DENDROBIUM AREA 3A, ILLAWARRA METALLURGICAL COAL

IMPACT REPORT

5 August 2022

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) on a monthly basis prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 2 August 2022 had progressed approximately 284m. During a recent inspection, two new subsidence impacts were identified.

DA3A_LW19_001 (E 292826, N6192225)

DA3A_LW19_001 is located on a steep slope/ step east of Fire Road 6F (Figure 1). The impact was identified on 3 August 2022, consisting of rock fracturing. The rock fracturing has an approximate maximum length of 3m and a maximum width of less than 0.1m (Photo 1). Measurements have been estimated due to safety concerns.

DA3A_LW19_001 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically;

- Crack or fracture up to 10m length
- Crack or fracture up to 100m width

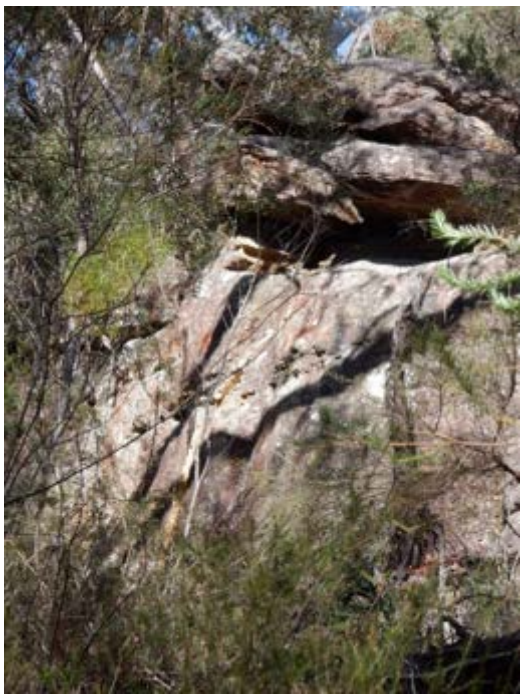

Photo 1: *DA3A_LW19_001,* showing a section of rock fracturing. Taken 3/08/2022.

DA3A_LW19_002 (E 292849, N 6192228)

DA3A_LW19_002 is located on a steep slope/ step east of Fire Road 6F (Figure 1). The impact was identified on 3 August 2022, consisting of two rock fractures approximately 10m apart. The rock fracturing has an approximate maximum length of 4m and a maximum width of less than 0.1m (Photo 2 to Photo 4). Measurements have been estimated due to safety concerns.

DA3A_LW19_002 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically;

- Crack or fracture up to 10m length
- Crack or fracture up to 100m width

Photo 2: *DA3A_LW19_002,* showing overview of site. Taken 3/08/2022.

Photo 3: *DA3A_LW19_002,* showing a section of rock fracturing. Taken 3/08/2022.

Photo 4: *DA3A_LW19_002,* showing a section of rock fracturing. Taken 3/08/2022.

Corrective Management Actions (CMAs)

In accordance with the DA3A SMP, the following actions have been initiated:

- Continue monitoring program as required in the DA3B SMP.
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator; Regional NSW – Mining, Exploration and Geoscience)
- Summarise impacts and report in the End of Panel Report and Annual Review.

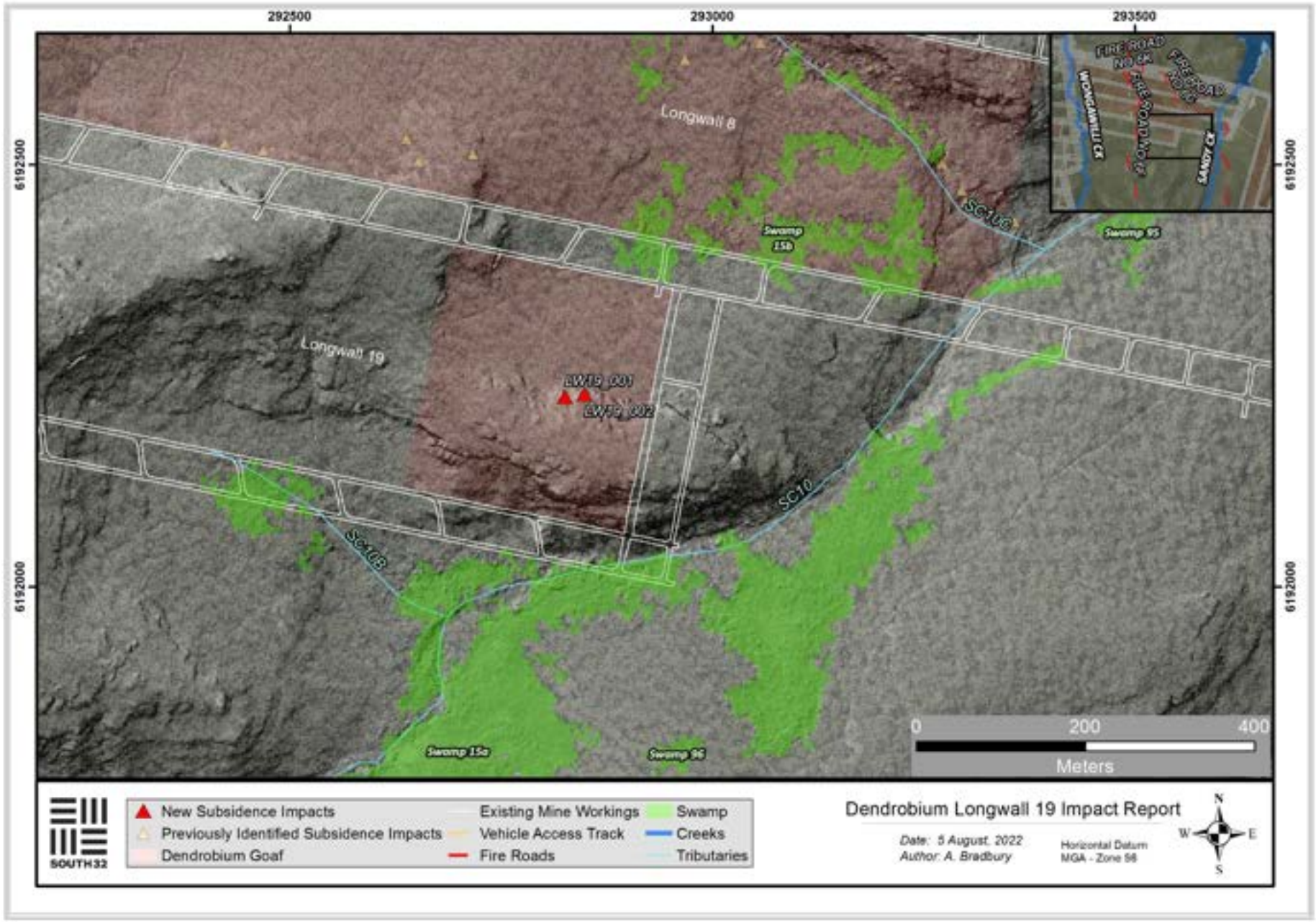

Figure 1: Map showing latest subsidence impact relevant to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1*** * • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3B_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	This Report
DA3B_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 14 August 2022 had progressed approximately 371m. During recent inspections an increase in iron staining was identified along tributary WC14.

DA3A_LW19_003 (E 291372, N 6192315)

WC14 is a tributary of Wongawilli Creek, that flows westward from DA3A mining operations (Figure 1). Rock fracturing and iron staining on WC14 was previously identified and reported in January 2020, however likely occurred during the extraction of Longwall 8. During recent inspections of WC14, an increase in the extent of the iron staining was observed between WC14_Pool 10 and the confluence of WC14 and Wongawilli Creek (Photo 1 to Photo 12). Iron staining was not evident in Wongawilli Creek (Photo 4). Isolated sections of iron staining were evident upstream between WC14_Pool 10 and WC14_Step 3. Similar observations were recorded during baseline mapping in 2020 (Photo 13 and Photo 14). No iron was observed upstream of WC14_Step 3 (Photo 15 and Photo 16).

This observation is a Level 2 trigger as per the DA3A Watercourse Impact, Monitoring Management and Contingency Plan (Table 1), specifically:

- Observable increase in iron staining within the mining area continues to outside the mining area. i.e. 400 m from the Longwall.

Photo 1: WC14_Pool 3 looking upstream. Taken on 22/12/2021.

Photo 2: WC14_Pool 3 looking upstream. Taken on 16/08/2022.

Photo 3: WC14_Pool 3 looking downstream towards Wongawilli Creek. Taken on 16/08/2022.

Photo 4: WC14 and Wongawilli Creek confluence, looking downstream. Taken on 16/08/2022.

Photo 5: WC14_Pool 9 looking upstream taken on 11/12/2020

Photo 6: WC14_Pool 9 looking upstream taken on 16/8/2022.

Photo 7: WC14_Boulderfield 1, looking at a section of iron staining. Taken on 17/12/2019.

Photo 8: WC14_Boulderfield 1, looking at the same section of iron staining. Taken on 16/08/2022.

Photo 9: WC14_Step 1, looking upstream. Taken on 17/12/2019.

Photo 10: WC14_Step 1, looking upstream. Taken on 16/08/2022.

Photo 11: WC14_Rockbar 3, looking upstream. Taken on 28/01/2020.

Photo 12: WC14_Rockbar 3, looking upstream. Taken on 16/08/2022.

Photo 13: WC14_Step 3, looking at the iron staining. Taken on 28/01/2020.

Photo 14: WC14_Step 3, looking at the iron staining. Taken on 16/08/2022.

Photo 15: WC14_Pool 16, looking downstream. Taken on 16/08/2022.

Photo 16: WC14_Pool 18, looking upstream. Taken on 16/08/2022.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP;
- Report impacts to key stakeholders;
- Summarise impacts and report in the End of Panel Report;
- Review monitoring frequency;
- Submit letter report to DPE, Resources Regulator and Water NSW and seek advice on any CMA required;
- Implement agreed CMAs as approved (subject to agency feedback).

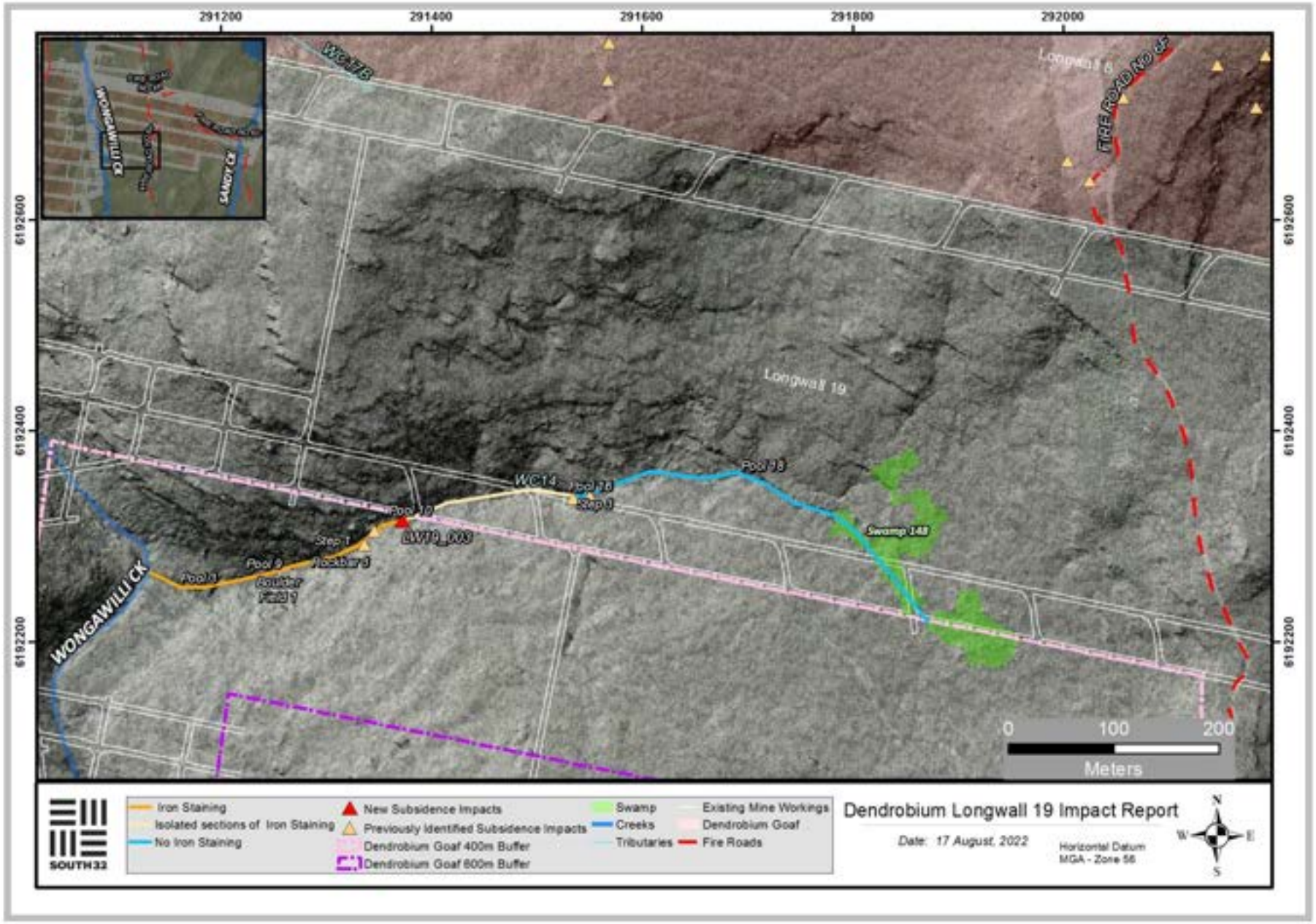

Figure 1: Map showing latest subsidence impacts and trigger sites. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Watercourse TARP.

WC13, WC14, WC15, WC16, WC17, WC17A, WC17B, SC7, SC10 and SC10C General observation of streams in active mining areas when longwall is within 400m	***Level 1*** • Crack or fracture up to 100mm width at its widest point with no observable loss of surface water or erosion • Crack or fracture up to 10m length with no observable loss of surface water or erosion • Erosion in a localised area (not associated with cracking or fracturing) which would be expected to naturally stabilise without CMA and within the period of monitoring • Observable release of strata gas at the surface • Observable increase in iron staining within the mining area	• Continue monitoring program • Submit an Impact Report to BCD, DPIE, DRG, Water NSW • Report in the End of Panel Report • Summarise actions and monitoring in AEMR
	Level 2 • Crack or fracture between 100 and 300mm width at its widest point or any fracture which results in observable loss of surface water or erosion • Crack or fracture between 10 and 50m length • Soil surface crack that causes erosion that is likely to stabilise within the monitoring period without intervention • Observable increase in iron staining within the mining area continues to outside the mining area i.e. 400m from the longwall	• *Actions as stated for Level 1* • Review monitoring frequency • Submit letter report to DPIE, DRG and Water NSW and seek advice on any CMA required • Implement agreed CMAs as approved (subject to agency feedback)
	Level 3 • Crack or fracture over 300mm width at its widest point • Crack or fracture over 50m length • Fracturing observed in the bedrock base of any significant permanent pool which results in observable loss of surface water • Soil surface crack that causes erosion that is unlikely to stabilise within the monitoring period without intervention • Gas release results in vegetation dieback, mortality or loss of aquatic habitat • Observable increase in iron staining within the mining area continues more than 600m from the longwall	• *Actions as stated for Level 2* • Offer site visit with BCD, DPIE, DRG, Water NSW • Implement additional monitoring or increase frequency if required • Develop site CMA (subject to agency feedback). This may include: grouting of rockbar and bedrock base of any significant pool where it is appropriate to do so in consultation with BCD, DPIE, DRG, Water NSW • Completion of works following approvals and at a time agreed between S32, DPIE, DRG and Water NSW (i.e. may be after mining induced movements and impacts are complete), including monitoring and reporting on success • Review relevant TARP and Management Plan in consultation with key agencies

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	This Report

DENDROBIUM AREA 3A, ILLAWARRA METALLURGICAL COAL

IMPACT REPORT

23 August 2022

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 20 August 2022 had progressed approximately 395m. During a recent inspection, two new subsidence impacts were identified.

DA3A_LW19_004 (E 292690, N 6192352)

DA3A_LW19_004 is located on a steep slope/ step west of Swamp 15b (Figure 1). The impact was identified on 19 August 2022, consisting of rock fracturing and fragmentation. The rock fracturing has an approximate maximum length of 1.5m and a maximum width of 0.05m (Photo 1). The rock fragmentation has an approximate volume of 0.3m x 0.2m x 0.15m. Measurements have been estimated due to safety concerns.

*DA3A_LW19_*004 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 10m length
- Crack or fracture up to 100mm width

Photo 1: *DA3A_LW19_004,* looking at rock fracturing and fragmentation. Taken on 19/08/2022.

DA3A_LW19_005 (E 292674, N 6192330)

DA3A_LW19_005 is located on a steep slope/ step west of Swamp 15b (Figure 1). The impact was identified on 19 August 2022, consisting of two rock fractures. The rock fracturing has maximum continuous length of 2.59m, a width of 0.035m and a maximum measurable depth of 0.37m (Photo 2 to Photo 4). Minor rock displacement from the soil is present.

*DA3A_LW19_*005 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 10m length
- Crack or fracture up to 100mm width

Photo 2: *DA3A_LW19_005,* looking at section of rock fracturing. Taken on 19/08/2022.

Photo 3: *DA3A_LW19_005,* looking at section of rock fracturing. Taken on 19/08/2022.

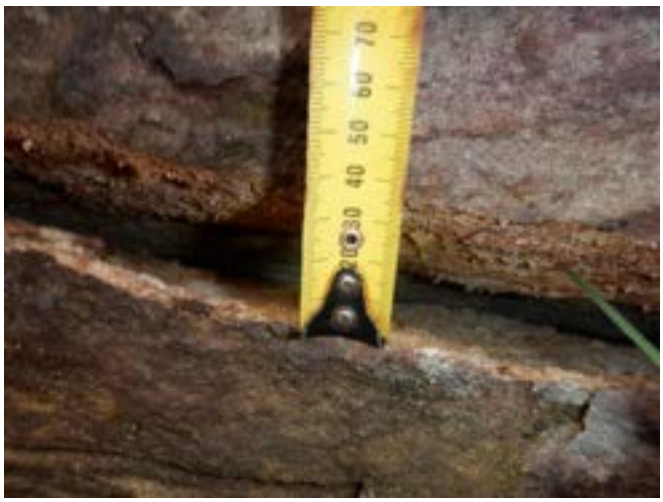

Photo 4: *DA3A_LW19_005,* looking at width of rock fracture. Taken on 19/08/2022.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review

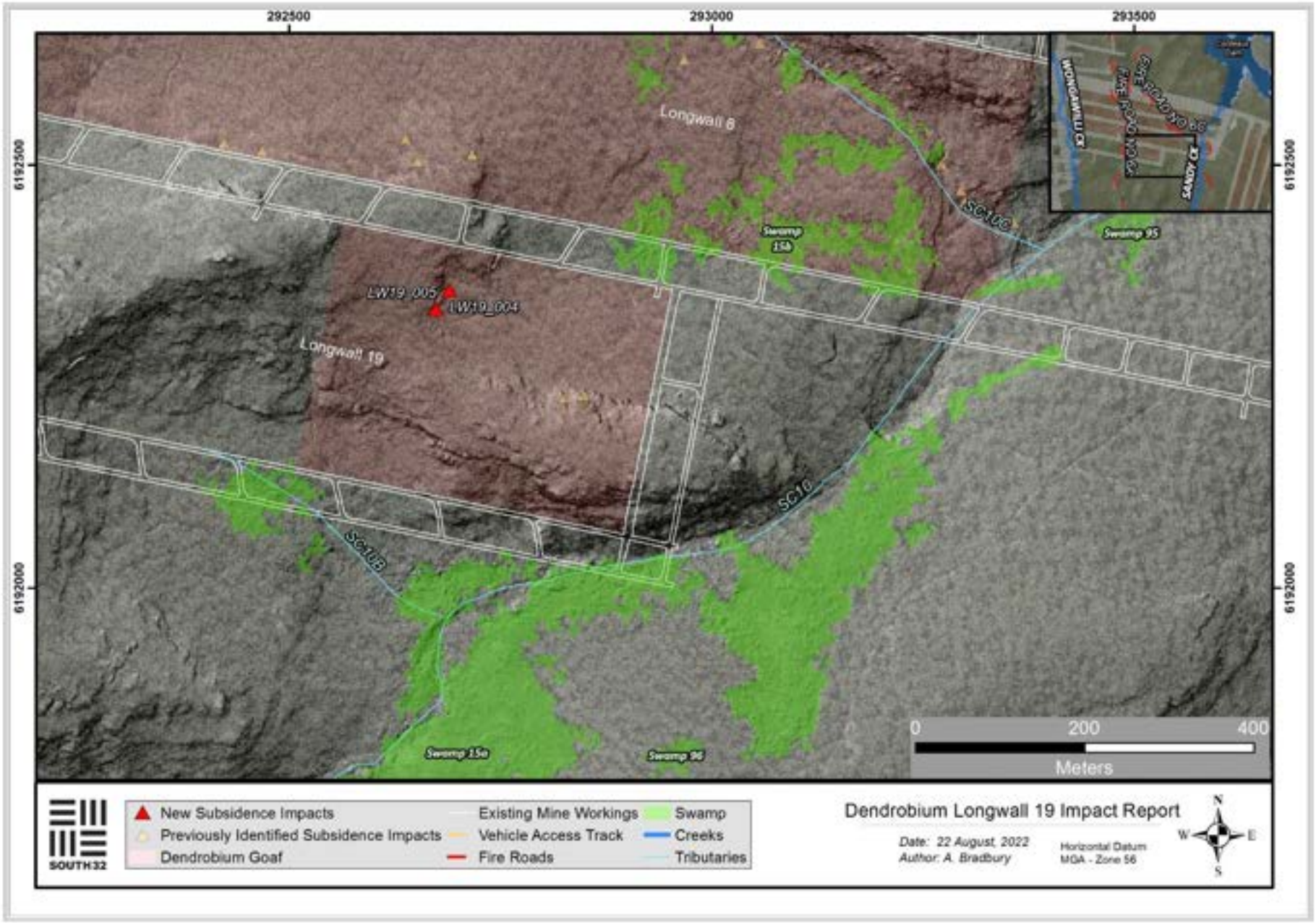

Figure 1: Map showing latest subsidence impacts and trigger sites. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/08/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	This Report
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 30 August 2022 had progressed approximately 463m. During a recent inspection, one new subsidence impact was identified.

DA3A_LW19_006 (E 292955, N 6192582)

DA3A_LW19_006 is located approximately 150m south of tributary SC10C (Figure 1). The impact was identified on 31 August 2022 and consists of soil cracking. The soil cracking has a maximum continuous length of 2.5m (Photo 1), a maximum discontinuous length of 10m and maximum measurable depth of 1.1m. The soil crack has a maximum width of 0.14m (Photo 3). Surface erosion at the site has a maximum width of 0.7m (Photo 2). Flagging tape is in place as a safety precaution. This impact likely occurred due to the mining of Longwall 8 but was not identified during previous inspections.

DA3A_LW19_006 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100mm and 300mm width

Photo 1: Maximum continuous length of soil cracking (measuring tape set at 2.5m). Taken 31/08/2022.

Photo 2: Width of surface erosion. Taken 31/08/2022.

Photo 3: Width of soil crack. Taken 1/09/2022.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review
- Review monitoring frequency
- Notify relevant technical specialists and seek advice on any CMA required
- Provide safety signage and barricades as appropriate
- Implement agreed CMAs as approved

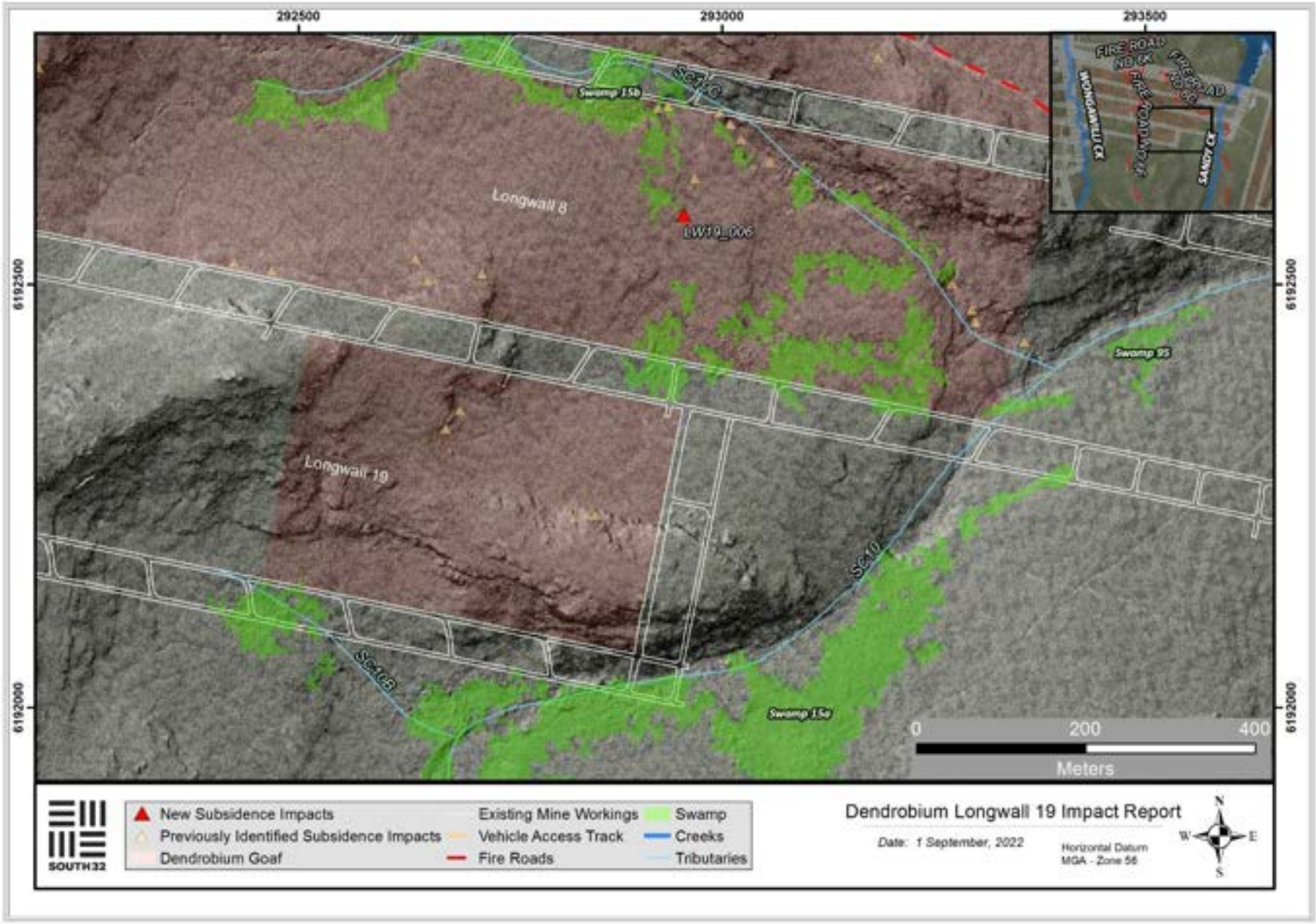

Figure 1: Map showing latest subsidence impacts and trigger sites. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

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DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/08/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Longwall 19. Extraction of Longwall 19 commenced 20 June 2022 and as of 17 October 2022 had progressed approximately 708m. During a recent inspection, one new subsidence impact was identified.

DA3A_LW19_007 (E 292579, N 6192537)

DA3A_LW19_007 was identified on 18 October 2022 and consists of soil cracking, located 100m to the north of Longwall 19 (Figure 1). The soil cracking is situated in bushland and runs parallel to a closed access track. The cracking has a maximum continuous length of 2.4m, a maximum width of 0.08m and maximum measurable depth of 0.4m (Photo 1 to Photo 4). It has a total discontinuous length of approximately 50m. In some sections, the soil is displaced from adjacent rock outcropping (Photo 2). This impact likely occurred during Longwall 8 but was only identified during the latest inspection of the area. Some sections of the soil cracking indicate more recent movements, likely due to Longwall 19.

DA3A_LW19_007 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100 width;
- Crack or fracture up to 10m length.

Photo 1: *DA3A_LW19_007*, section of soil cracking. Taken on 18/10/2022.

Photo 2: *DA3A_LW19_007*, width of soil cracking. Taken on 18/10/2022.

Photo 3: *DA3A_LW19_007*, depth of soil cracking. Taken on 18/10/2022.

Photo 4: *DA3A_LW19_007*, section of soil cracking. Taken on 18/10/2022.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP
- Report impacts to key stakeholders (Biodiversity Conservation and Science Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review

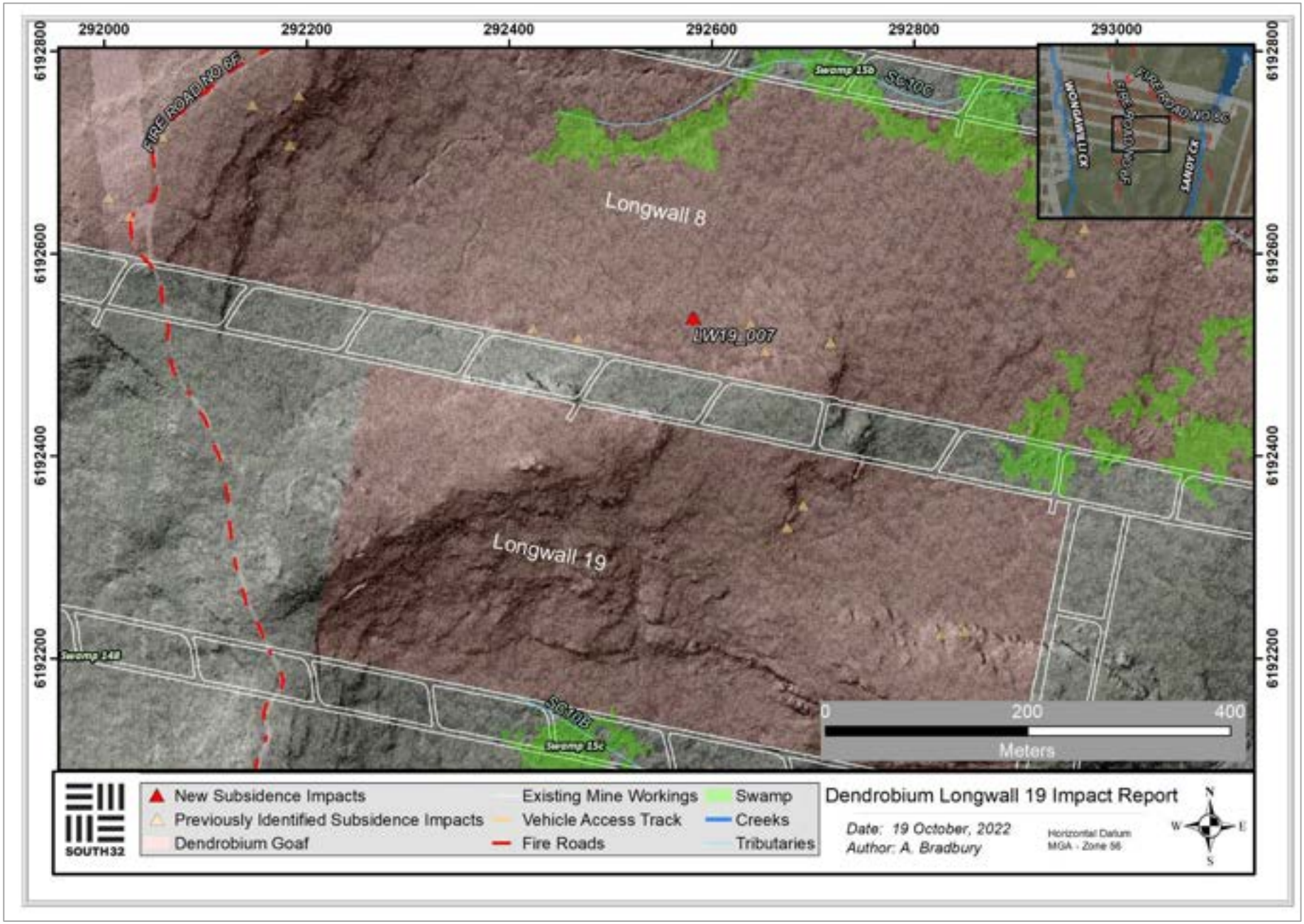


Figure 1: Map showing latest subsidence impacts and trigger sites. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/08/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Longwall 19 in Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 6 November 2022 had progressed approximately 815m. During a recent inspection, conducted on the 7 November 2022, nine new subsidence impacts were identified.

DA3A_LW19_008 (E 292201, N 6192364)

DA3A_LW19_008 is located 80m east of Fire Road 6F and consists of rock fracturing to a rock outcrop (Figure 1). The fracturing has a maximum continuous length of 5.4m, a maximum width of 0.028m and maximum measurable depth of 1.539m (Photo 1 and Photo 2). The fracture has a total discontinuous length of approximately 22m. Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_008 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 1: *DA3A_LW19_008*, section of rock fracturing. Taken on 7/11/2022.

Photo 2: *DA3A_LW19_008*, width of rock fracturing. Taken on 7/11/2022.

DA3A_LW19_009 (E 292218, N 6192350)

DA3A_LW19_009 is located 95m east of Fire Road 6F and consists of rock fracturing to a rock outcrop (Figure 1). The fracturing has a maximum continuous length of 7.44m, a maximum width of 0.016m and maximum

measurable depth of 0.043m (Photo 3 and Photo 4). The fracture has a total discontinuous length of approximately 48m. Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_009 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 3: *DA3A_LW19_009*, section of rock fracturing. Taken on 7/11/2022.

Photo 4: *DA3A_LW19_009*, width of rock fracturing. Taken on 7/11/2022.

DA3A_LW19_010 (E 292242, N 6192320)

DA3A_LW19_010 is located 115m east of Fire Road 6F and consists of rock fracturing to a rock outcrop (Figure 1). The fracturing has a maximum continuous length of 2.8m, a maximum width of 0.012m and maximum measurable depth of 0.29m (Photo 5 and Photo 6). Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_010 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 5: *DA3A_LW19_010*, section of rock fracturing. Taken on 7/11/2022.

Photo 6: *DA3A_LW19_010*, width of rock fracturing. Taken on 7/11/2022.

DA3A_LW19_011 (E 292252, N 6192308)

DA3A_LW19_011 is located 115m east of Fire Road 6F and consists of two rock fractures to a rock outcrop (Figure 1). The fracturing has a maximum continuous length of 4m and a maximum width of 0.003m (Photo 7 and Photo 8). Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_011 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 7: *DA3A_LW19_011*, section of rock fracturing. Taken on 7/11/2022.

Photo 8: *DA3A_LW19_011*, width of rock fracturing. Taken on 7/11/2022.

DA3A_LW19_012 (E 292290, N 6192348)

DA3A_LW19_012 is located 165m east of Fire Road 6F and consists of rock fracturing to a rock outcrop (Figure 1). The fracturing has a maximum continuous length of 5.7m, a maximum width of 0.008m and maximum measurable depth of 0.17m (Photo 9 and Photo 10). The fracture has a total discontinuous length of approximately 9.5m. Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_012 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 9: *DA3A_LW19_012*, section of rock fracturing. Taken on 7/11/2022.

Photo 10: *DA3A_LW19_012*, width of rock fracturing. Taken on 7/11/2022.

DA3A_LW19_013 (E 292246, N 6192357)

DA3A_LW19_013 is located 120m east of Fire Road 6F and consists of rock fracturing and rock movement to a steep slope/step (Figure 1). The fracturing has a maximum continuous length of 1.8m, a maximum width of 0.105m and maximum measurable depth of 2.3m (Photo 11 and Photo 12). Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_012 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100mm and 300mm width.

Photo 11: *DA3A_LW19_013*, section of rock fracturing. Taken on 7/11/2022.

Photo 12: *DA3A_LW19_013*, width of rock fracturing. Taken on 7/11/2022.

DA3A_LW19_014 (E 292448, N 6192427)

DA3A_LW19_014 is located 350m east of Fire Road 6F and consists of the movement of a boulder (Figure 1). The boulder has been dislodged from its natural position and rolled forward approximately 1m. The boulder has a length of 3.4m, a width of 2.5m, height of 1.1m and an approximate volume of ≈9.35m^3 (Photo 13 and Photo 14). Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_014 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Surface movement or rock displacement with negligible soil surface exposed.

Photo 13: *DA3A_LW19_014*, looking at the displacement of the boulder. Taken on 7/11/2022.

Photo 14: *DA3A_LW19_014*, looking at the displacement of the boulder. Taken on 7/11/2022.

DA3A_LW19_015 (E 292738, N 619127)

DA3A_LW19_015 is located 100m north of Swamp 15a and consists of a rock fracture to a steep slope/step (Figure 1). The following measurements have been estimated from a distance due to safety concerns. The fracturing has a length of 1m, a maximum width of 0.30m and maximum depth of 3m (Photo 15). Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_015 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100mm and 300mm width

Photo 15: *DA3A_LW19_015*, section of rock fracturing.
Taken on 7/11/2022.

DA3A_LW19_016 (E 292449, N 6192346)

DA3A_LW19_016 is located 320m east of Fire Road 6F and consists of two rock fractures and associated displacement at a steep slope/step (Figure 1). The following measurements have been estimated from a distance due to safety concerns. The largest fracture has a length of 2m and a maximum width of 0.1m. The rock displacement/fragmentation has approximate dimensions of 1.3m x 0.8m x 0.5m. Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_016 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100mm and 300mm width.

Photo 16: *DA3A_LW19_016*, section of rock fracturing. Taken on 7/11/2022.

Photo 17: *DA3A_LW19_016*, section of rock fracturing. Taken on 7/11/2022.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the Longwall 19 SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review
- Review monitoring frequency
- Notify relevant technical specialists and seek advice on any CMA required
- Provide safety signage and barricades as appropriate
- Implement agreed CMAs as approved

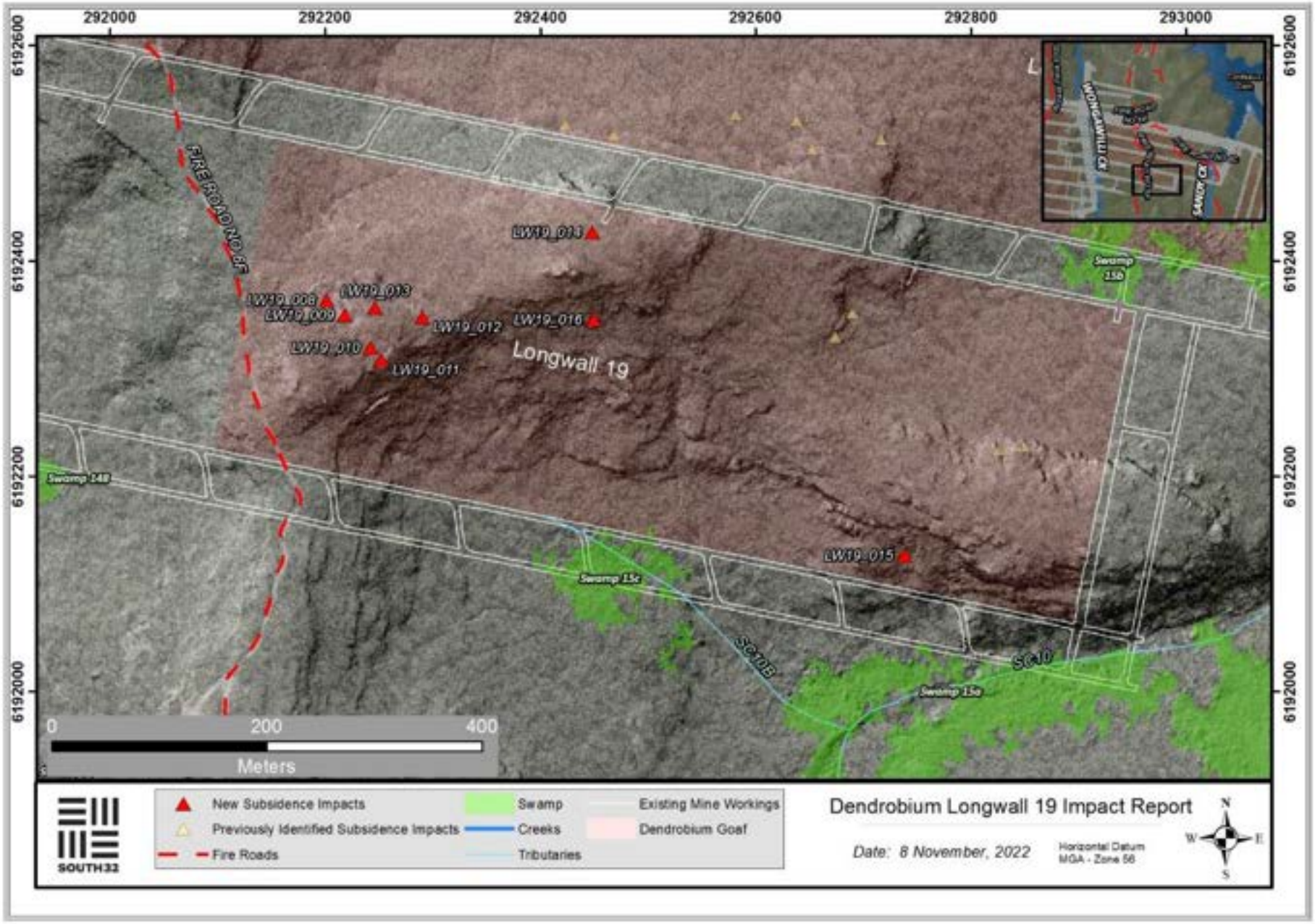


Figure 1: Map showing latest subsidence impacts and trigger sites. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	This Report
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	This Report
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	This Report
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	This Report
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	This Report
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	This Report
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	This Report
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	This Report

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 11 December 2022 had progressed approximately 1040m. During a recent inspection, seven new subsidence impacts were identified.

DA3A_LW19_017 (E 292245, N 6192382)

DA3A_LW19_017 is located 130m east of Fire Road 6F and consists of rock fracturing to a rock outcrop (Figure 1). The fracturing has a maximum continuous length of 2.8m and a maximum width of 0.001m (Photo 1 and Photo 2).

DA3A_LW19_017 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 1: *DA3A_LW19_017*, section of rock fracturing. Taken on 13/12/2022.

Photo 2: *DA3A_LW19_017*, width of rock fracturing. Taken on 13/12/2022.

DA3A_LW19_018 (E 292388, N 6192402)

DA3A_LW19_018 is located approximately 280m east of Fire Road 6F and consists of rock displacement away from soil (Figure 1). The displacement has a maximum continuous length of 1.1m, a maximum width of 0.015m and maximum measurable depth of 0.22m (Photo 3 and Photo 4).

DA3A_LW19_018 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;

- Crack or fracture up to 10m length.

Photo 3: *DA3A_LW19_018*, section of rock displacement. Taken on 13/12/2022.

Photo 4: *DA3A_LW19_018*, width of rock displacement. Taken on 13/12/2022.

DA3A_LW19_019 (E 292408, N 6192390)

DA3A_LW19_019 is located approximately 290m east of Fire Road 6F and consists of multiple rock displacements away from soil within a 10m x 2m area (Figure 1). The displacement has a maximum continuous length of 2.8m, a maximum width of 0.086m and maximum measurable depth of 1m (Photo 5 and Photo 6).

DA3A_LW19_019 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 5: *DA3A_LW19_019*, section of rock displacement. Taken on 13/12/2022.

Photo 6: *DA3A_LW19_019*, width of rock displacement. Taken on 13/12/2022.

DA3A_LW19_020 (E 292448, N 6192368)

DA3A_LW19_020 is located approximately 330m east of Fire Road 6F and consists of soil cracking to the base of a rock outcrop (Figure 1). The soil cracking has a discontinuous length of 7m, a maximum continuous length of 3.1m, a maximum width of 0.10m and maximum measurable depth of 1.2m (Photo 7 and Photo 8). Barricading is not appropriate as the site is located in remote bushland.

DA3A_LW19_020 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100 and 300mm width.

Photo 7: *DA3A_LW19_020*, section of soil cracking. Taken on 13/12/2022.

Photo 8: *DA3A_LW19_020*, width of soil cracking. Taken on 13/12/2022.

DA3A_LW19_021 (E 292491, N 6192387)

DA3A_LW19_021 is located approximately 370m east of Fire Road 6F and consists of soil cracking and rock displacement to boulders (Figure 1). The soil cracking has a maximum continuous length of 3.7m, a maximum width of 0.15m and maximum measurable depth of 1.1m (Photo 9 to Photo 12). Barricading is not appropriate as the site is located in remote bushland.

DA3A_LW19_021 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100 and 300mm width

Photo 9: *DA3A_LW19_021*, section of soil cracking. Taken on 13/12/2022.

Photo 10: *DA3A_LW19_021*, section of rock displacement. Taken on 13/12/2022.

Photo 11: *DA3A_LW19_021*, depth of soil cracking. Taken on 13/12/2022.

Photo 12: *DA3A_LW19_021*, width of soil cracking. Taken on 13/12/2022.

DA3A_LW19_022 (E 292503, N 6192363)

DA3A_LW19_022 is located approximately 380m east of Fire Road 6F and consists of multiple soil cracks, rock fractures and rock displacements (Figure 1). The soil cracking has a discontinuous length of 30m, a maximum continuous length of 3.5m, a maximum width of 0.18m and maximum measurable depth of 6m (Photo 15 and Photo 16). The rock fracturing has a maximum length of 1.2m, a maximum width of 0.13m and maximum measurable depth of 2.4m (Photo 13 and Photo 14). Flagging tape has been placed at the site.

DA3A_LW19_022 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100 and 300mm width

Photo 13: *DA3A_LW19_022*, section of rock fracturing. Taken on 13/12/2022.

Photo 14: *DA3A_LW19_022*, width of rock fracturing. Taken on 13/12/2022.

Photo 15: *DA3A_LW19_022*, section of rock displacement. Taken on 13/12/2022.

Photo 16: *DA3A_LW19_022*, section of soil cracking. Taken on 13/12/2022.

DA3A_LW19_023 (E 292508, N 6192390)

DA3A_LW19_023 is located approximately 395m east of Fire Road 6F and consists of rock fracturing (Figure 1). The rock fracturing has a maximum continuous length of 2m (partially cover by sediment), a maximum width of 0.065m and maximum measurable depth of 0.9m (Photo 17 and Photo 18).

DA3A_LW19_013 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 17: *DA3A_LW19_023*, section of rock displacement. Taken on 13/12/2022.

Photo 18: *DA3A_LW19_023*, width of rock displacement. Taken on 13/12/2022.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review
- Review monitoring frequency
- Notify relevant technical specialists and seek advice on any CMA required
- Provide safety signage and barricades as appropriate
- Implement agreed CMAs as approved

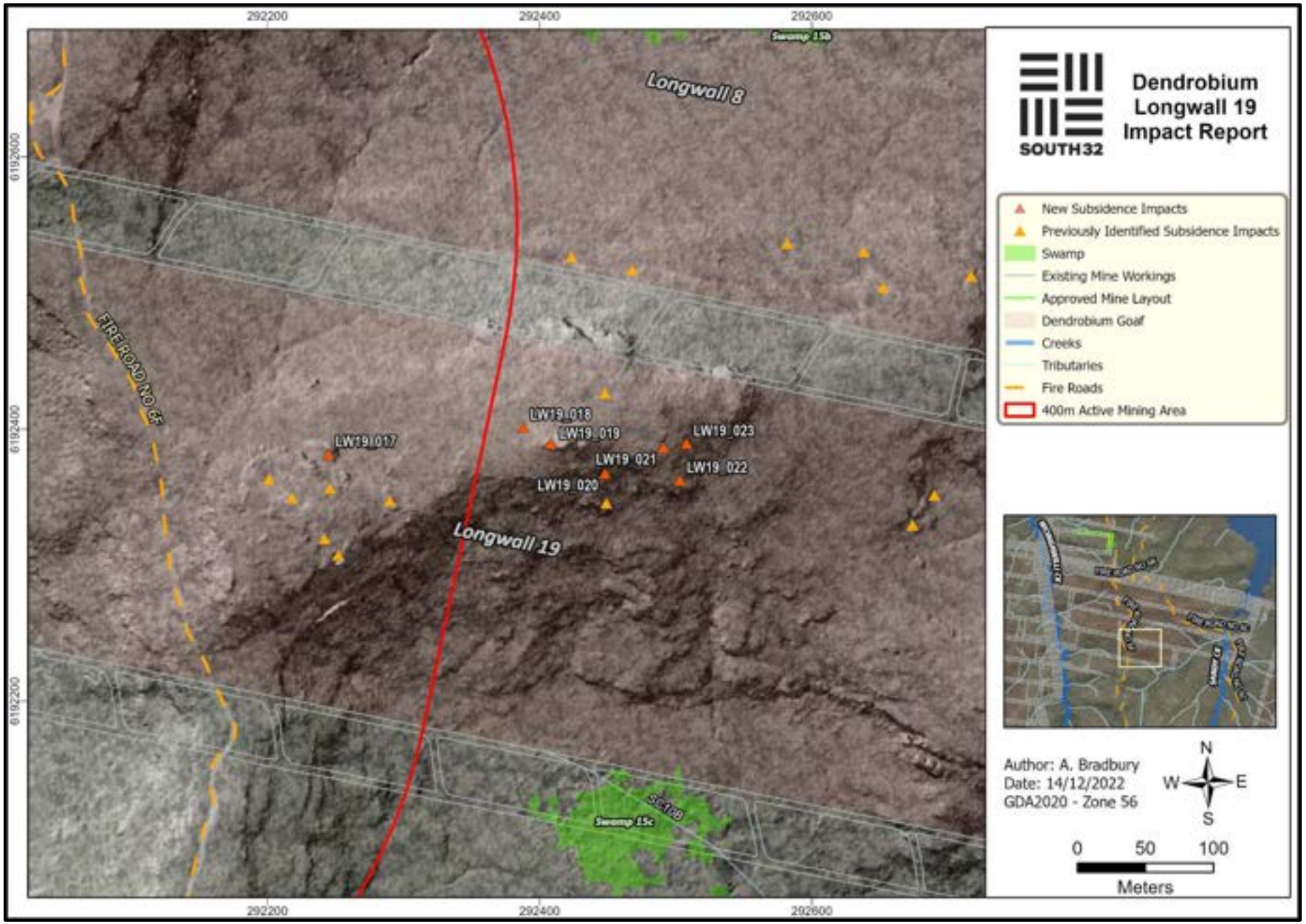


Figure 1: Map showing latest subsidence impacts. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1*** * • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	This Report
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	This Report
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	This Report
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	This Report
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	This Report
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	This Report
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 20 December 2022 had progressed approximately 1087m. During a recent inspection, three new subsidence impacts were identified and updates to two previously reported subsidence impacts, included below. Additionally, analysis of latest soil moisture data in *Swamp 148* show a trigger at site *S148_01*, details are also included in this report.

DA3A_LW19_024 (E 292660, N 6192191)

DA3A_LW19_024 is located 490m east of Fire Road 6F and consists of rock fracturing to steep slope/step and soil cracking (Figure 1). The rock fracturing and soil cracking are connected, with a maximum continuous length of 5m, a maximum width of 0.16m and a maximum measurable depth of 1.5m (Photo 1 to Photo 3). Other smaller rock fractures are also present within a 25m^2 area (Photo 4). Flagging tape has been placed at the site.

DA3A_LW19_024 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100mm and 300mm width.

Photo 1: *DA3A_LW19_024*, section of rock fracturing. Taken on 20/12/2022.

Photo 2: *DA3A_LW19_024*, section of soil cracking. Taken on 20/12/2022.

Photo 3: *DA3A_LW19_024*, width of soil cracking. Taken on 20/12/2022.

Photo 4: *DA3A_LW19_024*, section of rock fracturing. Taken on 20/12/2022.

DA3A_LW19_025 (E 292763, N 6192156)

DA3A_LW19_025 is located approximately 590m east of Fire Road 6F and consists of rock displacement away from soil (Figure 1). The displacement has a maximum continuous length of 6.2m, a maximum width of 0.07m and maximum measurable depth of 0.32m (Photo 5 and Photo 6).

DA3A_LW19_025 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 5: *DA3A_LW19_025*, section of rock displacement. Taken on 20/12/2022.

Photo 6: *DA3A_LW19_025*, width of rock displacement. Taken on 20/12/2022.

DA3A_LW19_026 (E 292083, N 6192457)

DA3A_LW19_026 is located on Fire Road 6F and consists of soil cracking (Figure 1). The soil cracking has an approximate discontinuous length of 12m, a maximum continuous length of 6m, a maximum width of 0.05m and maximum measurable depth of approximately 0.2m (Photo 7 and Photo 8).

DA3A_LW19_026 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 7: *DA3A_LW19_026*, section of soil cracking. Taken on 21/12/2022.

Photo 8: *DA3A_LW19_026*, section of soil cracking. Taken on 21/12/2022.

DA3A_LW19_015 (Update) (E 292545, N 6192234)

DA3A_LW19_015 is located approximately 390m east of Fire Road 6F and consists of a rock fracture to a steep slope/step (Figure 1). The rock fracturing has a maximum length of 1.2m, a maximum width of 0.20m and maximum measurable depth of 3m (Photo 9 and Photo 10). Measurements were previously estimated due to safety concerns. Other smaller rock fractures are also present (Photo 11 and Photo 12). Flagging tape is in place at the site as a safety precaution. Site coordinates have been corrected due to an error in previous reporting.

DA3A_LW19_015 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100mm and 300mm width

Photo 9: *DA3A_LW19_015*, section of rock fracturing. Taken on 20/12/2022.

Photo 10: *DA3A_LW19_015*, width of rock fracturing. Taken on 20/12/2022.

Photo 11: *DA3A_LW19_015*, section of rock fracturing. Taken on 20/12/2022.

Photo 12: *DA3A_LW19_015*, section of rock fracturing. Taken on 20/12/2022.

DA3A_LW19_016 (Update) (E 292523, N 6192252)

DA3A_LW19_016 is located 380m east of Fire Road 6F and consists of rock fracturing, fragmentation and fall (Figure 1). The rockfall has an approximate volume of $1m^3$ (Photo 13). The largest fracture has an approximate length of 2m and a maximum approximate width of 0.1m (Photo 14 and Photo 15). Measurements have been

estimated due to safety concerns. Flagging tape is in place at the site as a safety precaution. Site coordinates have been corrected due to an error in previous reporting.

DA3A_LW19_016 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100mm and 300mm width.

Photo 13: *DA3A_LW19_016*, section of rock fall. Taken on 20/12/2022.

Photo 14: *DA3A_LW19_016*, width of rock fracturing. Taken on 20/12/2022.

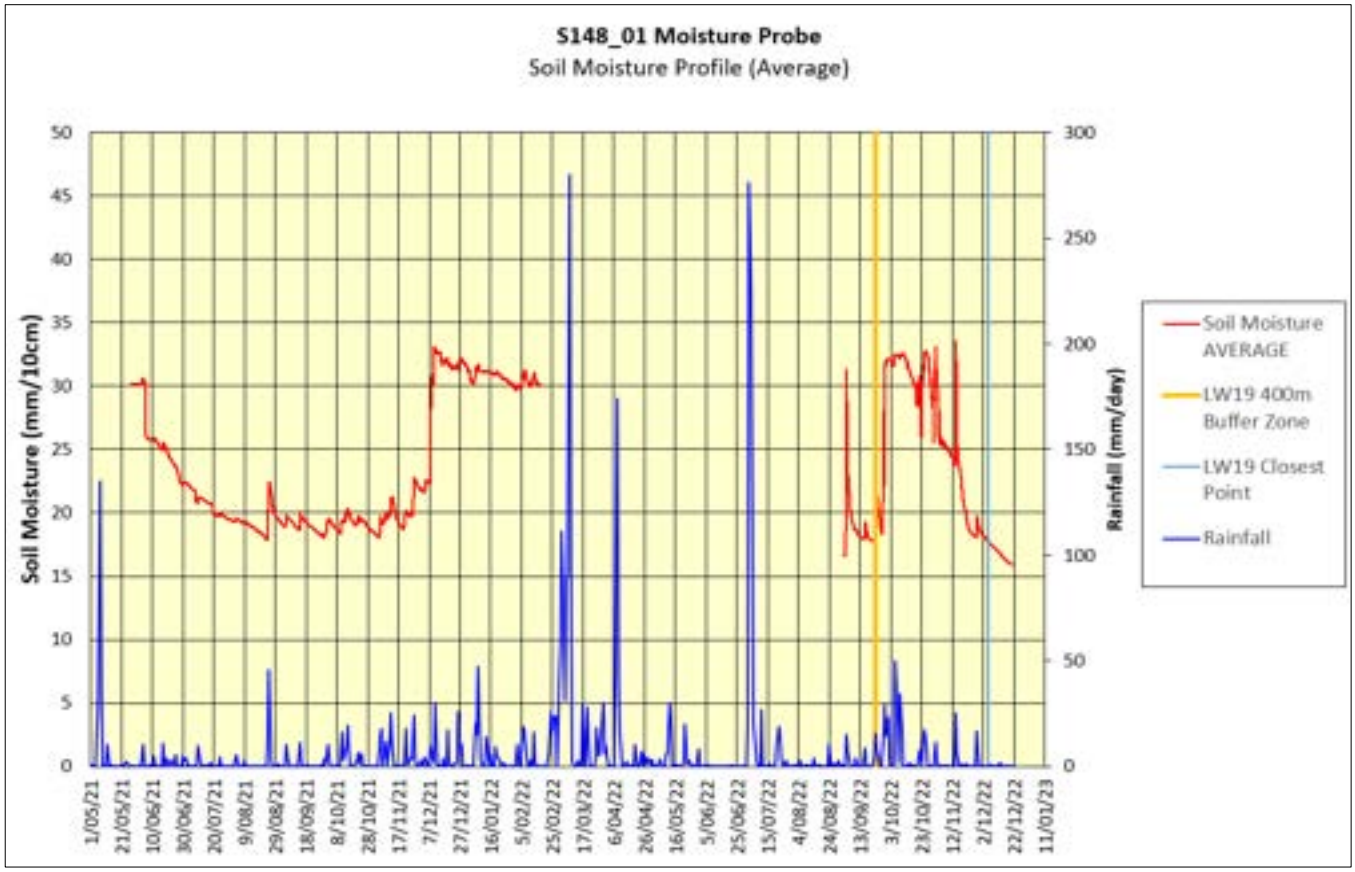
Photo 15: *DA3A_LW19_016*, section of rock fragmentation. Taken on 20/12/2022.

Swamp 148

A soil moisture probe and datalogger were installed at site *S148_01* in May 2021 (Figure 1). This site is situated, at its closest point, approximately 47m south of Longwall 19. Site *S148_01* entered the 400m buffer zone of LW19 on 23 September 2022 and was passed by LW19 on 05 December 2022. Analysis of records at *S148_01* show the average soil moisture data being lower than the lowest data recorded during the baseline period (Graph 1).

Soil moisture results at *S148_01* contribute to a Level 3 trigger according to the Longwall 19 Swamp Impact, Monitoring, Management and Contingency Plan (Table 2), specifically:

- Soil moisture level lower than baseline level at >80% of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps). NOTE there is only one probe installed in the swamp.



Graph 1: Average soil moisture records at S148_01, logged hourly. Date range: 27/05/2021 to 20/12/2022

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review
- Review monitoring frequency
- Notify relevant technical specialists and seek advice on any CMA required
- Provide safety signage and barricades as appropriate
- Implement agreed CMAs as approved

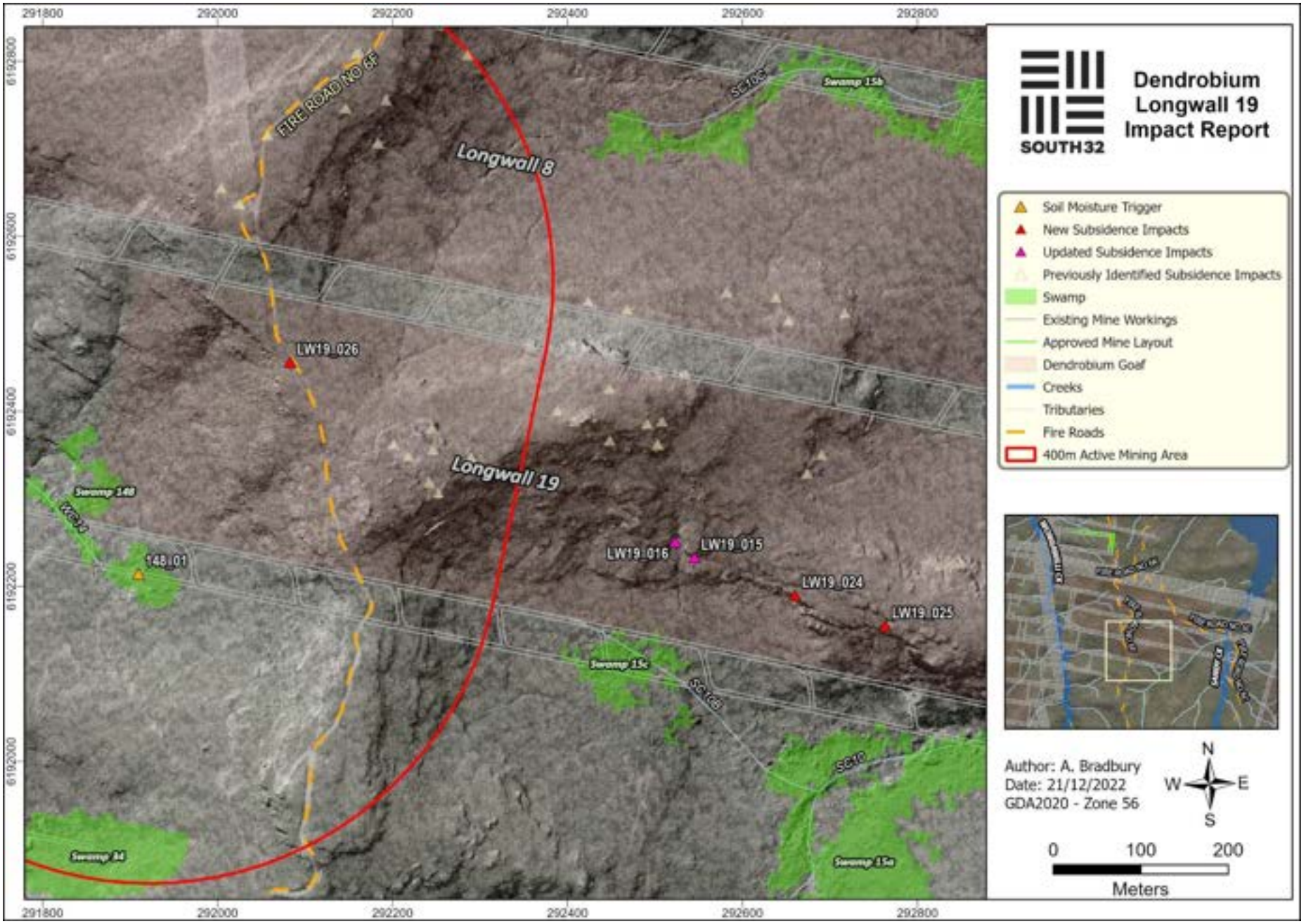


Figure 1: Map showing latest subsidence impacts. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Extract from Dendrobium Swamps Impacts, Triggers and Response Plan.

Performance Measures	***Potential Impacts***	***Performance Triggers***	***Management Strategies***	***Offsets***	***Other Actions***
Minor changes in the ecosystem functionality of the swamps	Falls in soil moisture levels in swamps *NB. Not linked specifically to a PM and would not be considered a breach if predictions were exceeded.*	*Level 1:* Soil moisture level lower than baseline level at **any** monitoring sites (within 400 m of mining) within a swamp (in comparison to reference swamps). *Level 2:* Soil moisture level lower than baseline level at **50%** of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps). *Level 3:* Soil moisture level lower than baseline level at **>80%** of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps).	a) upfront mine planning b) soil moisture monitoring c) water spreading d) weeding e) fire management f) reporting g) update future predictions		Triggers of soil moisture decline result in increased intensity and frequency of vegetation monitoring and/or further investigations of subsidence impacts on bedrock base and rockbars

Table 3: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	This Report
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	This Report
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	This Report
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & This Report
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & This Report
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 8 January 2023 had progressed approximately 1190m. During a recent inspection, one new subsidence impact was identified.

DA3A_LW19_027 (E 292069, N 6192332)

DA3A_LW19_027 consists of rock fracturing and associated small rockfalls at a step approximately 55m west of Fire Road 6F (Figure 1). The rock fracturing has a discontinuous length of 9m, a maximum continuous length of 2.09m, a maximum width of 0.018m and a maximum measurable depth of 0.76m. Two small rockfalls are evident at the site, with approximate rockfall volumes of $1m^3$ and $0.5m^3$ (Photo 1 to Photo 4). Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_027 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

A summary of impacts and triggers recorded during Longwall 19 is presented in Table 2.

Photo 1: *DA3A_LW19_027*, section of rock fracturing and rockfall. Taken on 10/01/2023.

Photo 2: *DA3A_LW19_027*, section of rock fracturing and rockfall. Taken on 10/01/2023.

Photo 3: *DA3A_LW19_027*, section of rock fracturing and rockfall. Taken on 10/01/2023.

Photo 4: *DA3A_LW19_027*, section of rock fracturing. Taken on 10/01/2023.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review

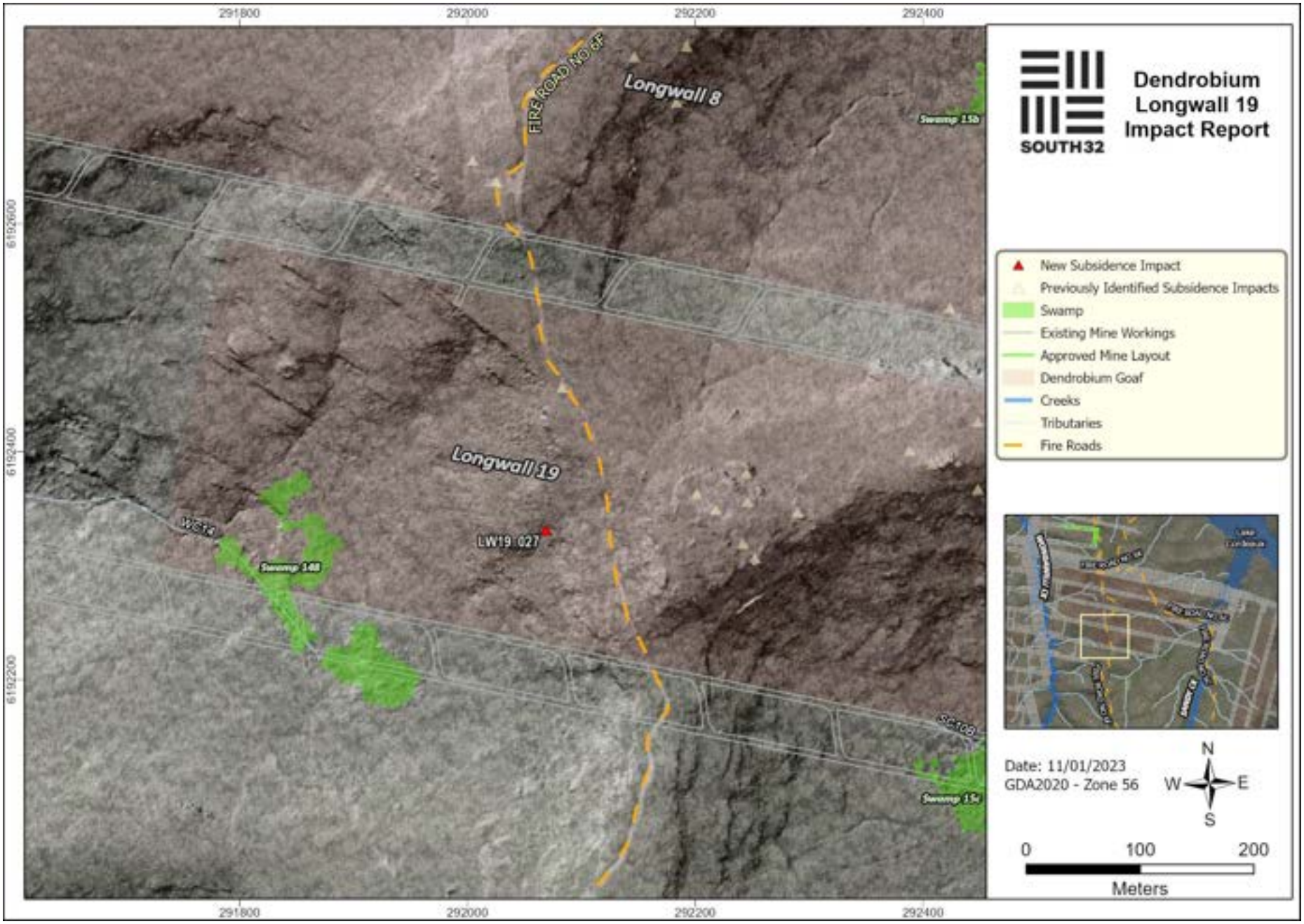


Figure 1: Map showing latest subsidence impact. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 5 February 2023 had progressed approximately 1371m. During recent inspections, one new subsidence impact was identified as well as a gas release in Wongawilli Creek. An update to a previously reported impact was also recently identified.

DA3A_LW19_028 (E 292172, N 6192301)

DA3A_LW19_028 consists of rock fracturing to a rock outcrop east of Fire Road 6F (Figure 1). The impact consists of three rock fractures within an area of 25m x 1m. The rock fracturing has a maximum continuous length of 5.86m, a maximum width of 0.016m and a maximum measurable depth of 0.4m.

DA3A_LW19_028 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 1: *DA3A_LW19_028*, section of rock fracturing. Taken on 6/02/2023.

Photo 2: *DA3A_LW19_028*, width of rock fracturing. Taken on 6/02/2023.

DA3A_LW19_029 (E 290816, N 6193699)

A gas release was observed in Wongawilli Creek at WC_Pool 50 on 18 January 2023. The release was observed originating from the base of a sandstone step on the western side of the pool (Photo 3). The release was constant for approximately 15 seconds and ceased for approximately one minute, before starting again in a similar interval. A period of approximately 10 minutes was then observed without release. Very light, intermittent bubbling was also observed from the centre of the pool however these were very small and not able to be photographed.

A follow-up inspection of the site was undertaken on 1 February 2023 to collect a gas sample for laboratory analysis and to determine whether the release was strata gas, as opposed to, for example, biological decomposition. During this inspection a similar release was observed from the same location on the western side of the pool (Photo 4). A light, intermittent release was observed towards the centre of the pool (Photo 5). A gas sample was taken from the release on the western margin of the pool. The release was intermittent during sampling as a constant release was not observed. Results of the gas sample are presented in Appendix A. Results of the analysis show mostly carbon dioxide and very low levels of methane. Methane content was lower than that expected from strata or in-seam gas. A light sheen was also observed on the surface of the pool during this inspection however this was similar to that observed at other sites around the catchment and is likely the result of natural oils derived from plant material or iron floc, originating upstream from a previously reported iron spring.

The gas release will be monitored and sampled again for further analysis if required.

DA3A_LW19_029 is a Level 1 trigger as per the Dendrobium Area 3A Watercourse TARP (Table 2), specifically:

- Observable release of strata *(unconfirmed)* gas at the surface.

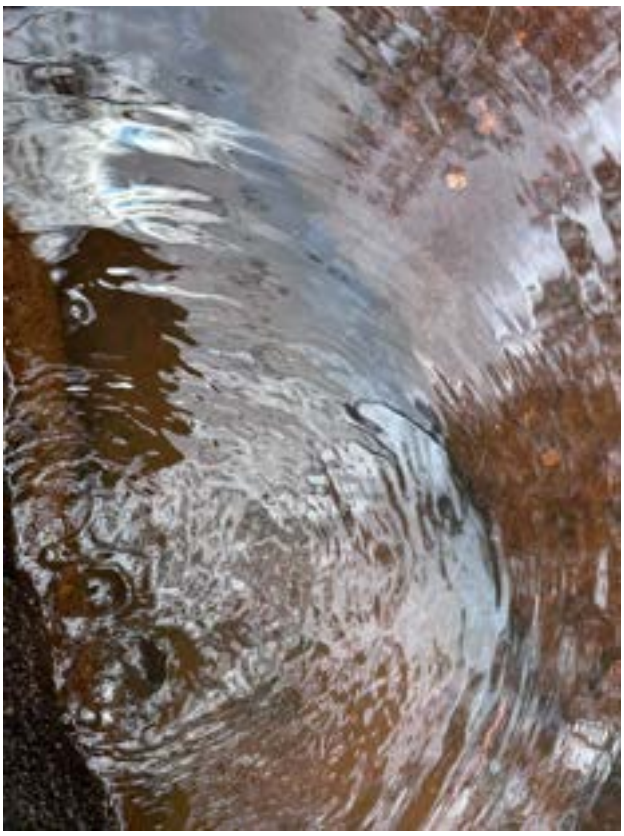


Photo 3: *DA3A_LW19_029*- gas release from base of sandstone ledge on the western side of WC_Pool 50, Wongawilli Creek. Taken on 18/01/2023.

Photo 4: *DA3A_LW19_029*- gas release from base of sandstone ledge on the western side of WC_Pool 50, Wongawilli Creek. Taken on 1/02/2023.

Photo 5: *DA3A_LW19_029*- small gas release observed towards the centre of WC_Pool 50, Wongawilli Creek. Taken on 1/02/2023

DA3A_LW19_025 (Update) (E 290816, N 6192156)

DA3A_LW19_025 was originally recorded on 20 December 2022 with changes to the impact recently observed. The impact consisted of rock displacement away from soil and soil cracking, located approximately 590m east of Fire Road 6F (Figure 1). The impact site now displays soil cracking and rock fracturing in addition to the previously reported displacement and cracking, that had an original length of 6.2m. The latest fracturing has a maximum continuous length of 1.96m, a maximum width of 0.096m and a maximum measurable depth of 1.13m. Other smaller fractures and soil cracks were observed over a total discontinuous length of approximately 23m, which includes the length of the originally reported displacement and soil cracking.

DA3A_LW19_025 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

A summary of impacts and triggers recorded during Longwall 19 is presented in Table 3.

Photo 6: *DA3A_LW19_025*, section of rock fracturing. Taken on 17/01/2023.

Photo 7: *DA3A_LW19_025*, width of rock fracturing. Taken on 17/01/2023.

Photo 8: *DA3A_LW19_025*, showing soil cracking. Taken on 17/01/2023

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review

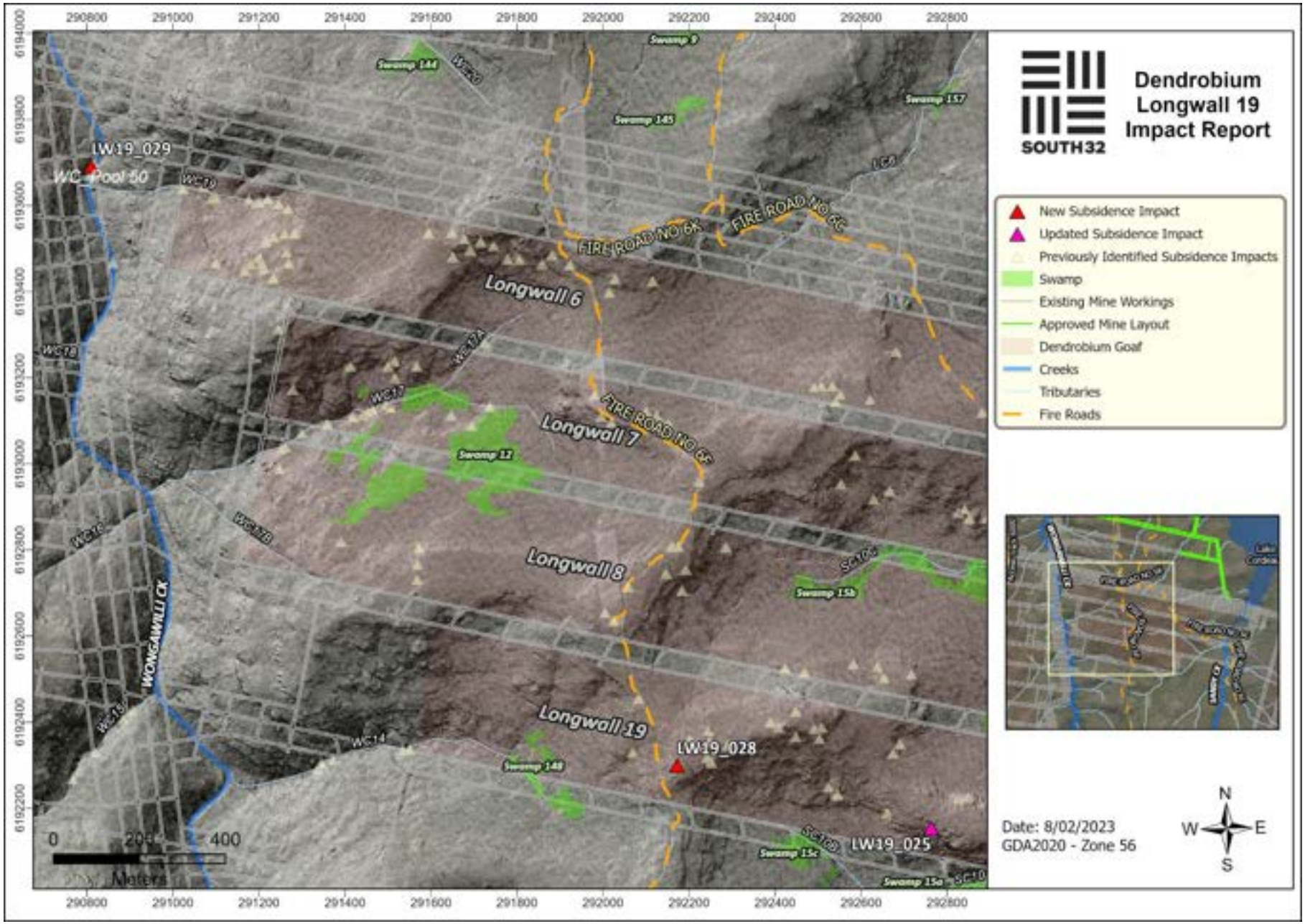


Figure 1: Map showing latest subsidence impacts. Inset shows main frame in relation to DA3A mining operations

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Extract from Dendrobium Area 3A Watercourse TARP.

OBSERVATIONAL MONITORING		
Sandy Creek and Wongawilli Creek **Relevant Performance Measure(s):** • Wongawilli Creek - minor environmental consequences • Sandy Creek - minor environmental consequences General observation of streams in active mining areas when longwall is within 400m	***Level 1*** • Crack or fracture up to 100mm width at its widest point with no observable loss of surface water or erosion • Crack or fracture up to 10m length with no observable loss of surface water or erosion • Erosion in a localised area (not associated with cracking or fracturing) which would be expected to naturally stabilise without CMA and within the period of monitoring • Observable release of strata gas at the surface • Observable increase in iron staining within the mining area • Observation that a pool on a subject Creek is dry • Observation that the subject Creek has ceased to flow	• Continue monitoring program • Submit an Impact Report to BCD, DPIE, DRG, Water NSW • Report in the End of Panel Report • Summarise actions and monitoring in AEMR
	Level 2 • Observation that a single pool on a subject Creek is dry in consecutive monitoring events • Observation that two or more pools on a subject Creek are dry in a single monitoring event • Observation that the subject Creek has ceased to flow in consecutive monitoring event	• *Actions as stated for Level 1* • Carry out Water Flow Assessment Method D • Review monitoring frequency • Submit letter report to DPIE, DRG and Water NSW and seek advice on any CMA required • Implement agreed CMAs as approved (subject to agency feedback)
	• Crack or fracture between 100 and 300mm width at its widest point or any fracture which results in observable loss of surface water or erosion • Crack or fracture between 10 and 50m length • Soil surface crack that causes erosion that is likely to stabilise within the monitoring period without intervention • Observable increase in iron staining within the mining area continues to outside the mining area i.e. 400m from the longwall	• *Actions as stated for Level 1* • Review monitoring frequency • Submit letter report to DPIE, DRG and Water NSW and seek advice on any CMA required • Implement agreed CMAs as approved (subject to agency feedback)
	Level 3 • Crack or fracture over 300mm width at its widest point • Crack or fracture over 50m length • Fracturing observed in the bedrock base of any significant permanent pool which results in observable loss of surface water • Soil surface crack that causes erosion that is unlikely to stabilise within the monitoring period without intervention	• *Actions as stated for Level 2* • Offer site visit with BCD, DPIE, DRG, Water NSW • Implement additional monitoring or increase frequency if required • Develop site CMA (subject to agency feedback). This may include: grouting of rockbar and bedrock base of any significant pool where it is appropriate to do so in consultation with BCD, DPIE, DRG, Water NSW • Completion of works following approvals and at a time agreed between S32, DPIE, DRG and Water NSW (i.e. may be after mining induced

Table 3: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate observations featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148*.	22/12/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	This Report
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	This Report
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and This Report

Appendix A- Laboratory results for gas sample collected from WC_Pool 50 on Wongawilli Creek

ILLAWARRACOAL
Pride, passion, performance.

Gas Laboratory
Illawarra Coal Holdings
Coal
South32

GAS COMPOSITION REPORT - GAS BAG

Report Number: **2302014**	*Issue Number:* **01**	*Date of Issue:* 06/02/2023
To: Environment Field Team	*Attention:* Gary Brassington / Josh Carlon	

Sample Details:

Collar Location: WC - POOL 50 (WONGAWILLI CK)		
Sampled By: ENVIRO FIELD CREW	*Sampling Date:* 01/02/2023	*Sampling Time:* 12:30
Comments:		

Gas Composition:

Analyte	As Received Basis		Air-Free Basis	
oxygen	15.9	%v/v		
argon	0.710	%v/v		
nitrogen	81.3	%v/v		
methane	0.0298	%v/v	1.45	%v/v
hydrogen	Not Detected	%v/v	Not Detected	%v/v
carbon monoxide	Not Detected	%v/v	Not Detected	%v/v
carbon dioxide	2.05	%v/v	98.5	%v/v
ethane	Not Detected	%v/v	Not Detected	%v/v
ethylene	Not Detected	%v/v	Not Detected	%v/v
propane	Not Detected	%v/v	Not Detected	%v/v
propylene	Not Detected	%v/v	Not Detected	%v/v
i-butane	Not Detected	%v/v	Not Detected	%v/v
n-butane	Not Detected	%v/v	Not Detected	%v/v
i-pentane	Not Detected	%v/v	Not Detected	%v/v
n-pentane	Not Detected	%v/v	Not Detected	%v/v

N2 Excess 21.9%	Air Contamination: 75.9 %v/v

Notes:

1. ***All samples analysed as received, dry basis.***
2. ***Results normalised to 100%.***
3. ***Argon calculated by difference.***
4. ***Air-free results calculated free of O2, Ar and N2.***
5. ***Gas composition determined by gas chromatography (In-house method QS-CGL-SP004)***

Authorisation: FINAL REPORT

Signature: *Date:* **06/02/2023**

Kris Whyte

Cordeaux Mine Site Gas Laboratory
Picton Road, Mt Keira West NSW 2500 Australia
PO Box 514, Unanderra NSW 2526 Australia
Jessica.Juric@south32.net
Tel.: +61 2 4224 6270 Mob.: +61 0476 234 326

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025
Accreditation Number: 17236

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 14 February 2023 had progressed approximately 1453m. During a recent inspection, five new subsidence impacts were identified.

DA3A_LW19_030 (E 292181, N 6192366)

DA3A_LW19_030 consists of rock fracturing to a rock outcrop east of Fire Road 6F (Figure 1). The impact consists of a single rock fracture. The fracture has a maximum continuous length of 9.8m, a maximum width of 0.032m and a maximum measurable depth of 1.1m (Photo 1 and Photo 2)

DA3A_LW19_030 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 1: *DA3A_LW19_030*, rock fracturing to an outcrop. Taken on 15/2/2023.

Photo 2: *DA3A_LW19_030*, width of rock fracturing on outcrop. Taken on 15/2/2023.

DA3A_LW19_031 (E 292281, N 6192359)

DA3A_LW19_031 consists of two small rock fractures to a rock outcrop east of Fire Road 6F (Figure 1). The rock fracturing has a maximum continuous length of 0.65m, a maximum width of 0.009m and a maximum measurable depth of 0.23m (Photo 3 and Photo 4).

DA3A_LW19_031 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 3: *DA3A_LW19_031*, rock fracturing to an outcrop. Taken on 15/2/2023

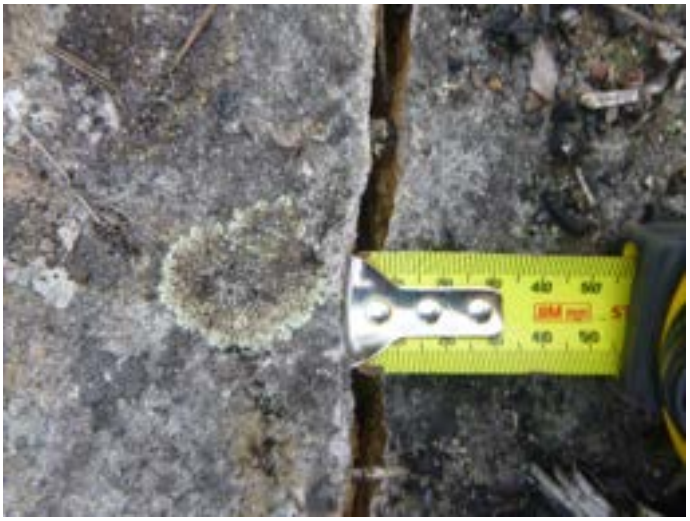


Photo 4: *DA3A_LW19_031*, width of rock fracture on outcrop. Taken on 15/2/2023

DA3A_LW19_032 (E 292267, N 6192304)

DA3A_LW19_032 consists of a rock fracture that runs vertically up a rock step, to the east of Fire Road 6F and within close proximity to landscape monitoring site *LW19_SS11* (Figure 1 and Photo 5). The rock fracture is not visible at the landscape monitoring site photo point (Photo 6). A baseline photo is provided for pre-mining comparison (Photo 7). The rock fracture has a maximum continuous length of 1.2m, a maximum width of 0.01m and a maximum measurable depth of 0.31m (Photo 5).

DA3A_LW19_032 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 5: *DA3A_LW19_032*, rock fracturing on side of outcrop. Taken on 15/2/2023

Photo 6: Landscape monitoring site *LW19_SS11*. Taken 16/06/2022.

Photo 7: Landscape monitoring site *LW19_SS11*. Taken 16/02/2023.

DA3A_LW19_033 (E 292257, N 6192257)

DA3A_LW19_033 consists of a small rockfall on a step to the east of Fire Road 6F (Figure 1). The rockfall has an approximate rockfall volume of 0.042m^3 (Photo 6 and Photo 7). Flagging tape is in place at the site as a safety precaution.

DA3A_LW19_033 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 8: *DA3A_LW19_033*, rock fall from edge of steep slope. Taken on 15/2/2023.

Photo 9: *DA3A_LW19_033*, rock fall from edge of steep slope. Taken on 15/2/2023.

DA3A_LW19_034 (E 292233, N 6192251)

DA3A_LW19_034 consists of a thin rock fracture that runs vertically up a rock outcrop east of Fire Road 6F (Figure 1). The rock fracturing has a maximum continuous length of 2.9m, a maximum width of 0.008m and a maximum measurable depth of 0.07m (Photo 8).

DA3A_LW19_034 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 10: *DA3A_LW19_034*, rock fracturing on side of an outcrop. Taken on 15/2/2023.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the Longwall 19 SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review

A full list of impacts and triggers recorded during Longwall 19 is presented in Table 2.

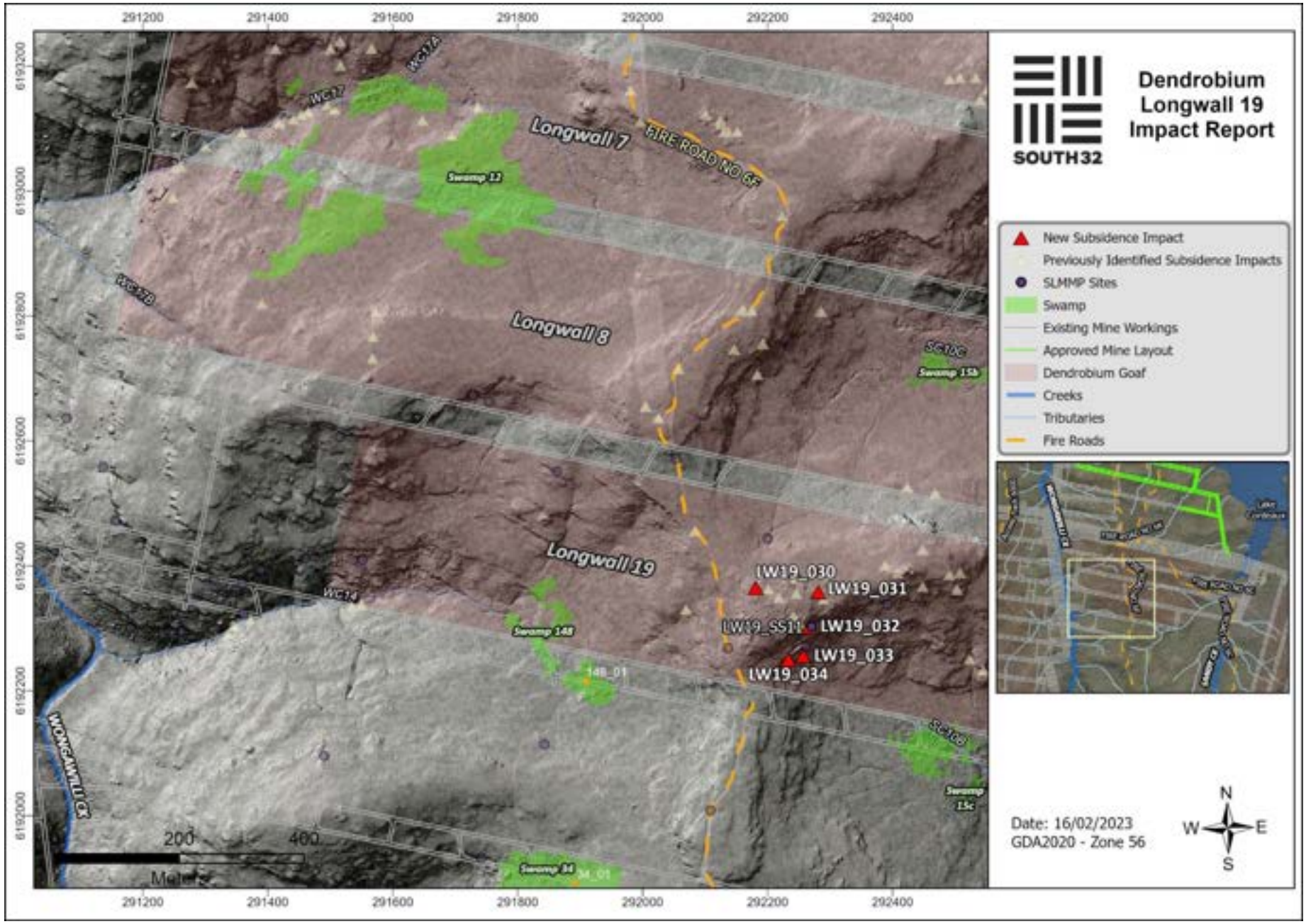


Figure 1: Map showing latest subsidence impacts. Inset shows main frame in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate observations featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	This Report
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	This Report
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	This Report
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	This Report
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	This Report

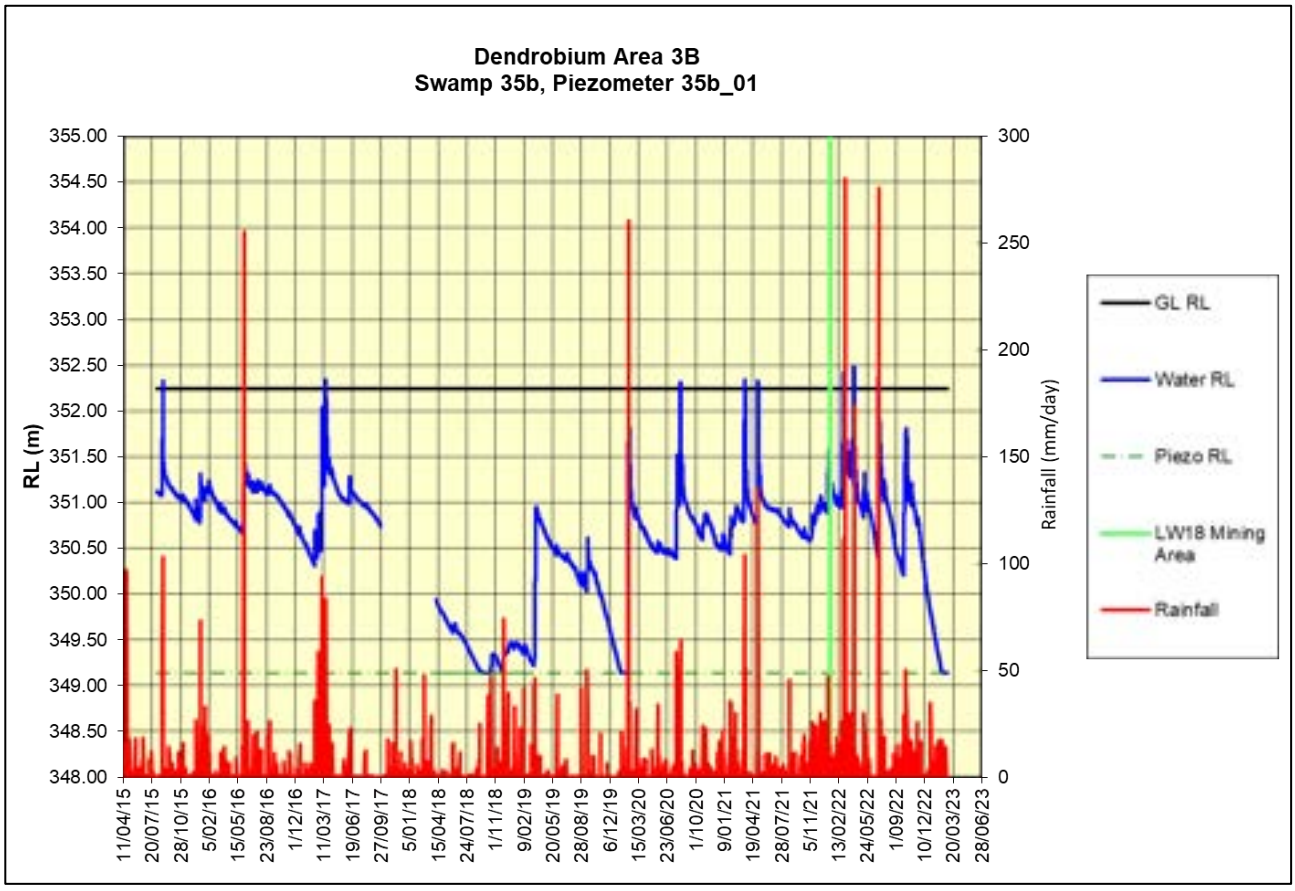
Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining, weekly during mining and again monthly during post-mining period. Monitoring is conducted in accordance with the relevant approved Swamp Impact, Monitoring, Management and Contingency Plan (SIMMCP). The Area 3B SIMMCP covers sites in the previous mining area, the subject of this report. Extraction of Longwall 18 ended on 17 May 2022. Recent analysis of groundwater data in Swamp 35b identified a shallow groundwater trigger in borehole *35b_01*.

This Version 2 of the report includes a summary of consultation with stakeholders undertaken since the initial report.

Swamp 35b

A near-surface groundwater trigger was recorded in Swamp 35b (borehole *35b_01*) during recent analysis of piezometer data for the swamp. Borehole *35b_01* is located 116m to the south of Longwall 18 (Figure 1). It entered the Longwall 18 400m buffer (mining area) on 16 January 2022, was passed by Longwall 18 on 3 March 2022 and remained in the mining area until the end of the longwall. The post mining rate of water level recession (17.94 mm/day calculated between 20/12/22 05:00 and 17/01/23 02:00) has exceeded the rate recorded at the same depth interval before mining (11.48 mm/day calculated between 1/11/19 18:00 and 15/12/19 08:00) (Graph 1). These results contribute to a Level 3 trigger according to the Dendrobium Swamps TARP (Table 1), specifically:

> **Level 3:** Groundwater level lower than baseline level at >80% of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps); and/or rate of groundwater level reduction exceeds rate of groundwater level reduction during baseline period at >80% of monitoring sites (within 400 m of mining) within the swamp. (It should be noted that there is only one shallow borehole/piezometer in Swamp 35b, therefore only a Level 3 trigger applies).



Graph 1: Near-surface groundwater levels at 35b_01, logged hourly, date range: 06/08/2015 to 28/02/2023

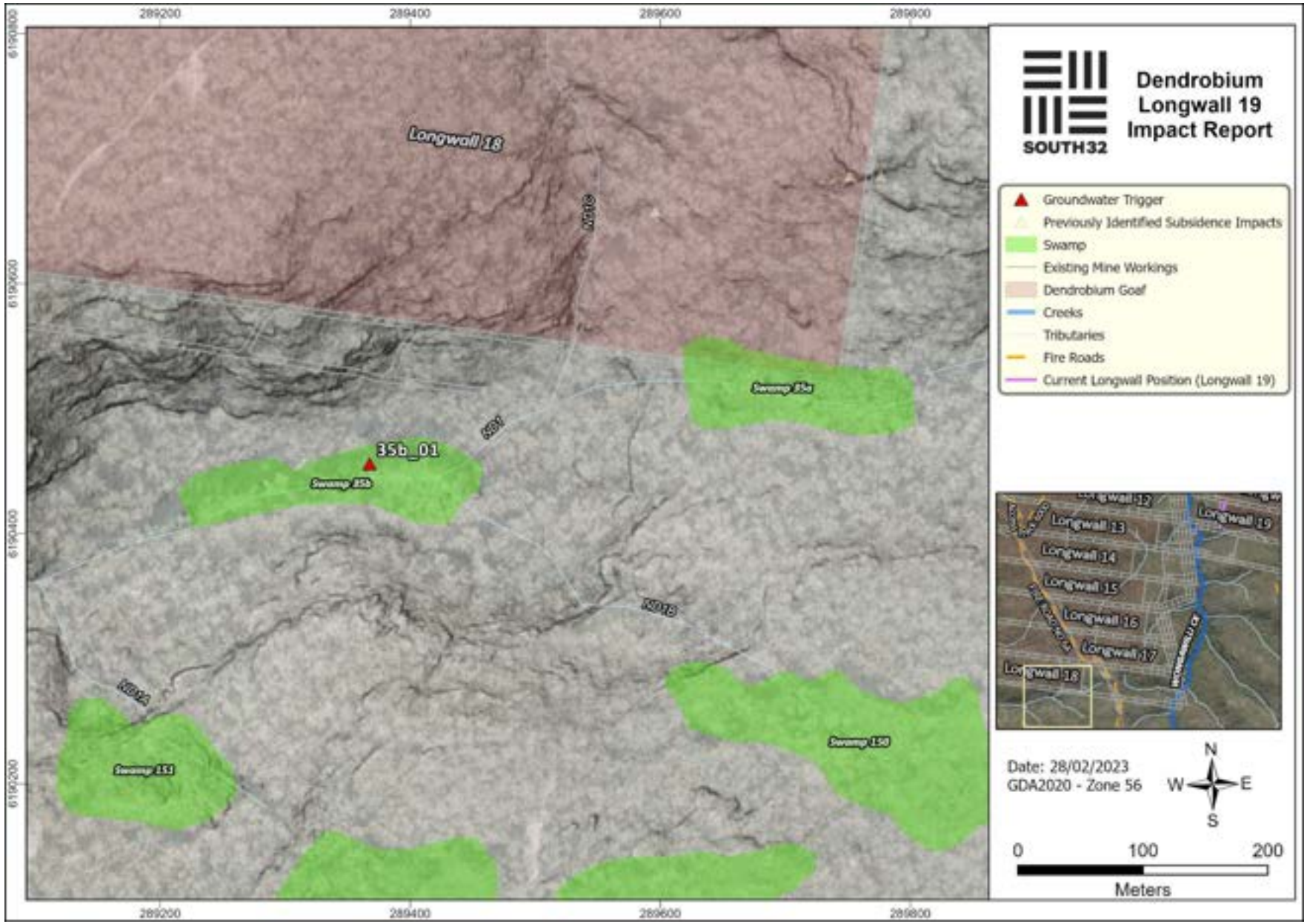


Figure 1: Map Showing Swamp 35b in relation to Longwall 18. Inset shows frame in relation to wider Dendrobium mine workings.
Title is 'Longwall 19' as it is the current longwall/reporting period.

Table 1: Extract from Area 3B Swamp Impact, Monitoring, Management and Contingency Plan.

Performance Measures	*Potential Impacts*	*Performance Triggers*	*Management Strategies*	*Offsets*	*Other Actions*
Minor changes in the ecosystem functionality of the swamps	Falls in surface or near-surface groundwater levels in swamps *NB. Not linked specifically to a PM and would not be considered a breach if predictions were exceeded.*	*Level 1:* Groundwater level lower than baseline level at any monitoring site within a swamp (in comparison to reference swamps); and/or Rate of groundwater level reduction exceeds rate of groundwater level reduction during baseline period at any monitoring site (measured as average mm/day during the recession curve). *Level 2:* Groundwater level lower than baseline level at **50%** of monitoring sites (within 400 m of mining) within a swamp (in comparison to reference swamps); and/or Rate of groundwater level reduction exceeds rate of groundwater level reduction during baseline period at a **50%** of monitoring sites (within 400m of mining) within the swamp. *Level 3:* Groundwater level lower than baseline level at **>80%** of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps); and/or Rate of groundwater level reduction exceeds rate of groundwater level reduction during baseline period at **>80%** of monitoring sites (within 400 m of mining) within the swamp.	a) upfront mine planning b) groundwater monitoring c) implementation of swamp research program d) weeding e) fire management f) reporting g) update future predictions		Triggers for groundwater decline result in increased intensity and frequency of vegetation monitoring and/or further investigations of subsidence impacts on bedrock base and rockbars

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted row indicates observation featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/08/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	9/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	9/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	9/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	9/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	9/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	9/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	9/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	9/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	9/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	9/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	9/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148*.	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/02/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/02/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/02/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/02/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/02/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023

CONSULTATION

Summary of consultation undertaken in relation to the subsidence impact report

The impact report was uploaded to the Major Projects Portal on 15 March 2023 and issued with reference number DA60-03-2001-PA-194. Consultation with BCD and WaterNSW was elected to be undertaken via the portal. The impact report was also emailed directly to WaterNSW, BCD and the Resources Regulator.

The Resources Regulator responded via email on 15 March 2023 and issued reference number MAAG0015759 indicating that an assessment officer would be in contact should further information be required. No further correspondence was received.

WaterNSW responded via the portal with a letter dated 11 April 2023 requesting reassessment of groundwater impacts to swamp 35b in Longwall 19 End of Panel Report.

BCD responded via the portal with a letter dated 12 April 2023 requesting further information for on-going assessment of these impacts.

Summary of the comments received during consultation

WaterNSW

WaterNSW noted the following:

- The different approach has been implemented for assessment of groundwater recession rates in this SIR and the EOPR. The EOPR includes results of 3-day groundwater recession rates plotted together with groundwater levels, while SIR compares recession rates for two periods when groundwater levels in Swamp 35b decline below the instrument RL (the swamp become dry)
- Groundwater hydrograph for Swamp 35b indicates that there has been a change in groundwater recession rates during 2022. It is not clear what could cause this post drought change and if mining in Area 3B could have any influence on Swamp 35b
- The exceedance in postmining groundwater recession rate would be greater if the estimated post Longwall 18 rate (December/January 2023) was compared with the recession rate during the period of drought (June 2017 to October 2018)

WaterNSW recommend reassessment of groundwater impacts to Swamp 35b in Longwall 19 End of Panel Report and confirm results are consistent with previous analysis by Watershed (2019, 2021) concluding about mining effects not been observed at distances greater than 60 m from a longwall panel.

Biodiversity and Conservation Division (BCD)

BCD concerns included:

- The longwall does not directly overlie the swamp and impacts may be occurring at least 116 m to the south of the nearest longwall.
- Impacts to Swamp 35b could affect the population of Littlejohn's treefrog downstream along WC ND1 as identified in the Swamp Impact Monitoring and Management Contingency Plan (Area 3B SIMMCP).

BCD requested further information including:

- All raw monitoring data from Swamp35b, Swamp35a, Swamp150 and Swamp151;
- All vegetation and threatened species data within a 500-meter radius of Swamp 35b;
- Monitoring data for all pools along ND1; and
- Ongoing monitoring data, as specified above, on a 6 monthly basis

Summary of actions taken by Illawarra Metallurgical Coal in response to comments received during consultation

In response to comments from WaterNSW and BCD, IMC have undertaken the following actions:

- Engaged a groundwater expert to reassess groundwater impacts to Swamp 35b. Results of this assessment are to be included in the Longwall 19 End of Panel Report to satisfy WaterNSW recommendations.
- Provided a data pack to BCD on 11 May 2023 that included:
    - Raw monitoring data from Swamp 35b, Swamp 35a, Swamp 150 and Swamp 151;
    - Ecology data within a 500-meters of Swamp 35b
    - Monitoring data for pools along ND1
    - Rainfall data
    - Associated spatial data
- End of Panel data pack for future longwalls will be provided to BCD to satisfy provision of ongoing monitoring data.
- Implementation of on-going corrective management actions (CMAs) as detailed above.

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 16 March 2023 had progressed approximately 1620m. During a recent inspection, one new subsidence impact was identified.

This Version 2 of the report includes a summary of consultation with stakeholders undertaken since the initial report.

DA3A_LW19_035 (E 291863, N 6192548)

DA3A_LW19_035 consists of soil cracking and rock displacement to a closed vehicle access track and surrounding bushland west of Fire Road 6F (Figure 1). The site is situated near SLMMP monitoring site *LW19_AT1*. The soil cracking extends across a closed vehicle access track where it continues into the bushland causing rock displacement. The impact has a discontinuous length of 18.25m, a maximum continuous length of 15.35m, a maximum width of 0.10m and a maximum measurable depth of 2.29m (Photo 1 to Photo 4). Caution tape barricading is in place at the site as a safety precaution.

DA3A_LW19_035 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture between 100mm and 300m width;
- Crack or fracture between 10m and 50m length.

Photo 1: *DA3A_LW19_035*, depth of the soil cracking. Taken on 16/03/2023.

Photo 2: *DA3A_LW19_035*, width of the soil cracking/rock displacement. Taken on 16/03/2023.

Photo 3: *DA3A_LW19_035*, overview of the impact. Taken on 16/03/2023.

Photo 4: *DA3A_LW19_035*, section of soil cracking. Taken on 16/03/2023.

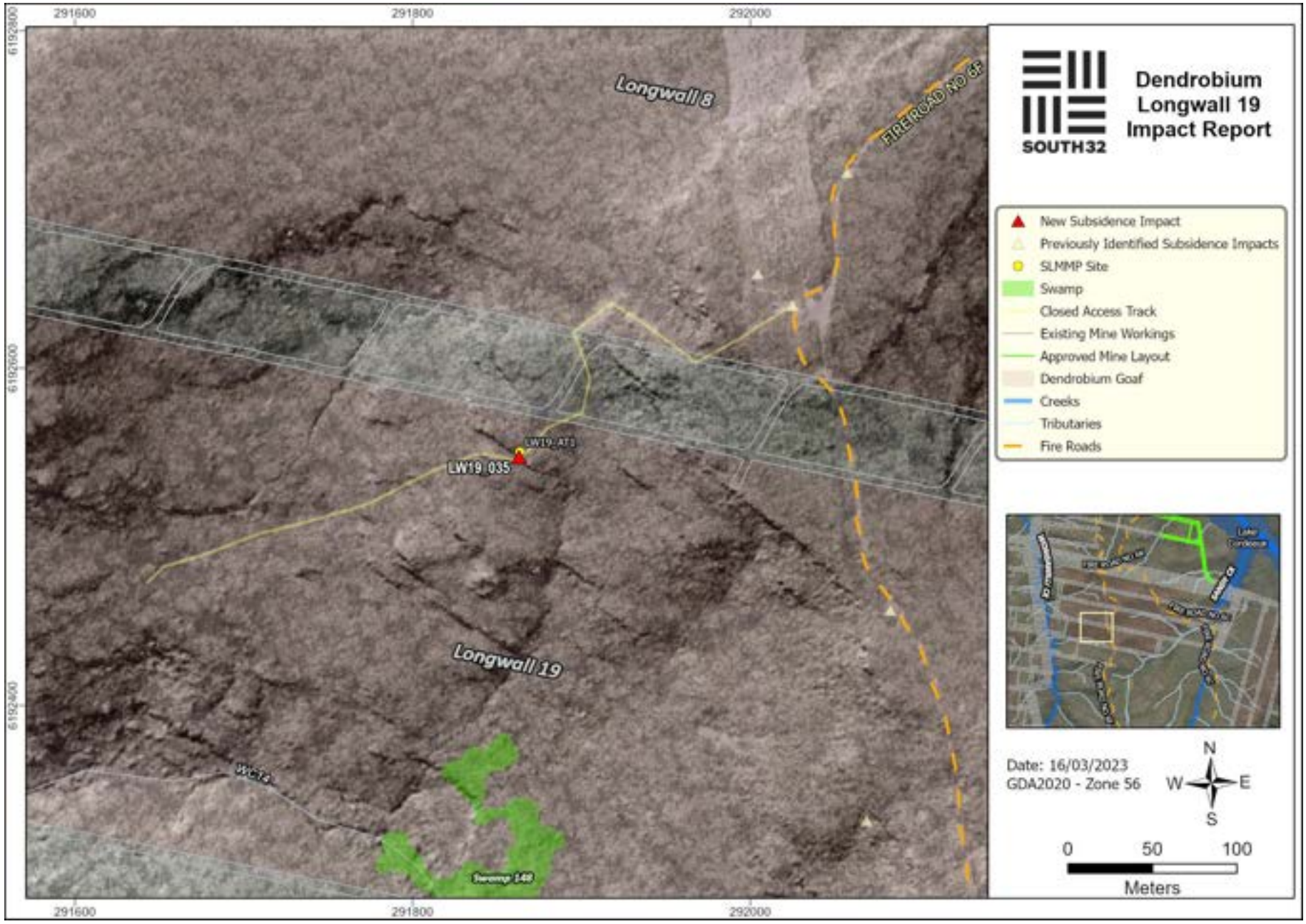


Figure 1: Map showing latest subsidence impacts. Inset shows main frame in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate observations featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023

CONSULTATION

Summary of consultation undertaken in relation to the subsidence impact report

The impact report was uploaded to the Major Projects Portal on 17 March 2023 and issued with reference number DA60-03-2001-PA-195. Consultation with BCD and WaterNSW was elected to be undertaken via the portal. The impact report was also emailed directly to WaterNSW, BCD and the Resources Regulator.

The Resources Regulator responded via email on 20 March 2023 and issued reference number MAAG0015780 indicating that an assessment officer would be in contact should further information be required. No further correspondence was received.

WaterNSW responded via the portal and email on 13 April 2023 with comments and recommendations as detailed below.

BCD responded via the portal with a letter dated 4 April 2023 with comments detailed below. No further actions were required.

Summary of the comments received during consultation

WaterNSW

WaterNSW noted the following concerns:

- A growing number of reported impacts in areas undermined by Dendrobium longwalls.
- Total of 38 landscape impacts and one swamp impact have been reported for currently mined longwall 19 to date.
- About 90% of identified landscape impacts comprise of rock fracturing/surface cracking and rock movements in bushland, rock outcrops and steep slopes.
- Remaining 10% impacts account for surface cracking on fire road and closed access tracks, iron staining in WC14 tributary, gas release in Wongawilli Creek and a decline in soil moisture in Swamp 148.

WaterNSW recommends surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP.

Biodiversity and Conservation Division (BCD)

BCD comments included:

- There is a Level 2 incident reported for which we do not require any further action.

- We realise SIRs are now being more frequently referred via the Planning Portal. As such, the Portal requires a formal reply to be uploaded (including for nil response issues) to close out the matter. This is proving to be an inefficient process and it is requested South32 consider referring SIRs via the Illawarra Planning Mailbox: rog.illawarra@environment.nsw.gov.au In that arrangement, we can formally provide comments as necessary otherwise we can issue South32 with a simple email reply.

Summary of actions taken by Illawarra Metallurgical Coal in response to comments received during consultation

In response to comments and recommendations from WaterNSW and BCD, IMC have undertaken the following actions:

- IMC responded via email to WaterNSW on 11/05/2023 proposing the following actions:
    - Develop a plan showing the location of all subsidence related impacts in Areas 3A and 3B. This analysis is expected to show that surface impacts are greater in steep areas. Compared to most of Area 3B, Longwall 19 is situated under steeper areas, similar to Areas 3A, 2 and 1. The plan and analysis will be provided with the Longwall 19 End of Panel Report and is relevant to WaterNSW concern regarding the growing number of reported impacts.
    - In response to the recommendation "that surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP", as the TARP relates to open, vehicle tracks, IMC propose to erect caution tape and signage as appropriate as closed access tracks are unable to be accessed by vehicles and are rarely used by other catchment users. IMC will also monitor and reassess if something changes.
- WaterNSW responded via email on 11/05/2023 acknowledging the proposed actions.
- IMC acknowledge that BCD prefer SIRs to be submitted via the Illawarra Planning Mailbox. WaterNSW was contacted and agreed to receive SIRs via email in the first instance prior to upload of the final SIR report to the portal which would include a summary of consultation undertaken. Future SIRs will be emailed to relevant agencies prior to consultation. Final reports will be uploaded to the Major Projects Planning Portal following consultation.
- Implementation of on-going corrective management actions (CMAs) as detailed above.

Email correspondence is provided in the Attachment 1.

ATTACHMENT 1 – Email Correspondence

From: Maria Dubikova
To: Zanotto, Linda
Cc: Ravi Sundaram; Juri Jung
Subject: RE: Dendrobium Mine Subsidence Impact Reports, March 2023
Date: Thursday, 11 May 2023 1:04:16 PM
Attachments: image002.png

Hi Linda,

Thanks for addressing our concerns and providing additional interpretations of observed landscape impacts in the End of Panel Report.

Regards,
Maria

From: Zanotto, Linda <Linda.Zanotto@south32.net>
Sent: Thursday, 11 May 2023 11:55 AM
To: Maria Dubikova <Maria.Dubikova@waternsw.com.au>
Cc: Ravi Sundaram <ravi.sundaram@waternsw.com.au>
Subject: [EXTERNAL] RE: Dendrobium Mine Subsidence Impact Reports, March 2023

Hi Maria,

In response to your comments and recommendations in relation to the March impact reports in email below, IMC propose to:

- Develop a plan showing the location of all subsidence related impacts in Areas 3A and 3B. This analysis is expected to show that surface impacts are greater in steep areas. Compared to most of Area 3B, Longwall 19 is situated under steeper areas, similar to Areas 3A, 2 and 1. The plan and analysis will be provided with the Longwall 19 End of Panel Report and is relevant to WaterNSW concern regarding the growing number of reported impacts.
- In response to the recommendation "that surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP", as the TARP relates to open, vehicle tracks, IMC propose to erect caution tape and signage as appropriate as closed access tracks are unable to be accessed by vehicles and are rarely used by other catchment users. IMC will also monitor and reassess if something changes.

Please let me know if you have any questions or would like to discuss further. Appreciate your feedback.

Kind Regards,
Linda

Linda Zanotto
Principal Mining Approvals
Illawarra Metallurgical Coal

M: +61 409 399 560
E: Linda.Zanotto@South32.net

south32.net

From: Maria Dubikova <Maria.Dubikova@waternsw.com.au>
Sent: Thursday, 13 April 2023 4:19 PM
To: Zanotto, Linda <Linda.Zanotto@south32.net>
Cc: Ravi Sundaram <ravi.sundaram@waternsw.com.au>
Subject: Dendrobium Mine Subsidence Impact Reports, March 2023

Hi Linda,

I've just uploaded to the Planning Portal our response to the SIRs received in March.

According to the TARP action plan IMC is required to report all identified landscape impacts to key stakeholders. In March 2023, WaterNSW has received and reviewed three (3) Longwall 19 Subsidence Impacts Reports dated:

- 17/03/2023 that reported one new Level 2 trigger related to soil cracking and rock displacement to a closed vehicle access track,
- 24/03/2023 that reported one new Level 1 trigger associated with soil cracking to a closed access track, and
- 29/03/2023 that identified two new subsidence impacts causing rock fracturing at registered Aboriginal Heritage sites, Sandy Creek 21 (fractures and rockfall about 6m away from the artwork) and DM15 (a new hairline fracture through a part of the artwork). Both impacts are assessed as Level 2 trigger as per the Aboriginal Cultural Heritage Management Plan for Longwall 19 and Level 1 trigger as per Area 3A Landscape TARP (based on fractures dimensions).

WaterNSW is concerned with a growing number of reported impacts in areas undermined by Dendrobium longwalls. It is noted that total of 38 landscape impacts and one swamp impact have been reported for currently mined longwall 19 to date. About 90% of identified landscape impacts comprise of rock fracturing/surface cracking and rock movements in bushland, rock outcrops and steep slopes. Remaining 10% impacts account for surface cracking on fire road and closed access tracks, iron staining in WC14 tributary, gas release in Wongawilli Creek and a decline in soil moisture in Swamp 148.

WaterNSW recommends that surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP.

Please feel free to contact Maria Dubikova if you would like to discuss any of the above matters further.

Regards,

Maria Dubikova
Hydrogeologist

PO Box 398, Parramatta NSW 2124
Level 14, 169 Macquarie Street
Parramatta, NSW, 2150
maria.dubikova@waternsw.com.au
www.waternsw.com.au

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 23 March 2023 had progressed approximately 1641m. During a recent inspection, one subsidence impact was identified.

This Version 2 of the report includes a summary of consultation with stakeholders undertaken since the initial report.

DA3A_LW19_036 (E 291530, N 6193145)

DA3A_LW19_036 is located 480m north of Longwall 19 and consists of soil cracking on closed access track adjacent to watercourse WC17 (Figure 1). Due to the nature and location of the soil crack it is likely historic and occurred during extraction of Longwall 7. The soil crack has a maximum length of 0.65m, a maximum width of 0.07m, and a maximum measurable depth of 0.79m (Photo 1 and Photo 2).

DA3A_LW19_036 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

Photo 1: *DA3A_LW19_036*, soil cracking. Taken on 21/03/2023.

Photo 2: *DA3A_LW19_036*, soil cracking. Taken on 21/03/2023.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP
- Report impacts to key stakeholders
- Summarise impacts and report in the End of Panel Report and Annual Review

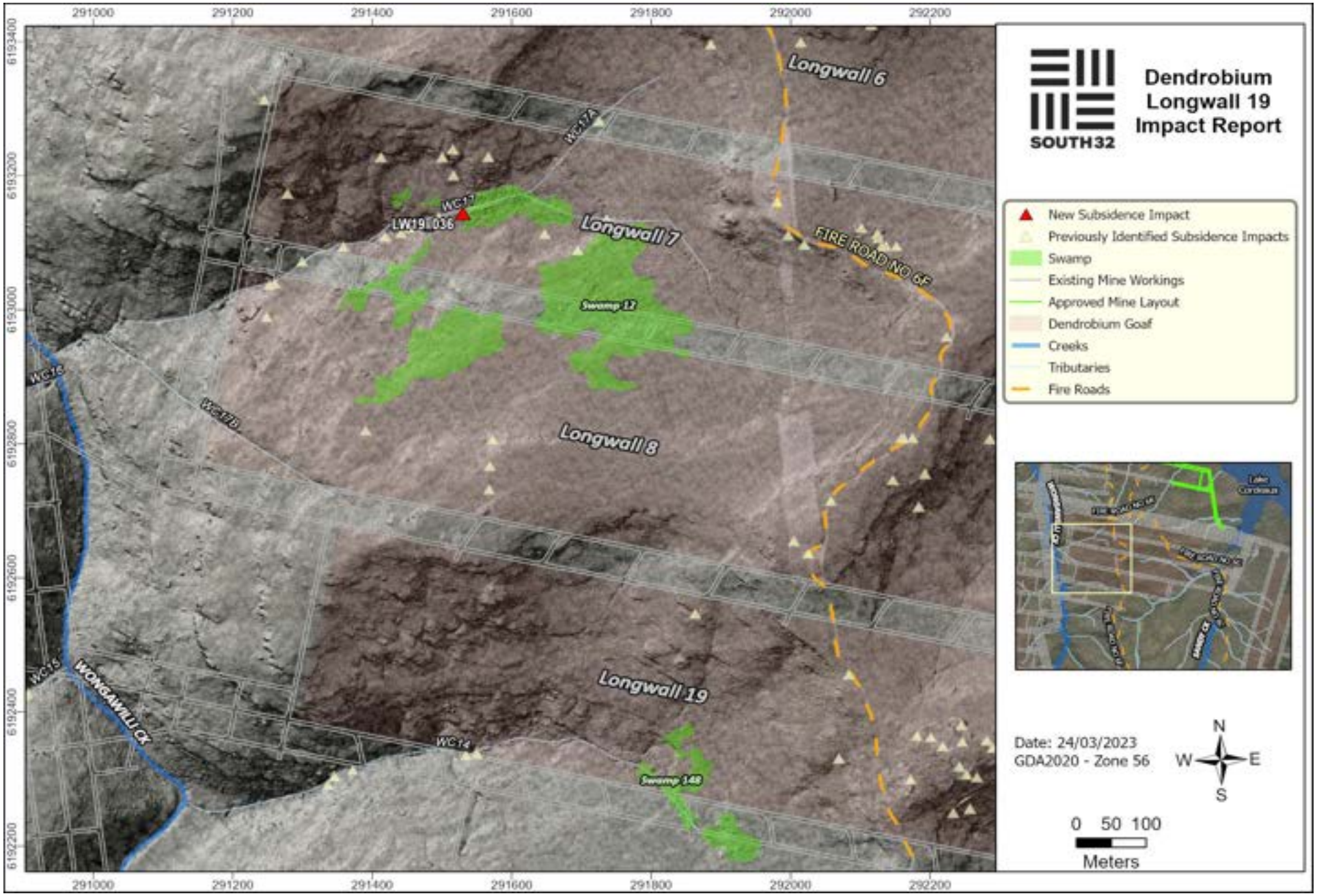


Figure 1: Map showing the latest subsidence impact. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4)	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
AREA 3A **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3*	***Level 2 **** • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
AREA 3B **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 3 **** • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted row indicates the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023
DA3A_LW19_036	Soil Cracking	Closed Access Track	21/02/2023	1	Soil cracking on a closed access track over Longwall 7.	24/03/2023

CONSULTATION

Summary of consultation undertaken in relation to the subsidence impact report

The impact report was uploaded to the Major Projects Portal on 24 March 2023 and issued with reference number DA60-03-2001-PA-196. Consultation with BCD and WaterNSW was elected to be undertaken via the portal. The impact report was also emailed directly to WaterNSW, BCD and the Resources Regulator.

The Resources Regulator responded via email on 24 March 2023 and issued reference number MAAG0015798 indicating that an assessment officer would be in contact should further information be required. No further correspondence was received.

WaterNSW responded via the portal and email on 13 April 2023 with comments and recommendations as detailed below.

BCD responded via the portal with a letter dated 4 April 2023 with comments detailed below. No further actions were required.

Summary of the comments received during consultation

WaterNSW

WaterNSW noted the following concerns:

- A growing number of reported impacts in areas undermined by Dendrobium longwalls.
- Total of 38 landscape impacts and one swamp impact have been reported for currently mined longwall 19 to date.
- About 90% of identified landscape impacts comprise of rock fracturing/surface cracking and rock movements in bushland, rock outcrops and steep slopes.
- Remaining 10% impacts account for surface cracking on fire road and closed access tracks, iron staining in WC14 tributary, gas release in Wongawilli Creek and a decline in soil moisture in Swamp 148.

WaterNSW recommends surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP.

Biodiversity and Conservation Division (BCD)

BCD comments included:

- There is a Level 1 incident reported for which we do not require any further action.

- We realise SIRs are now being more frequently referred via the Planning Portal. As such, the Portal requires a formal reply to be uploaded (including for nil response issues) to close out the matter. This is proving to be an inefficient process and it is requested South32 consider referring SIRs via the Illawarra Planning Mailbox: rog.illawarra@environment.nsw.gov.au In that arrangement, we can formally provide comments as necessary otherwise we can issue South32 with a simple email reply.

Summary of actions taken by Illawarra Metallurgical Coal in response to comments received during consultation

In response to comments from WaterNSW and BCD, IMC have undertaken the following actions:

- IMC responded via email to WaterNSW on 11/05/2023 proposing the following actions:
    - Develop a plan showing the location of all subsidence related impacts in Areas 3A and 3B. This analysis is expected to show that surface impacts are greater in steep areas. Compared to most of Area 3B, Longwall 19 is situated under steeper areas, similar to Areas 3A, 2 and 1. The plan and analysis will be provided with the Longwall 19 End of Panel Report and is relevant to WaterNSW concern regarding the growing number of reported impacts.
    - In response to the recommendation "that surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP", as the TARP relates to fire roads (open, vehicle access tracks) IMC propose to instead erect caution tape and signage as appropriate as closed access tracks are unable to be accessed by vehicles and are rarely used by other catchment users. IMC will also monitor and reassess if something changes.
- WaterNSW responded via email on 11/05/2023 acknowledging the proposed actions.
- IMC acknowledge that BCD prefer SIRs to be submitted via the Illawarra Planning Mailbox. WaterNSW was contacted and agreed to receive SIRs via email in the first instance prior to upload of the final SIR report to the portal which would include a summary of consultation undertaken. Future SIRs will be emailed to relevant agencies prior to consultation. Final reports will be uploaded to the Major Projects Planning Portal following consultation.
- Implementation of on-going corrective management actions (CMAs) as detailed above.

Email correspondence is provided in the Attachment 1.

ATTACHMENT 1 – Email Correspondence

From: Maria Dubikova
To: Zanotto, Linda
Cc: Ravi Sundaram; Juri Jung
Subject: RE: Dendrobium Mine Subsidence Impact Reports, March 2023
Date: Thursday, 11 May 2023 1:04:16 PM
Attachments: image002.png

Hi Linda,

Thanks for addressing our concerns and providing additional interpretations of observed landscape impacts in the End of Panel Report.

Regards,
Maria

From: Zanotto, Linda <Linda.Zanotto@south32.net>
Sent: Thursday, 11 May 2023 11:55 AM
To: Maria Dubikova <Maria.Dubikova@waternsw.com.au>
Cc: Ravi Sundaram <ravi.sundaram@waternsw.com.au>
Subject: [EXTERNAL] RE: Dendrobium Mine Subsidence Impact Reports, March 2023

Hi Maria,

In response to your comments and recommendations in relation to the March impact reports in email below, IMC propose to:

- Develop a plan showing the location of all subsidence related impacts in Areas 3A and 3B. This analysis is expected to show that surface impacts are greater in steep areas. Compared to most of Area 3B, Longwall 19 is situated under steeper areas, similar to Areas 3A, 2 and 1. The plan and analysis will be provided with the Longwall 19 End of Panel Report and is relevant to WaterNSW concern regarding the growing number of reported impacts.
- In response to the recommendation "that surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP", as the TARP relates to open, vehicle tracks, IMC propose to erect caution tape and signage as appropriate as closed access tracks are unable to be accessed by vehicles and are rarely used by other catchment users. IMC will also monitor and reassess if something changes.

Please let me know if you have any questions or would like to discuss further. Appreciate your feedback.

Kind Regards,
Linda

Linda Zanotto
Principal Mining Approvals
Illawarra Metallurgical Coal

M: +61 409 399 560
E: Linda.Zanotto@South32.net

south32.net

From: Maria Dubikova <Maria.Dubikova@waternsw.com.au>
Sent: Thursday, 13 April 2023 4:19 PM
To: Zanotto, Linda <Linda.Zanotto@south32.net>
Cc: Ravi Sundaram <ravi.sundaram@waternsw.com.au>
Subject: Dendrobium Mine Subsidence Impact Reports, March 2023

Hi Linda,

I've just uploaded to the Planning Portal our response to the SIRs received in March.

According to the TARP action plan IMC is required to report all identified landscape impacts to key stakeholders. In March 2023, WaterNSW has received and reviewed three (3) Longwall 19 Subsidence Impacts Reports dated:

- 17/03/2023 that reported one new Level 2 trigger related to soil cracking and rock displacement to a closed vehicle access track,
- 24/03/2023 that reported one new Level 1 trigger associated with soil cracking to a closed access track, and
- 29/03/2023 that identified two new subsidence impacts causing rock fracturing at registered Aboriginal Heritage sites, Sandy Creek 21 (fractures and rockfall about 6m away from the artwork) and DM15 (a new hairline fracture through a part of the artwork). Both impacts are assessed as Level 2 trigger as per the Aboriginal Cultural Heritage Management Plan for Longwall 19 and Level 1 trigger as per Area 3A Landscape TARP (based on fractures dimensions).

WaterNSW is concerned with a growing number of reported impacts in areas undermined by Dendrobium longwalls. It is noted that total of 38 landscape impacts and one swamp impact have been reported for currently mined longwall 19 to date. About 90% of identified landscape impacts comprise of rock fracturing/surface cracking and rock movements in bushland, rock outcrops and steep slopes. Remaining 10% impacts account for surface cracking on fire road and closed access tracks, iron staining in WC14 tributary, gas release in Wongawilli Creek and a decline in soil moisture in Swamp 148.

WaterNSW recommends that surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP.

Please feel free to contact Maria Dubikova if you would like to discuss any of the above matters further.

Regards,

Maria Dubikova
Hydrogeologist

PO Box 398, Parramatta NSW 2124
Level 14, 169 Macquarie Street
Parramatta, NSW, 2150
maria.dubikova@waternsw.com.au
www.waternsw.com.au

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and as of 28 March 2023 had progressed approximately 1649m. During a recent inspection, two new subsidence impacts were identified.

This Version 2 of the report includes a summary of consultation with stakeholders undertaken since the initial report.

DA3A_LW19_037 (E 292211, N 6192222)

DA3A_LW19_037 is located 57m east of Fire Road 6F and consists of rock fracturing beneath an overhang with some small associated rock falls (Figure 1). At the time of inspection, the rock fracture had a length of 5.2m, width of 0.022m, and measurable depth of 0.34m (Photo 1 to Photo 4). The site is registered Aboriginal Heritage site *Sandy Creek 21 (52-5-0273)*. The fracturing is approximately 6m away from the site's recorded artwork.

Some fracturing and rockfalls were identified during the baseline inspection- *Aboriginal Cultural Heritage Assessment Report Longwall 19, DA3A* (30 October 2020). Recent fracturing and rockfalls were identified in the latest inspection (Photo 5 and Photo 6). The rock fracturing at *Sandy Creek 21* does not directly impact the artwork (Photo 7 and Photo 8).

DA3A_LW19_037 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

DA3A_LW19_037 is a Level 2 trigger as per the Aboriginal Cultural Heritage Management Plan Longwall 19, Dendrobium Area 3A TARP (Table 2), specifically:

- Change in shelter conditions not attributable to natural weathering or preservation- change in drip line or seepage, cracking or exfoliation of overhang or shelter, movement or opening of existing planes and joints in panel, block fall within shelter or overhang, shelter, or overhang collapse.

Photo 1: DA3A_LW19_037, rock fracturing. Taken on 28/03/2023.

Photo 2: DA3A_LW19_037, rock fracturing. Taken on 28/03/2023.

Photo 3: DA3A_LW19_037, rock fall. Taken on 28/03/2023.

Photo 4: DA3A_LW19_037, rock fall. Taken on 28/03/2023.

Photo 5: Baseline photo of Sandy Creek 21. Taken circa October 2020.

Photo 6: DA3A_LW19_037, rock fracturing through overhang at Sandy Creek 21. Taken on 28/03/2023.

Photo 7: Baseline photo of art at Sandy Creek 21. Taken circa October 2020.

Photo 8: Sandy Creek 21 showing no impacts to art. Taken on 28/03/2023.

DA3A_LW19_038 (E 291440, N 6192459)

DA3A_LW19_038 is located 125m north of tributary WC14 and consists of rock fracturing with some smaller associated rockfalls (Figure 1). Fracture measurements are estimated due to limited site access. At the time of inspection, the fracture had an estimated length of 2m and a maximum width of 0.001m. The fracture extends vertically up from an existing horizontal fracture present in the baseline record. The rockfall at the site has an approximate volume of 0.05m^3 (Photo 9 to Photo 12).

The site is registered Aboriginal Heritage site *DM15 (52–2–3639).* The new hairline fracture runs through a part of the artwork and up to the ceiling of the overhang with a small rockfall. Baseline observations prior to mining included one pre-existing fracture through the art (Photo 13 and Photo 14).

DA3A_LW19_038 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length.

DA3A_LW19_038 is a Level 2 trigger as per the Aboriginal Cultural Heritage Management Plan Longwall 19, Dendrobium Area 3A TARP (Table 2), specifically:

- Change in shelter conditions not attributable to natural weathering or preservation- change in drip line or seepage, cracking or exfoliation of overhang or shelter, movement or opening of existing planes and joints in panel, block fall within shelter or overhang, shelter, or overhang collapse.

Photo 9: DA3A_LW19_038, rock fracturing at artwork. Taken on 28/03/2023.

Photo 10: DA3A_LW19_038, rock fracturing extending to the upper part of overhang. Taken on 28/03/2023.

Photo 11: DA3A_LW19_038, section where rock fall occurred. Taken on 28/03/2023.

Photo 12: DA3A_LW19_038, rock fall on ground. Taken on 28/03/2023.

Photo 13: Art at DM15- baseline image displaying horizontal rock fracture identified prior to mining. Taken circa October 2020.

Photo 14: Art at DM15- image taken in latest inspection showing current fracturing. Recent fracture is circled. Taken on 28/03/2023.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the DA3A SMP.
- Report impacts to key stakeholders.
- Summarise impacts and report in the End of Panel Report and Annual Review.
- Continue monitoring program.
- Condition assessment and photographic record.
- Notify RAPs and Heritage NSW.
- Modify monitoring program if necessary.
- Initiate development of site management plan to mitigate effects in consultation with Registered Aboriginal Parties and Landowner (WaterNSW).
- Complete Aboriginal Site Impact Recording Forms (ASIRF) for impacted sites.
- Coordinate site visits for Registered Aboriginal Parties.

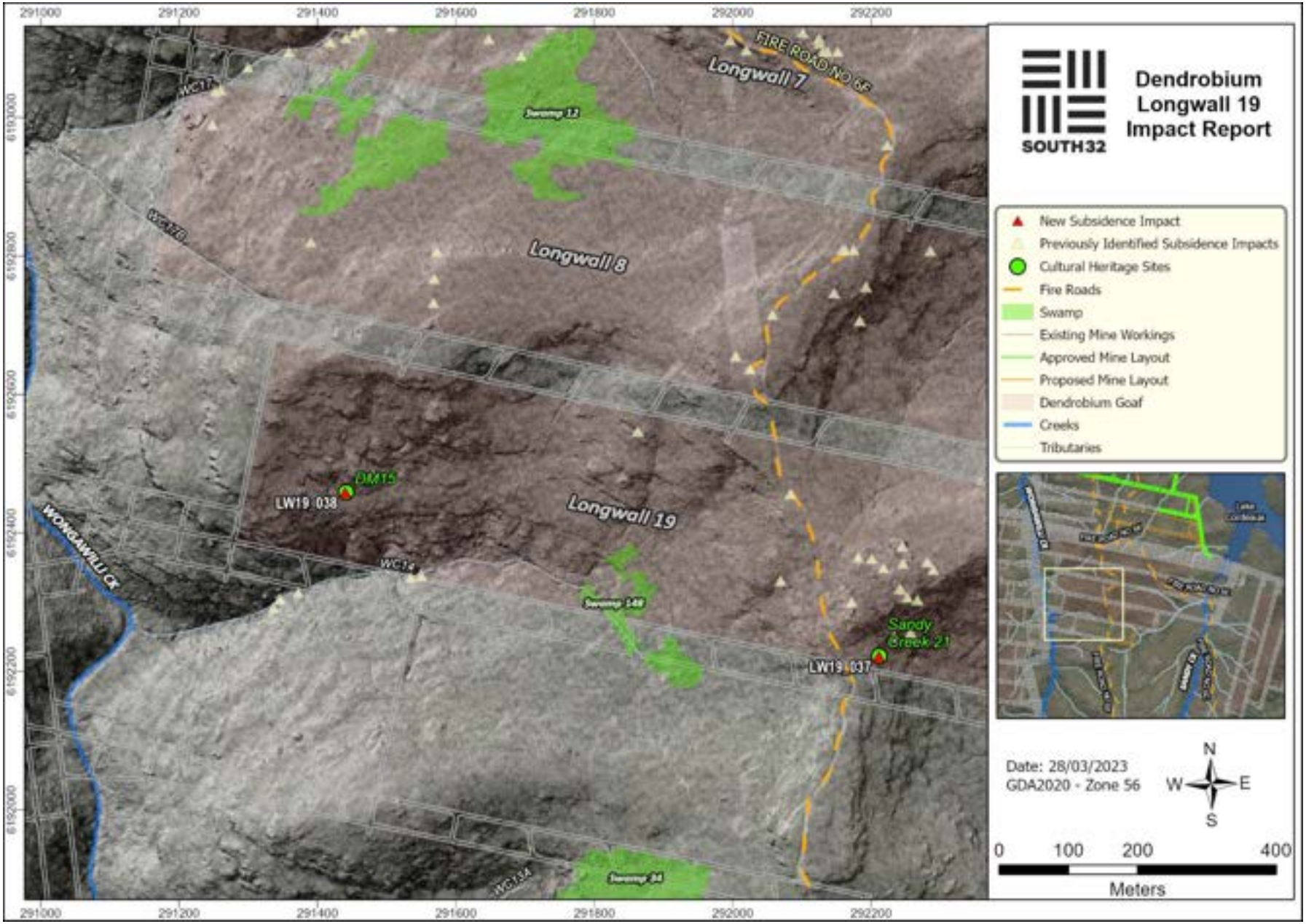


Figure 1: Map showing the latest subsidence impacts and cultural heritage sites. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4)	***Level 1*** * • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
AREA 3A **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3*	***Level 2*** * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
AREA 3B **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 3*** * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Extract from Aboriginal Cultural Heritage Sites Monitoring for Longwall 19 TARP.

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

Table 3: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023
DA3A_LW19_036	Soil Cracking	Closed Access Track	21/02/2023	1	Soil cracking on a closed access track over Longwall 7.	24/03/2023
DA3A_LW19_037	Rock Fracturing and Rockfall	Sandy Creek 21 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall within proximity to cultural heritage site *Sandy Creek 21*	29/03/2023
DA3A_LW19_038	Rock Fracturing and Rockfall	DM15 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall at cultural heritage site *DM15*.	29/03/2023

CONSULTATION

Summary of consultation undertaken in relation to the subsidence impact report

The impact report was emailed directly to the Heritage NSW Mailbox and the Department of Planning and Environment on 29 March 2023. The impact report was uploaded to the Major Projects Portal on 30 March 2023 and issued with reference number DA60-03-2001-PA-200. Consultation with BCD and WaterNSW was elected to be undertaken via the portal. The impact report was also emailed directly to WaterNSW, BCD and the Resources Regulator on 30 March 2023.

The Resources Regulator responded via email on 30 March 2023 and issued reference number MAAG0015830 indicating that an assessment officer would be in contact should further information be required. No further correspondence was received.

A meeting with Heritage NSW was held on 4 April 2023 to discuss the impacted sites and Aboriginal Heritage Impact Permit (AHIP) requirements for future longwalls.

Registered Aboriginal Parties (RAPs) were also informed via telephone on 29 March 2023. Details of phone conversations are provided in Table 4. RAPs were offered the opportunity for a field visit to inspect the impacted sites as part of the Longwall 19 End of Panel process.

The Illawarra Local Aboriginal Land Council (ILALC) were informed via email on 30 March 2023 extending an invitation to inspect the Longwall 19 heritage sites. A meeting was held on 5 April 2023. Meeting minutes are provided in the following section.

WaterNSW responded via the portal and email on 13 April 2023 with comments and recommendations as detailed below.

BCD responded via the portal with a letter dated 4 April 2023 with comments detailed below. No further actions were required.

Summary of the comments received during consultation

WaterNSW

WaterNSW noted the following concerns:

- A growing number of reported impacts in areas undermined by Dendrobium longwalls.
- Total of 38 landscape impacts and one swamp impact have been reported for currently mined Longwall 19 to date.
- About 90% of identified landscape impacts comprise of rock fracturing/surface cracking and rock movements in bushland, rock outcrops and steep slopes.

- Remaining 10% impacts account for surface cracking on fire road and closed access tracks, iron staining in WC14 tributary, gas release in Wongawilli Creek and a decline in soil moisture in Swamp 148.

It is noted that no additional actions in relation to the impacts reported on 29 March 2023 were required by WaterNSW.

Biodiversity and Conservation Division (BCD)

BCD comments included:

- There is a Level 1 incident and a Level 2 incident reported for which we do not require any further action.
- We realise SIRs are now being more frequently referred via the Planning Portal. As such, the Portal requires a formal reply to be uploaded (including for nil response issues) to close out the matter. This is proving to be an inefficient process and it is requested South32 consider referring SIRs via the Illawarra Planning Mailbox: rog.illawarra@environment.nsw.gov.au. In that arrangement, we can formally provide comments as necessary otherwise we can issue South32 with a simple email reply.

Heritage NSW

A meeting with Heritage NSW was held on 4 April 2023 to discuss the impacted sites and Aboriginal Heritage Impact Permit (AHIP) requirements for future longwalls. Heritage NSW requested IMC provide steps that have been undertaken in terms of consultation for Longwall 19A in order to advise on future AHIP requirements.

Illawarra Local Aboriginal Land Council (ILALC)

Meeting minutes prepared by Niche Environment and Heritage for meeting held 10am on 5/04/2023, via GoogleMeet.

<u>Online attendees:</u>

- Adell Hyslop (ILALC CEO)
- Aara Welz (ILALC Cultural Heritage Manager)
- Antony Leone (S32-IMC)
- Gary Brassington (S32-IMC)
- Damien Piro (S32 headquarters, Perth)
- Stella Quast (Niche)
- Jamie Reeves (Niche)

<u>Minutes:</u>

- Introductions.
- S32 PowerPoint was presented regarding the two impacted AHIMS sites over Longwall 19.

- ILALC comments:
  - Would like to focus on steps forward regarding the management of these shelters, i.e. preventative/preservation measures, salvage excavations within the shelters, etc.
  - ILALC board meeting taking place on 17th April where discussion will take place regarding the impacted Longwall 19 sites and steps moving forward. Aara highlighted that she cannot speak on behalf of ILALC's members, especially before board discussions have taken place.
  - Aara queried if there was an AHIP in place for the impacted sites as the ACHM Plan mentions this – Gary answered explaining that these sites previously had AHIPs but had since expired. Approvals had been conducted prior to Longwall 19 extraction, and that at the time, the advice was that an AHIP was not required under the consolidated consent. Regardless, an ACHMP was prepared in consultation with the RAPs and submitted to Heritage NSW.
  - Aara requested documents to be sent through from S32 (inc. TARPs and photos) – Antony confirmed he will send these through, and that this information should be shared with all RAPs.
  - Aara emphasised ILALC believes sites should not be disarticulated from their broader contexts, and highlighted the importance of the context of Aboriginal cultural heritage sites – i.e. the broader landscape context (such as waterways next to sites), cultural values contexts, and the interrelation of sites to one another (sites should not be disarticulated from one another).
  - Aara and Adell would like to see all eight AHIMS sites within the Longwall 19 subject area to be visited / monitored, not just those immediately over Longwall 19.
  - Aara and Adell would like the End of Panel fieldwork to include visiting landscape impacts other than those experienced at cultural heritage sites (e.g. impacts to waterways, ridgelines, etc) – Gary replied that this could be done, especially on the way to and from AHIMS sites.
  - Aara expressed concern regarding potential further subsidence impacts to these sites from further future mining in the area. Gary responded that from previous experience the overhangs are not structurally compromised. But this will be confirmed via expert geotechnical advice.
  - Adell noted that the current language at ILALC is focussed on long term impacts and their implications (taking a generational view, i.e. well beyond the standard 12 month monitoring mark). Meeting concluded.

Registered Aboriginal Parties (RAPs)

Details of telephone calls made on 29 March 2023 are provided in Table 4.

Table 4: Details of telephone consultation with RAPs (Niche Environment and Heritage)

Date of consultation	Time of consultation	Stage	Type of consultation	Name	Stakeholder group associated with	Notes
29/03/2023	4:37pm	*Impacted Sites Notification*	Phone call	Sandy Chalmers	NTS Corp (on behalf of South Coast People Native Title Claimants)	Left a voicemail for Sandy/NTS Corp to call back.
29/03/2023	4:37pm	*Impacted Sites Notification*	Phone call	Kim Moran	Bellambi Aboriginal Tent Assembly	Left a voicemail for Kim to call back.
29/03/2023	4:37pm	*Impacted Sites Notification*	Phone call	Richard Campbell	Gumaraa	Richard expressed sadness at hearing the news, thanked us for notifying him, and noted that he would like to send someone out to inspect the sites for the End of Panel assessment.
29/03/2023	4:40pm	*Impacted Sites Notification*	Phone call	Glenda Chalker	Cubbitch Barta Native Title Claimants	Left a voicemail for Glenda to call back.
29/03/2023	4:41pm	*Impacted Sites Notification*	Phone call	James Davis	Wodi Wodi Traditional Owners	Left a voicemail for James to call back.
29/03/2023	4:41pm	*Impacted Sites Notification*	Phone call	Glenda Chalker	Cubbitch Barta Native Title Claimants	• Glenda called back. She stated that she was not pleased about the news, but she immediately noted that all the wet weather recently experienced would have likely played a partial role in these impacts (by destabilising the ground surface). • Would like to know which specific sites were impacted. • Is interested to know how these impacted sites conform/not conform with their subsidence predictions, along with the prediction that less than 10% of sites in the Catchment will be impacted by mining. • Would like to send a site officer out to inspect the damage to the sites.
29/03/2023	4:49pm	*Impacted Sites Notification*	Phone call	Kayla Williamson	Woronora Plateau Gundungara Elders Council	• Kayla said she was sad to hear the news and is interested to know which sites these are. • Like Glenda, she noted that the wet weather may have played a role in exacerbating subsidence impacts and is interested to know if these impacts are in line with the subsidence predictions for the sites. • Kayla thanked us for letting her know and is keen to send someone out there to have a look.
29/03/2023	4:50pm	*Impacted Sites Notification*	Phone call	Nathanial Kennedy	Warra Bingi Nunda Gurri	• Nathanial said he is unhappy with this outcome, and that his brother Jade will likely have quite a lot to say about this (as part of ILALC, which Jade is still on the board of). • He would be interested to know which sites have been impacted, and exactly how they have been impacted (i.e. if art has been impacted). • Nathanial would like us to keep him informed about this issue moving forwards.

Date of consultation	Time of consultation	Stage	Type of consultation	Name	Stakeholder group associated with	Notes
29/03/2023	4:59pm	*Impacted Sites Notification*	Phone call	James Davis	Wodi Wodi Traditional Owners	James called back. Said he is sad to hear about these shelters and is keen to get out in the field to have a proper look at the damage. James thanked us for letting him know.
29/03/2023	5:05pm	*Impacted Sites Notification*	Phone call	Scott Franks	Tocumwall	Left a voicemail for Scott to call back.
29/03/2023	5:05pm	*Impacted Sites Notification*	Phone call	Shaun Carroll	Merrigarn	Tried to call, phone number seems disconnected.
29/03/2023	5:06pm	*Impacted Sites Notification*	Phone call	Jesse Johnson	Muragadi	Left a voicemail for Jesse to call back.
29/03/2023	5:07pm	*Impacted Sites Notification*	Phone call	Ryan Johnson	Murra Bidgee Mullangari	Left a voicemail for Ryan to call back.
29/03/2023	5:07pm	*Impacted Sites Notification*	Phone call	Roxanne Smith	Murramarang (Murrin Clan/Peoples)	Tried to call, phone number seems disconnected.
29/03/2023	5:08pm	*Impacted Sites Notification*	Phone call	Leonard Wright	Three Ducks Dreaming	Left a voicemail for Leonard to call back.
29/03/2023	5:08pm	*Impacted Sites Notification*	Phone call	George Villaflor	Korewal Elouera Jerrungurah Tribal Elders Council	Left a voicemail for George to call back.
29/03/2023	5:09pm	*Impacted Sites Notification*	Phone call	Maria Maher	Kullila Welfare and Housing Aboriginal Corporation	Left a voicemail for Maria to call back.
29/03/2023	5:14pm	*Impacted Sites Notification*	Phone call	Scott Franks	Tocumwall	• Scott called back. He was not happy about this news and questioned which specific shelters have been impacted. • Initially a little unclear about which specific project this was for, as he was asking at the start of the call if these sites are on the Georges River. • He would like to go out to assess the impacts to the sites. • Scott thanked us for letting him know so quickly and would like to continue to be consulted on this matter.
29/03/2023	5:15pm	*Impacted Sites Notification*	Phone call	Adell Hyslop	Illawarra Local Aboriginal Land Council (ILALC)	AL (S32) called Adell. No answer, so left voice-to-text voicemail.

Date of consultation	Time of consultation	Stage	Type of consultation	Name	Stakeholder group associated with	Notes
29/03/2023	5:31pm	*Impacted Sites Notification*	Phone call	Gary Caines	Individual (Elder)	• Uncle Gary stated that this is bad news. • Noted that this is part of the bigger picture - says that the whole mining situation is ruining country and needs to be reviewed. • Uncle Gary noted that he used to work as a coal miner at Mount Nebo, and he feels it would be very beneficial for the Dendrobium RAPs to be taken on an underground tour of Dendrobium, so they can gain a better understanding of exactly how longwall mining works (and therefore what they are dealing with). • Is also concerned that coal mining is negatively impacting the drinking water of the Catchment. • Strongly believes that there should be no more coal mining in the Catchment. • Emphasised multiple times that South32 needs to think about what they are taking and why, and that we need to change the status quo around mining in this area. Uncle Gary stated that the impacts to these sites supports this.
30/03/2023	11:06am	*Impacted Sites Notification*	Phone call	Adell Hyslop	ILALC	AL (S32) called Adell. No answer, so then sent a follow up SMS.
30/03/2023	11:18am	*Impacted Sites Notification*	Phone call	Donna Hiscox	ILALC	AL (S32) called Donna (ILALC landline). Spoke with receptionist and left details for Adell to call back.
30/03/2023	12:32pm	*Impacted Sites Notification*	Phone call	Aara Welz	ILALC	SQ (Niche) left a message for Aara to call back.
31/03/2023	9:09am	*Impacted Sites Notification*	Phone call	Aara Welz	ILALC	• Unhappy about the news, but not surprised given previous subsidence impacts in the Catchment. Appreciative of S32's transparency on this matter (self-reporting). • Noted that the recent wet weather has likely played a role in exacerbating subsidence impacts. • Keen for herself (as an archaeologist) as well as a cultural representative to attend the site visits on behalf of ILALC. • ILALC would like to meet with South32 to discuss this matter – it would be a meeting with Aara, Adell and possibly Jade Kennedy. • Meeting with ILALC should not take place during the first week of the school holidays, as Aara will be away (7-16 April). Unsure what Adell's schedule is at this stage; she may be away for the full school holidays. • Noted the implications that these impacted sites could have on the future of mining and approvals at Dendrobium (and the broader Catchment). • Noted that other mining companies (Metropolitan Colliery and Wollongong Coal) have been resizing their longwalls to be narrower, in order to minimise subsidence impacts to the surface. Also suggested that South32 should consider the post-and-pillar method of extraction as well, to minimise subsidence.

Date of consultation	Time of consultation	Stage	Type of consultation	Name	Stakeholder group associated with	Notes
						• ILALC would like a ranger program in Dendrobium within all previously mined areas, in order to conduct long-term monitoring of subsidence impacts to AHIMS sites and their surrounding landscape contexts (e.g. creeks next to grinding grooves). • Noted that ILALC has never supported mining in the Catchment and will continue to oppose this practice.

Summary of actions taken by Illawarra Metallurgical Coal in response to comments received during consultation

In response to comments from WaterNSW and BCD, IMC have undertaken the following actions:

- IMC responded via email to WaterNSW on 11/05/2023 proposing the following actions:
    - Develop a plan showing the location of all subsidence related impacts in Areas 3A and 3B. This analysis is expected to show that surface impacts are greater in steep areas. Compared to most of Area 3B, Longwall 19 is situated under steeper areas, similar to Areas 3A, 2 and 1. The plan and analysis will be provided with the Longwall 19 End of Panel Report and is relevant to WaterNSW concern regarding the growing number of reported impacts.
    - In response to the recommendation "that surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP", as the TARP relates to open, vehicle tracks, IMC propose to erect caution tape and signage as appropriate as closed access tracks are unable to be accessed by vehicles and are rarely used by other catchment users. IMC will also monitor and reassess if something changes.
- WaterNSW responded via email on 11/05/2023 acknowledging the proposed actions. Email Correspondence with WaterNSW is provided in Attachment 2.
- IMC acknowledge that BCD prefer SIRs to be submitted via the Illawarra Planning Mailbox. WaterNSW was contacted and agreed to receive SIRs via email in the first instance prior to upload of the final SIR report to the portal which would include a summary of consultation undertaken. Future SIRs will be emailed to relevant agencies prior to consultation. Final reports will be uploaded to the Major Projects Planning Portal following consultation.
- Implementation of on-going corrective management actions (CMAs) as detailed above.

In response to comments from Heritage NSW, RAPs and ILALC, IMC have undertaken the following actions:

- The Longwall 19A Aboriginal Cultural Heritage Assessment (ACHA) and consultation timeline were provided to Heritage NSW following the meeting on 11 April 2023, seeking additional advice. Discussions regarding provisions of the *National Parks and Wildlife Act, 1974* are ongoing.
- Field visits to impacted sites and other heritage sites within the Longwall 19 study area were undertaken with the RAPs and representatives of the ILALC on 26 – 28 April 2023.
- IMC will continue to consult with relevant stakeholders, comply with requirements under the NPWS Act and continue to seek the advice of Heritage NSW in relation to heritage sites.

ATTACHMENT 1 – NOTIFICATION EMAIL

From:	Brady, Cody
To:	HERITAGEMailbox@environment.nsw.gov.au; Gabrielle Allan
Cc:	Brassington, Gary; Zanotto, Linda; Jessie Evans
Subject:	Dendrobium - Subsidence Impact Report
Date:	Wednesday, 29 March 2023 8:57:52 PM
Attachments:	Dendrobium Area 3A Impact Report_230329.pdf image001.png

Hi HeritageNSW and Gabrielle,

Please find the attached subsidence impact report for Dendrobium Mine regarding recent subsidence impact observations to two cultural heritage sites within Area 3A. In accordance with the Aboriginal Cultural Heritage Management Plan, IMC is required to notify DPE and HeritageNSW of these impacts. IMC will carry out further assessment of these sites in accordance with the management plan.

Please let me know if you have any questions or wish to discuss.

Regards

Cody Brady
Principal Mining Approvals
Illawarra Metallurgical Coal

M: +61 417 998 297
E: Cody.Brady@South32.net
PO Box 514 Unanderra NSW 2526 Australia

ATTACHMENT 2 –WATERNSW CONSULTATION

Maria Dubikova

To: Zanotto, Linda
Subject: Dendrobium Mine Subsidence Impact Reports, March 2023

Dear Ms Zanotto

According to the TARP action plan IMC is required to report all identified landscape impacts to key stakeholders. In March 2023, WaterNSW has received and reviewed three (3) Longwall 19 Subsidence Impacts Reports dated:

- 17/03/2023 that reported one new Level 2 trigger related to soil cracking and rock displacement to a closed vehicle access track,
- 24/03/2023 that reported one new Level 1 trigger associated with soil cracking to a closed access track, and
- 29/03/2023 that identified two new subsidence impacts causing rock fracturing at registered Aboriginal Heritage sites, Sandy Creek 21 (fractures and rockfall about 6m away from the artwork) and DM15 (a new hairline fracture through a part of the artwork). Both impacts are assessed as Level 2 trigger as per the Aboriginal Cultural Heritage Management Plan for Longwall 19 and Level 1 trigger as per Area 3A Landscape TARP (based on fractures dimensions).

WaterNSW is concerned with a growing number of reported impacts in areas undermined by Dendrobium longwalls. It is noted that total of 38 landscape impacts and one swamp impact have been reported for currently mined longwall 19 to date. About 90% of identified landscape impacts comprise of rock fracturing/surface cracking and rock movements in bushland, rock outcrops and steep slopes. Remaining 10% impacts account for surface cracking on fire road and closed access tracks, iron staining in WC14 tributary, gas release in Wongawilli Creek and a decline in soil moisture in Swamp 148.

WaterNSW recommends that surface cracking to a closed vehicle access track is assessed and repaired to make the road safe as per corrective management actions outlined in the approved Area 3A Landscape TARP.

Please feel free to contact Maria Dubikova if you would like to discuss any of the above matters further.

Regards,

Maria Dubikova
Hydrogeologist

WaterNSW

PO Box 398, Parramatta NSW 2124
Level 14, 169 Macquarie Street
Parramatta, NSW, 2150
maria.dubikova@waternsw.com.au
www.waternsw.com.au

ATTACHMENT 3: BCD CONSULTATION

Department of Planning and Environment

Your ref: PAE-56418714
Our ref: DOC23/263329

Ms Linda Zanotto
Specialist Environment - Systems and Reporting

Illawarra Metallurgical Coal

By email: linda.zanotto@south32.net

Dear Ms Zanotto

Major Projects – Proponent Request for Advice - Dendrobium Mine - Area 3A Subsidence Impact Report (SIR) 29 Mar (DA60-03-2001-PA-189)

I refer to the Dendrobium 3A additional Impact Report for 29 March 2023. Biodiversity Conservation Division (BCD) have reviewed the document and provide the following advice:

- There is a Level 1 incident and a Level 2 incident reported for which we do not require any further action.
- We realise SIRs are now being more frequently referred via the Planning Portal. As such, the Portal requires a formal reply to be uploaded (including for nil response issues) to close out the matter. This is proving to be an inefficient process and it is requested South32 consider referring SIRs via the Illawarra Planning Mailbox: rog.illawarra@environment.nsw.gov.au In that arrangement, we can formally provide comments as necessary otherwise we can issue South32 with a simple email reply.

  .

If you have any further questions about this issue, please contact Ms Tania Ashworth, Senior Conservation Planning Officer, South East, Biodiversity and Conservation Division, on 02 6229 7921 or at tania.ashworth@environment.nsw.gov.au.

Yours sincerely

Chris Page
Senior Team Leader, Planning (Illawarra)
Biodiversity and Conservation Division

Date: 4 April 2023

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and was completed on 29 March 2023. During a recent inspection, there was one update to an existing subsidence impact and four new subsidence impacts identified.

This Version 2 of the report includes a summary of consultation with stakeholders undertaken since the initial report.

DA3A_LW8_003 (Update) (E 291534, N 6192335)

DA3A_LW8_003 was originally recorded on 28 January 2020, with changes to the impact recently observed. *DA3A_LW8_003* is located on *WC14*, a tributary to *Wongawilli Creek* (Figure 1). During the initial inspection the impact consisted of rock fracturing and uplift at the top of a step, located approximately 3m south of Longwall 19. The impact site now displays a continuation in rock fracturing which extends beneath a step with small associated rockfalls/fragments. Originally the rock fracturing was recorded with a maximum continuous length of 1.8m and a maximum width of 0.005m. The latest fracturing has a maximum continuous length of 2.73m, a maximum width of 0.04m and maximum measurable depth of 0.49m (Photo 1 to Photo 3). The associated rockfall/fragments dimensions were estimated due to safety concerns, with an approximate rockfall volume of 0.2m^3 (Photo 4).

DA3A_LW8_003 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 1: *DA3A_LW8_003*, looking at the width of rock fracturing. Taken 12/04/2023.

Photo 2: *DA3A_LW8_003*, looking at the extent of rock fracturing. Taken 12/04/2023.

Photo 3: *DA3A_LW8_003*, looking at the depth of rock fracturing. Taken 12/04/2023.

Photo 4: *DA3A_LW8_003*, looking at the rockfall and associated fragments. Taken on 12/04/2023.

DA3A_LW19_039 (E 291495, N 6192380)

DA3A_LW19_039 is approximately 30m to the north of *WC14*, a tributary to *Wongawilli Creek* (Figure 1). The impact consists of a rockfall at the base of a steep slope. Dimensions were estimated due to safety concerns with a total estimated rockfall volume of 1.3m^3 (Photo 5 and Photo 6).

DA3A_LW19_039 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 5: *DA3A_LW19_039*, looking at the rockfall. Taken 12/04/2023

Photo 6: *DA3A_LW19_039*, looking at the rockfall. Taken 12/04/2023

DA3A_LW19_040 (E 291523, N 6192422)

DA3A_LW19_040 consists of rockfalls and fragmentation at the base of a step, approximately 80m to the north of tributary *WC14* (Figure 1). The rockfall has an approximate rockfall volume of 0.3m^3 with some rock fragments spread out in an area of approximately 1m^2 (Photo 7 and Photo 8).

DA3A_LW19_040 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 7: *DA3A_LW19_040*, looking at rockfall and fragments. Taken 12/04/2023.

Photo 8: *DA3A_LW19_040,* looking at rockfall and fragments. Taken 12/04/2023.

DA3A_LW19_041 (E 291460, N 6192410)

DA3A_LW19_041 consists of a rockfall that runs horizontally along landscape monitoring site *LW19_SS5* (Figure 1). Two large boulders have become dislodged with one boulder rolling downhill approximately 25m from the steep slope with associated ground disturbance over this distance and extending up to 8m wide (Photo 11 and Photo 12). A baseline photo is provided for pre-mining comparison (Photo 9). The largest boulder was measured with an approximate volume of 8.7m^3 (Photo 12). The other slightly smaller boulder was unable to be measured due to safety concerns around the steep slope. The surface area where the boulders detached from the steep slope has an estimated area of 21m^2 (Photo 10).

DA3A_LW19_041 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Rock fall or overhang collapse at cliff (steep slope) site, where characteristics of the cliff (steep slope) have changed, and there has been significant ground disturbance.

Photo 9: Baseline photo taken of *LW10_SS5* pre-mining. Taken 17/06/2022.

Photo 10: *DA3A_LW19_041* looking at the rockfall at landscape site *LW19_SS5*. Taken 12/04/2023.

Photo 11: *DA3A_LW19_041* looking at boulder that has dislodged and rolled downhill from steep slope.

Photo 12: *DA3A_LW19_041* looking at boulder that has dislodged and rolled downhill from steep slope.

DA3A_LW19_042 (E 291389, N 6192392)

DA3A_LW19_042 consists of a very small rockfall/fragmentation from the ceiling and side of an overhang at landscape monitoring site *LW19_SS4* (Figure 1). A baseline photo is included for a pre-mining comparison (Photo 13). The rockfall and fragments were estimated due to safety concerns. The rockfall has an estimated volume of 0.005m^3, with fragments scattered below (Photo 14 to Photo 16).

DA3A_LW19_042 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 13: *LW19_SS4* during its baseline inspection. Taken 17/06/2022.

Photo 14: *LW19_SS4* during its most recent inspection. Taken 12/04/2023.

Photo 15: *DA3A_LW19_042* looking at rockfall and associated fragments. Taken 12/04/2023.

Photo 16: *DA3A_LW19_042* looking at rockfall and associated fragments. Taken 12/04/2023.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the Longwall 19 SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review

A full list of impacts and triggers recorded during Longwall 19 is presented in Table 2.

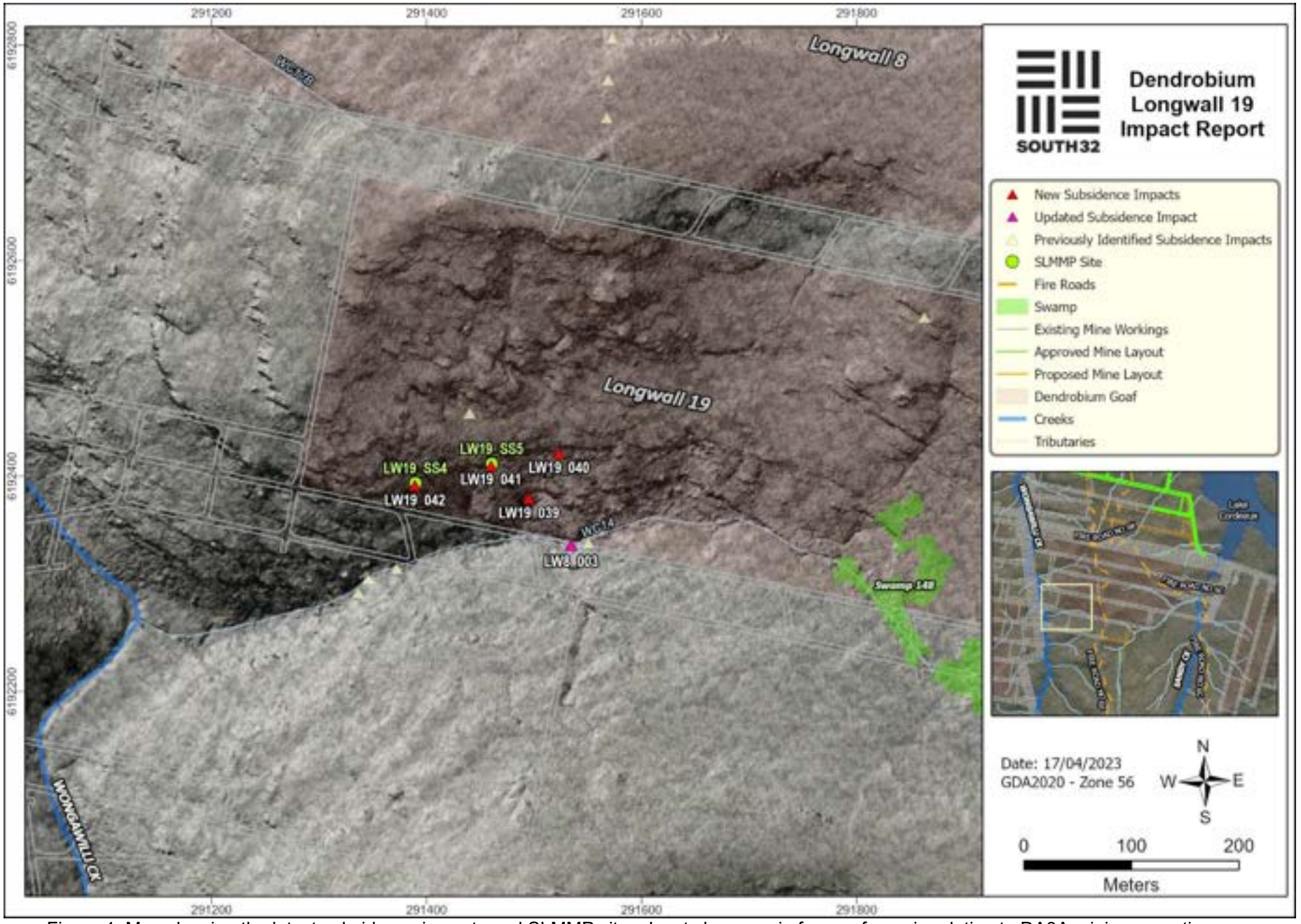


Figure 1: Map showing the latest subsidence impacts and SLMMP sites. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023
DA3A_LW19_036	Soil Cracking	Closed Access Track	21/02/2023	1	Soil cracking on a closed access track over Longwall 7.	24/03/2023
DA3A_LW19_037	Rock Fracturing and Rockfall	Sandy Creek 21 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall within proximity to cultural heritage site *Sandy Creek 21*	29/03/2023
DA3A_LW19_038	Rock Fracturing and Rockfall	DM15 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall at cultural heritage site *DM15*.	29/03/2023
DA3A_LW8_003 (Update)	Rock Fracturing, Rockfall and Fragmentation	WC14	12/04/2023	1	Rock fracturing with associated rockfall and fragmentation on WC14.	29/01/2020 and 17/04/2023
DA3A_LW19_039	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_040	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_041	Rockfall	LW19_SS5	12/04/2023	2	Rockfall at steep slope (landscape monitoring site LW19_SS5).	17/04/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_042	Rockfall and Fragmentation	LW19_SS4	12/04/2023	1	Very small rockfall with associated fragmentation at landscape monitoring site LW19_SS4.	17/04/2023

CONSULTATION

Summary of consultation undertaken in relation to the subsidence impact report

The impact report was emailed to DPE, WaterNSW, BCD and the Resources Regulator on 17 April 2023 for review and feedback.

The Resources Regulator responded via email on 18 April 2023 and issued reference number MAAG0015830 indicating that an assessment officer would be in contact should further information be required. No further correspondence was received.

WaterNSW responded via email on 21 April 2023 indicated they had no comments or questions. Evidence is provided in Attachment 1.

BCD responded via email with a letter dated 3 May 2023 indicating that no further actions were required. Evidence is provided in Attachment 2.

Summary of the comments received during consultation

WaterNSW

No comments or questions.

Biodiversity and Conservation Division (BCD)

There is four Level 1 incidents and a Level 2 incident reported for which we do not require any further action.

Summary of actions taken by Illawarra Metallurgical Coal in response to comments received during consultation

IMC will implement the corrective management actions (CMAs) as detailed within this impact report.

ATTACHMENT 1 – WATERNSW CONSULTATION

From: Maria Dubikova
To: Zanotto, Linda
Cc: Ravi Sundaram
Subject: RE: ARK: Dendrobium Mine - Subsidence Impact Report 17 April 2023
Date: Friday, 21 April 2023 7:27:54 PM

Hi Linda,

Thanks for the landscape subsidence impacts update. It was noted that longwall 19 was completed at the end of March.
I've just reviewed the report and don't have any comments or questions.

Regards,
Maria

From: Zanotto, Linda <Linda.Zanotto@south32.net>
Sent: Monday, 17 April 2023 3:17 PM
To: Ravi Sundaram <ravi.sundaram@waternsw.com.au>; Maria Dubikova <Maria.Dubikova@waternsw.com.au>; Resources Regulator <nswresourcesregulator@service-now.com>; Chris Page <Chris.Page@environment.nsw.gov.au>; Camilla Edmunds <Camilla.Edmunds@waternsw.com.au>; Environmental Assessments <Environmental.Assessments@waternsw.com.au>; rog.illawarra@environment.nsw.gov.au; gabrielle.allan@dpie.nsw.gov.au
Cc: Brassington, Gary <Gary.M.Brassington@south32.net>; Carlon, Josh <Josh.Carlon@south32.net>; Crehan, Amanda <Amanda.Crehan@south32.net>; Schultz, Chris <Chris.Schultz1@south32.net>; Leone, Antony <Antony.Leone@south32.net>; Walsh, Richard <Richard.V.Walsh@south32.net>; Mapstone, Rod <Rod.Mapstone1@south32.net>
Subject: ARK: Dendrobium Mine - Subsidence Impact Report 17 April 2023

Hi All,

Attached is the latest subsidence impact report (dated 17/04/2023) for Dendrobium Mine regarding recent subsidence impact observations in Area 3A. Please note that the report has not been uploaded to the Major Projects Planning Portal as consultation has been requested to be undertaken via email.

The report will be updated following receipt of feedback and the final report uploaded to the Major Projects Planning Portal in due course.

Please let me know if you have any questions.

Kind Regards,

Linda Zanotto
Principal Mining Approvals
Illawarra Metallurgical Coal

M: +61 409 399 560
E: Linda.Zanotto@South32.net

south32.net

ATTACHMENT 2 – BCD CONSULTATION

Department of Planning and Environment

Your ref: PAE-56418714
Our ref: DOC23/358213

Ms Linda Zanotto
Specialist Environment - Systems and Reporting

Illawarra Metallurgical Coal

By email: linda.zanotto@south32.net

Dear Ms Zanotto

Major Projects – Proponent Request for Advice - Dendrobium Mine - Area 3A Subsidence Impact Report (SIR) 17 April (DA60-03-2001-PA-189)

I refer to the Dendrobium 3A additional Impact Report for 17 April 2023. Biodiversity Conservation Division (BCD) have reviewed the document and note the following:

- There is four Level 1 incidents and a Level 2 incident reported for which we do not require any further action.

Thank for your continued notification.

If you have any further questions about this issue, please contact Ms Tania Ashworth, Senior Conservation Planning Officer, South East, Biodiversity and Conservation Division, on 02 6229 7921 or at tania.ashworth@environment.nsw.gov.au.

Yours sincerely

Chris Page
Senior Team Leader, Planning (Illawarra)
Biodiversity and Conservation Division

Date: 3 May 2023

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and was completed on 29 March 2023. During a recent inspection, there were two new subsidence impacts identified.

DA3A_LW19_043 (E 291495, N 6192342)

DA3A_LW19_043 consists of multiple rock fractures and some associated uplift on *WC14*, a tributary to *Wongawilli Creek* (Figure 1). The largest fracture has a maximum continuous length of 7.7m, a maximum width of 0.08m and a maximum measurable depth of 0.81m (Photo 1 to Photo 4). Some rock fracturing has uplifted on the rockbar with a measured uplift of 0.130m occurring at the downstream end of the impacted rockbar. No Flow was present during the inspection however some flow diversion could be expected during surface flow as the fracture runs across the main flow path of the tributary.

DA3A_LW19_043 is a Level 2 trigger as per the DA3A Watercourse Impact, Monitoring Management and Contingency Plan (Table 1), specifically:

- Crack or fracture that (could) result in observable loss of surface water or erosion.

Photo 1: DA3A_LW19_043, looking at rock fracturing on rockbar. Taken 17/04/2023.

Photo 2: DA3A_LW19_043, looking upstream at rock fracturing on rockbar. Taken 17/04/2023.

Photo 3: DA3A_LW19_043, looking at rock fracturing across rockbar. Taken 17/04/2023.

Photo 4: DA3A_LW19_043, looking at section of uplift. Taken 17/04/2023.

DA3A_LW19_044 (E 291000, N 6192679)

DA3A_LW19_044 is located approximately 15m east of *Wongawilli Creek* (Figure 1). The impact consists of iron staining which appears beneath a rock (Photo 5) and flows westward from DA3A mining operations. The iron staining's extent is approximately 20m in length and does not flow into *Wongawilli Creek* (Photo 6).

DA3A_LW19_044 is a Level 1 trigger as per the DA3A Watercourse Impact, Monitoring Management and Contingency Plan (Table 1), specifically:

- Observable increase in iron staining within the mining area

Photo 5: DA3A_LW19_044, looking at origin of iron staining beneath a rock. Taken 19/04/2023.

Photo 6: DA3A_LW19_044, looking at extent of iron staining. Taken 19/04/2023.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the Longwall 19 SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator)
- Summarise impacts and report in the End of Panel Report and Annual Review
- Review monitoring frequency
- Submit letter report to DPE, DRG and WaterNSW and seek advice on any CMA required
- Implement agreed CMAs as approved (subject to agency feedback)

A full list of impacts and triggers recorded during Longwall 19 is presented in Table 2.

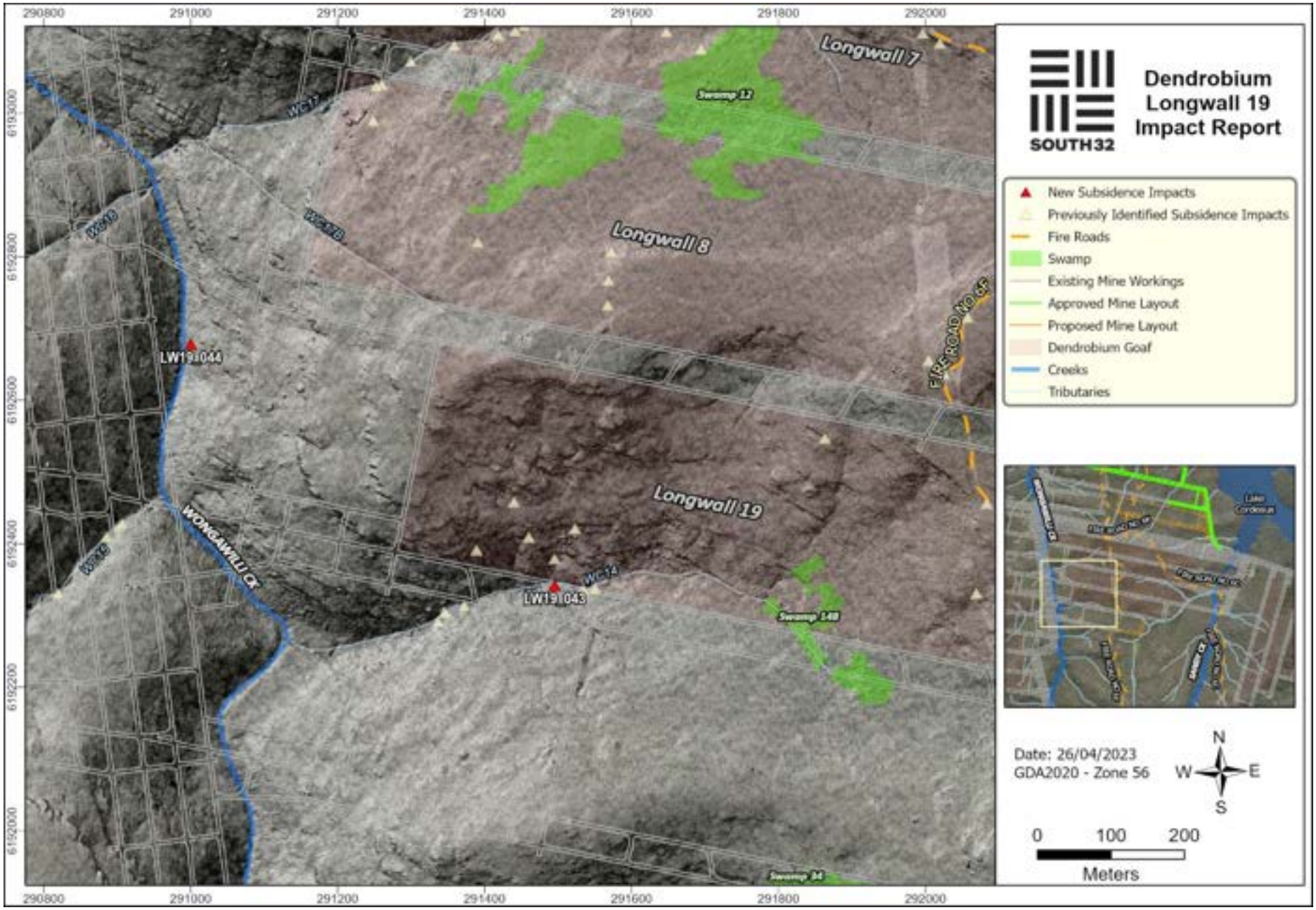


Figure 1: Map showing the latest subsidence impacts. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Watercourse TARP.

OBSERVATIONAL MONITORING		
WC13, WC14, WC15, WC16, WC17, WC17A, WC17B, SC7, SC10 and SC10C General observation of streams in active mining areas when longwall is within 400m	***Level 1*** • Crack or fracture up to 100mm width at its widest point with no observable loss of surface water or erosion • Crack or fracture up to 10m length with no observable loss of surface water or erosion • Erosion in a localised area (not associated with cracking or fracturing) which would be expected to naturally stabilise without CMA and within the period of monitoring • Observable release of strata gas at the surface • Observable increase in iron staining within the mining area	• Continue monitoring program • Submit an Impact Report to BCD, DPE, DRG, Water NSW • Report in the End of Panel Report • Summarise actions and monitoring in AEMR
	Level 2 • Crack or fracture between 100 and 300mm width at its widest point or any fracture which results in observable loss of surface water or erosion • Crack or fracture between 10 and 50m length • Soil surface crack that causes erosion that is likely to stabilise within the monitoring period without intervention • Observable increase in iron staining within the mining area continues to outside the mining area i.e. 400m from the longwall	• *Actions as stated for Level 1* • Review monitoring frequency • Submit letter report to DPE, DRG and Water NSW and seek advice on any CMA required • Implement agreed CMAs as approved (subject to agency feedback)
	Level 3 • Crack or fracture over 300mm width at its widest point • Crack or fracture over 50m length • Fracturing observed in the bedrock base of any significant permanent pool which results in observable loss of surface water • Soil surface crack that causes erosion that is unlikely to stabilise within the monitoring period without intervention • Gas release results in vegetation dieback, mortality or loss of aquatic habitat • Observable increase in iron staining within the mining area continues more than 600m from the longwall	• *Actions as stated for Level 2* • Offer site visit with BCD, DPE, DRG, Water NSW • Implement additional monitoring or increase frequency if required • Develop site CMA (subject to agency feedback). This may include: grouting of rockbar and bedrock base of any significant pool where it is appropriate to do so in consultation with BCD, DPE, DRG, Water NSW • Completion of works following approvals and at a time agreed between S32, DPE, DRG and Water NSW (i.e. may be after mining induced movements and impacts are complete), including monitoring and reporting on success • Review relevant TARP and Management Plan in consultation with key agencies

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023
DA3A_LW19_036	Soil Cracking	Closed Access Track	21/02/2023	1	Soil cracking on a closed access track over Longwall 7.	24/03/2023
DA3A_LW19_037	Rock Fracturing and Rockfall	Sandy Creek 21 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall within proximity to cultural heritage site *Sandy Creek 21*	29/03/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_038	Rock Fracturing and Rockfall	DM15 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall at cultural heritage site *DM15*.	29/03/2023
DA3A_LW8_003 (Update)	Rock Fracturing, Rockfall and Fragmentation	WC14	12/04/2023	1	Rock fracturing with associated rockfall and fragmentation on WC14.	29/01/2020 and 17/04/2023
DA3A_LW19_039	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_040	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_041	Rockfall	LW19_SS5	12/04/2023	2	Rockfall at steep slope (landscape monitoring site LW19_SS5).	17/04/2023
DA3A_LW19_042	Rockfall and Fragmentation	LW19_SS4	12/04/2023	1	Very small rockfall with associated fragmentation at landscape monitoring site LW19_SS4.	17/04/2023
DA3A_LW19_043	Rock Fracturing and Uplift	WC14	17/04/2023	2	Rock fracturing and associated uplift to a rockbar on WC14.	This Report
DA3A_LW19_044	Iron Staining	Bushland	19/04/2023	1	Iron staining present flowing on valley slope within proximity to Wongawilli Creek	This Report

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and was completed on 29 March 2023. During recent inspections, there were six new subsidence impacts identified.

This Version 2 of the report includes a summary of consultation with stakeholders undertaken since the initial report.

DA3A_LW19_045 (E 290884, N 6192410)

DA3A_LW19_045 is located on *WC15*, a tributary to *Wongawilli Creek* (Figure 1). The impact consists of iron staining which appears at the base of a step above *WC15_Pool 2* and extends downstream approximately 1.4m, to the pool before disappearing beneath a boulder on the tributary's edge (Photo 1 and Photo 2). Impact *DA3B_LW13_046* was previously recorded at the site on 1 April 2019 during Longwall 13, consisting of rock fracturing and displacement at *WC15_Pool 2*. The iron staining has only appeared following the latest inspection.

DA3A_LW19_045 is a Level 1 trigger as per the DA3A Watercourse Impact, Monitoring, Management and Contingency Plan (Table 1), specifically:

- Observable increase in iron staining within the mining area

Photo 1: *DA3A_LW19_045*, showing iron staining appearing at base of a step. Taken on 26/04/2023.

Photo 2: *DA3A_LW19_045*, showing iron staining disappearing beneath a boulder. Taken on 26/04/2023.

DA3A_LW19_046 (E 291636, N 6192624)

DA3A_LW19_046 is located approximately 390m west of *Fire Road 6F* (Figure 1). The impact consists of a rockfall on a steep slope/step. Several boulders have become dislodged from the steep slope/step face with an approximate debris area of 7m^2 (Photo 3 to Photo 5). The boulders that detached have a total combined rockfall volume of approximately 10m^3. The impact site has minimal impact to vegetation or ground disturbance.

DA3A_LW19_046 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 3: *DA3A_LW19_046*, showing steep slope/ step face where rocks detached. Taken on 27/04/2023.

Photo 4: *DA3A_LW19_046*, showing steep slope/ step face where rocks detached. Taken on 27/04/2023.

Photo 5: *DA3A_LW19_046*, showing debris area. Taken on 27/04/2023.

DA3A_LW19_047 (E 291302, N 6192673)

DA3A_LW19_047 is located approximately 460m to the north of *WC14*, a tributary to *Wongawilli Creek* (Figure 1). The impact consists of a rockfall on a steep slope/step. The largest rock segment that has detached from the slope face has an approximate rockfall volume of 0.024m^3 (Photo 6) and a debris area of 0.7m^2 (Photo 7). The impact site has very minimal impact to vegetation or ground disturbance.

DA3A_LW19_047 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 6: *DA3A_LW19_047*, showing steep slope/ step where rock has detached from rock face. Taken on 27/04/2023

Photo 7: *DA3A_LW19_047*, showing debris area. Taken on 27/04/2023.

DA3A_LW19_048 (E 291780, N 6192521)

DA3A_LW19_048 is located approximately 280m west of *Fire Road 6F* (Figure 1). The impact consists of a rock fracturing and rock movement along a closed access track. The rock fracture has a maximum continuous length of 3.1m, a maximum width of 0.045m and a maximum measurable depth of 0.265m (Photo 8 to Photo 9). The rock movement presents a gap between soil and rock that's approximately 0.035m wide (Photo 10). The rock fracture has no impact to the access track.

DA3A_LW19_048 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;

Photo 8: *DA3A_LW19_048*, showing rock fracturing. Taken on 27/04/2023.

Photo 9: *DA3A_LW19_048*, showing width of rock fracture. Taken on 27/04/2023.

Photo 10: *DA3A_LW19_048*, showing rock movement. Taken on 27/04/2023.

DA3A_LW19_049 (E 291793, N 6192541)

DA3A_LW19_049 is located approximately 260m west of *Fire Road 6F* (Figure 1). The impact consists of soil cracking along a closed access track. The soil crack has a total discontinuous length of 9.9m, a maximum continuous length of 3.1m, a maximum width of 0.08m and a maximum measurable depth of 0.9m (Photo 11 and Photo 12). Flagging tape was put along the access track as a safety precaution.

DA3A_LW19_049 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;

Photo 11: *DA3A_LW19_049*, showing extent of soil crack. Taken on 27/04/2023.

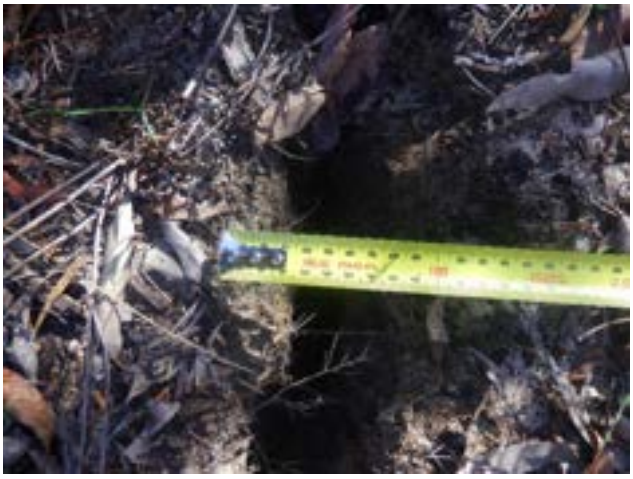


Photo 12: *DA3A_LW19_049*, showing width of soil crack. Taken on 27/04/2023.

DA3A_LW19_050 (E 291820, N 6192550)

DA3A_LW19_050 is located approximately 230m west of *Fire Road 6F* (Figure 1). The impact consists of soil cracking along a closed access track. The soil crack has a total discontinuous length of 6.3m, a maximum continuous length of 2.9m, a maximum width of 0.15m and a maximum measurable depth of 0.63m (Photo 13 and Photo 14). Flagging tape was put along the access track as a safety precaution.

DA3A_LW19_050 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture between 100mm and 300mm width;
- Crack or fracture between 10m and 50m length;

Photo 13: *DA3A_LW19_050*, showing extent of soil crack. Taken on 27/04/2023.

Photo 14: *DA3A_LW19_050*, showing width of soil crack. Taken on 27/04/2023.

Corrective Management Actions (CMAs)

- Continue monitoring program as required in the Longwall 19 SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator and Department of Planning and Environment)
- Summarise impacts and report in the End of Panel Report and Annual Review
- Review monitoring frequency
- Notify relevant technical specialists and seek advice on any CMA required
- Provide safety signage and barricades as appropriate
- Implement approved repairs to ensure safety and serviceability on fire trails
- Implement agreed CMAs as approved (subject to agency feedback)

A full list of impacts and triggers recorded during Longwall 19 is presented in Table 3.

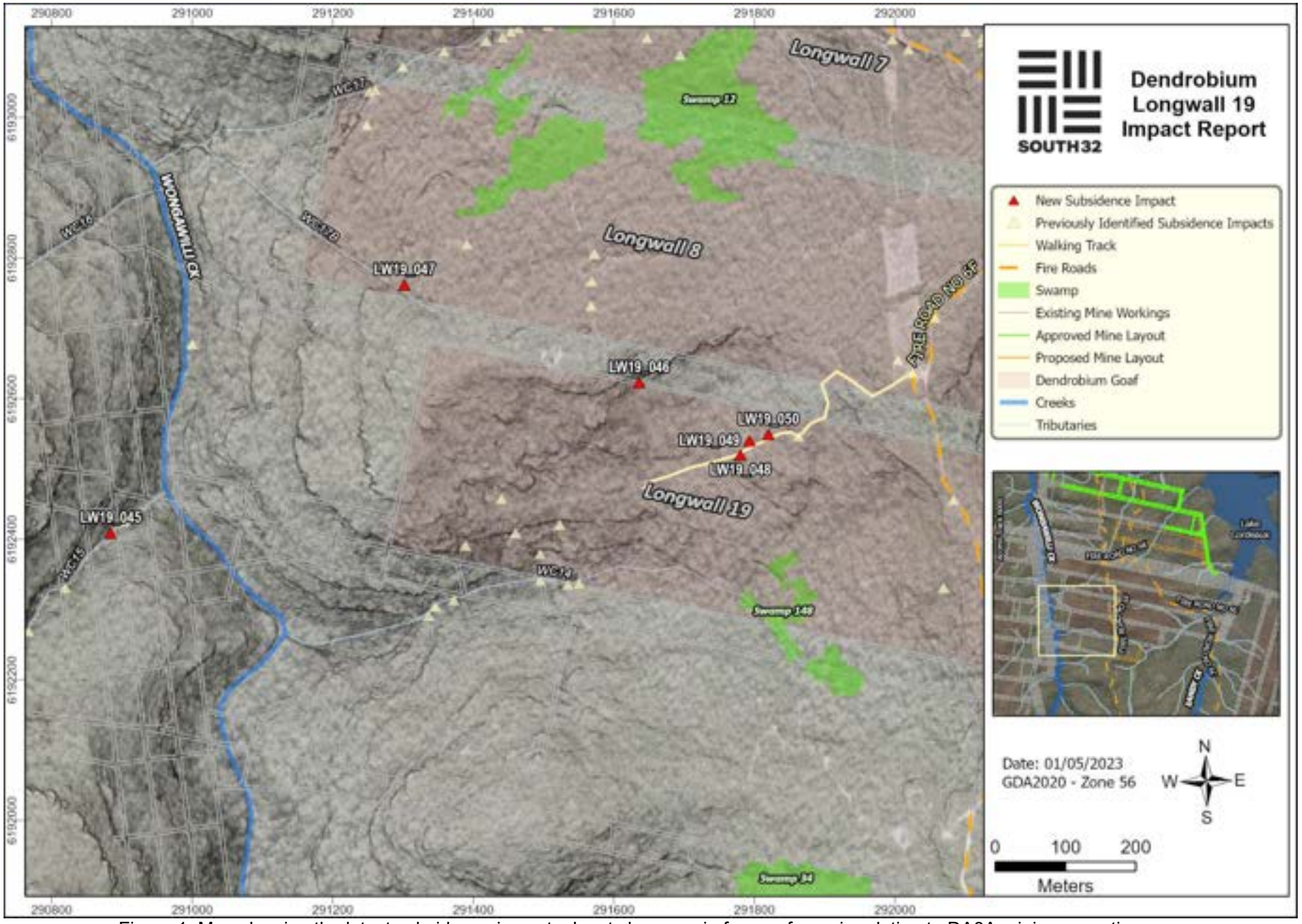


Figure 1: Map showing the latest subsidence impacts. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Watercourse TARP.

OBSERVATIONAL MONITORING		
WC13, WC14, WC15, WC16, WC17, WC17A, WC17B, SC7, SC10 and SC10C General observation of streams in active mining areas when longwall is within 400m	***Level 1*** • Crack or fracture up to 100mm width at its widest point with no observable loss of surface water or erosion • Crack or fracture up to 10m length with no observable loss of surface water or erosion • Erosion in a localised area (not associated with cracking or fracturing) which would be expected to naturally stabilise without CMA and within the period of monitoring • Observable release of strata gas at the surface • Observable increase in iron staining within the mining area	• Continue monitoring program • Submit an Impact Report to BCD, DPE, DRG, Water NSW • Report in the End of Panel Report • Summarise actions and monitoring in AEMR
	Level 2 • Crack or fracture between 100 and 300mm width at its widest point or any fracture which results in observable loss of surface water or erosion • Crack or fracture between 10 and 50m length • Soil surface crack that causes erosion that is likely to stabilise within the monitoring period without intervention • Observable increase in iron staining within the mining area continues to outside the mining area i.e. 400m from the longwall	• *Actions as stated for Level 1* • Review monitoring frequency • Submit letter report to DPE, DRG and Water NSW and seek advice on any CMA required • Implement agreed CMAs as approved (subject to agency feedback)
	Level 3 • Crack or fracture over 300mm width at its widest point • Crack or fracture over 50m length • Fracturing observed in the bedrock base of any significant permanent pool which results in observable loss of surface water • Soil surface crack that causes erosion that is unlikely to stabilise within the monitoring period without intervention • Gas release results in vegetation dieback, mortality or loss of aquatic habitat • Observable increase in iron staining within the mining area continues more than 600m from the longwall	• *Actions as stated for Level 2* • Offer site visit with BCD, DPE, DRG, Water NSW • Implement additional monitoring or increase frequency if required • Develop site CMA (subject to agency feedback). This may include: grouting of rockbar and bedrock base of any significant pool where it is appropriate to do so in consultation with BCD, DPE, DRG, Water NSW • Completion of works following approvals and at a time agreed between S32, DPE, DRG and Water NSW (i.e. may be after mining induced movements and impacts are complete), including monitoring and reporting on success • Review relevant TARP and Management Plan in consultation with key agencies

Table 2: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 3: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

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DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
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DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023
DA3A_LW19_036	Soil Cracking	Closed Access Track	21/02/2023	1	Soil cracking on a closed access track over Longwall 7.	24/03/2023
DA3A_LW19_037	Rock Fracturing and Rockfall	Sandy Creek 21 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall within proximity to cultural heritage site *Sandy Creek 21*	29/03/2023
DA3A_LW19_038	Rock Fracturing and Rockfall	DM15 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall at cultural heritage site *DM15*.	29/03/2023
DA3A_LW8_003 (Update)	Rock Fracturing, Rockfall and Fragmentation	WC14	12/04/2023	1	Rock fracturing with associated rockfall and fragmentation on WC14.	29/01/2020 and 17/04/2023
DA3A_LW19_039	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_040	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_041	Rockfall	LW19_SS5	12/04/2023	2	Rockfall at steep slope (landscape monitoring site LW19_SS5).	17/04/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_042	Rockfall and Fragmentation	LW19_SS4	12/04/2023	1	Very small rockfall with associated fragmentation at landscape monitoring site LW19_SS4.	17/04/2023
DA3A_LW19_043	Rock Fracturing and Uplift	WC14	17/04/2023	2	Rock fracturing and associated uplift to a rockbar on WC14.	27/04/2023
DA3A_LW19_044	Iron Staining	Bushland	19/04/2023	1	Iron staining present flowing on valley slope within proximity to Wongawilli Creek	27/04/2023
DA3A_LW19_045	Iron Staining	WC15	26/04/2023	1	Iron staining at base of step flowing into a pool on WC15.	01/05/2023
DA3A_LW19_046	Rockfall	Steep Slope/ Step	27/04/2023	1	Rockfall from steep slope/ step to the west of Fire Road 6F.	01/05/2023
DA3A_LW19_047	Rockfall	Steep Slope/ Step	27/04/2023	1	Rockfall from steep slope/ step to the north of WC14.	01/05/2023
DA3A_LW19_048	Rock Fracturing	Closed Access Track	27/04/2023	1	Rock fracturing on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_049	Soil Cracking	Closed Access Track	27/04/2023	1	Soil cracking on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_050	Soil Cracking	Closed Access Track	27/04/2023	2	Soil cracking on a closed access track west of Fire Road 6F	01/05/2023

CONSULTATION

Summary of consultation undertaken in relation to the subsidence impact report

The impact report was emailed to DPE, WaterNSW, BCD and the Resources Regulator on 2 May 2023 for review and feedback.

The Resources Regulator responded via email on 3 May 2023 and issued reference number MAAG0016027 indicating that an assessment officer would be in contact should further information be required. No further correspondence was received.

WaterNSW responded via email on 10 May 2023 with comments and recommendations as detailed below. IMC responded via email on 11 May 2023 with proposed actions and obtained agreement from WaterNSW on the same day. Evidence is provided in Attachment 1.

BCD responded via email with a letter dated 3 May 2023 indicating that no further actions were required. Evidence is provided in Attachment 2.

Summary of the comments received during consultation

WaterNSW

WaterNSW noted that:

- There have been two iron staining impacts (DA3A_LW19_044, DA3A_LW19_045) observed in the proximity of Wongawilli Creek since completion of longwall 19.
- A 150 mm crack at a closed access track was flagged as a safety precaution (Level 2).

WaterNSW recommends that the extent of iron staining continue to be monitored and surface cracking to a closed track is assessed and repaired to make it safe as per corrective management actions outlined in the approved Area 3A Landscape TARP.

IMC responded to WaterNSW via email on 11 May 2023 indicating:

- In terms of remediating cracks, the TARP refers to ‘fire trails, to ensure safety and serviceability’. This relates to open, vehicle tracks. IMC do not typically remediate cracks on closed access tracks as these tracks are unable to be accessed by vehicles and are rarely used by other catchment users. IMC propose instead to erect caution tape and signage as appropriate. IMC will also monitor and reassess if something changes.
- The extent of iron staining will continue to be monitored.

WaterNSW responded indicating agreement with IMC’s proposed actions.

Biodiversity and Conservation Division (BCD)

BCD note the following:

- There is five Level 1 incidents and a Level 2 incident reported for which we do not require any further action.

Summary of actions taken by Illawarra Metallurgical Coal in response to comments received during consultation

- Caution tape and signage was erected at the location of the crack on the closed access track.
- IMC are continuing to monitor the extent of iron staining at this location.
- IMC will implement the corrective management actions (CMAs) as detailed within this impact report.

ATTACHMENT 1 – WATERNSW CONSULTATION

From:	Maria Dubikova
To:	Zanotto, Linda
Cc:	Ravi Sundaram; Juri Jung
Subject:	RE: [EXTERNAL] Dendrobium Mine - Subsidence Impact Report 01/05/2023
Date:	Thursday, 11 May 2023 9:45:17 AM
Attachments:	image001.jpg

Hi Linda,

thanks for clarification, agree with your response.

Regards,
Maria

From: Zanotto, Linda <Linda.Zanotto@south32.net>
Sent: Thursday, 11 May 2023 9:19 AM
To: Maria Dubikova <Maria.Dubikova@waternsw.com.au>
Cc: Ravi Sundaram <ravi.sundaram@waternsw.com.au>; Juri Jung <Juri.Jung@waternsw.com.au>
Subject: RE: [EXTERNAL] Dendrobium Mine - Subsidence Impact Report 01/05/2023

Hi Maria,

Thanks for your email and recommendations.

In terms of remediating cracks, the TARP refers to 'fire trails, to ensure safety and serviceability'. This relates to open, vehicle tracks. IMC do not typically remediate cracks on closed access tracks as these tracks are unable to be accessed by vehicles and are rarely used by other catchment users. IMC propose instead to erect caution tape and signage as appropriate. IMC will also monitor and reassess if something changes.

The extent of iron staining will continue to be monitored.

Please let me know if you have any questions or further comments.

Kind Regards,
Linda

Linda Zanotto
Principal Mining Approvals
Illawarra Metallurgical Coal

M: +61 409 399 560
E: Linda.Zanotto@South32.net

south32.net

From: Maria Dubikova <Maria.Dubikova@waternsw.com.au>
Sent: Wednesday, 10 May 2023 4:08 PM
To: Zanotto, Linda <Linda.Zanotto@south32.net>
Cc: Ravi Sundaram <ravi.sundaram@waternsw.com.au>; Juri Jung <Juri.Jung@waternsw.com.au>
Subject: RE: [EXTERNAL] Dendrobium Mine - Subsidence Impact Report 01/05/2023

Hi Linda,

I reviewed the subsidence impact report dated 1 May 2023 describing 6 new impacts observed during field inspections on 26 and 27 April 2023.

It was noted that:

- There have been two iron staining impacts (DA3A_LW19_044, DA3A_LW19_045) observed in the proximity of Wongawilli Creek since completion of longwall 19.
- A 150 mm crack at a closed access track was flagged as a safety precaution (Level 2).

WaterNSW recommends that the extent of iron staining continue to be monitored and surface cracking to a closed track is assessed and repaired to make it safe as per corrective management actions outlined in the approved Area 3A Landscape TARP.

Regards,
Maria

From: Zanotto, Linda <Linda.Zanotto@south32.net>
Sent: Tuesday, 2 May 2023 9:01 AM
To: Ravi Sundaram <ravi.sundaram@waternsw.com.au>; Maria Dubikova <Maria.Dubikova@waternsw.com.au>; Resources Regulator <nswresourcesregulator@service-now.com>; Chris Page <Chris.Page@environment.nsw.gov.au>; Camilla Edmunds <Camilla.Edmunds@waternsw.com.au>; Environmental Assessments <Environmental.Assessments@waternsw.com.au>; rog.illawarra@environment.nsw.gov.au; gabrielle.allan@dpie.nsw.gov.au
Cc: Brassington, Gary <Gary.M.Brassington@south32.net>; Carlon, Josh <Josh.Carlon@south32.net>; Crehan, Amanda <Amanda.Crehan@south32.net>; Schultz, Chris <Chris.Schultz1@south32.net>; Leone, Antony <Antony.Leone@south32.net>; Walsh, Richard <Richard.V.Walsh@south32.net>; Mapstone, Rod <Rod.Mapstone1@south32.net>; Page, James (Agurba) <James.Page@south32.net>
Subject: ARK: [EXTERNAL] Dendrobium Mine - Subsidence Impact Report 01/05/2023

Hi All,

Attached is the latest subsidence impact report (dated 01/05/2023) for Dendrobium Mine regarding recent subsidence impact observations in Area 3A. Please note that the report has not been uploaded to the Major Projects Planning Portal as consultation has been requested to be undertaken via email.

The report will be updated following receipt of your feedback and the final report uploaded to the Major Projects Planning Portal in due course.

Please let me know if you have any questions.

Kind Regards,

Linda Zanotto
Principal Mining Approvals
Illawarra Metallurgical Coal

M: +61 409 399 560
E: Linda.Zanotto@South32.net

south32.net

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ATTACHMENT 2 – BCD CONSULTATION

Your ref: PAE-56418714
Our ref: DOC23/538217

Ms Linda Zanotto
Specialist Environment - Systems and Reporting

Illawarra Metallurgical Coal

By email: linda.zanotto@south32.net

Dear Ms Zanotto

Major Projects – Proponent Request for Advice - Dendrobium Mine - Area 3A Subsidence Impact Report (SIR) 1 May 2023 (DA60-03-2001-PA-189)

I refer to the Dendrobium 3A additional Impact Report for 1 May 2023. Biodiversity Conservation Division (BCD) have reviewed the document and note the following:

- There is five Level 1 incidents and a Level 2 incident reported for which we do not require any further action.

Thank for your continued notification.

If you have any further questions about this issue, please contact Ms Tania Ashworth, Senior Conservation Planning Officer, South East, Biodiversity and Conservation Division, on 02 6229 7921 or at tania.ashworth@environment.nsw.gov.au.

Yours sincerely

Chris Page
Senior Team Leader, Planning (Illawarra)
Biodiversity and Conservation Division

Date: 3 May 2023

DENDROBIUM AREA 3A, ILLAWARRA METALLURGICAL COAL

IMPACT REPORT

9 May 2023

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and was completed on 29 March 2023. During recent inspections, there were 12 new subsidence impacts identified.

DA3A_LW19_051 (E 291835, N 6192265)

DA3A_LW19_051 is located on *WC14*, a tributary to *Wongawilli Creek* (Figure 1). The impact consists of multiple rock fractures to a rock outcrop within *Swamp 148* with the largest fracture having a maximum continuous length of 1.15m, a maximum width of 0.06m and a maximum measurable depth of 1.27m (Photo 1 and Photo 2). During both the baseline inspection and the recent Longwall 19 impact inspection there was no flow present at the site, therefore the fracture is not associated with loss of surface water.

DA3A_LW19_051 is a Level 1 trigger as per the DA3A Watercourse Impact, Monitoring, Management and Contingency Plan (Table 1), specifically:

- Crack or fracture up to 100mm width at its widest point with no observable loss of surface water or erosion
- Crack or fracture up to 10m length with no observable loss of surface water or erosion

Photo 1: *DA3A_LW19_051*, showing rock fracturing to an outcrop on WC14. Taken on 4/5/2023.

Photo 2: *DA3A_LW19_051*, showing width of rock fracture. Taken on 4/5/2023.

DA3A_LW19_052 (E 291521, N 6192382)

DA3A_LW19_052 is located approximately 40m to the north of *WC14*, a tributary to *Wongawilli Creek* (Figure 1). The impact consists of rock fracturing along a steep slope with a small associated rockfall. The fracturing has a maximum continuous length of 3m, and a maximum width of 0.01m (Photo 4). The associated rockfall has a volume of 0.05m^3 (Photo 3).

DA3A_LW19_052 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 3: *DA3A_LW19_052*, showing area of rockfall. Taken on 4/5/2023.

Photo 4: *DA3A_LW19_052*, showing area of rock fracturing. Taken on 4/5/2023.

DA3A_LW19_053 (E 291508, N 6192499)

DA3A_LW19_053 is located approximately 155m to the north of tributary *WC14* (Figure 1). The impact consists of rock fracturing and associated rockfall along the base of a step. The rock fracturing has a maximum continuous length of 0.35m and a maximum width of 0.001m wide (Photo 6). The rockfall has an approximate volume of 0.27m^3 (Photo 5).

DA3A_LW19_053 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 5: *DA3A_LW19_053*, showing area of rockfall. Taken on 4/5/2023.

Photo 6: *DA3A_LW19_053*, showing rock fracturing. Taken on 4/5/2023

DA3A_LW19_054 (E 291671, N 6192546)

DA3A_LW19_054 is located 365m to the west of *Fire Road 6F* (Figure 1). The impact consists of rock fracturing and associated fragmentation. The rock fracturing has a maximum continuous length of 3.4m and a maximum width of 0.01m (Photo 7 and Photo 8). The largest rock fragment has a volume of less than 0.01m^3 (Photo 8).

DA3A_LW19_054 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;

Photo 7: *DA3A_LW19_054*, showing rock fracturing and fragmentation. Taken on 4/5/2023.

Photo 8: *DA3A_LW19_054*, showing rock fracturing and fragmentation. Taken on 4/5/2023.

DA3A_LW19_055 (E 291494, N 6192483)

DA3A_LW19_055 is located approximately 150m to the north of tributary *WC14* (Figure 1). The impact consists of rock fracturing and a small rockfall beneath an overhang of a steep slope. Rock fracturing beneath the overhang has a maximum continuous length of 1.2m, a maximum width of 0.003m and a maximum measurable depth of 0.58m (Photo 10). The rockfall has an approximate volume of less than 0.01m^3 (Photo 9).

DA3A_LW19_055 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 9: *DA3A_LW19_055*, showing area of rockfall. Taken on 4/5/2023.

Photo 10: *DA3A_LW19_055*, showing rock fracturing. Taken on 4/5/2023.

DA3A_LW19_056 (E 291611, N 6192519)

DA3A_LW19_056 is located 160m to the north of tributary *WC14* (Figure 1). The impact consists of rock fracturing and rockfall/block movement on a step/overhang. The rock fracture has a maximum continuous length of 17.5m. The large section of rock that has detached from the adjacent ground has an estimated volume of 110m^3 (Photo 11). There are multiple fractures under the overhang estimated to be up to 1.5m in length with widths up to 0.05m. There are also three rock fractures on the outcrop above the overhang, up to 0.15m in length and a width up to 0.04m (Photo 12). The impact site has minimal downslope vegetation disturbance. The immediate area around the impact was flagged with marking tape as a safety precaution.

DA3A_LW19_056 is a Level 2 trigger as per the DA3A Watercourse Impact, Monitoring, Management and Contingency Plan (Table 1), specifically:

- Rock fall or overhang collapse at a cliff (step) site, where characteristics of the cliff (step) have changed.
- Crack or fracture between 10 and 50m length.

Photo 11: *DA3A_LW19_056*, showing step/overhang that detached. Taken on 5/05/2023.

Photo 12: *DA3A_LW19_056*, showing top view of block that have moved away from the adjacent ground. Taken on 5/05/2023.

DA3A_LW19_057 (E 291553, N 6192524)

DA3A_LW19_057 is located 180m to the north of *WC14*, a tributary to *Wongawilli Creek* (Figure 1). The impact consists of a rockfall from a step. Two small debris falls of approximately 0.16m^3 and 0.03m^3 were observed (Photo 13 and Photo 14). The rockfall has a combined total volume of approximately 0.5m^3 (Photo 14). The impact site has minimal ground disturbance or impact to vegetation.

DA3A_LW19_057 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 13: *DA3A_LW19_057*, showing step where rocks detached. Taken on 5/05/2023.

Photo 14: *DA3A_LW19_057*, showing step where rocks detached and debris area. Taken on 5/05/2023.

DA3A_LW19_058 (E 291541, N 6192528)

DA3A_LW19_058 is located 190m to the north of tributary *WC14* (Figure 1). The impact consists of a series of small fractures to a rock outcrop (Photo 15). The maximum continuous length of the fractures is 0.26m while the largest width is 0.015m (Photo 16). The impact also contained a small rockfall which with total volume less than 0.01m^3 (Photo 16).

DA3A_LW19_058 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 15: *DA3A_LW19_058*, showing step where rock has detached from rock face. Taken on 5/05/2023. Note: Tape measure is set to 0.5m in length.

Photo 16: *DA3A_LW19_058*, showing step where rock has detached from rock face. Taken on 5/05/2023. Note: Tape measure is set to 0.5m in length.

DA3A_LW19_059 (E 291458, N 6192561)

DA3A_LW19_059 is located 225m to the north of tributary *WC14* (Figure 1). The impact consists of two rock fractures beneath a small overhang. The largest fracture has a maximum continuous length of 2.34m, a maximum width of 0.03m and a maximum measurable depth of 0.15m (Photo 17). The fractures resulted in a small rockfall less than 0.01m^3 in volume (Photo 18).

DA3A_LW19_059 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 17: *DA3A_LW19_059*, showing rock fracturing. Taken on 5/05/2023.

Photo 18: *DA3A_LW19_059*, showing fallen debris. Taken on 5/05/2023.

DA3A_LW19_060 (E 291426, N 6192566)

DA3A_LW19_060 is located 235m to the north of tributary *WC14* (Figure 1). The impact consists of a rock fracture, displacement and rockfall on a step/outcrop (Photo 19 to Photo 21). The rock fracture has a maximum continuous length of 3.26m and a maximum width of 0.04m. The displacement along the outcrop measured 3.43m in length (Photo 20). The total volume of the rockfall is approximately 0.7m^3 (Photo 21).

DA3A_LW19_060 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;
- Rockfall from a cliff (step) which is left mostly intact (<10% length), resulting in insignificant ground disturbance.

Photo 19: *DA3A_LW19_060*, showing extent of rock fracture and rockfall. Taken on 5/05/2023.

Photo 20: *DA3A_LW19_060*, showing extent of displacement. Taken on 5/05/2023.

Photo 21: *DA3A_LW19_060*, showing rockfall. Taken on 5/05/2023

DA3A_LW19_061 (E 291404, N 6192596)

DA3A_LW19_061 is located 265m to the north of tributary *WC14* (Figure 1). The impact consists of a rock fracture on a step/outcrop and associated soil cracking. The rock fracture has a total continuous length of 5.6m, a maximum width of 0.14m and a maximum measurable depth of 1.16m (Photo 22). The soil cracking has a total continuous length of 9.5m, a maximum width of 0.13m and a maximum measurable depth of 0.5m (Photo 23).

DA3A_LW19_061 is a Level 2 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture between 100mm and 300mm width.

Photo 22: *DA3A_LW19_061*, showing extent of rock fracture. Taken on 05/05/2023.

Photo 23: *DA3A_LW19_061*, showing extent of soil crack. Taken on 05/05/2023.

DA3A_LW19_062 (E 291527, N 6192539)

DA3A_LW19_062 is located 200m to the north of *WC14*, a tributary to *Wongawilli Creek* (Figure 1). The impact consists of multiple rock fractures on the face of a rock outcrop. The largest continuous length of the fractures is 0.60m while the largest width is 0.01m (Photo 24 and Photo 25).

DA3A_LW19_062 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 2), specifically:

- Crack or fracture up to 100mm width;
- Crack or fracture up to 10m length;

Photo 24: *DA3A_LW19_061*, showing extent of rock fracture. Taken on 05/05/2023.

Photo 25: *DA3A_LW19_061*, showing extent of rock fracture. Taken on 05/05/2023.

Corrective Management Actions (CMAs)

The following actions have been initiated:

- Continue monitoring program as required in the Longwall 19 SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator and Department of Planning and Environment)
- Summarise impacts and report in the End of Panel Report and Annual Review
- Review monitoring frequency
- Notify relevant technical specialists and seek advice on any CMA required
- Provide safety signage and barricades as appropriate
- Implement agreed CMAs as approved (subject to agency feedback)

A full list of impacts and triggers recorded during Longwall 19 is presented in Table 3.

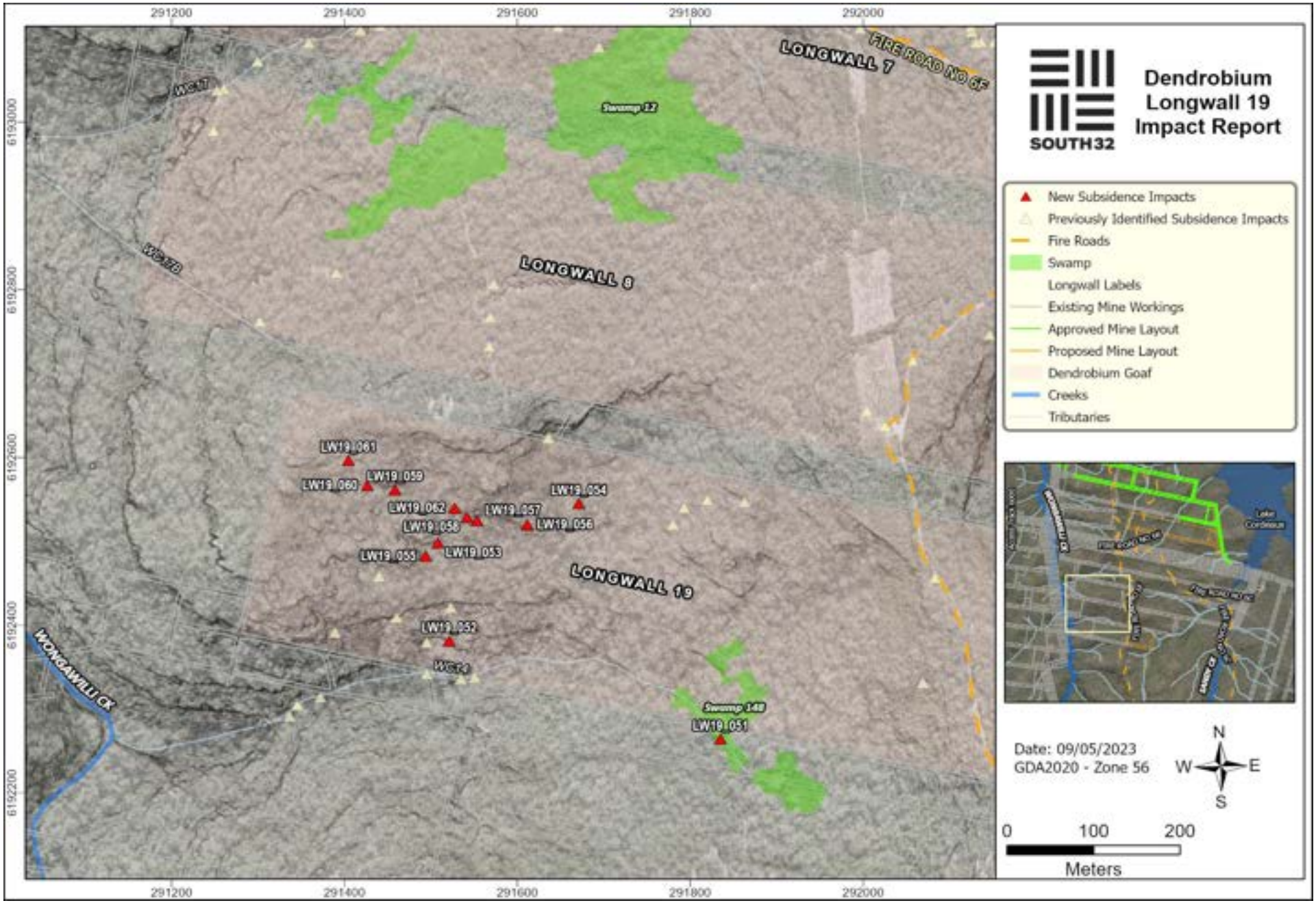


Figure 1: Map showing the latest subsidence impacts. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Watercourse TARP.

OBSERVATIONAL MONITORING		
WC13, WC14, WC15, WC16, WC17, WC17A, WC17B, SC7, SC10 and SC10C General observation of streams in active mining areas when longwall is within 400m	***Level 1*** • Crack or fracture up to 100mm width at its widest point with no observable loss of surface water or erosion • Crack or fracture up to 10m length with no observable loss of surface water or erosion • Erosion in a localised area (not associated with cracking or fracturing) which would be expected to naturally stabilise without CMA and within the period of monitoring • Observable release of strata gas at the surface • Observable increase in iron staining within the mining area	• Continue monitoring program • Submit an Impact Report to BCD, DPE, DRG, Water NSW • Report in the End of Panel Report • Summarise actions and monitoring in AEMR
	Level 2 • Crack or fracture between 100 and 300mm width at its widest point or any fracture which results in observable loss of surface water or erosion • Crack or fracture between 10 and 50m length • Soil surface crack that causes erosion that is likely to stabilise within the monitoring period without intervention • Observable increase in iron staining within the mining area continues to outside the mining area i.e. 400m from the longwall	• *Actions as stated for Level 1* • Review monitoring frequency • Submit letter report to DPE, DRG and Water NSW and seek advice on any CMA required • Implement agreed CMAs as approved (subject to agency feedback)
	Level 3 • Crack or fracture over 300mm width at its widest point • Crack or fracture over 50m length • Fracturing observed in the bedrock base of any significant permanent pool which results in observable loss of surface water • Soil surface crack that causes erosion that is unlikely to stabilise within the monitoring period without intervention • Gas release results in vegetation dieback, mortality or loss of aquatic habitat • Observable increase in iron staining within the mining area continues more than 600m from the longwall	• *Actions as stated for Level 2* • Offer site visit with BCD, DPE, DRG, Water NSW • Implement additional monitoring or increase frequency if required • Develop site CMA (subject to agency feedback). This may include: grouting of rockbar and bedrock base of any significant pool where it is appropriate to do so in consultation with BCD, DPE, DRG, Water NSW • Completion of works following approvals and at a time agreed between S32, DPE, DRG and Water NSW (i.e. may be after mining induced movements and impacts are complete), including monitoring and reporting on success • Review relevant TARP and Management Plan in consultation with key agencies

Table 2: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 3: Summary of Longwall 19 impacts and triggers. Highlighted rows indicate the latest impacts featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023
DA3A_LW19_036	Soil Cracking	Closed Access Track	21/02/2023	1	Soil cracking on a closed access track over Longwall 7.	24/03/2023
DA3A_LW19_037	Rock Fracturing and Rockfall	Sandy Creek 21 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall within proximity to cultural heritage site *Sandy Creek 21*	29/03/2023
DA3A_LW19_038	Rock Fracturing and Rockfall	DM15 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall at cultural heritage site *DM15*.	29/03/2023
DA3A_LW8_003 (Update)	Rock Fracturing, Rockfall and Fragmentation	WC14	12/04/2023	1	Rock fracturing with associated rockfall and fragmentation on WC14.	29/01/2020 and 17/04/2023
DA3A_LW19_039	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_040	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_041	Rockfall	LW19_SS5	12/04/2023	2	Rockfall at steep slope (landscape monitoring site LW19_SS5).	17/04/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_042	Rockfall and Fragmentation	LW19_SS4	12/04/2023	1	Very small rockfall with associated fragmentation at landscape monitoring site LW19_SS4.	17/04/2023
DA3A_LW19_043	Rock Fracturing and Uplift	WC14	17/04/2023	2	Rock fracturing and associated uplift to a rockbar on WC14.	27/04/2023
DA3A_LW19_044	Iron Staining	Bushland	19/04/2023	1	Iron staining present flowing on valley slope within proximity to Wongawilli Creek	27/04/2023
DA3A_LW19_045	Iron Staining	WC15	26/04/2023	1	Iron staining at base of step flowing into a pool on WC15.	01/05/2023
DA3A_LW19_046	Rockfall	Steep Slope/ Step	27/04/2023	1	Rockfall from steep slope/ step to the west of Fire Road 6F.	01/05/2023
DA3A_LW19_047	Rockfall	Steep Slope/ Step	27/04/2023	1	Rockfall from steep slope/ step to the north of WC14.	01/05/2023
DA3A_LW19_048	Rock Fracturing	Closed Access Track	27/04/2023	1	Rock fracturing on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_049	Soil Cracking	Closed Access Track	27/04/2023	1	Soil cracking on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_050	Soil Cracking	Closed Access Track	27/04/2023	2	Soil cracking on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_051	Rock Fracturing	WC14	04/05/2023	1	Rock fracturing on small rockbar (WC14 Channel 17) within Swamp 148.	This Report
DA3A_LW19_052	Rock Fracturing and Rockfall	Steep Slope	04/05/2023	1	Rock fracturing and associated rockfall on steep slope to the north of WC14.	This Report
DA3A_LW19_053	Rock Fracturing and Rockfall	Rock Step	04/05/2023	1	Rock fracturing and associated rockfall at base of a rock step to the north of WC14.	This Report
DA3A_LW19_054	Rock Fracturing and Fragmentation	Steep Slope	04/05/2023	1	Rock fracturing and fragmentation at base of a steep slope to the west of Fire Road 6F.	This Report
DA3A_LW19_055	Rock Fracturing and Rockfall	Steep Slope	04/05/2023	1	Rock fracturing and an associated rockfall beneath an overhang to the north of WC14.	This Report
DA3A_LW19_056	Rock Fracturing and Rockfall	Step/ Overhang	05/05/2023	2	Rock fracturing and rockfall on a steep slope to the north of WC14.	This Report
DA3A_LW19_057	Rockfall	Step	05/05/2023	1	Rockfall at a step to the north of WC14.	This Report

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_058	Rock Fracturing and Fragmentation	Rock Outcrop	05/05/2023	1	Rock fracturing and fragmentation on edge of a rock outcrop to the north of WC14.	This Report
DA3A_LW19_059	Rock Fracturing and Fragmentation	Overhang	05/05/2023	1	Rock fracturing and associated fragmentation beneath an overhang to the north of WC14.	This Report
DA3A_LW19_060	Rock Fracturing, Displacement and Rockfall	Step/ Outcrop	05/05/2023	1	Rock fracturing, displacement and rockfall on a steep slope/ outcrop to the north of WC14.	This Report
DA3A_LW19_061	Rock Fracturing and Soil Cracking	Step/ Outcrop	05/05/2023	2	Rock fracturing and soil cracking on a steep slope/ outcrop to the north of WC14.	This Report
DA3A_LW19_062	Rock Fracturing	Rock Outcrop	05/05/2023	1	Rock fracturing on the face of an outcrop to the north of WC14.	This Report

DENDROBIUM AREA 3A, ILLAWARRA METALLURGICAL COAL

IMPACT REPORT

15 May 2023

Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT) monthly prior to mining and weekly during mining. Monitoring is conducted in accordance with the approved Subsidence Management Plan (SMP) for Dendrobium Area 3A (DA3A). Extraction of Longwall 19 commenced 20 June 2022 and was completed on 29 March 2023. During a recent inspection, one new subsidence impact was identified.

DA3A_LW19_063 (E 292280, N 6192283)

DA3A_LW19_063 is located 150m to the east of Fire Road 6F (Figure 1). The impact consists of rock movement from a steep slope where a boulder has shifted downslope, with associated fragmentation (Photo 1 and Photo 2). The total volume of rock movement was estimated to be 2.5m^3.

DA3A_LW19_063 is a Level 1 trigger as per the Dendrobium Area 3A Landscape TARP (Table 1), specifically:

- Surface movement or rock displacement with negligible soil surface exposed

Photo 1: *DA3A_LW19_063*, showing rock movement site. Taken on 10/05/2023.

Photo 2: *DA3A_LW19_063*, showing associated rock fragmentation. Taken on 10/05/2023.

Corrective Management Actions (CMAs)

The following actions have been initiated:

- Continue monitoring program as required in the Longwall 19 SMP
- Report impacts to key stakeholders (Biodiversity and Conservation Division; WaterNSW; NSW Resources Regulator and Department of Planning and Environment)
- Summarise impacts and report in the End of Panel Report and Annual Review

A full list of impacts and triggers recorded during Longwall 19 is presented in Table 2.

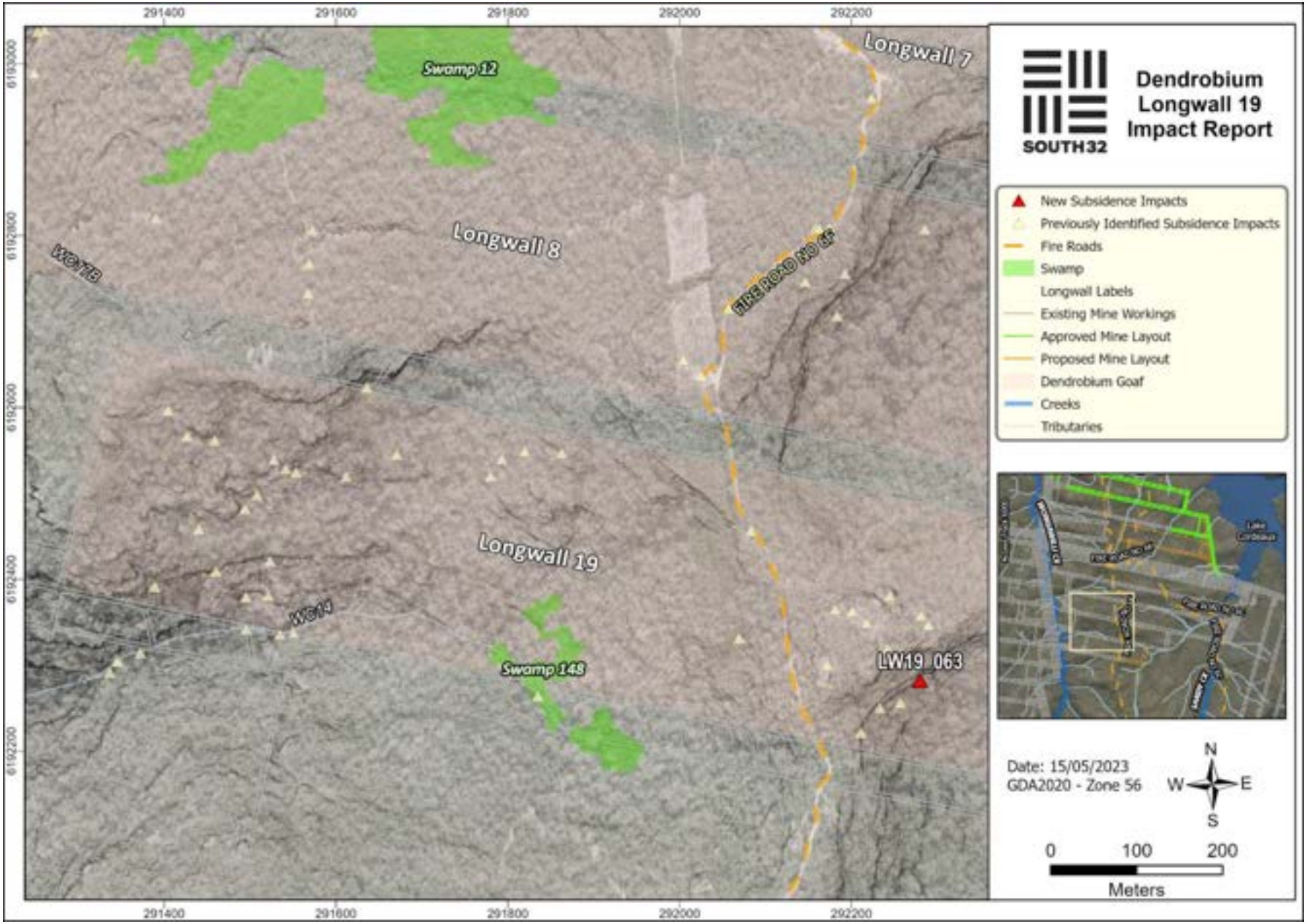


Figure 1: Map showing the latest subsidence impact and previously reported impacts. Inset shows main frame of map in relation to DA3A mining operations.

Table 1: Extract from Dendrobium Area 3A Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
AREA 2 **Cliffs** A2-CL1 (above LW4) **Steep Slopes** A2-SL1 and A2-SL2 (above LWs 4 & 5) **Watercourses** A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5) **Swamp** A2-SW1 (above LWs 4 & 5) **4WD Track** A2-FT1 (above LWs 4 & 5) **Crinanite Surface Extent** A2-CN1 & A2-CN2 (above LWs 3 & 4) **AREA 3A** **Cliffs** All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites) **Steep Slopes** All mapped steep slopes in subsidence area *Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites* **Watercourses/ Swamps** All mapped watercourse and swamps in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **Fire Trails** All mapped fire trails in subsidence area *Refer to Dendrobium Area 3A SMP Figure 19.3* **AREA 3B** **Cliffs** All mapped cliff sites in subsidence area *Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites*	***Level 1 **** • Rock fall from a cliff which is left mostly intact (<10% length), resulting in insignificant ground disturbance • Surface movement or rock displacement with negligible soil surface exposed • Crack at the surface, which should not result in any significant erosion or further ground movement • Crack in a fire trail which should not result in erosion or impede access • Crack or fracture up to 100mm width • Crack or fracture up to 10m length • Erosion in a localised area which would be expected to naturally stabilise without CMA and within the period of monitoring	• Continue monitoring program • Report impacts to key stakeholders • Summarise impacts and Report in the End of Panel Report and AEMR
	Level 2 * • Rock fall or overhang collapse at a cliff site, where characteristics of the cliff have changed, and there has been significant ground disturbance • Surface movement or rock displacement that has exposed significant areas of soil • A crack at the surface, which could result in significant erosion or movement at the surface • A crack at the surface with potential risk to safety and/or fauna entrapment • A crack in the fire trail, which could result in significant erosion or impede vehicle access • Crack or fracture between 100 and 300mm width • Crack or fracture between 10 and 50m length • Significant erosion at any location, which is not likely to naturally stabilise within the period of monitoring, or is located in a sensitive area e.g. swamps, creek, lake shore, and may result in increased sediment transport to Cordeaux Dam, or has been previously identified as Level 1, but is not likely to naturally stabilise within the monitoring period	• *Actions as stated for Level 1* • Review monitoring frequency • Notify relevant technical specialists and seek advice on any CMA required • Provide safety signage and barricades as appropriate • Implement approved repairs to ensure safety and serviceability on fire trails • Implement agreed CMAs as approved *Note: CMAs are to be proposed based on appropriate management of environmental and other consequences of impacts i.e. cracking at the surface with insignificant consequences may not require specific CMAs other than ongoing monitoring to confirm there are no ongoing impacts*
	Level 3 * • Major cliff collapse where the characteristics of the cliff change significantly and there is significant ground disturbance that is unlikely to naturally stabilise within the monitoring period	• *Actions as stated for Level 2* • Immediately notify DoPI, DPIM, SCA, resource managers and relevant technical specialists and seek advice on any CMA required • Site visits with stakeholders if required

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted row indicates the latest impact featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023
DA3A_LW19_036	Soil Cracking	Closed Access Track	21/02/2023	1	Soil cracking on a closed access track over Longwall 7.	24/03/2023
DA3A_LW19_037	Rock Fracturing and Rockfall	Sandy Creek 21 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall within proximity to cultural heritage site *Sandy Creek 21*	29/03/2023
DA3A_LW19_038	Rock Fracturing and Rockfall	DM15 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall at cultural heritage site *DM15*.	29/03/2023
DA3A_LW8_003 (Update)	Rock Fracturing, Rockfall and Fragmentation	WC14	12/04/2023	1	Rock fracturing with associated rockfall and fragmentation on WC14.	29/01/2020 and 17/04/2023
DA3A_LW19_039	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_040	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_041	Rockfall	LW19_SS5	12/04/2023	2	Rockfall at steep slope (landscape monitoring site LW19_SS5).	17/04/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_042	Rockfall and Fragmentation	LW19_SS4	12/04/2023	1	Very small rockfall with associated fragmentation at landscape monitoring site LW19_SS4.	17/04/2023
DA3A_LW19_043	Rock Fracturing and Uplift	WC14	17/04/2023	2	Rock fracturing and associated uplift to a rockbar on WC14.	27/04/2023
DA3A_LW19_044	Iron Staining	Bushland	19/04/2023	1	Iron staining present flowing on valley slope within proximity to Wongawilli Creek	27/04/2023
DA3A_LW19_045	Iron Staining	WC15	26/04/2023	1	Iron staining at base of step flowing into a pool on WC15.	01/05/2023
DA3A_LW19_046	Rockfall	Steep Slope/ Step	27/04/2023	1	Rockfall from steep slope/ step to the west of Fire Road 6F.	01/05/2023
DA3A_LW19_047	Rockfall	Steep Slope/ Step	27/04/2023	1	Rockfall from steep slope/ step to the north of WC14.	01/05/2023
DA3A_LW19_048	Rock Fracturing	Closed Access Track	27/04/2023	1	Rock fracturing on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_049	Soil Cracking	Closed Access Track	27/04/2023	1	Soil cracking on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_050	Soil Cracking	Closed Access Track	27/04/2023	2	Soil cracking on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_051	Rock Fracturing	WC14	04/05/2023	1	Rock fracturing on small rockbar (WC14 Channel 17) within Swamp 148.	09/05/2023
DA3A_LW19_052	Rock Fracturing and Rockfall	Steep Slope	04/05/2023	1	Rock fracturing and associated rockfall on steep slope to the north of WC14.	09/05/2023
DA3A_LW19_053	Rock Fracturing and Rockfall	Rock Step	04/05/2023	1	Rock fracturing and associated rockfall at base of a rock step to the north of WC14.	09/05/2023
DA3A_LW19_054	Rock Fracturing and Fragmentation	Steep Slope	04/05/2023	1	Rock fracturing and fragmentation at base of a steep slope to the west of Fire Road 6F.	09/05/2023
DA3A_LW19_055	Rock Fracturing and Rockfall	Steep Slope	04/05/2023	1	Rock fracturing and an associated rockfall beneath an overhang to the north of WC14.	09/05/2023
DA3A_LW19_056	Rock Fracturing and Rockfall	Step/ Overhang	05/05/2023	2	Rock fracturing and rockfall on a steep slope to the north of WC14.	09/05/2023
DA3A_LW19_057	Rockfall	Step	05/05/2023	1	Rockfall at a step to the north of WC14.	09/05/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_058	Rock Fracturing and Fragmentation	Rock Outcrop	05/05/2023	1	Rock fracturing and fragmentation on edge of a rock outcrop to the north of WC14.	09/05/2023
DA3A_LW19_059	Rock Fracturing and Fragmentation	Overhang	05/05/2023	1	Rock fracturing and associated fragmentation beneath an overhang to the north of WC14.	09/05/2023
DA3A_LW19_060	Rock Fracturing, Displacement and Rockfall	Step/ Outcrop	05/05/2023	1	Rock fracturing, displacement and rockfall on a steep slope/ outcrop to the north of WC14.	09/05/2023
DA3A_LW19_061	Rock Fracturing and Soil Cracking	Step/ Outcrop	05/05/2023	2	Rock fracturing and soil cracking on a steep slope/ outcrop to the north of WC14.	09/05/2023
DA3A_LW19_062	Rock Fracturing	Rock Outcrop	05/05/2023	1	Rock fracturing on the face of an outcrop to the north of WC14.	09/05/2023
DA3A_LW19_063	Rock Movement	Steep Slope	10/05/2023	1	Boulder shifted downslope, east of Fire Road 6F.	This Report

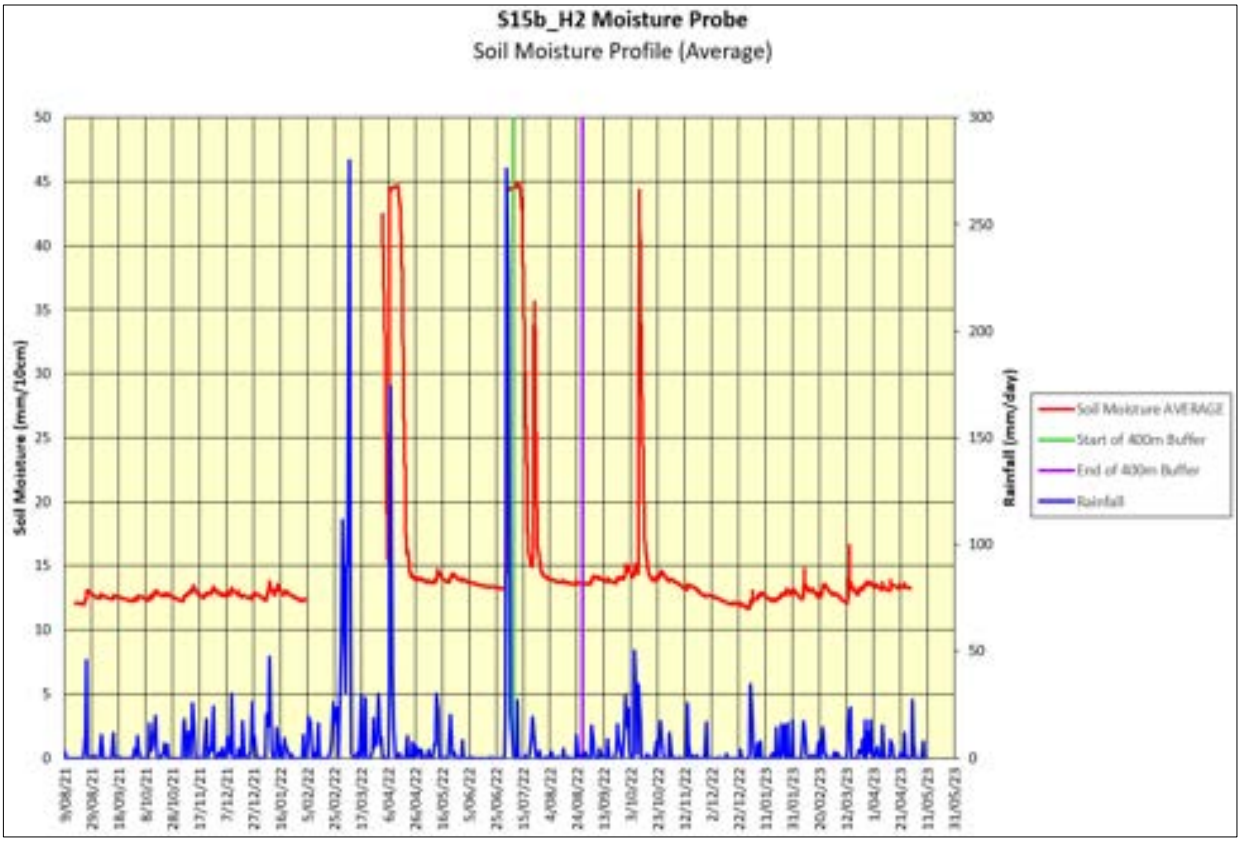
Monitoring of watercourses, swamps and landscape features is undertaken to identify subsidence impacts. These features are monitored by the Illawarra Metallurgical Coal Environmental Field Team (IMCEFT). Monitoring is conducted in accordance with the approved Longwall 19 Swamp Impact, Monitoring, Management and Contingency Plan (SIMMCP). Extraction of Longwall 19 began on 20 June 2022 and was completed on 29 March 2023. Recent analysis of soil moisture data in *Swamp 15b* identified triggers at monitoring sites *S15b_H2*, *S15b_H3* and *S15b_39*.

Swamp 15b

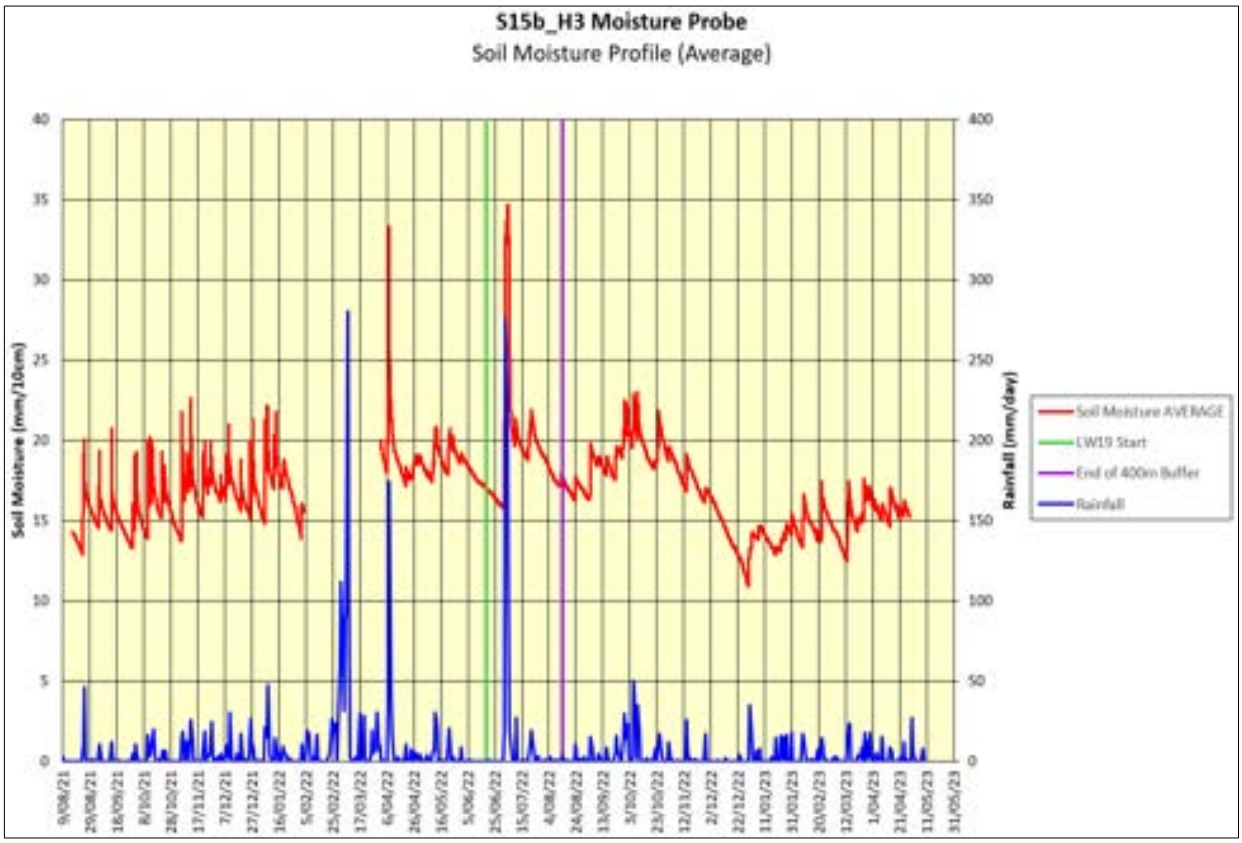
Four soil moisture probes and dataloggers were installed in *Swamp 15b* at sites *S15b_H1, S15b_H2, S15b_H3 and S15b_39* in August 2021. Analysis of records show the average soil moisture data after the completion of extraction being lower than the lowest data recorded during the baseline period at three of four sites i.e. at *S15b_H2, S15b_H3* and *S15b_39* (Graph 1 to Graph 3). These trigger sites are situated to the north and north-east of Longwall 19 (Figure 1). These results contribute to a Level 2 trigger according to the Longwall 19 SIMMCP, specifically:

- Level 2: Soil moisture level lower than baseline level at 50% of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps[#]).

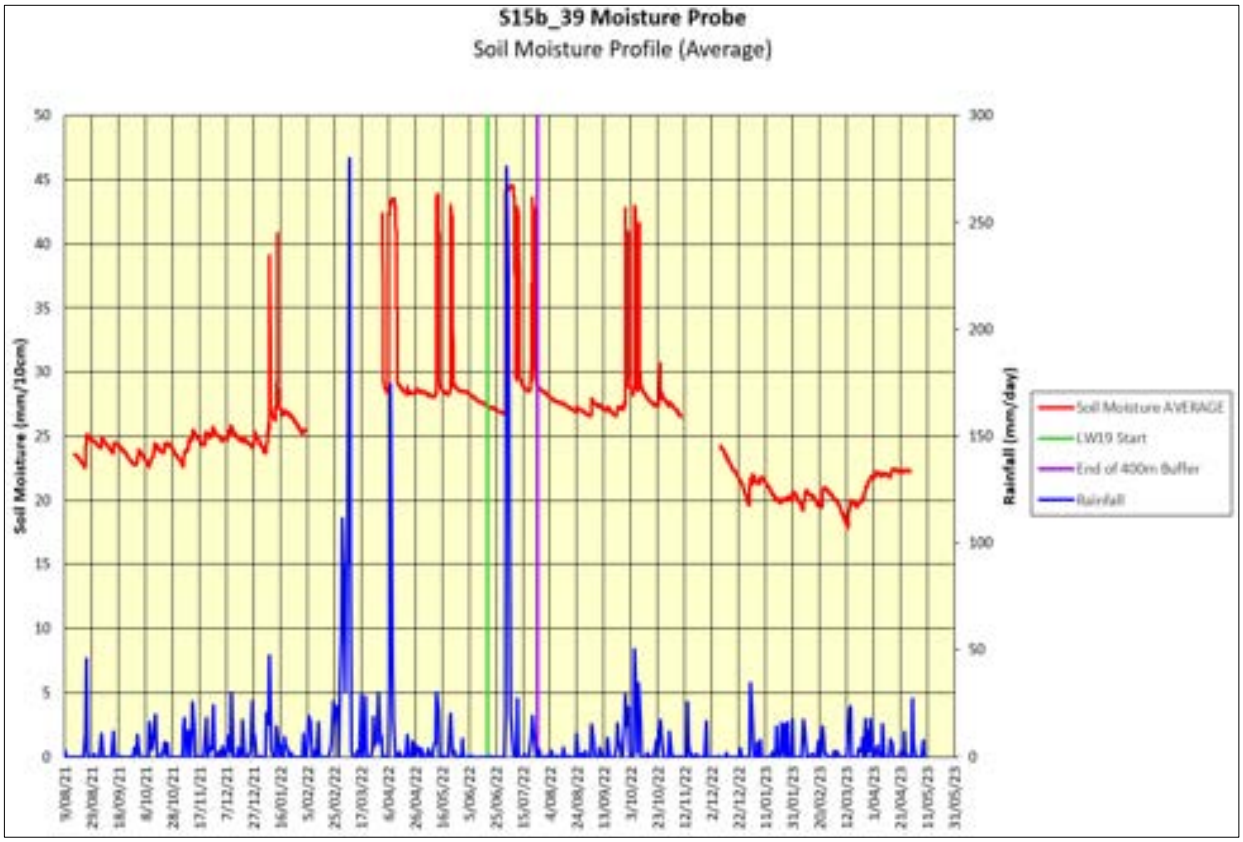
[#]*Comparison with reference swamps is undertaken as part of the End of Panel report.*



Graph 1: Average soil moisture records at S15b_H2, logged hourly. Date range: 16/08/2021 to 28/04/2023.



Graph 2: Average soil moisture records at S*15b_H3*, logged hourly. Date range: 16/08/2021 to 28/04/2023.



Graph 3: Average soil moisture records at S*15b_39*, logged hourly. Date range: 16/08/2021 to 28/04/2023.

It should be noted that Longwalls 7 and 8 were extracted between 4 May 2011 and 29 December 2012 and would likely have had an influence on soil moisture in the swamp however soil moisture probes were not part of swamp monitoring at this time. The proximity of Longwalls 7 and 8 to Swamp 15B is displayed in Figure 1. As such, the baseline period for recent soil moisture data should be treated as Longwall 19 pre-mining data only.

The comparison to reference swamps, stated in the Level 2 TARP definition, will be included in specialist analysis as part of the Longwall 19 End of Panel Report.

Table 1: Excerpt from Longwall 19 SIMMCP, Trigger Action Response Plan (Appendix A, Table 1.2).

Performance Measures	***Potential Impacts***	***Performance Triggers***	***Management Strategies***	***Offsets***	***Other Actions***
Minor changes in the ecosystem functionality of the swamps	Falls in soil moisture levels in swamps *NB. Not linked specifically to a PM and would not be considered a breach if predictions were exceeded.*	*Level 1:* Soil moisture level lower than baseline level at **any** monitoring sites (within 400 m of mining) within a swamp (in comparison to reference swamps). *Level 2:* Soil moisture level lower than baseline level at **50%** of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps). *Level 3:* Soil moisture level lower than baseline level at **>80%** of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps).	a) upfront mine planning b) soil moisture monitoring c) water spreading d) weeding e) fire management f) reporting g) update future predictions		Triggers of soil moisture decline result in increased intensity and frequency of vegetation monitoring and/or further investigations of subsidence impacts on bedrock base and rockbars

Table 2: Summary of Longwall 19 impacts and triggers. Highlighted row indicates latest impact featured in this report.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_001	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_002	Rock Fracturing	Steep Slope/ Step	3/08/2022	1	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	5/08/2022
DA3A_LW19_003	Iron Staining	WC14	16/08/2022	2	Increase in Iron staining at tributary WC14	17/11/2022
DA3A_LW19_004	Rock Fracturing and Fragmentation	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_005	Rock Fracturing	Steep Slope/ Step	19/08/2022	1	Rock fracturing to a steep slope/ step, west of Swamp 15b.	23/08/2022
DA3A_LW19_006	Soil Cracking	Bushland	31/08/2022	2	Soil cracking to bushland south of tributary SC10C.	5/09/2022
DA3A_LW19_007	Soil Cracking	Bushland	18/10/2022	1	Soil cracking in bushland between Longwall 19 and Swamp 15b.	20/10/2022
DA3A_LW19_008	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_009	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_010	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_011	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_012	Rock Fracturing	Rock Outcrop	7/11/2022	1	Rock fracturing to rock outcrop east of Fire Road 6F.	8/11/2022
DA3A_LW19_013	Rock Fracturing and Rock Movement	Steep Slope/ Step	7/11/2022	2	Rock fracturing and rock movement at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_014	Rock Movement	Boulder	7/11/2022	1	Dislodgement of a boulder east of Fire Road 6F.	8/11/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_015	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, north of Swamp 15a.	8/11/2022
DA3A_LW19_016	Rock Fracturing and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing and small rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022
DA3A_LW19_017	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_018	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_019	Rock Displacement	Steep slope	13/12/2022	1	Rock displacement to a steep slope, east of Fire Road 6F.	15/12/2022
DA3A_LW19_020	Soil Cracking	Bushland	13/12/2022	2	Soil cracking at the base of a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_021	Soil Cracking and Rock Displacement	Boulders	13/12/2022	2	Soil cracking and rock displacement to boulders, east of Fire Road 6F.	15/12/2022
DA3A_LW19_022	Soil Cracking, Rock Fracturing and Rock Displacement	Bushland/ Rock Outcrop	13/12/2022	2	Soil cracking, rock fracturing and rock displacement in bushland, east of Fire Road 6F.	15/12/2022
DA3A_LW19_023	Rock Fracturing	Rock Outcrop	13/12/2022	1	Rock fracturing to a rock outcrop, east of Fire Road 6F.	15/12/2022
DA3A_LW19_024	Rock Fracturing and Soil Cracking	Step/ Bushland	20/12/2022	2	Rock fracturing to a step and soil cracking to bushland, east of Fire Road 6F.	22/12/2022
DA3A_LW19_025	Rock Displacement	Boulder	20/12/2022	1	Rock displacement away from soil, east of Fire Road 6F.	22/12/2022
DA3A_LW19_026	Soil Cracking	Fire Road 6F	21/12/2022	1	Soil cracking to Fire Road 6F.	22/12/2022
DA3A_LW19_015 (Update)	Rock Fracturing	Steep Slope/ Step	7/11/2022	2	Rock fracturing to a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
DA3A_LW19_016 (Update)	Rock Fracturing, Fragmentation and Rockfall	Steep Slope/ Step	7/11/2022	2	Rock fracturing, fragmentation and rock fall at a steep slope/ step, east of Fire Road 6F.	8/11/2022 & 22/12/2022
S148_01	Soil Moisture	*Swamp 148*	22/12/2022	3	Soil moisture lower than baseline trigger in *Swamp 148.*	22/12/2022

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_027	Rock Fracturing and Rockfall	Step	10/01/2023	1	Rock fracturing and two small rockfalls at a step, west of Fire Road 6F.	11/01/2023
DA3A_LW19_028	Rock Fracturing	Rock Outcrop	6/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	09/02/2023
DA3A_LW19_029	Gas Release	Wongawilli Creek	18/01/2023	1	Gas release in WC_Pool 50, Wongawilli Creek	09/02/2023
DA3A_LW19_025 (Update)	Rock Displacement, Rock Fracturing and Soil Cracking	Rock Step/Outcrop	20/12/2022, 17/01/2022 (update)	1	Rock displacement away from soil, rock fracturing and soil cracking east of Fire Road 6F	22/12/2022 and 09/02/2023
DA3A_LW19_030	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_031	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_032	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_033	Rockfall	Rock Step/Outcrop	15/02/2023	1	Rockfall on rock outcrop east of Fire Road 6F	17/2/2023
DA3A_LW19_034	Rock Fracturing	Rock Outcrop	15/02/2023	1	Rock fracturing to rock outcrop east of Fire Road 6F	17/2/2023
S35b_01	Groundwater	*Swamp 35b*	27/02/2023	3	Groundwater recession rate greater than baseline	14/03/2023
DA3A_LW19_035	Soil Cracking and Rock Displacement	Closed Access Track and Bushland	16/03/2023	2	Soil cracking and rock displacement on a closed vehicle access track and adjacent bushland, west of Fire Road 6F.	17/03/2023
DA3A_LW19_036	Soil Cracking	Closed Access Track	21/02/2023	1	Soil cracking on a closed access track over Longwall 7.	24/03/2023
DA3A_LW19_037	Rock Fracturing and Rockfall	Sandy Creek 21 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall within proximity to cultural heritage site *Sandy Creek 21*	29/03/2023
DA3A_LW19_038	Rock Fracturing and Rockfall	DM15 (Cultural Heritage Site)	28/03/2023	2	Rock fracturing and rockfall at cultural heritage site *DM15*.	29/03/2023
DA3A_LW8_003 (Update)	Rock Fracturing, Rockfall and Fragmentation	WC14	12/04/2023	1	Rock fracturing with associated rockfall and fragmentation on WC14.	29/01/2020 and 17/04/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_039	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_040	Rockfall and Fragmentation	Steep Slope/ Step	12/04/2023	1	Rockfall and fragmentation at base of steep slope/ step.	17/04/2023
DA3A_LW19_041	Rockfall	LW19_SS5	12/04/2023	2	Rockfall at steep slope (landscape monitoring site LW19_SS5).	17/04/2023
DA3A_LW19_042	Rockfall and Fragmentation	LW19_SS4	12/04/2023	1	Very small rockfall with associated fragmentation at landscape monitoring site LW19_SS4.	17/04/2023
DA3A_LW19_043	Rock Fracturing and Uplift	WC14	17/04/2023	2	Rock fracturing and associated uplift to a rockbar on WC14.	27/04/2023
DA3A_LW19_044	Iron Staining	Bushland	19/04/2023	1	Iron staining present flowing on valley slope within proximity to Wongawilli Creek	27/04/2023
DA3A_LW19_045	Iron Staining	WC15	26/04/2023	1	Iron staining at base of step flowing into a pool on WC15.	01/05/2023
DA3A_LW19_046	Rockfall	Steep Slope/ Step	27/04/2023	1	Rockfall from steep slope/ step to the west of Fire Road 6F.	01/05/2023
DA3A_LW19_047	Rockfall	Steep Slope/ Step	27/04/2023	1	Rockfall from steep slope/ step to the north of WC14.	01/05/2023
DA3A_LW19_048	Rock Fracturing	Closed Access Track	27/04/2023	1	Rock fracturing on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_049	Soil Cracking	Closed Access Track	27/04/2023	1	Soil cracking on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_050	Soil Cracking	Closed Access Track	27/04/2023	2	Soil cracking on a closed access track west of Fire Road 6F	01/05/2023
DA3A_LW19_051	Rock Fracturing	WC14	04/05/2023	1	Rock fracturing on small rockbar (WC14 Channel 17) within Swamp 148.	09/05/2023
DA3A_LW19_052	Rock Fracturing and Rockfall	Steep Slope	04/05/2023	1	Rock fracturing and associated rockfall on steep slope to the north of WC14.	09/05/2023
DA3A_LW19_053	Rock Fracturing and Rockfall	Rock Step	04/05/2023	1	Rock fracturing and associated rockfall at base of a rock step to the north of WC14.	09/05/2023

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Impact Report/s Dated
DA3A_LW19_054	Rock Fracturing and Fragmentation	Steep Slope	04/05/2023	1	Rock fracturing and fragmentation at base of a steep slope to the west of Fire Road 6F.	09/05/2023
DA3A_LW19_055	Rock Fracturing and Rockfall	Steep Slope	04/05/2023	1	Rock fracturing and an associated rockfall beneath an overhang to the north of WC14.	09/05/2023
DA3A_LW19_056	Rock Fracturing and Rockfall	Step/ Overhang	05/05/2023	2	Rock fracturing and rockfall on a steep slope to the north of WC14.	09/05/2023
DA3A_LW19_057	Rockfall	Step	05/05/2023	1	Rockfall at a step to the north of WC14.	09/05/2023
DA3A_LW19_058	Rock Fracturing and Fragmentation	Rock Outcrop	05/05/2023	1	Rock fracturing and fragmentation on edge of a rock outcrop to the north of WC14.	09/05/2023
DA3A_LW19_059	Rock Fracturing and Fragmentation	Overhang	05/05/2023	1	Rock fracturing and associated fragmentation beneath an overhang to the north of WC14.	09/05/2023
DA3A_LW19_060	Rock Fracturing, Displacement and Rockfall	Step/ Outcrop	05/05/2023	1	Rock fracturing, displacement and rockfall on a steep slope/ outcrop to the north of WC14.	09/05/2023
DA3A_LW19_061	Rock Fracturing and Soil Cracking	Step/ Outcrop	05/05/2023	2	Rock fracturing and soil cracking on a steep slope/ outcrop to the north of WC14.	09/05/2023
DA3A_LW19_062	Rock Fracturing	Rock Outcrop	05/05/2023	1	Rock fracturing on the face of an outcrop to the north of WC14.	09/05/2023
DA3A_LW19_063	Rock Movement	Steep Slope	10/05/2023	1	Boulder shifted downslope, east of Fire Road 6F.	15/05/2023
Swamp 15B	Soil Moisture	Swamp 15b	29/05/2023	2	Soil moisture trigger at swamp sites *S15b_39*, *S15b_H2* and *S15b_H3*.	This Report

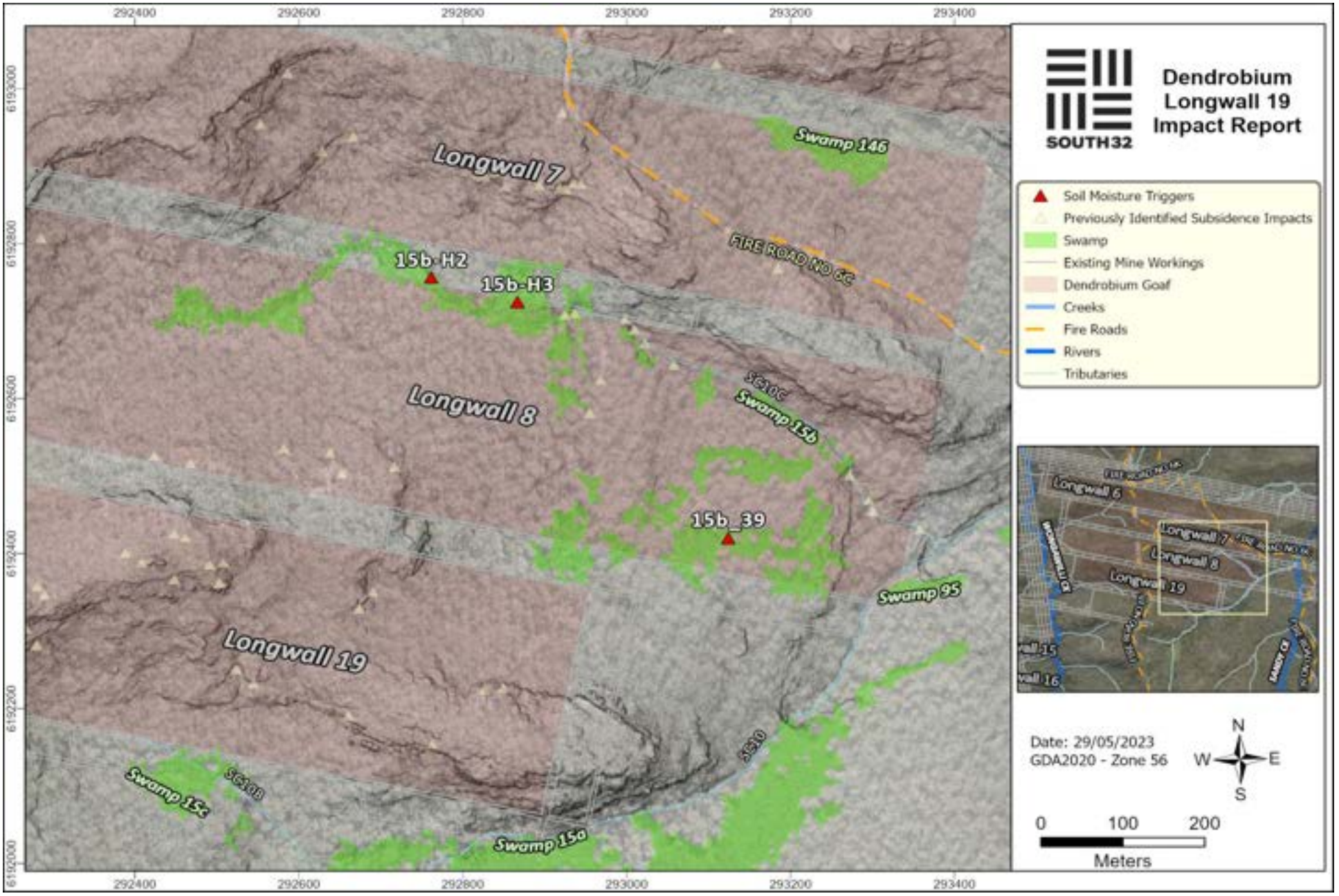


Figure 1: Map showing latest soil mositure trigger locations associated with Longwall 19. Inset shows main frame of map in relation to DA3A mining operations.