



Application for Works Approval Amendment

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W6205/2018/1
Works Approval Holder	Abra Mining Pty Limited
ACN	110 233 577
File Number	DER2018/001572
Premises	Abra Base Metals Project MEEKATHARRA WA 6642 Legal description – Part of mining tenements L52/194, M52/776, G52/292 and L52/210. As defined by the Premises maps attached to the Revised Works Approval
Date of Report	27/10/2023
Decision	Revised works approval granted

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1. Decision summary

Works Approval W6205/2018/1 is held by Abra Mining Pty Limited (Works Approval Holder) for the Abra Base Metals Project (the Premises), located at mining tenements L52/194, M52/776, G52/292 and L52/210.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during construction and operation of the Premises. As a result of this assessment, revised Works Approval W6205/2018/1 has been granted.

The revised Works Approval issued as a result of this amendment supersedes the existing Works Approval previously granted in relation to the Premises.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2.2 Application summary

On 6 July 2023, the Works Approval Holder submitted an application to the department to amend Works Approval W6205/2018/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments are being sought:

- increase the production capacity from the current 1,200,000 tonnes per annum to 1,350,000 tonnes per annum;
- removing the requirements to install a liner at the Tailings Storage Facility (TSF) Cell A basin; and
- altering the liner type for the TSF starter embankment from a geosynthetic clay liner (GCL) to a high density polyethylene (HDPE) liner.

This amendment is related to changes of Category 5 activities from the existing Works Approval. Table 1 below outlines the proposed changes to the existing Works Approval.

Table 1: Proposed production capacity changes

Category	Current production capacity	Proposed production capacity	Description of proposed amendment
5	1,200,000 tonnes per annum	1,350,000 tonnes per annum	Increase in production capacity.

2.2.1 Overview of Premises

The original Works Approval was issued on 28 June 2019 for construction and commissioning of category 5 (processing of metallic or non-metallic ore) activities.

Infrastructure at the Premises comprises of crushing and ore storage bin, grinding circuit, lead / silver flotation and concentrate, concentrate dewatering utilising a thickener and filter, tailings thickener, and TSF.

The original TSF design included a two cell, paddock type facility, located to the north of the plant site, between two intermittent creek lines. The TSF was to be constructed in six stages

and incorporate a rock-ring decant with submersible decant pumps in each cell to recover water from the TSF. The decant pond was to be raised in conjunction with the raising of the perimeter embankments. Surface water diversion channels and bunds were to be constructed to divert catchment runoff from the ridge areas to the south of the TSF behind the plant site towards the north, away from the TSF.

As part of the original design, the starter embankments and TSF cell basins were to be lined with GCL to produce a low permeability liner with hydraulic conductivity of 1×10^{-12} m/s at the base of the TSF to reduce seepage. This was based on initial metallurgical test work.

Initial metallurgical test work indicated that the lead concentrate produced on the Premises had 60-70% lead. The processing methods were to recover 96% lead and up to 90% silver. Mine waste (tailings and waste rock) chemistry and properties were based on small-scale metallurgical test work samples obtained from drill cores. In 2018, tailings geochemistry was analysed from composite ore samples from drill core, focussing on Acid Base Accounting (ABA) and net acid generation (NAG) analysis. No metal element solubility analysis was undertaken due to a lack of tailings material to test. ABA test work was then undertaken in 2019 on a range of samples classified as mine waste that found most waste types were non-acid forming (NAF). A precautionary approach was taken to include an impervious liner to the TSF embankments and basin due to the absence of test work to low solubility of residual metals from process tailings. The Works Approval Holder advised that further solubility analysis test work would be undertaken when operational scale tailings material was produced to inform future TSF Cell design.

Previous Condition 11 (now Condition 9) was included under the Works Approval to ensure this geochemical analysis was to be undertaken once tailings were produced. Condition 9 states;

“Within 60 days of the commencement of commissioning, the works approval holder must collect 10 individual tails samples for geochemical analysis, including undertaken leaching tests of this material using the US EPA Method 1313 test procedure (LEAF Test). The works approval holder shall submit a geochemical report to the CEO by the end of the commissioning period.”

As part of the Works Approval amendment application, the results from the LEAF Test analysis, updated TSF seepage modelling report, updated TSF Cell A Design report and hydrogeological report were provided for reasoning to alter the design of the TSF Cell A.

Rockwater (2022) TSF Seepage Modelling report concluded that the TSF site is underlain by saprolite and sediments of generally low hydraulic conductivity, with 5 m to 10 m depth of slightly more permeable material (silt, gravel, and sand). The calculated seepage rates were 18 m³/day (per 50 m width) to the interception drain and 26 m³/day (per 50 m width) to the water table. Seepage flow would move predominantly in a north direction in the existing groundwater flow. Rate of seepage movement is estimated to reach a distance of up to 200 m from the TSF after 100 years of continuing seepage. Rockwater (2022) indicated that a *“shallow sandy and gravelly layer is likely to form a zone of preferred flow, channelling seepage under the TSF wall(s) and could result in water daylighting near the wall.”* Proposed controls included the installation of an interception drain/s and pumping sumps, located to the north of the TSF.

The department sought technical advice from the department's Principal Hydrogeologist for the removal of the GCL from the TSF Cell A basin and alter the liner type to a HDPE liner for the starter embankments. The technical advice is summarised below and made the following recommendations:

- The Works Approval Holder should undertake suitable subgrade preparation of the substrate beneath the TSF footprint to reduce permeability of the soils within the area.
- The Works Approval Holder should install and construct at least one monitoring bore located hydraulically downgradient of the proposed interception drain to assess its effectiveness in recovering seepage.

- The Works Approval Holder should undertake monitoring of the monitoring bores near the TSF and should be sampled on a quarterly basis to monitor for groundwater contamination from leached metals.

Further assessment of these proposed amendments and technical advice recommendations are provided under Section 3.2.

Increased production capacity

The Works Approval Holder requested an amendment to increase production capacity from the current 1,200,000 tonnes per annum to 1,350,000 tonnes per annum.

CMW Geoscience (2022) provided a report of the updated TSF Cell A design removing the GCL liner from the TSF basin and altering the liner type for the stater embankment. The CMW (2022) report stated that the “*mine and processing production rate will be 1.3 million tpa when steady-state throughput is achieved in 2024, at the time when TSF Cell A is commissioned.*” Furthermore, the increased production capacity will align with the production capacity under the current licence L9383/2023/1 for this Premises.

2.3 Department of Mines, Industry Regulation and Safety (DMIRS)

The department referred the application to DMIRS to be advised on the geotechnical aspects and potential environmental issues on the removal of the GCL from the base of TSF Cell A.

DMIRS response was that no geotechnical or environmental issues were identified in the assessment after reviewing the revised Mining Proposal related to the removal of the liner for TSF Cell A.

DMIRS had no further comments on the Works Approval amendment for W6205/2018/1. The Works Approval Holder should ensure that the revised Mining Proposal is approved by DMIRS, prior to works commencing for TSF Cell A with liner removed.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway, and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020a).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this Amendment Report are detailed in Table 2 below. Table 2 also details the proposed control measures the Works Approval Holder has proposed to assist in controlling these emissions, where necessary.

Table 2: Works Approval Holder controls

Sources / activities	Emission	Potential pathways	Proposed controls
Construction			
Additional construction activities at the TSF Cell A: <ul style="list-style-type: none"> • cut-off trench. • compaction of base. • installation of piezometer in base and underneath the embankment. Installation and construction of monitoring bores	Dust	Air / wind dispersion	<ul style="list-style-type: none"> • existing Condition 1 of W6205/2018/1 relates to the design and construction requirements for this infrastructure.
	Stormwater	Overland runoff from dust contaminated areas	<ul style="list-style-type: none"> • existing Condition 1 of W6205/2018/1 relates to the design and construction requirements for this infrastructure.
Operation			
Storage of tailings material at the TSF Cell A that no longer includes an impervious liner at the base as originally approved. Increased tailings production capacity.	Increased tailings seepage	Seepage through the soils to the underlying groundwater and nearby creek lines	<ul style="list-style-type: none"> • maintain and operate cut-off trench; • maintain and operate interception drain to the north of the TSF; • undertake ambient groundwater monitoring from the TSF monitoring bores on a quarterly basis; • daily visual inspections to confirm general integrity of the TSF embankments and HDPE liner are maintained; and • visual inspections for any downstream seepage.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020a), the Delegated Officer has excluded employees, visitors, and contractors of the Works Approval Holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 3 below provides a summary of environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental siting* (DWER 2020b)).

Table 3: Environmental receptors and distance from prescribed activity

Environmental receptors	Distance from prescribed activity
Surface water	TSF infrastructure intersects or lies close to two minor drainage lines. There is also a larger drainage line (5 Mile Creek) which is located about 1.2 km east of the Premises. These drainage lines remain dry for long periods of time and only flow during heavy rainfall events.
Groundwater Groundwater in this area is good quality and is suitable for livestock drinking, potable or industrial use.	Groundwater levels range from 16 – 54 metres below ground level (mbgl) at the Premises. Groundwater under the TSF is approximately 22 mbgl.

3.1.3 Hydrogeology

The Premises is located in the upper tributary zone of the Ashburton River and the Gascoyne River catchment is south of the Premises' boundary. Numerous ephemeral creeks and their associated tributaries occur within and around the Premises, with two major drainage lines, Grave Creek and Five Mile Creek located to the east and west of the Premises, respectively. These ephemeral creeks are typically dry and flow for short periods after rainfall events.

Groundwater in and around the Premises is considered good quality and suitable for livestock drinking, potable or industrial use. Bore logs from four of the eight installed and constructed monitoring bores around TSF Cell A and future TSF Cell B indicated that depth to ground water ranges from 15.93 to 27.23 mbgl. The remaining four monitoring bores are to be installed and constructed as per the works approval condition to appropriately construct monitoring bores (refer to Section 3.2).

The Works Approval Holder engaged Rockwater (2022) to collect water samples from the groundwater monitoring bores during construction in June 2022 and analysed for a drinking water suite of parameters (Table 4). The results indicate the groundwater is fresh with salinities of 420 to 490 mg/L TDS, a neutral pH and metals mostly below Limits of Reporting (LOR).

Table 4: Water quality results for the four TSF monitoring bores

Parameter	Unit	LOR	MB01	MB02	MB03	MB04
pH	pH	0.01	7.81	7.69	7.73	7.70
Electrical Conductivity	µS/cm	1	733	654	620	732
Total Dissolved Solids (TDS)	mg/L	10	487	390	394	482
Total Hardness as CaCO ₃		1	328	276	251	286
Hydroxide Alkalinity as CaCO ₃		1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃		1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃		1	193	262	163	154

Parameter	Unit	LOR	MB01	MB02	MB03	MB04
Total Alkalinity as CaCO ₃		1	193	262	163	154
Sulphate as SO ₄ - Turbidimetric		1	135	25	37	43
Chloride		1	72	66	64	100
Calcium		1	72	56	51	57
Magnesium		1	36	33	30	35
Sodium		1	42	43	38	46
Potassium		1	13	15	10	13
Aluminium		0.01	<0.01	<0.01	<0.01	0.01
Manganese		0.001	0.683	1.44	<0.001	0.006
Iron		0.05	<0.05	0.06	<0.05	<0.05
Reactive Silica		0.05	34.7	29.1	41.4	50.4
Ammonia as N		0.01	0.25	0.92	<0.01	0.03
Nitrite as N		0.01	0.06	0.03	<0.01	<0.01
Nitrate as N		0.01	0.57	0.36	14.1	18.7
Nitrite + Nitrate as N		0.01	0.63	0.39	14.1	18.7
Reactive Phosphorus as P		0.01	0.03	0.28	0.04	0.04
Total Anions	meq/L	0.01	8.70	7.62	6.84	8.13
Total Cations		0.01	8.72	7.76	6.92	8.06
Ionic Balance	%	0.01	0.10	09.6	0.58	0.46

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020a) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 0. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the Works Approval Holder has proposed mitigation measures/controls (as detailed in Section 0), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Works Approval Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the Works Approval as regulatory controls.

Additional regulatory controls may be imposed where the Works Approval Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 5.

The Revised Works Approval W6205/2018/1 that accompanies this Amendment Report authorises construction, commissioning, and time-limited operations. The conditions in the Revised Works Approval have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

An amendment to Licence L9383/2023/1 will be required following the time-limited operational phase authorised under the Works Approval to authorise emissions associated with the ongoing operation of the Premises. A risk assessment for the operational phase has been included in this Amendment Report, however licence conditions will not be finalised until the department assesses the licence application.

Table 5. Risk assessment of potential emissions and discharges from the Premises during construction and operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of Works Approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
Construction								
<p>Additional construction activities at the TSF Cell A:</p> <ul style="list-style-type: none"> • cut-off trench. • compaction of base. • installation of piezometer in base and underneath the embankment. <p>Installation and construction of monitoring bores</p>	Dust	Air / wind dispersion directly impacting nearby creek lines.	Nearby creek lines	Refer to Section 3.1	<p>C = Slight L = Unlikely Low Risk</p>	Y	<p>Condition 1, 2, 3, 4, 5 and 20</p>	<p>Condition 1: inclusion of additional design and construction requirements for the TSF, that includes a compacted foundation of the TSF basin, starter embankments lined with HDPE liner, construct a cut-off trench with a nominal depth of 0.5 m and construct an interception drain north of the TSF. The TSF construction requirements added were based on the updated TSF Design by CMW (2022) and reviewed by the department's Principal Hydrogeologist.</p> <p>Condition 4: new condition for the design, construction, and installation of the remaining four out of eight monitoring bores to be constructed. In addition, the installation and construction of the proposed bore north of the TSF interception drain as per the recommendation by the department's Principal Hydrogeologist.</p> <p>Condition 5: new condition for the requirement to submit a bore construction report after all bores under condition 4 have been constructed and installed.</p> <p>Condition 20: relates to maintaining accurate and auditable books.</p>

Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of Works Approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
	Stormwater	Overland runoff from dust contaminated areas causing contamination of nearby creek lines.			C = Slight L = Unlikely Low Risk	Y	Condition <u>1</u> , 2, 3 and <u>20</u>	Condition 1: refer to the above explanation. Condition 20: refer to above explanation. The general provisions of the EP act and <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> apply.
Operation								
Storage of tailings material at the TSF Cell A that no longer includes an impervious liner at the base as originally approved. Increased tailings production capacity.	Increased tailings seepage	Seepage through soils to the underlying groundwater and nearby creek lines. Contamination of underlying potable groundwater source. Contamination of nearby creek lines causing ecosystem disturbance.	Groundwater Nearby minor creek lines and larger creek (5 Mile Creek) approximately 1.2 km east from the Premises	Refer to Section 3.1	C = Moderate L = Possible Medium Risk	N	Conditions <u>10</u> , <u>11</u> , <u>12</u> , <u>13</u> , <u>14</u> , <u>15</u> , <u>16</u> , <u>17</u> , <u>18</u> , <u>19</u> , <u>20</u> , 21 and <u>22</u>	Condition 10: new condition to ensure discharge of tailings is at an authorised discharge point. Conditions 12 to 14, 18 and 19: new conditions related to time limited operations for a period of 180 calendar days, operational requirements for the items of infrastructure specified in Table 4, and compliance reporting requirements. Inclusion of time limited operation conditions ensure the items of infrastructure are operating accordingly prior to inclusion to the current Licence L9383/2023/1. Conditions 15 to 17: new conditions related to ambient groundwater monitoring, recording of all monitoring results, and the Australian Standards

Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of Works Approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
								<p>to collect water samples and laboratory analysis requirements.</p> <p>Although the leaching assessment was undertaken for a range of metals and metalloids, one significant omission from the list of potential contaminants that were tested was thallium. Thallium is commonly present at high concentration in waste rock and tailings materials at lead mine sites, which can be readily leached under neutral to alkaline pH conditions.</p> <p>Thus, the department's Principal Hydrogeologist recommended the following elements: arsenic; barium; cadmium; copper; lead; antimony; selenium; and thallium to have trigger limits to identify potential seepage from the TSF Cell A. These elements are known or suspected of being present at high concentrations in ore and waste rocks at the Premises and known to be toxic at high concentrations to a range of environmental receptors. The recommended trigger limit criteria for potential contaminants in groundwater are either the ANZECC & ARM CANZ (2000) long-term irrigation criteria, or a value of ten-times the drinking water criteria for each of the analytes (whichever is the lower value). These trigger limits have been included under Table 5.</p> <p>Condition 20: refer to above explanation.</p> <p>Condition 22: condition related to</p>

Risk Event					Risk rating ¹ C = consequence L = likelihood	Works Approval Holder's controls sufficient?	Conditions ² of Works Approval	Justification for additional regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls				
								keeping and recording complaints. The general provisions of the EP Act and <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> apply.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk assessments* (DWER 2020a).

Note 2: Proposed Works Approval Holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

Table 6: Consultation

Consultation method	Comments received	Department response
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 7 August 2023.	DMIRS replied on 22 August 2023 advising that had no geotechnical or environmental issues on the proposal. Further comments are detailed in section 2.3.	N/A
Jidi Jidi Aboriginal Corporation (JJAC) advised of proposal on 7 August 2023.	No comments were received.	N/A
Works Approval Holder was provided with draft amendment on 9 October 2023	No comments were received. Additional information requested by the department was sufficient to progress assessment.	N/A

5. Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a Revised Works Approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

5.1 Summary of amendments

Table 7 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Works Approval as part of the amendment process.

Table 7: Summary of Works Approval amendments

Condition no.	Proposed amendments
Cover page	Amended assessed production capacity from 1,200,000 tonnes per annual period to 1,350,000 tonnes per annual period.
Definitions table	Moved definitions table to after the conditions as per current works approval format. Table 1 renumbered to Table 6. Removal of redundant terms and inclusion of new terms.
Works approval history	Inclusion of the proposed amendments of this works approval amendment.
Table 1 (previously Table 2)	Table 2 renumbered to Table 1. Amended reference to Table 1 throughout text.

Condition no.	Proposed amendments
Table 1	<p>Amended design capacity under column 2 from 1.2 Mtpa to 1.35 Mtpa.</p> <p>Inclusion of the following related to TSF design and construction requirements:</p> <ul style="list-style-type: none"> • <i>'Compacted foundation of the TSF basin'</i>; • <i>'Construction of a cut-off trench with a nominal depth of 0.5 m'</i>; and • <i>'Construction of an interception drain north of the TSF'</i>. <p>Removal of the reference to the TSF basin being lined and amended the liner type from GCL to a HDPE liner.</p> <p>Removal of the design and construction requirement <i>'Eight groundwater monitoring bores constructed to a depth 80 mbgl'</i>. Four out of the eight monitoring have been constructed and operating under Licence L9383/2023/1.</p> <p>A new condition for bore construction and installation of the remaining four bores and proposed bore north of the TSF has been included.</p>
2	Previous condition 2 removed and new condition 2 updated to the current works approval format.
3	Previous condition 3 removed and new condition 3 updated to the current works approval format.
4	<p>Previous condition 4 removed in line with the current works approval format.</p> <p>New condition 4 for the design, construction, and installation of the remaining four bores and proposed bore north of the TSF.</p>
Table 2	New Table under condition 4 for the infrastructure requirements for the groundwater monitoring bores still to be constructed.
5	New condition for the submission of a bore construction report.
-	Inclusion of 'Commissioning' heading with the relevant existing commissioning conditions under this heading.
6	Previously condition 9, renumbered due to inclusion of new conditions 4 and 5.
7	Previously condition 5, renumbered due to inclusion of new conditions 4 and 5.
8	Previously condition 10, renumbered due to moving condition under 'Commissioning' heading.
9	Previously condition 11, renumbered due to moving condition under 'Commissioning' heading.
-	Removal of condition 6 related to authorised emissions. Condition replaced with new condition 10.
10	New condition for authorised discharge point for tailings.
Table 3	New Table under condition 10 specifying the authorised discharge point for tailings.
-	Inclusion of 'Time limited operations' heading with new conditions under this heading.
12	New condition to commence time limited operations for infrastructure constructed under condition 1.
13	New condition related to the duration of time limited operations for infrastructure constructed under condition 1.

Condition no.	Proposed amendments
14	New condition related to operational requirements during time limited operations.
Table 4	New Table under condition 14 specifying operational requirements for items of infrastructure during time limited operations.
15	New condition related to ambient groundwater monitoring with the inclusion of the proposed monitoring bore north of the interception drain and limit values for several water quality parameters.
Table 5	New Table under condition 15 related to ambient groundwater monitoring.
16	New condition related to recording the results of all monitoring activities related to condition 15.
17	New condition related to the sampling and analysis is undertaken by a laboratory that is NATA accredited.
18	New condition related to the submission of a time limited operations report to be deemed compliant for the infrastructure referred to in condition 14.
19	New condition related to the reporting requirements for condition 18.
20	Previously condition 7, renumbered due to new conditions included and amended the wording as per new works approval condition.
21	Previously condition 8, replaced as a new works approval condition referring to books specified under condition 20.
22	New condition related to recording complaints.
-	Inclusion of a border and 'End of Conditions' as per current works approval format.
Site Plan 7	Addition of a figure of the monitoring bore locations within the Premises.
Schedule 2: Works	Removal of schedule as redundant schedule.

References

1. Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand (ANZECC & ARMCANZ) 2000, *Australia and New Zealand Environment Conservation Council guidelines for fresh and marine water quality Volume 1 – 3*, Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand.
2. CMW Geosciences (CMW) 2022, *Tailings Storage Facility (TSF) Cell A – Abra Base Metals Project, WA – Design Report*, report for Abra Mining Pty Ltd.
3. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Risk Assessments*, Perth, Western Australia.
5. DWER 2020b, *Guideline: Environmental Siting*, Perth, Western Australia.
6. Rockwater 2022, *Abra Base Metals Project – TSF Permeability Testing*, report for Abra Mining Pty Ltd.