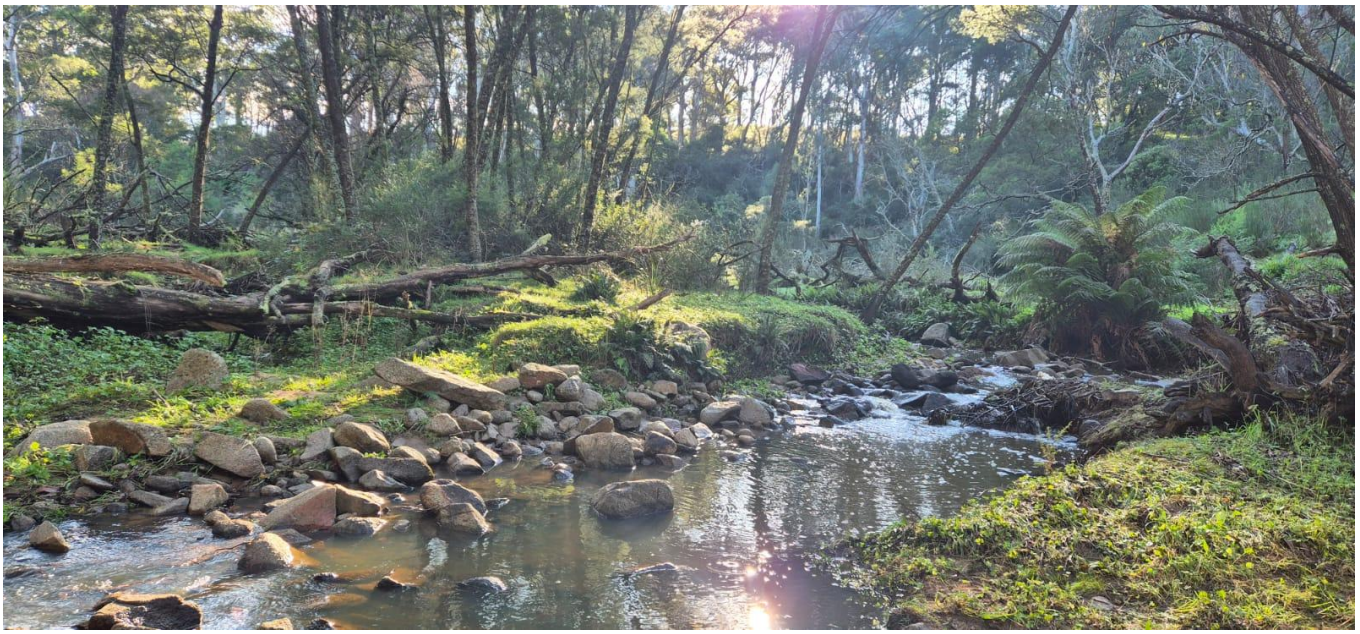
Dargues Gold Mine Aquatic Ecology Monitoring
Autumn 2025



Final report to the Aurelia Metals Ltd
Centre for Applied Water Science
University of Canberra

aurelia METALS Ltd.

UNIVERSITY OF CANBERRA

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Executive Summary

This report summarises the autumn 2025 aquatic ecology surveys at Dargues Gold Mine (DGM) as required by their Biodiversity Management Plan (BMP). Habitat, water quality, and macroinvertebrate and fish communities were sampled at eight sites surrounding DGM in May 2025. Four groundwater monitoring bores were also sampled for stygofauna. There were several rainfall events leading to large peaks in flow in the three months leading up to sampling in May 2025, including days before sampling was undertaken.

Riparian condition at each of the sites was classed as either 'Excellent', 'Very good' or 'Good'. Generally, site condition improved in a downstream direction. Sites upstream of DGM had the poorest riparian condition, being located in agricultural land, with little to no riparian zone. The condition rating for all sites remained the same as the previous assessment, except for AE6, which went from 'Good' to 'Very Good' and this was due to a decrease in algae present at the site. For the fifth assessment in a row, backpack electrofishing was unable to be conducted, and no macroinvertebrate sample was able to be taken at site AE6 because of low flow and overgrowth of terrestrial plants.

Water quality varied between sites and was generally acceptable for all variables except electrical conductivity, which was high at one site, AE5.

Fish relative abundance doubled between previous and current surveys, though species diversity decreasing from six to four species. Mountain galaxias (*Galaxias olidus*) were the most abundant and widespread species in autumn 2025 (comprising 83 % of fish captured) and found at five of seven sites sampled. The observation of young-of-year Mountain galaxias observed in the tens to thousands in the last survey most likely contributed to this increase. Overall, there were 167 more fish captured in this survey compared to spring 2024.

Macroinvertebrate communities had a relatively high taxa richness across the suite of sites, with 54 taxa collected in autumn 2025, two more than spring 2024. Taxonomic richness ranged from 19 to 27 taxa per site, and SIGNAL Scores were between 4.10 and 6.16, indicating mild to moderate disturbance. There was no difference between macroinvertebrate communities from upstream and downstream of the DGM, based on samples taken from edge habitats. All sites where edge samples were collected were assessed as being in condition quadrant 2 (high salinity or nutrient levels) as they were for the spring 2024 assessment. Biological condition of riffle macroinvertebrate communities (riffle sites only present at sites D/S DGM) were not impaired, indicating minimal if any downstream effects of the operation of DGM on riffle macroinvertebrate communities. Overall, macroinvertebrate community health improved slightly in autumn 2025 compared to spring 2024.

Stygofauna have been detected again in autumn 2025, there were more individuals, and one more species captured when compared to spring 2024. This is still a positive result as they are an important indicator of ecosystem health.

Overall, the operation of DGM does not appear to be having a significant impact on the aquatic ecology of Majors Creek and Spring Creek. The mild to moderate ecological impairment at sites is likely due to longer-term land use impacts (e.g. land-clearing and historical mining). At this stage, no management intervention relating to DGM operations is required.

Introduction

Dargues Gold Mine (DGM) is located 7 km north of Majors Creek and 16 km south of Braidwood, New South Wales, and is operated by Aurelia Metals Ltd. DGM was granted project approval in February 2012, and a Biodiversity Management Plan (BMP) was prepared in May 2012 (R. W. Corkery & Co. Pty. Limited., 2012). The monitoring of vegetation (flora), fauna, aquatic ecology, and stygofauna at DGM is a requirement of the BMP as a condition of the project's approval. Surveys occur in autumn and spring every year and have the following objectives:

• Monitor abiotic (physico-chemistry of water, habitat features) and biological (macroinvertebrate and fish communities) indicators of aquatic ecosystem health in Majors Creek and Spring Creek.

• Assess if there are changes between sites upstream and downstream of the mine or over time.

• Recommend mitigation and management options to reduce the impact on aquatic ecosystems.

This is the sixth report since CAWS has taken over the monitoring program. This report outlines the summary findings of the aquatic ecology and stygofauna monitoring for the autumn 2025 survey.

Methods

Autumn samples were collected on the 26th – 27th May 2025. Temperatures ranged from 3.4 – 14.9°C. All sites were flowing during the survey period, though site AE6 was again very low, and overgrown with terrestrial plants.

Sampling sites

Spring Creek runs adjacent to Dargues Gold mine operational area and enters Majors creek ~1 km downstream of the mine. During the survey, eight sites were sampled which include three reference sites, AE7 and AE8 on Majors Creek upstream of the Spring Creek confluence and AE6 on Spring Creek, all of which are upstream of the mine. Three sites sampled downstream of the mine that may be impacted are AE5 on Spring Creek and AE3 and AE4 on Majors Creek. Sites AE1 and AE2 are approximately 6 km downstream from Dargues gold mine and are used to indicate how the aquatic ecology recovers from any potential disturbances at the sites closer to the mine as they are below the Araluen escarpment in a well vegetated conservation area (Figure 1).

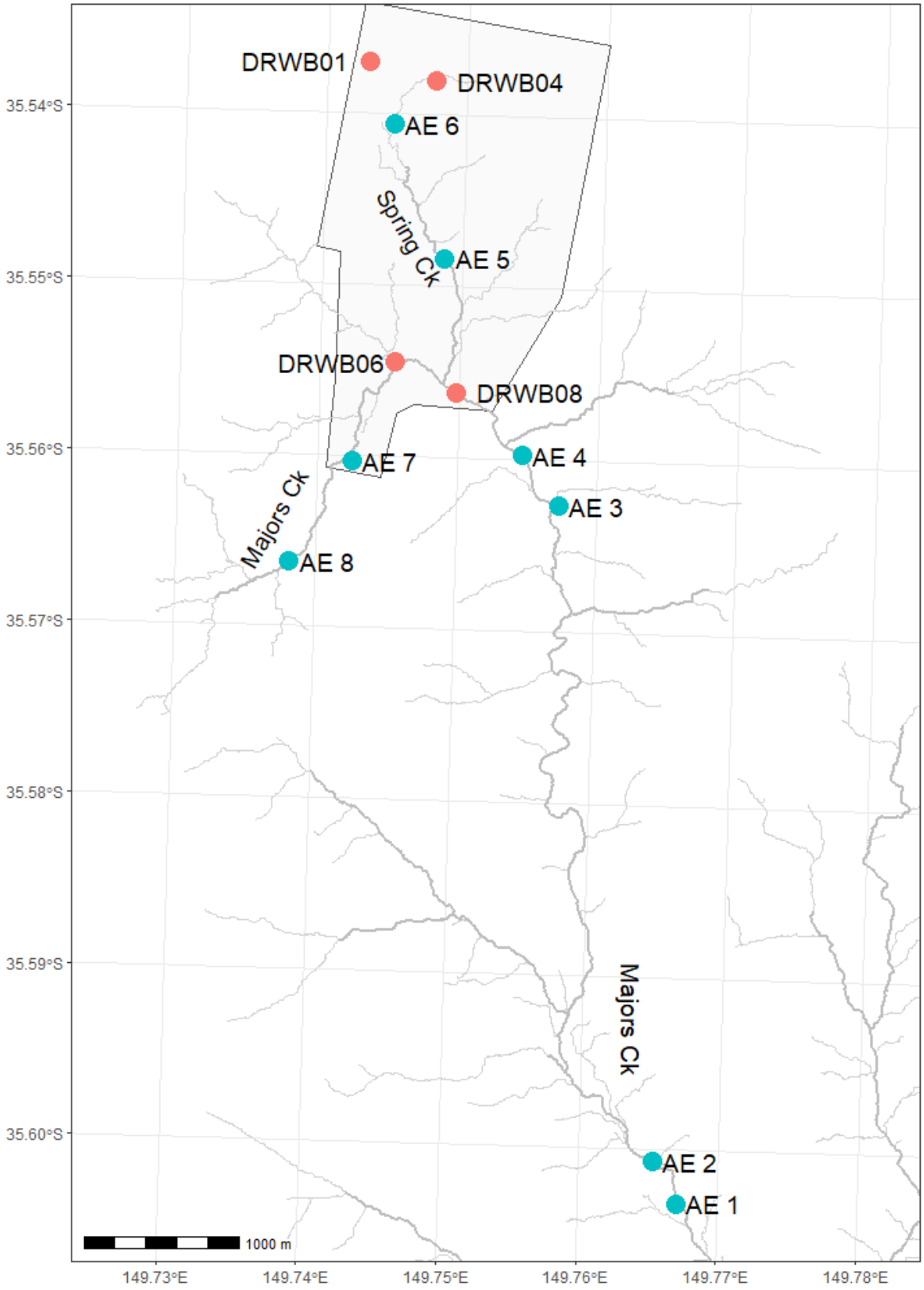

Figure 1. Map of sampling sites for the Dargues gold mine aquatic ecology monitoring program

Habitat assessment

The riparian condition assessment was undertaken using a version of the Riparian, Channel and Environmental (RCE) inventory (Petersen Jr, 1992) modified for Australian conditions (Chessman et al., 1997). The modified RCE has 13 descriptors, each with a score from 1 to 4. The total score for each site was calculated by summing the score for each descriptor and converting the result to a percentage of the highest possible score.

Sites with a high RCE score (up to 52, or 100%) indicate that the riparian zone is unmodified by human activity, while those with a low score have been substantially modified. Based on the original classification established by Peterson (1992), site condition was rated as:

- Poor for RCE scores of 0-24%
- Fair for RCE scores of 25-43%
- Good for RCE scores of 44-62%
- Very good for RCE scores of 63-81%
- Excellent for RCE scores of 82-100%.

Physical and chemical water quality assessment

Water temperature, pH, electrical conductivity, turbidity, salinity and total dissolved solids (TDS) were measured at all sites using a calibrated Horiba U-52 water quality meter and dissolved oxygen was measured using a Hach portable DO meter. Total alkalinity was calculated by field titration to an end point of pH 4.5 (Eaton et al., 2005).

Water quality guideline values were based on values from the ANZECC and ARMCANZ (2000) water quality guidelines for aquatic ecosystem protection in south-east Australian upland rivers.

Macroinvertebrate sampling and analysis

An edge and riffle sample was taken at each site where possible. A 250-µm sweep net was used to collect macroinvertebrates following methods from the NSW AUSRIVAS protocol (Turak et al., 2004) for both edge and riffle habitats. Net contents were emptied into a white sorting tray and scanned for 40 minutes with the aim of collecting each invertebrate taxa and preserving them in 70% ethanol. If additional taxa were still being collected after 40 minutes, the sample was scanned for another 20 minutes. Edge and riffle samples were sorted and preserved separately. In the laboratory, invertebrates were identified to family using a Leica M80 dissecting microscope.

Each family was assigned a Stream Invertebrate Grade Number-Average Level (SIGNAL) score based on Chessman (2003). The SIGNAL score indicates how sensitive an invertebrate family is to disturbance and is used as an indication of habitat health. Families that are sensitive to pollution have scores between six and ten and are likely to only occur in healthy habitats, while those with scores below six can tolerate pollution and will occur in impacted stream habitats (Gooderham and Tsyrlin, 2002). A signal score was derived for each survey site (following Chessman) (Chessman, 2001).

Macroinvertebrate community data was analysed using the Primer v7 software package (PRIMER-E Ltd 2006). Prior to analysis, data was grouped in factors based on habitat (riffle/edge), and location relative to mine (upstream/downstream). As riffle habitat was not available at every site, only edge data was used. Data was transformed for presence/absence and a Bray-Curtis similarity matrix developed. Nonmetric multidimensional scaling (nMDS) plots were generated to visually display data. Sites with similar communities overlap or appear close together in nMDS plots while those

with communities that have different community compositions are further apart (Clarke and Gorley, 2006).

Analysis of Macroinvertebrate communities was assessed for edge samples only between treatment (upstream or downstream of the mine) using analysis of similarity (ANOSIM) with location as a fixed factor. Data was fourth-root transformed (to account for highly abundant taxa) and then a resemblance matrix was constructed using the Bray-Curtis similarity measure. The ANOSIM was run with a maximum of 9999 permutations.

Fish sampling

Fish were collected using bait traps and backpack electrofishing. At each site 10 unbaited traps were set in sections where electrofishing could not be conducted i.e. deep pools. They were set at the arrival to a site and pulled at the conclusion of the electrofishing (1 – 2hrs).

At each site backpack electrofishing was conducted for 510 – 600 seconds of on time (Table 1) using a Smith-Root LR-24 backpack unit. Shock times varied depending on habitat, water depth and wading difficulty. Shocking times of 600 seconds (10 minutes) were achieved at all sites except AE6 and AE8 (Table 1). Site AE 6 was not able to be sampled due to lack of fishable habitat. All fish captured were measured to total length (TL) or fork length (FL), depending on species, and then released at the site.

Table 1. Backpack electrofisher settings for autumn 2025.

Site	Frequency (Hz)	Volts	Time on (sec)	Time on (min:sec)
AE1	90	400	600	10:00
AE2	90	400	600	10:00
AE3	90	400	600	10:00
AE4	90	400	600	10:00
AE5	90	400	600	10:00
AE6	-	-	-	-
AE7	90	400	600	10:00
AE8	90	400	510	8:30

Stygofauna sampling

A stygofauna net was lowered to the bottom of each of the four bores and drawn up slowly through the water column. The net was rinsed and the contents emptied into a 63µm sieve. After six hauls of each bore were completed the contents of the sieve were washed into a labelled sample jar and preserved with 70% ethanol.

Results

Hydrological context

There were several flood events in the two months leading up to sampling in May 2025 including a few days prior (Figure 2). Prior to this period, there were several minor flood events between December 2024 – February 2025 (Figure 2).

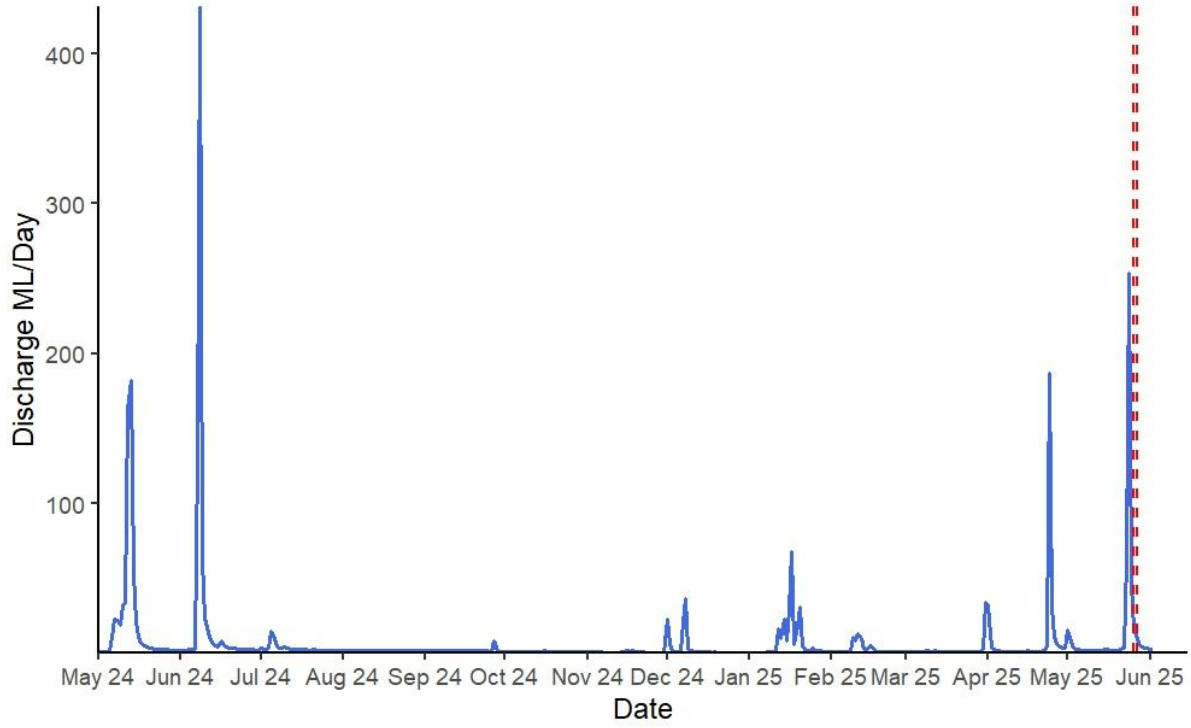

Figure 2. Discharge from Majors Creek (taken from station SW6) from May 2024 – Jun 2025. Red dashed lines indicate sampling dates for the spring 2024 assessment.

Physical and chemical water quality assessment

Water temperatures in the autumn 2025 survey ranged between 8.26 – 11.99°C at site AE3 and AE2, respectively (Table 2). pH ranged across sites from 7.4 – 7.99 and was within the ANZECC guideline range for all sites (Table 2).

Electrical conductivity (EC) measurements on Majors Creek generally increased with distance downstream from the most upstream site AE8 (Table 2). Only one site, AE5, had EC above ANZECC guidelines in autumn 2025 (Table 2).

Table 2. Physical and chemical water quality at Dargues gold mine monitoring sites for autumn 2025.

Parameter	ANZECC Range	AE1	AE2	AE3	AE4	AE5	AE6	AE7	AE8
Temperature (°C)		11.81	11.99	8.26	10.87	9.2	9.92	10.09	10.72
pH	6.5 – 8.0	7.97	7.99	7.28	7.4	7.55	7.64	7.71	7.59
EC (µS/cm)	30 - 350	297	288	238	225	**509**	306	129	125
Turbidity (NTU)	2 - 25	6.7	6.8	22.1	20.1	11	6.7	19.9	23.3
Dissolved oxygen (mg/L)		10.57	10.56	11.17	10.2	10.45	9.86	10.53	8.29
DO (% saturation)	90 - 110	101.6	102.5	101.5	101.8	98.7	96.6	103	81.6
Salinity (ppt)		0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1
Alkalinity (ppm)		50	50	32	28	41	56	27	23
TDS (g/L)		0.193	0.187	0.155	0.146	0.326	0.199	0.084	0.081

Red bold highlighted text denotes variables outside of the recommended ANZECC and ARMCANZ (2000) range.

Total dissolved solids (TDS) and salinity measurements were highest at site AE5, with readings of 0.326g/L and 0.2 ppt, respectively. Turbidity measurements were within the ANZECC range for all sites in autumn 2025 (Table 2). DO concentrations (% saturation) were within the ANZECC range at all sites (Table 2). Alkalinity ranged between 23 – 56 ppm across all sites. Highest alkalinity occurred at reference site AE6, which is just upstream of the mine and within the mine site (Table 2).

River channel environment (RCE)

River channel environment (RCE) scores varied considerably between sites, generally improving in condition in a downstream direction (Table 3). RCE scores ranged from 58% (AE8) at the most upstream site to 85% (AE1 and AE2) at the most downstream sites (Table 3). The two most downstream sites scored in the 'Excellent' range, four sites scored in the 'Very good' range and two sites in the 'Good' range (Table 3).

Table 3. River channel environment (RCE) scores for sites in autumn 2025.

	AE1	AE2	AE3	AE4	AE5	AE6	AE7	AE8
Land-use pattern beyond the immediate riparian zone	3	3	4	3	2	2	2	3
Width of riparian of woody vegetation	3	3	3	3	3	2	1	2
Completeness of riparian strip of woody vegetation	3	3	3	2	2	1	1	2
Vegetation of riparian zone within 10 m of channel	3	3	3	3	3	3	3	2
Stream bank structure	4	4	3	2	3	3	3	3
Bank undercutting	4	4	2	2	2	3	2	3
Channel form	4	4	4	4	4	4	4	3
Riffle/pool sequence	4	4	4	3	4	2	3	2
Retention devices in stream	4	4	4	4	4	2	3	3
Channel sediment accumulations	3	3	2	2	2	3	2	2
Stream bottom	4	4	3	3	2	3	3	1
Stream detritus	1	1	2	2	2	2	2	2
Aquatic vegetation	4	4	4	4	2	4	2	2
RCE Score	**44**	**44**	**41**	**37**	**35**	**34**	**31**	**30**
RCE Score %	**84.6**	**84.6**	**78.8**	**71.2**	**67.3**	**65.4**	**59.6**	**57.7**
Condition rating	**Excellent**	**Excellent**	**Very Good**	**Very Good**	**Very Good**	**Very Good**	**Good**	**Good**

Site AE8 and AE7, the two most upstream sites on Majors Creek, had the lowest scores of 58 and 60%, respectively, placing them in the 'Good' range. AE8 was heavily silted with little instream features. Site AE7 had no riparian woody vegetation and undercut banks with mixed native and exotic vegetation. Site AE6 increased in its condition rating to 'Very Good' from 'Good' from the previous assessment (Table 3). This is due to a decrease in algal and macrophyte growth at the site because of recent heavy rains and increased flow.

Sites AE1 and AE2 scored 'Excellent' in their condition rating in autumn 2025 similar to the previous assessment. The overall score was slightly lower because of a lack of stream detritus present due to recent heavy flows clearing the substrate.

Macroinvertebrate communities

A total of 1945 invertebrates were collected in autumn 2025 survey, comprising 54 taxa. Macroinvertebrate samples were collected from five edge habitats and four riffle habitats (Table 5). Two families occurred at all sites sampled in autumn 2025, which included Leptophlebiidae*and Leptoceridae from highest to lowest relative abundance (Table 4). During this period, edge habitats had between 23 and 26 taxa at impacted sites (AE3 – AE5) while reference sites (AE7 – AE8) had 27 and 20 taxa, respectively (Table 5). No edge samples were taken at the recovery sites (AE1 – AE2) in autumn 2025, but the riffle habitats had between 19 and 24 taxa present (Table 5). Leptophlebiidae has one of the highest SIGNAL scores (indicating they are sensitive to degradation) of eight and were found at all sites (Table 4). Site AE6 was not sampled in autumn 2025 as there was no suitable edge habitat because of low flows in Spring Creek.

*control-left click to be taken to webpage containing information about this taxa.

Table 4. Macroinvertebrate taxa, number of taxa collected and estimated total macroinvertebrate abundance in sub-samples from Majors Creek and Spring Creek in autumn 2025.

CLASS Order Family *Sub-family*	Signal 2 Grade	AE1 Edge	AE1 Riffle	AE2 Edge	AE2 Riffle	AE3 Edge	AE3 Riffle	AE4 Edge	AE4 Riffle	AE5 Edge	AE6 Edge	AE7 Edge	AE8 Edge
Gordea		Not sampled due to lack of suitable edge habitat		Not sampled due to lack of suitable edge habitat							Not sampled due to lack of suitable edge habitat		
Gordiidae	5						1		3				
Gastropoda													
Lymnaeidae	1							1					
Planorbidae	4					1		2		1		1	2
Physidae	1					4		7		12		4	7
Pelecypoda													
Sphaeriidae	5									1			2
Decapoda													
Atyidae	3							4		3		5	
OLIGOCHAETA	2		1		3		1		2	2		2	
ACARINA	6		1		1		2					2	
Coleoptera													
Dytiscidae	2					22		20	1	13		18	6
Elmidae (Adul)	7				1					1			
Elmidae (Larvae)	7		3		11	2	2					1	
Hydrophilidae	2						1	1					
Scirtidae	6						2	2		2		1	
Psephenidae	6		8		3				3				
Hydrochidae	4							4					
Gyrinidae	4							2				1	
Hygrobiidae	4							1					8
Diptera													
Tipulidae	5		2		6		3		5			1	2
Ceratopogonidae	4												7
Simuliidae	5		17		17	2	5		6				
Dixidae	7		1			5		2		2			1
Stratiomyidae	2					3		2		1		4	
Sciomyzidae	2												7
Podonominae	6		1										
Tanypodinae	4					1						4	1
Orthocladiinae	4		2			2	2	1	2	2		1	1
Chironominae	3		1		1	1			1	2			13
Ephemeroptera													
Baetidae	5		19		10	4	19	1	10	5		2	
Leptophlebiidae	8		101		68	18	113	6	94	87		9	5
Caenidae	4					28	2	33		17		33	
Hemiptera													
Veliidae	3					5	2	1	5	3		1	3
Notonectidae	3					20		2		29		2	7
Micronectidae	2					41		12		11			3
Corixidae	2		2										
Megaloptera													
Corydalidae	7		11		10		27		23				
Odonata													
Aeshnidae	4									3			
Gomphidae	5		4		2	1		1				9	
Argiolestidae	5											1	
Synlestidae	7					1		8		7		7	
Telephlebiidae	9					1	1						
Plecoptera													
Gripopterygidae	8		9		16	3	19		18	3		13	
Trichoptera													
Hydrobiosidae	8		5		10	1	11		14			1	
Glossosomatidae	9		2										
Calamoceratidae	7				2	1	2	1					1
Helicopsychidae	8		2										
Hydroptilidae	4					1				1			2
Philopotamidae	8				18		6		15				
Atriplectididae	7											1	
Hydropsychidae	6		9		16		3		7				
Ecnomidae	4		4			3	1					1	1
Conoesucidae	8		10		6	1	1		1			3	
Calocidae	9							1					
Leptoceridae	6		2		4	41	1	101	2	33		75	128
Tasimiidae	8		4										
No. of individuals			**221**		**205**	**213**	**227**	**216**	**212**	**241**		**203**	**207**
No. of taxa			**24**		**19**	**26**	**23**	**24**	**18**	**23**		**27**	**20**
% of sub-sample			100		100	100	100	100	100	100		100	100
Whole sample estimate			**221**		**205**	**213**	**227**	**216**	**212**	**241**		**203**	**207**

Table 5. Macroinvertebrate community indices for autumn 2025.

Result	AE1	AE2	AE3		AE4		AE5	AE6*	AE7	AE8
	Riffle	Riffle	Edge	Riffle	Edge	Riffle	Edge		Edge	Edge
Total taxa	24	19	26	23	24	18	23	-	27	20
Average SIGNAL score	5.96 ± (0.40)	6.16 ± (0.39)	5.00 ± (0.45)	5.78 ± (0.42)	4.29 ± (0.45)	5.50 ± (0.49)	4.35 ± (0.43)	-	4.85 ± (0.40)	4.10 ± (0.41)
Proportion of sensitive taxa	75.6	73.2	47.4	78.4	66.2	75.9	60.6	-	68.0	66.2
Site SIGNAL score	6.35	6.65	4.48	6.5	4.22	6.36	4.29	-	4.98	3.81

*Site AE6 not sampled as there was no suitable edge or riffle habitat.

The average SIGNAL scores for each site ranged from 4.10 at AE8 to 6.16 at AE2 in autumn 2025 (Table 5). AE8 had the lowest site SIGNAL score and had the second lowest proportion of sensitive taxa in autumn 2025 (Table 5). For edge communities, site SIGNAL scores at reference sites were 3.81 – 4.98, indicating moderate pollution to mild pollution, respectively. For the impacted sites (AE3 – AE5) the site SIGNAL scores ranged between 4.22 – 4.48 for edge communities, indicating moderate to mild pollution. Riffle habitats had higher site SIGNAL scores than edge habitats with scores ranging from 6.35 – 6.65 (Table 5). All sites where edge samples were collected were assessed as being in condition quadrant 2 (high salinity or nutrient levels) for the autumn 2025 assessment, as they were for the spring 2024 assessment (Figure 3). Samples collected from riffle habitats all had healthy SIGNAL2 scores, though two of the four sites just missed out of being assessed in quadrant 1 (indicates favourable habitat and chemically dilute waters) because of slightly lower taxonomic richness, and were assed as quadrant 3 (indicating toxic pollution or harsh physical conditions (or inadequate sampling) (Figure 4). There was no significant difference in the macroinvertebrate communities between sites upstream of the mine and sites downstream of the mine, based on samples collected from edge habitats (Global R = 0.1667 p = 0.3) (Figure 5).

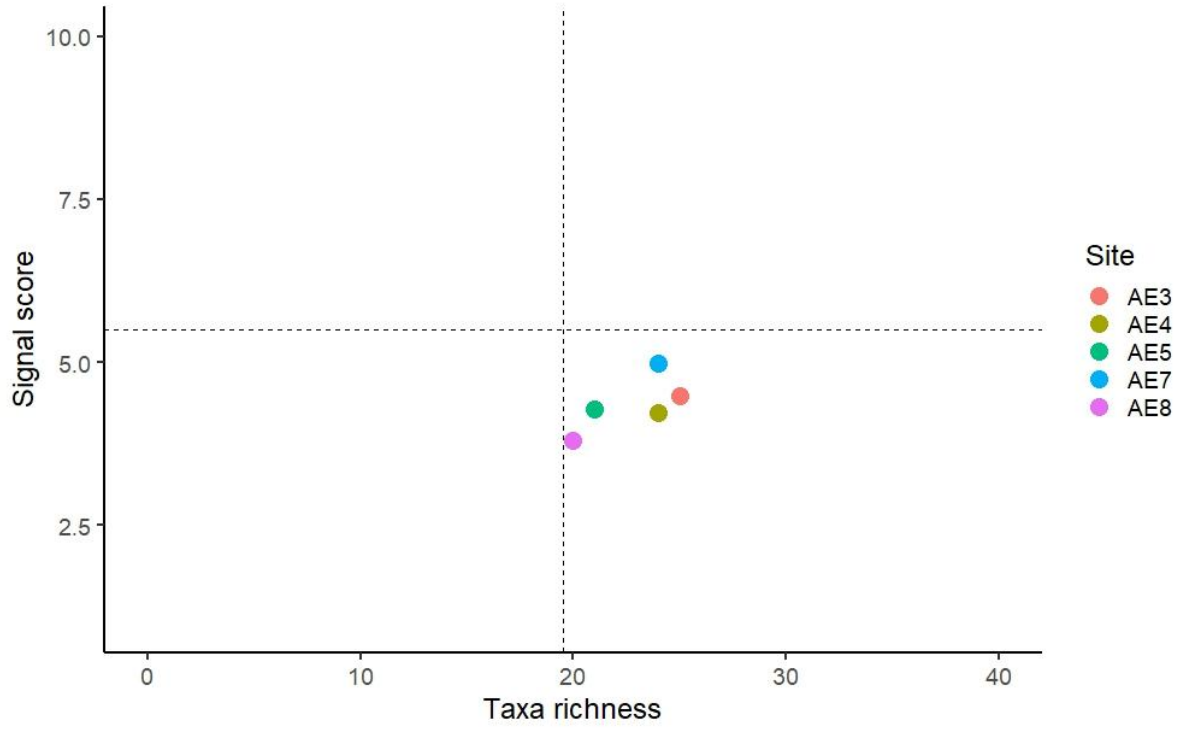

Figure 3. Biplot of macroinvertebrate communities collected from edge samples in autumn 2025. Dotted lines indicate the location of quadrants for interpretation of site SIGNAL results (from Chessman 2001).

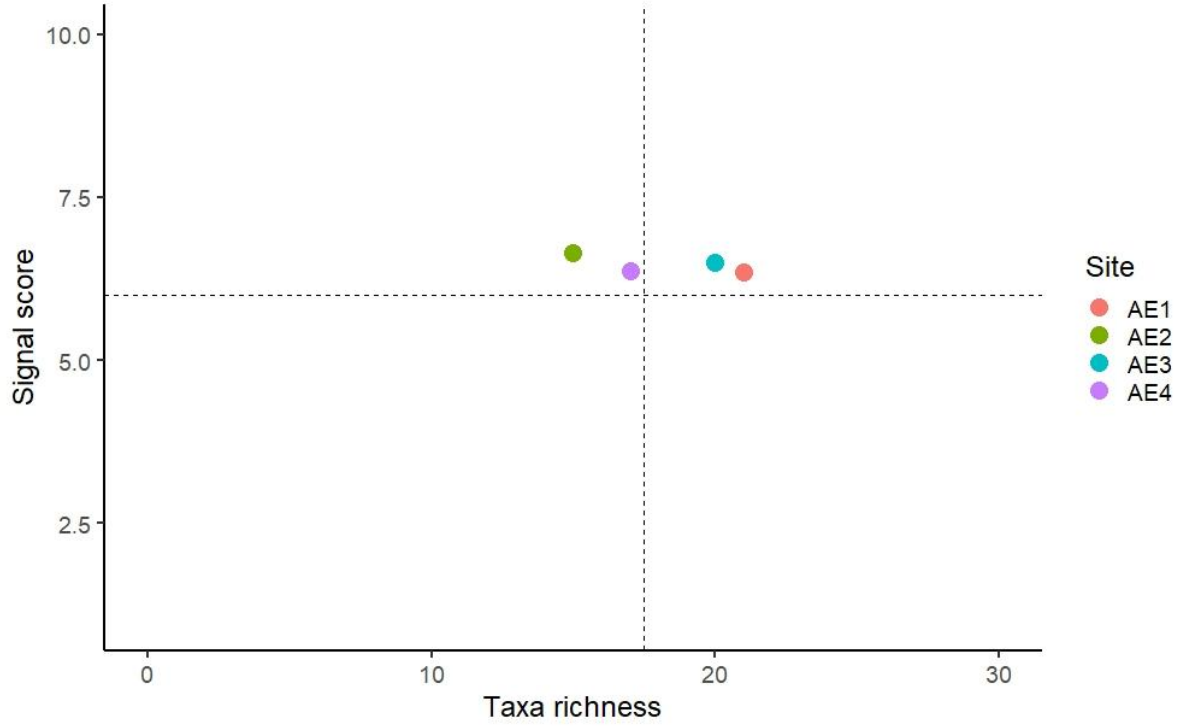

Figure 4. Biplot of macroinvertebrate communities collected from riffle samples in autumn 2025. Dotted lines indicate the location of quadrants for interpretation of site SIGNAL results (from Chessman 2001).

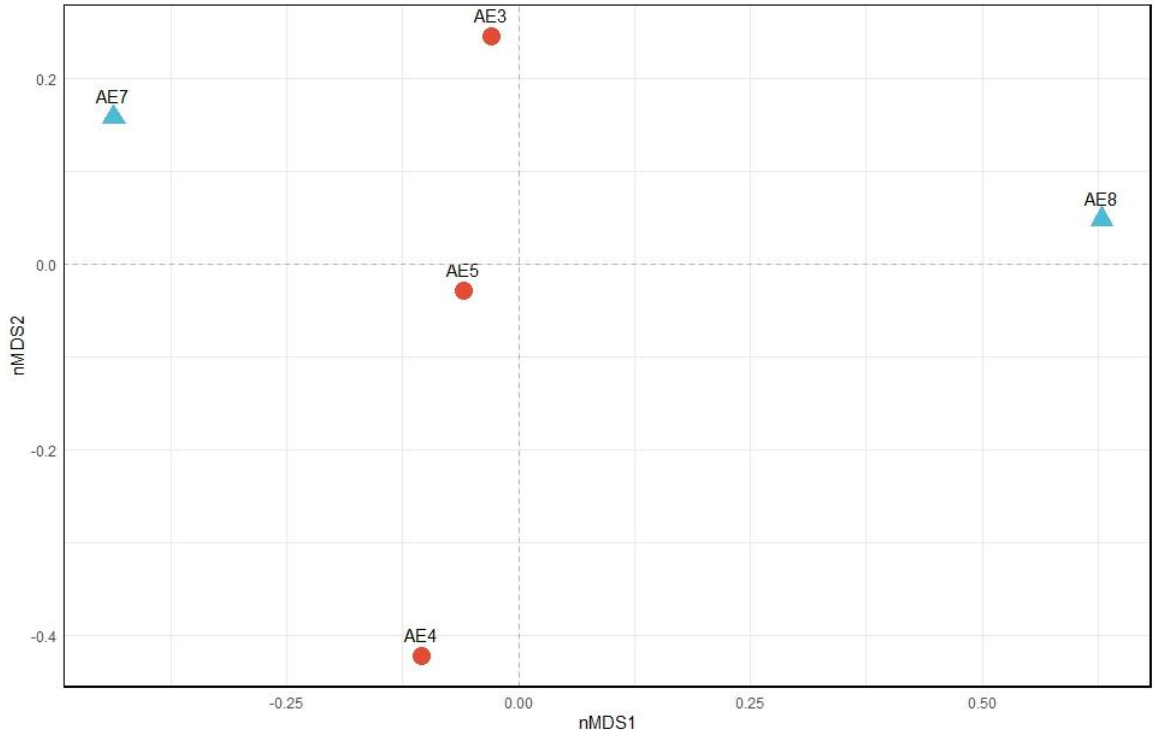

Figure 5. nMDS comparison of macroinvertebrate communities at edge habitats upstream (blue) and downstream (red) of Dargues Gold Mine for autumn 2025.

Stygofauna communities

Four bores were sampled (1, 4, 6 and 8) in autumn 2025. Two bores (DRW04 and DRW06) had stygofauna with three species present. There was a total of nine individuals captured from the two bores (Table 6).

Table 6. Total abundance of each species of stygofauna per site for spring 2024.

Site	Taxa	Total
DRWB04	Parabathynellidae	6
DRWB04	Astigmata	1
DRWB06	Astigmata	1
DRWB06	Hypogastruridae	1

*Taxa identified to lowest taxonomic level.

Fish communities

Four species of fish were captured in autumn 2025; Mountain galaxias* (*Galaxias olidus*), Cox's gudgeon (*Gobiomorphus coxii*), Short-finned eel (*Anguilla australis*), and Long-finned eel (*Anguilla reinhardtii*). All sites sampled had 1 – 3 species present except for AE6, where no sampling occurred in autumn 2025 due to low flows and no suitable habitat to sample (Table 7).

*Control-left click to be taken to webpage containing information about this taxa.

Table 7. Total abundance of each species per site for autumn 2025.

Species	AE1	AE2	AE3	AE4	AE5	AE6	AE7	AE8	Total
Cox's gudgeon	21	23	0	0	0	0	0	0	**44**
Long-finned eel	1	0	0	1	0	0	0	0	**2**
Short-finned eel	1	0	0	6	1	0	1	0	**9**
Mountain galaxias	0	0	54	51	28	0	80	52	**265**
Total	**23**	**23**	**54**	**58**	**29**	**0**	**81**	**52**	**320**

Nine Short-finned eels were captured across four sites ranging in size from 100 – 350 mm total length (TL) (Table 7 and Figure 6).The most widespread species were Mountain galaxias captured at five out of eight sites (Table 7). Mountain galaxias were also the most abundant species with 265 individuals (comprising 83 % of total number of fish captured) captured ranging in size from 34 – 90 mm fork length (FL) (Table 7 and Figure 7). A total of 44 Cox's gudgeon were caught at sites AE1 and AE2 and ranged in size from 40 – 90 mm (TL) and were the second most abundant species captured (Table 7 and Figure 8). Two Long-finned eels were captured at site AE1 and AE4 and measured 300 and 200mm (TL), respectively.

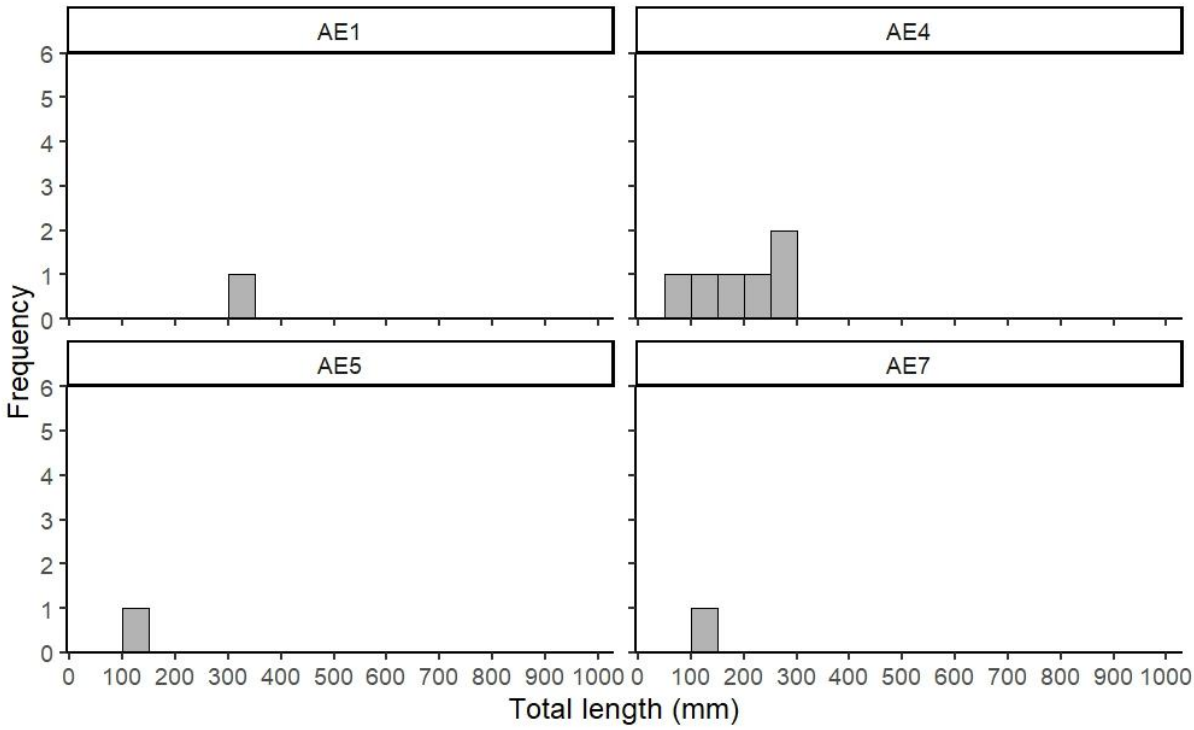

Figure 6. Length frequency of Short-finned eel captured by backpack electrofishing at four sites in autumn 2025.

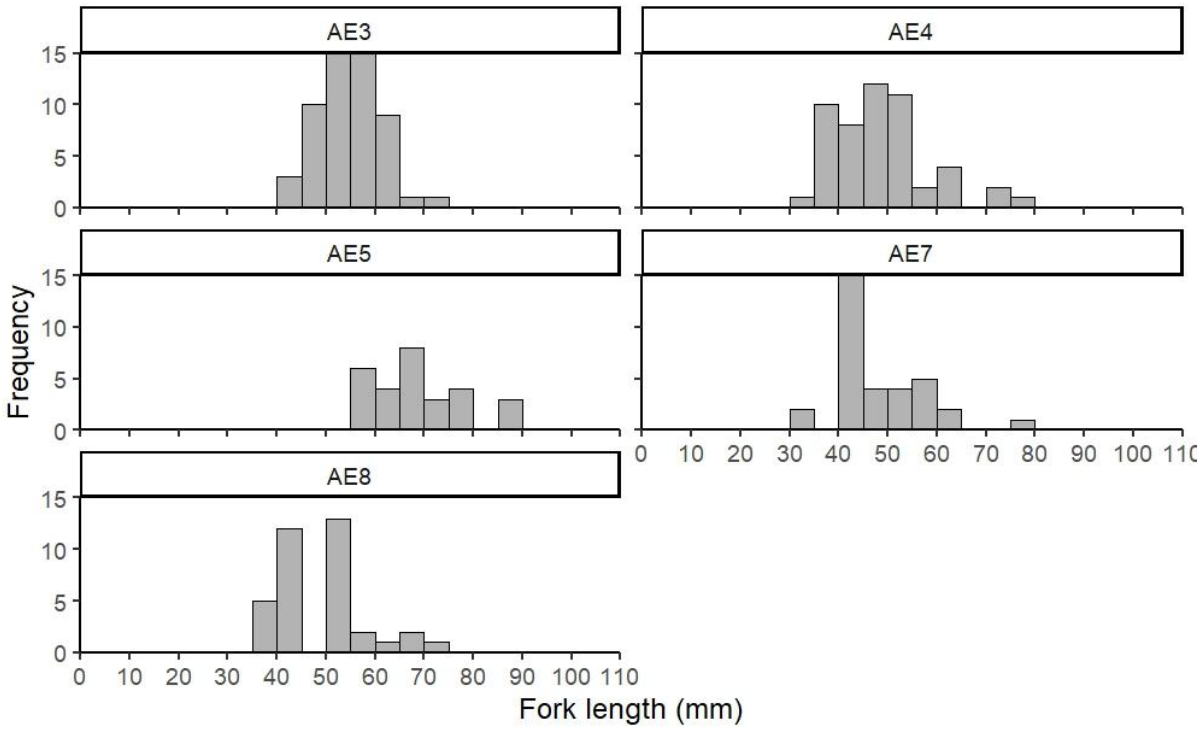

Figure 7. Length frequency of Mountain galaxias captured by backpack electrofishing at five sites in autumn 2025.

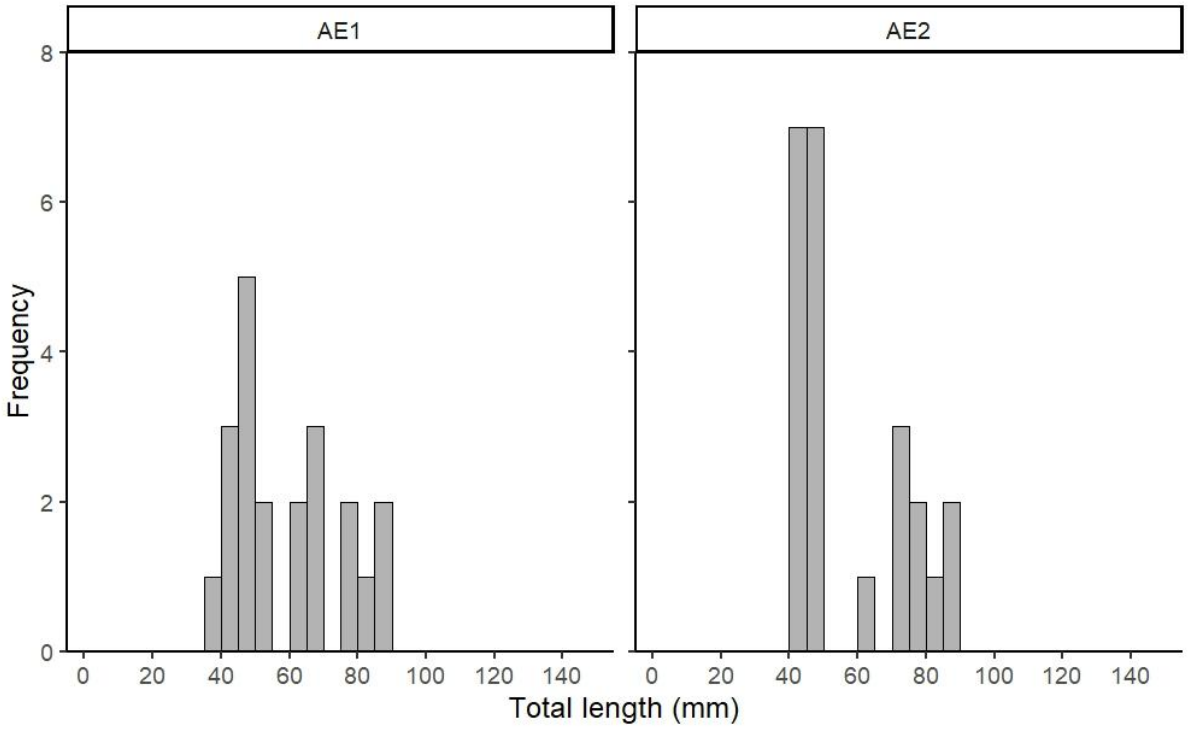

Figure 8. Length frequency of Cox's gudgeon captured by backpack electrofishing at two sites in autumn 2025.

The highest catch rate for Short-finned eels occurred at site AE4 with 36 fish per hour (Table 8). Catch rates for Mountain galaxias were the highest at site AE7 with 480 fish caught per hour followed by AE8 with 367 fish caught per hour (Table 8). The most common size range was between 50 – 70 mm (FL) (Figure 7). Site AE2 had the highest catch rate for Cox's gudgeon with 138 fish caught per hour (Table 8 and Figure 8). The most common size range was between 50 – 70 mm (TL) (Figure 8).

Table 8. Catch per hour of fish collected in autumn 2025.

Species	AE1	AE2	AE3	AE4	AE5	AE6	AE7	AE8
Cox's gudgeon	126	138	0	0	0	0	0	0
Long-finned eel	6	0	0	6	0	0	0	0
Short-finned eel	6	0	0	36	6	0	6	0
Mountain galaxias	0	0	324	306	168	0	480	367.06

The reference site, AE7, had the most fish caught with 81 out of 320 fish captured and comprised two species in autumn 2025 (Table 7). This catch was Mountain galaxias and Short-finned eel with a total catch per hour of 486 fish for the site (Table 8). The total catch per hour across all sites for autumn 2025 was 1975 fish.

Conclusion

In contrast to spring 2024, there were several rainfall events and subsequent high flows in the three months leading to the autumn 2025 sampling. Based on the results of this assessment, there were no clear indications that the DGM is having a significant impact on the aquatic ecology of Spring Creek or Majors Creek. Elevated EC downstream of the mine at AE5 and continuing downstream to AE1 does not appear to be having a significant impact on the macroinvertebrate or fish communities in autumn 2025.

Macroinvertebrate communities did not significantly differ above and below the DGM. All five edge habitat communities collected were again assessed as being in condition quadrant (Quadrant 2), as they were for the spring 2024 assessment, which showed some impairment, and grouped out as sites that are often impaired by salinity or nutrient levels (Chessman, 2001). Biological condition of riffle macroinvertebrate communities (riffle sites only present at sites D/S DGM) were not impaired, indicating minimal if any downstream effects of the operation of DGM on riffle macroinvertebrate communities. Overall, macroinvertebrate community health was slightly better in autumn 2025 when compared to spring 2024 (Clear et al., 2024). Total taxa detected increased by two, taxa richness from edge samples increased at three of five sites and the percentage of sensitive taxa also increased at four sites when compared to spring 2024.

Fish communities in autumn 2025 doubled in overall abundance, though number of species were fewer compared to the spring 2024 survey. Fish diversity decreased at sites AE1 and AE2, with two species, Australian smelt and Common galaxias, not detected. There was an decrease of 32% of Cox's gudgeon captured when compared to spring 2024 (Clear et al., 2024). Mountain galaxias were the dominant species with 265 captured in the current survey compared to 69 in spring 2024. This may be attributed to the hundreds of young-of-year Mountain galaxias observed in spring 2024. Overall, there were 167 more fish captured in autumn 2025 when compared to spring 2024 (Clear et al., 2024).

In autumn 2025, three different stygofauna taxa were detected from two of the four bore sites. There was one more species detected and more individuals when compared to spring 2024 (Clear et al., 2024). Two of the species detected were the same and one different to those found in spring 2024. Stygofauna are an important indicator of ecosystem health (Saccò et al., 2022) and also very sensitive to environmental characteristics of the water (Serov et al., 2012). Future surveys will help determine if there have been any positive or negative impacts on the stygofauna communities.

River channel environment (RCE) condition ratings remained the same for all sites, except AE6, when compared to spring 2024 (Clear et al., 2024). The condition rating went from 'Good' to 'Very good' for this site and this was due to a decrease in algal and macrophyte growth because of recent heavy rains and increased flow. The low flow and overgrowth of terrestrial plants at AE6 in autumn 2025 meant backpack electrofishing was unable to be conducted, and no macroinvertebrate sample was able to be taken. Site AE5 increased slightly it its RCE score as it had less algal growth due to recent rains and subsequent heavy flows.

Other than the high EC continuing downstream from AE5 – AE1 there were no other longitudinal trends downstream of DGM, indicating that mining operations are not having a significant impact on aquatic ecology. Instead, the main overriding impact on aquatic ecology present at the sites appears to be current and historic agricultural and historic mining activities and current hydrological regime.

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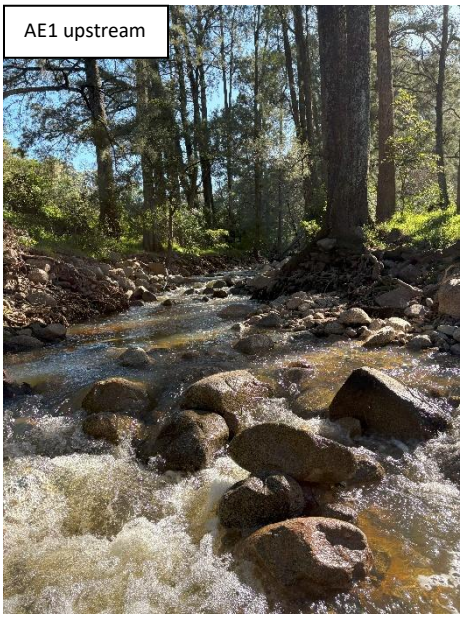
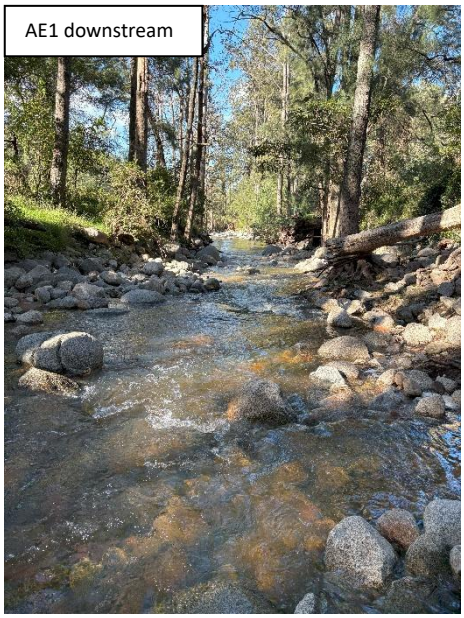
Appendix A – Site Photos

Site AE1

AE1 upstream



AE1 downstream



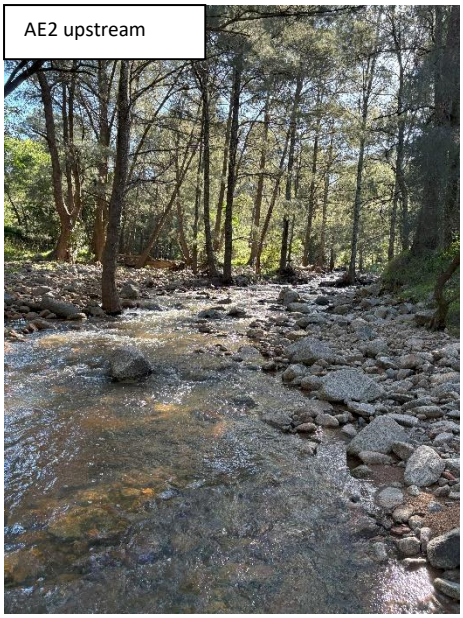
This site is 5 km downstream of Dargues gold mine near Araluen. It is sparsely vegetated with both native and exotic species.

The channel bed consists of cobbles and boulders embedded in sand and gravel. The water was turbid with an increased flow at the time of sampling because of recent rainfall. Riffles were present linking the pools. There was sand present in the slower flowing sections and no detritus present as it would have been washed away by the elevated flows.

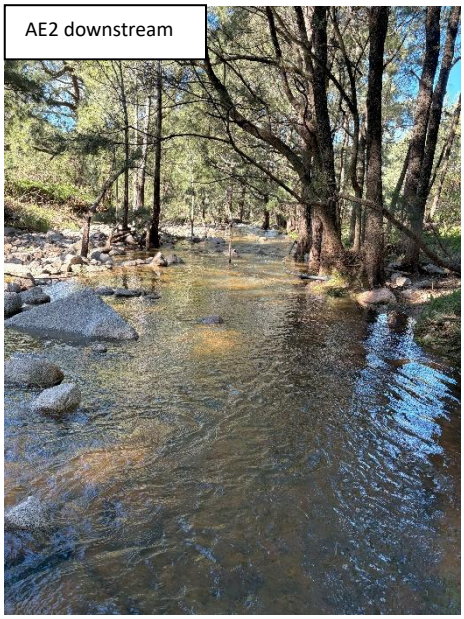
The trees and shrubs in the riparian corridor along the stream were mostly native with casuarina being the dominant species.

Site AE2

AE2 upstream



AE2 downstream

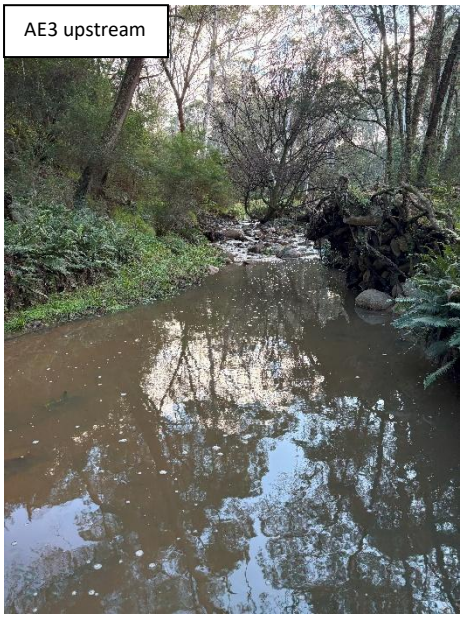


This site is 400m upstream of AE1 and downstream of Dargues gold mine. The surrounding land and vegetation are the same as AE1.

The channel bed consists of cobbles and boulders embedded in sand and gravel. The water was turbid with an increased flow at the time of sampling because of recent rainfall. Riffles were present linking the pools. There was sand present in the slower flowing sections and no detritus present as it would have been washed away by the elevated flows. The banks had undercutting due to the floods from the previous two years which exposed the roots of large trees making them unstable. Dead trees were common with several falling into the river or along the banks.

Site AE3

AE3 upstream



AE3 downstream

This site is on Majors Creek, 300 m from the top of Majors Creek Falls and 900 m downstream from the mine. The riparian zone consisted of a mix of native and exotic species while the broader area outside of this was mostly undisturbed native vegetation.

The channel frequently alternated between riffles and pools and consisted of bedrock with cobbles and boulders. Bars of sand and silt were common covering the stream bottom in the pools and slower flowing areas. Bank undercutting was frequent along the stream and the banks were mainly held by ferns and grasses.

The water was turbid with an increased flow at the time of sampling because of recent rainfall. No macrophytes were present at the time of sampling.

Site AE4

AE4 upstream

AE4 downstream

This site is 400m downstream of Majors Creek Road. The riparian zone consisted of mixed native and exotic trees and shrubs while the broader area consisted mixed native vegetation, pastures and exotics.

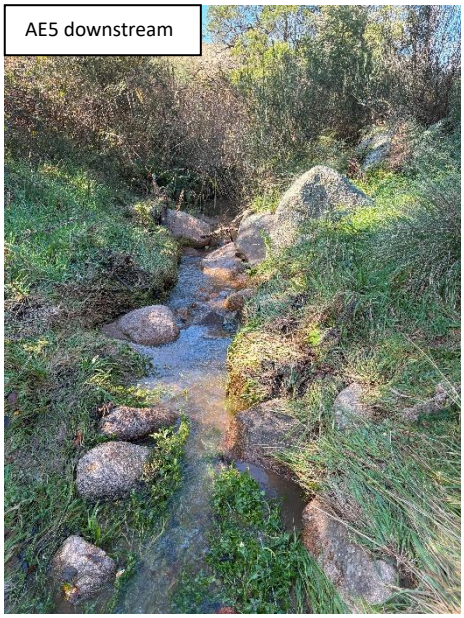
The channel consisted of long pools and runs with infrequent riffles. Many large boulders were present and bars of sand and silt were common covering the stream bottom in the slower flowing sections of this reach. Bank undercutting was frequent along the stream the banks were held by grasses and sedges.

The water was turbid with an increased flow at the time of sampling because of recent rainfall. No macrophytes were present at the time of sampling.

Site AE5

AE5 upstream

AE5 downstream



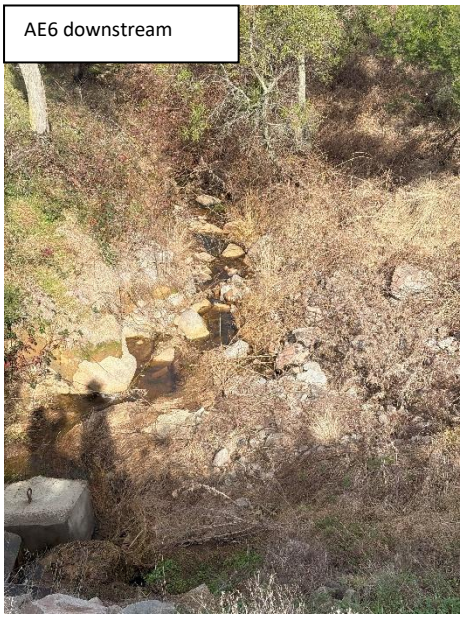
This site is on Spring Creek and downstream of Dargues goldmine project area. The riparian zone is made of mostly grasses and herbs (exotic and native) which supported both banks. The broader area consisted of mainly pasture with scattered trees.

The channel consists of narrow runs and occasional pools. The creek bed consists of cobbles and boulders with bars of sand and silt common. Bank undercutting was frequent along all parts of the creek.

The water was turbid at the time of sampling because of recent rainfall. Submerged and emergent macrophytes were present within the reach. The emergent macrophytes had been pushed over due to recent heavy flows. There was also an increase in the amount of sand deposited in the slower flowing sections because of the heavy flows from the recent rainfall. Some sections are still covered with overhanging vegetation and emergent macrophytes making it impossible to sample.

Site AE6

AE6 downstream



This site is on Spring Creek upstream of Dargues gold mine and approximately 700m upstream of AE4. The survey area is immediately downstream of the haul road crossing. The riparian zone consisted of pasture grasses and with minimal trees and was overgrown with blackberries.

The channel consists of narrow runs and occasional pools. Cobbles and boulders were present with the benthic composition being sand and silt.

The water was turbid at the time of sampling because of recent rainfall. Submerged and emergent macrophytes along with overhanging exotic vegetation dominated the reach at the time of sampling. This with the low flow made it impossible to sample.

Site AE7

AE7 upstream

AE7 downstream

This site is on Majors Creek approximately 1 km upstream from the confluence with Spring Creek. As it is upstream of the gold mine it acts as a reference site as there are no potential influences from the mine. The riparian zone consisted of shrubs and grasses that overhung the water on both banks with no mature trees present. The vegetation in the broader area was similar to the riparian zone.

The channel consisted of runs and pools with no riffles. The creek bed consisted of sand with boulders and shallow bedrock.

The water was turbid at the time of sampling because of recent rainfall. Woody debris was common throughout the reach and the pool upstream of the weir was dominated by emergent macrophytes that were laying over at the time of sampling because of recent heavy flows. There was little to no algal growth at the time of sampling.

Site AE8

AE8 upstream

AE8 downstream

This site is on Majors Creek, north of the Majors Creek village and is divided by a road causeway. Like AE7 it acts as a reference site as its upstream of any potential impacts from the mine. The riparian zone was dominated by exotic trees and shrubs in particular willows and blackberries. The broader area has been cleared and consisted mostly of grasses.

The channel consisted of a pool upstream of the causeway and shallow runs downstream. The creek bed consisted of soft sediment and some woody debris consisting of fallen willow and willow roots.

The water was turbid with elevated flows at the time of sampling because of recent rainfall. The macrophytes had recovered in the pool upstream when compared to the spring 2024 sampling. Downstream was choked with juvenile willow trees. The deposits of sand and gravel appeared to be caused from runoff from the road crossing.