

DA3C_LW21_027 (E 291221, N 6194124)

DA3C_LW21_027 is located approximately 20m north of tributary WC20 (Figure 1). The impact consists of a rockfall to the rock step at Landscape Monitoring site LW21_SS1 (Photo 8 and Photo 9). The measurements were estimated due to safety concerns. The rockfall has a maximum length of $\approx 6.5\text{m}$, a maximum width of $\approx 3\text{m}$ and a maximum height of $\approx 3\text{m}$, with a total volume of $\approx 15\text{m}^3$ and ground disturbance area of $\approx 10\text{m}^2$. Caution tape barricading is in place at the site as a safety precaution.

DA3C_LW21_027 is a Level 2 trigger as per the Dendrobium Landscape TARP (Table 1), specifically:

- Rockfall or overhang collapse at a cliff (step) site, where characteristics of the cliff have changed, and there has been significant ground disturbance.



Photo 8: DA3C_LW21_027, overview of rockfall.
Taken 06/09/2023



Photo 9: DA3C_LW21_027, overview of rockfall.
Taken 06/09/2023

DA3C_LW21_028 (E 291287, N 6194140)

DA3C_LW21_028 is located approximately 55m north of tributary WC20 (Figure 1). The impact consists of a horizontal fracture to a rock outcrop (Photo 10 and Photo 11). The fracture has a maximum length of 1m, a maximum width of 0.003m and a maximum measurable depth of 0.06m.

DA3C_LW21_028 is a Level 1 trigger as per the Dendrobium Landscape TARP (Table 1), specifically:

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



Photo 10: DA3C_LW21_028, rock fracture. Taken 06/09/2023



Photo 11: DA3C_LW21_028, width of rock fracture. Taken 06/09/2023

DA3C_LW21_029 (E 291222, N 6194184)

DA3C_LW21_029 is located approximately 80m north of tributary WC20 (Figure 1). The impact consists of fracturing to a rock outcrop at Landscape Monitoring site LW21_SS3 (Photo 12 and Photo 13). Some measurements were estimated due to safety. The fracturing has a maximum length of ≈ 6 m and a maximum width of ≈ 0.01 m.

DA3C_LW21_029 is a Level 1 trigger as per the Dendrobium Landscape TARP (Table 1), specifically:

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



Photo 12: DA3C_LW21_029, section of rock fracture. Taken 6/09/2023



Photo 13: DA3C_LW21_029, section of rock fracture. Taken 6/09/2023

Corrective Management Actions (CMAs)

The following management actions have been initiated:

- Continue monitoring program
- Submit an Impact Report to key stakeholders
- Seek advice on any other CMAs
- Report in the End of Panel Report
- Summarise actions and monitoring in AEMR
- Review monitoring frequency
- Notify technical specialists and seek advice on any CMA required
- Provide safety barricades as appropriate
- Implement agreed CMAs as approved (subject to agency feedback)

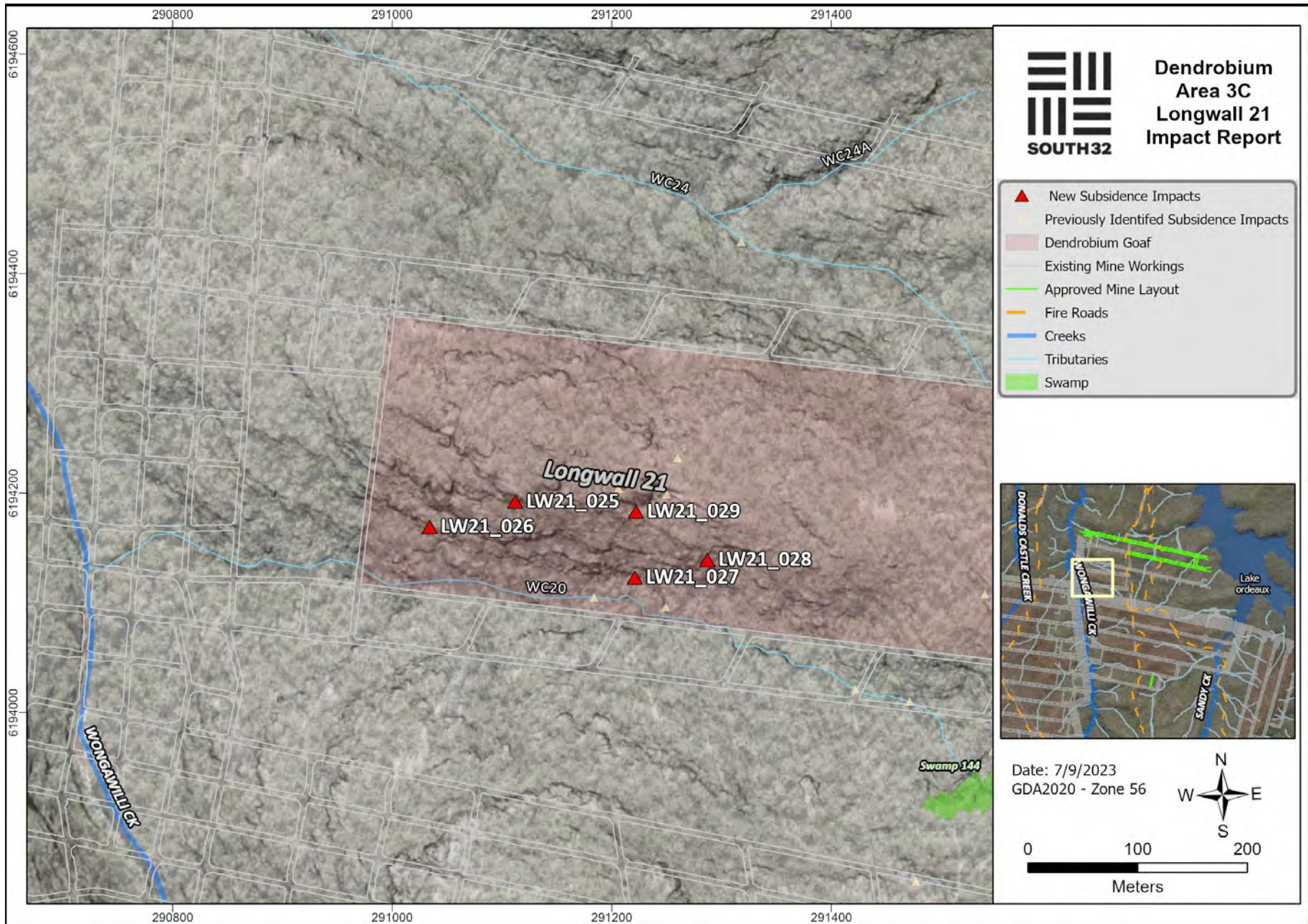


Figure 1: Latest subsidence impacts over Longwall 21 mining area in DA3C. Inset shows frame in relation to Dendrobium mining operations.

Table 1: Extract from Dendrobium Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
<p>AREA 2</p> <p>Cliffs A2-CL1 (above LW4)</p> <p>Steep Slopes A2-SL1 and A2-SL2 (above LWs 4 & 5)</p> <p>Watercourses A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5)</p> <p>Swamp A2-SW1 (above LWs 4 & 5)</p> <p>4WD Track A2-FT1 (above LWs 4 & 5)</p> <p>Crininite Surface Extent A2-CN1 & A2-CN2 (above LWs 3 & 4)</p>	<p>Level 1 *</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Continue monitoring program Report impacts to key stakeholders Summarise impacts and Report in the End of Panel Report and AEMR
<p>AREA 3A</p> <p>Cliffs All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites)</p> <p>Steep Slopes All mapped steep slopes in subsidence area Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites</p> <p>Watercourses/ Swamps All mapped watercourse and swamps in subsidence area Refer to Dendrobium Area 3A SMP Figure 19.3</p> <p>Fire Trails All mapped fire trails in subsidence area Refer to Dendrobium Area 3A SMP Figure 19.3</p> <p>AREA 3B</p> <p>Cliffs All mapped cliff sites in subsidence area Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites</p>	<p>Level 2 *</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 <p><i>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</i></p>
	<p>Level 3 *</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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: Impacts and triggers since June 2023. Highlighted row indicates observations featured in this report.

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_001	Rock Fracturing	Outcrop	06/06/2023	1	Rock fracturing to a small rock outcrop west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_002	Rock Fracturing and Rock Movement	LW21_RO1	06/06/2023	2	Rock fracturing and rock movement to a small rock outcrop at Landscape Monitoring Site LW21_RO1.	9/06/2023
DA3C_LW21_003	Rock Fracturing and Rockfall	Outcrop and Step	06/06/2023	2	Rock fracturing and rockfall to an outcrop and a step west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_004	Rock Fracturing	Outcrop	06/06/2023	2	Rock fracturing on an outcrop west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_005	Rock Fracturing	Outcrop	15/06/2023	1	Rock fracture on a rock outcrop northeast of <i>WC20</i> .	19/06/2023
DA3C_LW21_006	Rock Fracturing	Outcrop	15/06/2023	1	Rock fracturing on a rock outcrop northeast of <i>WC20</i> .	19/06/2023
DA3C_LW21_007	Rock Fracturing and Rockfall	Outcrop	15/06/2023	2	Rock fracturing and rock fall on an outcrop northeast of <i>WC20</i> .	19/06/2023
DA3C_LW21_008	Rock Fracturing and Soil Cracking	Rock Step	19/06/2023	1	Rock fracturing/soil cracking to a rock step and bushland northeast of <i>WC20</i> .	20/06/2023
DA3C_LW21_009	Rock Fracturing	Rock Step	19/06/2023	1	Rock fracturing to a rock step west of <i>Fire Road 6F</i> .	20/06/2023
DA3C_LW21_010	Rock Fracturing and Rock Movement/ Displacement	Outcrop	19/06/2023	2	Rock fracturing and associated rock movement/displacement at an outcrop west of <i>Fire Road 6F</i> .	20/06/2023
DA3C_LW21_011	Rock Fracturing, Rock Displacement and Soil Cracking	Outcrop and Bushland	19/06/2023	1	Soil cracking, rock fracturing and associated rock displacement to an outcrop and bushland west of <i>Fire Road 6F</i> .	20/06/2023
144_01	Groundwater	Swamp 144	22/06/2023	3	Groundwater recession rate greater than baseline	28/06/2023
S144_01	Soil Moisture	Swamp 144	27/06/2023	3	Average soil moisture level below the baseline level	28/06/2023
DA3C_LW21_012	Rock Fracturing	Rock Step	27/06/2023	1	Rock fracturing to rock step west of <i>Fire Road 6F</i> .	28/06/2023
DA3C_LW21_013	Rock Fracturing	Outcrop	03/07/2023	1	Rock fracturing to rock outcrop west of <i>Fire Road 6F</i> .	04/07/2023
DA3C_LW21_014	Rock Fracturing	Watercourse	11/07/2023	2	Rock fracturing to rock-bar on tributary <i>WC20</i> .	17/07/2023
DA3C_LW21_015	Rock Fracturing	Watercourse	11/07/2023	2	Rock fracturing to channel on tributary <i>WC20</i> .	17/07/2023

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_016	Rockfall	Rock Step	11/07/2023	1	Small rockfall to step north of tributary WC20.	17/07/2023
Swamp 15a	Groundwater	Swamp	12/07/2023	1	Groundwater trigger at one site in Swamp 15a. (Longwall 19 mining area)	17/07/2023
Swamp 15a	Soil Moisture	Swamp	12/07/2023	2	Soil moisture triggers at three sites within Swamp 15a. (Longwall 19 mining area)	17/07/2023
DA3C_LW21_016 (Update)	Rockfall	Rock Step	26/07/2023	2	Rockfall to step north of tributary WC20.	31/07/2023
DA3C_LW21_017	Rock Fracturing	Watercourse	26/07/2023	1	Rock fracturing and uplift to WC20_Rockbar 15.	31/07/2023
DA3C_LW21_018	Rock Fracturing	Rock Outcrop/Ledge	26/07/2023	1	Rock fracturing to rock outcrop/ledge.	31/07/2023
DA3C_LW21_019	Rock Fracturing	Rock Step	1/08/2023	1	Rock fracturing to rock step west of Fire Road 6F.	2/08/2023
DA3C_LW21_020	Iron Staining	Watercourse	1/08/2023	1	Iron staining in tributary WC24.	2/08/2023
DA3C_LW21_021	Iron Staining	Rock Step	1/08/2023	1	Iron staining on the Swamp 144 basal step. Reported under the Watercourse TARP as iron occurs in the general drainage line and headwaters of WC20.	2/08/2023
DA3C_LW21_022	Rockfall	Rock Step	7/08/2023	1	Rockfall to rock outcrop/step west of Fire Road 6F	9/08/2023
S145_01	Soil Moisture	Swamp	4/08/2023	3	Soil moisture trigger at one site in Swamp 145	9/08/2023
09_02	Groundwater	Swamp	4/08/2023	2	Groundwater trigger at one site in Swamp 9	9/08/2023
Swamp 15a (update)	Soil Moisture	Swamp	11/08/2023	3	Soil moisture trigger recorded two additional sites (total now five) in Swamp 15a.	18/08/2023
S12_04	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 12 (Longwall 19 mining area).	4/09/2023
S150_01	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 150 (Longwall 18 mining area).	4/09/2023
09_01	Groundwater	Swamp	30/08/2023	3	Groundwater trigger at second site in Swamp 9 (Longwall 21 mining area).	4/09/2023
S09_01	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023
S09_02	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_023	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_024	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_025	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing and rockfall to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_026	Rockfall	Rock Outcrop	6/09/2023	1	Small rockfall and fracturing to step north of tributary WC20.	8/09/2023
DA3C_LW21_027	Rockfall	Rock Outcrop	6/09/2023	2	Rockfall to step north of tributary WC20 at Landscape Monitoring Site LW21_SS1.	8/09/2023
DA3C_LW21_028	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_029	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20 at Landscape Monitoring Site LW21_SS3.	8/09/2023

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, weekly during mining and monthly during the post-mining period. Monitoring is conducted in accordance with the approved Longwall 21 Subsidence Management Plan (SMP). Extraction of Longwall 21 started on 25 April 2023 and was completed on 6 August 2023. During the latest inspection for Longwall 21, five new subsidence impacts were identified.

DA3C_LW21_030 (E 291566, N 6194131)

DA3C_LW21_030 is located approximately 155m northeast of tributary WC20 (Figure 1). The impact consists of a fracture to a rock outcrop (Photo 1 and Photo 2). The rock fracture has a maximum continuous length of 1.85m, a maximum width of 0.04m and a maximum measurable depth of 0.91m.

DA3C_LW21_030 is a Level 1 trigger as per the Dendrobium Landscape TARP (Table 1), specifically:

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



Photo 1: *DA3C_LW21_030*, overview of rock fracture.
Taken: 12/09/2023.



Photo 2: *DA3C_LW21_030*, width of rock fracture.
Taken: 12/09/2023.

DA3C_LW21_031 (E 291337, N 6194174)

DA3C_LW21_031 is located approximately 75m north of tributary WC20 (Figure 1). The impact consists of a small rock fracture to the bottom of a step (Photo 3 and Photo 4). The fracture has a maximum continuous length of 0.32m, a maximum width of 0.015m and a maximum measurable depth of 0.012m.

DA3C_LW21_031 is a Level 1 trigger as per the Dendrobium Landscape TARP (Table 1), specifically:

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



Photo 3: DA3C_LW21_031, width of rock fracture. Taken: 12/09/2023.



Photo 4: DA3C_LW21_031, overview of rock fracture. Taken: 12/09/2023. Note- measurement tape set to 0.5m for scale.

DA3C_LW21_032 (E 291055, N 6194151)

DA3C_LW21_032 is located approximately 30m north of tributary WC20 (Figure 1). The impact consists of multiple fractures to a rock step/overhang, with varying lengths and orientations (Photo 5 and Photo 6). Measurements were estimated from distance for safety reasons. The rock fracturing has an approximate maximum continuous length of $\approx 1\text{m}$ and a maximum width of $\approx 0.035\text{m}$. Caution tape barricading is in place at the site as a safety precaution due to the overhanging nature of the step.

DA3C_LW21_032 is a Level 1 trigger as per the Dendrobium Landscape TARP (Table 1), specifically:

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



Photo 5: DA3C_LW21_032, overview of fracturing to rock step/overhang. Taken 12/09/2023.



Photo 6: DA3C_LW21_032, overview of fracturing to rock step/overhang. Taken 12/09/2023.

DA3C_LW21_033 (E 291033, N 6194174)

DA3C_LW21_033 is located approximately 55m north of tributary WC20 (Figure 1). The impact consists of a small rock fracture beneath a rock step/overhang (Photo 7 and Photo 8). The rock fracturing has a maximum continuous length of 0.2m, a maximum width of 0.01m and a maximum measurable depth of 0.1m.

DA3C_LW21_033 is a Level 1 trigger as per the Dendrobium Landscape TARP (Table 1), specifically:

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



Photo 7: DA3C_LW21_033, overview of rock fracture.
Taken: 12/09/2023.



Photo 8: DA3C_LW21_033, width of rock fracture. Taken:
12/09/2023.

DA3C_LW21_034 (E 291046, N 6194236)

DA3C_LW21_034 is located approximately 120m north of the tributary WC20 (Figure 1). The impact consists of rock movement and soil cracking (Photo 9 to Photo 10). The soil crack extends for 1.9m beneath the rock feature, with a maximum width of 0.17m. The soil cracking potentially extends away from the rock feature as unstable soil was observed during the inspection (Photo 11).

DA3C_LW21_034 is a Level 2 trigger as per the Dendrobium Landscape TARP (Table 1), specifically:

- Crack or fracture between 100 and 300mm width.



Photo 9: DA3C_LW21_034 overview of rock movement and soil crack. Taken: 12/09/2023.



Photo 10: DA3C_LW21_034 width of soil crack. Taken 12/09/2023.



Photo 11: DA3C_LW21_034. Dashed line shows approximate section of unstable soil/leaf litter extending from rock movement. Taken 12/09/2023

Corrective Management Actions (CMAs)

The following management actions have been initiated:

- Continue monitoring program
- Submit an Impact Report to key stakeholders
- Seek advice on any other CMAs
- Report in the End of Panel Report
- Summarise actions and monitoring in AEMR
- Review monitoring frequency
- Notify technical specialists and seek advice on any CMA required
- Provide safety barricades as appropriate
- Implement agreed CMAs as approved (subject to agency feedback)

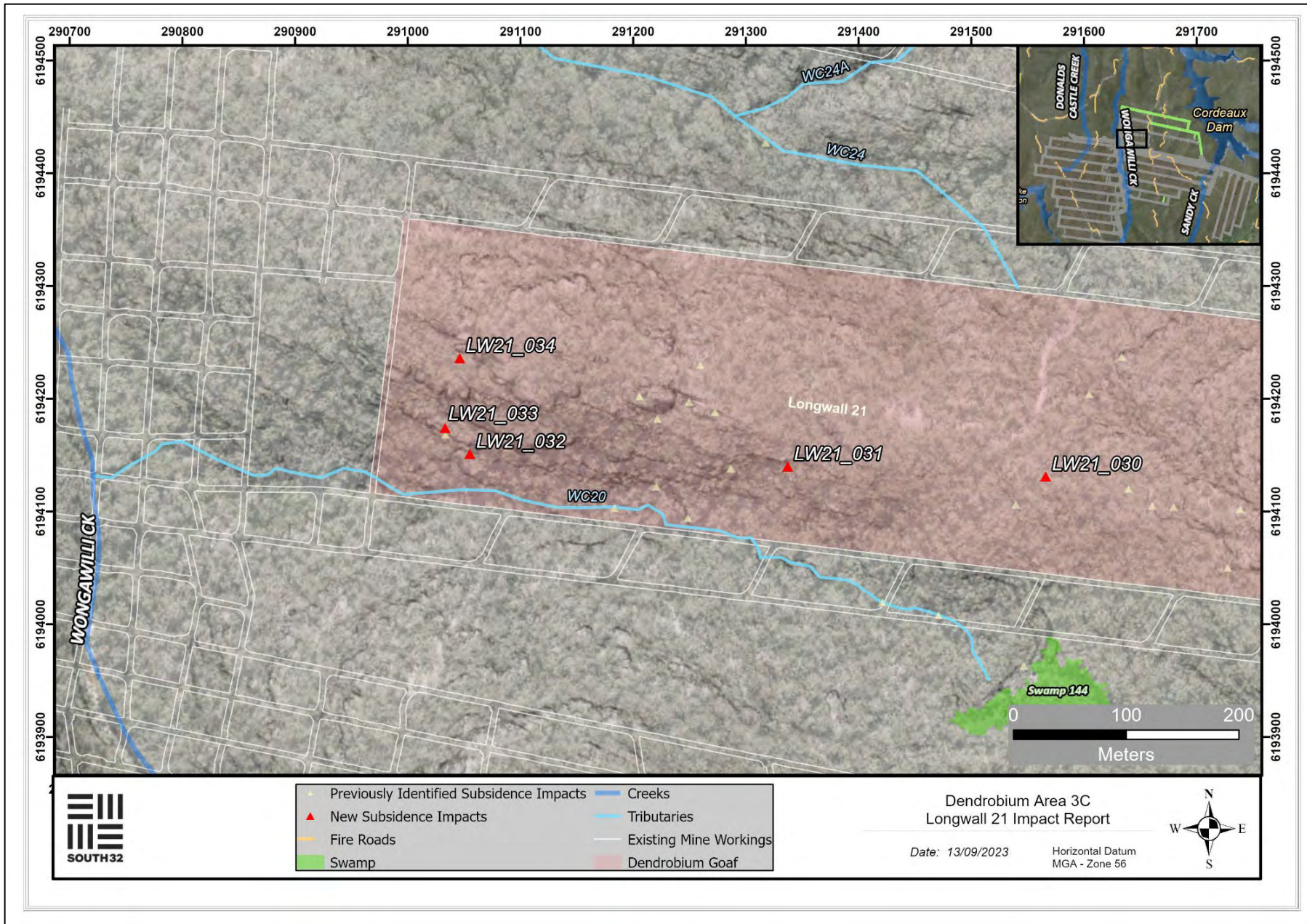


Figure 1: Latest subsidence impacts over Longwall 21 mining area in DA3C. Inset shows frame in relation to Dendrobium mining operations.

Table 1: Extract from Dendrobium Landscape TARP.

Monitoring	Trigger	Action
LANDSCAPE FEATURES		
<p>AREA 2</p> <p>Cliffs A2-CL1 (above LW4)</p> <p>Steep Slopes A2-SL1 and A2-SL2 (above LWs 4 & 5)</p> <p>Watercourses A2-WC10 and A2-WC11 (above LW3) A2-WC13 & A2-WC16 (above LWs 4 & 5)</p> <p>Swamp A2-SW1 (above LWs 4 & 5)</p> <p>4WD Track A2-FT1 (above LWs 4 & 5)</p> <p>Crininite Surface Extent A2-CN1 & A2-CN2 (above LWs 3 & 4)</p>	<p>Level 1 *</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Continue monitoring program Report impacts to key stakeholders Summarise impacts and Report in the End of Panel Report and AEMR
<p>AREA 3A</p> <p>Cliffs All mapped cliff sites in subsidence area (Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites)</p> <p>Steep Slopes All mapped steep slopes in subsidence area <i>Refer to Dendrobium Area 3A SMP Figures 19.3 for location of sites</i></p> <p>Watercourses/ Swamps All mapped watercourse and swamps in subsidence area <i>Refer to Dendrobium Area 3A SMP Figure 19.3</i></p> <p>Fire Trails All mapped fire trails in subsidence area <i>Refer to Dendrobium Area 3A SMP Figure 19.3</i></p> <p>AREA 3B</p> <p>Cliffs All mapped cliff sites in subsidence area <i>Refer to Dendrobium Area 3B SMP Figures 18.1 for location of sites</i></p>	<p>Level 2 *</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 <p><i>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</i></p>
	<p>Level 3 *</p> <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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: Impacts and triggers since start of Longwall 21. Highlighted rows indicate observations featured in this report.

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_001	Rock Fracturing	Outcrop	06/06/2023	1	Rock fracturing to a small rock outcrop west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_002	Rock Fracturing and Rock Movement	LW21_RO1	06/06/2023	2	Rock fracturing and rock movement to a small rock outcrop at Landscape Monitoring Site LW21_RO1.	9/06/2023
DA3C_LW21_003	Rock Fracturing and Rockfall	Outcrop and Step	06/06/2023	2	Rock fracturing and rockfall to an outcrop and a step west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_004	Rock Fracturing	Outcrop	06/06/2023	2	Rock fracturing on an outcrop west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_005	Rock Fracturing	Outcrop	15/06/2023	1	Rock fracture on a rock outcrop northeast of WC20.	19/06/2023
DA3C_LW21_006	Rock Fracturing	Outcrop	15/06/2023	1	Rock fracturing on a rock outcrop northeast of WC20.	19/06/2023
DA3C_LW21_007	Rock Fracturing and Rockfall	Outcrop	15/06/2023	2	Rock fracturing and rock fall on an outcrop northeast of WC20.	19/06/2023
DA3C_LW21_008	Rock Fracturing and Soil Cracking	Rock Step	19/06/2023	1	Rock fracturing/soil cracking to a rock step and bushland northeast of WC20.	20/06/2023
DA3C_LW21_009	Rock Fracturing	Rock Step	19/06/2023	1	Rock fracturing to a rock step west of <i>Fire Road 6F</i> .	20/06/2023
DA3C_LW21_010	Rock Fracturing and Rock Movement/ Displacement	Outcrop	19/06/2023	2	Rock fracturing and associated rock movement/displacement at an outcrop west of <i>Fire Road 6F</i> .	20/06/2023
DA3C_LW21_011	Rock Fracturing, Rock Displacement and Soil Cracking	Outcrop and Bushland	19/06/2023	1	Soil cracking, rock fracturing and associated rock displacement to an outcrop and bushland west of <i>Fire Road 6F</i> .	20/06/2023
144_01	Groundwater	Swamp 144	22/06/2023	3	Groundwater recession rate greater than baseline	28/06/2023
S144_01	Soil Moisture	Swamp 144	27/06/2023	3	Average soil moisture level below the baseline level	28/06/2023
DA3C_LW21_012	Rock Fracturing	Rock Step	27/06/2023	1	Rock fracturing to rock step west of Fire Road 6F.	28/06/2023
DA3C_LW21_013	Rock Fracturing	Outcrop	03/07/2023	1	Rock fracturing to rock outcrop west of Fire Road 6F.	04/07/2023
DA3C_LW21_014	Rock Fracturing	Watercourse	11/07/2023	2	Rock fracturing to rock-bar on tributary WC20.	17/07/2023

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_015	Rock Fracturing	Watercourse	11/07/2023	2	Rock fracturing to channel on tributary WC20.	17/07/2023
DA3C_LW21_016	Rockfall	Rock Step	11/07/2023	1	Small rockfall to step north of tributary WC20.	17/07/2023
Swamp 15a	Groundwater	Swamp	12/07/2023	1	Groundwater trigger at one site in Swamp 15a. (Longwall 19 mining area)	17/07/2023
Swamp 15a	Soil Moisture	Swamp	12/07/2023	2	Soil moisture triggers at three sites within Swamp 15a. (Longwall 19 mining area)	17/07/2023
DA3C_LW21_016 (Update)	Rockfall	Rock Step	26/07/2023	2	Rockfall to step north of tributary WC20.	31/07/2023
DA3C_LW21_017	Rock Fracturing	Watercourse	26/07/2023	1	Rock fracturing and uplift to WC20_Rockbar 15.	31/07/2023
DA3C_LW21_018	Rock Fracturing	Rock Outcrop/Ledge	26/07/2023	1	Rock fracturing to rock outcrop/ledge.	31/07/2023
DA3C_LW21_019	Rock Fracturing	Rock Step	1/08/2023	1	Rock fracturing to rock step west of Fire Road 6F.	2/08/2023
DA3C_LW21_020	Iron Staining	Watercourse	1/08/2023	1	Iron staining in tributary WC24.	2/08/2023
DA3C_LW21_021	Iron Staining	Rock Step	1/08/2023	1	Iron staining on the Swamp 144 basal step. Reported under the Watercourse TARP as iron occurs in the general drainage line and headwaters of WC20.	2/08/2023
DA3C_LW21_022	Rockfall	Rock Step	7/08/2023	1	Rockfall to rock outcrop/step west of Fire Road 6F	9/08/2023
S145_01	Soil Moisture	Swamp	4/08/2023	3	Soil moisture trigger at one site in Swamp 145	9/08/2023
09_02	Groundwater	Swamp	4/08/2023	2	Groundwater trigger at one site in Swamp 9	9/08/2023
Swamp 15a (update)	Soil Moisture	Swamp	11/08/2023	3	Soil moisture trigger recorded two additional sites (total now five) in Swamp 15a.	18/08/2023
S12_04	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 12 (Longwall 19 mining area).	4/09/2023
S150_01	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 150 (Longwall 18 mining area).	4/09/2023
09_01	Groundwater	Swamp	30/08/2023	3	Groundwater trigger at second site in Swamp 9 (Longwall 21 mining area).	4/09/2023

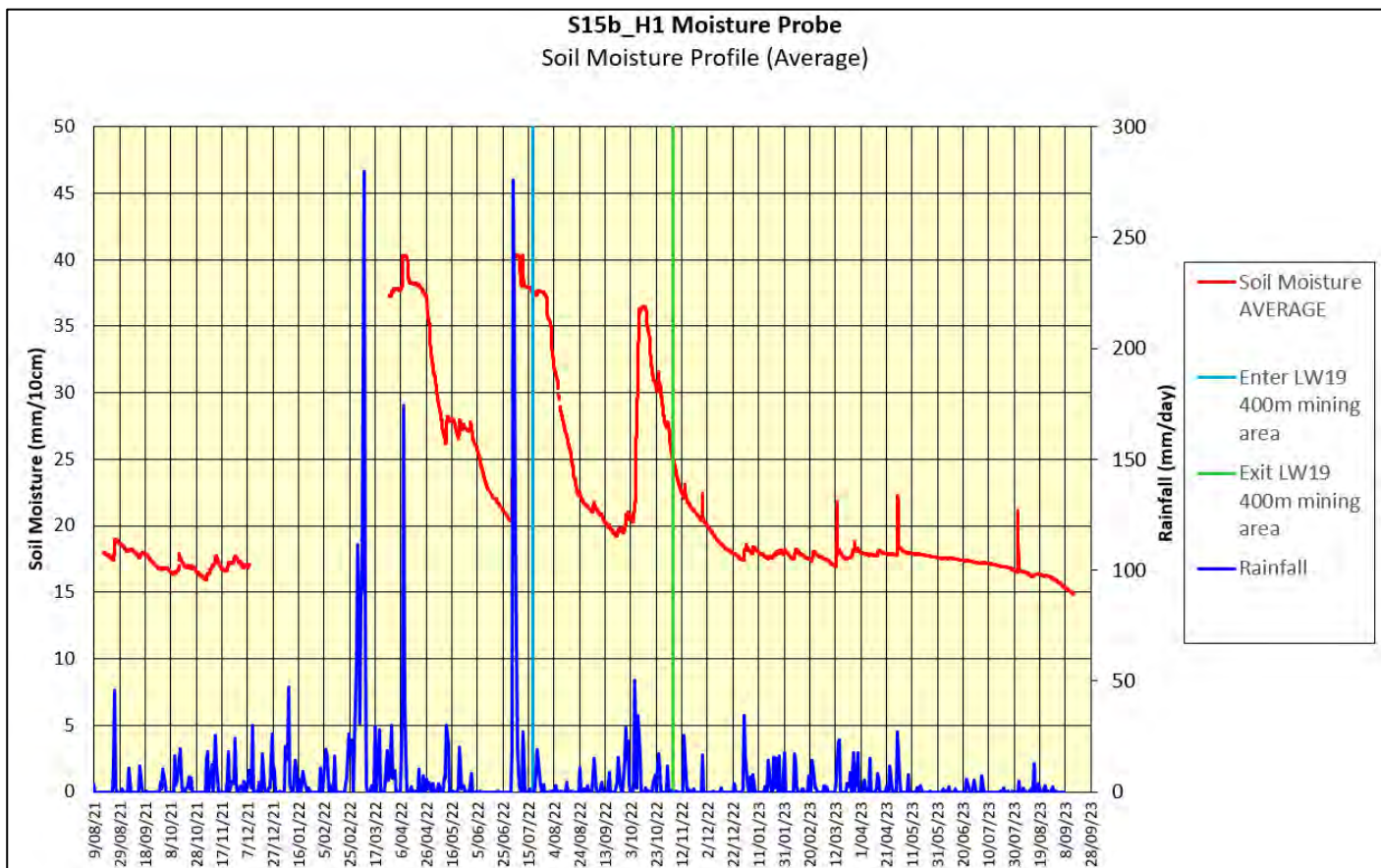
Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
S09_01	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023
S09_02	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023
DA3C_LW21_023	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_024	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_025	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing and rockfall to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_026	Rockfall	Rock Outcrop	6/09/2023	1	Small rockfall and fracturing to step north of tributary WC20.	8/09/2023
DA3C_LW21_027	Rockfall	Rock Outcrop	6/09/2023	2	Rockfall to step north of tributary WC20 at Landscape Monitoring Site LW21_SS1.	8/09/2023
DA3C_LW21_028	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_029	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20 at Landscape Monitoring Site LW21_SS3.	8/09/2023
DA3C_LW21_030	Rock Fracturing	Rock Outcrop	12/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	14/09/2023
DA3C_LW21_031	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_032	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_033	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_034	Rock Movement and Soil Cracking	Rock Outcrop	12/09/2023	2	Rock movement and soil cracking to rock outcrop north of tributary WC20.	14/09/2023

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). 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 ended on 29 March 2023. Recent analysis of soil moisture data in *Swamp 15b* shows a trigger at site *S15b_H1*.

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. Recent analysis of records at *S15b_H1* shows the average soil moisture data after completion of extraction being lower than the lowest data recorded during the baseline period. As soil moisture triggers for *S15b_H2*, *S15b_H3* and *S15b_39* were identified and reported in May 2023 these results contribute to a Level 3 trigger according to the Longwall 19 SIMMCP, specifically:

- 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#).



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, as stated in the Level 3 TARP definition, will be included in specialist analysis as part of the Longwall 21 End of Panel Report.

Table 1: Excerpt 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 <i>NB. Not linked specifically to a PM and would not be considered a breach if predictions were exceeded.</i>	<u>Level 1:</u> Soil moisture level lower than baseline level at any monitoring sites (within 400 m of mining) within a swamp (in comparison to reference swamps). <u>Level 2:</u> Soil moisture level lower than baseline level at 50% of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps). <u>Level 3:</u> 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

Corrective Management Actions (CMAs)

The following management actions have been initiated:

- Continue monitoring program
- Submit an Impact Report to key stakeholders
- Seek advice on any other CMAs
- Report in the End of Panel Report
- Summarise actions and monitoring in AEMR

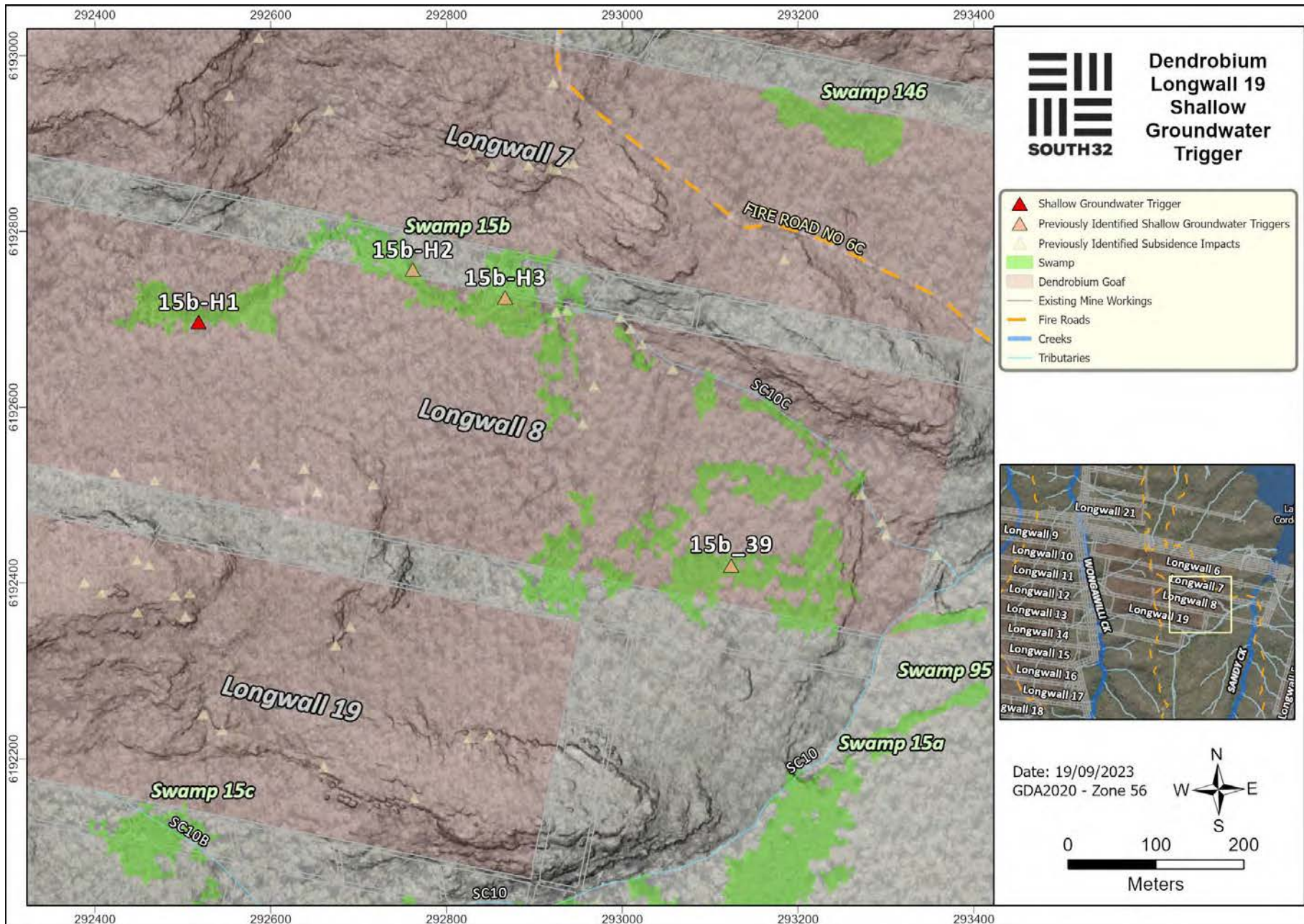


Figure 1: Map showing latest soil moisture trigger locations in relation to DA3A longwalls. Inset shows main frame in relation to DA3A mining operations.

Table 1: Impacts and triggers since start of Longwall 21. Highlighted rows indicate observations featured in this report.

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_001	Rock Fracturing	Outcrop	06/06/2023	1	Rock fracturing to a small rock outcrop west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_002	Rock Fracturing and Rock Movement	LW21_RO1	06/06/2023	2	Rock fracturing and rock movement to a small rock outcrop at Landscape Monitoring Site LW21_RO1.	9/06/2023
DA3C_LW21_003	Rock Fracturing and Rockfall	Outcrop and Step	06/06/2023	2	Rock fracturing and rockfall to an outcrop and a step west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_004	Rock Fracturing	Outcrop	06/06/2023	2	Rock fracturing on an outcrop west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_005	Rock Fracturing	Outcrop	15/06/2023	1	Rock fracture on a rock outcrop northeast of WC20.	19/06/2023
DA3C_LW21_006	Rock Fracturing	Outcrop	15/06/2023	1	Rock fracturing on a rock outcrop northeast of WC20.	19/06/2023
DA3C_LW21_007	Rock Fracturing and Rockfall	Outcrop	15/06/2023	2	Rock fracturing and rock fall on an outcrop northeast of WC20.	19/06/2023
DA3C_LW21_008	Rock Fracturing and Soil Cracking	Rock Step	19/06/2023	1	Rock fracturing/soil cracking to a rock step and bushland northeast of WC20.	20/06/2023
DA3C_LW21_009	Rock Fracturing	Rock Step	19/06/2023	1	Rock fracturing to a rock step west of <i>Fire Road 6F</i> .	20/06/2023
DA3C_LW21_010	Rock Fracturing and Rock Movement/ Displacement	Outcrop	19/06/2023	2	Rock fracturing and associated rock movement/displacement at an outcrop west of <i>Fire Road 6F</i> .	20/06/2023
DA3C_LW21_011	Rock Fracturing, Rock Displacement and Soil Cracking	Outcrop and Bushland	19/06/2023	1	Soil cracking, rock fracturing and associated rock displacement to an outcrop and bushland west of <i>Fire Road 6F</i> .	20/06/2023
144_01	Groundwater	Swamp 144	22/06/2023	3	Groundwater recession rate greater than baseline	28/06/2023
S144_01	Soil Moisture	Swamp 144	27/06/2023	3	Average soil moisture level below the baseline level	28/06/2023
DA3C_LW21_012	Rock Fracturing	Rock Step	27/06/2023	1	Rock fracturing to rock step west of <i>Fire Road 6F</i> .	28/06/2023
DA3C_LW21_013	Rock Fracturing	Outcrop	03/07/2023	1	Rock fracturing to rock outcrop west of <i>Fire Road 6F</i> .	04/07/2023
DA3C_LW21_014	Rock Fracturing	Watercourse	11/07/2023	2	Rock fracturing to rock-bar on tributary WC20.	17/07/2023
DA3C_LW21_015	Rock Fracturing	Watercourse	11/07/2023	2	Rock fracturing to channel on tributary WC20.	17/07/2023

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_016	Rockfall	Rock Step	11/07/2023	1	Small rockfall to step north of tributary WC20.	17/07/2023
Swamp 15a	Groundwater	Swamp	12/07/2023	1	Groundwater trigger at one site in Swamp 15a. (Longwall 19 mining area)	17/07/2023
Swamp 15a	Soil Moisture	Swamp	12/07/2023	2	Soil moisture triggers at three sites within Swamp 15a. (Longwall 19 mining area)	17/07/2023
DA3C_LW21_016 (Update)	Rockfall	Rock Step	26/07/2023	2	Rockfall to step north of tributary WC20.	31/07/2023
DA3C_LW21_017	Rock Fracturing	Watercourse	26/07/2023	1	Rock fracturing and uplift to WC20_Rockbar 15.	31/07/2023
DA3C_LW21_018	Rock Fracturing	Rock Outcrop/Ledge	26/07/2023	1	Rock fracturing to rock outcrop/ledge.	31/07/2023
DA3C_LW21_019	Rock Fracturing	Rock Step	1/08/2023	1	Rock fracturing to rock step west of Fire Road 6F.	2/08/2023
DA3C_LW21_020	Iron Staining	Watercourse	1/08/2023	1	Iron staining in tributary WC24.	2/08/2023
DA3C_LW21_021	Iron Staining	Rock Step	1/08/2023	1	Iron staining on the Swamp 144 basal step. Reported under the Watercourse TARP as iron occurs in the general drainage line and headwaters of WC20.	2/08/2023
DA3C_LW21_022	Rockfall	Rock Step	7/08/2023	1	Rockfall to rock outcrop/step west of Fire Road 6F	9/08/2023
S145_01	Soil Moisture	Swamp	4/08/2023	3	Soil moisture trigger at one site in Swamp 145	9/08/2023
09_02	Groundwater	Swamp	4/08/2023	2	Groundwater trigger at one site in Swamp 9	9/08/2023
Swamp 15a (update)	Soil Moisture	Swamp	11/08/2023	3	Soil moisture trigger recorded two additional sites (total now five) in Swamp 15a.	18/08/2023
S12_04	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 12 (Longwall 19 mining area).	4/09/2023
S150_01	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 150 (Longwall 18 mining area).	4/09/2023
09_01	Groundwater	Swamp	30/08/2023	3	Groundwater trigger at second site in Swamp 9 (Longwall 21 mining area).	4/09/2023
S09_01	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023
S09_02	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023

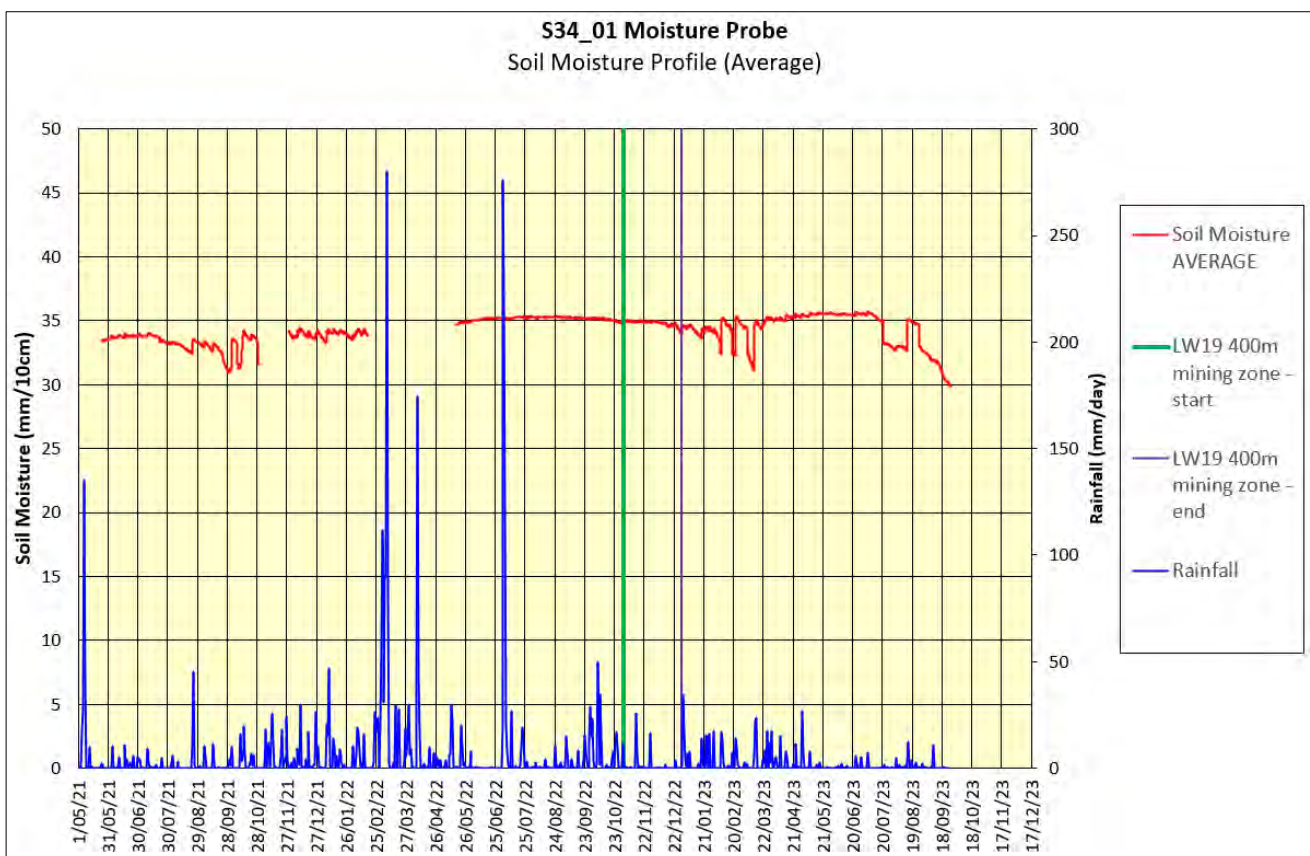
Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_023	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_024	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_025	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing and rockfall to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_026	Rockfall	Rock Outcrop	6/09/2023	1	Small rockfall and fracturing to step north of tributary WC20.	8/09/2023
DA3C_LW21_027	Rockfall	Rock Outcrop	6/09/2023	2	Rockfall to step north of tributary WC20 at Landscape Monitoring Site LW21_SS1.	8/09/2023
DA3C_LW21_028	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_029	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20 at Landscape Monitoring Site LW21_SS3.	8/09/2023
DA3C_LW21_030	Rock Fracturing	Rock Outcrop	12/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	14/09/2023
DA3C_LW21_031	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_032	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_033	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_034	Rock Movement and Soil Cracking	Rock Outcrop	12/09/2023	2	Rock movement and soil cracking to rock outcrop north of tributary WC20.	14/09/2023
Swamp 15b (update)	Soil Moisture	Swamp	19/09/2023	3	Soil moisture trigger recorded at one additional site (total now four) in Swamp 15b (Longwall 19 mining area).	21/09/2023

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, weekly during mining and monthly during the post-mining period. 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 34* identified a soil moisture trigger at site *S34_01*.

Swamp 34

A soil moisture trigger was identified at monitoring site *S34_01* in Swamp 34 during recent analysis of moisture data by the IMCEFT. *S34_01* is located approximately 360 m south of Longwall 19 (Figure 1). It entered the Longwall 19, 400m active mining area on 1 November 2022 and remained in the mining area until 29 December 2022. Recent analysis of records shows that the average soil moisture data after the completion of extraction is now lower than the lowest data recorded during the baseline period. As *S34_01* is the only soil moisture site in Swamp 34, these results may contribute to a Level 3 trigger according to the Longwall 19 SIMMCP, specifically:

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#).



Graph 1: Average soil moisture records at *S34_01*, logged hourly. Date range: 25/05/2021 to 26/09/2023.

These reporting triggers provide level 1, 2 and 3 triggers that allow for a rapid assessment of changing monitoring data that can be reported by the IMCEFT. These triggers as reported in this Subsidence Impact Report do not necessarily assess causality from mining or indicate an exceedance of the performance measure and further analysis will be conducted in this regard.

#The comparison to reference swamps, as stated in the Level 3 TARP definition, will be included in specialist analysis as part of the Longwall 21 End of Panel Report.

Baseline monitoring for this site has predominately occurred during a period of unusually high rainfall in 2021 and 2022. In contrast, 2023 has been the driest year during the S34_01 monitored period and the third driest year-to-date in the 22 years of rainfall records from Cordeaux Colliery. There were no impacts recorded when the soil moisture probe was within the Longwall 19 active mining area.

Table 1: Excerpt 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 <i>NB. Not linked specifically to a PM and would not be considered a breach if predictions were exceeded.</i>	<u>Level 1:</u> Soil moisture level lower than baseline level at any monitoring sites (within 400 m of mining) within a swamp (in comparison to reference swamps). <u>Level 2:</u> Soil moisture level lower than baseline level at 50% of monitoring sites (within 400m of mining) within a swamp (in comparison to reference swamps). <u>Level 3:</u> 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

Corrective Management Actions (CMAs)

The following management actions have been initiated:

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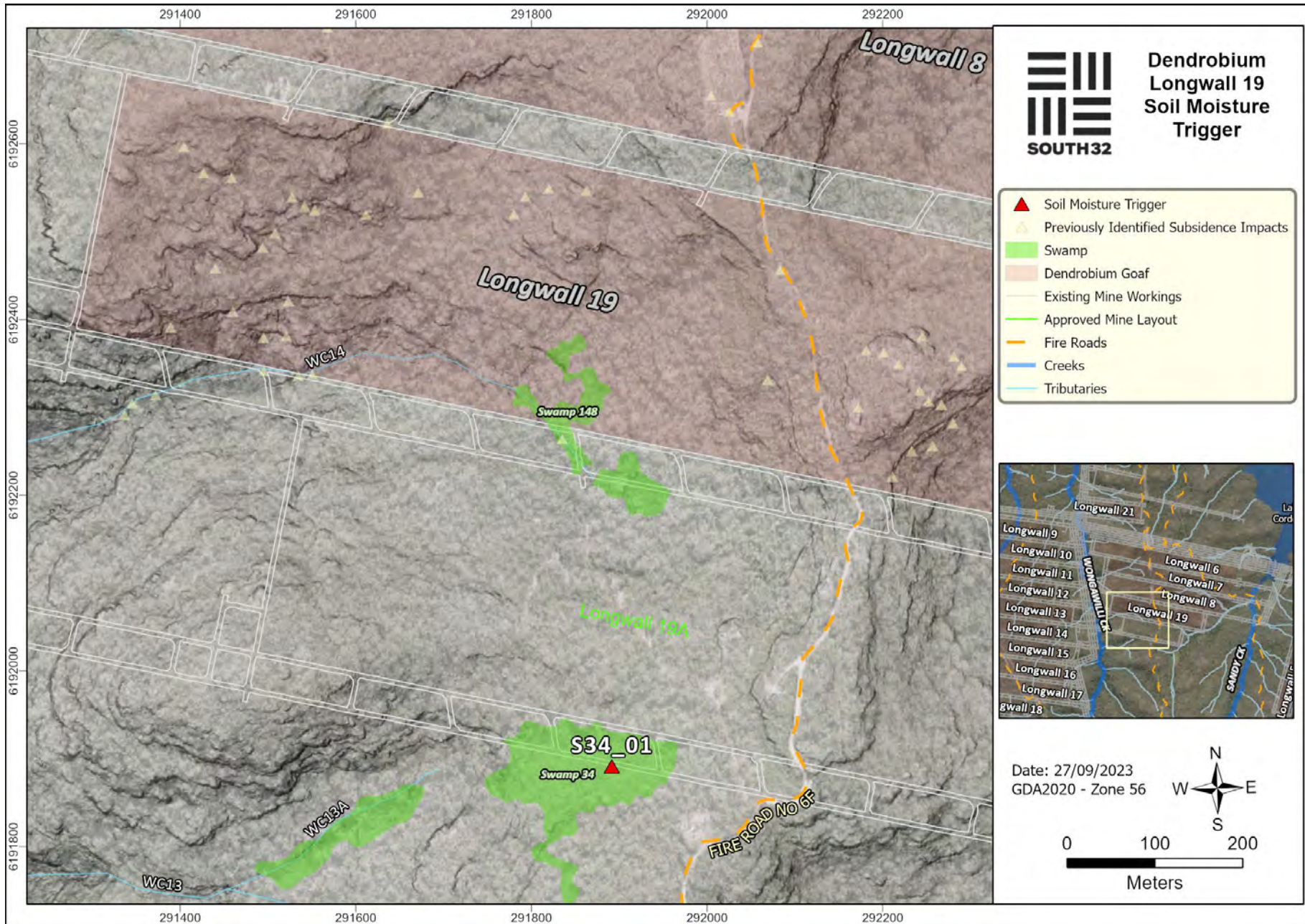


Figure 1: Map showing latest soil moisture trigger locations in relation to DA3A longwalls. Inset shows main frame in relation to DA3A mining operations.

Table 1: Impacts and triggers since start of Longwall 21. Highlighted rows indicate observations featured in this report.

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
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DA3C_LW21_021	Iron Staining	Rock Step	1/08/2023	1	Iron staining on the Swamp 144 basal step. Reported under the Watercourse TARP as iron occurs in the general drainage line and headwaters of WC20.	2/08/2023
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S150_01	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 150 (Longwall 18 mining area).	4/09/2023
09_01	Groundwater	Swamp	30/08/2023	3	Groundwater trigger at second site in Swamp 9 (Longwall 21 mining area).	4/09/2023
S09_01	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023
S09_02	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_023	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_024	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_025	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing and rockfall to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_026	Rockfall	Rock Outcrop	6/09/2023	1	Small rockfall and fracturing to step north of tributary WC20.	8/09/2023
DA3C_LW21_027	Rockfall	Rock Outcrop	6/09/2023	2	Rockfall to step north of tributary WC20 at Landscape Monitoring Site LW21_SS1.	8/09/2023
DA3C_LW21_028	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_029	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20 at Landscape Monitoring Site LW21_SS3.	8/09/2023
DA3C_LW21_030	Rock Fracturing	Rock Outcrop	12/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	14/09/2023
DA3C_LW21_031	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_032	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_033	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_034	Rock Movement and Soil Cracking	Rock Outcrop	12/09/2023	2	Rock movement and soil cracking to rock outcrop north of tributary WC20.	14/09/2023
Swamp 15b (update)	Soil Moisture	Swamp	19/09/2023	3	Soil moisture trigger recorded at one additional site (total now four) in Swamp 15b (Longwall 19 mining area).	21/09/2023
S34_01	Soil Moisture	Swamp	27/09/2023	3	Soil moisture trigger recorded in Swamp 34 (Longwall 19 mining area).	28/09/2023

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, weekly during mining and monthly during the post-mining period. Monitoring is conducted in accordance with the approved Longwall 21 Subsidence Management Plan (SMP). Extraction of Longwall 21 started on 25 April 2023 and was completed on 6 August 2023. During a recent inspection undertaken in addition to regular monitoring for Longwall 21, two new subsidence impacts were identified.

DA3C_LW21_035 (E 290842, N 6193559)

DA3C_LW21_035 is located upslope approximately 15m east of *WC_Pool 50* on *Wongawilli Creek* and is not associated with any mapped tributary (Figure 1). The impact consists of an iron spring and associated iron staining originating from a rock outcrop with seepage extending westward from an area associated with previous *DA3A* mining operations, specifically Longwall 6. The spring was active during the inspection with both the seepage and iron staining extending to *Wongawilli Creek* (Photo 1 & Photo 2). The iron spring and associated staining is approximately 95m north of a previously identified iron spring reported during the *LW17* monitoring period, specifically *DA3B_LW17_031* (Figure 1) and is outside the Longwall 21 mining area.

DA3C_LW21_035 is a Level 1 trigger as per the Dendrobium Watercourse TARP (Table 1), specifically:

- Observable increase in iron staining within the mining area.



Photo 1: *DA3C_LW21_035*, looking upslope, showing source of iron spring & staining.



Photo 2: *DA3C_LW21_035*, looking downslope, showing extent of staining with *Wongawilli Creek* in the background.

DA3C_LW21_036 (E 290837, N 6193550)

DA3C_LW21_036 is located upslope approximately 8m east of WC_Pool 50 on Wongawilli Creek and is not associated with any mapped tributary (Figure 1). The impact consists of an iron spring and associated iron staining originating from a rock outcrop with seepage extending westward from an area associated with previous DA3A mining operations, specifically Longwall 6. The spring was active during the inspection with both the seepage and iron staining extending to Wongawilli Creek (Photo 3 & Photo 4). This iron spring and associated staining is approximately 85m north of a previously identified iron spring reported during the LW17 monitoring period, specifically DA3B_LW17_031 (Figure 1) and is outside the Longwall 21 mining area.

DA3C_LW21_036 is a Level 1 trigger as per the Dendrobium Watercourse TARP (Table 1), specifically:

- Observable increase in iron staining within the mining area



Photo 3: DA3C_LW21_036, looking upslope, showing source of spring and iron staining.

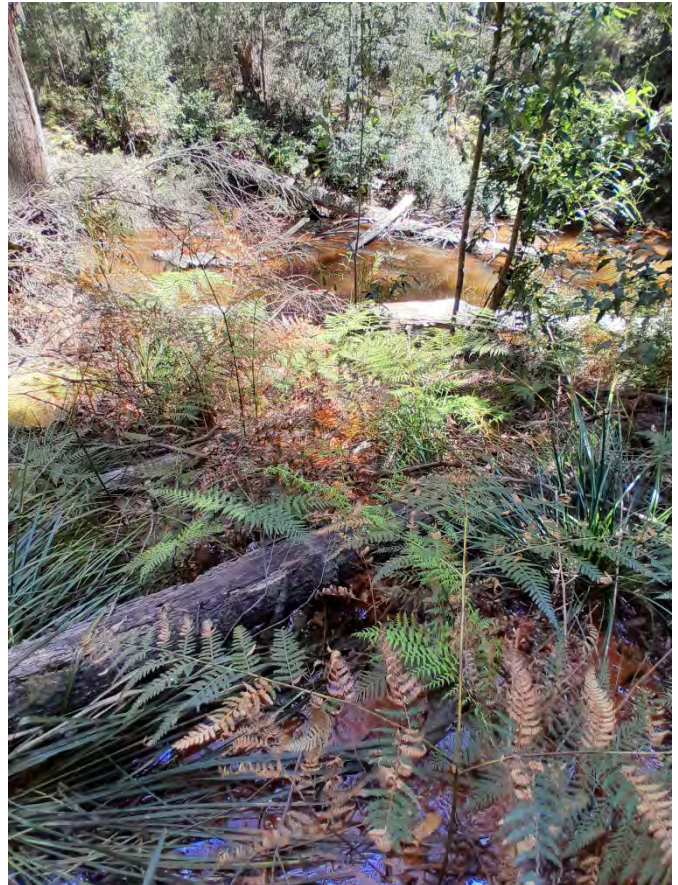


Photo 4: DA3C_LW21_036, looking downslope, showing extend of staining with Wongawilli Creek in the background.

Corrective Management Actions (CMAs)

The following management actions have been initiated:

- Continue monitoring program
- Submit an Impact Report to key stakeholders
- Report in the End of Panel Report
- Summarise actions and monitoring in AEMR

Table 1: Extract from Dendrobium Watercourse TARP.

<p>Donalds Castle Creek and Wongawilli Creek</p> <p>Relevant Performance Measure(s):</p> <ul style="list-style-type: none"> • Donalds Castle Creek - minor environmental consequences • Wongawilli Creek - minor environmental consequences <p>General observation of streams in active mining areas when longwall is within 400m</p>	<p>Level 1</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Continue monitoring program • Submit an Impact Report to BCD, DPIE, Resources Regulator, WaterNSW • Report in the End of Panel Report • Summarise actions and monitoring in AR
	<p>Level 2</p> <ul style="list-style-type: none"> • 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 • 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 	<ul style="list-style-type: none"> • <i>Actions as stated for Level 1</i> • Carry out Water Flow Assessment Method D • Review monitoring frequency • Submit letter report to BCD, DPIE, Resources Regulator and WaterNSW and seek advice on any CMA required • Implement agreed CMAs as approved (subject to agency feedback)
	<p>Level 3</p> <ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • <i>Actions as stated for Level 2</i> • Offer site visit with BCD, DPIE, Resources Regulator and WaterNSW • 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

	<ul style="list-style-type: none">• 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	<p>consultation with BCD, DPIE, Resources Regulator, WaterNSW</p> <ul style="list-style-type: none">• Completion of works following approvals and at a time agreed between S32, DPIE, WaterNSW (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
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Table 2: Impacts and triggers since start of Longwall 21. Highlighted rows indicate observations featured in this report.

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_001	Rock Fracturing	Outcrop	06/06/2023	1	Rock fracturing to a small rock outcrop west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_002	Rock Fracturing and Rock Movement	LW21_RO1	06/06/2023	2	Rock fracturing and rock movement to a small rock outcrop at Landscape Monitoring Site LW21_RO1.	9/06/2023
DA3C_LW21_003	Rock Fracturing and Rockfall	Outcrop and Step	06/06/2023	2	Rock fracturing and rockfall to an outcrop and a step west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_004	Rock Fracturing	Outcrop	06/06/2023	2	Rock fracturing on an outcrop west of <i>Fire Road 6F</i> .	9/06/2023
DA3C_LW21_005	Rock Fracturing	Outcrop	15/06/2023	1	Rock fracture on a rock outcrop northeast of WC20.	19/06/2023
DA3C_LW21_006	Rock Fracturing	Outcrop	15/06/2023	1	Rock fracturing on a rock outcrop northeast of WC20.	19/06/2023
DA3C_LW21_007	Rock Fracturing and Rockfall	Outcrop	15/06/2023	2	Rock fracturing and rock fall on an outcrop northeast of WC20.	19/06/2023
DA3C_LW21_008	Rock Fracturing and Soil Cracking	Rock Step	19/06/2023	1	Rock fracturing/soil cracking to a rock step and bushland northeast of WC20.	20/06/2023
DA3C_LW21_009	Rock Fracturing	Rock Step	19/06/2023	1	Rock fracturing to a rock step west of <i>Fire Road 6F</i> .	20/06/2023
DA3C_LW21_010	Rock Fracturing and Rock Movement/ Displacement	Outcrop	19/06/2023	2	Rock fracturing and associated rock movement/displacement at an outcrop west of <i>Fire Road 6F</i> .	20/06/2023
DA3C_LW21_011	Rock Fracturing, Rock Displacement and Soil Cracking	Outcrop and Bushland	19/06/2023	1	Soil cracking, rock fracturing and associated rock displacement to an outcrop and bushland west of <i>Fire Road 6F</i> .	20/06/2023
144_01	Groundwater	Swamp 144	22/06/2023	3	Groundwater recession rate greater than baseline	28/06/2023
S144_01	Soil Moisture	Swamp 144	27/06/2023	3	Average soil moisture level below the baseline level	28/06/2023
DA3C_LW21_012	Rock Fracturing	Rock Step	27/06/2023	1	Rock fracturing to rock step west of Fire Road 6F.	28/06/2023
DA3C_LW21_013	Rock Fracturing	Outcrop	03/07/2023	1	Rock fracturing to rock outcrop west of Fire Road 6F.	04/07/2023
DA3C_LW21_014	Rock Fracturing	Watercourse	11/07/2023	2	Rock fracturing to rock-bar on tributary WC20.	17/07/2023

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_015	Rock Fracturing	Watercourse	11/07/2023	2	Rock fracturing to channel on tributary WC20.	17/07/2023
DA3C_LW21_016	Rockfall	Rock Step	11/07/2023	1	Small rockfall to step north of tributary WC20.	17/07/2023
Swamp 15a	Groundwater	Swamp	12/07/2023	1	Groundwater trigger at one site in Swamp 15a. (Longwall 19 mining area)	17/07/2023
Swamp 15a	Soil Moisture	Swamp	12/07/2023	2	Soil moisture triggers at three sites within Swamp 15a. (Longwall 19 mining area)	17/07/2023
DA3C_LW21_016 (Update)	Rockfall	Rock Step	26/07/2023	2	Rockfall to step north of tributary WC20.	31/07/2023
DA3C_LW21_017	Rock Fracturing	Watercourse	26/07/2023	1	Rock fracturing and uplift to WC20_Rockbar 15.	31/07/2023
DA3C_LW21_018	Rock Fracturing	Rock Outcrop/Ledge	26/07/2023	1	Rock fracturing to rock outcrop/ledge.	31/07/2023
DA3C_LW21_019	Rock Fracturing	Rock Step	1/08/2023	1	Rock fracturing to rock step west of Fire Road 6F.	2/08/2023
DA3C_LW21_020	Iron Staining	Watercourse	1/08/2023	1	Iron staining in tributary WC24.	2/08/2023
DA3C_LW21_021	Iron Staining	Rock Step	1/08/2023	1	Iron staining on the Swamp 144 basal step. Reported under the Watercourse TARP as iron occurs in the general drainage line and headwaters of WC20.	2/08/2023
DA3C_LW21_022	Rockfall	Rock Step	7/08/2023	1	Rockfall to rock outcrop/step west of Fire Road 6F	9/08/2023
S145_01	Soil Moisture	Swamp	4/08/2023	3	Soil moisture trigger at one site in Swamp 145	9/08/2023
09_02	Groundwater	Swamp	4/08/2023	2	Groundwater trigger at one site in Swamp 9	9/08/2023
Swamp 15a (update)	Soil Moisture	Swamp	11/08/2023	3	Soil moisture trigger recorded two additional sites (total now five) in Swamp 15a.	18/08/2023
S12_04	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 12 (Longwall 19 mining area).	4/09/2023
S150_01	Soil Moisture	Swamp	29/08/2023	3	Soil moisture trigger recorded in Swamp 150 (Longwall 18 mining area).	4/09/2023
09_01	Groundwater	Swamp	30/08/2023	3	Groundwater trigger at second site in Swamp 9 (Longwall 21 mining area).	4/09/2023

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
S09_01	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023
S09_02	Soil Moisture	Swamp	30/08/2023	3	Soil moisture trigger recorded in Swamp 9 (Longwall 21 mining area).	4/09/2023
DA3C_LW21_023	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_024	Rock Fracturing	Rock Outcrop	31/08/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	4/09/2023
DA3C_LW21_025	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing and rockfall to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_026	Rockfall	Rock Outcrop	6/09/2023	1	Small rockfall and fracturing to step north of tributary WC20.	8/09/2023
DA3C_LW21_027	Rockfall	Rock Outcrop	6/09/2023	2	Rockfall to step north of tributary WC20 at Landscape Monitoring Site LW21_SS1.	8/09/2023
DA3C_LW21_028	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	8/09/2023
DA3C_LW21_029	Rock Fracturing	Rock Outcrop	6/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20 at Landscape Monitoring Site LW21_SS3.	8/09/2023
DA3C_LW21_030	Rock Fracturing	Rock Outcrop	12/09/2023	1	Rock fracturing to a rock outcrop north of tributary WC20.	14/09/2023
DA3C_LW21_031	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_032	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_033	Rock Fracturing	Rock Step	12/09/2023	1	Rock fracturing to a rock step north of tributary WC20.	14/09/2023
DA3C_LW21_034	Rock Movement and Soil Cracking	Rock Outcrop	12/09/2023	2	Rock movement and soil cracking to rock outcrop north of tributary WC20.	14/09/2023
Swamp 15b	Soil Moisture	Swamp	19/09/2023	3	Soil moisture trigger recorded at one additional site (total now four) in Swamp 15b (Longwall 19 mining area).	21/09/2023
S34_01	Soil Moisture	Swamp	27/09/2023	3	Soil moisture trigger recorded in Swamp 34 (Longwall 19 mining area).	28/09/2023
DA3C_LW21_035	Iron Staining	Bushland	9/10/2023	1	Iron staining present flowing on valley slope within proximity to Wongawilli Creek.	This Report

Site ID	Impact/Trigger Type	Feature Affected	Identification Date	Trigger Level	Description	Refer to Report/s Dated
DA3C_LW21_036	Iron Staining	Bushland	9/10/2023	1	Iron staining present flowing on valley slope within proximity to Wongawilli Creek.	This Report