
Annexure G

Response to IESC advice

Table G.1 Responses to IESC advice (dated 10 December 2025)

IESC advice item number	IESC advice	HVO response
Question 1: Does the IESC consider the decision maker can have confidence in the impact assessment, modelling and impact predictions provided? In particular, are the water balance and groundwater models adequate to understand the risks to water resources? If not, what additional data and information should be provided?		
1.	Decision makers can be confident about the proponent’s predictions of the project’s potential impacts on water resources, especially because of the substantial historical data that are available. However, clarity about the specific impacts under proposed versus approved scenarios could be improved. The following text expands on this and includes several recommendations.	Noted – see responses below.
Groundwater		
2.	The groundwater modelling undertaken is considered adequate to understand potential risks to water resources in and near the project area and involves the following key elements.	Noted
2a	Potential groundwater impacts of the project were assessed using MODFLOW-USG (MFUSG). MFUSG is appropriate modelling software for developing a groundwater model of this scale. However, assumptions and limitations were largely carried over from previous modelling undertaken by Australasian Groundwater and Environmental Consultants in 2022 (EMM Consulting 2025d, p. 132) and should be re-stated in the report along with any changes.	Section 6 of the GMR (EMM 2026c) has been updated to include assumptions and limitations carried over from the previous modelling undertaken by Australasian Groundwater and Environmental Consultants (AGE) in 2022.
2b	Detailed graphical conceptual models were developed to demonstrate understanding of the hydrogeological system at the site (EMM Consulting 2025a, Figure 4.9, p. 49 and Figure 4.13, p. 53). Where existing features (e.g. the faults) have not yet been fully characterised by data, model parameterisation has been informed through the calibration process (EMM Consulting 2025d, p. 62). The numerical model is consistent with the conceptualisation with one exception, namely that minor streams were modelled as gaining only systems (EMM Consulting 2025d, p.60). Because this is not consistent with their ephemeral nature (EMM Consulting 2025d, p. 19), the proponent should justify this assumption.	RIV boundary conditions with stage and river bottom set to topography was used to prevent surface water from leaking to groundwater, which is consistent with the conceptualisation. Groundwater was allowed to discharge from the watercourse if/where the watertable is sufficiently shallow. Section 3.5.3ii of the GMR (EMM 2026c) has been updated to detail additional justification for the use of RIV boundary conditions for minor drainage system.

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2c	<p>Calibration was undertaken through an automated history-matching process using PESTPP-IES. An ensemble of 500 parameter realisations was used to identify the most probable values for parameters to match historical groundwater level monitoring and some groundwater abstraction rates (EMM Consulting 2025d, p.75 - 6). Model calibration is considered moderate in quality, reflecting the complex disturbance of the area from previous mining activities. The modelled groundwater – surface water interactions of the four main watercourses were not reported and should be compared with available estimates to demonstrate the suitability of the groundwater model for estimating future impacts.</p>	<p>Section 4.3 of the GMR (EMM 2026c) has been updated to include history-matching surface water-groundwater interaction outputs for the four main watercourses.</p>
2d	<p>Parameter sensitivity was undertaken using PESTPP-SEN (EMM Consulting 2025d, p. 103); however, the discussion conflates identifiability with the global sensitivity analyses provided by PESTPP-SEN. Identifiability is a different measure, a number between 0 and 1, that conveys the extent to which a parameter has been constrained by the observation data of the calibration (Doherty 2025, p. 178). The sensitivity section should be revised to correct this and to discuss the implications of the sensitivity results on model uncertainty and future monitoring plans.</p>	<p>Section 4.5 of the GMR (EMM 2026c) has been updated to provide more clarity. The description of the sensitivity analysis has been modified, removing reference to ‘identifiability’ as this is a different measure.</p>
2e	<p>Predictive uncertainty analysis was undertaken with reference to Peeters and Middlemiss (2023), enabling predictions to be divided into five percentile-based categories of likelihood ranging from very likely to very unlikely (EMM Consulting 2025d, p. 105). Convergence analysis indicated that the ensemble size was suitable for providing statistical predictions of mean values (EMM Consulting 2025d, p. 106).</p>	<p>Noted</p>
2f	<p>Impacts to groundwater – surface water interactions were described in terms of the net reduction in baseflow and leakage volume (EMM Consulting 2025d, p.131). The proponent should present the proportion of this change compared to total volumes to enable assessment of proportional risks.</p>	<p>Section 7.3 of the WRIA has been updated with additional detail regarding potential changes in surface water – groundwater interaction in terms of percentage of total streamflow.</p>
2g	<p>Climate change was represented through modification of rainfall and evapotranspiration inputs to predictive stress periods based on RCP8.5 (EMM Consulting 2025d, p. 59). The net result was a lowering of groundwater levels under climate change, with variable magnitude depending on location and depth (EMM Consulting 2025d, p. 126).</p>	<p>Noted</p>

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Surface Water		
3.	The surface water modelling and assessments — covering water balance, streamflow and flooding — are consistent with accepted industry practice, and their configurations are generally justified. Additional justification or analysis should be provided for the water balance modelling, as noted below.	Noted – see responses below.
3a	The proponent has used an existing water balance model for the project assessment (EMM Consulting 2025a, p.74); however, results are presented only for the proposed project combined with approved conditions (Engeny 2025, pp. 89–95). This approach does not allow the incremental impact of the project to be distinguished. To enable an adequate assessment of the project’s contribution, the proponent should also provide model results for the approved conditions alone.	Section 4 and Attachment I (water balance modelling report) of the SWIA (Engeny 2026) have been updated to include an assessment of representation of "approved" conditions.
3b	The approach to incorporating climate change in the water balance model is reasonable (Engeny 2025, Attachment I, p. 32), although it is noted that no account is given to seasonal changes in rainfall and temperature that are available from NARcliM2.0 (https://www.climatechange.environment.nsw.gov.au/narclim). It also appears that the proponent has not accounted for the increases in rainfall intensity associated with climate change for short duration flood events that could cause uncontrolled spills from water management ponds. The proponent should assess the sensitivity of their conclusions to projected changes in seasonality and rainfall intensity.	The climate change model has been rerun for the RCP-8.5 scenario using seasonal predicted changes to rainfall and evaporation. The updated results are presented in Attachment I (water balance modelling report) of the SWIA (Engeny 2026). Overflows are included in the updated results and a comparison made in Section 9.2.1 of the water balance modelling report of the forecast changes with the climate change modelling. Sections 4.2 and 7.1 of the SWIA include additional information on climate change and detailed designs (see also item 4a below).
4.	Documentation of the water balance modelling lacks sufficient explanation of some results, leaving uncertainties about potential risks to water resources.	Noted – see responses below.
4a	Results of the water balance model indicate that the Water Management System (WMS) can accommodate the water inventory for wet (i.e. 95th percentile) climate sequences (Engeny 2025, p. 95). However, the proponent also notes that overflows from the WMS are ‘typically limited to overflows from sediment dams’ (Engeny 2025, p. 95). Figure 3.18 to Figure 3.21 (in Engeny 2025, pp. 83–86) suggest that overflow from sediment dams is often directly to the waterway. The proponent should clarify the likelihood and consequence of uncontrolled spills from the WMS into receiving waterways and discuss what consideration has been given to the increase in rainfall intensities for events relevant to the risks of overtopping.	The following updates have been made to the SWIA: <ul style="list-style-type: none"> • additional text has been added to Section 3.2.2 • expansion of commitments for the Project in Section 7.1 to include consideration of changes to government guidance (also in Section 12.1 of the WRIA). • additional section on overflows included as Section 4.7 • further details on historical overflows included in Section 6.3.

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4b	<p>The proponent assumes that the water quality of releases to the Hunter River is equal to the median historical value recorded in the release storages (Engeny 2025, p. 94). There does not appear to be any treatment of discharge water prior to release (other than settling in the sediment ponds (Engeny 2025, p. 63)). The true water quality is therefore likely to vary seasonally and be dependent on resident storage time. The proponent should utilise water quality outputs from the water balance model as an input to the mixing calculation or, alternatively, undertake a sensitivity analysis to inform the water quality assessment for releases.</p>	<p>Analysis of metals data provided for Hunter River u/s and Release Dams has been added into Appendix B (water quality assessment) of the SWIA (Engeny 2026).</p> <p>Updates to Section 4.6 of SWIA (Engeny 2026) have been undertaken to incorporate sensitivity analysis completed for 80th percentile release dam values and consideration of toxicity limits for ANZG and other guidelines.</p>
5.	<p>The proponent states that there are no new creek diversions proposed or required for the project (Engeny 2025, p. 63). However, this conflicts with statements indicating that the project includes 'construction of the Mitchell Clean Water Diversion' (EMM Consulting 2025a, p. 112). The proponent should provide details regarding the activities associated with the Mitchell Clean Water Diversion, and comment on the potential impacts of these works, as well as requirements for construction and rehabilitation.</p>	<p>Section 7.1 of the SWIA (Engeny 2026) and Section 12.1 of the WRIA have been updated to provide more clarity.</p>

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Ecology		
6.	<p>The proponent acknowledges that the project will impact large areas of terrestrial vegetation, which provides habitat for at least nine faunal MNES (Umwelt 2025a, Umwelt 2025b). It is also stated that there will be direct effects on 55.92 ha (HVO North, Umwelt 2025a, Table 5.1, p. 74) and 11 ha (HVO South, Umwelt 2025b, Table 5.1, p. 65) of aquatic habitat of Latham’s snipe (<i>Gallinago hardwickii</i>), a water-dependent MNES that has been recorded in the project area. Although the MNES assessments for this species conclude that the impacts are not likely to be significant because the bird has been recorded in low numbers and is highly mobile, it is less clear what the impacts will be on the aquatic habitat itself and whether other less mobile aquatic or riparian biota may be affected. The proponent should provide more detail about how the removal of this habitat may impact aquatic and riparian biota in the area, and how these potential impacts are to be monitored and mitigated.</p>	<p>The Project Area contains aquatic habitat in the form of semi-permanent dams and soaks, river and tributaries. No clearance of aquatic habitat is proposed for key aquatic habitats of the Hunter River and its tributaries. The Project occurs in an area characterised by existing mining infrastructure and agricultural landscapes and further impacts associated with any disturbance needed for additional infrastructure will not introduce new operational disturbances to surrounding aquatic habitats.</p> <p>Other than the Latham’s snipe, no EPBC Act-listed threatened aquatic fauna species have been recorded in the Project Area utilising these riparian habitats.</p> <p>The aquatic ecosystems surveyed for the Aquatic Ecology and GDE Assessment (ELA 2025) all appear to be in poor ecological condition based on the macroinvertebrate community and water quality. Hunter River fish communities are mapped as being in good condition by DPI Fisheries, which suggests the community is dominated by native species and that recruitment is at a sustainable level. While the site is mapped as having potential habitat for the threatened purple-spotted gudgeon (<i>Mogurnda adspersa</i>), no records of the species is known from the Hunter River and it is not likely to occur in the Project Area. The assessment concluded that there would be no additional impact to aquatic ecology for the Hunter River.</p> <p>Riparian flora species are likely to be directly impacted where clearance is required, however this would be limited to riparian woodlands associated with creeks and rivers in the Project Area. The areas to be impacted are not extensive and the Project is unlikely to have significant impacts for floristic riparian communities in the locality. Consideration for the river red gum (<i>Eucalyptus camaldulensis</i>) communities along the Hunter River is established through HVO’s River Red Gum Rehabilitation and Restoration Strategy (HVO 2025) with monitoring of the condition of these stands occurring since 2007 and actions taken to restore and rehabilitate the community in the locality. Monitoring will be ongoing for this community in accordance with the Strategy.</p> <p>A range of mitigation measures have been proposed for the Project to minimise the impacts of clearance on both terrestrial and aquatic fauna. These are detailed in the updated MNES reports (Umwelt 2026a and Umwelt 2026b). The mitigation measures represent a suitable suite of management strategies that are well known and routinely implemented in biodiversity management plans for mining projects in the Hunter Valley and elsewhere and therefore are considered to represent a low risk of failure.</p>

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7.	<p>Field sampling and desktop analyses indicate that the Hunter River alluvium has a moderately diverse stygofauna (Eco Logical Australia 2025, pp. 32–39 and pp. 43-44). A GDE risk analysis (Serov et al. 2012) indicated that local drawdown and excavation of the alluvial aquifer pose a ‘high’ cumulative risk to stygofauna because this obligate GDE is rated as being of ‘High Ecological Value’ and at ‘High Risk’ of impact (Eco Logical 2025, p. 62). The GDE risk management matrix recommends protecting this aquifer as well as undertaking ongoing monitoring and annual assessments of mitigation effectiveness. The proponent acknowledges that it will not be possible to avoid impacts to stygofauna in the alluvium where excavation is to occur (Eco Logical 2025, p. 65). The current baseline data of stygofauna in the project area is spatially limited and based on only two periods (April 2020, January 2022) when stygofauna were collected (Eco Logical 2025, pp. 43-44). Further stygofauna sampling where alluvium is to be excavated and in nearby reference sites is required to provide a more up-to-date baseline dataset of taxa that will be impacted and confirm whether the same taxa occur at sites where there will be no disturbance. These updated baseline data will also be useful for assessing the effectiveness of mitigation measures and post-operations recovery (Paragraph 15).</p>	<p>Sections 4.6.4, 4.6.5 and 4.8.3 of the WRIA have been updated to include additional information regarding groundwater monitoring and findings from the aquatic ecology and GDE surveys. Section 12.5.5 includes the commitment for additional stygofauna surveys.</p> <p>. HVO has a long history of monitoring data in the alluvium at HVO and within the Hunter Valley which provides confidence in the conceptual hydrogeological understanding and provides insight into aquifer ecological condition.</p> <p>Alluvial groundwater levels and salinity at HVO have remained relatively stable, responding to climate events such as high rainfall and streamflow; with observations within historical ranges. Stygofauna were collected from the Carrington West Wing alluvial area, the remnant paleochannel, alluvium in the Alluvial Lands area and the Cheshunt area. The taxa found are well documented in other areas of the Hunter River valley. Given the minimal change in groundwater / aquifer conditions, stygofauna communities are unlikely to have changed.</p> <p>The impact assessment is already based on the premise that the Hunter River alluvial aquifer is a high priority GDE.</p> <p>Given the above, HVO has not proposed additional stygofauna surveys prior to PER submission. Additional surveys will be conducted prior to mining occurring in the remnant paleochannel and Hunter River alluvium in the impact area to collect baseline data, and a stygofauna monitoring plan will be developed as part of the updated WMP.</p>
<p>Question 2: Do the water assessment reports identify effective strategies to avoid, mitigate or reduce the likelihood, and extent of impacts, including cumulative impacts to water-related resources? In particular:</p> <p>a) Are the design plans for the Carrington West Wing barrier wall sufficient to mitigate groundwater flows from the Hunter aquifer into Carrington Pit?</p> <p>b) Are the flood levees appropriate to mitigate the modelled flood risks to the mine?</p> <p>c) What, if any, additional surface water monitoring parameters should be included in the surface water monitoring program?</p> <p>d) Does the final landform design appropriately mitigate the risk of offsite seepage migration?</p>		
8.	<p>The water assessment reports identify strategies to avoid, mitigate and reduce the likelihood and extent of impacts to water resources in most cases. Predicted impacts from the project are minor when compared to cumulative impacts occurring from existing mining activities in the region. Therefore, the IESC acknowledges that the proponent’s options for mitigating cumulative impacts to water-related resources are limited.</p>	Noted

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9.	A detailed design of the Carrington West Wing low-permeability barrier wall (LPBW) has not been provided to evaluate either the risks of loss of water from Hunter River alluvium or the risks of seepage of mine water to the alluvium. However, the general properties and objectives for this LPBW have been outlined and are consistent with previous LPBWs installed at the site (EMM Consulting 2025a, p. 113).	Noted
9a	Although implementation of low-permeability designs could limit seepage as low as practicable, there is a residual risk of seepage at the base and sides of the LPBW, requiring site-specific information and monitoring. The proponent states that monitoring results for existing LPBWs (not provided) show that groundwater levels and salinity have been relatively stable. Evidence for the long-term performance of existing LPBWs should be provided to justify that the design and construction minimise the risks of degradation or failure of the proposed barrier.	Section 4.6.4, 4.6.5 and 12.3 of the WRIA have been updated to include evidence for the long-term performance of existing LPBWs.
9b	The proponent should provide details and justification for the post mining plans for barrier walls on the site, including if, how and when hydraulic connection may be re-established without compromising water resources.	The LPBWs will remain post mining to provide ongoing management to limit groundwater leakage from the Hunter River and associated alluvial aquifer to backfilled mine areas and final voids. Section 10 presents discussion on the influence of the final voids. Removal of the LPBWs as part of closure would result in increased groundwater flow from the alluvium and Hunter River towards the voids and therefore HVO does not propose removing the barrier walls.
10.	The proponent's prediction of low risk to <i>Eucalyptus camaldulensis</i> in the Hunter catchment from this pathway (EMM Consulting 2025a, Figure 4.9, p. 49) appears reasonable where the LPBW and/or regulated releases in the Hunter River mitigate drawdown below the community.	Noted
11.	The adopted hydraulic modelling (Engeny 2025, Attachment C, pp. 17-18) for the flood assessment provides a sound basis for understanding the risk of flooding to the mine. Results indicate that the levees provide protection to the pits during operation for events up to at least the 0.1% AEP (Engeny 2025, p. 106), including a 0.5-m freeboard. This level of protection is considered adequate for flood risk mitigation during the proposed operations.	Noted

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12.	For surface water monitoring:	
12c	The proponent has indicated that the existing water quality monitoring program will be maintained for the project (Engeny 2025, Table 7.1, p. 123). The requirements of this water quality monitoring program (Engeny 2025, p. 48) are considered adequate (but see Paragraph 23). However, dissolved (not just total) metals and dissolved organic carbon (DOC) should be included in the analytical suite.	Section 7.2 of the SWIA (Engeny 2026) and Section 12.6 of the WRIA have been updated to include additional commitment.
12d	The proponent has indicated that there will be no changes to the existing water extraction and discharge licences (EMM Consulting 2025a, p. ES.1). As such, the existing monitoring associated with these licences, and monitoring in line with the Water Management Plan (HVO 2018) is considered adequate to assess the potential impacts of the project on streamflow.	Noted
12e	Although the proponent indicates that the project does not include changes to the extent or depth of mining in the Cheshunt and Riverview pits (EGI 2022, p. 7), the extended life of the mine may increase the duration of exposure to the pyritic Archerfield sandstone (EGI 2022, p. xi). The proponent should include monitoring of water quality in these pits prior to, and informing consequences of, pumping.	Section 2.5.1 of the SWIA (Engeny 2026) has been updated to include note of pits and tailings in the mine water monitoring.
13	The final landform includes three terminal pit lakes that will result in long-term evaporative loss of water and groundwater drawdown (EMM Consulting 2025a, p. 98). Current groundwater monitoring indicates that groundwater levels in the rehabilitated alluvial lands are lower than the base of the alluvium, and modelling predicts that levels will remain so (EMM Consulting 2025a, p. 93). Particle track modelling predicts that most seepage through the backfilled mining areas, and from Carrington pit lake, will migrate towards and be captured by the two main HVO North and South final voids (EMM Consulting 2025a, Figure 10.4, p. 102). Minor volumes of seepage may discharge to the alluvium, and to the Hunter River via baseflow but this may change if, for example, the low permeability barrier walls degrade or fail. There may also be preferential pathways, via remnant paleochannels, which are not accounted for in the modelling. Dilution effects are likely to occur between the backfill and the alluvium, and between the alluvium and Hunter River, but may not be effective in reducing risk if the seepage volume is higher than predicted. Although risks are likely to be low, the proponent should quantify these risks based on monitoring and modelling results.	Section 8.5.2 of the WRIA has been updated to include additional discussion, including a summary of previously conducted field investigations and the commitment to review the need for additional investigation as part of detailed design. In addition, the approved but not yet constructed Carrington West Wing LPBW will be designed and constructed to key into Permian strata (interburden or overburden) adjacent to and below the alluvial sediments.

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14.	A plausible range of trends in salinity, and their associated uncertainties, in the pit lakes needs to be estimated and presented. The implications of this increasing pit lake salinity on seepage salt loads to the Hunter River should be discussed.	<p>Sensitivity of salinity of inflows has been added into Attachment J (final void assessment) and Section 5.2.1 of the SWIA (Engeny 2026).</p> <p>Sections 5.3 and 7.1 of the SWIA have been updated to incorporate approved v project final voids and modelling approaches; and a commitment of further modelling (as well as Section 12.1 of the WRIA).</p> <p>Section 10.5.2 of the WRIA has been updated to discuss the potential of increased pit lake salinities causing seepage salt loads to the Hunter River. The pit lake salinity would need to increase to implausible concentrations, beyond the saturation limit of water and anything recorded on Earth, to result in a reversal of hydraulic gradient and cause groundwater flow from the pit lakes towards the Hunter River.</p>
Question 3: Are there any additional mitigation, monitoring, management or offsetting measures that should be considered?		
15.	<p>The temporal and spatial extents of stygofauna monitoring were limited but confirm that a moderately diverse stygofauna assemblage occurs in the paleochannel alluvium (Paragraph 77). Some excavation of paleochannel alluvium and associated stygofauna is subject to existing approval, acknowledging that there will be an impact on this GDE. The IESC recommends that a suitable monitoring program be developed that includes the additional bores suggested by Eco Logical (2025, p. 65) and that extends the baseline data (Paragraph 77) to monitor changes in stygofaunal community composition during and after operations to identify any project-related impacts, demonstrate the effectiveness of the proposed mitigation measures and document post mining recovery of dewatered alluvial sediments.</p>	Section 12.5.5 of the WRIA includes discussion regarding additional monitoring and preparation of a stygofauna monitoring program as part of the updated WMP.
16.	<p>The Water Resource Impact Assessment (EMM Consulting 2025a) does not mention the green and golden bell frog, despite there being conditions of management for this species under the existing EPBC approval for mining across the HVO complex (EPBC 2016/7064). The proponent should provide a more stringent assessment of the project's potential impacts on this species and other water-dependent MNES and describe how these potential impacts will be monitored, managed and mitigated.</p>	<p>Extensive surveys for green and golden bell frog have been undertaken over many years, most recently in 2025 and no green and golden bell frogs have been recorded in the Project Area. Existing green and golden bell frogs-related commitments under EPBC 2016/7064 will continue throughout the life of the Project. While common frog species were recorded, many farm dams contained the invasive mosquito fish (<i>Gambusia holbrooki</i>) limiting the ability of native species to thrive in these habitats. See further discussions in the updated MNES reports (Umwelt 2026a and Umwelt 2026b).</p>
17.	<p>The proponent has proposed a suitable network of groundwater monitoring bores to assess the effectiveness of the Carrington West Wing LPBW, both in terms of relative groundwater levels and potential migration of saline water. Monitoring and management post mining should include triggers and contingency actions to manage future failure / degradation of the barrier walls.</p>	Section 12.6.1 of the WRIA has been updated to include additional commitment.

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18.	<p>An assessment of leachable concentrations of metals/metalloids from overburden/interburden and mine rejects (EGi 2022) found that metals/metalloids were leachable. The proponent should compare leachable metal/metalloid concentrations to baseline concentrations in groundwater. Risks posed to groundwater environments by leaching and seepage from backfilled mined areas should be quantified.</p>	<p>Leachate results provide an indication of solutes that might be released from freshly exposed NAF and PAF materials immediately following oxidation (atmospheric conditions). The geochemical assessment by EGi (2022) determined that significant metal/metalloid generation and release from materials would only occur under Acid Rock Drainage (ARD) conditions. Thus, the prevention of acid generation will effectively control metal leaching. The vast majority of overburden/interburden (97%) is classified as NAF, with total sulphur concentrations generally below 0.1%. This means that, if managed correctly, it is unlikely that ARD, and in turn metal/metalloid release would occur.</p> <p>Leachate results of both water and peroxide extraction tests (EGi 2022) indicate that metal/metalloids that potentially could be released due to occurrence of ARD, associated with pyrite oxidation, could include Al, Cd, Co, Cr, Cu, Fe, Mn, Ni, Sr, and Zn, and possibly As if pH got to 3. Concentrations in leachate are expected in the order of up to 1 to 10 mg/L. A review of current groundwater quality (AGE 2022) identifies some naturally occurring metals such as Al, Sr and Fe occurring in the alluvium, Permian and spoil aquifers at the same concentration range (1 – 10 mg/L) as those expected for leachate under ARD conditions. Most metals in groundwater are identified as being an order of magnitude or lower (0.1–1 mg/L) in groundwater than identified in the leachate.</p> <p>However, the direct comparison of leachate concentrations derived from extraction tests with groundwater baseline concentrations is problematic. This is because the leachate concentrations are representative of the concentration at the direct point of generation, usually locations such as waste rock dump or tailings storage facility. The concentration of the metals generated at those locations are expected to decrease while the seepage migrates away from the generation source towards environmental receptors, in this case, the groundwater system. These decreases result from dilution and attenuation due to a range of physical, chemical and biological processes. Thus, leachate concentrations determined at the source will not be representative of that in seepage that would potentially interact with groundwaters after migration along transport pathways.</p> <p>Engineered management processes, common place in the mining industry, can also reduce the amount of seepage and thus concentration of metals that may reach environmental receptors. These include cover systems and design that reduce oxidation and infiltration and thus inhibit the production of both neutral and acidic leachate. Other strategies include drainage interception schemes, dewatering bores and impermeable liners located at the base of waste rock dumps and tailings dumps which will also reduce the amount of leachate that may reach environmental receptors.</p>

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19.	Geochemical assessment of some coal seams (including the Lemington, Woodlands Hill and Glen Munro Seams) has not been undertaken (EGi 2022, p. xiii). This assessment should be undertaken to assess potential risk posed by inclusion of this material in pit backfilling.	<p>The Lemington, Woodlands Hill and Glen Munro Seams are located in parts of the HVO Complex and thus it is possible their exposure is minor. Woodlands Hill and Glen Munro Seams are associated with the Riverview Pit area at HVO South, while Lemington is associated with the West Pit area at HVO North.</p> <p>As stated in EGi (2022) only some coal intervals were available for sampling and testing, and these were from a limited number of seams.</p> <p>Some geochemical data (EGi 2022) is identified for the three seams, with total sulphur (TS) content determinations for the Lemington (n=20), Woodlands Hill (n=3) and Glen Munro (n=5) coals seams completed and as such MPA values calculated (EGi 2022). However, the Acid Neutralising Capacity was not determined and thus ABA classifications could not be made for these samples.</p> <p>The data provided identifies TS values for the Lemington seam of between 0.5 and 5%, providing MPA values of 10 – 150 kg H₂SO₄/t; for the Glen Munro Seam TS contents range between 0.4 and 0.9%, with MPA of 10 to 30 kg H₂SO₄/t; and for the Woodlands Hill, TS of 0.6 to 0.7% and resulting MPA of 17-21 kg H₂SO₄/t.</p> <p>This data suggests that the potential of PAF materials occurring in these coal seams as at least moderate, especially the Lemington seam. Furthermore, the majority of coal seams that were tested for ARD potential were classified as PAF/PAF-LC. Therefore, it is anticipated that during mine waste management and closure planning that all coal seam materials would be classified as PAF and thus managed in such a manner as stated in EGi (2022).</p> <p>Given this conservative assumption, coal seam materials will be managed as PAF mine waste unless designated otherwise. Management protocols include placement of materials in bulk fill zones that isolates them from oxidation zones and the mixing of PAF waste with NAF and acid buffering materials.</p> <p>In addition to the above strategy, HVO has developed a geochemical sampling program, which involves the continued retrieval and analysis of cores from across the HVO Complex. As part of this program two recent cores (5534C and 5153C) were collected from the Mitchell Pit and HVO South pit respectively. These are proximal to the areas where the coals seams in question could occur. In 2026 another core will be collected and analysed from the Mitchell Pit area (at HVO North). ABA results for core 5153C indicate that the vast majority of the 77 samples analysed were classed as NAF, with 5 proving some uncertainty with NPR values of between 1 and 2. Inspection of the core log indicates that it does not intersect either the Woodland Hills or Glen Munro coal seams. Core 5534C is identified to have intersected the Lemington coal seam at depths of 15-16 mbgl (seam C) and at 27 to 28 mbgl (seam D). Initial NAG pH values (<3) for these seams indicates that both are likely PAF classification.</p>

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		It is anticipated that all units (including coal seams) will be identified and analysed in this ongoing sampling and analysis campaign. However, until this is complete HVO will continue to assume a classification of PAF for all coal seam materials and will manage them accordingly.
20.	Future surface water and groundwater monitoring should include DOC to enable appropriate comparison of dissolved copper, nickel and zinc concentrations to the pending new water quality guidelines.	Section 7.2 of the SWIA (Engeny 2026) and Section 12.6 of the WRIA have been updated to include additional commitment.
21.	The proponent should consider automated monitoring of EC, pH and total suspended solids for surface water in the release storages to provide more timely responses to water quality exceedances than allowed for in the current quarterly monitoring regime.	Section 3.1.6 of the SWIA (Engeny 2026) has been updated to include existing EPL discharge monitoring requirements.
22.	Offsetting was mentioned within the Water Resources Impact Assessment (EMM Consulting 2025a, p. 48) for residual impacts from clearing of Central Hunter Valley Eucalypt Forest and Woodland CEEC (which is a GDE where excavation is proposed). Offsets are proposed to be identified using the Biodiversity Assessment Method. The proponent's proposed intention to avoid or mitigate impacts to waterways and associated MNES is preferable to using offsets.	The sentence has been removed from the updated WRIA as it does not fully reflect the efforts undertaken to avoid or mitigate potential biodiversity impacts. HVO has, where possible, altered the Project to avoid and minimise biodiversity impacts through the Project design stage and a range of impact mitigation strategies have been included to mitigate the impact on ecological values prior to the consideration of offsetting requirements. Biodiversity impact assessment, including measures to avoid or minimise impacts, is included within the MNES Report.
23.	The proponent should consider the long-term risk posed by failure of the post mining levee banks and the catastrophic capture of the main Hunter River channel in the final voids, particularly as the risks of large floods will increase with global warming.	Additional risk-profile discussion and design commitments for climate change considerations added into Sections 6.7.2 and 7.1 of the SWIA (Engeny 2026), respectively.