3]	Seed	Outline/infill	Charcoal/red ochre infill	Black/red	10 x 3cm
Panel 3					
1	Indeterminate	Outline	Charcoal	Black	40 x 20cm
2[1]	Indeterminate	Infill	Charcoal	Black	25 x 30cm
3[1]	Indeterminate	Infill	Charcoal	Black	30 x 20cm
Panel 4					
1[4]	Goanna (bottom half)	Outline	Charcoal	Black	30 x 30cm
Panel 5[5]					
1	Indeterminate	Lines	Charcoal	Black	45 x 30cm
Panel 6[6]					
1	Macropod	Infill	Charcoal	Black	130 x 90cm
2	Macropod	Infill	Charcoal	Black	50 x 20cm
3	Partial human?	Outline	Charcoal	Black	40 x 25cm
4	Macropod	Outline – not aboriginal?	Charcoal	Black	100 x 50cm
5	Macropod	Outline – not aboriginal?	Charcoal	Black	60 x 30cm

1. Due to the poor condition of the artworks, representative photographs were unable to be obtained for this motif.
2. Natural fissuring was observed to be present due to water seepage on the panel. Refer to Plate 17.
3. Red ochre infill was observed for motif 7. Refer to Plate 18.
4. Refer to Figure 3 for location. The goanna is difficult to see in the photograph due to sunlight at time of baseline recording.
5. Note the Natural seepage and mineral loss was observed over the panel.
6. Natural seepage at the bedding planes between the panel and floor were observed. Fire damage was present all along the ceiling of the shelter.

2.3.2 Baseline recording images – site overview

Plate 14: External context image of FRC 76. View south west.

Plate 15: External context image of FRC 76. View north east. Note the location of Panel 6, Motif 1 and 2.

2.3.3 Baseline recording plans – site overview

Figure 3: Plan and A1 Section of FRC 76.

2.3.4 Baseline recording images – detailed panel recording

Panel 1

Plate 16: Overview of FRC 76 Panel 1, Motif 1.

Panel 2

Plate 17: Overview of FRC 76 Panel 2, Motifs 1-7.

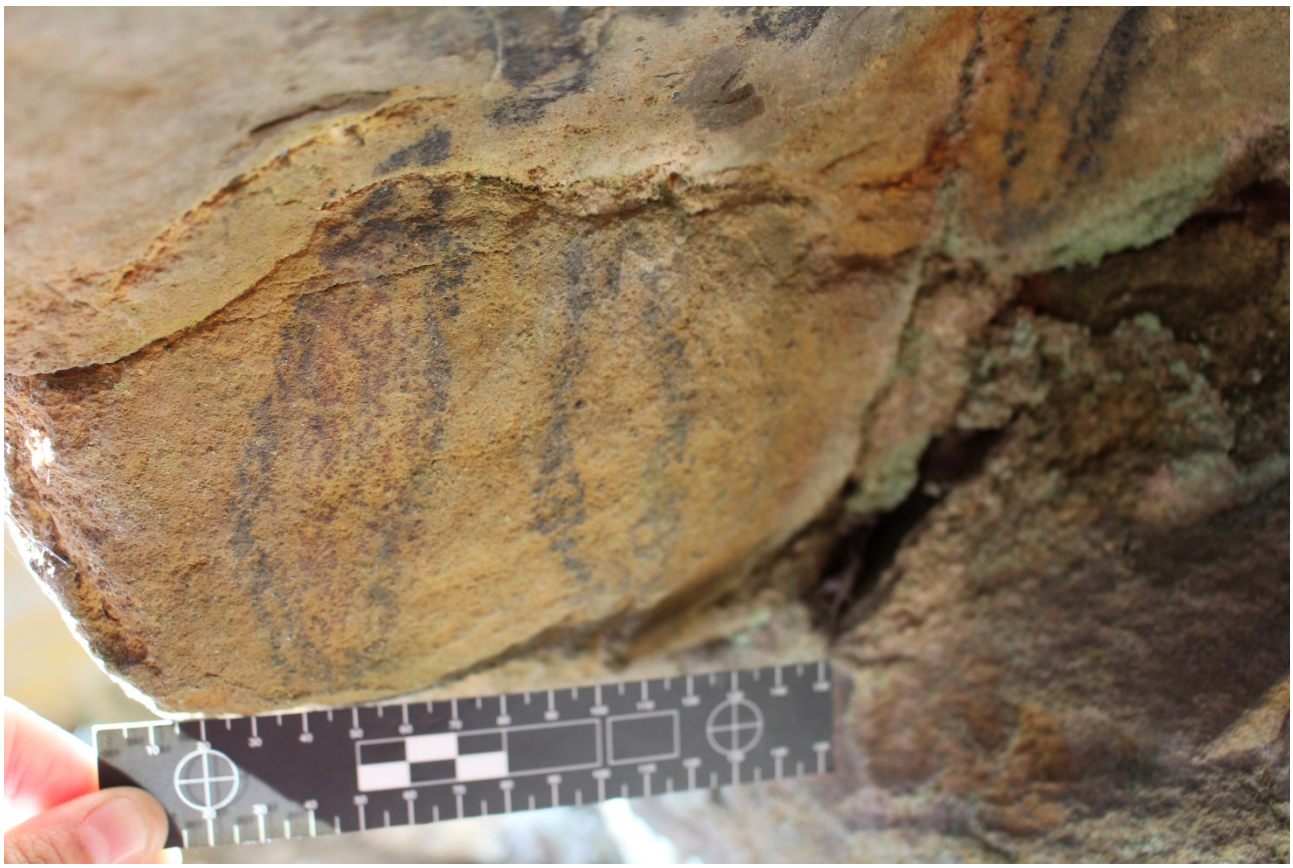

Plate 18: FRC 76 Panel 2, Motifs 6 and 7.

Panel 3

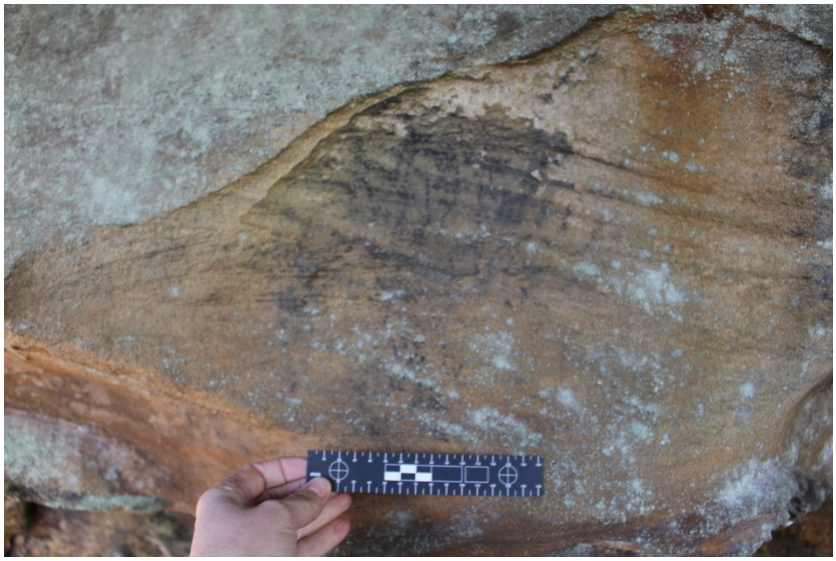

Plate 19: FRC 76 Panel 3, Motif 1. View east.

Panel 4

Plate 20: Site FRC 76 Panel 4 general location.

Panel 5

Plate 21: FRC 76 Panel 5, Motif 1. View east.

Panel 6

Plate 22: FRC 76 Panel 6 Motifs 1, 2, 3 4 and 5.

2.4 Flat Rock Creek 77 (FRC 77, AHIMS# 52-2-0330 and 52-2-0886)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The art located at this shelter is in very poor condition and heavily faded since being recorded by Sefton (during initial recording of the site). The original AHIMS site card discusses two quartz flakes (one white quartz bipolar flake [25 x 20 x 4 mm] and one grey quartz flake [28 x 12 x 6 mm]) being present within the dripline of the shelter, these artefacts could not be relocated during this baseline recording.

2.4.1 FRC 77 Baseline recording data

Table 8: baseline recording data for FRC 77.

Overview					
Site type	Shelter with art, artefacts and deposit	Corrected MGAE	312390	Corrected MGAN	6216910
Previous Recording	Site card- Caryll Sefton, Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	11m	Depth	2.4m	Height	1.8m
Orientation	340° NNW	Floor area	6 m^2	Floor condition	Poor/moderate (modern charcoal)
Location in Landscape	4 ridgelines east of the Waratah Rivulet on a continuous ridge.				
Shelter exterior/formation	Cavernous weathering and block fall in antiquity.[3]				
Shelter interior	In poor condition due to recent bush fire.[2]				
Distance to water	10m to tributary	Landform	Ridge		
Setting	Continuous ridgeline				
Archaeological Deposit					
Deposit	Yes	**Describe**	Recent charcoal on top of a brown loamy sand, that is approximately 25cm deep.		
Visible artefacts?	No[1]	Where?	Not relocated	How many?	Not relocated
Art					
Art surfaces	Weathering has resulted in significant fading in the artwork.				
Art Condition	Salt leaching observed through motif 1 in Panel 1.				
Art Overview	Panel 1 - Motif 1 Kangaroo (Macropod) top half fading away, bottom still visible. Panel 2 - Motif 1 indeterminate line below, almost faded away.				
Damage/threats					
Waterwash	Yes	**Graffiti**	No	**Macro vegetals**	No
Animals	No	**Salt/granular loss**	Yes	**Fissuring**	Yes – one to the right of panel 1
Insects	Yes – spiders	**Spalling/exfoliation**	Yesmore exfoliation than spalling	**Other**	Mould in horizontal bedding planes
Fire	Yes – recent and older	**Block fall**	Yes – in antiquity		

1. The original AHIMS site card identified two quartz flakes.
2. Fire damage was observed on ceiling. Refer to plate 23.
3. Block fall can be seen in Plate 24.

Table 9: Baseline recording data for art surfaces present within FRC 77.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1[1]					
1	Animal	Macropod	Charcoal	Black	40 x 30cm
Panel 2					
1[2]	Indeterminate	Line (curved)	Charcoal	Black	40 x 30cm

1. Natural fissure to right of art panel shown in Plate 25.
2. Heavily faded due to natural weathering at the shelter.

2.4.2 Baseline recording images – site overview

Plate 23: Context image of shelter FRC 77. View east.

Plate 24: Context image of shelter FRC 77. View west.

2.4.3 Baseline recording plans – site overview

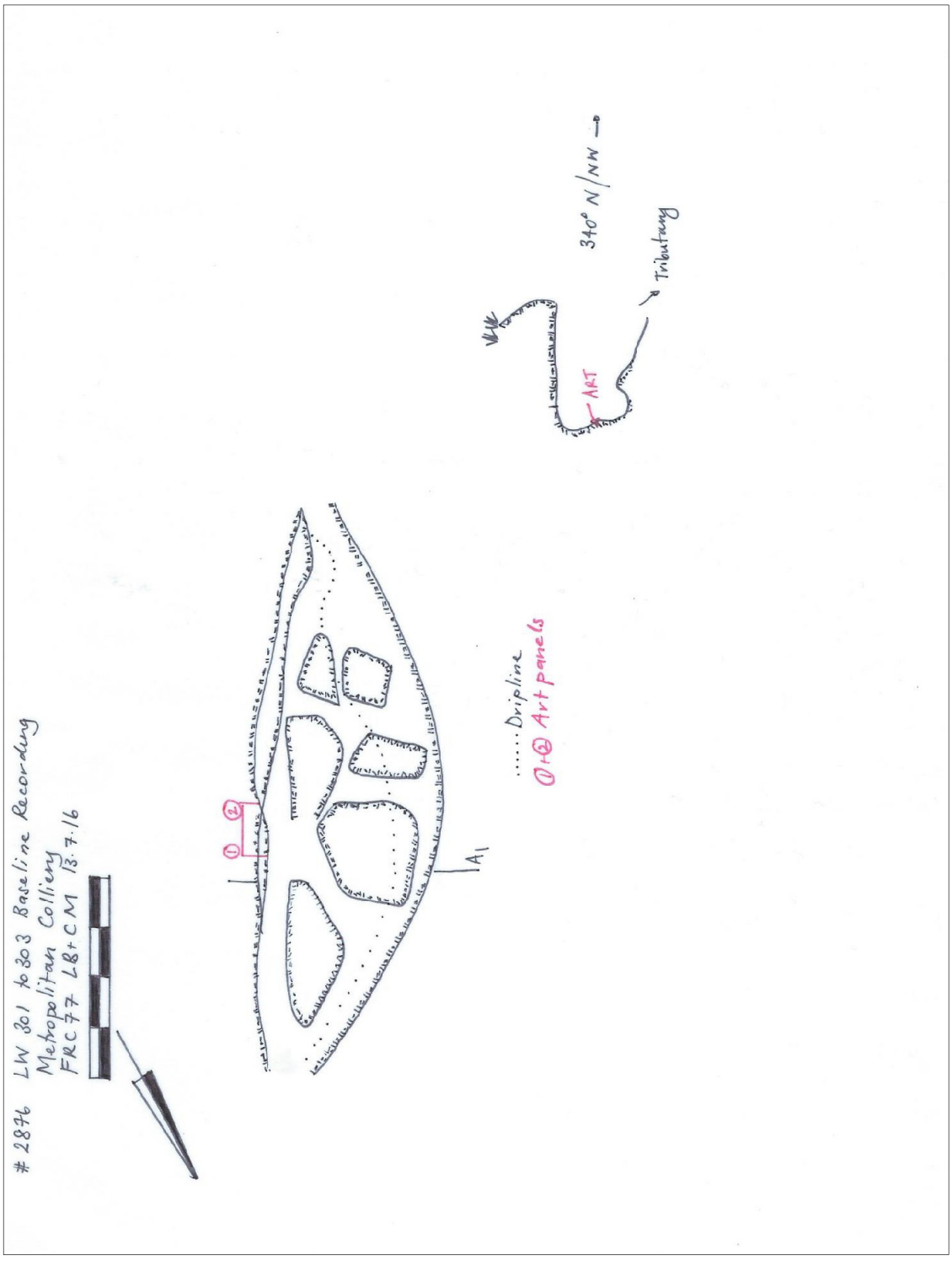

Figure 4: Plan and A1 Section of FRC 77.

2.4.4 Baseline recording images – detailed panel recording

Panel 1

Plate 25: FRC 77 Panel 1, Motif 1. View east.

Panel 2

Plate 26: FRC 77 Panel 2, Motif 1. View east.

2.5 Flat Rock Creek 78 (FRC 78, AHIMS# 52-2-0885)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The art located at this shelter is in very poor condition, and was observed to be heavily faded and covered in mould since being initially recorded by Sefton. The art has had some case hardening occur over the panels which has saved some sections from fading.

2.5.5 FRC 78 baseline recording data

Table 10: Baseline recording data for FRC 78.

Overview					
Site type	Shelter with art	Corrected MGAE	312380	Corrected MGAN	6216915
Previous Recording	Site card- Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	12m	Depth	4.2m	Height	2.6m
Orientation	340° NNW	Floor area	9 m^2	Floor condition	Fair/good
Location in Landscape	Below FRC 77 on the next ridgeline.				
Shelter exterior/formation	Cavernous weathering and block fall in antiquity.				
Shelter interior	Extensive water wash towards the eastern end.[1]				
Distance to water	10m to tributary	Landform	Ridge		
Setting	Isolated – directly below FRC 77				
Archaeological Deposit					
Deposit	Yes	**Describe**	Orange sand on top of a sandstone shelf		
Visible artefacts?	No	Where?	n/a	How many?	n/a
Art					
Art surfaces	Panel 1 – mould, dust cover and exfoliation. Granular salt leaching from above. Panel 2 – mould causing fading. Panel 3 – fair condition, exfoliation towards eastern end and mould on the lip at the bottom. Panel 4 – faded with mould cover.				
Art Condition	Moderate/fair				
Art Overview	1 large macropod, 2 smaller macropods or echidna?, 2 indeterminate with lines.				
Damage/threats					
Waterwash	Yes	**Graffiti**	No	**Macro vegetals**	No
Animals	No	**Salt/granular loss**	Yes	**Fissuring**	No
Insects	Yes - spiders	**Spalling/exfoliation**	Yes - exfoliation	**Other**	Microvegetation all over the shelter
Fire	No	**Block fall**	Yes		

1. Extensive water wash/seepage and mineral loss from ceiling visible in Plate 27.

Table 11: Baseline recording data for art surfaces present within FRC 78.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1[1]					
1	Animal	Large macropod	Charcoal	Black	110 x 60cm
Panel 2					
1	Animal	Large macropod (very blurry)	Charcoal	Black	40 x 50cm
Panel 3[2]					
1	Animal	Macropod or echidna?	Charcoal	Black	45 x 25cm
2	Indeterminate	Lines vertical	Charcoal	Black	20 x 90cm
3[1]	Indeterminate (not previously recorded)	Lines	Charcoal	Black	15 x 30cm
Panel 4					
1	Indeterminate	Lines horizontal	Charcoal	Black	20 x 90cm

1. Due to the poor condition of this artwork, representative photographs were unable to be obtained for this motif.
2. Water wash is visible to the left of the panel in Plate 32.

2.5.6 Baseline recording images – site overview

Plate 27: External context image of shelter site FRC78. View east.

Plate 28: External context image of shelter site FRC78. View west.

2.5.7 Baseline recording plans – site overview

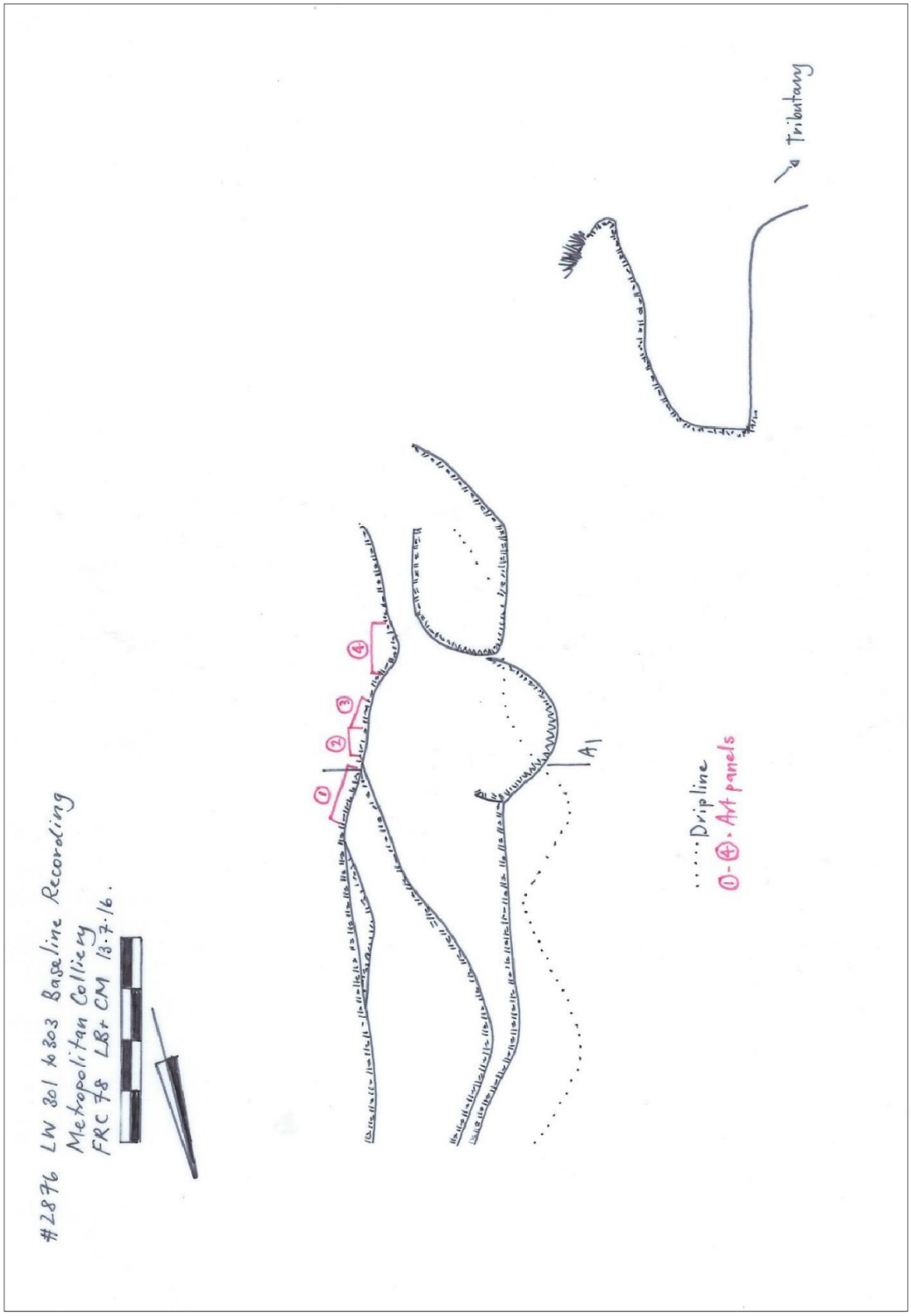

Figure 5: Plan and A1 Section of FRC 78.

2.5.8 Baseline recording images – detailed panel recording

Panel 2

Plate 29: Overview of FRC 78 Panel 2, Motif 1.

Plate 30: FRC 78 Panel 2, Motif 1.

Panel 3

Plate 31: Overview of FRC 78, Panel 3, Motif 1.

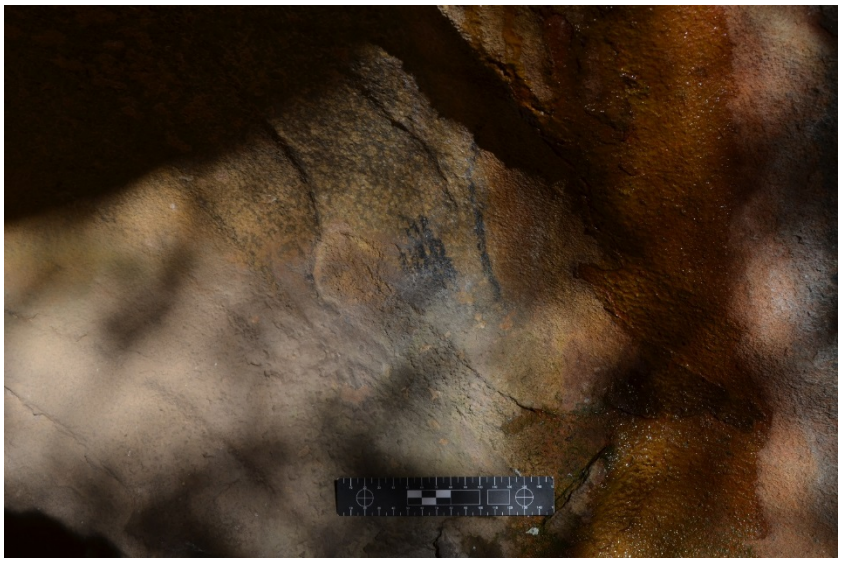

Plate 32: FRC 78, Panel 3, Motif 2. Note the water wash to the left of the art panel.

Panel 4

Plate 33: Overview of FRC 78, Panel 4, Motif 1.

Plate 34: FRC 78, Panel 4, Motif 1.

2.6 Flat Rock Creek 85 (FRC 85, AHIMS # 52-2-0883)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The art located at this shelter is in very poor condition, heavily faded and covered in macro vegetals growing out of the horizontal bedding plans above the art panels since being recorded by Sefton (during the initial site recording). The six fish and bird motifs described by Sefton in the AHIMS site card have been heavily eroded by natural weathering processes and are no longer visible. All of the eight artefacts (3 quartz artefacts and 5 chert artefacts) described in the AHIMS recording were relocated within the shelter dripline during this assessment (Figure 6, Plate 51). The artefacts included the following:

- One black chert bipolar flake (30 x 12 x 12 mm).
- One black chert bipolar core (35 x 31 x 12 mm).
- One red brown chert flake (24 x 15 x 5 mm) with use wear/retouch.
- One buff chert bipolar core (35 x 17 x 6 mm) with use wear/retouch.
- One black chert flake (22 x 15 x 12mm).
- One white quartz flake (22 x 12 x 8 mm).
- One black chert flake (15 x 10 x 10mm).

2.6.9 FRC 85 baseline recording data

Table 12: Baseline recording data for FRC 85.

Overview					
Site type	Shelter with art, artefacts and deposit	Corrected MGAE	312466	Corrected MGAN	6217360
Previous Recording	Site card – Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	10m	Depth	3.2m	Height	5.5m
Orientation	233° South-west	Floor area	$10m^2$	Floor condition	Very poor, covered in glass and ceramic
Location in Landscape	First ridgeline off Fire Road 9I.				
Shelter exterior/formation	Cavernous weathering and block fall in antiquity.				
Shelter interior	Very heavily weathered. Shelter has been used at some stage in the past. Broken glass and ceramic with dates. Brown beer bottles 1946 and broken ceramic plate with stamp (Grindley England – Mercules Vitrified 1936 to 1954).				
Distance to water	Less than 100m north of the unnamed tributary off the Waratah Rivulet.	Landform	Ridgeline		
Setting	Continuous ridgeline				
Archaeological Deposit					
Deposit	Yes – very thin soil profile	**Describe**	Heavily disturbed orange loamy sand due to being used in the recent past.		
Visible artefacts?	Yes	Where?	Dripline at around the 6m mark.	How many?	All artefacts listed on the site card (8).
Art					
Art surfaces	Charcoal outlines and infill drawings.				
Art Condition	Very poor condition. Heavily eroded, exfoliating and being effected by water wash.				
Art Overview	Panel 1 – Motif 1 large infill macropod, Motif 2 indeterminate charcoal line. Panel 2 – Motif 1 charcoal infill macropod, back legs and tail only remaining. Motifs 2 to 4 human and Motif 5 one charcoal infill indeterminate. Panel 3 – Motif 1, 13 indeterminate charcoal lines. Panel 4 – Motif 1, 3 indeterminate charcoal lines. Panel 5 – Motif 1charcoal bandicoot outline.				
Damage/threats					
Waterwash	Yes – heavy water wash over art surfaces	**Graffiti**	No	**Macro vegetals**	Yes
Animals	No	**Salt/granular loss**	Yes – heavily deteriorating	**Fissuring**	No
Insects	Yes - spiders	**Spalling/exfoliation**	Yes – heavily	**Other**	

Damage/threats (continued)					
Fire	Yes – In the past exfoliation due to fire	**Block fall**	Yes – in antiquity		

Table 13: Baseline recording data for art surfaces present within FRC 85.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1					
1	Infill animal	Back of macropod	Charcoal infill	Black	Too high to measure
2[1]	Indeterminate	Line	Charcoal	Black	
Panel 2[2]					
1	Infill animal	Back of macropod	Charcoal Infill	Black	
2	Outline frontal human	Outline	Charcoal	Black	
3	Outline infill human side on	Charcoal infill	Charcoal	Black	
4	Charcoal outline human	Outline	Charcoal	Black	
5[3]	Indeterminate	Charcoal infill	Charcoal	Black	
Panel 3[4]					
1	Indeterminate	Lines x 13	Charcoal	Black	
Panel 4					
1	Indeterminate	Lines x 3	Charcoal	Black	
Panel 5					
1	Bandicoot	Outline	Charcoal	Black	

1. Due to the poor condition of this artwork representative photographs were unable to be obtained for this motif.

2. Heavily mineral leeching, natural exfoliation and macrovegetal growth was observed out of the shelters natural bedding planes, and is visible in Plate 38.

3. Natural water wash and macrovegetal growth observed out of the shelters natural bedding planes and is visible in Plate 40.

4. Note the natural exfoliation across and below the art panel.

2.6.10 Baseline recording images – site overview

Plate 35: Overview of the exterior of FRC 86. View south.

Plate 36: Overview of the exterior of FRC 85. View north.

2.6.11 Baseline recording plans – site overview

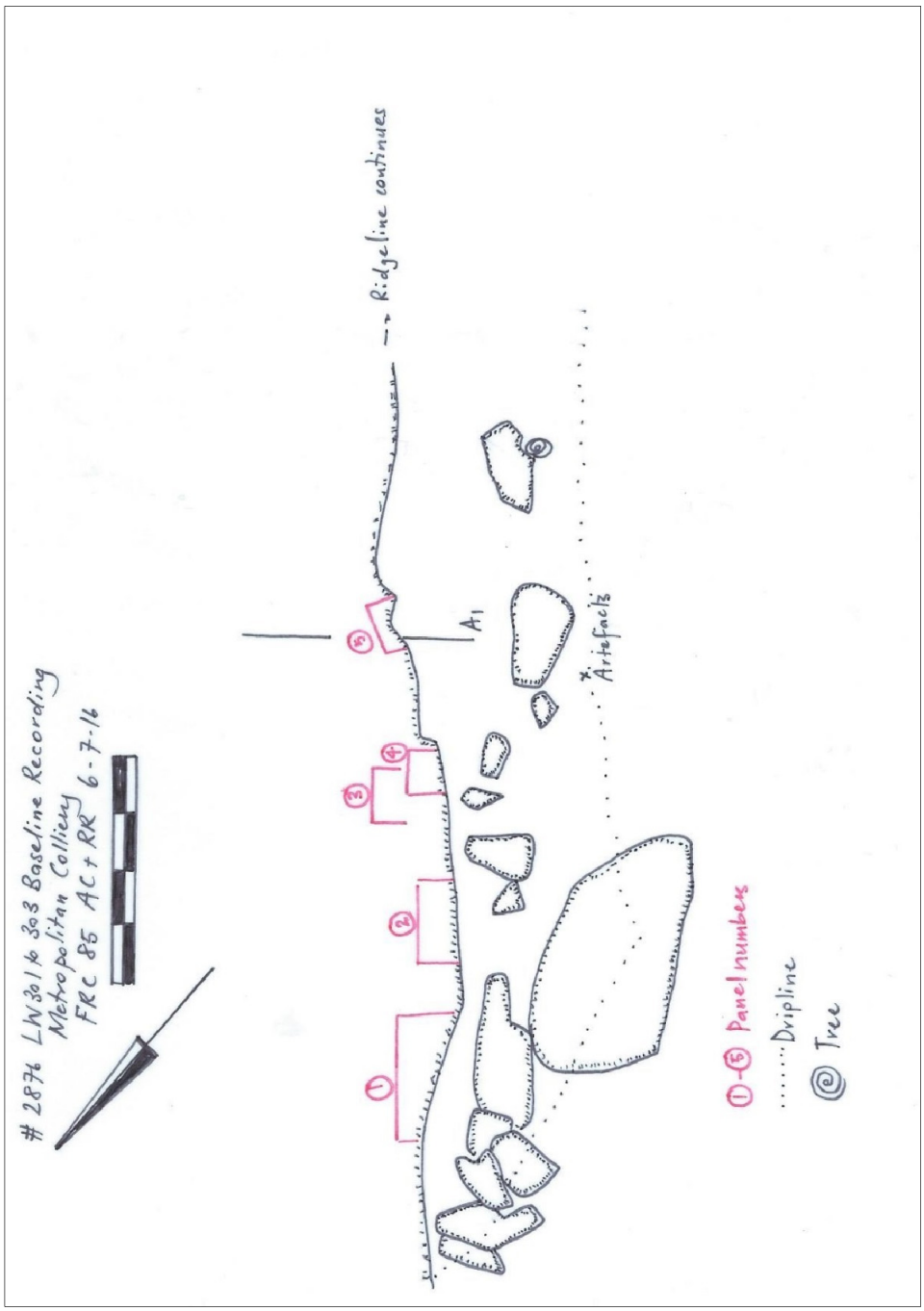

Figure 6: Plan of FRC 85.

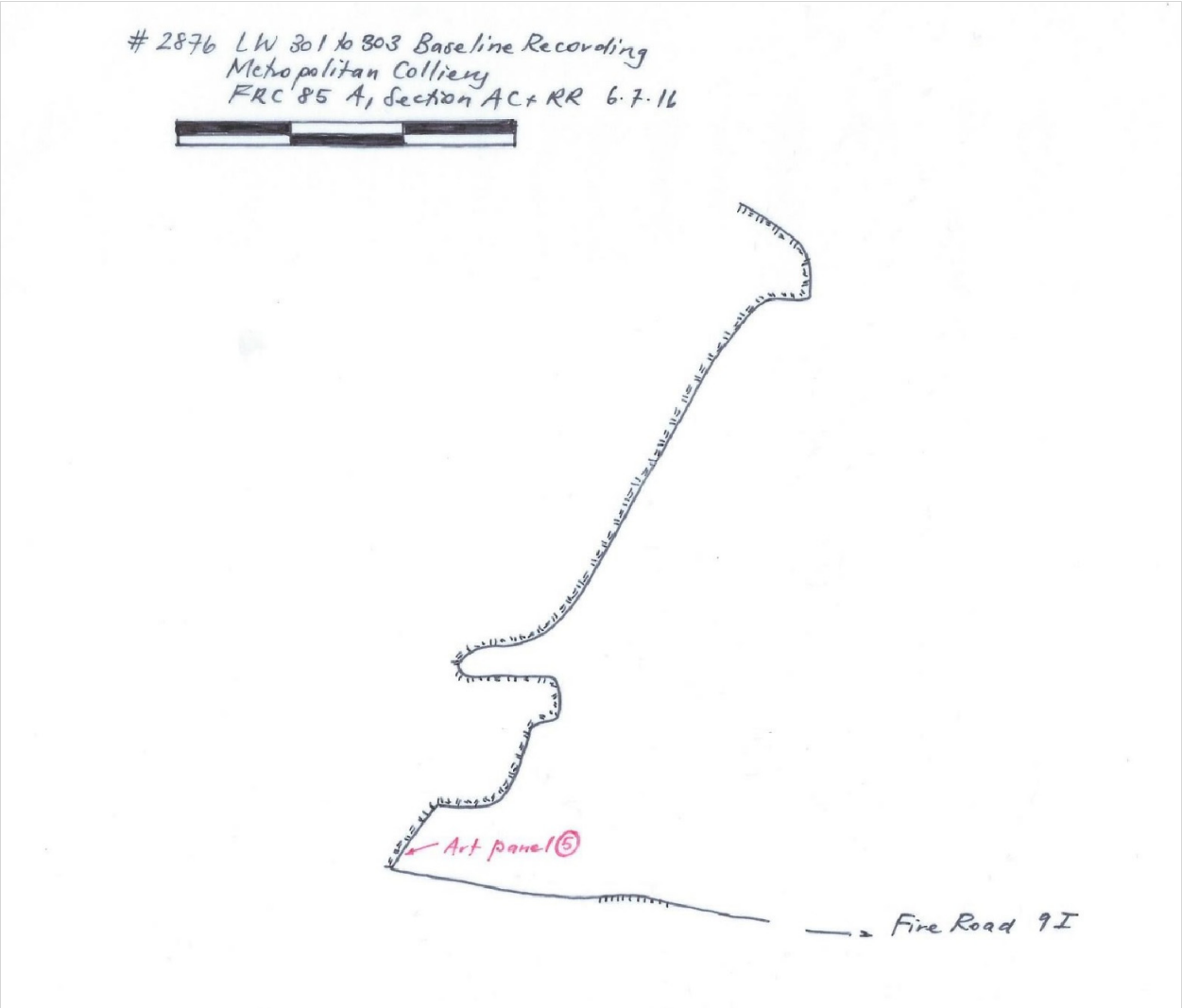

Figure 7: A1 Section of FRC 85.

2.6.12 Baseline recording images – detailed panel recording

Panel 1

Plate 37: Overview of FRC 85 Panel 1, Motif 1, northern end of the shelter.

Panel 2

Plate 38: Overview of FRC 85, Panel 2. View east west.

Plate 39: Overview of FRC 85, Panel 2, Motifs 2, 3 and 4.

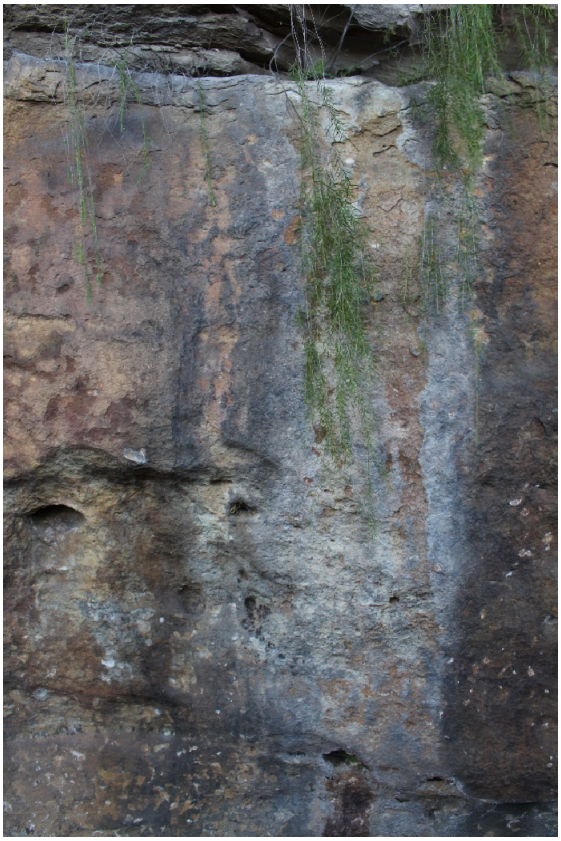

Plate 40: Overview of FRC 85, Panel 2, Motif 5.

Panel 3

Plate 41: FRC 85, Panel 3, Motif 1.

Panel 4

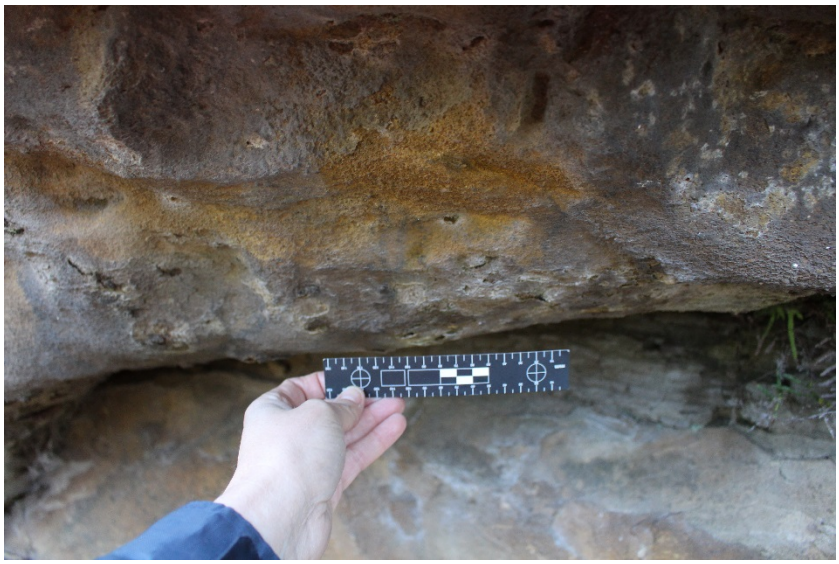

Plate 42: Overview of FRC 85, Panel 4, Motif 1.

Panel 5

Plate 43: FRC 85, Panel 5, Motif 1.

2.6.13 Artefacts- Aboriginal and European

Plate 44: Image of Aboriginal artefacts located in the dripline of FRC 85.

2.7 Flat Rock Creek 86 (FRC 86, AHIMS# 52-2-0207 and 52-2-0898)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The art located at this shelter is in very poor condition and heavily faded since being recorded by Sefton (during the initial site recording).

2.7.1 FRC 86 baseline recording data

Table 14: Baseline recording data for FRC 86.

Overview					
Site type	Shelter with art	Corrected MGAE	312500	Corrected MGAN	6217130
Previous Recording	Site Card- Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	7m	Depth	2m	Height	1.6m
Orientation	248° SW	Floor area	4m²	Floor condition	Moderate to fair
Location in Landscape	Ridgeline				
Shelter exterior/formation	Cavernous weathering and block fall in antiquity.				
Shelter interion	Moss visible on some rock surfaces.				
Distance to water	300m	Landform	Hill/Ridgeline		
Setting	Isolated rock outcrop				
Archaeological Deposit					
Deposit	Yes	**Describe**	Sandy loam (deposit approximately 20cm deep).		
Visible artefacts?	No	Where?	n/a	How many?	n/a
Art					
Art Surfaces	Panel 1 – towards north west side of shelter (1 x motif). Panel 2 – towards south east side of shelter (1 x motif).				
Art Condition	Poor condition.				
Art Overview	2 x panels (1 motif in each). Both indeterminate charcoal drawings in poor condition.				
Damage/threats					
Waterwash	No	**Graffiti**	No	**Macro vegetals**	No
Animals	Yes	**Salt/granular loss**	No	**Fissuring**	Yes
Insects	Yes	**Spalling/exfoliation**	Yes- in the ceiling of the shelter	**Other**	Moss visible on some rock surfaces
Fire	No	**Block fall**	Yes		

Table 15: Baseline recording data for art surfaces present within FRC 86.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1					
1	Indeterminate	Indeterminate	Charcoal	Black	50 x 40cm
Panel 2					
2	Indeterminate	Indeterminate	Charcoal	Black	50 x 40cm

2.7.2 Baseline recording images – site overview

Plate 45: Overview of shelter FRC 86. View north west.

2.7.3 Baseline recording plans – site overview

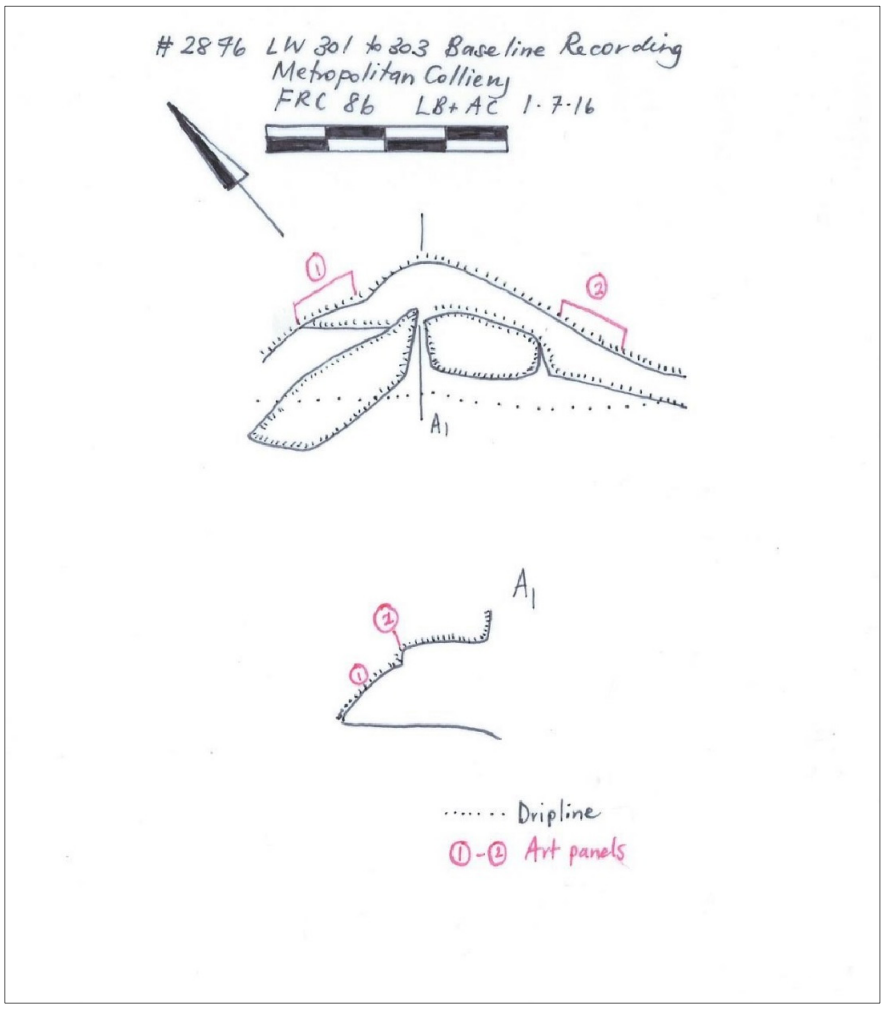

Figure 8: Plan and A1 Section of FRC 86.

2.7.4 Baseline recording images – detailed recording

Panel 1

Plate 46: FRC 86, Panel 1, Motif 1.

Panel 2

Plate 47: FRC 86, Panel 2, Motif 1.

2.8 Flat Rock Creek 87 (FRC 87, AHIMS# 52-2-0899)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The art motifs that were recorded by Sefton during the initial site recording (including two charcoal birds, seven indeterminate charcoal lines and a macropod) are no longer present at the shelter, they have completely faded off. The grey-green chert flake (32 x 12 x 6 mm) and pink quartzite flake (25 x 14 x 5 mm) listed on the original AHIMS site recording could also not be relocated during this baseline recording.

2.8.5 FRC 87 baseline recording data

Table 16: Baseline recording data for FRC 87.

Overview					
Site type	Shelter with art, artefacts and deposit	Corrected MGAE	312220	Corrected MGAN	6217355
Previous Recording	Site card – Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	11m	Depth	4m	Height	3.2m
Orientation	340° NW	Floor area	1m²	Floor condition	Sandstone in poor to moderate condition Broken bottles present.
Location in Landscape	Just off Fire Road 9I.				
Shelter exterior/formation	Cavernous weathering and block fall in antiquity.				
Shelter interior	Large rocks visible at eastern end.				
Distance to water	10m to unnamed tributary 300m to Rivulet	Landform	Continuous ridgeline		
Setting	Cliff				
Archaeological Deposit					
Deposit	Yes	**Describe**	Small orange deposit on top of sandstone – majority covered in leaf litter.		
Visible artefacts?	No[1]	Where?	No	How many?	No
Art					
Art Surfaces	All traces of art gone. The surfaces are covered in mould and blackening from old fires that have obscured/worn away and Caryll Sefton and the Illawarra Prehistory Group note that the site was heavily worn in 2005.				
Art Condition	No longer visible.				
Art Overview	No longer visible.				
Damage/threats					
Waterwash	Yes	**Graffiti**	No	**Macro vegetals**	In floor
Animals	Yes – wombat footprints	**Salt/granular loss**	Yes	**Fissuring**	No
Insects	Spiders	**Spalling/exfoliation**	Yes – spalling and exfoliation	**Other**	Moss/mould everywhere
Fire	Yes – black surface	**Block fall**	Yes – in antiquity		

1. The original AHIMS site card identified one grey-green chert flake and one pink quartzite flake.

2.8.6 Baseline recording images – site overview

Plate 48: General photograph of FRC 87. View west.

Plate 49: General photograph of FRC 87. View east.

2.8.7 Baseline recording plans – site overview

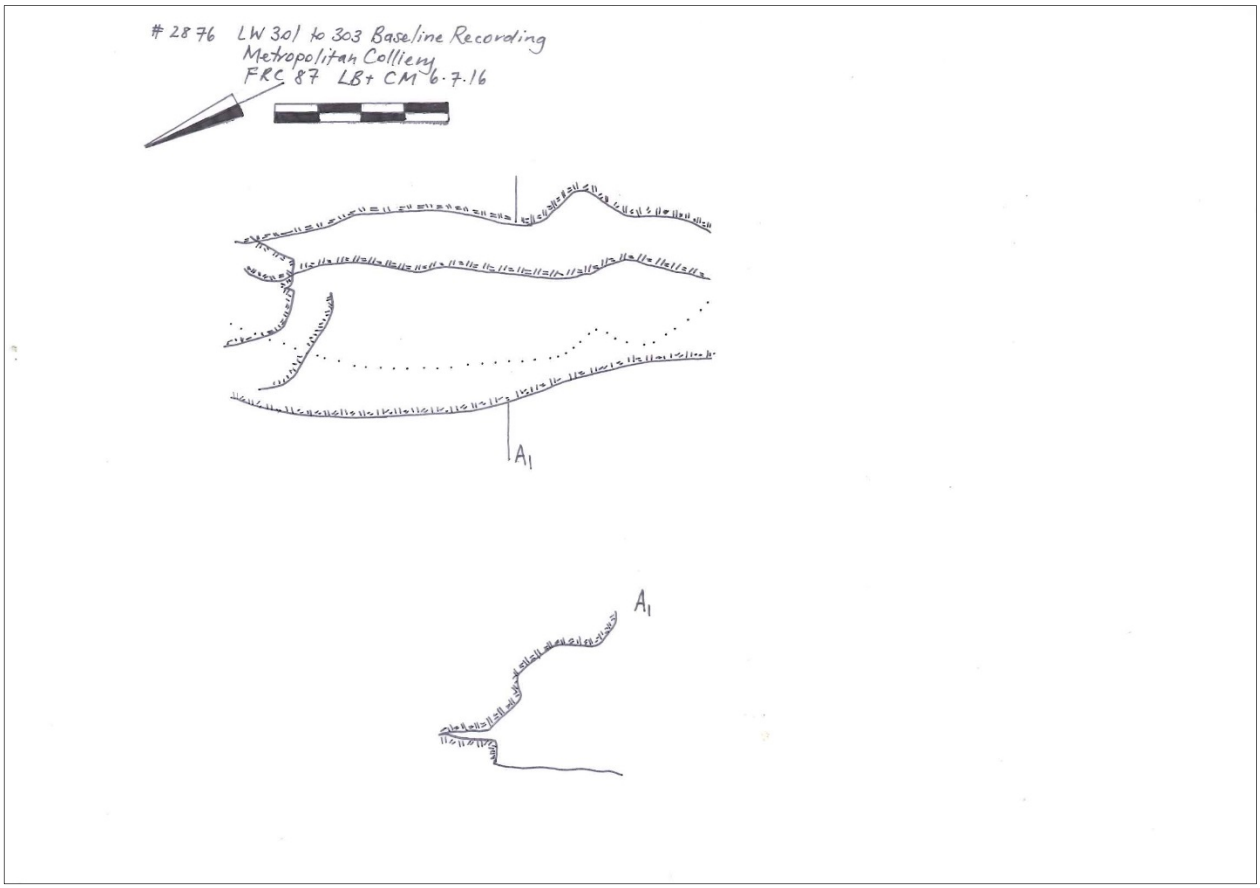

Figure 9: Plan and A1 Section of FRC 87.

2.9 Flat Rock Creek 90 (FRC 90, AHIMS # 52-2-0869)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The four artefacts recorded by Sefton within the shelters dripline (one white bipolar quartz core [22 x 10 x 10 mm], one white bipolar quartz flake [12 x 11 x 5 mm] and two quartz flakes [white 21 x 16 x 5 mm and grey 20 x 13 x 8 mm]) were not relocated during this baseline recording. The AHIMS site card also refers to chert and silicrete artefacts and small pieces of shell being observed during the original recording.

2.9.8 FRC 90 baseline recording data

Table 17: Baseline recording data for FRC 90.

Overview					
Site type	Shelter with artefacts deposit	Corrected MGAE	312500	Corrected MGAN	6217230
Previous Recording	Site card- Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	20m	Depth	4m	Height	1.2m
Orientation	265° West	Floor area	15m²	Floor condition	Isturbed by deer
Location in Landscape	Ridgeline				
Shelter exterior/formation	Cavernous weathering/block fall in antiquity.				
Shelter interior	Brown sandy loam deposit – evidence of deer prints (animal movement).				
Distance to water	Creek line above	Landform	Hill/ridgeline		
Setting	Isolated rock outcrop				
Archaeological Deposit					
Deposit	Yes	**Describe**	Brown loamy sand, approximately 10 cm deep. Artefacts not relocated.		
Visible artefacts?	No[1]	Where?	n/a	How many?	n/a
Art					
Art surfaces	n/a				
Art Condition	n/a				
Art Overview	n/a				
Damage/threats					
Waterwash	No	**Graffiti**	No	**Macro vegetals**	Yes
Animals	Yes	**Salt/granular loss**	Yes	**Fissuring**	No
Insects	Yes	**Spalling/exfoliation**	Yes	**Other**	
Fire	No	**Block fall**	Yes		

1. The original AHIMS site card identified four quartz artefacts at this site.

2.9.9 Baseline recording images – site overview

Plate 50: Overview of site FRC 90. View south.

Plate 51: Overview of site FRC 90. View north.

2.9.10 Baseline recording plans – site overview

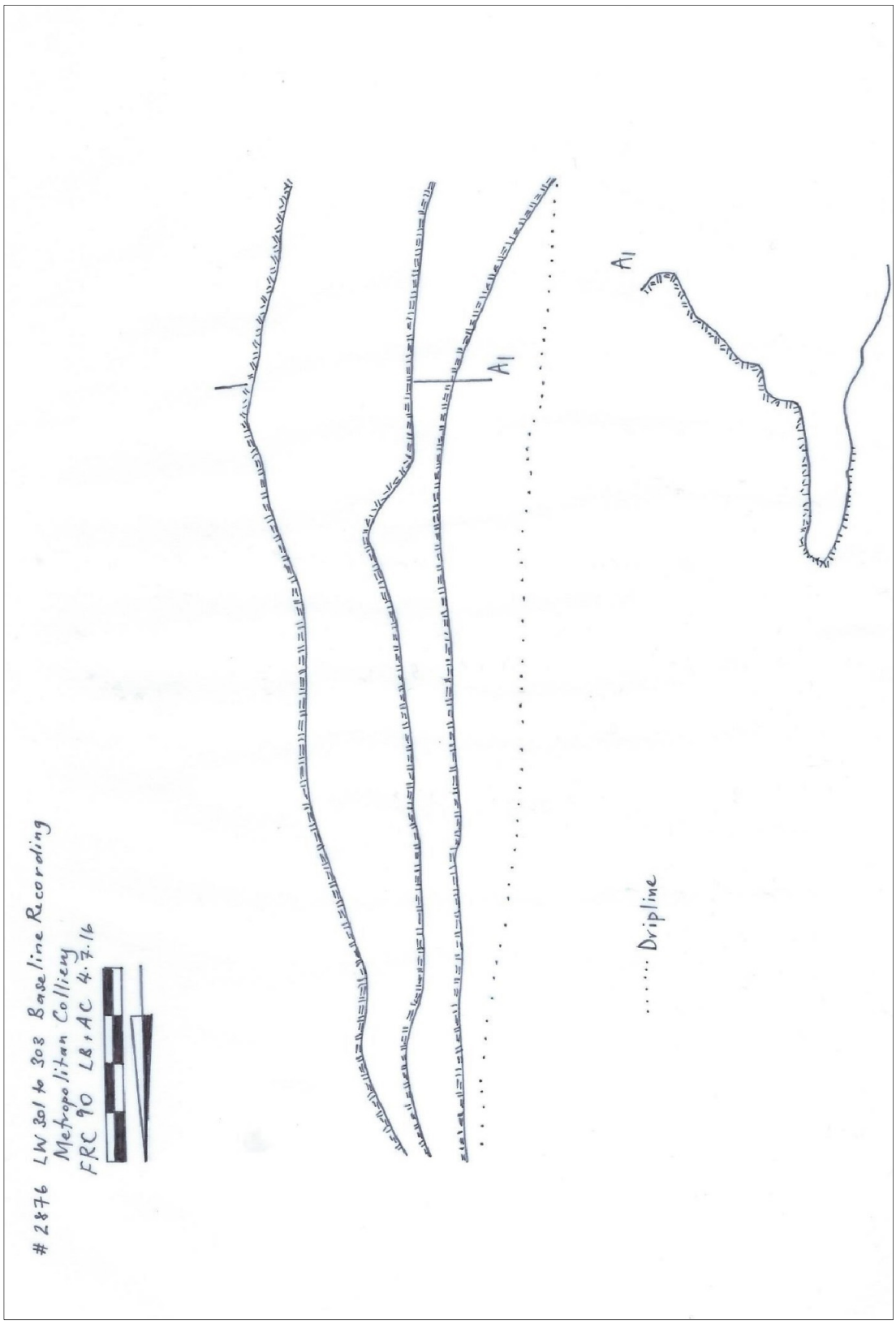

Figure 10: Plan and A1 Section of FRC 90.

2.10 Flat Rock Creek 91 (FRC 91, AHIMS# 52-2-0870)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The artefacts recorded by Sefton within the shelters dripline (including one white quartz flake [13 x 11 x 6 mm], one white quartz bipolar core [20 x 20 x 12 mm] and one white quartz flake [16 x 13 x 10 mm]) could not be relocated within the dripline of the shelter during this baseline recording.

Art is present on the rear wall of the shelter, but it is generally in poor condition.

There has been some root jacking at the northern end of the shelter, due to heavy vegetation growth over the roof of the shelter.

2.10.11 FRC 91 baseline recording data

Table 18: Baseline recording data for FRC 91.

Overview					
Site type	Shelter with art, artefacts and deposit	Corrected MGAE	312520	Corrected MGAN	6217410
Previous Recording	Site card – Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	11m	Depth	2m	Height	1.2m
Orientation	255° West	Floor area	16m^2	Floor condition	Moderate
Location in Landscape	Ridgeline				
Shelter exterior/formation	Cavernous weathering/block fall in antiquity.				
Shelter interior	Some rock dropped from the roof (root jacking at the northern end of shelter).				
Distance to water	200m from tributary	Landform	Hill/ridgeline		
Setting	Isolated				
Archaeological Deposit					
Deposit	Yes	**Describe**	Cream sandy loam (35cm deep) clean.		
Visible artefacts?	No[1]	Where?	n/a	How many?	n/a
Art					
Art surfaces	Panel 1 – 3 Motifs Panel 2 – 1 Motif Art north west, hardened and flaky.				
Art Condition	Poor condition.				
Art Overview	Panel 1 – Motif 1-3 kangaroos. Panel 2 – Motif 1 indeterminate charcoal.				
Damage/threats					
Waterwash	No	**Graffiti**	No	**Macro vegetals**	Yes – root jacking (northern end)
Animals	Yes	**Salt/granular loss**	No	**Fissuring**	Yes
Insects	Yes	**Spalling/exfoliation**	Yes – in the ceiling of the shelter	**Other**	
Fire	No	**Block fall**	Yes – in antiquity		

1. The original AHIMS site card identified 3 quartz artefacts at this site.

Table 19: Baseline recording data for art surfaces present within FRC 91.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1					
1	Outline	Kangaroo	Charcoal	Black	30 x 25cm
2[1]	Line	Kangaroo	Charcoal	Black	30 x 25cm
3[1]	Line	Kangaroo	Charcoal	Black	30 x 25cm
Panel 2					
1	Line	Indeterminate	Charcoal	Black	50 x 30cm

1. Due to the poor condition of the artworks representative photographs were unable to be obtained for this motif.

2.10.12 Baseline recording images – site overview

Plate 52: Overview of site FRC 91. View south.

Plate 53: Overview of site FRC 91. View north.

2.10.13 Baseline recording plans – site overview

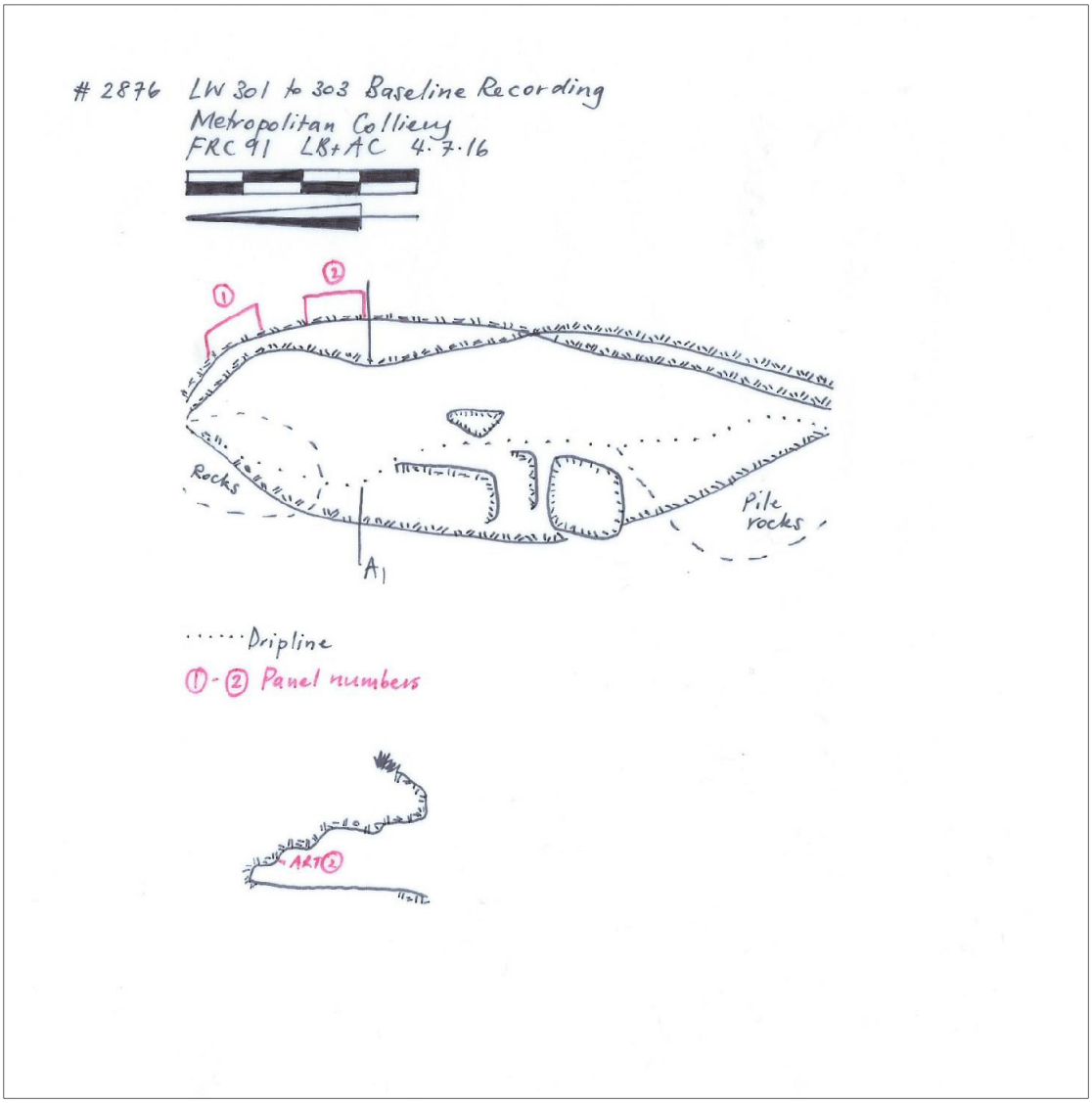

Figure 11: Plan and A1 Section of FRC 91.

2.10.14 Baseline recording images – detailed panel recording

Panel 1

Plate 54: FRC 91, Panel 1, Motif 1. View east.

Panel 2

Plate 55: FRC 91, Panel 2, Motif 1. View east.

2.11 Flat Rock Creek 93 (FRC 93, AHIMS # 52-2-0346 and 52-2-0198 and 52-2-0872)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The art is in the same condition as described by Sefton on the AHIMS site card (i.e. poor condition due to natural weathering processes and exposure to bushfires).

The Metropolitan Coal Project Environmental Assessment previously described and assessed site 2-0346 as being located above Longwall 302. During this baseline recording, Niche undertook a detailed site inspection. Despite searches of all possible locations (based on descriptions in the AHIMS site card and previous assessment reports) and the surrounding area, the site was unable to be relocated. Niche has assessed the site and determined that it is the same as site FRC 93.

2.11.15 FRC 93 baseline recording data

Table 20: Baseline recording data for FRC 93.

Overview					
Site type	Shelter with art	Corrected MGAE	312045	Corrected MGAN	6217436
Previous Recording	Site card – Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	8m	Depth	2.6m	Height	1m
Orientation	245° SW	Floor area	14m^2	Floor condition	Poor – very disturbed
Location in Landscape	Third ridgeline north from the Woronora dam.				
Shelter exterior/formation	Block fall and cavernous weathering.				
Shelter interior	Deposit fairly disturbed. A lot of Lomandra, Banksia and coral fern growing in the floor deposit.				
Distance to water	100m	Landform	Ridgeline		
Setting	Continuous ridgeline				
Archaeological Deposit					
Deposit	Yes	**Describe**	Fairly disturbed loamy sand.		
Visible artefacts?	No	Where?	n/a	How many?	n/a
Art					
Art surfaces	Panel 1 – 4 motifs, all in very poor condition due to natural weathering processes and exposure to bushfire in the past – bushfire evidence in the cracking/exfoliation of motif 4.				
Art Condition	Poor condition.				
Art Overview	See motif sheet 2 x fish, 1 x back end of macropod + 1 charcoal indeterminate line.				
Damage/threats					
Waterwash	Yes – seepage outside southern end of shelter	**Graffiti**	No	**Macro vegetals**	No
Animals	No	**Salt/granular loss**	Yes – rapidly deteriorating	**Fissuring**	Yes – due to bushfire
Insects	No	**Spalling/exfoliation**	Yes – rapidly deteriorating	**Other**	
Fire	Yes – roof and art panels	**Block fall**	Yes – in antiquity		

Table 21: Baseline recording data for art surfaces present within FRC 93.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1[1]					
1	Outline	Fish (partial)	Charcoal	Black	40 x 5cm
2	Outline	Fish (partial)	Charcoal	Black	40 x 5cm
3[2]	Outline	Back end macropod	Charcoal	Black	25 x 15cm
4[2]	Line	Indeterminate	Charcoal	Black	35 x 1.5cm

1. Natural exfoliation and blockfall visible in Plate 59.
2. Due to the poor condition of the artworks representative photographs were unable to be obtained for this motif.

2.11.16 Baseline recording images – site overview

Plate 56: Overview of site FRC 93. View east.

Plate 57: Overview of site FRC 93. View south.

2.11.17 Baseline recording plans – site overview

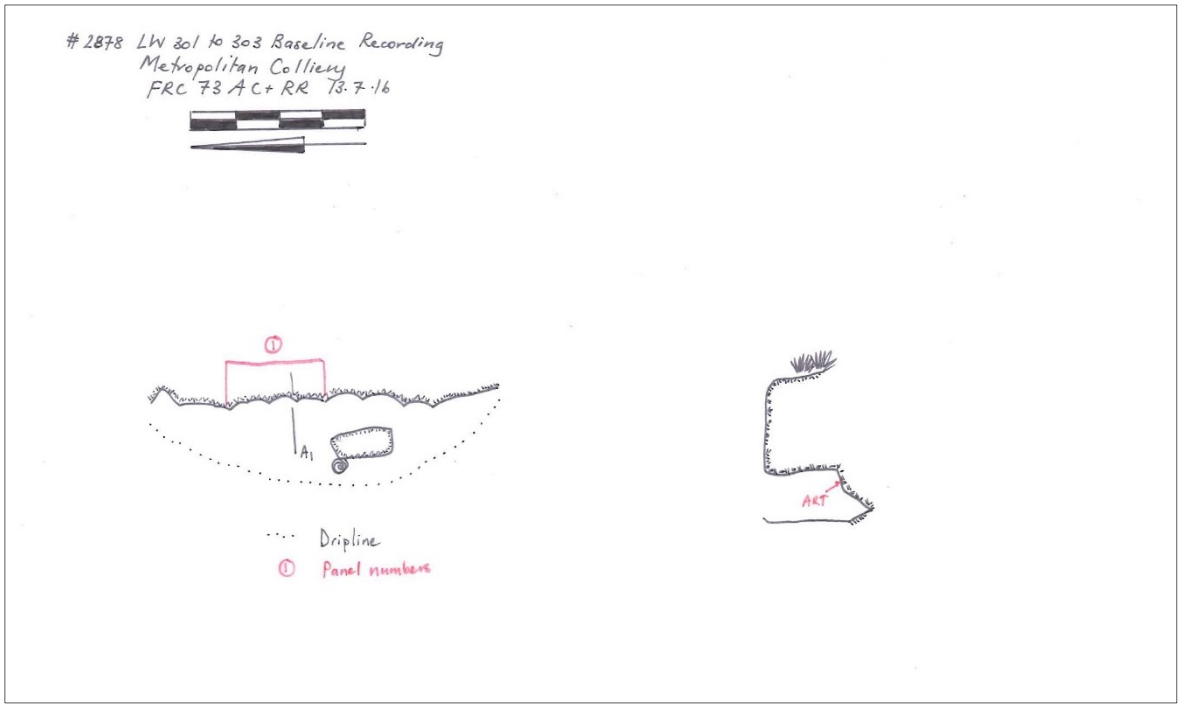

Figure 12: Plan and A1 Section of FRC 93.

2.11.18 Baseline recording images – detailed panel recording

Panel 1

Plate 58:Over view of FRC 93, Panel 1, Motifs 1 to 4.

Plate 59: Detail of FRC 93, Panel 1, Motif 1. View east.

Plate 60: Detail of FRC 93, Panel 1, Motif 2. View east.

2.12 Flat Rock Creek 309 (FRC 309, AHIMS# 52-2-3501)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. Two of the quartz bipolar flakes and broken quartz pebble recorded by Sefton (in the AHIMS site card) within the shelters dripline were relocated during this baseline recording. However, the remaining grey bipolar chert core (26 x 12 x 8 mm), bipolar quartz flake could not be relocated during this assessment.

2.12.19 Baseline recording data

Table 22: Baseline recording data for FRC 309.

Overview					
Site type	Shelter with artefacts and deposit	Corrected MGAE	312275	Corrected MGAN	6216845
Previous Recording	Site card- Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	10m	Depth	2m	Height	1.5m
Orientation	300° NW	Floor area	20m^2	Floor condition	
Location in Landscape	3 ridges east from Waratah Rivulet/Lake Woronora.				
Shelter exterior/formation	Cavernous weathering block fall in antiquity.				
Shelter interior	Sandy deposit				
Distance to water	150m to tributary	Landform	Ridge		
Setting	Continuous ridgeline				
Archaeological Deposit					
Deposit	Yes	**Describe**	25cm deep cream loamy sand		
Visible artefacts?	Yes	Where?	Dripline	How many?	2[1]
Art					
Art surfaces	n/a				
Art Condition	n/a				
Art Overview	n/a				
Damage/threats					
Waterwash	Yes	**Graffiti**	No	**Macro vegetals**	Yes
Animals	No	**Salt/granular loss**	Yes	**Fissuring**	No
Insects	No	**Spalling/exfoliation**	Yes	**Other**	Mould
Fire	Yes	**Block fall**	Yes		

1. The original AHIMS site card identified an additional 3 artefacts at this site.

2.12.20 Baseline recording images – site overview

Plate 61: General context of site FRC 309. View west.

Plate 62: General context of site FRC 309. View east.

2.12.21 Baseline recording plans – site overview

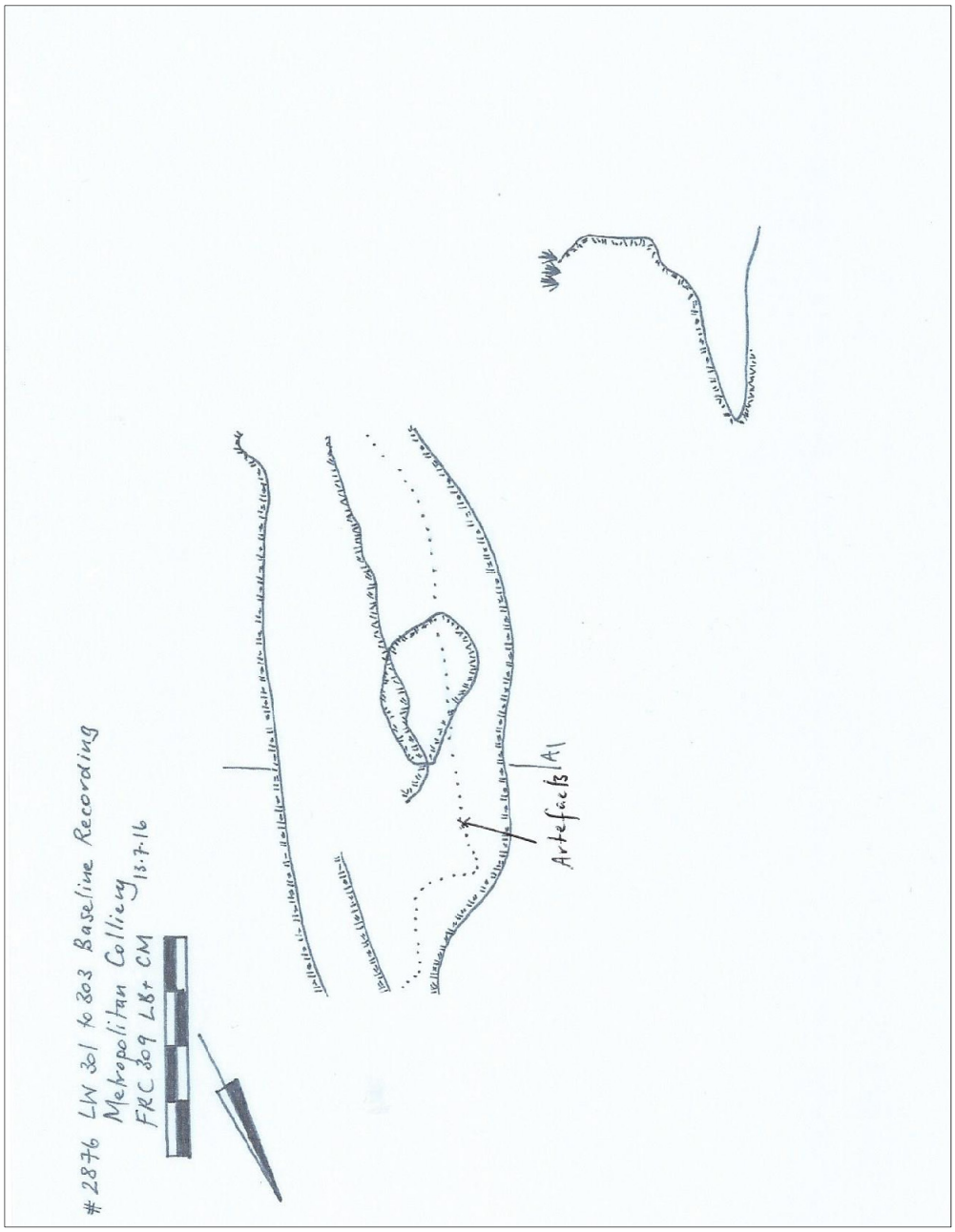

Figure 13: Plan and A1 Section of FRC 309.

2.12.22 Baseline recording images – artefacts

Plate 63: Artefacts relocated in FRC 309 dripline.

2.13 Flat Rock Creek 310 (FRC 310, AHIMS# 52-2-3500)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The art is very very worn through natural weathering processes. It is noted that the AHIMS site card for this also refers to the art as being in poor condition.

2.13.23 FRC 310 baseline recording data

Table 23: Baseline recording data for FRC 310.

Overview					
Site type	Shelter with art	Corrected MGAE	312312	Corrected MGAN	6217350
Previous Recording	Site card – Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	7.2m	Depth	3m	Height	1.6m
Orientation	204° SW	Floor area	22m^2	Floor condition	Mostly rock
Location in Landscape	On a small unnamed tributary, just off fire road 9I. Enter off fire road 9I at e.312280 n.6217316.				
Shelter exterior/formation	Cavernous weathering and blockfall in antiquity.				
Shelter interior	Largely made up of eroding sandstone and block fall from antiquity.				
Distance to water	On the tributary	Landform	Continuous ridgeline		
Setting	Continuous overhang				
Archaeological Deposit					
Deposit	Yes	**Describe**	15cm brown loamy sand.		
Visible artefacts?	No	**Where?**	n/a	**How many?**	n/a
Art					
Art surfaces	Very poor condition, 1 small charcoal line along the back wall.				
Art Condition	Heavily eroded and disturbed, in the same condition as listed on the site card.				
Art Overview	1 small indeterminate charcoal line.				
Damage/threats					
Waterwash	No	**Graffiti**	No	**Macro vegetals**	No
Animals	No	**Salt/granular loss**	No	**Fissuring**	No
Insects	No	**Spalling/exfoliation**	Yes	**Other**	n/a
Fire	No	**Block fall**	Yes – in antiquity		

Table 24: Baseline recording data for art surfaces present within FRC 310.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1					
1[1]	Indeterminate	line	Charcoal	Black	5 x 5cm

1. Charcoal lines were visibly faded, refer to Plate 68.

2.13.24 Baseline recording images – site overview

Plate 64: General context of FRC 310. View west.

Plate 65: General context of FRC 310. View east.

2.13.25 Baseline recording plans – site overview

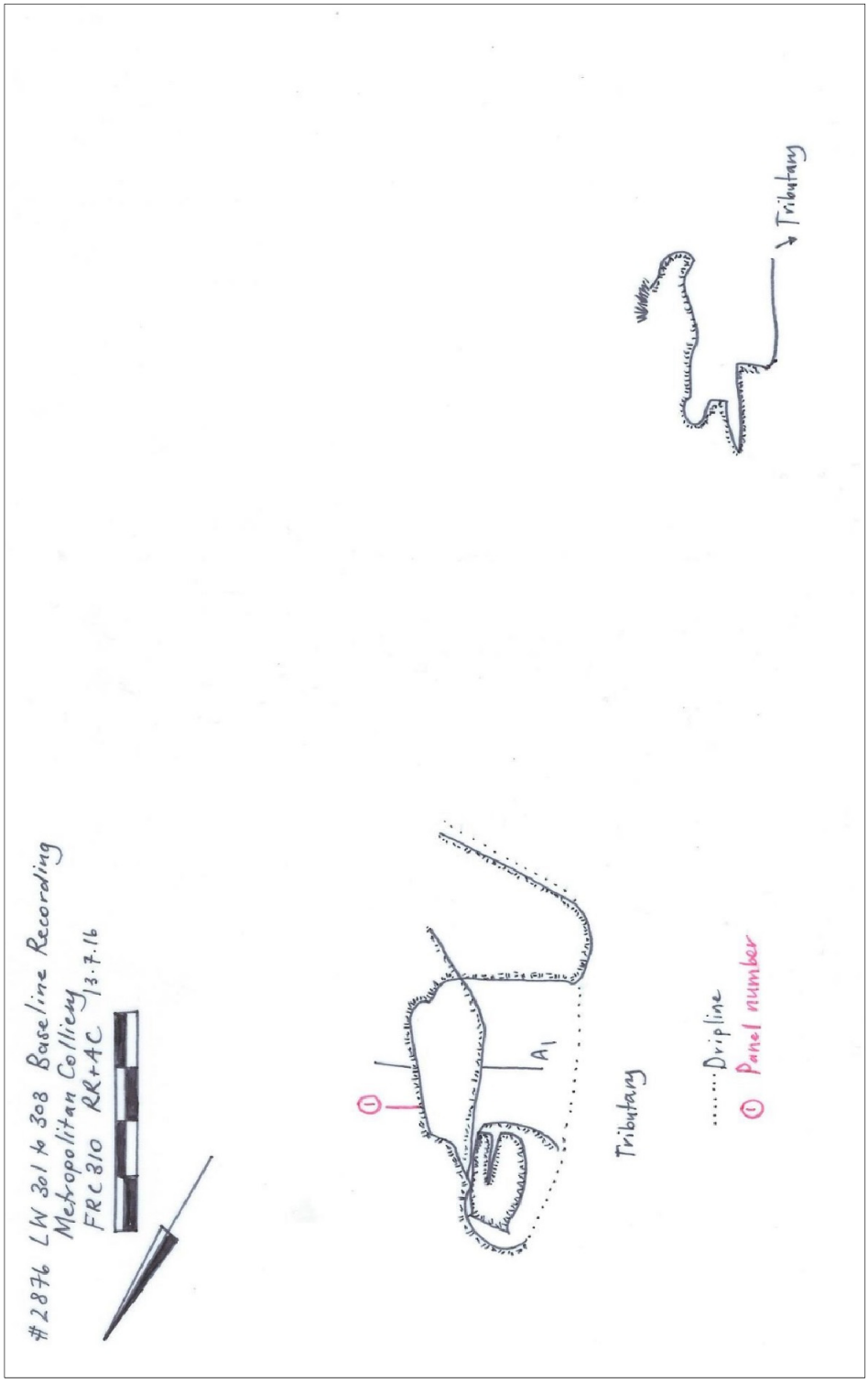

Figure 14: Plan and A1 Section of FRC 310.

2.13.26 Baseline recording images – detailed panel recording

Panel 1

Plate 66: General location of FRC 309, Panel 1.

Plate 67: FRC 309, Panel 1, Motif 1.

2.14 Flat Rock Creek 325 (FRC 325, AHIMS# 52-2-3466)

This shelter is formed out of Hawkesbury sandstone by cavernous weathering and blockfall in antiquity. The art is located on the ceiling of the shelter, and survives only where a silica skin has formed over it, due to mineral leeching.

2.14.27 FRC 325 baseline recording data

Table 25: Baseline recording data for FRC 325.

Overview					
Site type	Shelter with art	Corrected MGAE	311982	Corrected MGAN	6215894
Previous Recording	Site card – Caryll Sefton Illawarra Prehistory Group	Date	Not specified		
Site Details					
Width	7m	Depth	3m	Height	1.6m
Orientation	319° NW	Floor area	21m²	Floor condition	All sandstone
Location in Landscape	On the Woronora dam.				
Shelter exterior/formation	Cavernous weathering and block fall in antiquity.				
Shelter interior	Silica skin formed due to mineral leeching.				
Distance to water	On the water	Landform	Ridgeline		
Setting	Continuous overhang				
Archaeological Deposit					
Deposit	No	**Describe**	n/a		
Visible artefacts?	No	Where?	n/a	How many?	n/a
Art					
Art Surfaces	As described on the AHIMS site card – only survives where there is silica skin. 1 outline infill snake + 2 indeterminate charcoal lines.				
Art Condition	Good, where covered by silica skin.				
Art Overview	As described on the AHIMS site card – only survives where there is silica skin.				
Damage/threats					
Waterwash	No	**Graffiti**	No	**Macro vegetals**	No
Animals	No	**Salt/granular loss**	Yes – roof	**Fissuring**	No
Insects	No	**Spalling/exfoliation**	Yes – roof	**Other**	
Fire	No	**Block fall**	Yes – in antiquity		

Table 26: Baseline recording data for art surfaces present within FRC 325.

Motif No.	Type	Form	Media	Colour	Measurement
Panel 1					
1	Animal	Partial snake	Charcoal infill	Black	130 x 70cm
2	Indeterminate	Indeterminate partial snake?	Charcoal infill	Black	40 x 40cm
3[1]	Indeterminate	Indeterminate partial snake	Charcoal infill	Black	40 x 40 cm

1. Due to the poor condition of the artworks representative photographs were unable to be obtained for this motif.

2.14.28 Baseline recording images – site overview

Plate 68: Overview of site FRC 325. View south west.

Plate 69: Overview of site FRC 325. View facing east.

2.14.29 Baseline recording plans – site overview

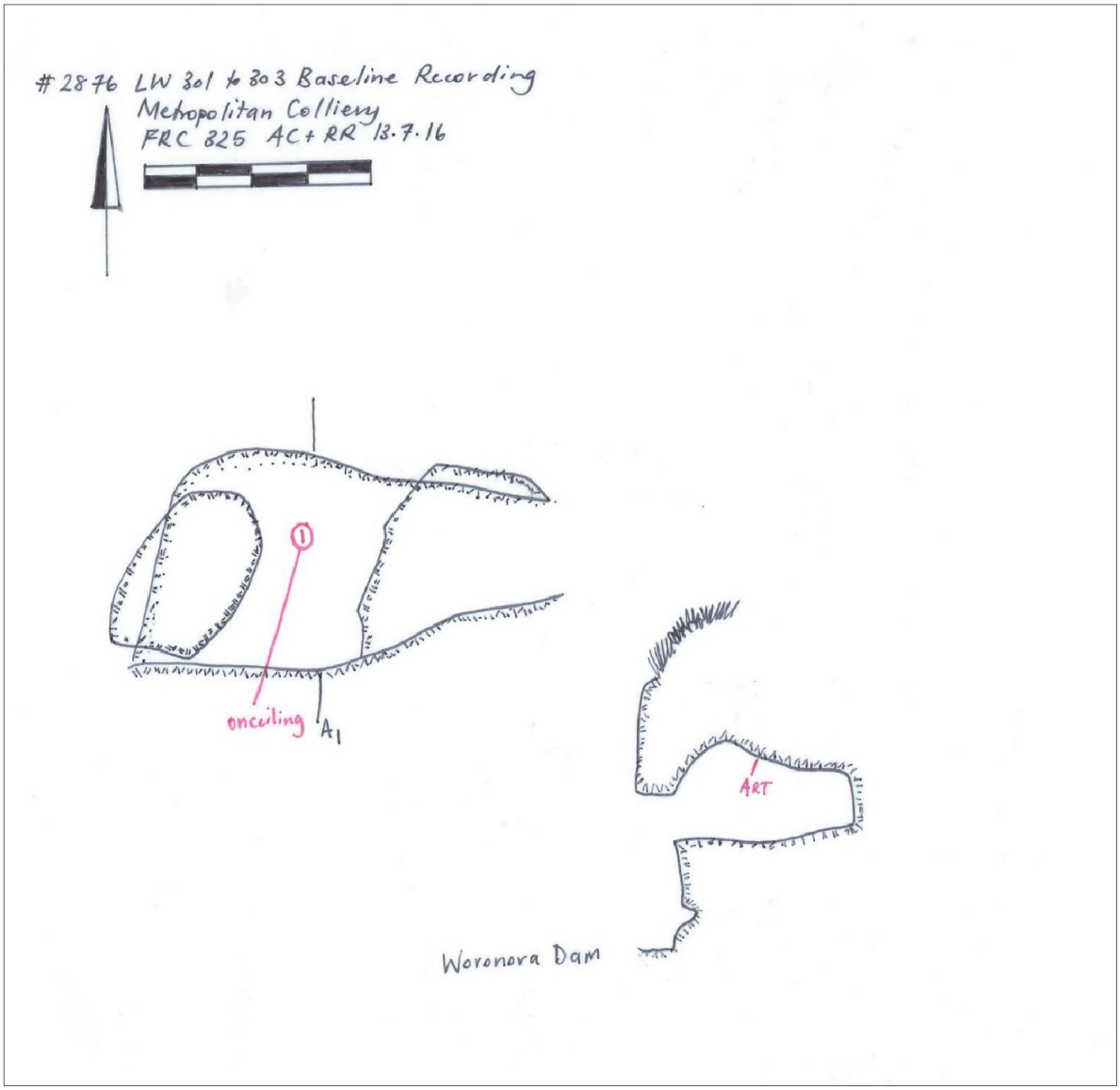

Figure 15: Plan and A1 Section of FRC 325.

2.14.30 Baseline recording images – detailed panel recording

Panel 1

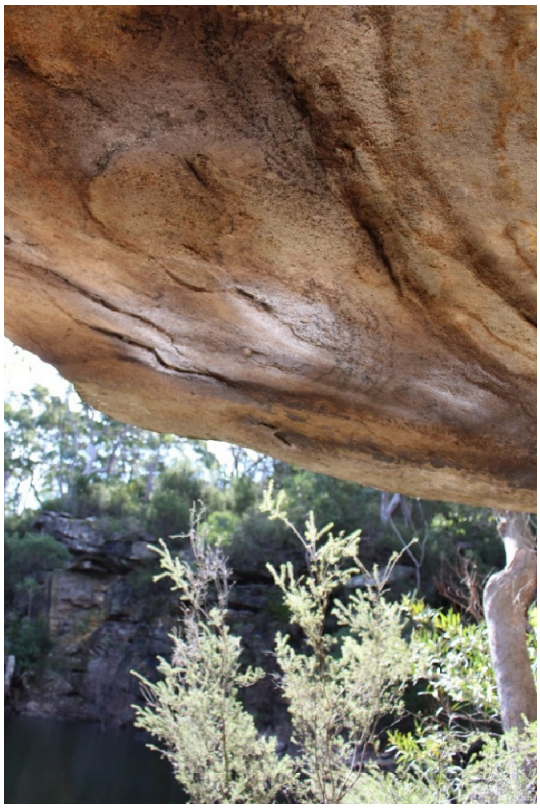

Plate 70: Overview of FRC 325, Panel 1, Motifs 1 and 2.

Plate 71: FRC 325, Panel 1.

Reference List

Illawarra Prehistory Group (2007) *Information from an archaeological survey of parts of the Woronora Plateau to identify and record previously un-recorded Aboriginal heritage sites and to re-record previously recorded Aboriginal heritage sites.* Unpublished data provided to Helensburgh Coal Pty Ltd, January 2007.

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APPENDIX 2

HERITAGE MANAGEMENT PLAN
SUBSIDENCE IMPACT REGISTER AND ASSESSMENT FORM

Heritage Management Plan - Subsidence Impact Register

Impact Register Number[1]	Aboriginal Heritage Site	Description of changes due to mine subsidence[2]	Cumulative number of sites with changes due to mine subsidence[3]	Has the site been affected by subsidence impacts?[4]	Cumulative number of sites affected by subsidence impacts[5]	Cumulative percentage of sites affected by subsidence impacts[6, 9]	Management or Contingency Measures Implemented? (Yes/No)[7]	Were Measures Effective? (Yes/No)[8]
1	FRC 281	Multiple cracks ranging from large, medium and small recorded in the shelter wall either running through or next to motifs (Longwalls 20-22 Round 1 Survey)	1	Yes	1	1/142 sites = <1%	No	N/A
2	FRC 284	Fractured corner or a buttress like formation on the rear wall (Longwalls 20-22 Round 1 Survey)	2	No	1	1/142 sites = <1%	No	N/A
3	FRC 284	Exfoliated section associated with the cracking has slumped (Longwalls 20-22 Round 2 Survey)	2	No	1	1/143 sites = <1%	No	N/A
4	FRC 15	Cracking of shelter wall (Longwalls 20-22 Round 2 Survey)	3	No	1	1/143 sites = <1%	No	N/A
5	FRC 15	Increased cracking of shelter wall (Longwalls 20-22 Round 3 Survey)	3	No	1	1/143 sites = <1%	No	N/A
6	MET 1	Cracking in roof of shelter and vertical cracking (Longwalls 20-22 Round 3 Survey)	4	No	1	1/143 sites = <1%	No	N/A
7	FRC 283	Opening of joints and silica forming over art panel (Longwalls 20-22 Round 3 Survey)	5	No	1	1/143 sites = <1%	No	N/A
8	FRC 176	Vertical cracking observed along the northern and southern ends of the shelter (Longwalls 23-27 Round 1 Survey)	6	No	1	1/143 sites= <1%	No	N/A

Notes:

1: Fill out all details in the Subsidence Impact Register Assessment Form and record the register number here.

2: Description of changes observed due to mine subsidence. (e.g. cracking of shelter wall, opening of joints).

3: Cumulative number of sites with changes due to mine subsidence.

4: Has the site been affected by subsidence impacts? Sites are considered to be 'affected by subsidence impacts' if they exhibit one or more of the following consequences that cannot be attributed to natural weathering or deterioration: overhang collapse; cracking of sandstone that coincides with Aboriginal art or grinding grooves; and rock fall that damages Aboriginal art).

5: Cumulative number of sites affected by subsidence impacts.

6: If the cumulative percentage of sites affected by subsidence impacts equals or exceeds 10%, notify General Manager. If less than 10%, notify the Technical Services Manager or Environment and Community Manager of the cumulative percentage.

7: Indicate whether management or contingency measures were implemented (yes or no).

8: Indicate whether the implemented management or contingency measures were considered to be effective (yes or no).

9: The total number of sites within the mining area (as defined by Appendix 3 of the Project Approval) changed from 142 sites to 143 sites due to the identification of a new site within the mining area during Round 2 monitoring (MET 4).

Heritage Management Plan – Subsidence Impact Register
Assessment Form

Date:

Observer (Name and position):

Register Number (i.e. Number 1, 2, etc.):

Longwall Number and Chainage:

Location of Observed Change Due to Mine Subsidence:

Description of Change Due to Mine Subsidence:

Description of Potential Consequences:

Examples:

- cracking through art or grinding groove;
- burial of artefacts and deposit; and
- complete loss of site due to collapse.

Attach photographs

Description of Photographs:

Has the site been affected by subsidence impacts?

What is the cumulative percentage of sites affected by subsidence impacts?

Person Notified:	Manager – Safety & Environment	☐
	Manager – Technical Services	☐
	General Manager	☐

Actions Required:	Management/Remediation Measures	☐
	Contingency Plan Initiated	☐
	Incident Notification	☐
	Safety Measures/Public Safety Management Plan Requirements	☐

Management/Remediation Measures Implemented:

Contingency Measures Implemented:

Effectiveness of Contingency or Management Measures:

APPENDIX 3

CONTINGENCY PLAN CHECK LIST

Contingency Plan Check List

Contingency Plan Component	Yes/No	Comment
Observation reported to the Manager – Technical Services Manager or the Manager – Safety & Environment (within 24 hours).		
Observation recorded in the Heritage Management Plan - Subsidence Impact Register.		
Reporting of any Aboriginal heritage performance measure exceedance to DP&E and OEH (as soon as practicable after Metropolitan Coal becomes aware of the exceedance).		
Conduct investigation to evaluate the potential contributing factors. Investigation to: • 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.		
Identification of appropriate course of action with respect to the identified impact(s) in consultation with specialists, relevant agencies and Aboriginal stakeholders, as necessary. For example: • proposed management/mitigation measures; • a program to review the effectiveness of the management/mitigation measures.		
Submission of the proposed course of action to the DP&E for approval.		
Implementation of the approved course of action to the satisfaction of the DP&E.		
Provision of a suitable offset - if either the contingency measures implemented by Metropolitan Coal have failed to remediate the impact or the Secretary of the DP&E determines that it is not reasonable or feasible to remediate the impact.		