

GRINDING GROOVES DF04 AND PS11

Phase 3 Post Mining Inspection – Avoidance and mitigation



REPORT

Document status							
Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date		
1.0	Draft – Internal Review	Kate Morris	Ben Slack	Ben Slack	19/02/2021		
2.0	Draft	Kate Morris	Ben Slack	Ben Slack	05/03/2021		

Approval for issue

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5 March 2021

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EXECUTIVE SUMMARY

This report documents the Phase 3 recording of Aboriginal grinding groove sites AHIMS 45-3-3502 and AHIMS 45-3-3506 (RPS names DF04 and PS11). Aboriginal heritage is managed under Centennial's Northern Holdings Aboriginal Cultural Heritage Management Plan (ACHMP) (RPS 2019) and sets out the requirements and methodology for the phase 3 postmining recording. The grinding grooves are in the Mandalong Southern Extension area (SSD-5144).

The grinding grooves are located beyond the western edge of Longwall 25 of the Mandalong Southern Extension. However, they fall within the 26.5 degree angle of draw.

This report was prepared in consultation with the Registered Aboriginal Parties (RAPs) who were present for the fieldwork. The original phase 1 baseline was recording was undertaken on 8 March 2018 by Tessa Boer-Mah and Dragomir Garbov of RPS along with the following RAP representatives: Peter Leven of Awabakal Descendants Traditional Owners Aboriginal Corporation (ADTOAC), Tracey Howie of Guringai Tribal Link Aboriginal Corporation (GTLAC), Jackson Walker (ATOAC) and Darcy Dole (Wonn1). The Phase 1 inspection included baseline recording, photogrammetry, and 3D scanning (the latter conducted by Centennial).

The Phase 2 (initial post mining) was undertaken on 5 September 2019 by RPS Senior Heritage Consultant Ben Slack along with RAP representatives Kane Levin (ADTOAC), Barry Williams (Darkinjung LALC), Jackson Walker (ATOAC), Arthur Fletcher (Wonn1), Ashley Sampson (Cacatua), Tracey Howie (GTLAC) and Sharon Hodgetts (Forests NSW).

This report comprises the final recording (Phase 3) of the two AHIMS sites and was undertaken on 17 August 2020 by RPS Senior Heritage Consultant Ben Slack along with Arthur Fletcher (Wonn1), Kyle Howie (GTLAC), Jackson Walker (ATOAC), Amanda Shields (Darkinjung LALC), Tori Leven (ADTOAC), Barry Williams (Darkinjung LALC) and Robert Briggs (Biraban).

No damage due to mining activities has been noted at the location of AHIMS site 45-3-3502 and AHIMS 45-3-3506 (RPS names DF04 and PS11) with both sites in the same condition as the pre-mining inspection. Subsidence results for both sites is on or below the predicted levels. No further recording is required.

Recommendation 1

This Phase 3 recording is to be kept on record as compliance and completion of Centennial's Northern Region Aboriginal Cultural Heritage Management Plan.

1 INTRODUCTION

This report sets out the Phase 3 recording carried out under Development Consent SSD-5144 (Grinding Groove Trial Mitigation Schedule 4, Conditions 9 and 10). It is proposed that the trial mitigation works are undertaken in accordance with Centennial's Northern Region Aboriginal Cultural Heritage Management Plan (ACHMP) (RPS, 2013, 2016). The baseline recording and Phase 2 (Post-mining inspection) have been undertaken. This report documents the Phase 3 (Post mining secondary inspection) recording and monitoring of Aboriginal grinding grooves AHIMS 45-3-3502 and AHIMS 45-3-3506 (RPS site names DF04 and PS11).

1.1 Compliance with the Development Consent Conditions

This report has been developed to meet the key conditions of the development consent in relation to Aboriginal grinding grooves AHIMS 45-3-3502 (DF04) and AHIMS 45-3-3506 (PS11).

Condition	Requirements	Section Addressed in this Report
Grinding Groove T	rial Mitigation	
9	Prior to the extraction of Longwall 25, the Applicant must undertake trial mitigation works at grinding grove sites RPS DF04 and RPS PS11, in consultation with Forestry Corporation of NSW, OEH and Registered Aboriginal Parties, and to the satisfaction of the Secretary.	Sections 2 and 3
10	The applicant must:	
	Monitor the effectiveness of the trial mitigation works during and following the extraction of Longwall 25	Section 3
	Provide a report on the monitoring to the Secretary, OEH and Registered Aboriginal Parties; and	Section 1.4 (8/3/2021)
	Use the report to inform the impact avoidance, management and mitigation strategies in future Extraction Plans covering other grinding groove sites,	Recommendation 2
	To the satisfaction of the Secretary	

Table 1 Key Conditions of Development Consent SSD_5144

1.2 Original Site Recording

Aboriginal grinding groove site AHIMS 45-3-3502 (RPS site name DF04) was originally recorded by Deborah Farina on 5/5/2011 during investigations related to the Mandalong Southern Extension Project Heritage Impact Assessment (RPS 2013). The site is located near the junction of two first order streams of Byron's Gully above Longwall 25, GDA94, Zone 56, E350470, N6330285 (Figure 1). The four grinding grooves were recorded as two sets of two on the same large rock platform. Two are long grooves and two are short grooves, one of which is faint. All are 'U' shaped. The grinding grooves are located beyond the western end of Longwall 25, but within the 26.5 degree angle of draw; however, impact to this site from cracking is unlikely.

Aboriginal grinding groove site AHIMS 45-3-3506 (RPS site name PS11) was originally recorded by Philippa Sokol on 11/3/2011 during investigations related to Mandalong Southern Extension Project Heritage Impact Assessment (RPS 2013). This site is located on the course of a first order tributary of Byron's Gully above longwall 25, GDA94, Zone 56, E350536, N6330234 (Figure 1). Rock pools occur directly north west of the

two grinding grooves. The grinding grooves are located beyond the western end of Longwall 25, but within the 26.5 degree angle of draw however, impact to this site from cracking is also unlikely.

1.3 Subsidence Predictions

Centennial Mandalong has reduced the length of Longwall 25 and now excluded all archaeological sites from the direct subsidence impact area. However Aboriginal grinding groove sites RPS DF04 and RPS PS11, are still located within the 26.5 degree angle of draw. Subsidence testing was conducted on 17 August 2020 at the locations of AHIMS sites RPS DF04 and RPS PS11. The results of these are shown in (**Table 1**).

Table 2 Updated Subsidence Predictions

	EIS		Extraction Plan LW 25-31			
	Subsidence (m)	Tilt (mm/m)	Horizontal Strain (mm/m)	Subsidence (m)	Tilt (mm/m)	Horizontal Strain (mm/m)
RPS DF04	0.77	8.5	-2.4	-0.01	0.9	0.4
RPS PS11	0.95	4.1	-4.1	-0.09	3.9	1.3

1.4 Fieldwork and Aboriginal Participation

As per the Centennial's Northern Region ACHMP, an invitation to participate in the Phase 3 recording was sent to the registered Aboriginal Parties (RAPs). The Phase 3 recording was undertaken on 17 August 2020 by RPS Senior Heritage Consultant Ben Slack along with Arthur Fletcher (Wonn1), Kyle Howie (GTLAC), Jackson Walker (ATOAC), Amanda Shields (Darkinjung LALC), Tori Leven (ADTOAC), Barry Williams Darkinjung LALC) and Robert Briggs (Biraban).

A copy of this report will be provided to RAPs for review and comments are to be incorporated into the final document.

The report was provided to RAPs on 8/3/2021.

1.5 Authorship

This report was prepared by RPS Senior Heritage Consultant Ben Slack and RPS Graduate Heritage Consultant Kate Morris and reviewed by RPS Senior Heritage Consultant Ben Slack.



2 METHODS

The methodology for undertaking the grinding groove trial mitigation as per condition 9 and 10 under the Development Consent SSD-5144 will be aligned with the monitoring methodology included within the previously approved ACHMP.

As per the Centennial's Northern Region ACHMP, the aim of the monitoring program is to identify whether there is a risk of harm to Aboriginal cultural heritage sites as a result of mining activities and to identify appropriate mitigation strategies, if required. This monitoring program has been developed in accordance with the principles of due diligence as defined by the NP&W Regulation 2009. While the broad principles of the Due Diligence Code of Practice for the protection of Aboriginal Objects in NSW (DECCW, 2010) and the NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects (Minerals Council, 2010) have been adopted; additional (and more specific heritage) management protocols have been developed to manage the complexities of mining activities, the nature of the Aboriginal cultural heritage sites present and the assessment of harm.

The monitoring program will record the condition of the site before mining (baseline survey and baseline check) and the condition of the site after mining (post mining initial condition and post mining secondary condition check) and thus has been separated into three phases.

- Phase 1: Baseline recording (prior to site being undermined)
- Phase 2: Post mining initial condition (immediately after undermining)
- Phase 3: Post mining secondary condition (approximately 8 months after undermining)
- Phase 3a: (Longwall Mining) In instances where final subsidence is not achieved until after a number of longwall extractions have taken place, then additional inspections by a qualified cultural heritage consultant may be required to assess risks to Aboriginal cultural heritage sites.

This report has been produced for the Phase 3 post mining secondary condition inspection which was undertaken on August 17th, 2020.

It has included:

- Visual inspection/monitoring;
- Detailed archaeological recording;
- Archival Photography; and,
- 3D Scanning.

Phase 3 recording was undertaken in consultation with the RAPs as per the Centennial's Northern Region ACHMP.

2.1 Survey Control Points

The recording of control points were undertaken by a suitably qualified surveyor (appointed by Centennial) in consultation with the heritage consultant using a total station or better equipment if available. The purpose of the control points is to provide points of reference on the sandstone in order to later monitor the effects of subsidence. The location of these control points will, where practical, be tied to known surveyed points outside the zone of influence and/or other permanent points such as electricity transmission towers.

3 PHASE 3 POST MINING RECORDING RESULTS

The recording of Phase 3 was undertaken on August 17th, 2020 and entailed locating the grooves at the registered co-ordinates, detailed inspection and archaeological recording, and photography.

3.1 Detailed Archaeological Recording and Photography

Aboriginal grinding groove sites AHIMS 45-3-3502 (RPS site name DF04) and AHIMS 45-3-3506 (RPS site name PS11) were identified and reinspected. Archival photographs were taken of both sites.

3.2 AHIMS 45-3-3502 (RPS DF04)

Four grinding grooves were originally identified as a result of the original recording of the site, with one additional groove identified during the Phase 1 baseline recording. Water flow along the drainage line is from east to west and was flowing during the time of the Phase 3 inspection. Measurements were able to be taken of all grooves and all were consistent with the baseline recording.

Groove ID Number	Length (mm)	Width (mm)	Depth (mm)	Notes
1	250	40	20	Single groove
2	310	70	40	Single groove
3	100	45	10	Single groove
4	110	40	10	Single groove
5	238	78	11	Single groove

Table 3 Grinding groove attributes AHIMS 45-3-3502 (RPS DF04)

3.3 AHIMS 45-3-3506 (RPS PS11)

Two grinding grooves were identified during the Phase 3 inspection as previously identified during the previous inspections. These were consistent with the Phase 1 and Phase 2 inspections. Although no running water was observed over the grooves, pooling of water was prevalent throughout indicating recent heavy rains and inundation of the grinding grooves.

Table 4Grinding groove attributes AHIMS 45-3-3506 (RPS PS11)

Groove ID Number	Length (mm)	Width (mm)	Depth (mm)	Notes
1	100	40	38	Single groove
2	110	40	34	Single groove

3.4 3D scanning

3D scans were taken by Centennial of the grinding grooves using Trimble SX10 instrument to provide comprehensive coverage of the grooves.

3.5 Ground Truthing

During the baseline recording, high precision coordinates were taken of both sites using the Trimble SX10 3D scanner and the original coordinates corrected. The Phase 3 inspection identified these sites in the correct position and no updates to locations are required.

3.6 Subsidence Results

The survey control points recorded potential subsidence for both site locations:

 Table 5
 Results of Subsidence Monitoring

		26/02/2018	9/09/2019		17/08/2020	
AHIMS#		Test 0 (RL)	Test 1 (RL)	Test 1 (Subsidence, m)	Test 2 (RL)	Test 2 (Subsidence, m)
45-3-3502	DF04	46.538	46.555	0.017	46.519	-0.019
45-3-3501	PS11	49.063	49.080	0.017	49.030	-0.032

AHIMS site 45-3-3502 (RPS DF4) experienced subsidence of -0.019 m which is consistent with the expected (0.01) subsidence predictions for Longwall 25-31.

AHIMS site 45-3-3506 (RPS PS11) experienced subsidence of -0.032 m which is below the expected (0.09) subsidence predictions for Longwall 25-31.



Figure 2 AHIMS (DF04) 45-3-3502 Original Orthomosaic



Figure 3 45-3-3506 (PS11) Original Orthomosaic

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Figure 4 AHIMS 45-3-3502 (DF04) Scan Data



Figure 5 AHIMS 45-3-3506 (PS11) Scan Data

4 CONCLUSIONS AND RECOMMENDATIONS

The final Phase 3 recording was undertaken in accordance with Development Consent SSD-5144 (Schedule 4, Conditions 9 and 10) and the Centennial Mandalong Southern Extension Project Heritage Impact Assessment (HIA) (RPS, 2016). No further recording is required.

No damage from mining related activities was observed during the final Phase 3 recording and all subsidence results were within predicted levels.

Recommendation 1

This Phase 3 recording is to be kept on record as compliance and completion of Centennial's Northern Region Aboriginal Cultural Heritage Management Plan.

Recommendation 2

This report is used to inform the impact avoidance, management and mitigation strategies in future Extraction Plans covering other grinding groove sites.

5 **REFERENCES**

DECCW. (2010). Due Diligence Guidelines for Protection of Aboriginal Objects in NSW - Consultation Draft.

- Minerals Council. (2010). NSW Mining Industries Due Diligence Code of Practice for the Protection of Aboriginal Objects. New South Wales Minerals Council.
- RPS. (2013). Heritage Impact Assessment for the Mandalong Southern Extension Project.
- RPS. (2016). Centennial Coal's Northern Region Aboriginal Cultural Heritage Management Plan.
- RPS. (2018a). Aboriginal Cultural Heritage Management Plan: For Mandalong LW25-31 Extraction Plan.
- RPS. (2018b). Grinding Grooves DF04 and PS11: Grinding Groove Trial Mitigation Report. (Baseline Report)

6 PLATES



Plate 1 AHIMS Site 45-3-3502 grinding grooves (17 August 2020)



Plate 2 AHIMS Site 45-3-3502, context shot (17 August 2020)



Plate 3 AHIMS 45-3-3506 Grinding Grooves (17 August 2020)



Plate 4 AHIMS Site 45-3-3506 Context Shot (17 August 2020)