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## **LONGWALL 22 END OF PANEL REPORT AQUATIC FLORA AND FAUNA REVIEW**

### **Introduction**

Dendrobium Coal Pty Ltd, a subsidiary of Illawarra Coal Holdings Pty Ltd (ICHPL), which is a wholly owned subsidiary of Gear M Illawarra Met Coal Pty Ltd (operating as GM3), is using longwall mining to extract coal from the Dendrobium Coal Mine. Current mining operations are located approximately 15 km to 20 km west of Wollongong. Consent for the mine, granted in November 2001, allows extraction from three longwall domains, known as Dendrobium Area 1, Dendrobium Area 2, and Dendrobium Area 3 (DA1, DA2 and DA3). DA3, situated between Lake Cordeaux and Lake Avon, is currently being mined. A modification to the mine layout of DA3, approved in December 2008, allowed the mine to be expanded, with DA3 divided into three smaller domains, DA3A, DA3B and DA3C. Longwall 22, the second longwall to be mined in Area 3C, commenced extraction 11 August 2024 and was completed 20 January 2026.

Stantec (formerly Cardno) was commissioned by ICHPL to undertake a review of the status of aquatic flora and fauna in relation to the extraction of Longwall 22 to support the End of Panel reporting. Stantec has been undertaking ongoing monitoring and assessment of watercourses within the Dendrobium Mine including the perennial Wongawilli Creek and several associated first and second order ephemeral / intermittent tributaries. The overall objective of the monitoring is to determine whether the extent and nature of observed impacts, primarily subsidence-induced fracturing of bedrock, flow diversion and loss of aquatic habitat, if any, are consistent with the predictions made in the relevant aquatic impact assessments and Subsidence Management Plan (SMPs). For Longwall 22, these are the Aquatic Flora and Fauna Assessment (AFFA) for Longwalls 22 and 23 (Cardno 2021), Longwall 22 and 23 SMP (South32 2021) and Area 3C Watercourse Impact, Monitoring and Contingency Plan (WIMMCP) (South32 2024). This review includes:

- An overview of the management of aquatic flora and fauna including monitoring proposed and undertaken.
- Review of observed impacts to aquatic habitat, flora and fauna from ICHPL impact reports and a comparison with those predicted in the SMP.
- Recommendations for any Corrective Management Actions (CMA) and future aquatic flora and fauna monitoring.

This review focuses on any landscape (e.g., physical changes such as fracturing and flow diversions, and changes in watercourse appearance such as signs of iron staining) and water quality impacts to watercourses overlaying and within 400 m (i.e., have potential to be impacted based on previous observations of mining impacts in the Dendrobium mining area) of Longwall 22 and any associated potential impacts to aquatic habitat and biota that may have occurred during extraction of Longwall 22. This review considers Wongawilli Creek, Wongawilli Creek tributaries WC24, WC24A, WC26, WC26A, and Lake Cordeaux tributaries LC5, LC5B, LC5B1, LC6 and LC7. These watercourses were those identified in Cardno (2021) as within 400 m of Longwall 22 and where impacts have potential to occur due to longwall extraction. The aquatic ecology impact assessment in this AFFA is based on the findings of ongoing field surveys in these watercourses by the ICHPL Environmental Field Team (EFT) and on Stantec's experience of undertaking monitoring and assessment of aquatic habitat and biota in the Dendrobium Mining Area.

The potential impacts to aquatic ecology attributed to extraction of Longwall 22 are also placed in context of the cumulative impacts to aquatic ecology experienced in the Dendrobium mining area. A full assessment of impacts due to extraction of all longwalls in DA3A, DA3B and DA3C will be provided in the latest monitoring

report (Stantec 2026a) following completion of aquatic ecology surveys in 2025. Any impacts to swamps and amphibians are considered by other specialist consultants.

### **Aquatic Ecology Management and Monitoring**

The monitoring requirements recommended in the AFFA and SMP for Longwall 22 incorporates a Before, After, Control, Impact (BACI) sampling design. The program monitors mine subsidence impacts on the aquatic environment with collection of at least two years of baseline data followed by monitoring during extraction, and at least two years of post-extraction monitoring. The following indicators were monitored at impact and control sites relevant to Longwall 22 as a measure of aquatic health:

- Aquatic habitat condition - using a modified version of the Riparian, Channel and Environmental Inventory method (RCE) (Chessman *et al.* 1997).
- Macroinvertebrates, including threatened species of dragonfly (Adams emerald dragonfly and Sydney hawk dragonfly) - using AUSRIVAS and standardised artificial collectors.
- Limited *in-situ* water quality – using a portable probe.
- Fish abundance using backpack electrofishing and bait traps.

The AFFA also included a literature review on the landscape setting, aquatic habitat, water quality, aquatic macroinvertebrates, fish, threatened species, populations and ecological communities in DA3C. **Table 1-1** summarises the monitoring that has been completed in DA3 including monitoring in Area 3C from 2021 in line with the AFFA and SMP for Longwall 22. Assessment of potential impacts associated with Longwall 22 incorporates data collected from these sites from the two survey years (2021 and 2023) (Cardno 2022 and Stantec 2024a) undertaken immediately prior to the commencement of extraction of Longwall 22 (Baseline). Monitoring undertaken in 2025 (Stantec 2026a) provided the first year of data following the commencement of extraction of Longwall 22.

Table 1-1 Monitoring undertaken for DA3C Longwall 22 in line with the Longwall 22 and 23 SMP Requirements and Recommendation in Cardno (2021).

Report	Survey Date	Sampling Component
<b>Baseline Monitoring</b>		
Dendrobium Area 3A, 3B and 3C Aquatic Ecology Monitoring 2010 to 2021. Cardno (2022)	Apr / May / Sep / Oct 2021	Habitat assessment, fish, macroinvertebrates, water quality
Dendrobium Area 3A, 3B and 3C Aquatic Ecology Monitoring 2010 to 2023. Stantec (2024a)	Apr / May / Sep / Oct 2023	Habitat assessment, fish, macroinvertebrates, water quality
<b>During Extraction Monitoring</b>		
Dendrobium Area 3A, 3B and 3C Aquatic Ecology Monitoring 2010 to 2025. Stantec (2026a)	Mar / May / Sep / Nov 2025	Habitat assessment, fish, macroinvertebrates, water quality

ICHPL undertake weekly monitoring of landscape and other natural features in DA3 when within 400 m of the active longwall, and monthly thereafter. This includes watercourse monitoring during extraction of active longwalls to identify any fracturing, pool water level reduction, changes in flow and water quality.

The SMP includes the following triggers as part of the Trigger Action Response Plans (TARPs) relating to aquatic ecology:

- Level 1 – Reduction in aquatic habitat for 1 year.
- Level 2 – Reduction in aquatic habitat for 2 years following the active subsidence period (i.e., when a longwall is within 400 m of a feature, such as a creek).
- Level 3 – Reduction in aquatic habitat for >2 years or complete loss of habitat following the active subsidence period.

Trigger-specific management actions aim to minimise any further impacts to the aquatic environment, and include requirements for further monitoring, reporting, application of corrective management actions (CMAs), such as grouting and repair of fractures, and notification to relevant stakeholders, as required.

## **Predicted and Observed Impacts**

### ***Landscape and Water Quality Mining Impacts***

Details of the mining related impacts identified in watercourses by the EFT (GM3 2026) during extraction of Longwall 22 are provided in **Table 1-2** and **Figure 1-1**. No impacts were observed in Wongawilli Creek. Several impacts occurred at rockbars (RB), channels (CH), pools (PL) and other features in some first- and second-order tributaries:

- LC5: rock fractures on LC5-RB11 and one rock fracture in LC5-CH07.
- LC6: rock fractures on LC6-RB15, LC6-PL31, LC6-PL28, LC6-CH08 and LC6-CH11. Iron staining was also observed in LC6-PL22 and in a spring in nearby bushland. A reduction in water level and / or flow was observed in sections of LC6.
- WC15: rockfall from step upstream of WC15-PL02 (an update to a previous rock fracture due to Longwall 13).
- WC20: rock fracture at WC20-RB17. This occurred above, and was likely due to extraction of, Longwall 21 (GM3 2026).
- WC24A: several rock fractures above Longwall 22.

In tributary LC6, impacts were first observed on 15 November 2024, with iron staining observed in Pool 22. Subsequently on 2 December 2024, Pool 22 was observed to be dry. An extension of the length of LC6 with reduced surface water levels was observed on 6 January 2025, with 60% of mapped pools along LC6 dry or with minimal water. This reduction in surface water levels in LC6, including at Pool 22 was also evident in December 2025. Fracturing expected to result in flow diversions was also observed at several features in LC6 (Pool 28, Channel 8, Rockbar 15, Channel 11, Pool 31 and Pool 22) from December 2024 to December 2025. On 30 June 2025, iron staining in LC6 was also found to extend for 530 m from Pool 22 downstream to LC6-RB01, and iron staining was also observed in a spring in bushland adjacent to LC6.

Rock fractures were also observed in LC5 at Rockbar 11 and Channel 7 in May / June 2025, with flow diversion observed at Rockbar 11 associated with this fracturing. In Wongawilli Creek tributary, WC15, fracturing with the potential to result in flow diversions was observed at Step 2, upstream of Pool 2, in January 2026. Fracturing was also observed in WC24A, though this occurred in the extreme headwaters of this tributary which is ephemeral and was dry during baseline mapping of the site. The rock fracture observed on WC20-RB17 in January 2025 was attributed to the extraction of Longwall 21, as this occurred above Longwall 21 and the fracture appeared weathered.

There was no evidence that extraction of Longwall 22 affected flow in Wongawilli Creek (HGEO 2026a). Reductions in flow were identified in WC20, WC24 and WC26, LC5, LC6 and LC7, though the reduction in LC5 was less than expected (HGEO 2026a). Reductions in flow in these tributaries are most likely due to fracturing of bedrock and flow diversions. Mining of Longwall 22 contributed to depressurisation of groundwater in DA3 line with numerical model predictions (HGEO 2026b). The mean total mine inflow during Longwall 22 extraction was 7.51 ML/day, which represents a slight (3%) increase compared with inflows during extraction of the most recent previous Longwall 19A.

Localised mining-related declines in DO were recorded at some monitoring sites on watercourses within or 400 m or directly above Longwall 22 (WC24A, WC26, LC5 and LC6). Mining related increases in concentrations of sulphate, iron, manganese and zinc also occurred in LC6 (HGEO 2026a). Changes in water quality in tributaries were consistent with watercourses where mining-related fracturing has occurred. Elevated concentrations of sulphate, iron and manganese previously identified in Wongawilli Creek during extraction of earlier longwalls also persisted during extraction of Longwall 22. However, no changes in water quality were associated with any water quality TARP triggers. A comparison of dissolved metal concentrations against the ANZG (2018) Default Guideline Values (DGVs) for 95% species protection indicates that when DGVs were exceeded during Longwall 22 extraction, baseline concentrations often also exceeded DGVs (HGEO 2026), suggesting no significant consequences for aquatic ecology due to potential toxicity.

### ***Impacts on Aquatic Habitat and Biota***

The assessment of impacts to aquatic habitat and biota due to the landscape and water quality impacts observed by ICHPL and described above are summarised in **Table 1-3**. The findings are compared with the impacts to aquatic habitat and biota predicted to occur in the AFFA for Longwalls 22 and 23 (Cardno 2021). These predictions were based on the maximum predicted subsidence parameters for the sections of Wongawilli Creek and tributaries that flow through the Longwall 22 and 23 SMP Area, their predicted impacts

on the landscape and water chemistry characteristics of the waterways (MSEC 2021), and the assessment of potential impacts on surface water and groundwater (HGEO 2021a, 2021b).

No mining induced landscape impacts or impacts to water availability or quality attributed to extraction of Longwall 22 were observed in Wongawilli Creek. Previous changes in water quality in Wongawilli Creek that persisted during extraction of Longwall 22 included changes in concentration of metals associated with ongoing iron staining. While iron staining appears associated with impacts to a component of the aquatic macroinvertebrate community (Stantec 2024a-b, 2026a), impacts are not considered to be significant and, regardless, appear unrelated to extraction of Longwall 22. Mining induced fracturing, flow diversions and / or reduced water levels in LC5, LC6 and LC7 have resulted in a reduction in the availability of aquatic habitat and likely a reduction in the population size of aquatic biota in these tributaries. Iron staining in LC6 may have also modified aquatic habitat due to the infilling of habitat interstices with iron precipitate, which could have resulted in changes in the abundance of aquatic macroinvertebrates and potentially other aquatic fauna, if present.

Table 1-2 Mining related impacts observed in watercourses by ICHPL during extraction of DA3C Longwall 22.

Site ID	Impact Type	Feature Affected	Identification Date	Trigger Level	Description
DA3C_LW22_073	Rock Fracturing	LC5_Channel 7	30/06/2025	1	Rock fracturing across LC5_Channel 7. No flow diversion observed.
DA3C_LW22_065	Rock Fracturing	LC5_Rockbar11	10/06/2025	2	Rock fracturing to rockbar on LC5
DA3C_LW22_060 (Update)	Rock Fracturing	LC5_Rockbar11	12/05/2025	2	Rock fracturing on rockbar on LC5. Flow diversion expected.
DA3C_LW22_060	Rock Fracturing	LC5_Rockbar11	7/05/2025	1	Rock fracturing on rockbar on LC5
DA3C_LW22_015 (Update)	Pool Level	LC6_Pool 22	15/12/2025	2	Extension to length of LC6 observed to be dry or with reduction in surface water. Update included rock fracture also observed in Pool 22.
DA3C_LW22_076	Iron Staining	LC6 bushland	30/06/2025	1	Iron staining originating from spring in bushland flowing to LC6
DA3C_LW22_008 (Update)	Iron Staining	LC6_Pool 22	30/06/2025	2	Increase in iron staining in LC6. Iron staining present for 530 metres from Pool 22 to LC6-RB01.
DA3C_LW22_036	Rock Fracturing	LC6_Pool 31	27/02/2025	2	Rock fracture to pool on LC6. Likely resulted in flow diversion.
DA3C_LW22_037	Rock Fracturing and Rock Displacement	LC6_Channel 11	27/02/2025	2	Rock fracturing to channel on LC6. Flow diversion could be expected.
DA3C_LW22_025	Rock Fracture	LC6_Rockbar 15	29/01/2025	2	Rock fracturing to rockbar on LC6. No flow diversion observed, but it could occur.
DA3C_LW22_015 (Update)	Pool Level	LC6_Pool 22	8/01/2025	N/A	Extension to length of LC6 observed to be dry or with reduction in surface water
DA3C_LW22_017	Rock Fracturing	LC6_Channel 8	16/12/2024	2	Rock fracturing on tributary LC6. Surface water also absent
DA3C_LW22_016	Rock Fracturing	LC6_Pool 28	16/12/2024	2	Rock fracturing on tributary LC6. Surface water also absent. Likely resulted in flow diversion.
DA3C_LW22_015	Pool Level	LC6_Pool 22	5/12/2024	N/A	Localised pool became dry
DA3C_LW22_008	Iron Staining	LC6_Pool 22	13/11/2024	1	Localised iron staining in LC6_Pool 22
DA3B_LW13_046 (Update)	Rockfall	WC15_Pool 2 and Step 2	14/01/2026	2	Fracture and rockfall from step on tributary WC15. No flow diversion observed, but could be present.
DA3C_LW22_035 (LW21)	Rock Fracturing and Rock Displacement	WC20_Rockbar 17	25/02/2025	1	Rock fracturing on rockbar on WC20. Likely a Longwall 21 impact.
DA3C_LW22_102	Rock Fracturing	WC24A	7/10/2025	1	Multiple rock fractures along WC24a. Flow diversion not expected.

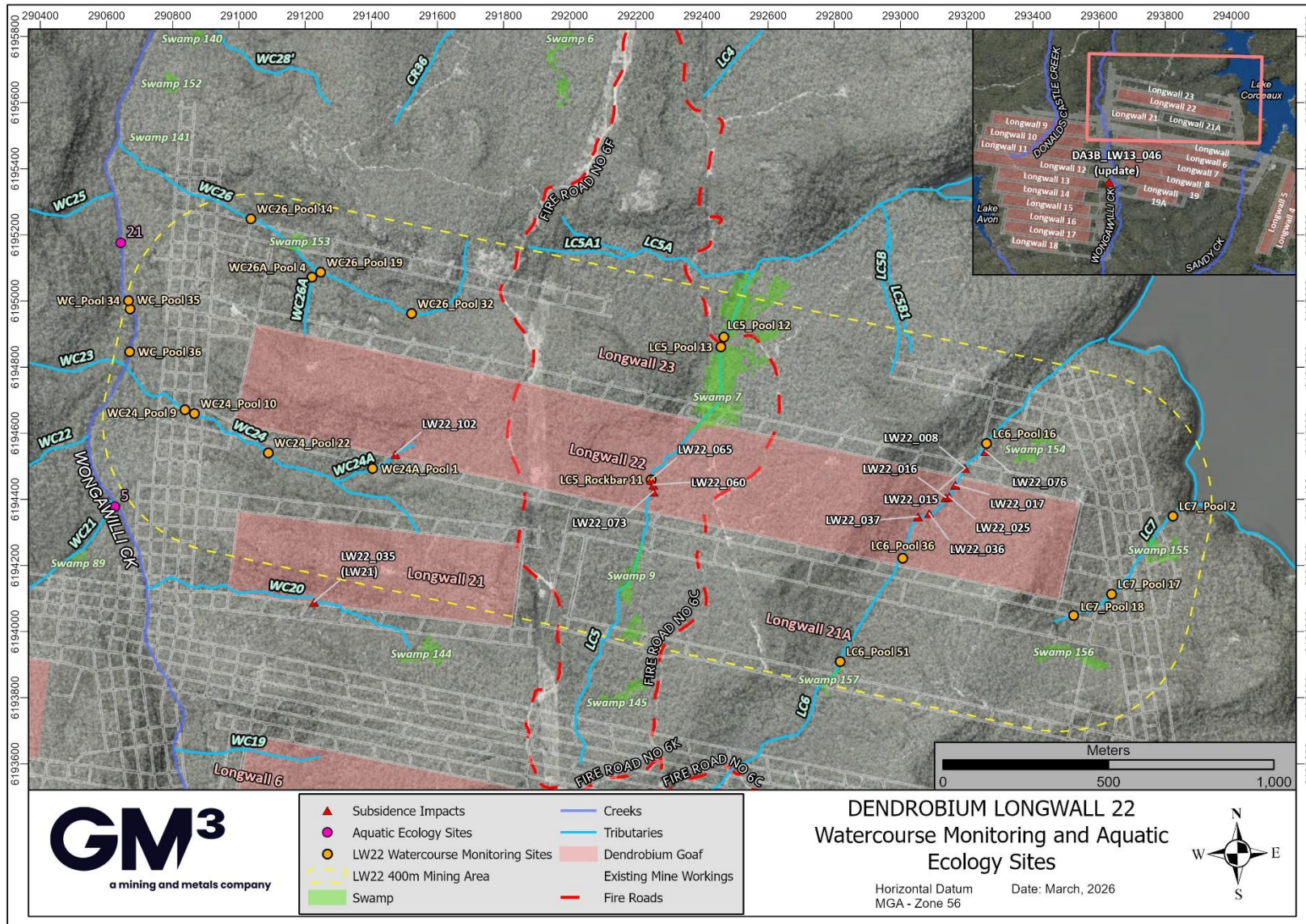


Figure 1-1. Watercourse related subsidence impacts observed during extraction of DA3C Longwall 22.

Table 1-3 Predicted and observed impacts to aquatic ecology associated with Longwall 22.

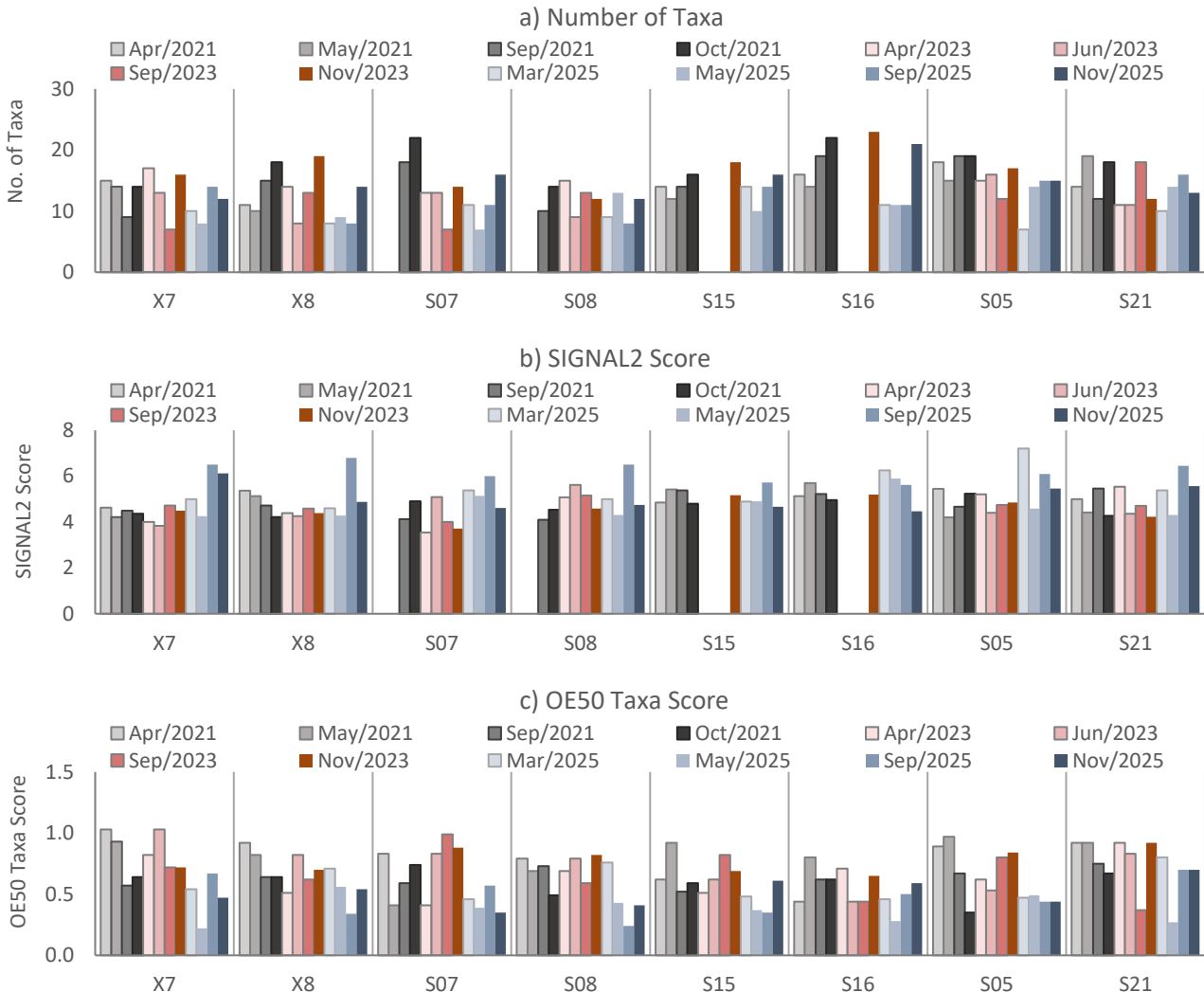
Attribute	Predicted Landscape Impacts	Predicted Impacts on Aquatic Ecology	Observed Impacts to Aquatic Ecology
Wongawilli Creek			
Ponding, flooding and scouring of stream banks due to tilt	Adverse changes in the potential for ponding, flooding or scouring of the banks along the creek due to the mining-induced tilt are unlikely.	Measurable effects on the availability and connectivity of most aquatic habitats are unlikely. There is potential for minor, localised changes in the availability of aquatic habitat in some pools. Associated impacts to aquatic biota, if they occur, are therefore expected to be minor and localised.	None identified during the extraction of Longwall 22.
Fracturing of bedrock and diversion of surface flows	<p>The overall likelihood of significant fracturing resulting in surface water flow diversions at the rockbars along Wongawilli Creek is 6 %.</p> <p>Minor fracturing could occur along the creek at distances up to approximately 400 m from the proposed longwalls.</p>	<p>A total of 21 rockbars are located in Wongawilli Creek within 600 m of Longwalls 22 and 23. Based on the predicted fracture rate, it would be expected that on average one of these would experience fracturing associated with flow diversions. Associated pools are 15 m to 200 m long. If it were to occur, the potential drainage of smaller pools would represent a relatively minor impact in the context of the length of pool habitat within Wongawilli Creek. The loss of the largest pool (200 m in length) does, however, represent a relatively large impact to aquatic habitat. However, based on the low rate of fracture that would result in flow diversions and the size range of associate pools, the probability of fracturing resulting in large reduction in pool habitat is expected to be low.</p> <p>Minor and isolated fracturing, if it occurs, would not cause any significant diversion of surface flows although it could cause localised reductions in the availability of aquatic habitat.</p>	No reductions in pool water levels and flow or changes in water quality observed during extraction of Longwall 22, and thus no suggestion of impacts occurring to aquatic habitat and biota.
Water Quality and Availability	<p>Groundwater modelling (HGEO, 2021b) indicates the incremental reduction in flow in Wongawilli Creek adjacent to Area 3C due to extraction of Longwall 22 would be 0.02 ML/day to 0.06 ML/day and for Longwall 23 it would be 0.007 ML/day to 0.026 ML/day. As a result, it is expected that Longwall 22 would cause a negligible (1%) increase in the duration and length over which cease-to-flow conditions can occur in Wongawilli Creek during drought periods (HGEO 2021a). The effect of Longwall 23 is predicted to be up to a 2% increase (from approximately 6% of the time to 8%). Flow effects would likely not be discernible from natural variability or from other historical, approved and proposed longwalls (HGEO 2021a). Therefore, associated impacts to aquatic habitat and biota due to groundwater depressurisation and reductions in surface water availability associated with Longwalls 22 and 23, in isolation, are likely also to be negligible and not detectable.</p> <p>Based on previous observations, it is expected that water quality influence due to the extraction of Longwalls 22 and 23 would be minor or undetectable in stream reaches within most subsidence affected areas and water quality impacts have not been detected in watercourses that are not directly mined under (HGEO 2021a).</p>	<p>An overall reduction in base flow and increase in the number of zero flow days would impact aquatic habitat and biota in Wongawilli Creek. Although the reduction in baseflow would be small, the predicted increase in zero flow days would reduce longitudinal connectivity in the watercourse and possibly also the amount of aquatic habitat available to biota if pool levels also decrease during these periods. If pools do not drain completely then these would provide refuge for aquatic biota until flow returns. It is expected that such impacts to aquatic habitat and biota would be restricted to sections of Wongawilli Creek adjacent to mining, as there would be negligible impact to the overall yield of the Cordeaux River catchment.</p> <p>Impacts to aquatic habitat and biota due to changes in water quality appear unlikely as only minor changes in water quality are expected.</p>	<p>No changes in water quality or availability observed associated with extraction of Longwall 22.</p> <p>No evidence of impacts to aquatic macroinvertebrates during observations in March, May, September and November of 2025 due to extraction of Longwall 22 (Stantec 2026a).</p> <p>Previous changes in water quality and macroinvertebrates associated with previously identified iron staining in Wongawilli Creek continued during extraction of Longwall 22 (Stantec 2026a)</p>
Tributaries			

Attribute	Predicted Landscape Impacts	Predicted Impacts on Aquatic Ecology	Observed Impacts to Aquatic Ecology
Ponding, flooding and scouring of stream banks due to tilt	It is unlikely that there would be large-scale adverse changes in the levels of ponding or scouring of the banks along these tributaries due to subsidence induced tilt. It is possible that localised increased ponding could develop in some isolated locations, where the natural grades are small and where the tributaries exit the mining area	Localised changes in habitat availability and connectivity may occur along the tributaries due to tilt but these effects will be difficult to detect due the large variability in grade and natural flows within these ephemeral systems. The impacts resulting from the changes in surface water flows are expected to be small in comparison with those which occur during natural flooding conditions. Consequently, impacts to aquatic habitat and biota due to tilt, if any, are expected to be minor and localised.	No impacts observed due to tilt.
Fracturing of bedrock and diversion of surface flows	<p>It is expected that fracturing of the bedrock and flow diversions would occur along the sections of the tributaries that are located directly above Longwalls 22 and 23, with a total of approximately 1,700 m of first / second order tributaries directly above the longwalls. Fracturing can also occur outside the extents of the proposed longwalls, with minor and isolated fracturing previously observed at distances up to approximately 400 m. An additional ~ 5,200 m of first- / second-order tributary habitat is located within 400 m of the longwalls.</p> <p>In times of heavy rainfall, most of the runoff would flow over the fractured bedrock and soil beds and would not be diverted into the dilated strata below. In times of low flow, however, surface water flows can be diverted into the dilated strata below the beds.</p>	Fracturing induced flow diversions in tributaries directly above longwalls would result in a reduction in the amount of aquatic habitat. While the loss of associated aquatic biota represents a severe impact to aquatic biota at the scale of individual pools, at the scale of the upper Avon and Cordeaux River catchments, impacts to the population size of affected aquatic biota within tributaries associated with the extraction of Longwalls 22 and 23 would be minor.	Fracturing, flow diversions and / or reductions in flow have occurred in WC20, WC24 and WC26, LC5, LC6 and LC7. This has resulted in a reduction in the availability of aquatic habitat and likely also a loss of aquatic biota. While these impacts would be severe at the scale of individual tributaries, they are minor at the scale of the wider Avon River and Cordeaux River catchments.
Water quality	It is expected that water quality impacts, including transient increases in EC, pH, some dissolved metals, and localised iron staining, may be observed in tributaries that cross the longwall footprints (WC24, WC26, LC5 and LC6), and possibly in LC7 (HGEO 2021a).	Minor impacts to water quality are unlikely to represent substantial risks to aquatic habitat and biota in tributaries.	Minor changes in water quality in tributaries associated with extraction of Longwall 22 would be related with no more than minor impacts to aquatic biota.

While impacts to aquatic habitat and biota in these tributaries would be substantial at the scale of individual pools and tributaries, at the scale of the wider Cordeaux River catchment, such impacts are minor. First- and second-order LC5 and LC6 are very unlikely to support threatened species listed under the *Fisheries Management Act 1994*, do not provide Key Fish Habitat, and during surveys for the Longwalls 22 and 23 AFFA were not found to support species of fish, likely at least partly a result of the presence of barriers to fish passage at their confluence with Lake Cordeaux (Cardno 2021). While LC5 and LC6 were found to provide undisturbed aquatic habitat including apparently permanent pools and support several species of aquatic macroinvertebrates including freshwater crayfish (*Euastacus* sp.), this habitat is abundant in the Dendrobium Mine and Cordeaux River catchment. Changes in water quality associated with Longwall 22 appear relatively minor, and would be associated with no more than minor impacts to aquatic biota.

AUSRIVAS data from Longwall 22 impact (Site 21) and control (Sites X7, X8, 7, 8, 15 and 16) sites is provided in **Figure 1-2a**. Data from nearby Longwall 21 impact Site 5 is also included for comparative purposes, though this site is located over 400 m upstream of Longwall 22. Preliminary examination of AUSRIVAS data does not indicate impacts to aquatic habitat and biota have occurred. Trends in number of taxa (**Figure 1-2a**), SIGNAL2 Score (a biotic index of water pollution) (**Figure 1-2b**) and OE50 Taxa Score (a biotic index of habitat and water quality) (**Figure 1-2c**) appear largely consistent among sites throughout this period. Although the number of taxa caught at Site 5 in March 2025 and the SIGNAL2 Score at Site 21 in May 2025 appeared below that during previous surveys, similar apparent reductions were also observed at several control sites. Thus, such changes at Sites 5 and 21 appear related to natural variation rather than associated with mining. Overall, there was no evidence to suggest changes in these biotic indicators during 2025 were related to any potential mining effect in Wongawilli Creek, and there was no evidence that extraction of Longwall 22 contributed to impacts to aquatic macroinvertebrates in Wongawilli Creek (Stantec

2026a). Rather, the limited impact to aquatic macroinvertebrates associated with iron staining in Wongawilli Creek is most likely a result of extraction of previous DA3B longwalls.



**Figure 1-2 a) number of taxa, b) SIGNAL2 Score and c) OE50 Taxa Score from AUSRIVAS sampling at Longwall22 impact sites (Sites 5 and 21) and control sites (Sites X7, X8, 7, 8, 15 and 16).**

**Threatened Macquarie Perch**

It is very unlikely that the threatened Macquarie perch previously identified downstream in Wongawilli Creek has been put at risk by extraction of Longwall 22. Macquarie perch has been assessed as present in Wongawilli Creek downstream of WC-RB07, approximately 1.5 km downstream of Longwall 22 (Stantec 2026b). This species was not identified further upstream in Wongawilli Creek or in several tributaries as part of recent eDNA surveys and extensive sampling here as part of the ongoing Dendrobium monitoring program. Macquarie perch would be very unlikely to occur in tributaries overlaying Longwall 22 due to the absence of suitable habitat and several barriers to fish passage, including barriers in the lower sections of LC5 and LC6 that would prevent any Macquarie perch present in Lake Cordeaux from accessing these tributaries.

**Cumulative Impacts**

Fracturing, flow diversions and associated reductions in aquatic habitat and likely population sizes of aquatic biota in Dendrobium Area 3 was predicted to occur and were observed in tributaries above and within 400 m of DA3 longwalls. The recent Aquatic Ecology Cumulative Impact Assessment (AECIA) (Stantec 2025) for Dendrobium Area 3 found that although impacts to aquatic ecology observed in tributaries in DA3 would be significant at the local scale (individual pools and watercourses), at catchment scales the cumulative impact is minor. Assessment of mining footprints and watercourse locations undertaken by ICHPL in December 2025 indicated the total length of watercourses affected by mining in DA3B and DA3 represents a very small (1.8% to 3.4%) component of the total length of comparable watercourse habitat in the wider Avon and

Cordeaux catchments (Stantec 2025). The impacts observed in tributaries during extraction of Longwall 22 were also predicted to occur, and do not change the conclusion made in the AECIA.

It is difficult to quantify the additional impact to aquatic habitat and biota in the Wongawilli Creek catchment and the wider Dendrobium mining area due to extraction of individual longwalls. Landscape mining impacts that have occurred can be associated with individual longwalls or a cumulative effect of several longwalls. In such cases, it is difficult to determine if aquatic ecology impacts are due to a delayed response following extraction of earlier longwalls, a cumulative effect of extracting multiple longwalls, or a combination of mining impacts with prevailing environmental conditions e.g., prolonged reduced rainfall periods. Nevertheless, the extraction of Longwall 22 has contributed to overall groundwater depressurisation in DA3 (HGEO 2026b).

### **Aquatic Ecology TARP**

**Table 1-4** compares observed impacts to aquatic ecology with the aquatic ecology TARP levels to determine if any have been triggered and what management actions associated with extraction of Longwall 22 and previous longwalls may be appropriate, if any. These TARPS are applicable to watercourses where aquatic ecology monitoring sites are located within 400 m of Longwall 22 (Wongawilli Creek Site 21). No aquatic ecology triggers occurred at these sites during extraction of Longwall 22.

Table 1-4 TARP triggers and current status in Wongawilli Creek relevant to Longwall 22

TARP	Wongawilli Creek
Level 1 – Reduction in aquatic habitat for 1 year	Not triggered
Level 2 – Reduction in aquatic habitat for 2 years following the active subsidence period (i.e., when a longwall within 400 m of a feature, such as a creek, is completed)	Not triggered
Level 3 – Reduction in aquatic habitat for >2 years or complete loss of habitat following the active subsidence period	Not triggered

### **Conclusion and Recommendations**

Overall, the apparent absence of impacts to aquatic habitat and biota in Wongawilli Creek, and the observed and expected impacts to aquatic habitat and biota that occurred in first- and second-order tributaries during and following extraction of Longwall 22, are consistent with the predictions made in the AFFA for Longwalls 22 and 23 (Cardno 2021). The observed reductions in availability and quality of aquatic habitat due to fracturing, flow diversions and iron staining, and likely associated loss of some aquatic biota, in tributaries due to extraction of Longwall 22 represent relatively minor impacts to aquatic ecology at the scale of the Cordeaux River catchment. No aquatic ecology TARPs have been triggered with respect to Wongawilli Creek.

At this stage, no specific actions associated with Longwall 22 are recommended. Further analysis of the aquatic ecology monitoring dataset and assessment of potential impacts associated with extraction of Longwall 22 and of all longwalls in DA3A, DA3B and DA3C, including assessment of any effect of iron staining in Wongawilli Creek, will be undertaken as part of the 2025 Dendrobium Area 3 aquatic ecology monitoring report.

It is recommended that further during- and post-mining aquatic ecology monitoring is completed in DA3C in Wongawilli Creek and tributaries in line with the AFFA and SMP for Longwalls 22 and 23. ICHPL should continue to monitor watercourses (as required by the SMP) that have been affected by Area 3 longwalls. The findings of these will be used to assess whether TARPs will subsequently be triggered.

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