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31 October 2025

Steve Orr
Director Operations Central West, South Coast and Tablelands

NSW Environment Protection Authority
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Cc:
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Dear Steve,

RE: EPA Hydrobiology Review – Cadia Water Monitoring Program

Cadia Holdings Pty Limited (**CHPL**) is the owner and operator of Cadia Valley Operations (**Cadia**) and is a wholly owned subsidiary of Newmont Overseas Holdings Pty Ltd. CHPL holds Environment Protection Licence number 5590 (**EPL 5590**) for the scheduled activities of mining for minerals, mineral processing and crushing, grinding or separating, located at 1460 Cadia Road, Orange NSW (**the premises**).

In October 2024, the EPA notified Cadia that an independent review of the site's groundwater, surface water and aquatic ecosystem monitoring program had been commissioned. The EPA engaged Hydrobiology QLD Pty Ltd (**Hydrobiology**) as an independent environmental consultancy to carry out the review. Cadia supported the EPA in the review by providing information and records as requested and providing site access for Hydrobiology to visit the site and see site water infrastructure and the surrounding environment. Cadia was not provided a comprehensive scope for the review. If Cadia had been provided with the full scope of Hydrobiology's review we would have made certain that the EPA and Hydrobiology were provided with all of the relevant data and information required for the review. As a result, Hydrobiology conducted the review and prepared the report with materially insufficient data and information.

Cadia was provided by the EPA with the assessment report, Review of Cadia Valley Operations (CVO) Environmental Monitoring Program Design and Data from Hydrobiology on the 20 October 2025 and the subsequent Acid Mine Drainage (AMD) - Review of Cadia Valley Operations Environmental Monitoring Program Design and Data report on Friday, 24 October 2025. In subsequent discussions with the EPA, it was agreed that Cadia would write a response letter outlining the errors in the Hydrobiology report that have led to incorrect and misleading conclusions and unfounded recommendations. Therefore, the EPA invited Cadia to submit this response to the report to highlight and record the shortcomings of the Hydrobiology report. It is our understanding that the EPA will notwithstanding knowing these issues publish the report as is.

Cadia has reviewed the Hydrobiology report and strongly disagrees with multiple aspects, including misleading conclusions that are based on factually incorrect reporting and unfounded recommendations.

Cadia has worked closely with the EPA in recent years, supporting its comprehensive environmental sampling program at Cadia and in the Upper Belubula Region. Through this letter, we aim to provide constructive feedback on the Hydrobiology report to help ensure its accuracy and scientific integrity. The Hydrobiology report, as currently written, is riddled with errors that wrongly prejudice Cadia and in the interest of robust and defendable science we **request** that the Hydrobiology report be withdrawn pending:

1. Cadia providing the EPA with all relevant information and data, and
2. a peer review being conducted by an appropriate expert.

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The following tables provide more details of Cadia's commentary and concerns:

Table 1 - Overall Commentary

No.	Cadia Comment
1	**Dilution of key insights:** A primary point of the scope of this study was to identify potential impacts on the surrounding environment and community. Section 6.4.2 states that "*there has been no documented impacts on downstream surface water quality that would constitute a breach of environmental or regulatory thresholds for aquatic ecosystems, irrigation or stock watering.*" This conclusion is excluded from the executive summary and has not been re-emphasised in the conclusions, ignoring a key assessment outcome. **Cadia requests** that this conclusion be clearly highlighted in the report, and respectfully ask that the EPA also emphasise this material conclusion in its reporting, publications, and discussions relating to the report.
2	**Review limitations:** The assessment undertaken is based on limited data and documentation. The report does not present a "comprehensive review" as claimed by Hydrobiology. For example, the assessment did not include a review of pre-2010 data and key climatic, geological and hydrogeological factors were ignored. As mentioned above, **Cadia requests** that the report be withdrawn pending a "comprehensive review" of **all** relevant data, and climatic, geological and hydrogeological factors.
3	**QA/QC Interpretations:** Hydrobiology makes comments about the lack of quality assurance/quality control (**QA/QC**) in the Cadia data set. The request for information Cadia received from EPA was to provide the raw dataset from 2010. QA/QC processes are undertaken from the raw data before data is placed into the working environmental database that is used for interpretation or reporting. The Cadia environmental database is independently verified monthly and documented in a report. This is a failing of Hydrobiology's request for information (**RFI**) process which has led to unfounded doubt by Hydrobiology of the validity of Cadia's dataset.
4	**Statutory Reporting:** Hydrobiology misunderstands the requirements of the Annual Review (or referred to previously as the Annual Environmental Management Review). As the EPA is aware, operators of State significant mining developments, such as Cadia, are required under the conditions of their relevant project approval, to prepare an Annual Review that provides a summary of the performance of the operation over the relevant reporting period (generally the preceding calendar year). The Annual Review is submitted to regulators and made available to the community via the operation's website. The Department of Planning, Housing and Infrastructure (**DPHI**) has developed an Annual Review Guideline to assist operators of State significant mining developments in the preparation of an Annual Review. The continued references to include more documents into the Annual Review is counter to the DPHI's guideline and recommendations. The EPA has a list of NSW EPA Accredited Auditors that it normally uses to perform assessments, review and audits but unfortunately, Hydrobiology is not included in this list of accredited auditors. This departure from the EPA's processes may mean that it has contracted with a consultant who may not be aware of the NSW regulatory environment. **Cadia requests** that the EPA provide clear guidance to its consultants, especially Hydrobiology, on the regulations and requirements of the NSW EPA and DPHI.

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No.	Cadia Comment
	Every time Cadia's project approval (PA 06_0295) undergoes a modification or Cadia applies for a project approval, a comprehensive water impact study is conducted, covering surface water, groundwater and aquatic ecology. These assessments review the existing water monitoring and management systems with respect to hydrological and hydrogeological modelling and provide recommendations for adjustments and extensions as required. The water management plan is updated accordingly to adopt recommendations. Additionally, a review of the water management plan occurs periodically in accordance with certain triggers, prompting a review of the adequacy of the monitoring and management systems. All of these assessment, studies and plans are reviewed by the DPHI and EPA. **Cadia requests** that the EPA provide Hydrobiology with information on how project approvals are assessed in NSW and provide Hydrobiology with copies of all the relevant data relating to water impact studies at Cadia so that Hydrobiology can review and correct its assessments and conclusions reached in its report.
5	**Operational Context:** Throughout the report, Hydrobiology does not distinguish between mine water infrastructure and environmental monitoring points, leading to misinterpretation of the data. This is a material error by Hydrobiology and **Cadia requests** that Hydrobiology review its report and correctly identify mine water infrastructure and environmental monitoring points. Hydrobiology makes commentary about Cadia not using suitable reference sites, that should not be influenced by current or legacy mining, forestry or agriculture. There are no locations along the length of Cadiangullong Creek that would meet the definition outlined in section 2.2.2.1. of the Hydrobiology report. Cadia's remit is to identify potential impacts from Cadia mining operations. The environmental monitoring program is not intended to identify degradation associated with other impactful land uses like forestry or agriculture. **Cadia requests** that Hydrobiology review its assessment and report to take into account that there are no suitable reference sites and the ambit of Cadia's environmental monitoring program.

Cadia has identified many instances of incorrect data and location references in the Hydrobiology report and these manifest errors lead to Hydrobiology making misleading commentary and false interpretations. **Cadia requests** that these reporting inaccuracies be investigated and corrected by Hydrobiology.

Table 2 – Reporting Inaccuracies

Report Section	Section Title	Hydrobiology Comment	Cadia Comment
2.1.2	Ore Processing and Water Management	***Dewatering Facilities**: Water extracted during underground mining and from pit dewatering is directed to surface containment structures or reused in processing.*	The use of the term "Dewatering Facilities" is incorrect. The correct term is "process water holding tanks".
2.1.3	Tailings Storage Facilities	***Southern Tailings Storage Facility (STSF):** Commissioned in 2002, the STSF is the principal structure for active tailings deposition. It has associated leachate management systems, including Southern Leachate Dam (SLD) and collection ponds.* ***Cadia Hill Pit (PTSF): […]** Since the cessation of mining, the pit has been*	This is incorrect. The Pit Storage Facility is the principal structure for active tailings deposition. The Southern Leachate Dam (SLD) is not associated with STSF. It is located upstream of the NTSF and captures any potential seepage from the Southern Waste Rock Dump.

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Report Section	Section Title	Hydrobiology Comment	Cadia Comment
		repurposed as a Passive Tailings Storage Facility (PTSF).	Incorrect terminology for PTSF. The "P" stands for "pit" and not "passive". The PTSF is the Pit Tailings Storage Facility. It is concerning the Hydrobiology has made such a basic but material error in describing the PTSF.
2.1.5	Water Holding Dams	*Hoares Creek Dam: The dam, with a storage capacity of 56 ML, is located at the northern end of the **Passive** Tailings Storage Facility (PTSF) and is designed to manage runoff and water collected from a tributary of Cadiangullong Creek.*	As above.
3.3.5.2	Tailings Storage Facilities Western Zone	*Surface water is monitored at the following sites in TSF western zone:* - *Watercourses: CAWS61, **CAWS62**.*	CAWS62 is not a western location, it is south of the STSF at the confluence of Cadiangullong Creek and Rodds Creek (note this is also incorrectly identified in the Acid Mine Drainage addendum report).
	Tailings Storage Facilities Western Zone	*Sites CAWS61, CAWS67, and CAWS68 show elevated levels of salinity-related parameters, such as EC, TDS, bicarbonate alkalinity, sulfate, calcium, and magnesium, with TDS and EC values exceeding 4,000mg/L and 5,000 µS/cm, respectively, during peak years (notably pre-2020).*	CAWS61, CAWS67 and CAWS68 do not show TDS or EC values close to 4000mg/L or 5,000us/cm respectively. Average TDS ~1,200mg/L, EC average 1,100us/cm, as shown in graphs on page 149 of the Hydrobiology report.
	Tailings Storage Facilities Western Zone – Key Observations and Implications	*The TSF Western Zone sites exhibit moderate to elevated variability in water quality parameters and trace metals, consistent with their proximity to tailings infrastructure and exposure to seepage pathways.*	These dams in the western zone are classified as mine-affected runoff dams, not seepage dams. These dams are part of the site water capture systems and returns water back to the process.
	Tailings Storage Facilities Southern Zone	*Surface water is monitored at the following sites within the TSF southern zone:* *• Watercourses: CAWS28, CAWS30, CAWS55, CAWS59, CAWS63, 412702.* *• Surface water storages: CAWS31, CAWS41, **CAWS54, CAWS56, CAWS57.***	CAWS54, CAWS56, CAWS57 are not surface water storages. They are watercourse locations, representing tributaries to Rodds Creek.
	Tailings Storage Facilities Southern Zone – General Water Quality Parameters	*CAWS41 stands out with some of the highest sodium, sulfate, and EC values compared to other TSFSZ sites, indicating stronger or more direct seepage pathways.*	CAWS41 EC does not stand out; it averages ~1,900us/cm and is comparable to surrounding locations, as shown in graph on page 151 in the Hydrobiology report. CAWS41 is designed to capture seepage.

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Report Section	Section Title	Hydrobiology Comment	Cadia Comment
		Salinity-related parameters (EC, TDS, sulfate, sodium, total hardness) are consistently elevated [1]across most sites, particularly CAWS30, CAWS55, CAWS56, and 412702. EC values generally range between 1,500 and 3,000 µS/cm, while TDS and sulfate show parallel elevation patterns with strong clustering around 1,000–2,000 mg/L.	CAWS55 EC is not elevated comparatively – the original environmental impact statement[1] for Cadia Hill Pit demonstrates that Rodds Creek at Panuara Road was exhibiting ECs between 1500-2500us/cm in 1994/1995 pre mining (See Table I-11 in the Cadia Project EIS 1343 Vol 3 Appendix I).
	Cadia Dewatering Facility – key observations	*The potential influence of the Cadia dewatering facility has been observed based on elevated concentrations of copper and molybdenum at the monitoring sites within close proximity of the facility.* ***CDW03 appears to be the most reactive site*** *in terms of water chemistry variability and episodic metal spikes, possibly due to its location, proximity to discharge infrastructure, or influence from operational fluctuations.*	CDW03 is the upstream Belubula location, this is a background receptor, not a downstream receptor of the Cadia Dewatering Facility (CDF). As with many of our comments, it is concerning that Hydrobiology has made such a basic but material error.
4.2.1	Table 4-1	*Monitoring drawdown associated with production bore* ***RH64***	Process Facilities – incorrect identification: RH64 should be RH641
4.5.2.1	General Water Quality Indicators	*Electrical Conductivity (EC) levels at MB93 commonly exceed 5,000 µS/cm, with maximums reaching 7,200 µS/cm, compared to <1,500 µS/cm in background bores (e.g., MB90). This indicates a persistent saline influence in the Cadia Hill Pit groundwater system, likely related to tailings seepage and mineralised geological inputs.* *Total Dissolved Solids (TDS) at MB93 typically range from 3,200 to 4,800 mg/L, whereas background TDS levels are generally below 1,000 mg/L. These values further support the presence of concentrated dissolved ions in the pit-affected zone.*	Incorrect analysis of data for MB93. Results stated do not align with the results in the data provided and associated statements are incorrect for EC, TDS, cations, anions, manganese for MB93. MB93 EC averages 2,080 us/cm, max EC recorded is 2,720 us/cm in 2018. Note this is also incorrectly identified in the acid mine drainage addendum report. MB93 TDS average is 1,635 mg/L, maximum recorded is 2,580mg/L. See conductivity and TDS graphs on page 160 of the Hydrobiology report, showing EC for MB93 below 3,000us/cm and TDS for MB93 below 3,000 mg/L.

[1] Woodward-Clyde (1995) EIS 1343 Vol 3_AB020030.pdf

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Report Section	Section Title	Hydrobiology Comment	Cadia Comment
4.5.2.3	General Quality Parameters	*Electrical Conductivity (EC) and Total Dissolved Solids (TDS) are consistently high across most bores (notably MB86, MB84), with values often exceeding 5,000 µS/cm and 6,000 mg/L respectively.*	Incorrect analysis of MB84 EC results, averaging 2,000ug/cm and max at 2,380 ug/cm, as shown in graph in appendix of the Hydrobiology report, page 166.
4.5.2.4	Dissolved Metals and Metalloids	*Manganese, nickel, cobalt, and cadmium show sporadic elevations, again consistent with TSF influence. MB26B and MB83 are notable for high manganese (up to ~80 mg/L in isolated events).*	This conclusion reached about MB26B manganese does not align with results in the data provided by Cadia. Average manganese at MB26B is 0.22mg/L. Maximum recorded is 0.3mg/L. This conclusion reached about MB83 manganese does not align with results in the data provided by Cadia. MB83 average manganese is 0.6mg/L, max recorded at 2.01 mg/L. See manganese graph in Appendix of the Hydrobiology report on page 163 which does not align with the statement made by Hydrobiology.
6.1.2	STSF	*STSF has an existing seepage collection system that includes the **Southern Leachate Dam (SLD)** and collection ponds.*	Southern Leachate Dam is not relevant to STSF. It captures runoff from the SWRD and is not associated with the STSF. This is an incorrect association and needs to be corrected.
6.1.4.1	Seepage Pathways	*Historical seepage observations from the downstream toes of the NTSF (early 2000s) and subsequent reports of preferential flow paths in STSF foundations (including during Stage 7 works) indicate that groundwater expression resulting from seepage is an ongoing feature around these facilities. This is supported by elevated water levels and observable discharge zones downstream **(e.g., Southern Leachate Dam).***	Again, this is an incorrect reference to southern leachate dam – this is an incorrect association and shows that Hydrobiology has a lack of understanding of the site water management structures and their roles.
	Groundwater-Surface Water Connectivity	*Despite the assumptions in pit backfilling approvals (Mod 11 -13) that the Cadia Hill Pit would remain a long-term groundwater sink, hydrochemical trends suggest at least transient periods of hydraulic reversal and contaminant*	MB95 is incorrectly described as a bore "in proximity to pit". MB95 is in fact installed inside the pit shell to monitor water quality and level within the PTSF.

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Report Section	Section Title	Hydrobiology Comment	Cadia Comment
		mobilisation. Groundwater bores in proximity to the pit (e.g., MB91, MB93, ***and MB95)*** *show elevated arsenic, iron, manganese, and sulfate levels since 2020, which may reflect local expression of tailings pore water or decant seepage migrating through fractures or weathered regolith.* *In particular,* ***MB93*** *show increasing trends in arsenic (peaking ~0.06 mg/L) and iron (~5–6 mg/L) since 2020, consistent with pit lake elevation rise and lateral migration.*	The referenced results for MB93 are wrong– results for iron do not aligned with data. Average iron is 1.7mg/L, max at 3.6mg/L. See graph on page 159 of appendix of the Hydrobiology report.
6.2.1.1	Groundwater Discharge and Hydraulic Connectivity	*At Cadia Hill Pit, monitoring bores adjacent to the pit (e.g., MB93,* ***MB94****) indicate rising concentrations of arsenic, iron, and manganese since tailings deposition commenced, suggesting lateral migration of impacted water.*	MB94 is incorrectly identified as bore "adjacent to the pit". MB 94 bore was installed inside the pit shell to monitor water quality and level within the PTSF.
6.3		*Figure 6-1 presents temporal trends of four key water quality parameters (Copper, Molybdenum, Zinc, and Electrical Conductivity) across multiple monitoring sites along Cadiangullong Creek, spanning from upstream (e.g., CAWS0, CAWS2) to downstream locations (e.g., 412161,* ***412168****).*	412168 is incorrectly referenced as a downstream location. This is the northern-most location on Cadiangullong Creek, upstream of mine site. All interpretations in the Hydrobiology report referencing results to this location are incorrect.
	Zinc	*A mild increasing trend is evident in downstream sites (notably 412161 and CAWS78) around 2020–2022, corresponding to the timing of increased groundwater expression and tailings related activities.*	Discussion does not match what the graph depicts on page 126 (Fig 6-1) and in appendix graphs (page 144 and 152) of the Hydrobiology report. No consistent trend is evident.

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The report makes several recommendations for improvements to the monitoring network, though these are largely based on the shortcomings and inaccuracies noted above. Cadia's responses to each recommendation are provided below.

Table 3 - Report Recommendations

Aspect	Hydrobiology Recommendation	Cadia Response
Surface Water	Clearly define the role of each site in the monitoring network and improve site selection to support impact assessment.	Accept - The purpose and rationale behind selected monitoring sites is outlined in the applicable reports in the EIS. Adequacy of monitoring network has been assessed continually, with refinements made and documented through Water Management Plan (WMP) revisions. Stronger definition can be included in WMP.
	Establish paired control-impact site design, using hydrologically and geochemically comparable sites to enable statistically defensible assessments of change attributable to mining activities.	Accept - See response above.
	Review and update site classification in line with current catchment conditions and operational changes, ensuring control sites are not affected by legacy or external influences.	Reject - All sites in the region are affected by legacy or external influences such as legacy mining, forestry or agriculture. Hydrobiology does not take into account the operational setting within a disturbed rural setting. The purpose of the monitoring program is to identify any change in conditions from upstream to downstream of the mine site and compare these against set criteria to determine if there is potential for impact to downstream receptors.
	Apply formal statistical techniques to assess long-term changes and identify spatial patterns.	Reject. This is already done as a part of the updates to the surface water and Groundwater model. These reports are publicly available and could have been accessed by Hydrobiology or requested by the EPA.
	Incorporate multi-year comparisons and predictive modelling into Annual Review to support adaptive management and forecasting of water quality conditions.	Reject. As above, this is done as a part of the updates to the Surface Water and Groundwater models. These reports are publicly available and could have been accessed by Hydrobiology or requested by the EPA.
	Maintain year-round coverage at legacy or low-flow sites to improve dataset continuity and robustness of upstream/downstream comparisons.	Reject. Legacy sites are covered (pre-2010 to before mining occurred), low flow sites are sampled when there is presence of water. Otherwise, they cannot physically be sampled. This recommendation is not logical. Field data sheets are maintained to show when monitoring is unavailable due to dry

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Aspect	Hydrobiology Recommendation	Cadia Response
		conditions.
	Improve documentation and application of SSGVs, including their derivation and geographic relevance.	Accept – Cadia agrees to conduct a holistic review of SSGVs, in the context of environmental risk.
	Ensure that all SSGV derivations and technical justifications are clearly referenced and appended in annual reporting (e.g., AEMRs).	Reject. The Annual Review is not the place for this. SSGV's are referenced in the WMP and the Annual Review is reporting against the plan.
	Avoid relying solely on operationally influenced sites (e.g., 412702) for deriving Site-Specific Guideline Values (SSGVs), as this may not reflect conditions protective of environmental values. Instead, where feasible, adopt a scientifically defensible approach consistent with ANZG (2018) by identifying and utilising minimally impacted, ecologically comparable reference sites with at least 24 months of continuous monitoring data. Where suitable reference sites are unavailable, SSGVs should only be used as site management benchmarks, not as ecological risk thresholds, and clearly differentiated from triggers derived from laboratory or field-based biological effects data.	Accept – As above, Cadia agrees to conduct a holistic review of SSGVs, in the context of environmental risk.
	Strengthen the reporting of QAQC outcomes to improve transparency and support data confidence.	Reject - Already incorporated. Monthly assessments of QA/QC data performed by an independent consultant.
	Standardise data entry protocols, ensuring consistent use of LOR/LOD flags (e.g. "<LOR" rather than zero values), and streamline database formats for usability.	Reject – This already occur as part of the QA/QC process and entry to the environmental database.
	Require routine QA/QC reporting, including summaries of field duplicates, blanks, relative percent difference (RPD), and laboratory recovery rates.	Reject - Already incorporated. Monthly assessments of QAQC data performed by an independent consultant.
	Integrate QA/QC performance outcomes directly into data interpretation and exceedance assessments.	Reject - Already incorporated. Monthly assessments of QAQC data performed by an independent consultant.
	Combine streamflow and concentration data to calculate contaminant fluxes across catchments and within hydrologically connected zones.	Accept – Included in modelling updates.
	Develop mass balance models to evaluate cumulative contaminant fluxes across catchments and within hydrologically connected zones.	Reject - Cadia is a zero discharge site. It is unclear how contaminant fluxes would help define management recommendations.
	Install gauging stations at hydrologically significant but currently unmonitored locations (eg. rejoining creek channels) to assess baseflow and flow continuity.	Partially accept - To be considered in relation to ecosystem disturbance vs benefit.

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Aspect	Hydrobiology Recommendation	Cadia Response
	Develop and implement an event-based sampling protocol, including triggers (eg. rainfall thresholds, infrastructure overflows), site priorities and sample timing.	Reject - WMP stipulates event-based sampling for controlled and/or uncontrolled infrastructure overflows. Cadia is a zero discharge site. There is no evidence to support how this would help define management recommendations.
	Incorporate event-derived data into compliance assessments and risk evaluations to better capture episodic impacts and worst-case scenarios.	Reject - Uncontrolled and controlled overflow event conditions are stipulated in the EPL.
	Strengthen integration of water quality data with ecological outcomes.	Accept – Already included in FY26 aquatic ecology program.
	Establish formal linkages between water quality exceedances and macroinvertebrate/ecological health indicators to enhance ecological risk interpretation.	Accept – Already included in FY26 aquatic ecology program.
	Develop ecological risk frameworks that align exceedance thresholds with potential ecological consequences, particularly for toxicants of concern (e.g., metals, nitrogen species).	Reject – This is adequately covered in the current aquatic ecology program.
	Update and Modernise Monitoring Parameters.	Reject – This occurs periodically. Analytical suites are reviewed annually by consultants completing water assessments. Any recommendations are made in these assessments.
	Expand the current suite of analytes to include Dissolved Organic Carbon (DOC) and apply hardness correction for metals, in line with emerging ANZG guidance. Specifically, apply DOC and hardness corrections to test site data when comparing to DGVs (this is no longer applies for copper), as these are based on biological effects data and require adjustment for local water chemistry. Do not apply DOC or hardness corrections when comparing monitoring data to Site-Specific Guideline Values (SSGVs), as SSGVs reflect naturally elevated concentrations from minimally impacted reference sites and are not derived from biological effects data.	Accept – to be considered during SSGV review.
	Regularly review the parameter list to address emerging contaminants and refine monitoring based on updated site-specific risk profiles. Build Transparency into Methods and Personnel Competency.	Reject – This occurs periodically. Analytical suites are reviewed annually by consultants completing water assessments. Any recommendations are made in these assessments.
	Include clear documentation of sampling methodologies, equipment calibration,	Reject - Annual Review is not the place for this level of detail. The WMP defines

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Aspect	Hydrobiology Recommendation	Cadia Response
	chain-of-custody procedures, and sample handling processes in the Water Management Plan and AEMRs.	sampling methodology and standards required to be met. Procedures are supporting documents, not required to be attached the WMP. The WMP is an approved document, procedures are internal documents that rely on ability to update as equipment, software, laboratories change.
	Specify field team qualifications and roles to ensure accountability and build confidence in data quality and interpretation.	Reject. This is not standard practice, for example, Hydrobiology have not provided this level of detail to support their review.
Groundwater	Establish a comprehensive framework for bore network design, clearly defining each bores' purpose (e.g., compliance, observation, background) and hydrogeological context.	Accept - The purpose and rationale behind selected monitoring sites is outlined in the reports in the EIS. Adequacy of the monitoring network has been assessed continually, with refinements made and documented through the WMP revisions based on reviews and updated modelling. Stronger definition to be included in WMP.
	Develop formal site selection rationale for each bore, clearly describing role and hydrogeological context.	Accept - The purpose and rationale behind selected monitoring sites is outlined in the reports in the EIS. Adequacy of the monitoring network has been assessed continually, with refinements made and documented through the WMP. WMP revisions are based on reviews and updated modelling. Stronger definition to be included in WMP.
	Maintain an up-to-date network design map and register detailing bore status, history of installation, replacement.	Accept – Historical bore installation details and addition of bores drilled in past 12 months to be added to register.
	Ensure bore-specific information is consistently documented in annual reports and relevant appendices.	Reject - The Annual Review is not the place for this, this is part of the WMP
	Retrieve and compile legacy groundwater data (pre-2010) to extend baseline assessments and distinguish operational impacts.	Reject - Data pre-2010 is readily available and used to assess monitoring results and set SSGV's. It was not requested as part of this review.
	Acknowledge current limitations in historical coverage and clearly distinguish between baseline and operational phases in trend assessments.	Reject - There is no limitations in historical coverage. Data pre-2010 is readily available and used to assess monitoring results and set SSGV's. It was not requested as part of this review.
	Standardize groundwater datasets, ensuring consistent use of units, analytical names, qualifiers (e.g., <LOR), and centralized data management for QA/QC traceability.	Reject - Database management is standardized. Hydrobiology requested and were provided an unformatted output from the database and were expected to format as required.

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Aspect	Hydrobiology Recommendation	Cadia Response
	Apply statistical and trend analyses (e.g., Mann-Kendall, PCA) to long-term groundwater data to identify changes, detect contaminant sources, and assess spatial groupings.	Reject – Statistical analysis are performed as a part of the longer term reviews and model updates.
	Strengthen QA/QC protocols, including regular reporting of duplicate precision, blank contamination, and laboratory control performance, and integrate QA/QC results into the core dataset.	Reject – Already implemented, monthly assessments of laboratory analysis is already being conducted by an independent consultant.
	Refine the use of SSGVs by: − Clearly differentiating between guideline triggers and true SSGVs. − Developing SSGVs for both elevated and low-concentration bores to improve early detection of risk. − Implementing a two-tiered SSGV approach: observation bores for non-toxicants (e.g., TDS, sulfate), and compliance bores for toxicants. − Adopting dissolved molybdenum as a tracer of tailings seepage due to its elevated concentrations in TSF decant water	Accept – Cadia agrees to conduct a holistic review of SSGVs, in the context of environmental risk.
	Align groundwater assessments with surface water monitoring to better understand interactions, especially in areas with known seepage or expressed groundwater.	Reject – This recommendation is already being implemented and available in the most recent FY25 Annual Review.
	Ensure consistency in data interpretation and conclusions across all reporting documents to support robust, evidence-based environmental management.	Reject - Data interpretation is independently completed by consultants and is evidence based environmental management.
Aquatic Ecology	Redesign the monitoring network to ensure inclusion of ecologically valid reference sites and clear definition of site roles.	Reject - The purpose and rationale behind selected monitoring sites is outlined in the EIS. Adequacy of monitoring network has been assessed continually, with refinements made and documented through water management plan revisions.
	Review and clarify the roles of all sites in the monitoring network, explicitly identifying reference, control, impact, and downstream locations.	Reject - The monitoring network is as designed as part of the original EIS and based on monitoring undertaken pre-mining.
	Consider relocating or adding new reference sites that are ecologically and hydrologically comparable to test sites and less affected by regional land use.	Reject - Regional land use is an inherent baseline condition of contextualizing the area. The objective is to monitor the potential for impacts from the mining operation. It is not to monitor and identify other land use impacts occurring within the catchment, such as from forestry or agriculture operations.

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Aspect	Hydrobiology Recommendation	Cadia Response
	Formalize the program's conceptual model, incorporating hydrological connectivity and known pressures.	Reject – The program is informed by hydrological connectivity, baseline data, with understanding reviewed in annual assessments and EIS submission.
	Apply formal statistical analysis, including trend detection and power analysis, to improve the sensitivity of impact detection (time-series modelling, mixed effects frameworks and power analyses).	Reject – This is already implemented. Principal Component Analysis (PCA) as well as univariate and multivariate analysis statistical methods are used for interrogation of the datasets and presented in the Aquatic Ecology reports.
	Strengthen QA/QC frameworks across all program components, including taxonomic verification and observer calibration.	Reject – This is conducted under standard work methods by the suitably qualified consultants engaged to conduct the monitoring.
	Standardise the collection, archiving and reporting of field sheets, chain-of-custody forms and photographic records.	Reject – This is conducted under standard work methods by the suitably qualified consultants engaged to conduct the monitoring.
	Integrate datasets (e.g. habitat, chemistry, and biology) using multivariate and causal modelling techniques to support more robust causal interpretations of ecological condition.	Reject – This is already implemented. Principal Component Analysis (PCA) as well as univariate and multivariate analysis statistical methods are used for interrogation of the datasets.
	Extend statistical analyses beyond descriptive summaries, particularly for fish and platypus data.	Reject – This is already implemented. Principal Component Analysis (PCA) as well as univariate and multivariate analysis statistical methods are used for interrogation of the datasets.
	Explore environmental drivers of observed ecological patterns, ensuring interpretations are supported by data.	Reject – This is already implemented. Principal Component Analysis (PCA) as well as univariate and multivariate analysis statistical methods are used for interrogation of the datasets.
	Implement previous recommendations, including replicate sampling, improved species identification protocols, and consideration of environmental DNA (eDNA) methods.	Reject – This is already implemented. Principal Component Analysis (PCA) as well as univariate and multivariate analysis statistical methods are used for interrogation of the datasets.
TARPS	Timeliness and Transparency of Level 2 Responses: While TARPs provide a mechanism for escalation, documentation and transparency around the timing of Level 2 responses and reporting are limited. Regular reporting on the *outcomes of Level 2 investigations* and the *effectiveness of implemented mitigation* should be standardized to demonstrate accountability.	Reject - The outcomes of level 1 and level 2 investigations are included in the SW/GW Annual Reviews completed by independent consultants.
	Linkage to Incident Management and Emergency Protocols: Recommendation: Develop a formal procedure that clearly	Partially Accept. The TARP to be updated in the next WMP review to provide pathway to progress to the Pollution

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Aspect	Hydrobiology Recommendation	Cadia Response
	outlines how TARPs escalate into PIRMP actions during acute pollution events. This should include cross-referencing key personnel responsibilities, communication pathways, and timelines to ensure seamless integration of TARP triggers within broader emergency response frameworks.	Incident Response Management Plan (PIRMP).
	Establish a protocol to ensure that all significant rainfall, flooding, and operational upset events automatically trigger TARP responses and event-based sampling. Incorporate the resulting data systematically into regular reviews of water quality risk assessments, trend analysis, and TARP trigger evaluations.	Reject - Operational upsets are already triggered by incidents response and the PIRMP.
	Conduct a formal review of all current SSGVs and reference site selections, ensuring alignment with ANZG (2018) guidelines. Clearly document the derivation method, data sources, and justification for reference site selection. Where uncertainty exists, prioritise developing new SSGVs using appropriate minimally impacted sites and sufficient datasets.	Accept – Cadia agrees to conduct a holistic review of SSGVs, in the context of environmental risk.
	Operational Feedback Loops: Implement a formal operational feedback mechanism that requires any TARP trigger activation to be reviewed for potential infrastructure or operational adjustments (e.g., sediment basin capacity, stormwater diversion improvements, or tailings water management). Document all reviews and decisions within regular water management reports to demonstrate adaptive management and continuous improvement.	Reject – TARPs are internal documents that are managed and updated to adjust to operational requirements. Each TARP update goes through an internal Management of Change process which documents decisions.

In addition, detailed commentary on specific sections is included in **Appendix 1.**

Should you have any further queries regarding this matter, please do not hesitate to contact me.

Sincerely,

David Coe
Director- Environment

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Appendix 1 – Detailed Review of Hydrobiology Report

Section Number	Section Subheading	Cadia Commentary
Exec Summary	Aquatic Ecology – Key Findings: *Reference site limitations: All nominated reference or upstream sites are affected by land uses such as forestry, grazing, and past channel modification. These sites do not meet the criteria for minimally disturbed conditions and are ecologically distinct from mine-affected locations. This undermines the ability of the program to confirm whether observed impacts are caused by mining.*	There is no location in Cadiangullong Creek that would meet this criteria. This is clearly highlighted in section 2.2.2.1.
1.1	Scope: - *develop a conceptual site model that identifies, and estimates the magnitude of, any pollutant pathways from CVO to groundwater and waterways.*	This has not been done in this Hydrobiology report. This process would assist Hydrobiology to understand the conceptual site processes.
1.4	Data Analysis and Evaluation: *Statistical tools (e.g. trend analysis, comparison to reference sites, and significance testing) were used to support evidence-based findings. Visual tools such as time-series plots were also generated.*	The Hydrobiology report states statistical tools were used. Beyond time series plotting and directional trend determination, there is no evidence of statistically significant analyses having been done.
	Conceptual Site Model Review: *The conceptual site model (CSM) was reviewed and updated based on available data and field conditions. The CSM was used to:* *• Identify and map potential pollutant pathways* *• Characterise source–receptor relationships* *• Support risk assessment and management recommendations*	No evidence of this in the Hydrobiology report.
3.0	The assessment is informed by a range of documents, including: *• Cadia Water Management Plan (2023)* *• Review of Surface Water and Groundwater Data - 2010/2011 AEMR* *• CVO ANZECC Water Quality Assessment Review Report (GHD, 2016)* *• CVO AEMR - Surface and Groundwater Assessment Report (GHD, 2019)* *• CVO AEMR - Surface and Groundwater Assessment Report (GHD, 2020)* *CVO AEMR 2020-2021 Surface Water Assessment (GHD, 2021)*	All data is available publicly in the EIS's, Modifications, Annual Reviews and Modelling updates. It is unclear why certain documents were chosen and others not. For example the most recent Surface Water Assessments from 22-23 and 23-24 were not reviewed and neither were the Groundwater, Surface Water and Aquatic Ecology assessments from the 2009 EIS.

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	• *CVO Annual Review 2021-2022 Surface Water Assessment (GHD, 2022)* • *Cadia Valley AEMP Water quality trigger value review for Oaky Station (412702) (GHD, 2018)* • *Annual Environmental Management Reports (AEMRs) from 2011–2024* • *Section 4 of the Cadia East Project Approval Environmental Assessment (2009)*	
3.2	Table 3-1: 1. 412144: Streamflow reference; compliance for dam release 2. SCBW3: Baseflow reduction assessment	412144 is not the compliance site for dam release. Compliance for release criteria is based on Oaky Creek gauging station 412702 and Forestry gauging station 412168. SCBW3 was decommissioned in 2016.
3.2.1	*During the site inspection, considerably low surface flows were observed in Cadiangullong Creek at the location where the diverted channel rejoins the natural creek. Notably, there is no gauging station installed at this hydrologically critical point, which limits the ability to verify flow continuity or detect baseflow inputs. In contrast, at site 412161, located further downstream, a visibly higher flow was observed, suggesting the possible presence of an additional hydrological input between the two locations. As there are no known tributaries within this section of Cadiangullong Creek, one hypothesis is that groundwater discharge may be contributing to increased baseflow.*	This is based on visual observation, not scientific data. Delayed effect through creek is generally observed and supported by measured streamflow data. The site visit did not include any visual observations of the creek between SW005 and Oaky creek. Hydrobiology did not visually inspect a 12 km section of the creek which spans between Ore Processing and Oakey Gauging Station. To use the words Hydrobiology uses for other claims in this report *"conclusions are based on inference rather than evidence, weakening the credibility of statements".*
3.3.1.1	Table 3-2	Missing PFAS suite in accordance with EPL.
	Table 3-4 Waste Rock Dumps: CAWS52 – only seasonal monitoring.	Rodds Creek Dam is monitored monthly. The additional of B/G algae testing is seasonal.
	Table 3-4 General	"Adequacy" deemed "adequate" for all, yet there are comments regarding deficiencies. This appears contradictory. Comments regarding reference sites – these do all represent 'baseline' conditions, i.e.. Reflective of activities that would be occurring if mine wasn't present.

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	Comparability Issues: Similarly, sites that appear to have been intended as controls and those labelled as reference sites are also degraded by various factors which reduces their validity as a baseline for comparison.	Cadia's remit is to identify potential impacts from Cadia mining operations. The program is not intended to identify degradation associated with other impactful land uses like forestry or agriculture.
	Table 3-5 Control Site	Control sites are upstream locations. This is the same purpose, using a different name.
3.3.3	*Methods and QAQC: However, based on the review of available documentation, including AEMRs and the Water Management Plan, detailed descriptions of sampling procedures, analytical protocols, and QA/QC processes are limited or not explicitly stated.*	Hydrobiology had the option to ask for procedures or review documents during their site visit. Hydrobiology failed to request these documents. The AEMR is a high level annual report for external and community stakeholders. Procedures are internal documents for undertaking tasks. Cadia has separate procedures for monitoring and it is not a not a requirement to include these in the WMP or Annual Reviews. It is the responsibility of the reviewer to request documents that may be relevant to their review.
3.3.3.1	*However, the reviewed documents do not provide sufficient information on:* *• Specific sampling techniques (e.g. sample preservation, equipment, handling),* *• QA/QC practices in the field (e.g. field blanks, duplicates),* *• Laboratory accreditation (e.g. NATA) or analytical methods used,* *• Chain-of-custody protocols or sample storage conditions.* *As a result, while the program likely follows standard protocols, the absence of clearly documented methodologies limits the ability to fully evaluate the reliability, consistency, and regulatory defensibility of the surface water data.*	Hydrobiology had the option to ask for procedures or review documents during their site visit. Hydrobiology failed to request these documents. The AEMR is a high level annual report for external and community stakeholders. Procedures and methodologies are internal documents for undertaking tasks. Cadia has separate procedures for monitoring and it is not a not a requirement to include these in the WMP or Annual Reviews. It is the responsibility of the reviewer to request documents that may be relevant to their review. Cadia supplied, upon request, multiple examples of laboratory work order chain of custody validation certificates, as well as documents evidences the laboratory NATA accreditation, and quality control reports.
3.3.3.2	Personnel Competency and Data Handling Transparency: *While the reviewed reports occasionally mention that sampling was undertaken by suitably qualified personnel, they generally lack specific detail regarding the roles, qualifications, or professional*	This is not standard practice, and is evidenced by Hydrobiology not providing evidence of qualifications of the authors of their review in their own report. Responsibilities for monitoring and management is outlined by position in the WMP. Monitoring processes are

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	backgrounds of those involved in field data collection, data management, or interpretation. Personnel information, where provided, is typically limited to document preparation and internal review acknowledgements under document control sections. *To improve transparency and confidence in methodological rigour, future reporting should include clear documentation of field team roles, training, and relevant qualifications.*	completed in accordance with Australian Standards.
3.3.3.3	QAQC: *Specifically, details such as the frequency and resolution of field duplicates, performance of blanks, and relative percent difference (RPD) summaries from laboratory quality checks are not consistently presented or statistically summarized in the reviewed documents. This limits the ability to independently assess data quality and interpret trends with confidence.*	The WMP Section 8.3 details the field duplicate frequency rate of sampling. Cadia also conducts calibration of field instrumentation before each sampling round, as detailed in the procedure and recorded on file. Routine laboratory QA/QC methodologies are reviewed and assessed. The WMP has an approved duplication sampling frequency rate. QA/QC processes meet the Australian Standards. Hydrobiology doesn't provide any references or standards to support these statements.
3.3.4.1	Review of derivation and use of SSGVs: *Notably, the revised SSGVs were derived exclusively from data at site 412702, which may already be influenced by operational activities, rather than from minimally impacted reference sites.*	GHD revised the SSGVs for 412702 using specific data for the site dating back to 2001, i.e. reflecting actual background data, and pre-mining data. Which the Hydrobiology report acknowledges in the preceding paragraph.
3.3.5.1	*Where analytical results were reported as below the limit of reporting (LOR), the LOR value was conservatively adopted in the statistical analysis to maintain data integrity and enable consistent trend comparisons.*	LOR adoption - That is very conservative for some analytes and will give skewed results as there are analytes with more than 50% of results that are less than the LOR. This adopted process is not best practice in accordance with the ANZG 2018 guidelines, where results of half the LOR or a non-parametric method would be more appropriate.
3.3.5.2	Cadia Hill Pit: *The two sites associated with the Cadia Hill Pit area, CAWS46 and CAWS65, demonstrate distinctly different water quality patterns over time, with CAWS65 showing elevated concentrations for a range of parameters in recent years (Appendix A). This suggests varying levels of influence from pit-related*	CAWS65 is the PTSF decant water (i.e. process water that is transferred with the tailings) which is fully recovered for operations. Data is available from 2018 because this is when the pit tailings deposition commenced. Prior to this it was the open cut. Parameters for CAWS65 show marked increased around 2018-2019 because

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	seepage, legacy contamination, or operational discharges. Monitoring data for site CAWS65 is only available from 2018 onwards.	that's when it became a tailings facility rather than an open cut that collected rain water. Once again, it is concerning that Hydrobiology does not know these basic historical facts about the Cadia operation.
	Cadia Hill Pit: Key Observations and Implications: *The divergent water quality patterns between the two sites, particularly post-2018, reinforce the value of maintaining both locations in the long-term monitoring program.* ***CAWS65 may serve as an indicator of current pit-related impacts,***	CAWS65 is <u>not</u> an indicator of pit related impacts, it is the tailings decant. These are not impacts to the environment as this is process water and is fully recovered for processing. Hydrobiology have misrepresented the process water management system as the receiving environment. This is a material error and must be corrected.
	Ore Processing Area: *The SROP is clay lined and captures site runoff and leakage from the processing plant.*	The process plant is not "leaking". This terminology is incorrect and concerningly misleading. The Site Runoff Pond (SROP) captures run-off from active operations areas as it is designed to do.
	Ore Processing – Key Observations and Implications *Site CAWS73 exhibits distinctly different water quality characteristics compared to CAWS78 and CAWS79****, likely*** *reflecting its location within the mine water management system and the influence of process water recirculation, rather than natural surface water inputs.*	CAWS73 is process water captured in the SROP as opposed to the receptor being Cadiangullong Ck. CAWS73 is not "likely", but "definitely" reflecting water quality of the processing plant, as it is supposed to be being part of the process water capture and return system. Discussing these locations in the same context is misleading.
	Waste Rock Dumps – General Water Quality Parameters/Key Observations and Impact *Site CAWS35 consistently records the highest levels of salinity indicators, including EC, TDS, sulfate, and major cations (Ca, Mg, Na, K). EC values often exceed 4,000 µS/cm, and TDS values approach or surpass 5,000 mg/L, particularly from 2010 to 2018, with a gradual decline observed more recently. CAWS34 and CAWS37 show moderate levels of salinity indicators, including EC, TDS, sulfate, and major cations (Ca, Mg, Na, K).* *Site CAWS52 shows emerging increases in parameters such as*	CAWS34 and CAWS35 are designed to capture runoff from the WRDs and return the water to the process water stream. These basins are designed for storm events Hydrobiology's discussion fails to conclude the key observation of trends not being reflected at the associated Cadiangullong Creek monitoring location. This is a material omission and must be corrected.

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	molybdenum and pH, warranting closer observation.	
	Tailings Storage Facilities Eastern Zone – General Water Quality Parameters: *Surface water monitoring data from sites CAWS42, CAWS43, and CAWS60 in the TSF Eastern Zone reveal elevated and variable water quality parameters consistent with interactions between surface drainage and tailings-affected waters*	CAWS42 and CAWS43 are NTSF and STSF decants respectively. As such they are recovery points for process water not representative of general water quality. CAWS43 vs CAWS60is discussing process water and environmental points. The Hydrobiology discussion and report needs to clearly differentiate between internal process water that is contained and environmental water. This error is material and must be corrected.
	Tailings Storage Facilities Western Zone – Key Observations and Implications *Possible influence of TSF decant or drainage is evident at some dams along western side*	These statements are in relation to the internal water system which is expected, for the purpose of those dams. Hydrobiology fail to make conclusions with respect to water quality at the receiving environment of Cadiangullong Creek (CAWS61 location). Once again, this is a material error that must be corrected.
	Tailings Storage Facilities Southern Zone	Hydrobiology has not reviewed these results in relation to baseline conditions, original pre-mining datasets.
	Tailings Storage Facilities Southern Zone – General Water Quality Parameters *CAWS41 stands out with some of the highest sodium, sulfate, and EC values compared to other TSFSZ sites, indicating stronger or more direct seepage pathways.*	CAWS41 dam is listed in the water management plan as mine affected/seepage. Its purpose is to capture water and return to the water management system. In discussion points Hydrobiology fails to distinguish between managed water onsite and environmental receivers. Once again, a material error by Hydrobiology.
	Tailings Storage Facilities Southern Zone – Dissolved Metals *Aluminium, arsenic, iron, copper, molybdenum, manganese, nickel, and zinc are frequently detected, with CAWS41 and CAWS55 showing the most pronounced peaks.* *Site 412702, generally exhibits moderate metal concentrations, suggesting it integrates broader TSF impacts.*	Pronounced metal peaks described for CAWS55 and CAWS41 are not reflected in the graphs on page 150 in the appendix of the Hydrobiology report.
	Tailings Storage Facilities Southern Zone – Key Observations and Implications *The TSF Southern Zone exhibits persistent chemical signatures of tailings-related seepage, with CAWS41,*	CAWS41 is a defined mine affected seepage dam, that's designed to capture and manage seepage from the TSF. Hydrobiology once again fails to make this clear in their discussions. There

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	CAWS55, and CAWS30 demonstrating the most affected profiles.	repeated errors are very concerning and must be corrected. CAWS55 and CAWS30 represents Rodds Creek, downstream of ST14 and EC at these locations average at 1,800-2,000us/cm. If the original EIS had been reviewed by Hydrobiology, it would be clear that water quality at this location has historically reflected metals, elevated EC, and ions. Cadia rejects the conclusions as described by Hydrobiology and requests that Hydrobiology review their assessment and report and make corrections where required.
	Turbidity and TSS show isolated spikes, especially at CDW05, possibly indicating ***short-term runoff or sediment mobilisation*** *during rainfall or maintenance activities.*	The statement "possibly indicating short-term runoff or sediment mobilisation during rainfall or maintenance activities" is incorrect. Cadia is a zero discharge site. There are many other mechanisms for spikes, such as runoff from the public road.
	Cadia Dewatering Facility – key observations *CDW03 appears to be the most reactive site in terms of water chemistry variability and episodic metal spikes,* ***possibly due to its location, proximity to discharge infrastructure****, or influence from operational fluctuations.*	Cadia does not have discharge infrastructure. Cadia is a zero discharge site. CDW03 is upstream of the site and monitored as a background location. Influences at this location cannot occur from the CDF. Once again these material errors are very concerning and must be corrected.
3.3.5.3	Temporal Limitations in Trend Analysis *While surface water quality monitoring at Cadia Valley Operations (CVO) formally commenced in 1994, the available dataset for review predominantly spans from 2010 onwards.* *The* ***absence of baseline*** *or early-stage monitoring data (pre-2010) creates a significant gap in the historical record,*	The data request received by Cadia via the EPA from Hydrobiology was for post-2010 data which was provided. The baseline/early stage data is readily available in the Cadia database or publicly available in the previous EIS's. These wrong statements regarding the lack of baseline data pre-2010 must be corrected by Hydrobiology.
	Data Integrity – date entry format *Some data points are entered as zero, which is inappropriate where a limit of reporting (LOR) exists.tThese should be recorded as below LOR or flagged as not sampled, rather than defaulted to zero.*	Information supplied was an output from the environmental database and not a spreadsheet where data is manually input. Hydrobiology has demonstrated that is unable to manage and interpret a data set and this has resulted in incorrect conclusions and misleading reporting. This should not be allowed to negatively

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	• There is inconsistency in how limits of detection (LOD) and LORs are applied across datasets. *• The current data entry format includes numerous unnecessary columns, making the dataset difficult to interpret and manage. A streamlined, standardised format is recommended for future data submissions.*	impact Cadia and Cadia requests that this be addressed by the EPA and Hydrobiology.
	Limited Use of Statistical Testing *• Multivariate methods (e.g., Principal Component Analysis [PCA], cluster analysis) are also absent. These tools could assist in identifying spatial or temporal patterns across analytes or catchments.*	Multivariate methods were presented in all GHD surface water reports until the request to make them easier to digest came from the community. These are continued in the model updates and impact assessments.
3.4	Uncertainty Surrounding SSGV Application *• The derivation of SSGVs for some parameters is not consistently referenced, documented, or summarised in the annual reporting.*	The only reference to derivation required is in the WMP, the Annual Report is completed against the WMP.
	Inconsistent sampling frequency – *Some legacy or low-flow sites are excluded from monitoring during dry periods;*	If there is no water in the surface water body it is not possible to collect representative samples. Field record sheets track this information. Data for legacy sites is presented in the EIS and pre-2010 data.
	Limited incorporation of Event Bases sampling *Event-based sampling such as during high rainfall, overflow risks, or other hydrologically significant events is a critical component of surface water quality monitoring, particularly for capturing episodic contaminant mobilisation. However, CVO's current surface water monitoring program provides little to no evidence that event-based sampling is formally implemented, discussed, or reported.*	Cadia is a zero discharge site, stormwater from disturbed surfaces (including roads) is captured. The only water running into creeks is from undisturbed/vegetated ground, as would naturally occur. Event based monitoring is not considered to be necessary to inform risk from site discharge.
4	Introduction	AGE groundwater assessment reports are not referred to in list of documents being reviewed, nor are they included in the reference list. Hydrobiology has undertaken a limited assessment. Hydrobiology must address these shortcomings.
	Table 4-1	Sites listed after CQ098 on page 74 of the Hydrobiology report are not aligned with WMP terminology and aren't identified in

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		Cadia's monitoring network. There is a three blank rows then a list of locations. This appears to be an error in the table and must be corrected by Hydrobiology.
4.2.3	Bore Selection Framework and Rationale *While bores are informally understood to function as background, compliance, or impact locations, the rationale for their original siting and classification is not clearly articulated in the reviewed documents. This limits the transparency of the monitoring design and hinders the confidence with which observed groundwater trends can be interpreted or attributed to specific mining activities.*	Rationale stems from the approved EIS. This was not reviewed by Hydrobiology. This is a fundamental gap in Hydrobiology's review and must be addressed.
4.4.1	QA/QC *However, the reviewed documentation does not provide sufficient detail on critical aspects of the groundwater sampling program, including:* *• Specific sampling techniques (e.g. purging procedures, sample preservation, low-flow vs bailer sampling),* *• Field QA/QC practices (e.g. use of field blanks, duplicates, or equipment rinsates),* *• Laboratory accreditation (e.g. NATA certification) and the analytical methods employed,* *• Chain-of-custody protocols or sample storage and transport conditions.*	The WMP Section 8.3 details the Field Duplicate frequency rate of sampling. Cadia also conducts calibration of field instrumentation before each sampling round, as detailed in the standard work instruction. and recorded on file. Cadia conducts monthly reviews of laboratory handling of samples, receiving monthly QA/QC assessment reports. Cadia supplied, upon request, multiple examples of work order chain of custody validation certificates, as well as documents evidences the laboratory NATA accreditation, and quality control reports.
4.5.2.1	General Water Quality Indicators *Electrical Conductivity (EC) levels at MB93 commonly exceed 5,000 µS/cm, with maximums reaching 7,200 µS/cm, compared to <1,500 µS/cm in background bores (e.g., MB90).*	The results stated in Table 2 of the Hydrobiology report are factually incorrect. Additionally, MB90 is not a reference bore for this zone. It is located further south adjacent to SWRD and NTSF. These mistakes must be corrected by Hydrobiology.
	Key Trends and Implications - *The assessment found that it is likely that seepage from the pit is influencing localised groundwater.* *The current pit water level is above that of lower catchment sites, and there could be a net flow from the pit to more downstream sites. It matters less that sites in groundwater above the pit water level are flowing*	Current pit water level is 670 m, surrounding water table is >700 m. No groundwater level assessments have been made to support the statement in this section. There enough evidence in Cadia Annual Reviews to validate water levels around the pit flowing towards the pit. The statement here that there could be a net flow from the pit to downstream sites has

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	towards the pit if there is a pathway from the pit to lower elevation sites.	no consideration for rock type or the fact that the pit water level is lower than the surrounding water table. Hydrobiology have not provided any basis for their statement or undertaken modelling or presented groundwater contouring work to support their statement. MB93, MB94, MB95 have been installed within the Pit (on the decline) at the commencement of tailings deposition specifically to monitor pit filling. These wells were always intended to be monitoring GW/tailings interaction. This statement is unsubstantiated and, like many errors in the report, materially prejudices Cadia. Hydrobiology must provide evidence to substantiate this statement or remove it from the report.
4.5.2.2	Dissolved Metals and Metalloids *MB20 has persistently high concentrations of cobalt (>0.4 mg/L), manganese (>500 mg/L), and nickel (>0.1 mg/L), indicating a strong signature of TSF-related groundwater contamination. Declining trends are evident in cobalt and manganese after 2017–2018, which may indicate dilution or improved containment. MB20 shows episodically high copper concentrations (up to 600 µg/L) and extremely elevated zinc (up to ~350 µg/L). These peaks are not mirrored in the other bores,* ***reinforcing MB20 as a key impact site.***	MB20 is upgradient and is not connected to TSFs. Hydrobiology lacks a fundamental understanding of the conceptual site model and these inferences are not based on evidence.
	Key Trends and Implications *Surface–groundwater interaction is not directly inferred from this data but the persistently high EC, sulfate, and metal loads in MB20 suggest vertical or lateral migration from TSF seepage zones.*	Despite recommending that statistical analysis needs to be done to inform the analysis of the monitoring results, Hydrobiology has not done any work to inform their reviews. This must please be addressed by Hydrobiology.
	Key Trends and Implications *Across the southern TSF bores, high EC, TDS, and sulfate suggest long-term influence of tailings seepage. These metals serve*	Claims of "strong geochemical tracers of TSF influence". This needs to be contextualized against what the natural water quality footprint is. Generally, this

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	as strong geochemical tracers of TSF influence	discussion is not comparing results to background quality observations. This must be investigated and addressed by Hydrobiology.
4.6	Review of Groundwater SSGVs *Across the southern TSF bores, high EC, TDS, and sulfate suggest long-term influence of tailings seepage. These metals serve as strong geochemical tracers of TSF influence*	Documentation does clearly outline the data behind SSGV derivation. This is provided in WMP 9.1.5 and in the supporting GHD report that was provided to Hydrobiology.
4.7	Temporal Limitations in Trend Analysis *While groundwater monitoring at CVO has been ongoing for an extended period, the available dataset used in this review primarily spans from 2010 onwards. This restricts the ability to assess long-term trends or evaluate legacy impacts that may have occurred during the early stages of mining.*	The data request from Hydrobiology was for the post-2010 period. Cadia has and will share the pre 2010 dataset with Hydrobiology that can be used to address the errors in Hydrobiology's report.
	Bore Selection and Monitoring Network Design *Changes to the groundwater monitoring bore network such as bore replacement, new installations, or reclassification of bore roles are not consistently documented in reviewed reports.* *Formal documentation of network design and hydrogeological context for each monitoring bore is recommended to support transparent assessment and defensible site coverage.*	Hydrobiology has not understood that the Annual Reviews are reporting against the WMP. Changes in bores or locations are documented in the change management process of the WMP, not the Annual Reviews. Documentation of network design and hydrogeological context for each bore are the basis of the impacts assessments and groundwater models for each EIS, and their subsequent updates. Hydrobiology has undertaken a limited assessment. Hydrobiology must address these shortcomings in their review and report.
	Trigger Values and SSGV Implementation *An alternative two-tiered compliance framework is recommended:* *• Observation Bores – Located adjacent to potential sources (e.g., TSFs, WRDs), these bores should have SSGVs for non-toxicants, aiding early detection.* *• Compliance Bores – Located down-gradient of observation bores and between sources and receptors, these should be assessed using SSGVs for both toxicants and non-toxicants where sufficient baseline data exist.*	All bores listed in the groundwater monitoring program are classified as compliance bores, as failure to sample according to the nominated frequency would result in a non-compliance.

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4.8.1.1	Discrepancy in reporting *A significant discrepancy existed between the groundwater level changes identified in Advisian (2023) and the summarised findings in Cadia 2024 annual review. Advisian (2023) identified two key trends:* *• A period of over 15 m decline in water level in late 2020 near the Cadia East mine, specifically in monitoring bores MB50, MB5 and MB52. These changes were interpreted as potential mining impacts, followed by recent response to climate change.* *This discrepancy raises serious concerns about the accuracy and reliability of the reporting.*	First dot point – This is mining related. These bores are within the fracture zone of Cadia East. This drawdown is entirely expected. "discrepancy raises serious concerns about the accuracy and reliability of the reporting." – This interpretation is factually incorrect and is not supported by Cadia. This mistake must be corrected by Hydrobiology. AGE had no cause to comment on this in 2024 annual review. CRD deviation was observed in 2017-2018, returning to CRD alignment in 2020. Hydrobiology has made a prejudicial conclusion about discrepancy in reporting in error and this must be reassessed and corrected by Hydrobiology.
4.8.1.2	Lack of Incorporation of Faults into Numerical Model *However, it is important to note that the numerical model, as constructed, incorporates local refinements and performs within calibration targets for groundwater level trends across the broader monitoring network. The model successfully reproduces observed regional and local drawdowns, suggesting that, while not all faults are explicitly represented, the model remains functionally reliable for its intended predictive applications.*	Hydrobiology states that faults are not included and this is a critical flaw of the model and could underestimate contamination migration rates or drawn down, then concludes that it matches observed results. These are contradictory statements that must be corrected by Hydrobiology. The 2023 model has a scaled root mean square error of 1.8% and as such the model fit to the observed data is extremely good. If there are faults that are conduits affecting groundwater then it would be reflected in a significantly poorer fit of the model to the observed data. These comments have no basis in data. Hydrobiology has erred in making these statements and it should reassess and correct the report.
5.4.1	Data Collation and Personnel Expertise *However, in the absence of documented personnel roles or credentials, this assumption cannot be independently verified. As such, confidence in the methodological rigour of the program ultimately rests on institutional reputation, rather than transparent evidence of individual competence.*	Not appropriate. Engagement of GHD to conduct this monitoring on behalf of Cadia. Qualifications of personnel are presented as part of tendering process.
5.6	Regulatory Framework and Approvals	The Aquatic Ecology monitoring is not conducted "under the Annual Review", but rather under the WMP, on which the

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	Aquatic ecological monitoring at Cadia Valley Operations (CVO) is conducted under multiple regulatory instruments: Annual Reviews and AEMRs, which serve as the key instruments for demonstrating compliance with aquatic-related conditions of approval and environmental performance criteria	Annual Review reports on. This is further evidence that Hydrobiology lacks knowledge about NSW regulatory requirements.
5.6.1	Guideline Application and Benchmarking *Within the AEMP, the water quality assessments rely on total metal concentrations, without considering dissolved fractions that are more directly linked to bioavailability and ecological risk.*	The total metals analyses that Cadia currently uses are aimed at assessing the potential risks of high metals to the ecosystems, and are also a better indication of the total load of metals that may be attributed to the mine.
5.6.2	Demonstration of Compliance: *Reference site condition: All designated upstream or reference sites (e.g. Flyers Creek, Panuara Rivulet, Swallow Creek) are ecologically impaired to varying degrees, exhibiting salinity, nutrient enrichment, grazing pressure, or altered flow regimes. These sites do not meet AUSRIVAS assumptions of minimal disturbance and thus do not provide a valid baseline for detecting mining related impacts.* *Reports frequently use vague qualifiers such as "slightly above" or "not ecologically significant" without reference to toxicological thresholds, statistical comparisons, or clear decision rules. This reduces transparency and impedes objective interpretation.*	Compliance is misused here – Cadia's project approval consent outlines compliance criteria. Cadia conducts the stream health assessment required by conducting the aquatic ecology program. Reference site conditions – reinforcing commentary throughout report - Cadia's remit is to identify potential impacts from Cadia mining operations. The program is not intended to identify degradation associated with other impactful land uses like forestry or agriculture. Hydrobiology must correct this mistake.
6.1	6.1.1 and 6.1.2	The purpose and relevance to water monitoring program is unclear for NTSF and STSF sections.
6.1.3	Cadia Hill Pit – *Even if sealing of fractures and faults within the nominated range is successfully completed, there may be potential for the pressure head differential –from 713 m AHD in- pit to 705 m AHD regional*	Reference to mitigation works – works are in progress and are required to be in effect by the time water level reaches 694mAHD. This includes a solution for deep seepage mitigation. Last sentence in paragraph – this is speculation and assumptions with no evidence and must be retracted.

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	groundwater – to drive seepage under the sealed zone. The potential for seepage through the weathered regolith that presumably is present between the pit and Cadiangullong Creek does not appear to have been addressed. *For example, PTSF might be filled to say 705m AHD and then left for a few years while tailings were instead deposited in STSF; it is arguable whether the tailings would still be considered pre-consolidated, allowing more tailings to be discharged into PTSF.*	
6.1.4.1	Groundwater-Surface Water Connectivity : *Western Zone bores (e.g., MB25, MB87) Elevated nitrogen and molybdenum concentrations over time, consistent with TSF-related water chemistry.* *Eastern Zone bores (e.g., MB20, MB80): High historical concentrations of metals (e.g., copper, cobalt, nickel, cadmium) between 2013–2016, declining in later years. This temporal pattern is consistent with historic seepage episodes and subsequent mitigation.* *Despite the assumptions in pit backfilling approvals (Mod 11–13) that the Cadia Hill Pit would remain a long-term groundwater sink, hydrochemical trends suggest at least transient periods of hydraulic reversal and contaminant mobilisation. Groundwater bores in proximity to the pit (e.g., MB91, MB93, and MB95) show elevated arsenic, iron, manganese, and sulfate levels since 2020, which may reflect local expression of tailings pore water or decant seepage migrating through fractures or weathered regolith.*	MB25 and MB87 are spatially very different. MB87 is at northern west point of NTSF, MB25 is at western point of STSF south wall. This is yet another basic error by Hydrobiology that must be corrected. Elevated nitrogen is not aligned with TSF-related water chemistry. Not reflected in TSF decants (CAWS42) or associated runoff dams in vicinity (CAWS67). Eastern Zone bores –"historic seepage episodes" are not defined and are severely prejudicial and misleading. Discussion of concentration is not linked to any discussion of level and climatic changes. Statements regarding eastern zone bores is not contextualised with respect to water levels and oxidation during wet and dry periods. Reference in 6.2.1 of the Hydrobiology report that elevated concentrations of nitrate species exist are not supported by the graphs in the appendix on page 166. MB95 is referred to as a bore in proximity to pit – this is incorrect. The bore was installed inside the pit, so process water characteristics were expected. Statements around pit backfilling approvals – this is not an assumption, this is observed and the model clearly shows that bores within the walls of the pit will experience mixing.

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		Reference again to incorrect results for MB93 – results for iron not aligned with data on page 159 of the Hydrobiology report. This section also does not consider water level in the context of connectivity. These material errors must be addressed by Hydrobiology.
	Summary of Key Risks *Monitoring bores adjacent to Cadia Hill Pit show evidence of expressed groundwater, with rising contaminant concentrations since commencement of tailings deposition and partial pit filling, suggesting incomplete containment*	Statement made regarding incomplete containment in pit – groundwater table does not support this. Pit level remains below groundwater levels in adjacent bores, ie. acting as sink.
	Recommendations	There is no discussion about risk or criteria. Only presence and no presence. As discussed in previous sections criteria is required to understand if there is any impact on the beneficial users of groundwater or surface water.
6.2.1.1	Groundwater discharge and hydraulic connectivity *Bore data (e.g., MB25, MB87) show elevated concentrations of molybdenum and nitrate species, consistent with tailings pore water chemistry*	Nitrate elevation is not reflected on graphs on page 166 of the Hydrobiology report.
6.2.2.1	Monitoring Gaps and Infrastructure Limitations *For instance, low flows observed near the Cadiangullong Creek diversion outlet contrast with sustained baseflow at site 412161 further downstream, implying groundwater inputs in the intervening section.*	Statement regarding visual flow observations – this implication statement is based on visual observation, not scientific data. Delayed effect through the creek is generally observed and supported by measured streamflow data. To use the words Hydrobiology uses for other claims in this report *"conclusions are based on inference rather than evidence, weakening the credibility of statements".*
6.2.2.4	Hydrogeochemical risk assessment *Observed groundwater quality trends particularly those from bores adjacent to TSFs and the pit should be integrated with surface water quality exceedance records to identify likely discharge pathways.*	There has been no commentary on the conceptual site model that supports any of these inferences of impacts from groundwater to surface water. Without this fundamental understanding comments on likely discharge pathways is not based on evidence.
6.3	*Site-Specific Guideline Values (SSGVs) and Default Guideline Values (DGVs) are included for reference.*	SSGV used as reference for all locations in this discussion – SSGVs are specific to Oaky Creek location only (4121702)
	Copper	This statement is contradictory to the information provided in the surface water

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	Copper concentrations exhibit notable exceedances of both the SSGV and DGV at several downstream locations (particularly 412161 and CAWS78) from around 2018 to 2023. The highest concentrations are clustered after 2020, aligning temporally with reported infrastructure incidents and increasing decant return operations at TSFs. This suggests a probable influence of mine-related seepage or expressed groundwater into surface flows in the mid-to-lower reaches of Cadiangullong Creek. While upstream sites show occasional exceedances, the pattern intensifies downstream, indicating a cumulative effect of mining activity.	analysis section that shows historical mining and mineralised zones impact copper concentrations.
	Molybdenum *Molybdenum levels remain below the DGV for most locations and time periods, although an upward trend is observed at several downstream sites, particularly CAWS78 and 412161, beginning around 2019–2020.*	CAWS78 monitoring only commenced in 2020, so statements about increasing trends are not scientifically justified, nor supported by the graphs in Figure 6-1 of the Hydrobiology report.
	EC *EC trends show a significant rise in values at downstream sites (especially CAWS61 and 412161) during and after 2020, with many instances exceeding the SSGV of 875 µS/cm.*	High EC not contextualized with climate conditions, correlated with drought period. Analysis needs to be undertaken with consideration of climatic conditions.
6.3.1	Conclusion *These changes align with known periods of tailings deposition, seepage incidents, and pit water management challenges.* *The patterns support the inference that groundwater expression and mine-related seepage are influencing surface water chemistry in mid- to lower reaches of the creek.*	Use of phrasing "Seepage incidents and pit water management challenges" is misleading and unclear and not explained further. Hydrobiology have not explained where specifically the apparent locations of groundwater expression to Cadiangullong Creek are observed.
6.4.1	Biological and Sediment Monitoring *However, copper concentrations were found to decline further downstream, suggesting attenuation processes and limited spatial extent of contamination.*	This is suggestive of a mineralised area with copper, hence current and historic mining of copper is occurring in the area. This context is outlined in environmental impact statements and annual assessments, publicly available. Hydrobiology is continuing to draw conclusions without having all of the relevant information available. This limited assessment by Hydrobiology is

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		drawing conclusions without proper analysis or all the data. Cadia does not accept this unsubstantiated analysis.
6.4.2	Surface and Groundwater Quality Observations *Copper concentrations demonstrate notable exceedances of both the SSGV and DGV at multiple sites, particularly 412161 and CAWS78, from approximately 2018 onwards. While occasional exceedances are noted at upstream sites, downstream monitoring locations display sustained and higher frequency exceedances, suggesting cumulative downstream impacts attributable to mining activity.* *Molybdenum generally remains below DGV thresholds across all monitoring sites; however, a subtle upward trend is evident at downstream sites, notably CAWS78 and 412161, from around 2019–2020. This corresponds spatially with known seepage-affected zones and temporally with changes in tailings and pit water management.*	RE copper concentrations – see above Hydrobiology did not visually inspect Cadiangullong Ck between Ore Processing and Oakey Creek gauging station. This is a 12 km reach of this creek.
	Electrical Conductivity (EC) trends indicate a clear and significant increase at downstream sites, particularly CAWS78 and 412161, from 2020 onwards.	A trend cannot be observed at the beginning of the monitoring period (CAWS78). Report states: "EC trends indicate clear and significant increase at downstream site" The report continues to use phrases such as elevated, significant increases and provides no numerical quantification or orders of magnitude to support their statements. These errors must be addressed by Hydrobiology. The graphs in the appendix (pages 140 to 153) show the following ECs along the creek: Cadiangullong Dam (CAWS0) 100 to 200 us/cm, CAWS03 3500 us/cm, CAWS78 500 us/cm and 412161 300 to 400 us/cm. Hydrobiology's conclusions do not make any sense as 412161 is not a "clear and significant" increase from upstream. Datasets are not comparable to make these claims, CAWS78 data is only since

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		2020, 412161 data is since 2010 so incorporates broader climate conditions. These manifest errors cannot be ignored and must be addressed by Hydrobiology.
6.4.4	Recommendations for Enhanced Environmental Value Protection *Prioritize areas with known seepage influence or historical nonconformance (e.g., TSF toes, pit margins) for closer monitoring and adaptive management, especially during post-closure transition phases*	Recommendations are not based on any protection of the environment criteria. 6.4.2 of the Hydrobiology report states that there is no documented surface water quality issue that would constitute a breach of environmental or regulatory thresholds for aquatic ecosystems, irrigation or stock watering, yet the language throughout the rest of the document does not match or align with the that as a main finding. Hydrobiology is not comparing against criteria or risk to beneficial users. TSF toes and pit margins have extensive groundwater and surface water monitoring associated with them.