



## Application for Works Approval

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

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**Works Approval Number** W6802/2023/1

**Applicant** FMG Solomon Pty Ltd

**ACN** 128 959 179

**File number** DER2023/000004

**Premises** Solomon Mine

Mining tenements  
E47/1011, E47/1334, E47/1532, M47/1409, M47/1410, M47/1411, M47/1413, M47/1431, M47/1453, M47/1466, M47/1473, M47/1474, M47/1475, L47/293, L47/294, L47/296, L47/301, L47/351, L47/360, L47/362, L47/363, L47/367, L47/381, E47/382, L47/391, L47/392, L47/397, L47/471, L47/472, L47/710, L47/711, L47/813, L47/814, P47/1279, P47/1286, P47/1287, P47/1304, P47/1305, P47/1735, P47/1736 and portion of E47/1319, E47/1333, E47/1398, E47/1399, E47/1447, E47/3094, E47/3464, L47/361 and L47/713

Mt Sheila WA 6751

As defined by the premises maps attached to the issued works approval

**Date of report** 31 July 2023

**Decision** Granted

#### **A/SENIOR MANAGER, RESOURCE INDUSTRIES**

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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## 1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the premises. As a result of this assessment, works approval W6802/2023/1 has been granted.

## 2. Scope of assessment

### 2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) 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 and overview of premises

On 23 December 2022, FMG Solomon Pty Ltd (FMG, the applicant) submitted an application for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act). The premises is the Solomon Mine located at Mount Sheila, WA, for which FMG also hold licence L8464/2010/2.

The works approval application is for construction and time limited operations of:

- a valley-fill style tailings storage facility (TSF) – the “Brad TSF” and associated pipelines;
- a mobile concrete batching plant with throughput of 3,000m<sup>3</sup> concrete per annual period; and
- expansion of the existing Solomon landfill by 0.37 hectares (ha).

The premises relates to the categories and assessed production/design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6802/2023/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in works approval W6802/2023/1.

#### 2.2.1 Category 5 activities

The proposed Brad TSF (Figure 1) will be a valley fill design located partially within the existing Brad valley pit void. It will be supported by two embankments: one constructed to the north, the “main embankment”, and the other to the south-east, the “south-eastern saddle embankment” (Figure 8, Appendix 1). The footprint will be approximately 338.2 ha, with 316 ha occurring within the footprint of the Brad valley pit void.

Brad TSF will receive tailings from the Kings Ore Processing Facility (OPF) (Figure 11, Appendix 1), which currently produces 8.2 million tonnes per annum (Mtpa) tailings slurry<sup>1</sup>. Tailings are currently deposited into Tailings Storage Facility 1 (TSF1) (Figure 1). FMG forecasts TSF1 will reach capacity in 2025.

Upon completion of all proposed stages, Brad TSF will have an estimated storage capacity of approximately 54.2 million cubic metres (Mm<sup>3</sup>) over a ten-year life at a throughput rate of 8.2 million tonnes per annum (Mtpa) of dry tailings.

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<sup>1</sup> The other ore processing facility on-site, the Firetail Ore Processing Facility, is a dry plant and produces no tailings.

FMG proposes construction of the south-eastern saddle embankment in one stage and the northern main embankment in three stages (Table 1 below and Figure 9 in Appendix 1) and requests separate time limited operation periods for each stage. Stages 1 and 2 only will be assessed as part of this works approval application. As construction for stage 3 is proposed to commence in 2029 (being outside of a typical works approval duration), this should be applied for as part of a later amendment to licence. Time limited operations for stage 1 only will be granted as part of this approval. FMG will be required to amend licence L8464/2010/2 for operation of the stage 2 embankment lift.

**Table 1 Brad TSF proposed stages**

Parameter	Stage 1	Stage 2	Stage 3 (not assessed)
Proposed main embankment crest level	607 m RL	627 m RL	640 m RL
Proposed south-eastern embankment crest level	640 m RL	-	-
Proposed maximum operating pond level (wet season)	598.8 m RL	618.8 m RL	628.5 m RL
Design flood event	1:1000 AEP 72 hour storm	1:1000 AEP 72 hour storm	Probable Maximum Flood (PMF)
Design flood level	606.5 m RL	624.9 m RL	639.6 m RL
Safety bund crest level	608.8 m RL	628.8 m RL	641.8 m RL
Additional freeboard	1.5 m	3.1 m	2.2 m
Maximum tailings capacity (Mm <sup>3</sup> )	19.6	19.8	14.8
Proposed construction date	June 2023 – September 2023	June 2026 – November 2027	June 2029 – November 2030

A tailings delivery pipeline will be constructed from the Kings OPF to the Brad TSF (Figure 1), with a tie-in to the existing TSF1 pipeline for emergency purposes<sup>2</sup> (Figure 12). Tailings will be discharged from the main embankment to form a sloping beach pushing the decant pond to the south.

A tailings return pipeline will also be constructed, to return water to the Kings OPF or to be pumped to the Gee Pit. Discharge of Brad TSF decant water to Gee Pit is currently listed on the licence for “contingency discharge of TSF decant water/stormwater to Gee-Pit during high rainfall events”. The department recommends FMG apply to amend the licence to reflect modification of the discharge to Gee Pit.

<sup>2</sup> FMG indicates the proposed tie-in pipeline will be used for emergency unforeseen events such as tailings pipeline blockage (due to sanding within the tailings line). The tie-in pipeline will enable flushing of the pipeline into the existing TSF1, with remainder flushed into the proposed Brad TSF as an alternative contained blockage discharge. The exact location of the emergency outlet pipe on the tie-in pipeline into TSF1 will be confirmed when TSF1 approaches its end of life in 2025.



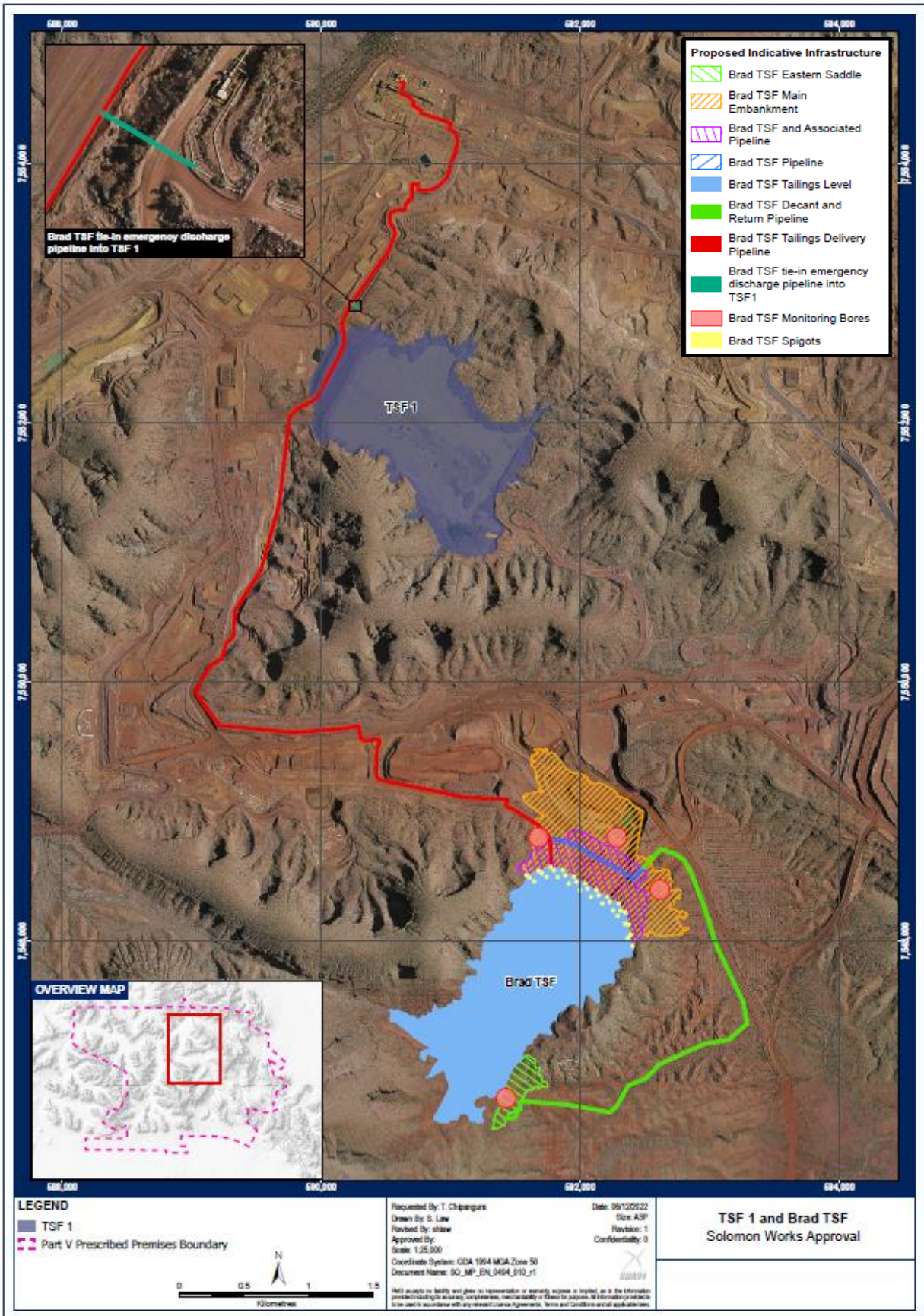


Figure 1 TSF1, Brad TSF and proposed pipelines

## 2.2.2 Category 64 activities

Solomon mine currently has an existing landfill licensed under category 64 of L8464/2010/2 for disposal of class II putrescible waste. The landfill is expected to be at capacity in less than 12 months. It is proposed to extend the footprint of the landfill within the existing Firetail North mining pit void by an approximate 0.37 ha (Figure 13, Appendix 1) to increase the operational life. There are no proposed changes to throughput or waste disposal types.

## 2.2.3 Category 77 activities

A mobile concrete batching plant (CBP) is proposed to service stage 4 of FMG's Pilbara Transmission Project<sup>3</sup> (PEC4). The CBP will move as required between tenements L47/294 and M47/1431 (Figure 7, Appendix 1) to facilitate concrete production for the construction of foundations and other associated infrastructure required. Concrete will also be used on other Fortescue projects as required.

The CBP will have a 100-tonne capacity silo, cement weigh hopper, and twin aggregate weigh bins. The process will involve the weighing and mixing of the components of the concrete batch to produce homogenous concrete, with a production rate of 50 m<sup>3</sup> per hour.

Raw material inputs will be supplied to the mobile CBP facility from an off-site location. Material will be transported by a front-end loader from the designated storage area to aggregate storage bins/bays at the CBP. The two bins/bays are expected to each hold up to approximately 500 tonnes of material.

## 2.3 Other approvals

### 2.3.1 Part IV of the EP Act

Two ministerial statements have been issued for the site, MS 862 (issued 20 April 2011) and MS 1062 (issued 3 October 2017). A section 45C amendment for MS 1062 was recently approved on 7 June 2023 (Attachment 1 of MS 1062).

The original Solomon iron ore project was approved under MS 862. As part of that approval, the proposal was defined as including tailing storage in valley pits. MS 1062 was issued for the project expansion, whereby the associated EPA Report 1588 noted that regulation of a TSF under Part V of the Act was appropriate to meet the EPA's objectives for that aspect of the proposal.

The section 45C amendment was approved to:

- increase the Mine Development Envelope (MDE) by 459 ha to cater to the creation of three separate groundwater supplementation areas;
- increase clearing within the Railway Development Envelope (RDE) by 150 ha; and
- allow water supply for the Lower Fortescue Borefield to be abstracted within the RDE.

As part of the section 45C amendment, FMG committed to no new clearing within the Yindjibarndi Native Title Determination Area. This is specifically in relation to the additional 459 ha and 150 ha clearing in the MDE and RDE respectively (as approved by the s45C).

EPA services notes that there may be previously authorised clearing extents (i.e. under MS 1062) that could be utilised by FMG in relation to this works approval. FMG stated on 14 July 2023 that "all clearing allowance previously approved within the MDE, RDE or LFBDE is still

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<sup>3</sup> The concrete is required to anchor the pylons for a 135 km long transmission line ("Pilbara Transmission Project").



planned as per the original approval... All clearing proposed to be undertaken with the Works Approval is approved under the original MS 1062”.

### 2.3.2 Aboriginal Heritage

The premises intersects with the Eastern Guruma (WAD6208/1998) and the Yindjibarndi #1 Ngurra Aboriginal Corporation native title claims (WAD6005/2003). The Eastern Guruma people are represented by the Wintawari Guruma Aboriginal Corporation (WGAC). The Yindjibarndi people are represented by the Yindjibarndi Ngurra Aboriginal Corporation (YNAC), Yindjibarndi Aboriginal Corporation (YAC) and Wirlu-Murra Yindjibarndi Aboriginal Corporation (WMYAC).

DWER requested comment from WGAC, YNAC, YAC and WMYAC regarding the proposed activities. YNAC raised concerns regarding Brad TSF, and other issues more broadly relating to the site, in December 2022<sup>4</sup> and as part of stakeholder consultation for the works approval in June 2023. A summary of concerns raised and the department’s responses are included in Appendix 2. The department will also consider some of YNAC’s comments in further detail in relation to the wider Solomon Mine Hub and respond holistically to these at a later date.

For issues more broadly relating to the site, the Yindjibarndi Nation has lodged a claim for compensation in the Federal Court (“WAD37/2022 Yindjibarndi Ngurra Aboriginal Corporation RNTBC (ICN 8721) and State of Western Australia & Ors”). As of the date of this report the outcome of the claim has yet to be determined.

The proposed works are adjacent to the following aboriginal heritage sites (Figure 16 and Figure 17, Appendix 1) originally listed under the *Aboriginal Heritage Act 1972*<sup>5</sup>:

- Site 36891 (S11 078), 140 m west of TSF;
- Site S08 008, 280 m north west of TSF;
- Site EAS16 058, 290 m west of TSF;
- Site 36228, intersecting with the northern pipeline; and
- Site 33577, intersecting with the northern pipeline.

The applicant has indicated that Aboriginal Heritage Site labelled ‘HRZ 066’ is located directly adjacent to the proposed main embankment construction. This location approximately aligns with lodged site S08 008.

The Department of Planning, Lands and Heritage (DPLH) confirmed on 27 June 2023 that the proposed infrastructure intersects with the actual boundaries of site ID 36891 (S11-078) and site ID 33577. DPLH confirmed that:

*“...a majority of the development footprint is covered by existing section 18 ministerial consents. This includes the inclusion of Aboriginal site ID 36891 in a Section 18 granted to FMG for the purpose of Solomon Mining and Infrastructure. However, Aboriginal Heritage place ID 33577 (Ganyjingarrinunha Nugurra), is not included in the 2011 section 18 consent granted to FMG for the “construction of a mining area and associated infrastructure, including a tailings storage facility (TSF) at FMG’s firetail and Kings Mining area (Solomon Hub)”. Therefore approvals under the Aboriginal Heritage Act 1972 (AHA) would be required for the works proposed for the northern portion of*

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<sup>4</sup> YNAC raised concerns regarding the proposed Brad TSF, and issues more broadly relating to the site, originally under a proposed amendment to licence L8464/2010/2 (December 2022, DWER reference A2154279). However, construction for Brad TSF was required to be applied for separately under a works approval application (this assessment).

<sup>5</sup> Noting the recent transition to the *Aboriginal Cultural Heritage Act 2021* on 1 July 2023.

*the "Brad Tailings Delivery Pipeline" that intersects with this Place."*

Additionally, DPLH noted that:

- the works approval application did not detail any consultation with the relevant groups regarding the proposal. They recommended that the FMG discuss the proposal with the Aboriginal Corporations, and in particular, potential impacts on heritage place ID 33577 with YNAC; and
- the new *Aboriginal Cultural Heritage Act 2021* comes into effect on 1 July 2023 and that the proponent should familiarise themselves with the new provisions of the Act and recommend a due diligence assessment is undertaken for the works footprint that is not currently covered by the section 18 ministerial consent.

The department forwarded DPLH's comments to FMG who responded "*Fortescue notes that the northern section of the Brad Tailings Delivery Pipeline will follow existing, disturbed and cleared operational areas. Therefore, the proposed pipeline will not impact on Aboriginal Heritage place ID 33577. Therefore, Fortescue considers that no additional approvals are required as no clearing is required for the construction of the northern section of the Brad Tailings Delivery Pipeline.*"

The department notes that the works approval holder is required to meet its obligations under the *Aboriginal Heritage Act 1972* (AH Act) and subsequent *Aboriginal Cultural Heritage Act 2021* (ACH Act) which is a separate regulatory process to that of applying for a works approval under Part V of the EP Act. The granting of the works approval does not remove FMG's obligations to comply with the AH Act and ACH Act.

### 2.3.3 The Mining Act 1978

Department of Mines, Industry Regulation and Safety (DMIRS) provided comment to DWER on 5 July 2023 regarding the proposed activities. A mining proposal for Brad TSF and the concrete batching plant was approved under the *Mining Act 1978* on 14 October 2022 (environmental registration ID 111671). The TSF design was reviewed from a geotechnical perspective and deemed acceptable. Several additional conditions were placed on mining lease 47/1474 (containing Brad TSF) requiring:

- The construction of the tailings impoundment starter embankment shall be supervised by an engineering/geotechnical specialist;
- The construction details shall be documented and confirm that the construction satisfies the design intent and includes records for all construction quality control testing and that a copy of the construction document be submitted to DMIRS for its records;
- The TSF shall be inspected on a daily basis to ensure the facility is functioning as per the design intent;
- A complete audit and review of the active tailings storage facility shall be provided by an engineering/geotechnical specialist on an annual basis and provided to DMIRS; and
- At the time of decommissioning of the TSF, and prior to rehabilitation, a further review report by a geotechnical engineer or engineering specialist will be required by DMIRS. The report should review the status and structure of contained tailings, examine and address the implications of the physical and chemical characteristics, and present and review the results of all environmental monitoring. The rehabilitation stabilisation works proposed and any on-going remedial requirements should also be addressed.

DWER will additionally issue formal correspondence to DMIRS with respect to mine closure and sulfate management (discussed in section 3.3.6 of this decision report).

### 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 2020).

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 time limited operations which have been considered in this decision report are detailed in Table 2 below. Table 2 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

As there are no residential receptors within the vicinity of proposed activities, noise (as an emission) has been excluded from the risk assessment.

**Table 2: Proposed applicant controls**

Emission	Sources	Potential pathways	Proposed controls
<b>Construction</b>			
Dust	Construction of: <ul style="list-style-type: none"> <li>Tailings storage facility main and eastern saddle embankments; and</li> <li>Landfill expansion.</li> </ul> Mobilisation of concrete batching plant. Vehicle movement and earthworks.	Air/windborne pathway causing poor vegetation health/death	While not specific to the infrastructure proposed, the applicant has referred to the dust management plan EO-PL-EN-0001 which includes: <ul style="list-style-type: none"> <li>Use of water carts in high traffic areas such as access roads, haul roads and laydown areas;</li> <li>Application of dust suppression agents in high traffic areas;</li> <li>Vehicle speed restrictions; and</li> <li>Sealing of roads (where applicable).</li> </ul>
Contaminated / sediment laden stormwater	Construction of the Brad TSF main and eastern saddle embankments	Overland flow causing poor vegetation health/death and/or contamination of nearby surface water bodies	<ul style="list-style-type: none"> <li>Windrows will be the primary control during construction</li> </ul>
	Construction of the landfill expansion		<ul style="list-style-type: none"> <li>Uncontaminated stormwater will be diverted around the landfill extension using windrows and bunding if required;</li> <li>The existing drainage channel will be used, or an additional drainage channel may be installed to the north-west end if required; and</li> <li>The existing drainage channel is depicted in Figure 18, Appendix 1. The existing drainage sump will “provide sufficient capacity” for the</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
			proposed minor extension to prevent the discharge of contaminated stormwater from a rainfall event.
	Mobilisation of concrete batching plant.		<ul style="list-style-type: none"> <li>• Diversion structures (i.e. bunds or channels) to separate and divert clean surface water flows around the CBP work areas and stockpiles</li> </ul>
<b>Operation</b>			
<b>Tailings storage facility</b>			
Tailings and contaminated water	Discharge and storage of tailings in Brad TSF	Seepage through base and embankments causing water table mounding which may adversely impact the health of adjacent native vegetation	<p><u>Controls:</u></p> <ul style="list-style-type: none"> <li>• Decant tailings water will be collected via trailer or skid-mounted pumps with floating intakes and pumped via return water pipelines to the Gee Pit or reused at the OPF.</li> <li>• The applicant has indicated that “impacts of the Brad TSF on surface water will be managed in accordance with the conditions specified in MS1062 and the Surface Water Management Plan (100-PL-EN-1015).”</li> </ul> <p><u>Proposed monitoring</u></p> <ul style="list-style-type: none"> <li>• Four monitoring bores surrounding the TSF as shown in Figure 10 of Appendix 1;</li> <li>• Proposed “routine sampling” of two existing monitoring bores along intersecting dolerite dyke (potential conduit for seepage) to monitor for changes in ground water levels and chemistry following commissioning of Brad TSF: SMB1056S &amp; D and “Satay Bore” (Figure 27, Appendix 1);</li> <li>• To monitor the phreatic surface within the embankments: installation of nine piezometers in the eastern embankment and twenty-two piezometers in stage 1 of the main embankment (to be replaced by a further twenty two piezometers in stage two); and</li> <li>• Monitoring of tailings delivery to Brad TSF.</li> </ul>
		Seepage through base and embankments causing contamination of nearby creek lines	
		Seepage through base and embankments causing potential impacts to the Millstream Water Reserve, a priority 2 public drinking water source area.	

Emission	Sources	Potential pathways	Proposed controls
		<p>Overtopping of TSF and direct discharge to land causing poor vegetation health/death and surface water contamination</p>	<ul style="list-style-type: none"> <li>• The maximum tailings levels applied for each stage restricts tailings volumes to allow for storm event inflow volumes over and above a long-term wet season</li> <li>• Stages 1 and 2 designed for a 1:1000 AEP 72-hour storm event (631mm)</li> <li>• Use of a safety bund crest to provide additional 1.8 m freeboard above design flood for stage 1 and 3.1 m additional freeboard above flood level for stage 2 (see Table 1).</li> <li>• Daily inspection of freeboard whilst the TSF is operational</li> </ul>
		<p>Pipeline leak/rupture and direct discharge to land causing vegetation poor health/death</p>	<ul style="list-style-type: none"> <li>• Tailings delivery and decant return pipelines to be equipped with real-time 24/7 telemetry monitoring with automatic cut-outs in the event of a pipeline failure.</li> <li>• Both the tailings delivery line and decant return line will be constructed predominantly on haul roads and light vehicle roads contained within the active mining footprint.</li> <li>• The access roads are bunded by earthen windrows to manage and contain pipeline leaks</li> <li>• Should the pipelines be located above ground and outside of existing road corridors, they will be bunded to a sufficient capacity to contain approximately 1km pipeline spill volume, 1km being the distance between cut-off valves (130m<sup>3</sup>)</li> <li>• The existing Solomon TSF1 is to be utilised as an emergency flush location where the first 1/3rd of the tailings delivery line can be cleared out to reduce pressure in the line and to allow for repairs and flushing the rest of the line to the Brad TSF in the event of failure or blockage.</li> </ul>
<p>Contaminated surface water run off</p>		<p>Overland flow causing poor vegetation health/death and/or contamination of nearby surface water bodies</p>	<ul style="list-style-type: none"> <li>• Windrows, culverts and/or bunding along the Brad TSF designed in accordance with the FMG Standard Engineering Specification for Drainage and Flood Protection (100-SP-CI-0004)</li> <li>• Audits to check natural drainage lines are buffered from disturbance footprint and ensure that the water</li> </ul>



Emission	Sources	Potential pathways	Proposed controls
			<p>quality and flow of monitored creeks downstream of construction activities remain similar to background levels;</p> <ul style="list-style-type: none"> <li>• Re-use run off from infrastructure/activity where possible to ensure turbid water is not discharged to the environment</li> <li>• Contain and appropriately manage contaminated stormwater prior to release to the environment</li> <li>• Audits/inspection reports to check that stormwater is captured and managed before being released to the environment and ensure that the results of monitoring are all within the natural variability expected and anthropogenic toxicants do not exceed guideline values.</li> <li>• Ongoing inspection and maintenance of the physical structures and monitoring of stormwater quality during operation of the Brad TSF.</li> </ul>
<b>Operation of expanded landfill</b>			
Dust	Operation of a category 64 putrescible landfill	Air/windborne pathway causing poor vegetation health/death	<p>Whilst not specific to operation of the landfill, FMG has referred DWER to the dust management plan EO-PL-EN-0001 which includes:</p> <ul style="list-style-type: none"> <li>• Use of water carts in high traffic areas such as access roads, haul roads and laydown areas;</li> <li>• Vehicle speed restrictions; and</li> <li>• Sealing of roads (where applicable).</li> </ul>
Windblown waste		Air/windborne pathway causing poor vegetation health/death	<p>The controls proposed by FMG are also currently conditioned under the existing licence L8464/2010/2</p> <p><u>Existing licence controls:</u></p> <ul style="list-style-type: none"> <li>• Waste shall be placed in a defined trench or within an area enclosed by earthen bunds.</li> <li>• Inert waste type 1: no cover required</li> <li>• Inert waste type 2: weekly - ensure waste is totally covered and no waste is left exposed</li> <li>• Putrescible waste: within 3 months of achieve final waste contours, cover to a depth of 1 m</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
Leachate		Seepage through base and embankments to soil and groundwater causing vegetation poor health/death and groundwater contamination	<p>The controls proposed by FMG are also currently conditioned under the existing licence L8464/2010/2</p> <p><u>Existing licence controls:</u></p> <ul style="list-style-type: none"> <li>The separation distance between the base of the landfill and the highest groundwater level shall not be less than 2 m.</li> </ul> <p><u>Existing licence monitoring:</u></p> <ul style="list-style-type: none"> <li>Quarterly monitoring of GQ9 and GQ10 (as shown in Figure 14, Appendix 1) for dissolved metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn), TDS, EC, pH, NO<sub>3</sub> and total P</li> </ul>
Contaminated surface water		Surface water run off causing poor vegetation health/death and/or contamination of nearby ephemeral creek lines	<ul style="list-style-type: none"> <li>Clean stormwater will be diverted around the landfill extension using windrows and bunding if required;</li> <li>The existing drainage channel will be used, or an additional drainage channel may be installed to the north-west end if required; and</li> <li>The existing drainage channel is depicted in Figure 18, Appendix 1. The existing drainage sump will "provide sufficient capacity" for the proposed minor extension to prevent the discharge of contaminated stormwater from a rainfall event.</li> </ul>
<b>Operation of mobile concrete batching plant</b>			
Dust	Operation of a concrete batching plant	Air/windborne pathway causing poor vegetation health/death	<p>The materials aggregate storage bays at the CBP will be semi-enclosed, which will assist with dust management.</p> <p>While not specific to the infrastructure proposed, FMG has referred DWER to the dust management plan EO-PL-EN-0001 which includes:</p> <ul style="list-style-type: none"> <li>Use of water carts in high traffic areas such as access roads, haul roads and laydown areas;</li> <li>Vehicle speed restrictions; and</li> <li>Sealing of roads (where applicable).</li> </ul>
Contaminated / sediment laden stormwater		Surface water run off causing poor vegetation health/death and/or contamination of nearby ephemeral creek lines	<ul style="list-style-type: none"> <li>Diversion structures (i.e. bunds or channels) to separate and divert clean surface water flows around the CBP work areas and stockpiles;</li> <li>Collect all stormwater drainage, wash-down water, and spillages from within the CBP work areas to designated collection points and</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
			sedimentation traps for treatment prior to re-use or release to the surrounding environment in accordance with Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000).

### 3.1.2 Receptors

In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors 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 and Figure 2 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental Siting* (DWER 2020)). Where environmental receptors have been excluded from the risk assessment, they have been shaded grey within the table.

The closest town is Tom Price located approximately 48km south of the prescribed premises.

**Table 3: Sensitive human and environmental receptors and distance from prescribed activity**

Human receptors	Distance from prescribed activity
<p>Yindjibarndi use of land (camping) adjacent to FMG tenure.</p> <p>(as per comment received during stakeholder consultation – see Appendix 2 for further detail)</p> <p><i>The area immediately adjoining FMG's tenure is located approximately 6.8 km north of the proposed Brad TSF. Given this distance, DWER has determined that a pathway does not exist between the TSF and this receptor for fugitive emissions (noise / dust) and therefore this receptor has been screened out.</i></p>	6.8 km north of the proposed Brad TSF
Environmental receptors	Distance from prescribed activity
<p><u>Groundwater</u></p> <p>Pilbara Groundwater Area – <i>Rights in Water Irrigation Act 1914</i></p>	<p><u>Groundwater depth</u></p> <p>Groundwater levels in June 2023 for bores surrounding Brad valley ranged between 40 meters below ground level (m bgl) from the south-east (MPB001R) to 21.7 m bgl to the north west (KBM004) (Figure 26, Appendix 1).</p> <p><u>Groundwater quality:</u></p> <p>Mostly fresh, with total dissolved solids (TDS) ranging between 340 – 1000 mg/L. Refer to section 3.3.4 for further detail.</p> <p><u>Groundwater flow direction</u></p> <p>Groundwater is expected to flow generally north</p>

	<p>toward mine pit voids which are being dewatered. Groundwater from the Brad Pit valley is expected to discharge at the towards Kings pit located immediately north (Figure 10, Appendix 1).</p> <p><u>Nearby groundwater users</u></p> <p>No known groundwater users within the vicinity of the proposed TSF.</p> <p>The nearest known bore is the Loops Yard Bore which is located approximately 9 km north east from the proposed TSF.</p>
<p><u>Public Drinking Water Source Area (Priority 2<sup>1</sup>)</u> Millstream Water Reserve</p>	<p>~5.7 km west of the proposed TSF</p> <p>~13.9 km south-west of Solomon Landfill facility (Figure 2)</p>
<p><u>Surface water</u> Pilbara Surface Water Area – <i>Rights in Water Irrigation Act 1914</i></p>	
<p><u>Zalamea Creek (tributary of Fortescue River)</u></p> <p><i>Under condition MS1062 10-1(5) FMG is required to minimise impacts to the health of vegetation associated with Zalamea Creek south of the existing rail line (not authorised for clearing).</i></p> <p><i>The department notes that this condition does not relate to degradation in surface water quality associated with tailings seepage. Potential impacts to Zalamea Creek will therefore be considered within this risk assessment.</i></p>	<p>Zalamea Creek is ~2.7 km south-east of the proposed TSF. (Figure 2)</p>
<p><u>Kangeenarina Creek (and associated permanent pools)</u></p> <p><i>Under MS1062 condition 10-1 (3) and (4) FMG is required to:</i></p> <ul style="list-style-type: none"> <li>• <i>maintain water levels in permanent pools in Kangeenarina Creek, which are not authorised to be removed by Schedule 1, consistent with pre-mining surveys; and</i></li> <li>• <i>maintain the health of riparian vegetation associated with permanent pools and semi-permanent pools in Kangeenarina Creek that are not authorised to be removed by Schedule 1 consistent with pre-mining surveys.</i></li> </ul> <p><i>The ministerial statement relates to water level management for the creeklines rather than potential impacts to water quality. The department will conduct further risk assessment with respect to potential impacts associated with tailings seepage.</i></p> <p>Further detail regarding Kangeenarina Creek supplementation is in the section below this table.</p>	<p>The Kangeenarina Creek is located 4.6 km west from the proposed TSF and is significant to the Yindjibarndi People (use for drinking water) (Figure 2).</p>

<p><u>Weelumurra Creek (and associated permanent and seasonal pools)</u></p> <p><i>Given the distance of this receptor from the proposed activities, it has been excluded from the risk assessment.</i></p>	<p>The Weelumurra Creek is located ~8.6 km south of the proposed TSF and 3.8 km south of the PEC4 southern area.</p>
<p>Hydrography WA - 250k surface water lines</p>	<p>Potential ephemeral creek lines / drainage adjacent to the TSF (Figure 19, Appendix 1)</p>
<p><u>Priority ecological communities (PEC)</u></p> <p>Priority 1<sup>2</sup> - Brockman Iron cracking clay communities of the Hamersley Range</p> <p>Vulnerable<sup>3</sup> - Themeda grasslands on cracking clays</p> <p><i>Given the distance of these communities from proposed activities these receptors have been excluded from the risk assessment.</i></p>	<p>1.9 km south of PEC4 concrete batching plant area and 7.4 km south of proposed Brad TSF</p> <p>5.8 km south-west of PEC4 concrete batching plant and 9.6 km south of proposed Brad TSF (Figure 2)</p>
<p><u>Conservation significant flora species</u></p> <p>Priority 2 flora species <i>Gompholobium karijini</i></p> <p><i>FMG is required to maintain the health of Gompholobium karijini populations under condition within MS1062 and the Vegetation Health Monitoring and Management Plan.</i></p>	<p>Directly adjacent to the new Brad TSF. (Figure 15, Appendix 1)</p>
<p><u>Habitat for conservation significant fauna species</u></p> <p>Significant fauna (under <i>Environmental Protection and Biodiversity Conservation Act 1999</i> [EPBC Act]) habitat for:</p> <ul style="list-style-type: none"> <li>• the Northern Quoll (endangered)</li> <li>• Pilbara Olive Python (vulnerable); and</li> <li>• the Peregrine Falcon (other specially protected).</li> </ul> <p><i>Under MS1062 condition 12-1(1) FMG is required to minimise direct and indirect impacts on conservation significant fauna species and their habitat, including, but not limited to the Pilbara Olive Python, Northern Quoll, and Pilbara Leaf-nosed Bat.</i></p>	<p>Adjacent to the western side of the new Brad TSF. (Figure 15, Appendix 1)</p>
<p><u>DBCA Legislated tenure</u></p> <p>Karijini National Park (Class A)</p> <p><i>Given the distance of the national park from proposed activities this receptor has been excluded from the risk assessment.</i></p>	<p>7.2 km east of PEC4 concrete batching plant area</p> <p>10km south-east of the new Brad TSF (Figure 2)</p>
<p><u>Native vegetation</u></p>	<p>Native Vegetation surrounds the Brad TSF, the Solomon Landfill Facility and the two proposed locations of the Concrete Batching Plants.</p>



<p><u>Subterranean fauna</u></p> <p><i>FMG is required to maintain the biodiversity and ecological integrity of troglofauna identified through baseline surveys under conditions within MS1062 and the Subterranean Fauna Management Plan.</i></p>	<p>The closest known incidence of subterranean fauna is Enchytraeidae sp. Located 640 m south – east of the proposed TSF.</p>
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Note 1: “P2 areas are normally assigned over rural land and are managed to minimise water quality risks. Low to medium intensity activities such as rural lifestyles and grazing can occur” (DoW, 2016)

Note 2: Priority one communities are “Species that are known from one or a few locations (generally five or less) which are potentially at risk.” (DBCA, 2019)

Note 3: Vulnerable – “Threatened species considered to be “facing a high risk of extinction in the wild in the medium-term future” (DBCA, 2019)

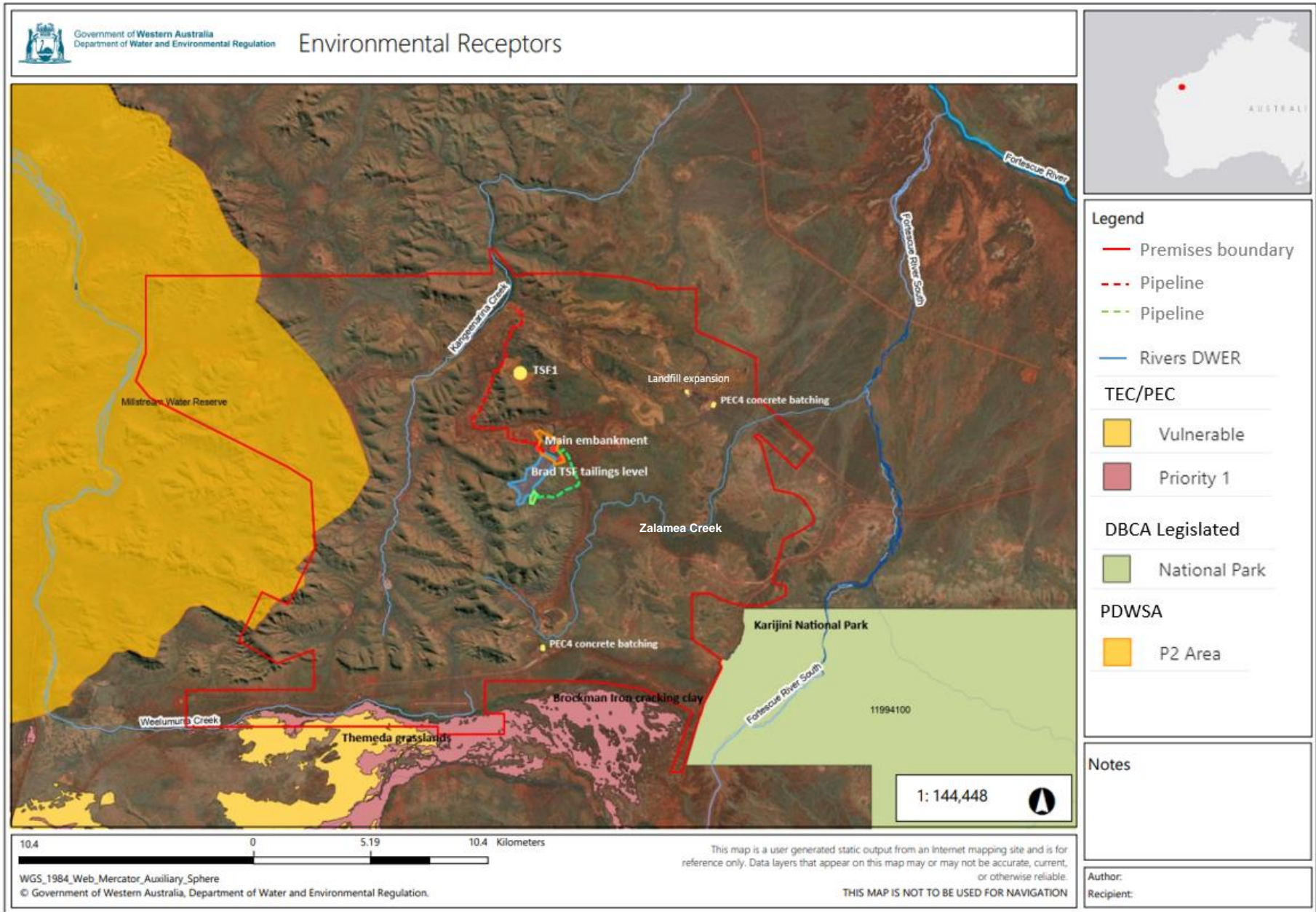
### **Kangeenarina Creek supplementation**

The ministerial statement requires that water levels are maintained in permanent pools of Kangeenarina Creek. A declining water table from groundwater abstraction on-site has the potential to impact creek lines and other groundwater dependent ecosystems. FMG consequently directly supplements the creek at various locations along the creek line. In 2022 1,524,197 kL was supplied to Kangeenarina Creek.

The Part V licence (L8464/2010/2) currently authorises:

- contingency discharge of TSF decant water / stormwater to Kangeenarina Creek during high rainfall events; and
- discharge of mine dewater to Kangeenarina creek via the supplementation scheme, including buried supplementation.

Monitoring of mine dewater discharged to the creek in 2021 is provided in Table 12, Appendix 1.



**Figure 2: Distance to sensitive receptors**

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## 3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant'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 applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 4.

Works approval W6802/2023/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 4 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

An amendment to licence L8464/2010/2 is required following the works approval time-limited operational phase to authorise emissions associated with the ongoing operation of the infrastructure (i.e. Brad TSF, land fill expansion and concrete batching plant). A risk assessment for the operational phase has been included in this decision report, however licence conditions will not be finalised until the department assesses the licence application.

**Table 4: Risk assessment of potential emissions and discharges from the premises during construction, and time limited operations**

Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
<b>Construction</b>								
Construction of: <ul style="list-style-type: none"> <li>Tailings storage facility main and eastern saddle embankment; and</li> <li>Landfill expansion.</li> </ul> Mobilisation of concrete batching plant. Vehicle movements and earthworks.	Dust	Air/windborne pathway causing poor vegetation health/death for adjacent native vegetation	Adjacent native vegetation	Refer to Section 3.1	C = Minor L = Unlikely <b>Medium Risk</b>	N	<b><u>Condition 1 – dust management</u></b>	<u>DWER control:</u> Applicant proposed controls relate to vehicle movements and access roads rather than dust associated with construction activities. This is considered insufficient to mitigate the risk. DWER has therefore conditioned a requirement that dust from construction activities is suppressed by using a water cart.
Construction of the Brad TSF main and eastern saddle embankment	Contaminated / sediment laden stormwater	Overland flow causing poor vegetation health/death and/or contamination of nearby creek lines	Adjacent native vegetation  Nearby creek lines	Refer to Section 3.1	C = Minor L = Unlikely <b>Medium Risk</b>	Y	Condition 2 – surface water management	Applicant proposed controls for containing and managing contaminated stormwater during construction of the TSF has been placed on the works approval as a regulatory control.
Construction of the landfill expansion					C = Slight L = Unlikely <b>Low Risk</b>	Y	N/A	N/A
Mobilisation of the concrete batching plant					C = Slight L = Unlikely <b>Low Risk</b>	Y	N/A	N/A

Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
<b>Operation (including time-limited-operations operations)</b>								
<b>Category 5 activities</b>								
Discharge and storage of tailings in Brad TSF	Tailings and contaminated water	Seepage through base and embankments causing water table mounding which may adversely impact the health of adjacent native vegetation	Adjacent native vegetation	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	N	Refer to section 3.3	Refer to section 3.3
		Seepage through base and embankments causing contamination of nearby creek lines	Zalamea Creek (2.7 km south-east) and Kangeenarina Creek (4.6 km west)	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	N		
		Seepage through base and embankments causing potential impacts to the Millstream Water Reserve, a priority 2 public drinking water source area.	PDSWA (5.7km west)	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	N		
		Overtopping of TSF and direct discharge to land causing poor vegetation health/death and surface water contamination	Adjacent native vegetation Adjacent creeklines connecting with Kangeenarina	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	Y	Condition 2 – construction requirements relating to freeboard Condition 21 – operational requirements, freeboard	Applicant proposed freeboard and inspection requirements have been placed on the works approval as regulatory controls.

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Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
			Creek and Zalamea Creek				and inspections	
		Pipeline leak/rupture and direct discharge to land causing vegetation poor health/death	Adjacent native vegetation Adjacent creek lines connecting with Kangeenarina Creek and Zalamea Creek	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	N	<b><u>Condition 2 – construction requirements</u></b> <b><u>Condition 21 – operational requirements</u></b>	Applicant proposed controls for pipeline construction and operation have been placed on the works approval.  <u>DWER control:</u> DWER has additionally included that pipeline construction adhere to the relevant Australian standards.  Testing and calibration of pipelines, flow meters and pressure meters has also been conditioned as a construction requirement.
	Contaminated surface water run off	Overland flow causing poor vegetation health/death and/or contamination of nearby ephemeral surface water bodies	Adjacent creek lines connecting with Kangeenarina Creek and Zalamea Creek	Refer to Section 3.1	C = Minor L = Unlikely <b>Medium Risk</b>	Y	Condition 2 – construction requirements	Applicant proposed surface water management has been placed on the works approval as a regulatory control.
<b>Category 64 activities</b>								
Operation of an expanded category 64 putrescible landfill (0.37 hectare expansion)	Dust	Air/windborne pathway causing poor vegetation health/death	Adjacent native vegetation and habitat for significant fauna	Refer to Section 3.1	C = Minor L = Unlikely <b>Medium Risk</b>	Y	N/A	N/A
	Windblown waste	Air/windborne pathway causing	Adjacent native	Refer to Section 3.1	C = Slight	Y	Condition 4 – construction	The applicant proposed controls for landfill

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Risk events					Risk rating <sup>1</sup>	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls	C = consequence L = likelihood			
		poor vegetation health/death	vegetation and habitat for significant fauna		L = Unlikely <b>Low Risk</b>		requirements Condition 21 – operational requirements	management reflect the current conditions of licence L8464/2010/2. As the risk profile for the current activity is similar to the proposed expansion, these will be placed on the works approval as regulatory controls for the expansion area.
	Leachate	Seepage through base and embankments to soil and groundwater causing vegetation poor health/death and groundwater contamination	Adjacent native vegetation and habitat for significant fauna Adjacent ephemeral creeklines	Refer to Section 3.1	C = Minor L = Unlikely <b>Medium Risk</b>	Y	Condition 4 – construction requirements Condition 21 – operational requirements	The applicant proposed minimum separation distance of 2 m from base of the landfill to groundwater (as per current licence L8464/2010/2) has been placed on the works approval as a regulatory control for the expansion area.  Quarterly monitoring for two wells near the landfill also takes place under L8464/2010/2. As the risk profile for the expansion is similar to current landfill activities, no additional monitoring requirements for the landfill will be placed on the works approval.
	Contaminated surface water	Surface water run off causing poor vegetation health/death and/or contamination of nearby ephemeral creek lines	Adjacent vegetation Nearby ephemeral creek lines	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	Y	Condition 4 – stormwater diversion around landfill	Applicant proposed control for constructing stormwater diversions around the landfill is considered acceptable and has been placed on the works approval as a regulatory control.
<b>Category 77 activities</b>								
Operation of a concrete batching plant	Dust	Air/windborne pathway causing poor vegetation	Adjacent native	Refer to Section 3.1	C = Minor L = Unlikely	Y	Conditions 3 and 21 – material storage within enclosed semi-enclosed	The applicant proposed control for material storage within bays has been placed on the works

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Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
		health/death for adjacent native vegetation	vegetation		<b>Medium Risk</b>		storage bays	approval as a regulatory control.
	Contaminated / sediment laden stormwater	Overland flow causing poor vegetation health/death and/or contamination of nearby creek lines	Nearby creek lines	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	Y	Condition 4 – stormwater diversion around CBP area	Applicant proposed control for constructing stormwater diversions around the CBP area/stockpiles is considered acceptable and has been placed on the works approval as a regulatory control.

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

Note 2: Proposed applicant controls are depicted by standard text. **bold and underline text** depicts additional regulatory controls imposed by department.

## 3.3 Detailed risk assessment for tailings storage facility seepage

### 3.3.1 Overview of potential risk events

Tailings storage facility seepage has the potential to impact groundwater quality and cause water table mounding. This may result in the following risk events which will be further assessed in the sections below:

- water table mounding may adversely impact the health of adjacent native vegetation;
- flow of seepage impacted groundwater may result in contamination of nearby creek lines Zalamea creek (~2.7 km south-east of proposed TSF) and Kangeenarina creek (~4.6 km west of proposed TSF) which is significant to the Yindjibarndi People (including for drinking water use); and
- flow of seepage impacted groundwater may result in potential impacts to the Millstream Water Reserve, a priority 2 Public Drinking Water Source Area (~5.7 km west of the proposed TSF).

### 3.3.2 Source: characterisation of emission

#### Tailings characterisation

Tailings for deposition into Brad TSF are expected by the applicant to be similar to that currently deposited into TSF1. No recent tailings information for TSF1 has been provided. FMG provided a TSF1 tailings report from 2015 (FMG, 2015) indicating this would reflect the expected tailings chemistry and physical properties. Thirty-two tailings slurry samples were collected directly from the ore processing facility between June 2014 and January 2015. The resulting total element and supernatant analysis are summarised below:

- Total element concentrations (Table 7, Appendix 1) include enrichment of aluminium, arsenic, barium, selenium, strontium, titanium, iron, vanadium and zinc. All tailings samples were classified as non-acid forming.
- Supernatant concentrations were compared against Australian and New Zealand and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000 95% freshwater species level protection (SLP) and site specific “investigative trigger values”<sup>6</sup> (ITV) under consideration at the time (Table 9, Appendix 1). These ITV’s do not appear on the current licence L8464/2010/2 and were revised in 2021 to be less conservative and aquifer specific<sup>7</sup> (Table 10 and Table 11, Appendix 1). Analytes in the supernatant (Table 8,

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<sup>6</sup> The ITV’s were originally prepared by Tetra Tech in 2014. According to FMG (2015) the ITV’s “differ from the ANZECC 95% of Species Limit of Protection (SLP) guidelines in that they represent the 95th percentile of regional groundwater concentrations for analysed parameters whereas the ANZECC 95% SLP guidelines represent the lowest concentrations that are toxic to the most sensitive of species with an additional factor of safety (assuming the element occurs as the most toxic soluble species)”.

<sup>7</sup> With the assistance of SRK consulting these criteria were developed by FMG to “assist with the management and internal compliance for water quality monitoring and inland water management.” The previous criteria did not distinguish between aquifers. The value used for sulfate for the revised criteria was the non-potable groundwater use value – 1,000 mg/L. These are used internally by FMG and do not appear on licence L8464/2010/2.

Appendix 1) exceeding ANZECC & ARMCANZ (2000) and 2014 ITV's<sup>89</sup> were boron, sodium, chloride, sulfate and strontium. According to the report, these are “not toxic” and the main impact tailings seepage would have on water quality would be to increase the salinity.

- Total dissolved solids in the tailings supernatant is expected by FMG to range between 200 and 1,100 mg/L (FMG, 2023d).

Kinetic testing of three tailings samples and three waste rock samples over 40 weeks undertaken in 2012 (Tetra Tech, 2012) indicated a low to moderate potential for fluoride leaching (average leach concentration of 1 mg/L) from the tailings material and a moderate potential for titanium leaching (leach concentrations “above or at the ITV” of 0.0005 mg/L).

The applicant has indicated impacts to groundwater from Brad TSF seepage will be similar to that of TSF1. Figure 6 shows data for monitoring bores surrounding TSF1 including groundwater elevation, total dissolved solids (TDS) and key analytes approaching or above FMG's screening criteria (as per Table 9, Appendix 1). These include nitrate, strontium, zinc, sulfate and titanium over time for the three currently licenced<sup>10</sup> monitoring bores. Total dissolved solids and major ion concentrations (magnesium, potassium) have also increased over time for the three bores, particularly in TSF1-MB-004.

### **Estimated seepage**

Tailings slurry will be deposited into Brad TSF at ~48% solids content by weight (Red Earth Engineering [REE], 2021). The tailings water inflow rate is estimated to be 25,000 m<sup>3</sup>/day, based on the current average annual tailings production rate of 8.2 Mtpa. Water from the slurry will be collected in the decant pond (for reuse in the OPF or discharge to Gee Pit), retained in the tailings or lost via evaporation and seepage.

The seepage rate for Brad TSF is expected to be similar to TSF1 which is also an unlined valley TSF and located 2.4 km north from Brad TSF. The average seepage loss at TSF1 was estimated by comparing satellite imagery taken at 5 day intervals following a rare storm event in February 2020 (Figure 3) (REE, 2021). TSF water balance was also simulated using a Monte Carlo (probabilistic) simulation approach. Using the satellite imagery and Monte Carlo simulation, seepage losses from Brad TSF were estimated by FMG (2023a) to range from 14,000 to 20,000 m<sup>3</sup>/day. The range is dependent on pond volume and area in contact with the in-situ material.

DWER received concerns from a stakeholder group<sup>11</sup> about the methodology used to calculate seepage. Technical advice, sought by DWER internally, indicated that the methodology was sound, but recommended that the seepage rate from the facility is monitored on an on-going basis by collection of water balance data. Technical advice recommended that the applicant establish a weather station at the mine site as seepage rates would be more accurate if rainfall and evaporation data are collected. FMG have indicated that they have several existing weather

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<sup>8</sup> Analytes below detection limits included silver, arsenic, beryllium, bismuth, cadmium, cobalt, chromium, lanthanum, molybdenum, nickel, phosphorus, lead, antimony, scandium, vanadium and tungsten.

<sup>9</sup> Supernatant analytes which exceeded ANZECC & ARMCANZ 2000 95% freshwater species protection and the specified 2014 ITV's were boron (23 samples), chloride (30 samples), sodium (27 samples), sulfate (24 samples), strontium (20 samples), thorium (3 samples), titanium (6 samples) and zinc (27 samples). Analytes which exceeded criteria for only one or two samples were barium (2 samples), fluorine (2 samples), mercury (1 sample), selenium (1 sample).

<sup>10</sup> As per FMG Solomon Part V licence L8464/2010/2. Licenced monitoring bores surrounding TSF1 include TSF1-MB-004, TSF1-MB-005D and MB-006D.

<sup>11</sup> The concern was raised by the Yindibarndi Aboriginal Corporation in December 2022 (DWER reference A2154279) among other issues more broadly relating to the site. See Appendix 3 of this decision report for a summary of comments received.

stations on-site.



**Figure 3 Sentinel Satellite imagery showing TSF1 water surfaces after a February 2020 storm**

### 3.3.3 Pathway

#### Hydrogeology

Groundwater beneath the Brad valley area sits within a weathered bedrock unit of the Brockman Iron Formation. The weathered bedrock is considered to be “reasonably permeable”, with a hydraulic conductivity of  $1.1 \times 10^{-5}$  m/s or 0.9 m/day (PDP, 2021). The aquifer is recharged by rainfall, surface water runoff and possibly by infiltration from nearby ephemeral creeks during flow events. The unit typically underlies the lower Channel Iron Deposit (CID) which is considered the primary aquifer within the project area<sup>12</sup> and tertiary sediments (including alluvial deposits) which also host water. Mining of the ore bearing CID units within the Brad valley has left the underlying bedrock unit as the exposed surface for tailings deposition.

Groundwater flow is expected to generally flow north from Brad TSF, towards mine voids which are actively being dewatered. Groundwater discharge from Brad Pit valley is also expected to occur at the Kings Pit to the north (Figure 10, Appendix 1).

A dolerite dyke intersects with the Brad valley area (Figure 4). Points of contact with surrounding rock units (along the same orientation as the dyke) could potentially act as a conduit for seepage (FMG, 2023a). FMG suggests that the dolerite dyke does not intersect with any sensitive receptors. However, DWER notes that the orientation of the dyke could potentially provide a pathway for seepage and pose additional risk to Kangeenarina Creek and Zalamea Creek (Figure 5).

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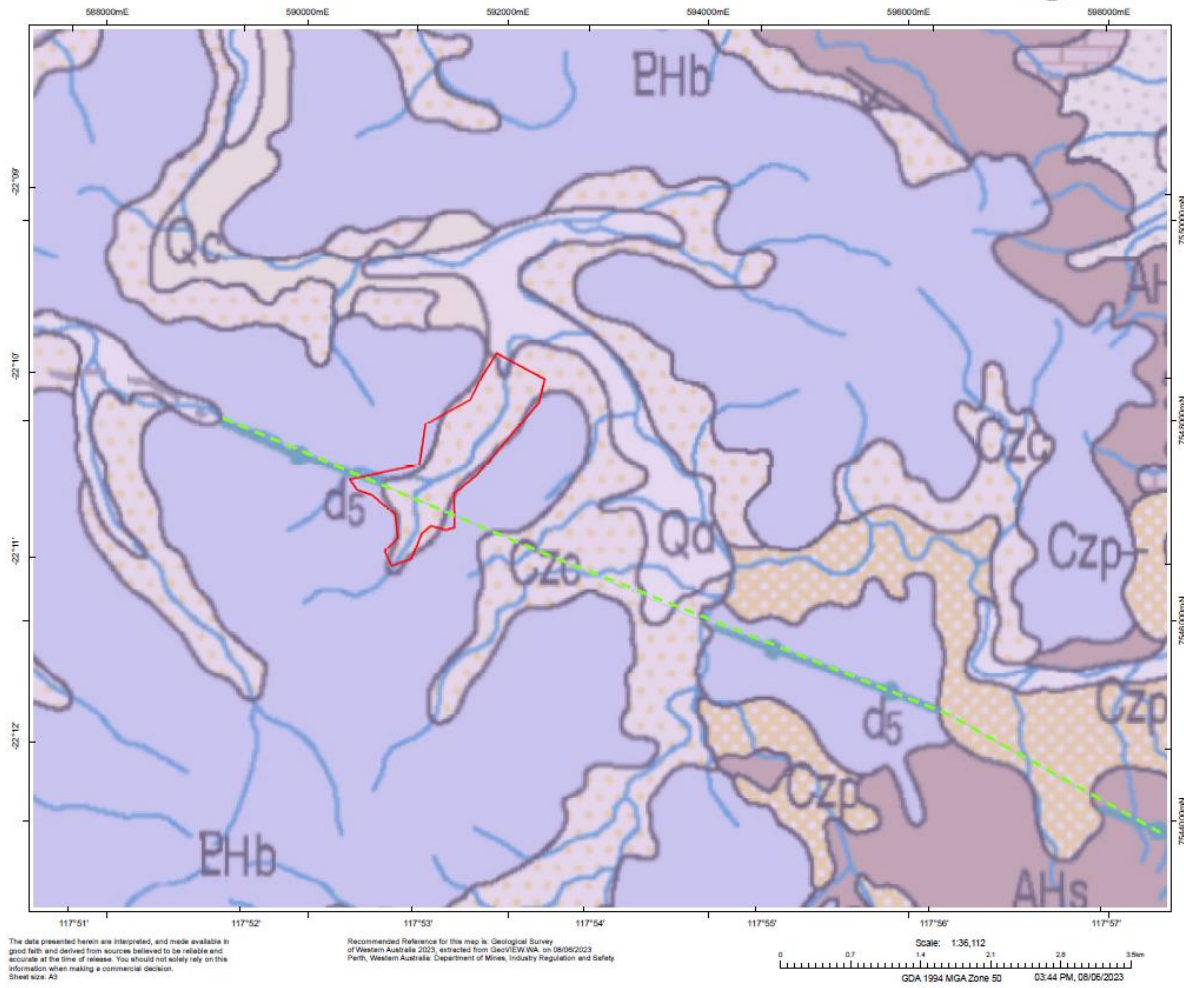
<sup>12</sup>The primary aquifer within the project area is within secondary porosity and transmissivity of the lower Channel Iron Deposit (CID). Mine dewatering in the hub has resulted in the reversal of hydraulic gradients within the CID towards the mine centre.

Groundwater in the project area is also associated with:

- The contact between the lower and upper CID.
- Tertiary paleochannel sediments overlying the CID. These include alluvium, colluvium and detrital deposits, including the Bedded Iron Deposits (BID) and Detrital Iron Deposits (DID). Commonly the BID and DID sediments occur above the water table.
- Deposits of calcrete within the Tertiary paleochannel sediments. The extent of the calcrete is variable and largely absent in the Brad TSF Area.

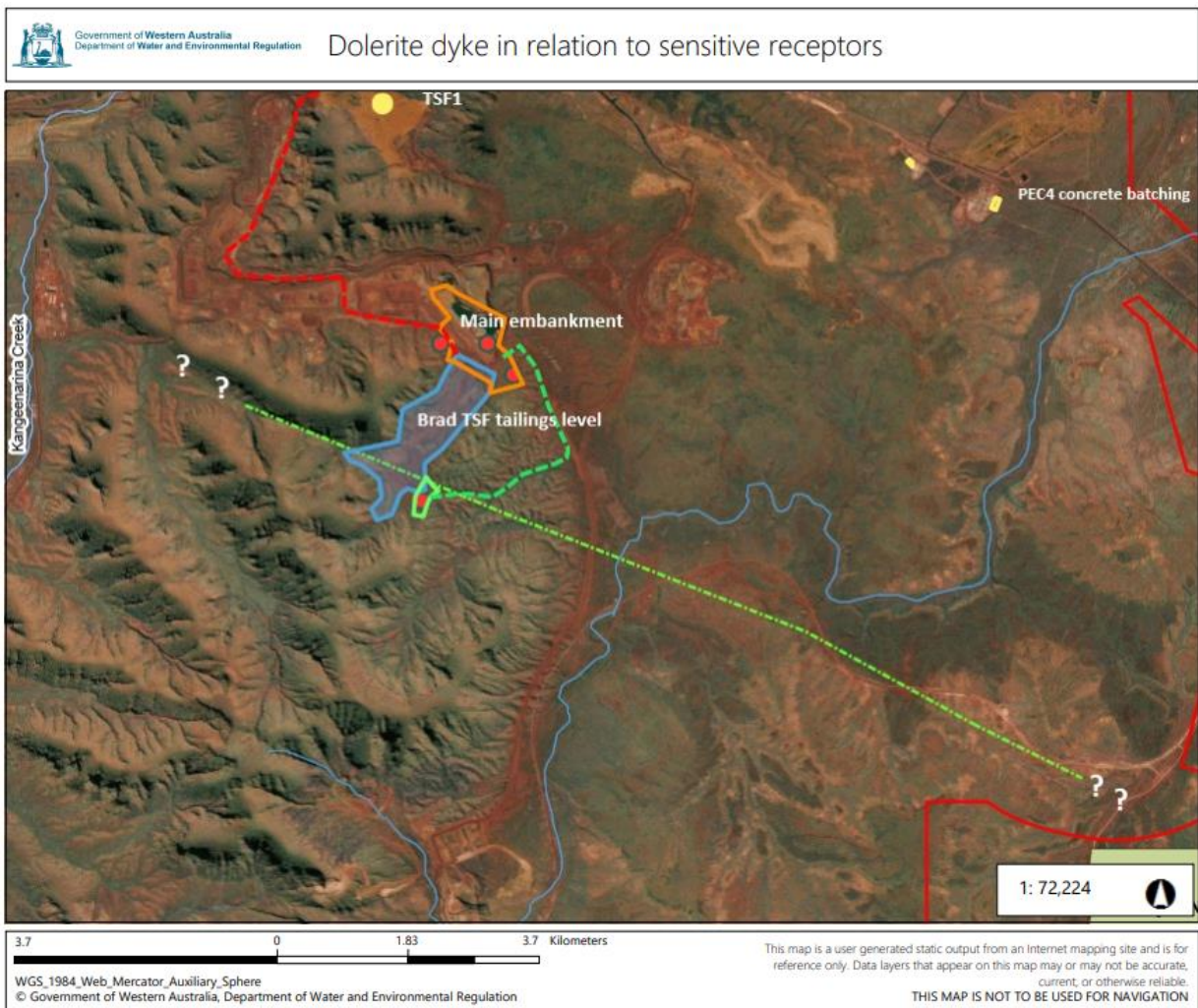


### Dolerite dyke



**Figure 4 Dolerite dyke (“d5”) as shown on GSWA 1:250,000 Geological map**





**Figure 5 Dolerite dyke in relation to sensitive receptors**

### 3.3.4 Groundwater and surface water data

#### Groundwater levels

Groundwater levels around Brad valley, and broadly for the Solomon Hub, have been lowered over time by mine pit dewatering. Declining water levels in recent years<sup>13</sup> are shown in hydrographs for monitoring bores surrounding Brad Valley (Figure 23 and Figure 24, Appendix 1). Groundwater elevations observed in 2022, within the interpreted mine aquifer extent, are given in Figure 25. Water levels are lower within the centre of the site where larger volumes are being abstracted.

Water table decline between 2015 and 2019 is also apparent for Part V licenced<sup>14</sup> monitoring bores (TSF1-MB-005D and MB-006D) north-east of TSF1 (Figure 6). Water levels for these bores increased between 2019 and 2023, although have not returned to their original levels. The water table south-west of TSF1 (TSF1-MB-004) has also been rising.

Groundwater levels in June 2023 (FMG, 2023c), for bores surrounding Brad valley, ranged

<sup>13</sup> For data mostly between 2012 and 2020. Some data is for monitoring as early as 2008. As reported in FMG (2023b) Solomon Triennial Groundwater Monitoring Review 2022

<sup>14</sup> As per FMG Solomon Part V licence L8464/2010/2. Licenced monitoring bores surrounding TSF1 include TSF1-MB-004, TSF1-MB-005D and MB-006D.

between 40 m bgl from the south-east (MPB001R) to 21.7 m bgl to the north-west (KBM004) (Figure 26, Appendix 1).

### **Groundwater quality**

Limited groundwater quality information has been provided for bores surrounding Brad valley. The department notes that the water quality information provided is unlikely to represent a true baseline, given the decades of mining which has occurred in the area. Major anions and cations have been provided (FMG, 2023c) for five nearby monitoring bores (Figure 26, Appendix 1 and Table 13, Appendix 1). Major anions, cations and metals have been provided for monitoring bore MPB001R, approximately 2.3 km south-east of Brad valley (Table 14, Appendix 1). From the limited data provided, water quality near Brad valley is:

- mostly fresh, with TDS ranging between 340 – 1,000 mg/L;
- elevated in sulfate (for two bores). Sulfate up to 100 mg/L was recorded for MPB001R. This level is higher than the ITV value originally derived by Tetrattech in 2014<sup>15</sup>, and lower than the non-potable groundwater use value (1,000 mg/L) currently used internally by FMG for water quality monitoring. The Australian Drinking Water Guideline (NHMRC, 2011; updated 2022) for sulfate is 500 mg/L (250 mg/L for aesthetic threshold);
- low in concentrations for other analytes of concern. One bore exceeded ANZECC & ARMCANZ, 2000 95% SLP for zinc. Where other 2014 ITV exceedances were noted, these do not exceed ANZECC & ARMCANZ (2000) or are attributed to an inappropriate limit of reporting.

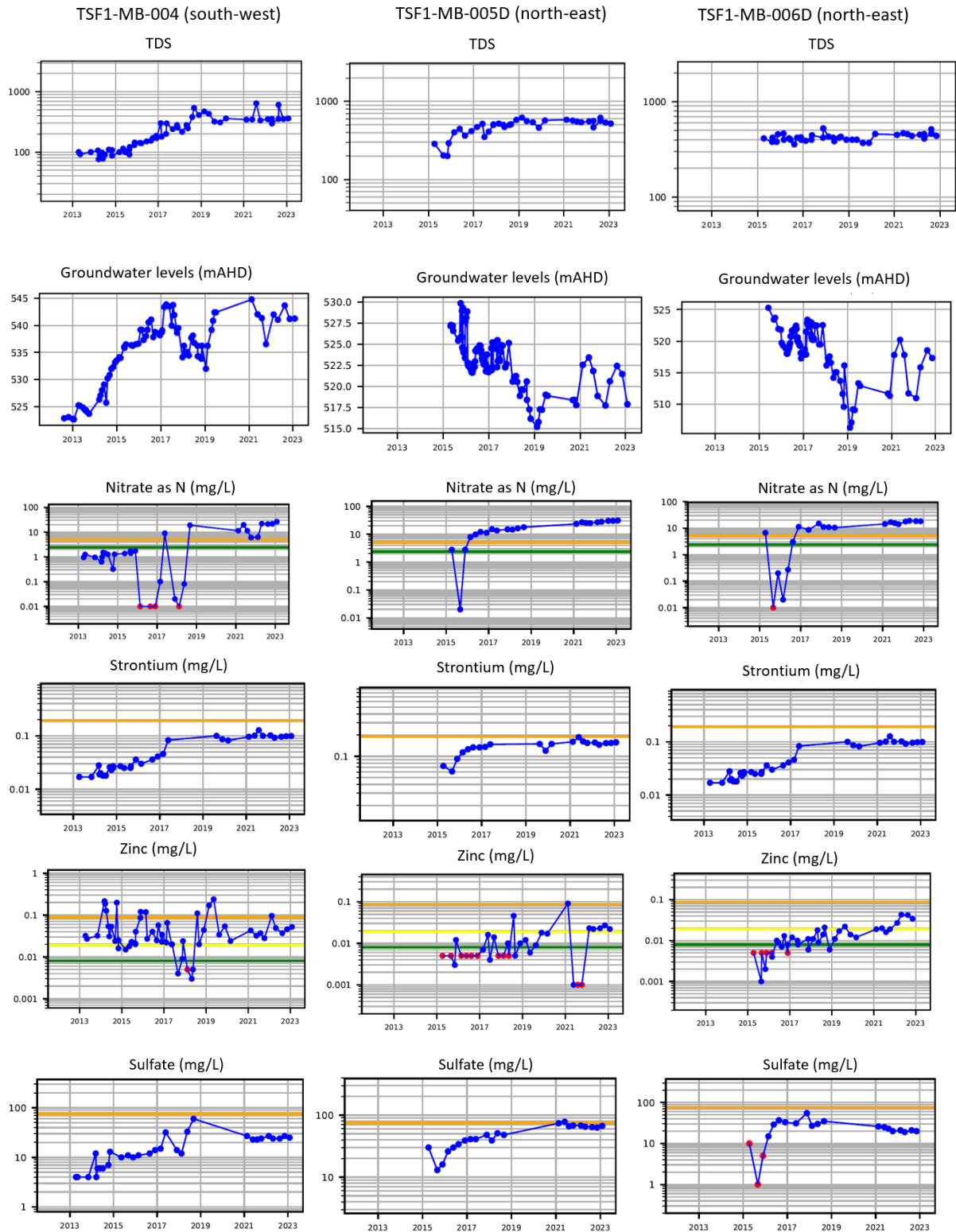
### **Surface water**

Limited surface water quality for Kangeenarina creek (~4.6km west of Brad Valley) and Zalamea Creek (~2.7km south east of Brad Valley) has been provided. Data from two sampling points (one per creek line) collected in 2020 has been provided (Figure 28, Appendix 1) and summarised in Table 15, Appendix 1 and below:

- TDS in Zalamea creek was 140 mg/L and Kangeenarina was 18 mg/L; and
- Sulfate in Zalamea creek was 14 mg/L and Kangeenarina creek was 1 mg/L.

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<sup>15</sup> The ITV's were prepared by Tetra Tech in 2014. According to FMG (2015) the ITVs "differ from the ANZECC 95% of Species Limit of Protection (SLP) guidelines in that they represent the 95th percentile of regional groundwater concentrations for analysed parameters whereas the ANZECC 95% SLP guidelines represent the lowest concentrations that are toxic to the most sensitive of species with an additional factor of safety (assuming the element occurs as the most toxic soluble species). As a result there may be elements that occur at concentrations in the groundwater below which they are considered toxic by the ANZECC guidelines, and as a consequence some ITVs may occur below the 95% SLP".



**Figure 6 TSF1 licenced monitoring bores – L8464/2010/2 (note logarithmic scale). FMG ITV's are indicated by an orange line, ANZECC 95% SLP by a green line and hardness modified criteria by yellow line for selected parameters.**

### 3.3.5 Proposed seepage management and monitoring

The applicant proposes the following controls to manage seepage from Brad TSF:

- TSF decant water will be collected via trailer or skid-mounted pumps and pumped to the Gee Pit<sup>16</sup> or reused at the OPF; and
- Management of any impacts to surface water in accordance with conditions specified in MS1062 and the Surface Water Management Plan (100-PL-EN-1015). The department notes that the ministerial statement relates to water level management for the creek lines rather than potential impacts to water quality.

#### Proposed monitoring

- Four monitoring bores surrounding the TSF as shown in Figure 10 of Appendix 1;
- Proposed “routine sampling” of two existing monitoring bores along intersecting dolerite dyke (potential conduit for seepage) to monitor for changes in ground water levels and chemistry following commissioning of Brad TSF: SMB1056S & D and “Satay Bore” (Figure 27, Appendix 1); and
- Process monitoring – tailings delivery to Brad TSF.

### 3.3.6 DWER assessment and regulatory controls

#### **Sulfate risk**

Internal technical advice was sought regarding risk associated with the tailings seepage. The advice:

- agrees that the chemical constituents of seepage from Brad TSF will likely be similar to that of TSF1;
- disagrees with FMG’s statement that the seepage is not environmentally hazardous, due to the likely concentrations of sulfate<sup>17</sup> within the seepage;
- considers, however, that seepage is unlikely to be discharged to downstream environmental receptors. Seepage impacted groundwater will likely be diverted towards mine voids undergoing dewatering. Surface water monitoring and installation of seepage recovery bores were therefore, at this stage, considered unnecessary;
- indicates that if the mine voids are backfilled to above the water table, seepage from the TSFs could be discharged into local waterways and reach downstream environmental receptors. Cumulative environmental risk associated with sulfate should therefore be considered in the closure plan for the Solomon mine site that is

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<sup>16</sup> Discharge of TSF decant to Gee pit is currently only authorised as a contingency in response to a high rainfall event (on Part V licence L8464/2010/2). It is recommended that FMG apply to amend the licence for this modification. A separate risk assessment for this activity will be undertaken at that time.

<sup>17</sup> Although sulfate generally has a low level of toxicity to aquatic fauna in water with a moderate to high hardness, large inputs of this ion into freshwater ecosystems can cause adverse impacts on aquatic and riparian vegetation due to changes in microbial processes that typically take place in sulfate-impacted aquatic sediments. These changes can cause large amounts of hydrogen sulfide and iron sulfide minerals to be produced in wetland sediments, which in turn (depending on the availability of iron) can cause plant deaths due to sulfide phytotoxicity (Simkin et al, 2013).

The sulfate discharges can also trigger algal blooms and the loss of biodiversity in a wetland by causing the release of phosphorus from sediments by a process known as “internal eutrophication” (Smolders *et al.*, 2006). The discharge of sulfate into a water body can also cause the release of mercury and methylmercury from sediments into the water column (Myrbo *et al.*, 2017).

administered by DMIRS. DWER will correspond with DMIRS regarding sulfate management and mine closure; and

- recommends installation of “piezometers”<sup>18</sup> in major creek channels near the downstream boundary of the Solomon mining area. The purpose of these piezometers would be to monitor water quality in the hyporheic zone (i.e., the mixing zone between surface water flows and groundwater), particularly for assessing long-term changes in sulfate ion concentrations. This would indicate whether downstream migration of TSF seepage in surface water flows would be a significant issue at the Solomon mine site.

## DWER assessment and regulatory controls

DWER has assessed the risk for the following:

- Water table mounding may adversely impact the health of adjacent native vegetation:

The consequence rating for tailings seepage impact to adjacent native vegetation is considered to be **moderate** given the high salinity of the seepage. The likelihood rating is considered **unlikely** as groundwater abstraction in the area is likely to continue to suppress the water table.

The overall risk rating for potential impacts to native vegetation is therefore **medium**.

- Groundwater contamination may result in contamination of nearby creek lines which are potentially connected to a Zalamea Creek and Kangeenarina Creek which is significant to the Yindjibarndi People (drinking water).

The consequence rating for tailings seepage impacts on Kangeenarina Creek and Zalamea Creek is considered to be **moderate** given the high salinity of the seepage and elevated concentrations of sulfate. The likelihood rating is considered **unlikely** due to:

1. the distance of the creek lines from Brad TSF (4.6 km and 2.7 km); and
2. seepage is likely to be diverted towards down-stream mine voids where large volumes of water are being abstracted for mine dewatering.

The overall risk rating for potential impacts to the creeklines is therefore **medium**.

- Groundwater contamination may result in potential impacts to the Millstream Water Reserve, a priority 2 Public Drinking Water Source Area.

The consequence rating for tailings seepage impacts on the Millstream Water reserve is considered to be **moderate** given the high salinity of the seepage and elevated concentrations of sulfate. The likelihood rating is considered to be **unlikely** due to:

1. The distance of the Brad TSF from the Millstream reserve (5.7 km); and
2. seepage is likely to be diverted towards down-stream mine voids where large volumes of water is being abstracted for the purposes of mine dewatering.

The overall risk rating for potential impacts to the Millstream Water Reserve is therefore **medium**.

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<sup>18</sup> In this instance, a piezometer is defined as a small-diameter well with a short screen, used to make head measurements and sample water at a specific depth. This is as per the UK Environmental Agency 2009, *Hyporheic Handbook: A handbook on the groundwater-surface water interface and hyporheic zone for environment managers*, Available from: <https://www.gov.uk/government/publications/the-hyporheic-handbook-groundwater-surface-water-interface-and-hyporheic-zone-for-environment-managers> Please note that this is a different definition from the “vibrating wire piezometers” for installation in the TSF embankments.



Given the medium risk rating for seepage to nearby receptors, the following regulatory controls will consequently be placed on the works approval.

**Table 5: DWER regulatory controls (seepage)**

Condition/control	Justification
<p><u>Water balance:</u> Condition 28 – water balance monitoring</p>	<p>While water balance modelling has been provided, to verify expected seepage, DWER has placed a requirement for monthly water balance monitoring during time limited operations. The frequency of water balance monitoring and reporting will be reviewed at the time of the licence application.</p> <p>To assist with water balance monitoring, and as recommended by internal technical advice, DWER has also conditioned that site rainfall and evaporation, collected from an on-site weather station, also be used to assist with seepage calculations.</p>
<p><u>Time limited operations – starter embankments</u> Condition 21 – time limited operations</p>	<p>The applicant requested construction of stages 1 and 2 under the works approval. Time limited operations under the works approval, allowing deposition of tailings, will be allowed following completion of stage 1 only.</p> <p>FMG will be required to apply for a licence amendment for deposition of tailings following construction of stage 2 under the works approval.</p> <p>Seepage impacts and the management of the TSF will be reassessed during each subsequent licence amendment (for on-going operation) to ensure the TSF is being managed appropriately</p>
<p><u>Tailings:</u> Condition 22 – authorised emissions</p>	<p>Tailings from other ore sources may present additional risk associated with potential contaminants which have not been considered or risk assessed within this approval.</p> <p>Only tailings from the FMG Solomon Project are therefore permitted to be deposited into the Brad TSF during time limited operations following construction of the stage 1 embankment. To deposit tailings from other ore sources, a works approval amendment would be required.</p>
<p><u>Tailings:</u> Condition 23 – tailings characterisation</p>	<p>The applicant has indicated that tailings deposited into Brad TSF will be similar to that currently deposited into TSF1. However, only data from 2015 has been provided. To account for potential ore variability, and verify expected tailings composition, DWER has conditioned a requirement for additional tailings characterisation.</p>
<p><u>Groundwater monitoring</u> Condition 2 – vibrating wire piezometer installation Condition 5 - groundwater monitoring well construction Conditions 7 - 9, 16 – 17, 24 – 27 groundwater monitoring, limits and reporting</p>	<p>Applicant proposed vibrating wire piezometer installation along the TSF embankments has been included in the works approval as a regulatory control.</p> <p>To monitor potential impacts from seepage, the applicant proposes to install four groundwater monitoring bores around the Brad TSF. DWER has therefore conditioned installation of these monitoring bores, including a monitoring event prior to tailings deposition and two monitoring events during time limited operations.</p> <p>Additionally, applicant proposed monitoring of the SMB1056S &amp; D and “Satay Bore” has been conditioned to allow detection of any seepage along the dolerite dyke intersecting with Brad valley. This will assist with detecting seepage prior to any potential flow through to Kangeenarina and Zalamea creeks.</p> <p>DWER will also recommend that sulfate water quality trigger levels be considered as part of the licence amendment application.</p>



<p><u>Mounding water table:</u></p> <p>Condition 24 – groundwater level management trigger and limit</p>	<p>To protect adjacent native vegetation, DWER has placed a standing water level limit of 4 m bgl on the works approval. A trigger for management action at 6 m bgl has also been conditioned.</p>
<p><u>Hyporheic monitoring in creek channels</u></p> <p>Condition 6 – installation of hyporheic monitoring points</p> <p>Conditions 7 - 9, 16 – 17, 24 – 27 monitoring, limits and reporting</p>	<p>Given that sulfate interaction with the hyporheic zone could cause impact to sensitive creek lines (these changes can cause large amounts of hydrogen sulfide and iron sulfide minerals to be produced in wetland sediments, or result in other process such as “internal eutrophication”), DWER has conditioned the requirement for sulfate ion monitoring – particularly to monitor any long term changes which may take place in the hyporheic zone.</p>

## 4. Consultation

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

**Table 6: Consultation**

Consultation method	Comments received	Department response
Application advertised on the department's website on 22 May 2023	None received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 22 May 2023	Comments received on 5 July 2023. Refer to section 2.3.3	N/A
Department of Planning, Lands and Heritage (DPLH) advised of proposal on 22 May 2023	Comments received on 27 June 2023. Refer to section 2.3.2	Refer to section 2.3.2
Wintawari Guruma Aboriginal Corporation (WGAC) advised of proposal on 22 May 2023	None received	N/A
Wirlu-Murra Yindjibarndi Aboriginal Corporation (WMYAC) advised of proposal on 22 May 2023	None received	N/A
Yindjibarndi Ngurra Aboriginal Corporation (YNAC) and Yindjibarndi Aboriginal Corporation (YAC)	Comments originally received in relation to Brad TSF in December 2022. Comments also received on 26 June 2023.	Refer to Appendix 2. The department will also consider some of YNAC's comments holistically with other assessment sbeing considered under Part V of the EP Act and the RIWI Act.

	Refer to Appendix 2.	
The applicant was provided with draft documents on 7 July 2023.	Comments were received on 14 July 2023. Refer to Appendix 3.	Refer to Appendix 3.

## 5. Conclusion

Based on the assessment in this decision report, the delegated officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

The department recommends FMG consider and address the following before commencing works:

- Comment from DPLH has indicated:
  - *“Aboriginal Heritage place ID 33577 (Ganyjingarringunha Nugurra), is not included in the 2011 section 18 consent granted to FMG for the “construction of a mining area and associated infrastructure, including a tailings storage facility (TSF) at FMG’s firetail and Kings Minin area (Solomon Hub)”. Therefore approvals under the Aboriginal Heritage Act 1972 (AHA) would be required for the works proposed for the northern portion of the “Brad Tailings Delivery Pipeline” that intersects with this Place”;*
  - the works approval application did not detail any consultation with the relevant groups regarding the proposal. DPLH recommends that the FMG discuss the proposal with the Aboriginal Corporations, and in particular, potential impacts on heritage place ID 33577 with YNAC; and
  - the new *Aboriginal Cultural Heritage Act 2021* comes into effect on 1 July 2023 and that the proponent should familiarise themselves with the new provisions of the Act and recommend a due diligence assessment is undertaken for the works footprint that is not currently covered by the section 18 ministerial consent.
- Yindjibarndi Ngurra Aboriginal Corporation have indicated in comments to DWER that FMG have failed to adequately consult with them regarding the proposal. DWER notes it is FMG’s responsibility to ensure that its obligations under the *Aboriginal Heritage Act 1972* and subsequently the *Aboriginal Cultural Heritage Act 2021* (following completion of the transitional period from the 1972 Act) (ACH Act) are met, including adherence to the ACH Act consultation guidelines.
- The mine closure plan may require updating to include sulfate management. DWER will issue formal correspondence to DMIRS with respect to sulfate management at mine closure. FMG is encouraged to liaise with DMIRS further on this matter.

### 5.1 Recommendations for licence amendment

The following recommendations for amendment of licence L8464/2010/2 are below:

- When the licence is amended to include Brad TSF, it is recommended that sulfate water quality triggers be considered at this time;
- The hyporheic monitoring suite be reviewed at the time of licence amendment (given sulfate is the primary analyte of concern, and depending on the outcome of the risk assessment, the suite may be reduced);
- Discharge of Brad TSF decant water to Gee Pit (or reuse via the OHP) has been proposed to manage the TSF water balance. However, this is listed in the licence only

for “contingency discharge of TSF decant water/stormwater to Gee-Pit during high rainfall events”. The department recommends FMG amend the licence to reflect this modification.

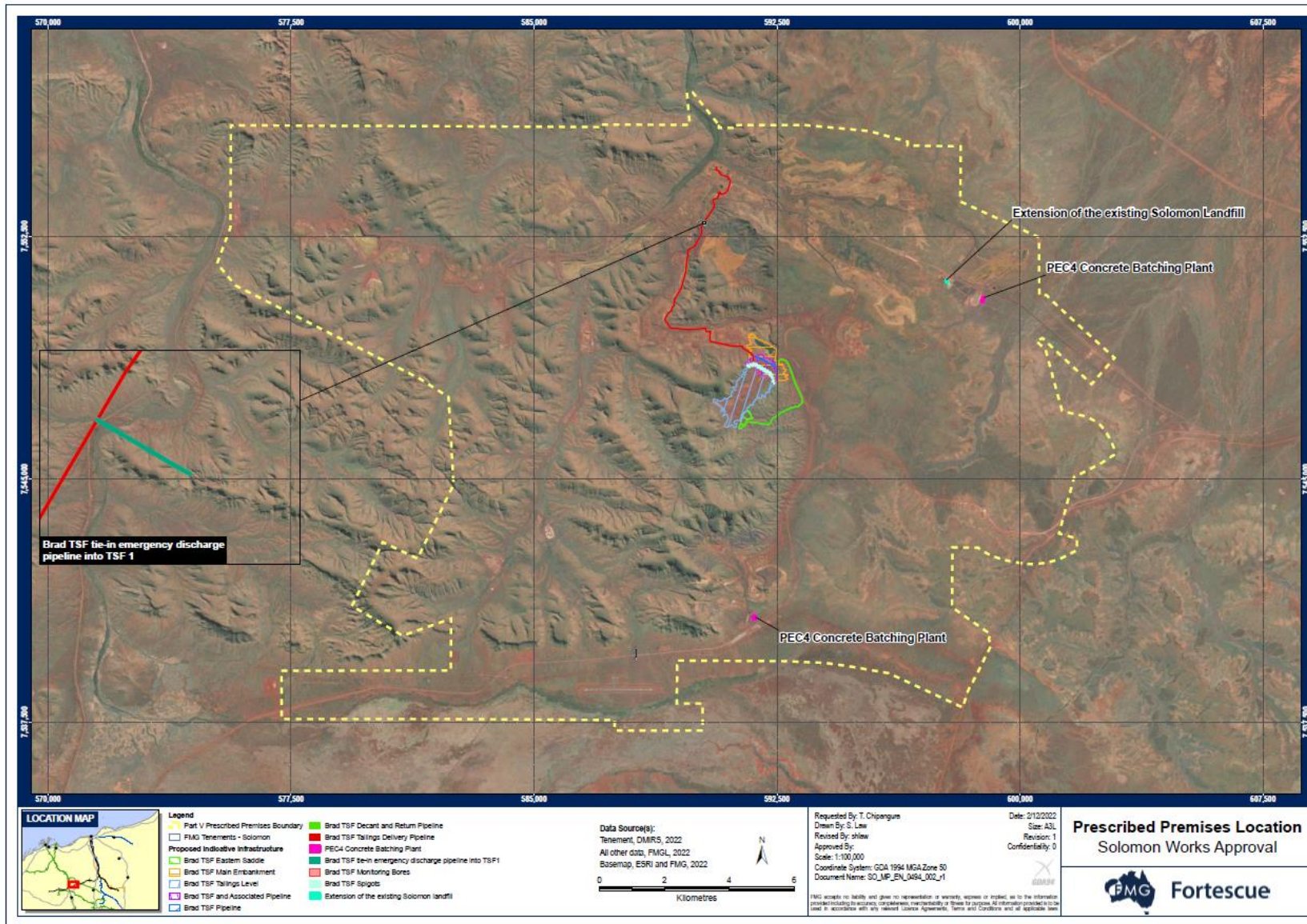
- Time limited operations for stage 1 only has been granted. FMG will need to apply for a licence amendment for operation of the stage 2 embankment.

## References

1. Department of Biodiversity, Conservation and Attractions (DBCA), 2019. *Conservation codes for Western Australian Flora and Fauna*, available from: <https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation%20code%20definitions.pdf>
2. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
3. Department of Water (DoW) (now DWER), 2016, *Strategic Policy – Protecting public drinking water source areas in Western Australia*
4. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
5. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
6. FMG, 2015, *Solomon Iron Ore Project – Tailings Seepage Report*
7. FMG, 2021, *Solomon Water Quality Threshold Assessment, Rev 2*, with assistance from SRK Consulting
8. FMG, 2023a, *FMG Solomon Pty Ltd response to the request for further information – Solomon mine works approval application outstanding information requirements* (DWER reference A2177694)
9. FMG, 2023b, *Solomon Triennial Groundwater Monitoring Review 2022*
10. FMG, 2023c, *RE: Brad TSF Queries* (DWER ref A2185979)
11. FMG, 2023d, *FMG responses to works approval and decision report draft* (DWER ref A2189051)
12. Myrbo, A., Swain, E.B., Johnson, N.W., Engstrom, D.R., Pastor, J., Dewey, B., Monson, P., Brenner, J., Dykhuizen Shore, M. and Peters, E.B., 2017, *Increase in nutrients, mercury, and methylmercury as a consequence of elevated sulfate reduction to sulfide in experimental wetland mesocosms*. *Journal of Geophysical Research: Biogeosciences*, 122(11), 2769-2785. The paper is available from web site <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2017JG003788>.
13. National Health and Medical Research Council (NHMRC), 2011 (updated in 2022), *Australian Drinking Water Guidelines*
14. Red Earth Engineering (REE), 2021, *Solomon Brad TSF Detailed Design Report*
15. Simkin, S.M., Bedford, B.L. and Weathers, K.C., 2013, *Phytotoxic sulfide more important than nutrients for plants within a groundwater-fed wetland*. *Ecosystems*, **16**, 1118–1129. The paper is available from web site [www.researchgate.net](http://www.researchgate.net).
16. Smolders, A.J.P, Lamers, L.P.M., Lucassen, E.C.H.E.T, van der Velde, G. and Roelofs J.G.M., 2006, *Internal eutrophication: How it works and what to do about it—a review*. *Chemistry and Ecology*, 22(2), 93–111. The paper is available from web site [www.researchgate.net](http://www.researchgate.net).
17. Tetra Tech, 2012, *Solomon TSF Colusre Plan (Brief 3A) Humidity Cell Testing Technical Memorandum*
18. Tetra Tech, 2014, *Life of Mine Geochemistry Programme – Site Specific Trigger Values*



# Appendix 1: Additional figures and tables



**Figure 7 General infrastructure location**

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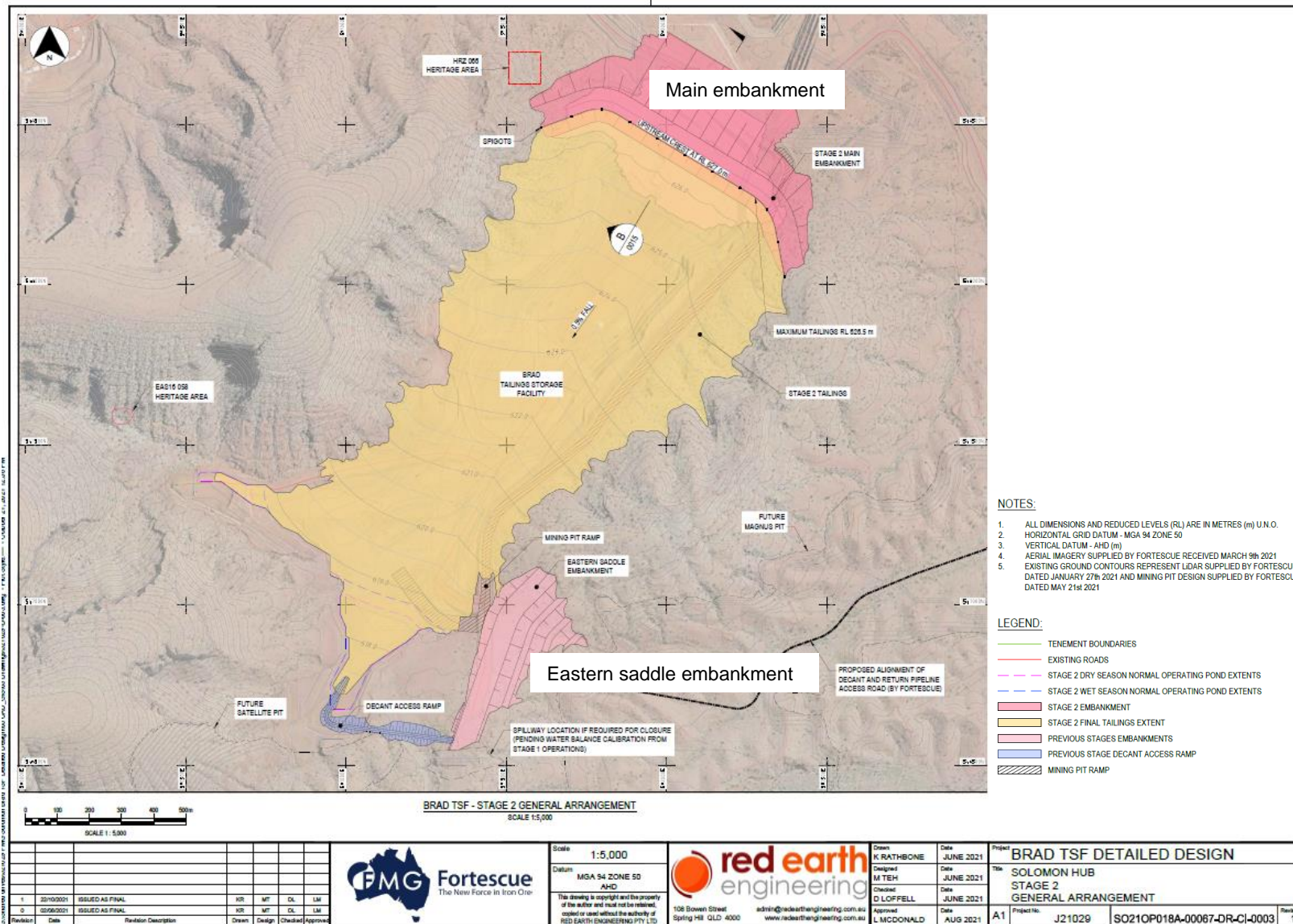
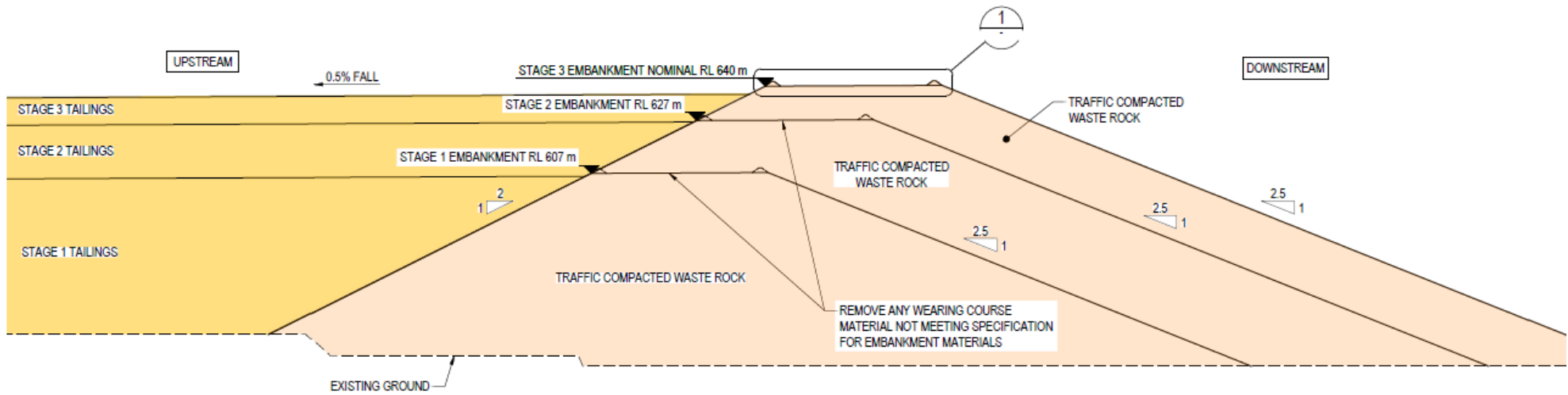


Figure 8 Brad TSF - stage 2 embankment

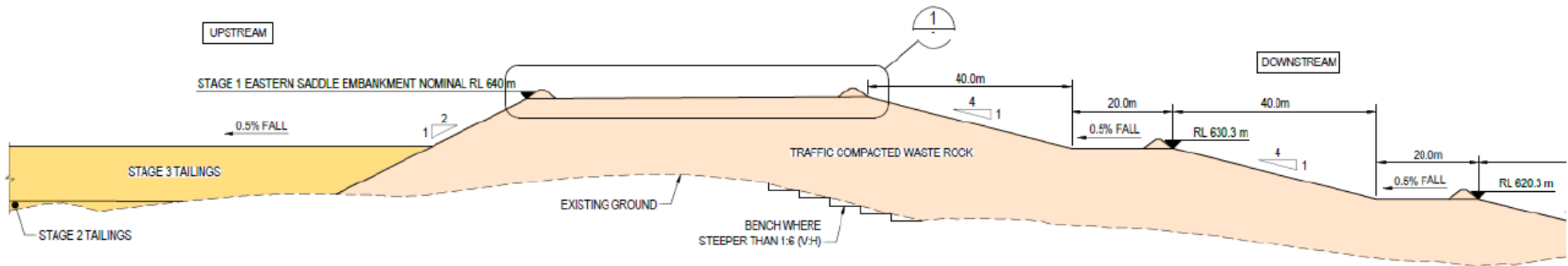
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Main Embankment – typical section

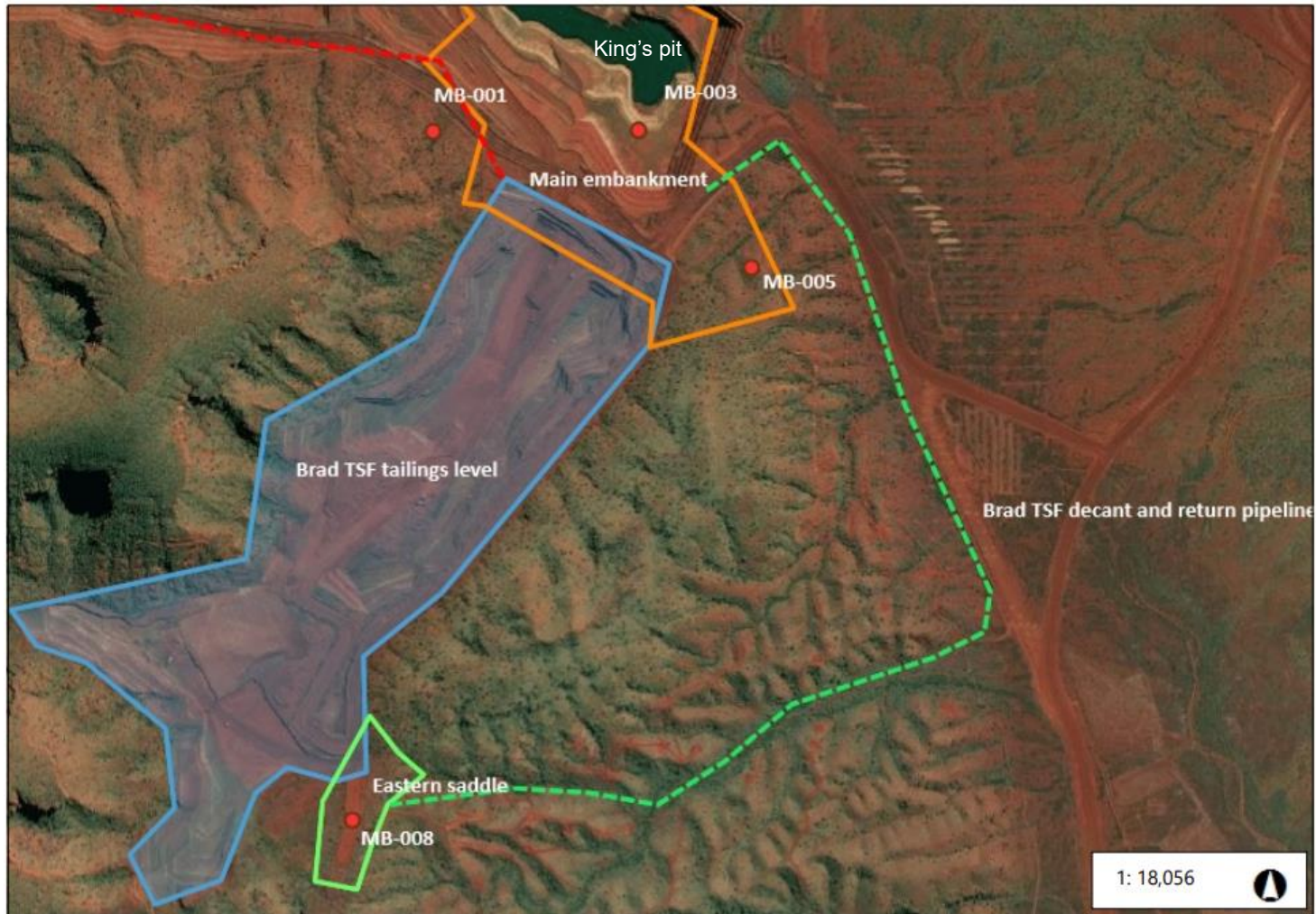


Eastern Saddle Embankment – typical section

Figure 9 Typical sections for embankments



## Proposed Brad TSF monitoring bore locations



0.9 0 0.46 0.9 Kilometers

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**Figure 10 Proposed Brad TSF monitoring bore locations**

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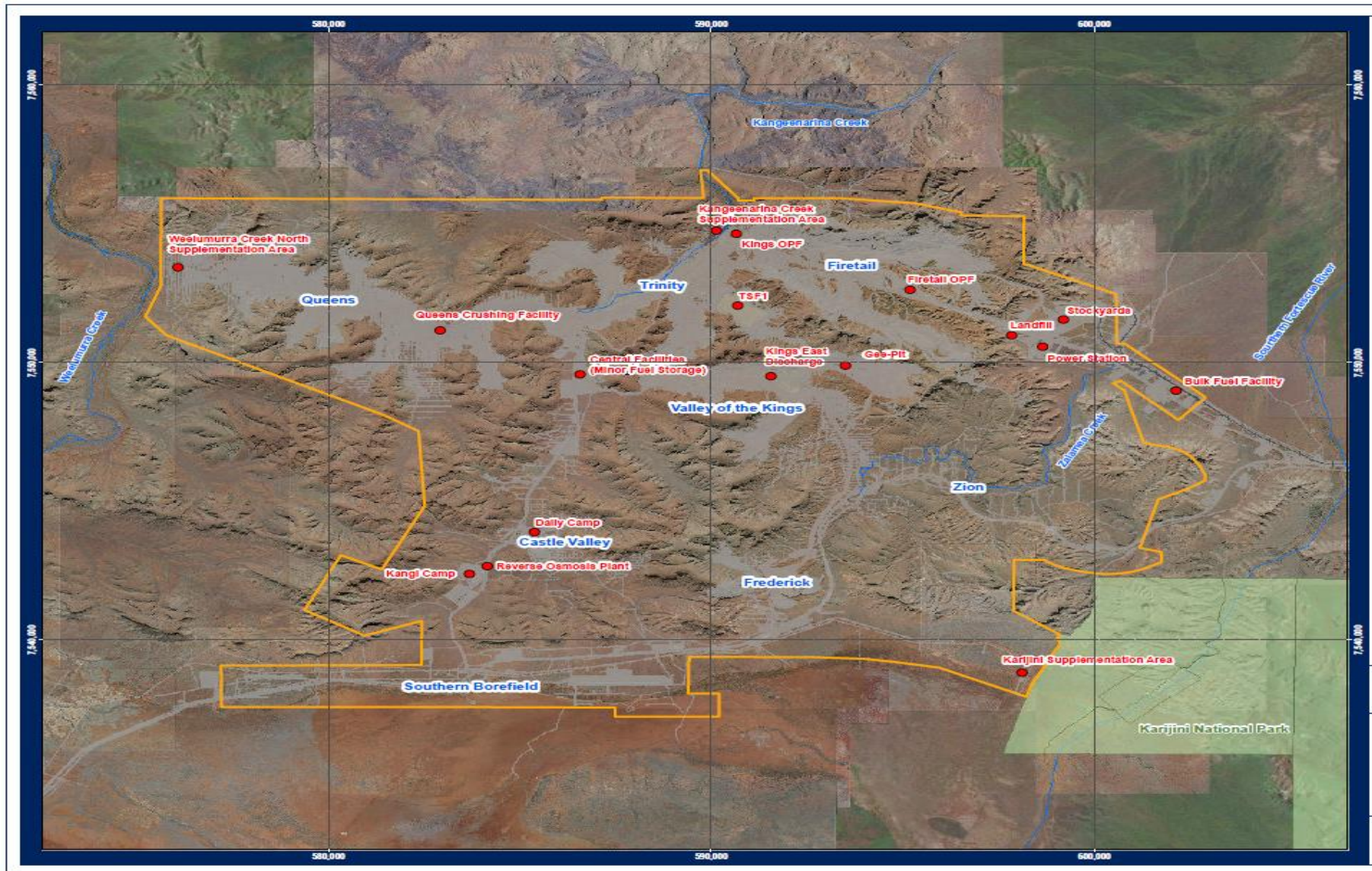
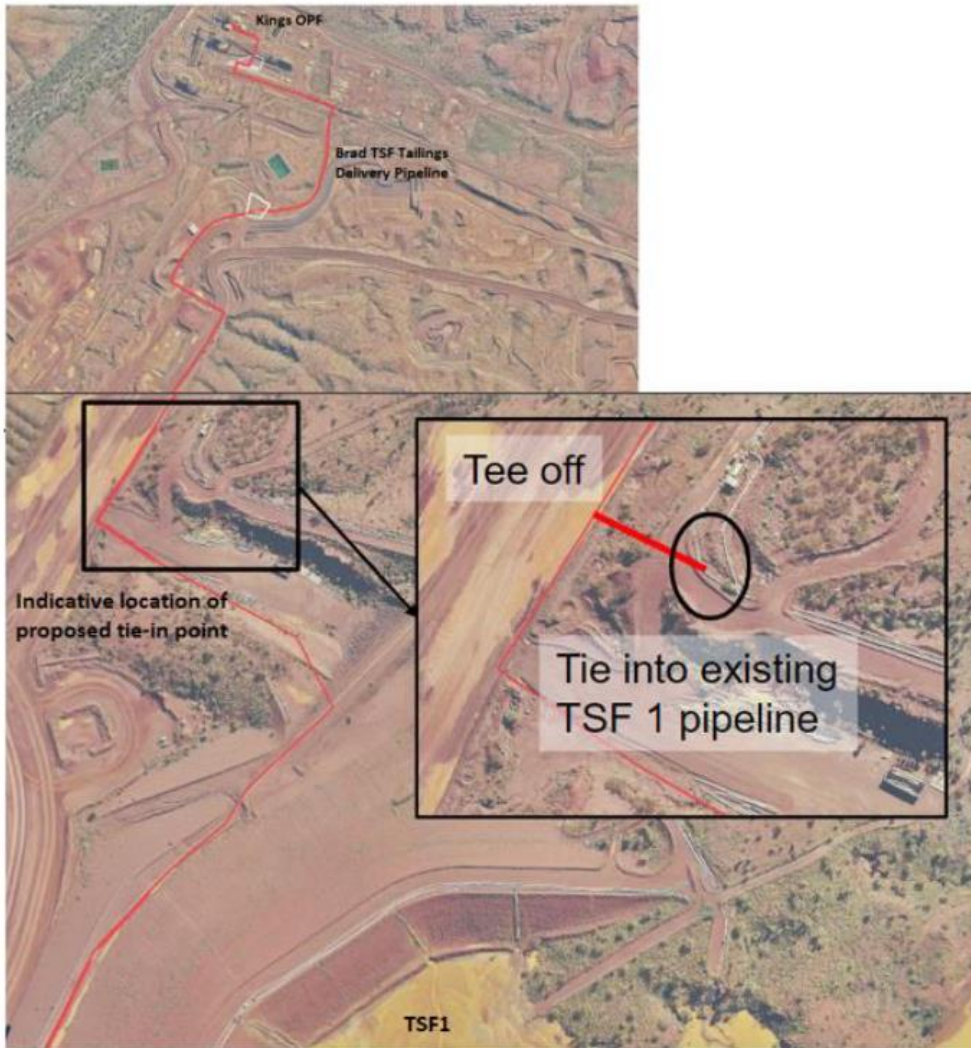
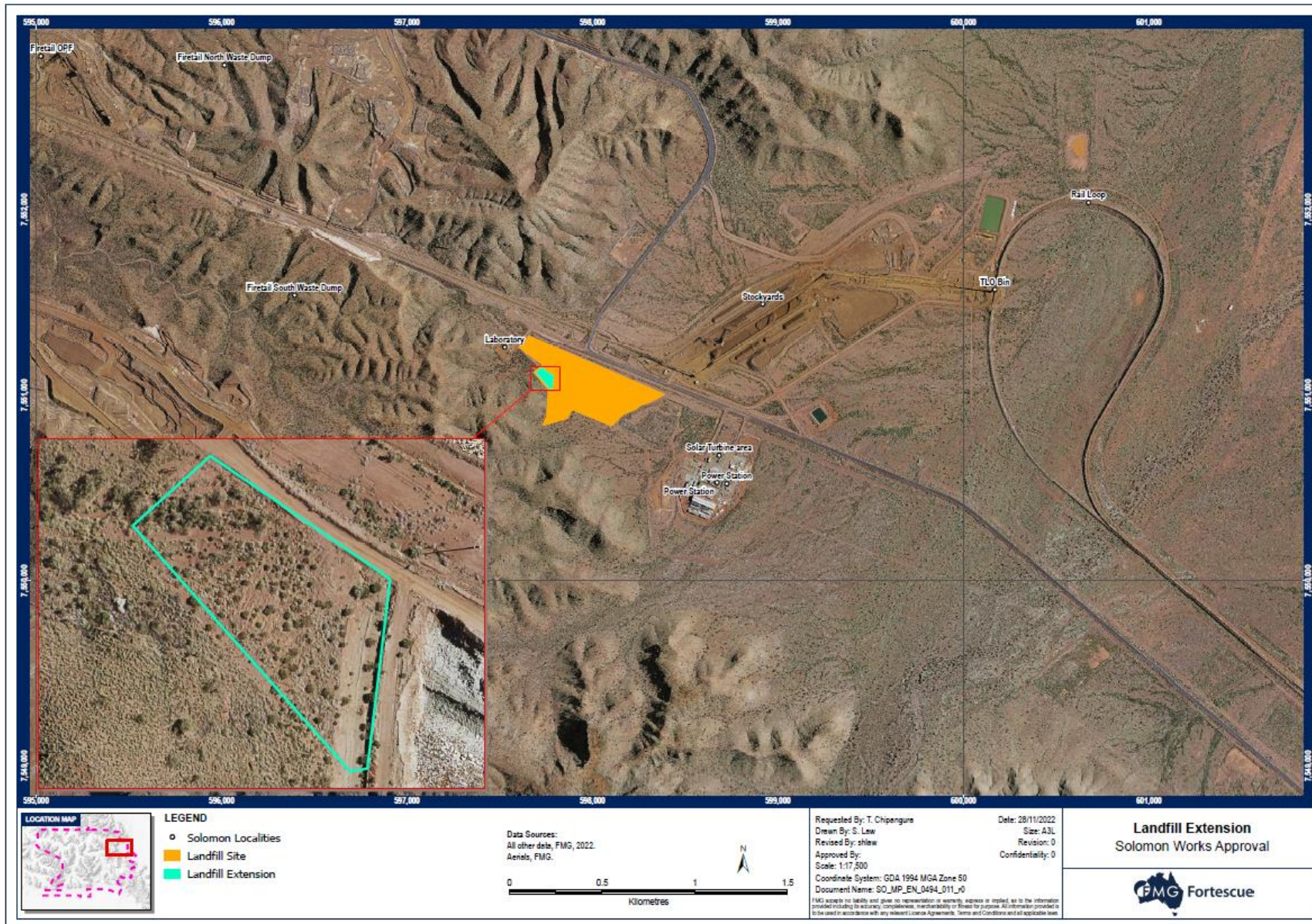


Figure 11 Key site infrastructure



**Figure 12 Indicative location of the Brad TSF tailings tie-in pipeline into the existing TSF1 pipeline for emergency purposes**





**Figure 13 Proposed landfill extension**

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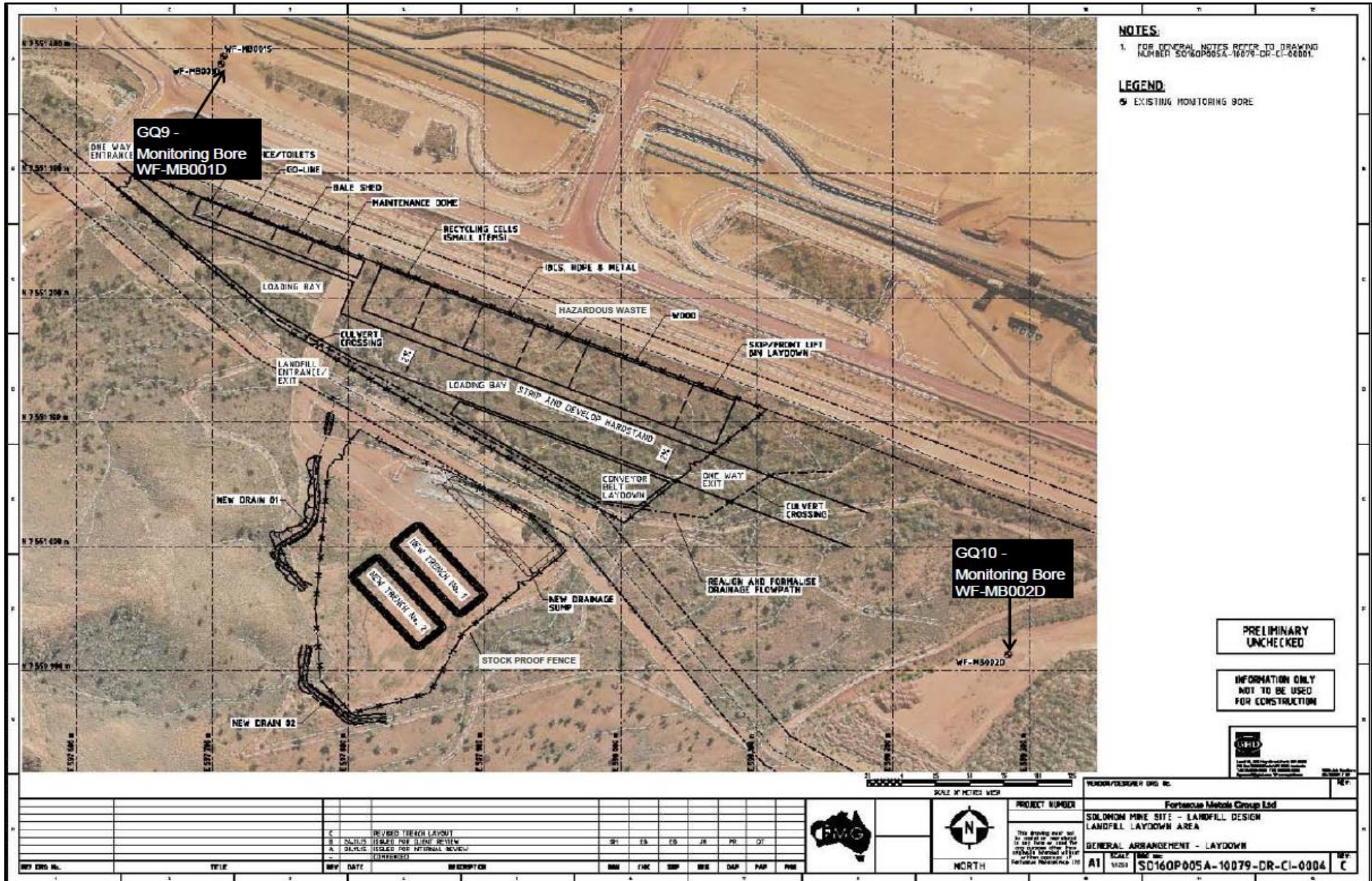
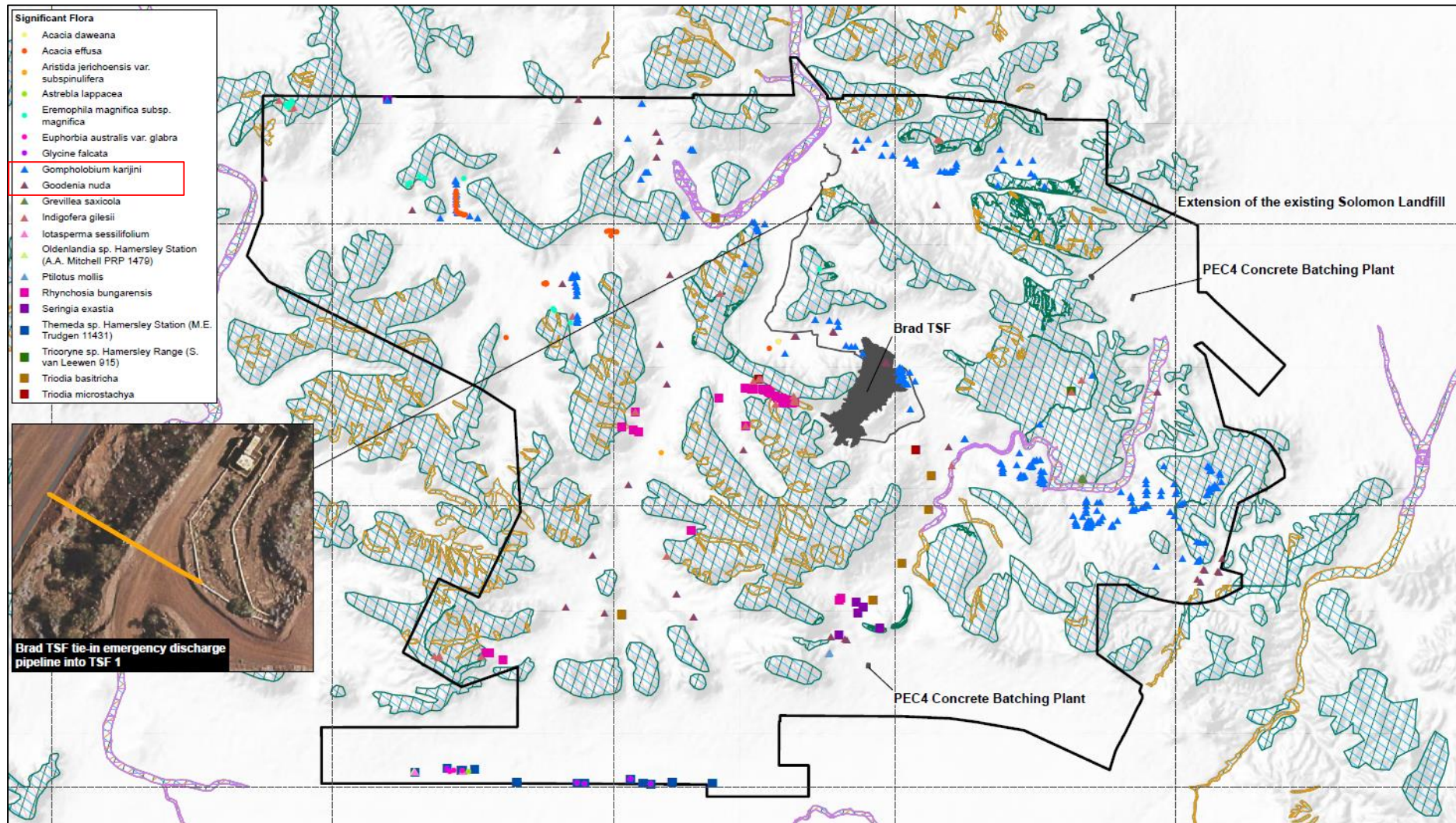


Figure 14 Existing landfill monitoring bores

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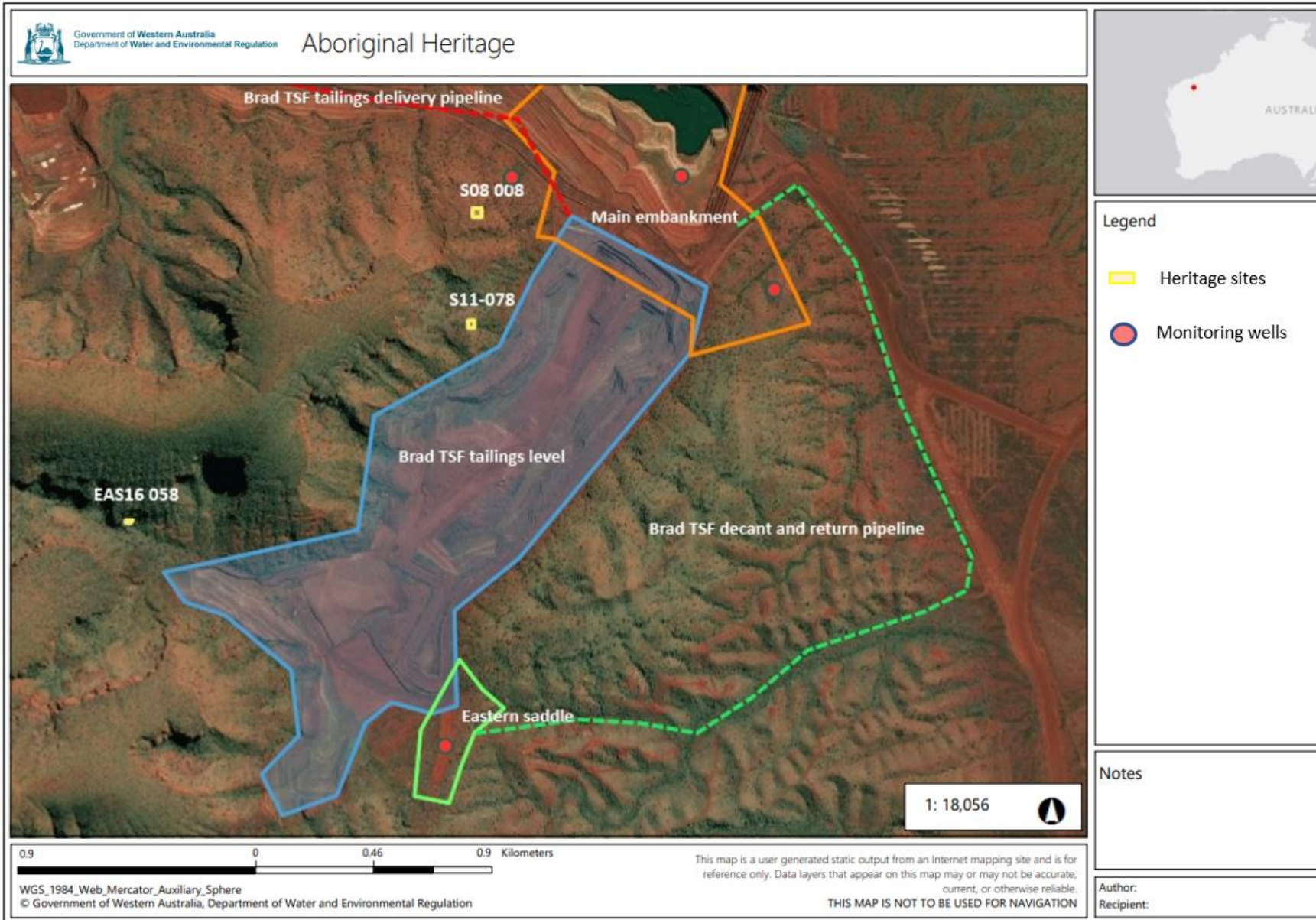
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**Figure 15 Conservation significant flora and fauna habitat**

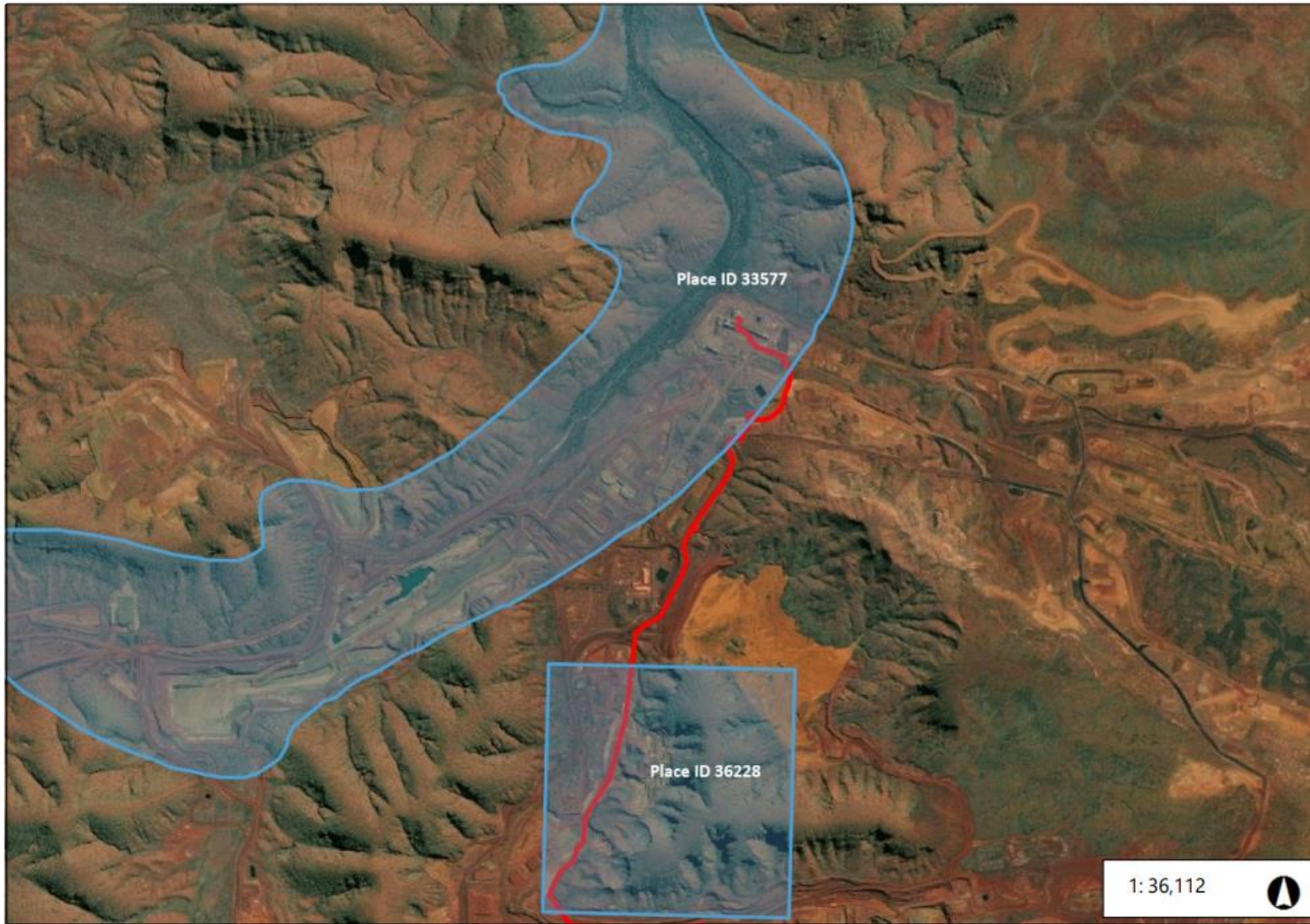




**Figure 16 Aboriginal Heritage sites**

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IR-T13 Decision report template (short) v3.0 (May 2021)



2.6 0 1.30 2.6 Kilometers

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**Figure 17 Pipeline intersection with Aboriginal site place ID 33577**

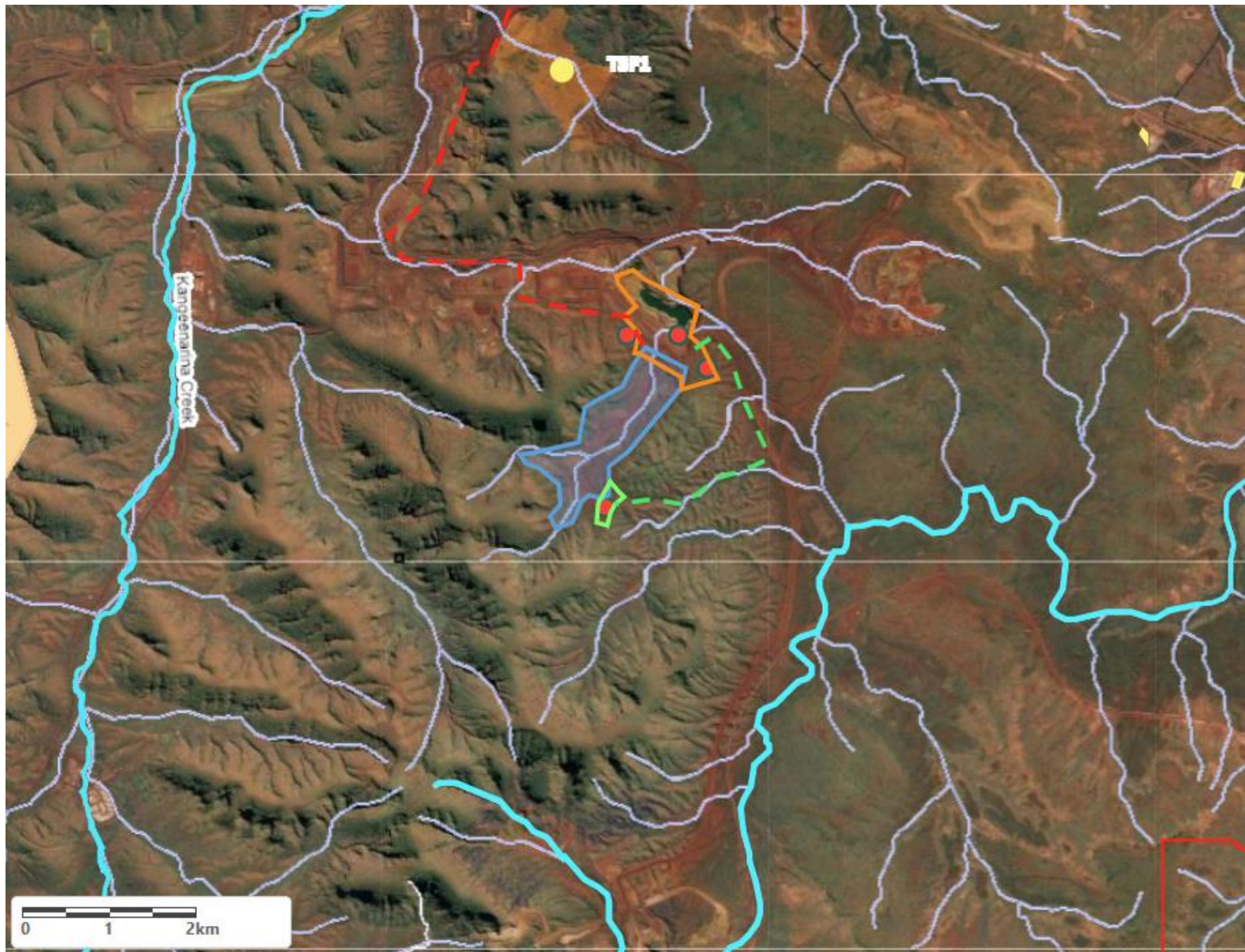
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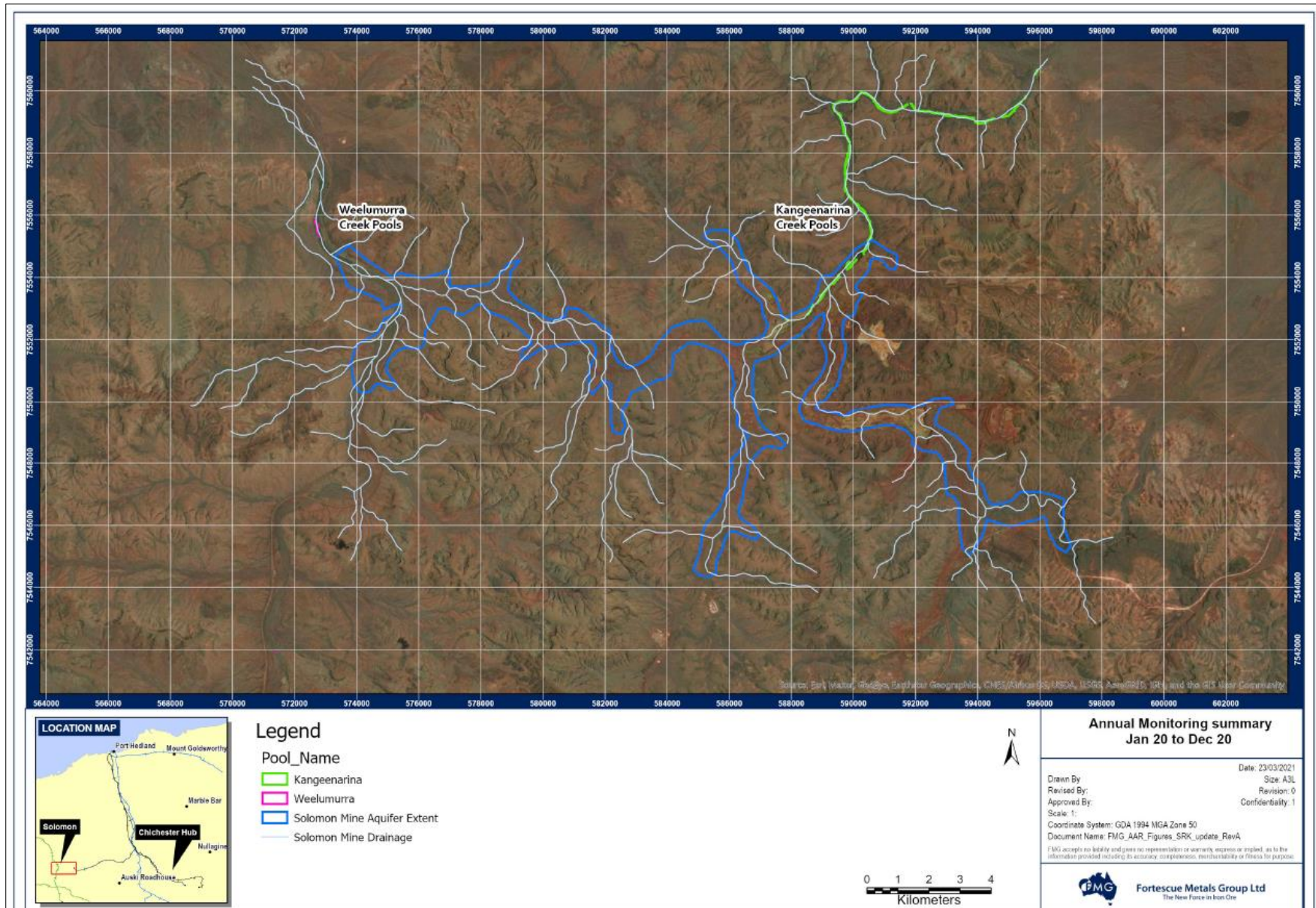
**Figure 18 Landfill surface water management**





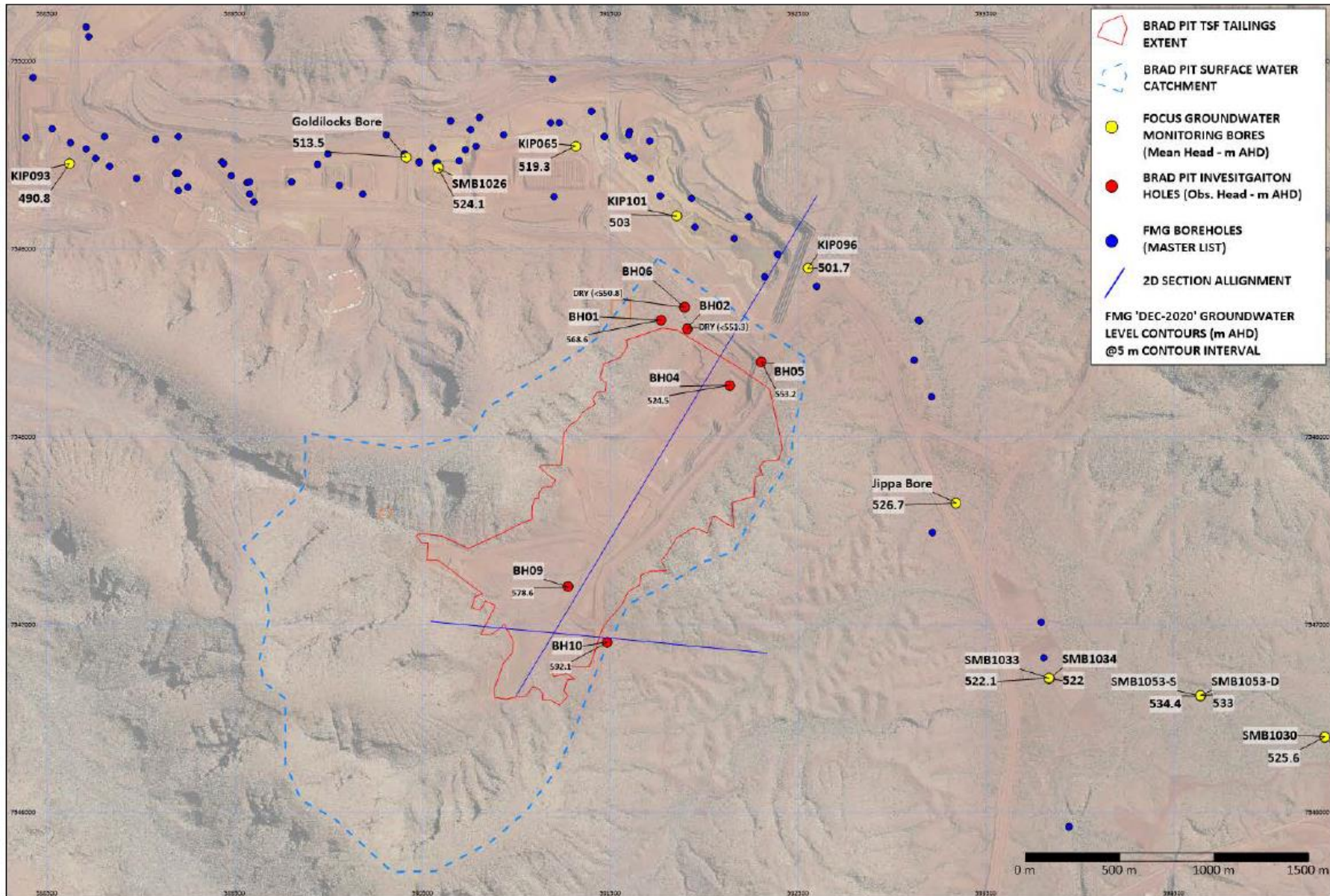
**Figure 19 Surface water including Hydrography WA 250k surface water lines**





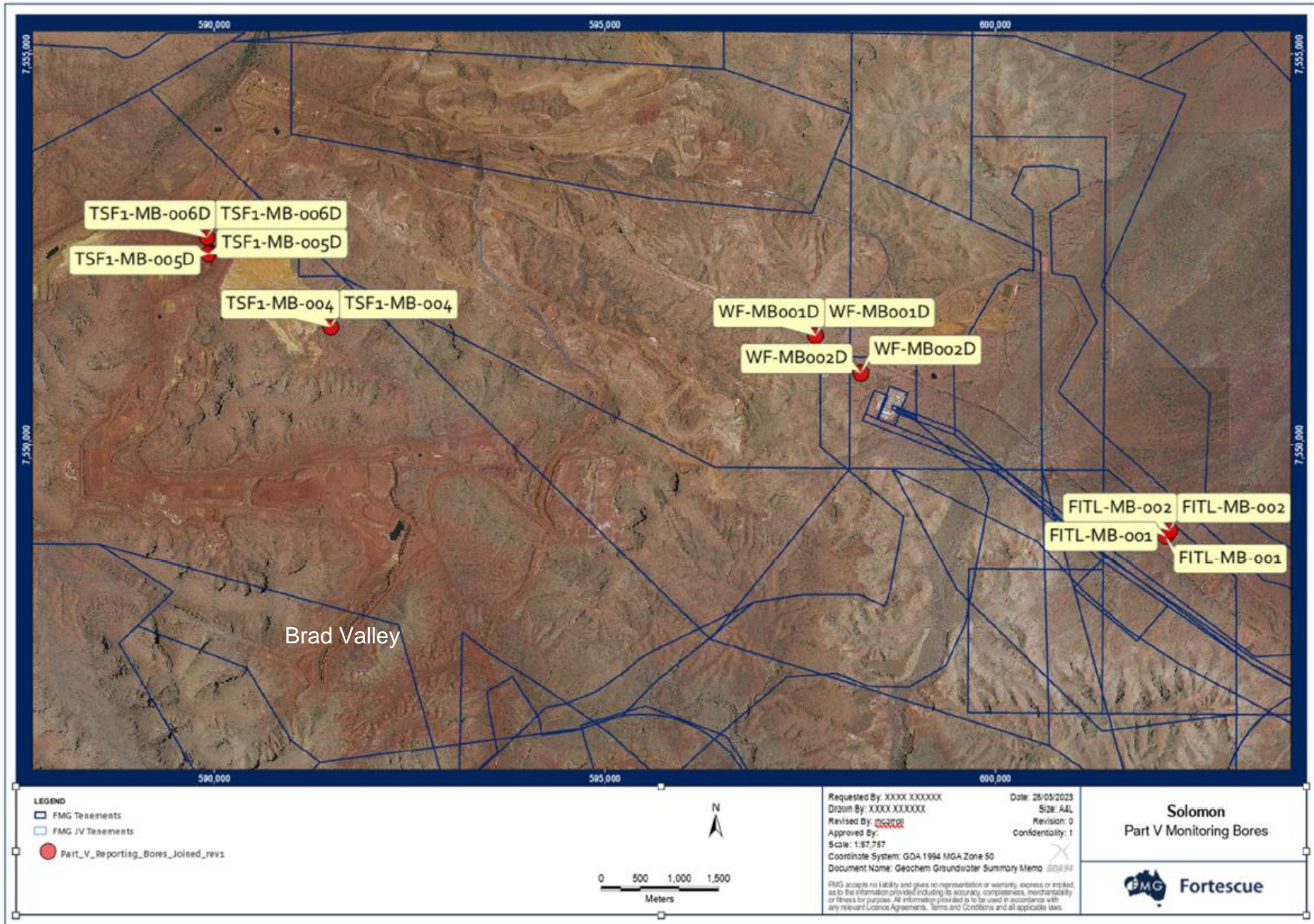
**Figure 20 Location of Weelumurra and Kangeenarina Pools**





**Figure 21 Groundwater monitoring bores near the Brad Valley (yellow)**

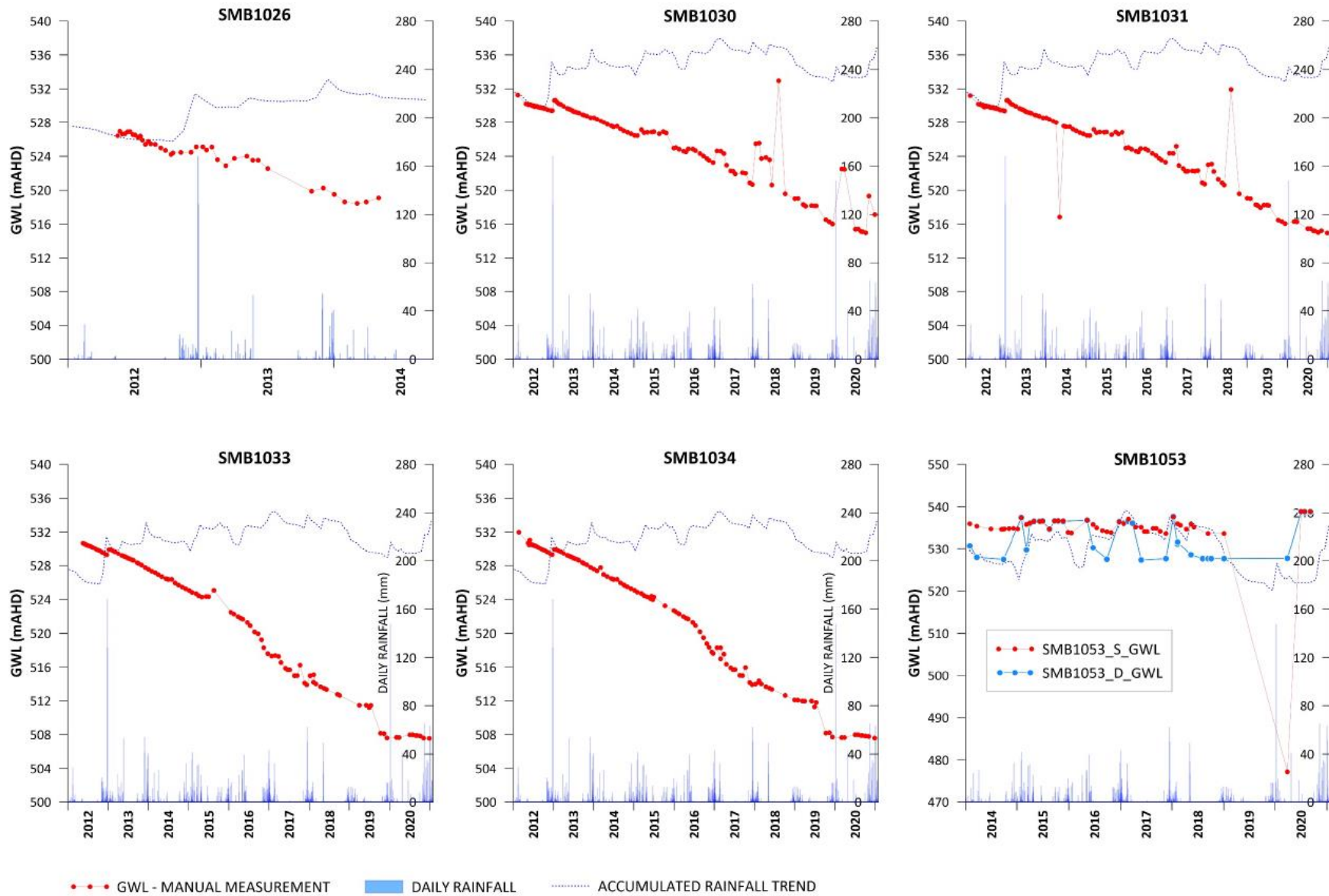




**Figure 22 Monitoring bores on Part V licence L8464/2010/2**

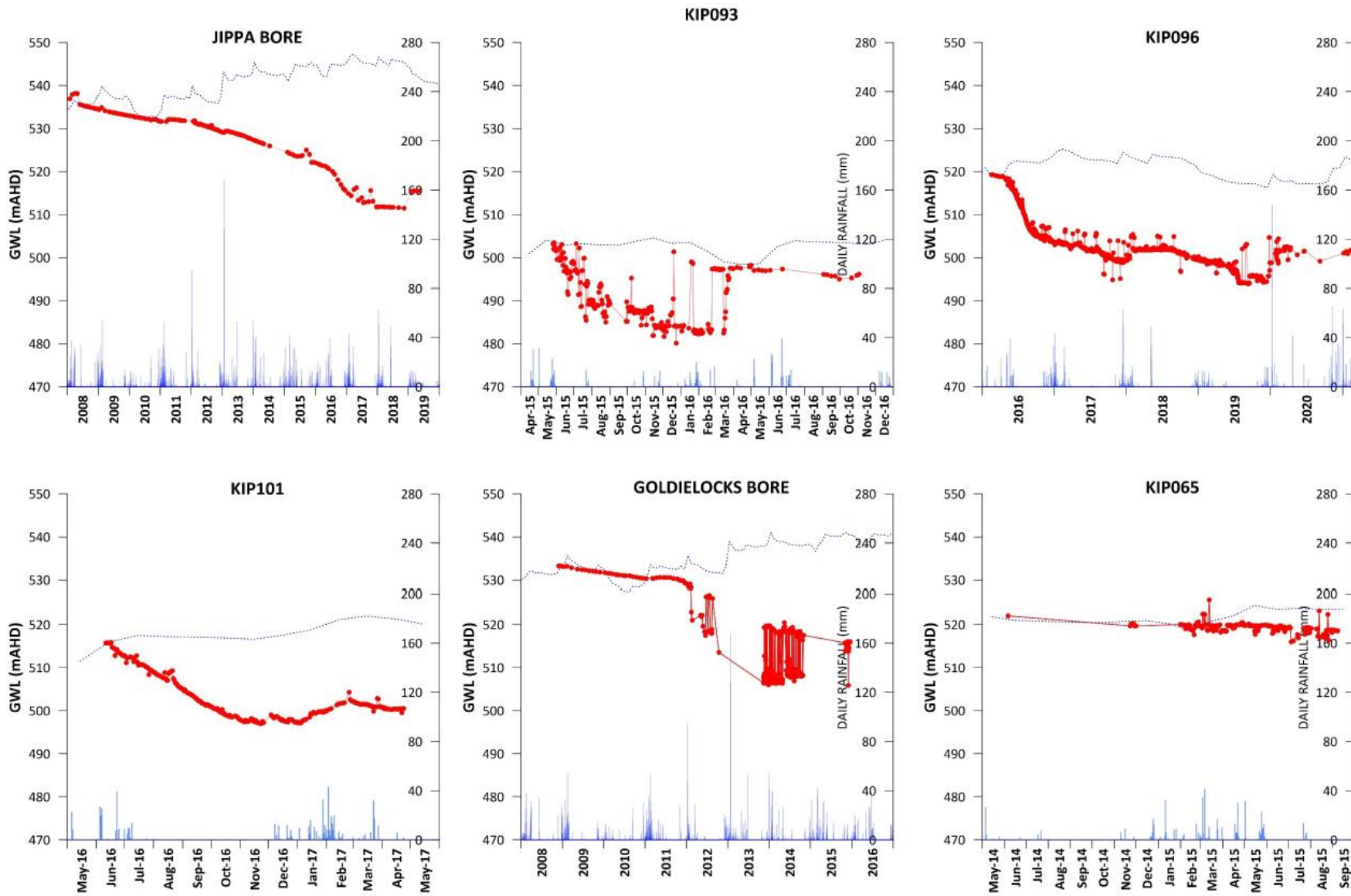
Works Approval: W6802/2023/1

IR-T13 Decision report template (short) v3.0 (May 2021)



**Figure 23 Hydrographs**

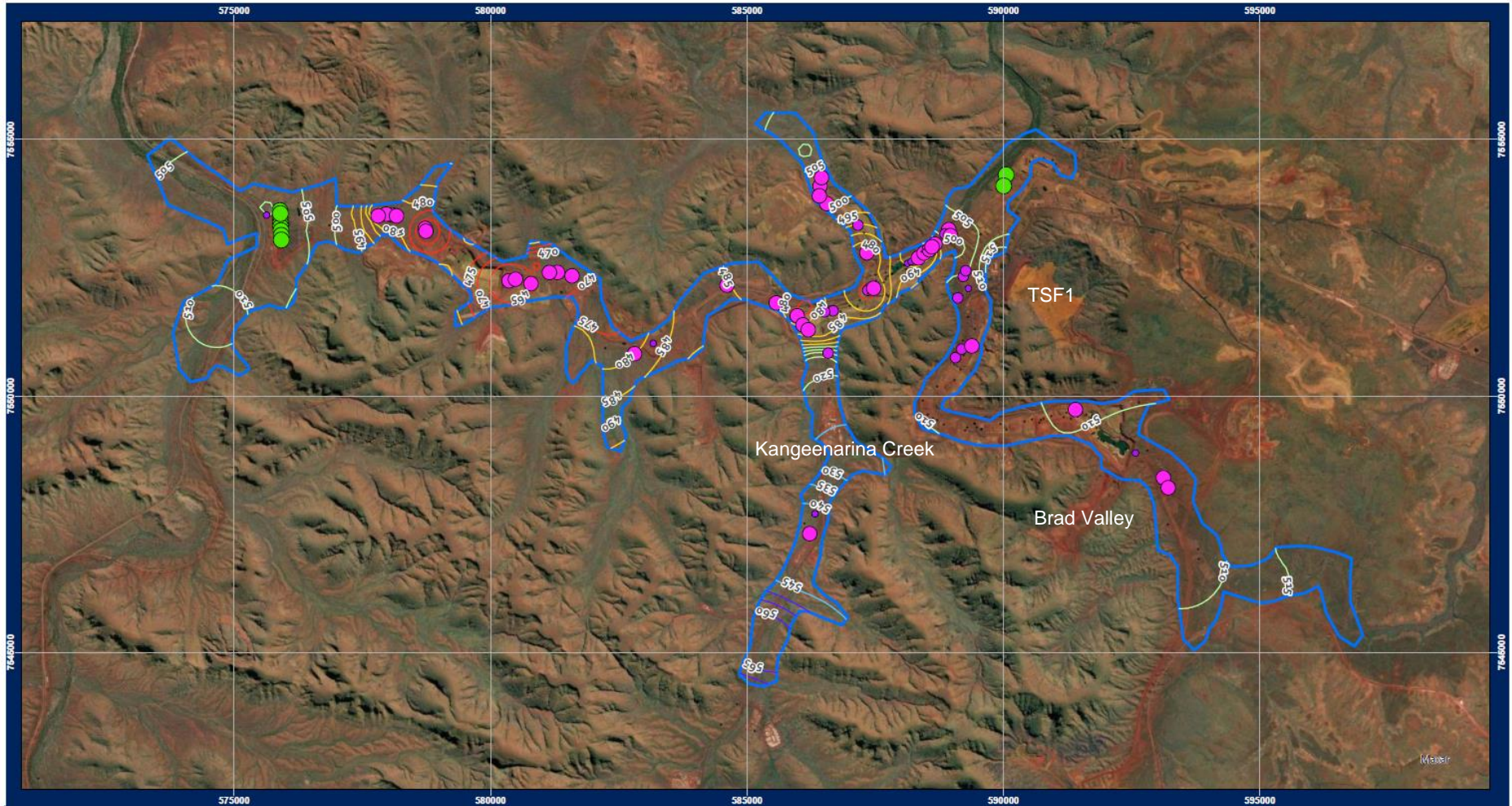




**Figure 24 Hydrographs**

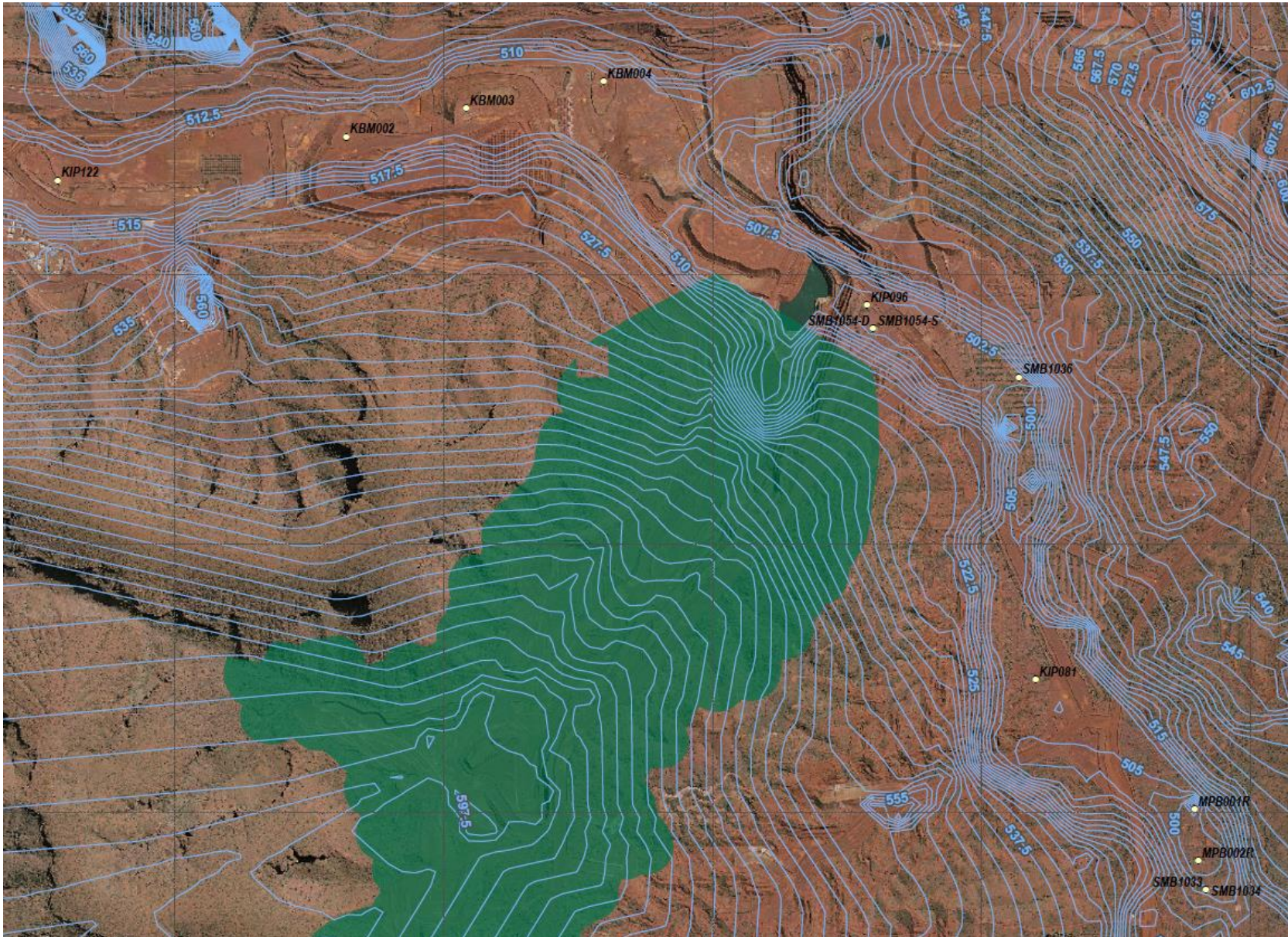
Works Approval: W6802/2023/1

IR-T13 Decision report template (short) v3.0 (May 2021)



**Figure 25 Solomon 2022 groundwater contours**





**Figure 26 FMG supplied figure indicating locations of bores surrounding Brad Valley**



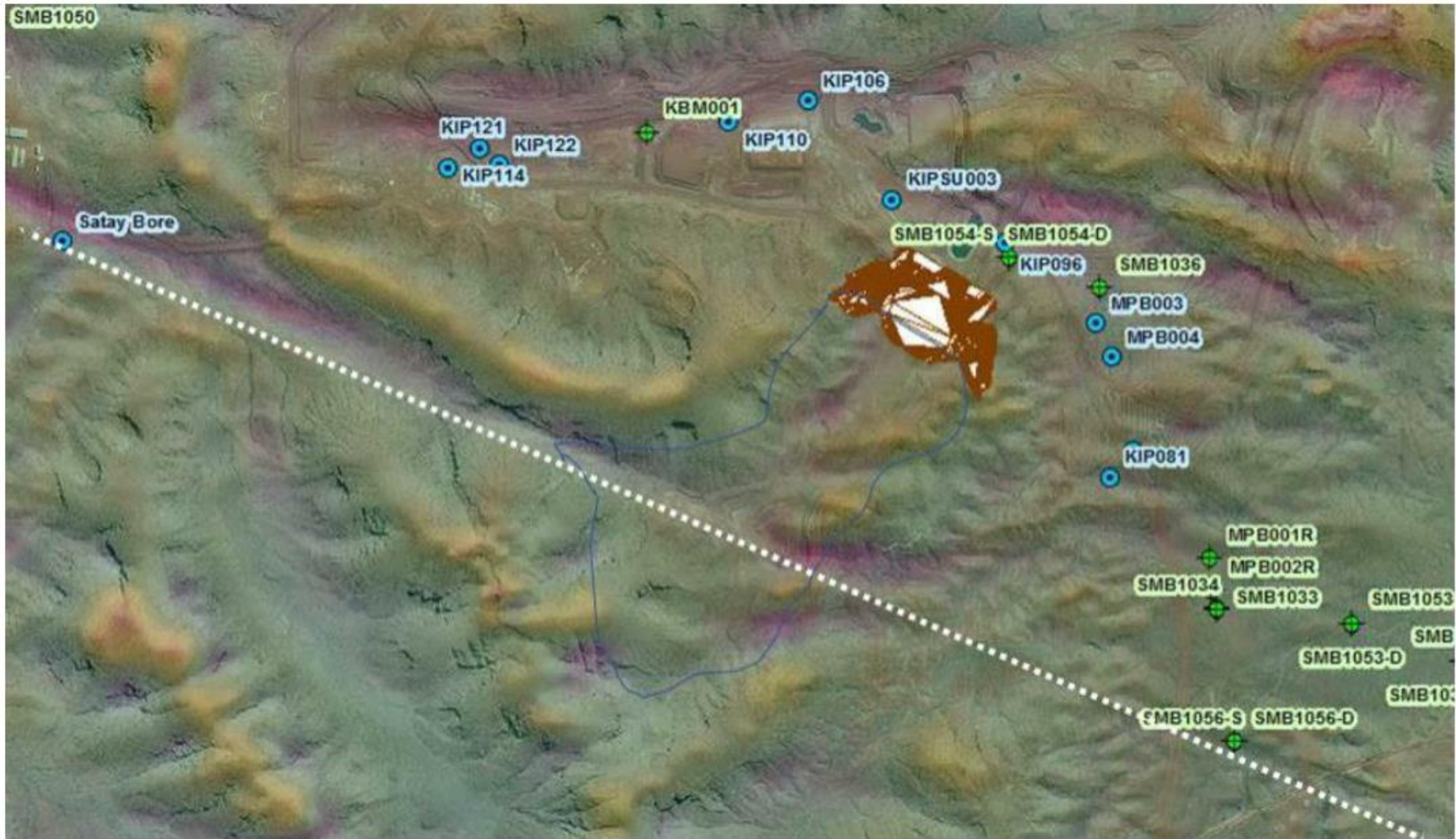


Figure 27 FMG monitoring bores in relation to dolerite dyke





**Figure 28 Kangeenarina and Zalamea Creek 2020 sampling points**

Table 7: Total element results for Solomon tailings material (mg/kg) (FMG, 2015)

Name	Date	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Ce	Cl	Co	Cr	Cs	Cu	Fe	Hg	K	La	Li	Mg	Mn	Mo	Na	Ni	Pb	Rb	S	Sb	Sc	Se	Sn	Sr	Th	Ti	Tl	U	V	W	Zn
Sol Tails 1	9-Jun-14	<0.1	23,900	6.5	<50	40	0.78	<0.1	270	<0.1	12	50	<1	21	0.11	1.7	230,000	<0.04	150	2.2	4.9	430	170	0.59	170	<10	4.2	1.6	300	0.17	4.2	0.39	<5	6.2	2.8	500	<0.1	0.79	17	<1	<50
Sol Tails 2	16-Jun-14	<0.1	22,500	7.6	<50	24	0.62	0.13	180	<0.1	9.6	59	<1	25	0.34	1.1	310,000	<0.04	230	2.2	3.4	330	120	0.74	<100	<10	4.3	3.3	300	0.15	4.4	0.84	<5	3.8	3.2	630	<0.1	0.77	26	<1	<50
Sol Tails 3	24-Jun-14	<0.1	40,900	10	<50	35	0.97	0.18	330	<0.1	14	110	<1	41	0.86	4.0	330,000	<0.04	510	4.6	6.6	610	180	0.94	180	12	7.3	6.9	300	<0.1	7.8	0.79	<5	6.9	4.5	1,000	<0.1	0.99	41	<1	<50
Sol Tails 4	29-Jun-14	<0.1	40,800	11	<50	24	0.79	0.16	280	<0.1	14	60	<1	37	0.91	2.5	300,000	<0.04	470	4.2	7.8	590	170	0.88	130	11	7.5	6.8	200	<0.1	8.0	0.54	<5	6.9	4.4	940	<0.1	1.0	36	<1	<50
Sol Tails 5	9-Jul-14	<0.1	6,600	59	<50	59	2.0	<0.1	350	<0.1	26	93	<1	14	0.21	<1	450,000	<0.04	69	6.5	<2	760	350	1.0	180	17	4.2	0.77	100	<0.1	2.2	0.35	<5	4.4	2.0	280	<0.1	1.1	15	<1	<50
Sol Tails 6	14-Jul-14	<0.1	10,500	58	<50	72	2.9	<0.1	450	<0.1	45	89	<1	19	0.44	<1	480,000	<0.04	150	11	3.5	1,300	540	0.70	230	23	4.5	1.4	100	<0.1	2.4	0.19	<5	4.7	1.9	400	<0.1	0.86	18	<1	61
Sol Tails 7	21-Jul-14	<0.1	17,500	21	<50	50	1.5	0.13	350	<0.1	20	93	<1	25	0.36	<1	330,000	<0.04	230	6.0	4.0	540	300	0.74	210	11	6.2	2.7	200	0.12	5.1	0.56	<5	5.8	5.3	580	<0.1	1.1	25	<1	<50
Sol Tails 8	28-Jul-14	<0.1	22,400	19	<50	30	1.2	0.14	250	<0.1	17	120	<1	24	0.98	<1	300,000	<0.04	260	4.7	6.7	750	180	0.59	180	13	5.9	4.5	200	<0.1	5.2	0.48	<5	5.1	4.7	570	<0.1	1.0	22	<1	<50
Sol Tails 9	4-Aug-14	<0.1	27,600	13	<50	44	1.3	0.17	320	<0.1	11	59	<1	35	0.23	<1	400,000	<0.04	250	3.0	4.7	590	320	1.1	170	10	6.6	2.9	300	0.13	3.4	1.3	<5	4.3	4.6	940	<0.1	1.1	41	<1	<50
Sol Tails10	12-Aug-14	<0.1	28,800	23	<50	57	1.6	0.14	540	<0.1	21	100	<1	33	1.7	<1	400,000	<0.04	330	6.0	7.6	2,000	360	0.69	260	17	6.2	7.3	200	0.14	3.1	0.73	<5	7.1	3.4	810	<0.1	1.2	36	<1	54
Sol Tails 11A	18-Aug-14	<0.1	24,800	56	<50	43	1.9	0.11	560	<0.1	26	82	<1	27	1.4	<1	400,000	<0.04	220	8.7	19	1,600	240	0.72	180	20	6.7	4.6	100	0.13	3.3	0.35	<1	8.1	3.1	610	<0.1	1.3	25	<1	74
Sol Tails11	18-Aug-14	<0.1	27,600	64	<50	49	2.1	<0.1	630	<0.1	25	86	<1	30	1.2	<1	430,000	<0.04	250	8.7	20	1,700	260	0.77	230	22	6.0	4.8	100	<0.1	2.9	0.38	<5	7.9	2.9	640	<0.1	1.3	27	<1	90
Sol Tails12	25-Aug-14	<0.1	16,000	64	<50	57	2.2	<0.1	480	<0.1	25	58	<1	23	0.53	<1	490,000	<0.04	220	6.6	3.9	1,200	530	0.73	160	19	5.6	3.4	100	<0.1	2.4	0.45	<5	4.3	2.1	480	<0.1	1.3	24	<1	120
Sol Tails 13	8-Sep-14	<0.1	11,000	38	<50	44	1.5	<0.1	270	<0.1	20	84	<1	16	0.73	<1	340,000	<0.04	150	4.7	<2	630	380	1.7	<100	10	6.5	4.0	100	<0.1	3.5	<0.1	<1	3.8	2.6	460	0.14	1.2	18	<1	67
Sol Tails 14	15-Sep-14	<0.1	15,000	50	<50	57	2.1	<0.1	400	<0.1	25	92	2.4	21	0.39	<1	440,000	<0.04	150	7.1	3.4	980	400	1.5	140	17	5.7	2.4	100	0.14	2.5	0.49	<1	5.2	2.1	550	<0.1	0.83	21	2.5	90
Sol Tails 15	22-Sep-14	<0.1	39,400	21	<50	55	1.2	0.15	700	<0.1	99	2.0	39	1.3	2.7	16	340,000	<0.04	500	5.6	14	1,500	300	1.4	240	19	7.0	8.9	200	0.14	5.4	0.79	1.4	11	4.2	930	<0.1	1.0	40	<1	<50
Sol Tails 16	1-Oct-14	<0.1	20,100	17	<50	36	0.92	0.16	260	<0.1	51	<1	26	1.1	<1	13	410,000	0.090	170	2.8	2.8	440	290	1.9	<100	<10	5.6	3.1	300	0.36	2.9	1.4	1.3	4.3	3.4	900	0.16	0.82	39	1.2	<50
Sol Tails 17	5-Oct-14	<0.1	11,700	13	<50	51	1.0	0.11	490	<0.1	95	12	22	0.30	<1	14	270,000	<0.04	180	3.9	<2	1,300	230	0.62	190	<10	4.8	2.7	200	0.20	2.5	0.16	<1	6.9	3.0	470	<0.1	0.91	19	<1	<50
Sol Tails 18	14-Oct-14	<0.1	6,610	15	<50	70	1.4	<0.1	810	<0.1	88	14	14	0.66	<1	20	290,000	0.050	190	5.0	<2	1,900	420	0.60	140	<10	4.6	3.2	100	0.11	1.6	<0.1	<1	6.0	1.8	190	0.19	1.1	9.8	<1	<50
Sol Tails 19	20-Oct-14	<0.1	9,330	18	<50	60	1.5	<0.1	400	<0.1	68	14	20	0.37	<1	15	320,000	0.050	120	3.6	<2	780	390	0.73	100	<10	5.4	1.7	100	0.16	2.0	0.13	<1	5.4	2.6	360	0.18	1.1	14	<1	54
Sol Tails 20	27-Oct-14	<0.1	7,200	29	<50	68	1.9	<0.1	310	<0.1	62	15	13	0.38	<1	25	350,000	0.060	100	5.3	<2	770	430	0.72	<100	11	5.3	1.6	200	0.12	1.6	0.2	<1	3.7	1.8	230	0.22	1.0	12	<1	72
Sol Tails 21	3-Nov-14	<0.1	22,900	24	<50	36	1.4	0.15	280	<0.1	56	4.9	30	0.72	5.8	20	410,000	0.12	190	3.8	3.4	960	280	1.2	100	<10	6.7	3.6	400	0.20	3.8	1.0	<1	4.7	4.4	640	<0.1	1.3	30	<1	<50
Sol Tails 22	10-Nov-14	<0.1	15,200	66	<50	49	2.5	<0.1	320	<0.1	114	7.8	20	0.59	4.1	35	500,000	0.10	200	7.2	6.2	860	390	1.4	150	15	5.8	2.8	100	0.11	2.5	0.39	<1	4.4	2.3	410	0.17	1.3	19	<1	92
Sol Tails 23	18-Nov-14	<0.1	24,100	56	<50	53	2.4	0.10	490	<0.1	75	9.4	24	0.87	4.1	31	450,000	0.040	240	8.2	16	1,500	500	0.90	180	23	7.3	3.8	100	<0.1	3.0	0.25	<1	7.4	2.7	460	0.23	1.0	19	<1	100
Sol Tails 24	24-Nov-14	<0.1	15,200	44	<50	51	2.5	<0.1	460	<0.1	80	8.1	17	0.78	4.2	35	420,000	0.050	220	7.7	6.9	2,100	420	0.64	130	19	6.4	3.3	100	<0.1	2.4	0.13	<1	5.5	2.2	350	0.18	1.0	13	<1	99
Sol Tails 25	1-Dec-14	<0.1	13,800	66	<50	47	2.6	<0.1	530	<0.1	55	9.1	21	0.84	3.5	26	460,000	0.090	140	8.3	6.8	1,500	380	1.2	160	19	6.1	3.0	100	<0.1	1.9	0.31	<1	6.2	2.3	480	0.12	0.94	22	1.8	100
Sol Tails 26	11-Dec-14	<0.1	11,000	15	<50	23	0.62	0.12	210	<0.1	56	3.7	20	0.14	5.1	6.8	380,000	0.10	56	2.3	<2	540	160	1.6	110	<10	3.6	0.83	100	0.45	2.2	0.98	<1	2.8	2.7	670	<0.1	1.7	24	2.9	<50
Sol Tails 27	16-Dec-14	<0.1	23,600	18	<50	20	0.87	0.17	160	<0.1	76	4.4	32	0.16	4.3	9.7	410,000	0.080	110	3.5	4.3	440	140	1.9	150	11	6.9	1.0	200	0.28	3.2	1.0	1.6	3.6	3.7	1,300	<0.1	1.2	41	1.1	<50
Sol Tails 28	22-Dec-14	<0.1	13,400	63	<50	35	2.5	<0.1	350	<0.1	69	8.0	20	0.53	3.2	30	460,000	0.070	130	8.8	8.6	1,300	330	1.1	140	20	5.8	1.9	100	<0.1	1.9	0.49	<1	4.0	2.5	420	<0.1	0.97	21	<1	100
Sol Tails 29	28-Dec-14	<0.1	21,700	77	<50	25	2.8	0.12	260	0.20	72	8.0	25	0.81	3.7	40	450,000	0.20	200	8.1	13	790	320	1.4	<100	25	7.0	3.1	100	0.15	3.2	0.55	<1	2.6	3.1	510	<0.1	1.0	28	1.6	140
Sol Tails 30	5-Jan-15	<0.1	13,100	89	<50	95	3.1	<0.1	250	0.16	67	8.9	19	0.82	3.3	45	500,000	0.17	220	9.0	7	650	690	1.4	<100	20	7.6	3.2	100	0.14	2.4	0.36	<1	3.1	2.2	360	0.27	1.0	23	2.2	120
Sol Tails 31	11-Jan-15	<0.1	26,300	29	<50	39	1.3	0.14	250	<0.1	120	4.4	28	0.50	5.3	18	400,000	0.080	210	6.0	3.8	1,200	270	1.5	140	<10	6.6	2.8	200	0.27	3.3	0.99	1.2	3.5	3.7	830	<0.1	1.3	29	2.4	<50
Sol Tails 32	19-Jan-15	<0.1	11,300	86	<50	93	3.1	<0.1	170	0.14	31	9.3	15	0.59	2.9	44	490,000	0.14	180	10	5.3	570	730	1.2	<100	21	7.2	2.3	100	0.12	2.00	0.3	<1	2.2	1.9	300	0.27	0.94	20	3.9	120



**Table 8 Supernatant results for Solomon Tailings Material**

Name	Date	pH	EC μS/cm	Alkalinity mg CaCO <sub>3</sub> /L	Al	B	Ba	Ca	Cl	Cs	Cu	F	Fe	Hg	K	Li	Mg	Mn	Na	Rb	SO <sub>4</sub>	Se	Sr	Th	Ti	U	Zn
Sol Super 1	9-Jun-14	6.8	1,070	21	<0.005	<b>0.49</b>	0.036	21	<b>173</b>	<0.0001	0.0002	0.28	<0.005	<0.0001	11	0.0090	31	<0.001	<b>126</b>	0.013	<b>117</b>	0.0060	<b>0.24</b>	<b>0.00010</b>	<0.0001	<0.0001	<b>0.006</b>
Sol Super 2	16-Jun-14	6.3	847	6.0	<0.005	<b>0.38</b>	0.045	21	<b>135</b>	<0.0001	0.0004	0.11	<0.005	<0.0001	10	<0.005	25	0.0350	<b>88</b>	0.013	<b>84</b>	0.0050	<b>0.20</b>	<0.0001	<0.0001	<0.0001	<b>0.0090</b>
Sol Super 3	24-Jun-14	6.7	924	16	<0.005	0.26	0.05	24	<b>169</b>	<0.0001	0.0003	0.13	0.0060	<0.0001	11	<0.005	24	0.0020	<b>102</b>	0.011	<b>90</b>	0.0060	<b>0.23</b>	<0.0001	<0.0001	<0.0001	<b>0.018</b>
Sol Super 4	29-Jun-14	6.1	787	1.0	0.010	0.27	0.11	19	<b>132</b>	<0.0001	0.0003	0.05	0.011	<0.0001	9.0	<0.005	23	0.026	<b>84</b>	0.011	69	0.0050	<b>0.24</b>	<0.0001	<0.0001	<0.0001	<b>0.025</b>
Sol Super 5	9-Jul-14	7.5	<b>1,230</b>	25	<0.005	<b>0.46</b>	0.054	31	<b>287</b>	0.0005	0.0006	0.54	<0.005	<0.0001	12	0.0160	43	0.0010	<b>121</b>	0.021	<b>84</b>	0.0020	<b>0.21</b>	<b>0.00010</b>	<0.0001	<0.0001	<b>0.0080</b>
Sol Super 6	14-Jul-14	7.5	853	51	<0.005	<b>0.46</b>	0.049	18	<b>180</b>	0.0006	0.0006	0.65	<0.005	0.00010	11	0.0130	30	0.0010	<b>87</b>	0.020	63	0.0020	0.10	<b>0.00040</b>	<0.0001	<0.0001	<b>0.0080</b>
Sol Super 7	21-Jul-14	7.7	<b>1,310</b>	81	<0.005	<b>0.45</b>	0.06	42	<b>276</b>	<0.0001	0.0008	0.58	0.0080	<0.0001	13	<0.005	38	0.0010	<b>144</b>	0.015	<b>111</b>	0.0050	<b>0.31</b>	<0.0001	<0.0001	<0.0001	<b>0.0080</b>
Sol Super 8	28-Jul-14	7.1	867	18	<0.005	<b>0.40</b>	0.061	14	<b>186</b>	0.0004	0.0008	0.27	<0.005	<0.0001	9.4	0.0060	25	0.0050	<b>98</b>	0.019	<b>78</b>	0.0050	0.14	<0.0001	<0.0001	<0.0001	<b>0.013</b>
Sol Super 9	4-Aug-14	7.5	<b>1,030</b>	47	<0.005	<b>0.52</b>	0.05	25	<b>171</b>	<0.0001	<0.0001	0.53	<0.005	<0.0001	8.6	<0.005	26	<0.001	<b>92</b>	0.013	<b>114</b>	0.0050	<b>0.19</b>	<0.0001	<0.0001	<0.0001	<0.005
Sol Super 10	12-Aug-14	7.4	<b>1,250</b>	23	<0.005	<b>0.38</b>	0.12	29	<b>231</b>	0.0004	<0.0001	0.34	<0.005	<0.0001	12	0.0100	40	0.0040	<b>110</b>	0.024	<b>141</b>	0.0060	<b>0.28</b>	<0.0001	<0.0001	<0.0001	<b>0.035</b>
Sol Super 11	18-Aug-14	7.3	<b>1,030</b>	14	0.0060	<b>0.43</b>	<b>0.18</b>	25	<b>194</b>	0.0004	0.0003	0.30	0.0070	0.00010	9.2	0.0190	32	0.0060	<b>99</b>	0.018	<b>96</b>	0.0040	<b>0.23</b>	<0.0001	<0.0001	<0.0001	<b>0.048</b>
Sol Super 11A	19-Aug-14	7.3	<b>1,010</b>	14	<0.005	<b>0.46</b>	<b>0.18</b>	26	<b>200</b>	0.0004	0.0001	0.30	<0.005	<b>0.00020</b>	10	0.0200	35	0.0070	<b>104</b>	0.018	<b>99</b>	0.0040	<b>0.25</b>	<0.0001	<0.0001	<0.0001	<b>0.051</b>
Sol Super 12	25-Aug-14	7.5	974	77	0.0070	0.30	0.074	30	<b>131</b>	0.0004	0.0001	0.51	<0.005	<0.0001	8.5	<0.005	37	0.0040	70	0.018	<b>123</b>	<b>0.010</b>	<b>0.20</b>	<0.0001	<0.0001	<0.0001	<b>0.021</b>
Sol Super 13	8-Sep-14	7.2	<b>1,210</b>	10	<0.005	0.34	0.12	29	<b>250</b>	0.0002	0.0004	0.28	<0.005	0.00010	12	<0.005	42	0.0040	<b>116</b>	0.017	<b>108</b>	0.0090	<b>0.27</b>	<0.0001	<b>0.00060</b>	<0.0001	<b>0.035</b>
Sol Super 14	15-Sep-14	7.5	<b>1,200</b>	23	<0.005	<b>0.38</b>	0.12	25	<b>269</b>	0.0002	<0.0001	0.54	0.0060	<0.0001	12	<0.005	37	<0.001	<b>124</b>	0.015	<b>90</b>	0.0040	<b>0.22</b>	<0.0001	<0.0001	<0.0001	<b>0.036</b>
Sol Super 15	22-Sep-14	7.6	<b>1,120</b>	44	0.0080	<b>0.49</b>	0.15	33	<b>189</b>	<0.0001	0.0002	0.39	0.0080	<0.0001	11	<0.005	36	<0.001	<b>118</b>	0.013	<b>147</b>	0.0070	<b>0.31</b>	<0.0001	<b>0.00070</b>	<0.0001	<b>0.047</b>
Sol Super 16	1-Oct-14	6.7	986	10	<0.005	<b>0.38</b>	0.087	24	<b>167</b>	0.0001	<0.0001	0.24	<0.005	<0.0001	10	0.0050	26	0.019	<b>92</b>	0.015	<b>102</b>	0.0080	<b>0.24</b>	<0.0001	<0.0001	<0.0001	<b>0.027</b>
Sol Super 17	5-Oct-14	6.8	<b>1,250</b>	24	<0.005	<b>0.53</b>	0.076	25	<b>274</b>	0.0001	0.0002	0.59	0.16	<0.0001	12	<0.005	34	0.0080	<b>133</b>	0.022	<b>126</b>	0.0060	<b>0.25</b>	<0.0001	<b>0.0017</b>	<0.0001	<b>0.0080</b>
Sol Super 18	14-Oct-14	7.9	<b>1,260</b>	150	<0.005	<b>0.37</b>	0.058	32	<b>214</b>	0.0002	<0.0001	<b>0.94</b>	<0.005	<0.0001	11	<0.005	43	<0.001	<b>94</b>	0.020	<b>126</b>	0.0090	<b>0.24</b>	<0.0001	<b>0.0021</b>	0.00010	0.0050
Sol Super 19	20-Oct-14	6.9	865	16	<0.005	<b>0.39</b>	0.073	17	<b>184</b>	0.0004	0.0001	0.37	<0.005	<0.0001	9.3	<0.005	23	0.0010	<b>81</b>	0.016	<b>93</b>	0.0050	0.17	<0.0001	<b>0.0019</b>	<0.0001	0.0070
Sol Super 20	27-Oct-14	6.1	809	2.0	<0.005	0.32	0.066	14	<b>174</b>	0.0003	0.0003	0.12	<0.005	<0.0001	8.9	0.0100	21	0.027	<b>76</b>	0.017	<b>105</b>	0.0090	0.12	<0.0001	<b>0.0018</b>	<0.0001	<b>0.024</b>
Sol Super 21	3-Nov-14	<b>5.8</b>	939	<1	<0.005	0.33	0.059	22	<b>140</b>	0.0004	<0.0001	0.08	0.0050	<0.0001	13	0.0070	31	0.057	<b>95</b>	0.023	<b>108</b>	0.0040	<b>0.24</b>	<0.0001	<0.0001	<0.0001	<b>0.010</b>
Sol Super 22	10-Nov-14	6.6	<b>1,270</b>	3.0	<0.005	<b>0.44</b>	0.069	24	<b>303</b>	0.0007	<0.0001	0.23	<0.005	<0.0001	<b>15</b>	0.0130	40	0.011	<b>146</b>	0.028	<b>78</b>	0.0050	<b>0.19</b>	<0.0001	<0.0001	<0.0001	<b>0.014</b>
Sol Super 23	18-Nov-14	7.2	859	10	<0.005	0.27	0.06	17	<b>176</b>	0.0004	<0.0001	0.45	<0.005	<0.0001	12	0.0090	24	<0.001	<b>100</b>	0.023	69	0.0030	0.16	<0.0001	<0.0001	<0.0001	0.0050
Sol Super 24	24-Nov-14	7.6	758	33	<0.005	0.29	0.065	17	<b>129</b>	0.0003	<0.0001	0.62	<0.005	<0.0001	12	0.0060	27	<0.001	<b>76</b>	0.022	69	0.0050	0.13	<0.0001	<0.0001	<0.0001	0.0070
Sol Super 25	1-Dec-14	7.4	755	20	<0.005	<b>0.37</b>	0.11	18	<b>136</b>	0.0005	<0.0001	<b>0.72</b>	<0.005	<0.0001	9.0	0.0110	22	<0.001	<b>77</b>	0.019	63	0.0030	0.15	<0.0001	<0.0001	<0.0001	<b>0.020</b>
Sol Super 26	11-Dec-14	7.3	<b>1,210</b>	15	<0.005	<b>0.52</b>	0.087	28	<b>265</b>	0.0003	<0.0001	0.64	<0.005	0.00010	<b>14</b>	0.0130	37	<0.001	<b>128</b>	0.027	<b>126</b>	0.0070	<b>0.20</b>	<0.0001	<0.0001	<0.0001	<b>0.020</b>
Sol Super 27	16-Dec-14	6.9	<b>1,030</b>	4.0	<0.005	0.35	0.089	13	<b>229</b>	0.0001	<0.0001	0.31	<0.005	<0.0001	12	<0.005	23	0.0090	<b>110</b>	0.015	<b>99</b>	0.0070	0.16	<0.0001	<0.0001	<0.0001	<b>0.017</b>
Sol Super 28	22-Dec-14	7.0	788	5.0	<0.005	<b>0.37</b>	0.087	12	<b>169</b>	0.0006	<0.0001	0.42	<0.005	<0.0001	8.3	0.0160	20	0.0030	71	0.020	72	0.0020	0.09	<0.0001	<0.0001	<0.0001	<b>0.018</b>
Sol Super 29	28-Dec-14	7.2	648	23	<0.005	<b>0.39</b>	0.053	14	119	0.0005	0.0002	0.43	<0.005	<0.0001	8.8	0.0090	19	<0.001	64	0.020	63	0.0020	0.072	<0.0001	<0.0001	<0.0001	<b>0.013</b>
Sol Super 30	5-Jan-15	6.7	681	5.0	<0.005	0.35	0.077	17	<b>136</b>	0.0008	0.0002	0.15	<0.005	<0.0001	7.4	0.0120	20	0.030	60	0.023	48	0.0020	0.11	<0.0001	<0.0001	<0.0001	<b>0.011</b>
Sol Super 31	11-Jan-15	7.4	<b>1,190</b>	62	<0.005	0.32	0.071	33	<b>223</b>	0.0003	0.0003	0.60	<0.005	<0.0001	<b>14</b>	<0.005	44	0.0090	<b>118</b>	0.023	<b>150</b>	0.0070	<b>0.23</b>	<0.0001	<0.0001	<0.0001	<b>0.014</b>
Sol Super 32	19-Jan-15	<b>5.3</b>	447	<1	<0.005	0.19	0.073	9.4	69	0.0011	0.0002	0.07	<0.005	<0.0001	6.0	0.0120	13	0.053	34	0.021	30	<0.001	0.06	<0.0001	<0.0001	<0.0001	<b>0.020</b>

EC in μS/cm; *Grey italic values* indicate value below detection limits; *Green Italic values* indicate greater than ANZECC 95% of Species Limit of Protection for freshwater unmodified criteria;

**Blue Bold values** indicate greater than Hardness Modified Trigger Values; **Red Bold values** indicate greater than Investigative Trigger Values

All concentrations for silver, arsenic, beryllium, bismuth, cadmium, cerium, cobalt, chromium, lanthanum, molybdenum, nickel, phosphorous, lead, antimony, scandium, tin, thallium, vanadium and tungsten were below detection limits and are not given in this table.

**Table 9 Trigger values used for FMG 2015 seepage analysis**

Parameter (mg/L)	ANZECC	Solomon	
	95% of Species Limit of Protection (95% SLP)	Low Risk Trigger Values (LRTV)	Investigation Trigger Values (ITV)
pH	6.5 – 8.5**	6.6 – 7.6**	6.2 – 7.9**
EC (µS/cm)	-	450	1,030
Alkalinity as CaCO <sub>3</sub>	-	410	977
Hardness as CaCO <sub>3</sub>	-	146	370
Ag	0.00005	(0.00010)	(0.00010)
Al	0.055	0.010	0.050
As(V)	0.013	0.0010	0.0030
B	0.37	0.19	0.42
Ba	-	0.050	0.17
Be	0.00013 <sup>‡</sup>	0.0010	0.0010
Bi	0.0007 <sup>‡</sup>	(0.00010)	(0.00010)
Ca	-	23	68
Cd	0.0002 (0.0005)	0.00010	0.0011*
Ce	-	(0.00050)	(0.00050)
Cl	-	58	127
Co	0.0028	0.0010	0.0025
Cr	0.001	0.0010	0.0047*
Cs	-	(0.00072)	(0.0049)
Cu	0.0014 (0.0035)	0.0025	0.0070*
F	-	0.30	0.68
Fe	0.3 <sup>‡</sup>	0.090	0.46
HCO <sub>3</sub>	-	125	298
Hg	0.0006	0.00010	0.00010
K	-	9.0	13
La	-	(0.0050)	(0.0050)
Li	-	(0.011)	(0.054)
Mg	-	23	48
Mn	1.9	0.070	0.54
Mo	0.034 <sup>‡</sup>	0.0010	0.010
Na	-	39	74
Ni	0.011 (0.027)	0.0030	0.055*
NO <sub>3</sub> as N	2.4***	1.8	5
NO <sub>3</sub>	10.6***-	8.1	22
NH <sub>3</sub> N	0.9	-	-
P	-	(0.10)	(0.10)
Pb	0.0034 (0.013)	0.0010	0.038*
Rb	-	(0.027)	(0.044)
SO <sub>4</sub>	-	41	75
Sb	0.009 <sup>‡</sup>	(0.0010)	(0.025)
Sc	-	(0.00025)	(0.00025)
Se	0.011	0.010	0.010
Sn	0.003 <sup>‡</sup>	0.0010	0.012
Sr	-	0.14	0.19
Th	-	(0.00010)	(0.00010)
Ti	-	(0.00050)	(0.00050)
Tl	0.00003 <sup>‡</sup>	(0.00010)	(0.00010)
U	0.0005 <sup>‡</sup>	(0.00074)	(0.0032)
V	0.006 <sup>‡</sup>	0.010	0.010
W	-	(0.0020)	(0.0020)
Zn	0.0080 (0.019)	0.027	0.088*

<sup>‡</sup>Low reliability guideline value (ANZECC and ARMCANZ, 2000).  
 \*If hardness < or >ITV mg CaCO<sub>3</sub>/L, HMTVs must be recalculated.  
 \*\*For pH, values outside of the indicated range are considered exceedances of trigger values.  
 (Hardness modified) trigger values were calculated for Cd, Cu, Ni, Pb and Zn following the ANZECC and ARMCANZ (2000) guidelines, based on 2021 evaluation (see Section 2)  
 (Provisional) trigger values requiring more analyses for confirmation.  
 \*\*\* Based on SLP grading values of nitrogen following NIWA (2013) and ANZECC and ARMCANZ (2000)

**Table 10 FMG 2021 internal ITV's - aquifer specific**

Parameter		Bedrock	Bedrock (TSF)	CID	Dolomite (LF)	Dolomite (SF)	Palaeo-channel	Alluvial	Pool	Surface Water	ANZECC 95% of Species Limit of Protection
		n=85	n=11	n=446	n=31	n=33	n=232	n=296	n=72	n=11	
		Threshold values									
pH	pH units	6.5-8.5	<b>6.0-8.5</b>	<b>5.2-8.5</b>	6.5-8.5	<b>6.5-8.7</b>	<b>6.5-8.9</b>	<b>6.2-8.5</b>	<b>6.4-8.5</b>	<b>6.3-8.5</b>	6.5 – 8.5
EC	µS/cm	-	-	-	-	-	-	-	-	-	-
TDS	mg/L	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000*
TSS	mg/L	-	-	-	-	-	-	-	-	-	-
Alkalinity	CaCO <sub>3</sub> mg/L	-	-	-	-	-	-	-	-	-	-
Hardness (calculated)	CaCO <sub>3</sub> mg/L	-	-	-	-	-	-	-	-	-	-
Cl	mg/L	-	-	-	-	-	-	-	-	-	-
F	mg/L	-	-	-	-	-	-	-	-	-	-
SO <sub>4</sub>	mg/L	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000*
Ca	mg/L	-	-	-	-	-	-	-	-	-	-
Mg	mg/L	-	-	-	-	-	-	-	-	-	-
Na	mg/L	-	-	-	-	-	-	-	-	-	-
K	mg/L	-	-	-	-	-	-	-	-	-	-
Ag	mg/L	<b>0.0005</b>	<b>0.0005</b>	<b>0.0005</b>	<b>0.0005</b>	<b>0.0005</b>	<b>0.0005</b>	<b>0.00005</b>	<b>0.0005</b>	0.00005	0.00005
Al	mg/L	0.055	0.055	<b>0.50</b>	<b>0.12</b>	<b>0.055</b>	<b>0.072</b>	<b>0.11</b>	<b>0.076</b>	<b>0.252</b>	0.055
As	mg/L	0.013	0.013	<b>0.023</b>	0.013	0.013	0.013	<b>0.023</b>	0.013	0.013	0.013
B	mg/L	<b>0.54</b>	<b>0.37</b>	<b>0.37</b>	0.37	<b>1.28</b>	<b>2.34</b>	<b>1.49</b>	<b>6.6</b>	0.37	0.37
Ba	mg/L	-	-	-	-	-	-	-	-	-	-
Be	mg/L	<b>0.0005</b>	<b>0.0005</b>	<b>0.003</b>	<b>0.0005</b>	<b>0.0005</b>	<b>0.0005</b>	<b>0.0005</b>	<b>0.0005</b>	<b>0.0065</b>	0.00013§
Bi	mg/L	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007§
Cd	mg/L	0.0011	0.0005	0.00054	0.0008	0.0011	0.0011	0.0005	0.0008	<b>0.0008</b>	0.0002
Ce	mg/L	-	-	-	-	-	-	-	-	-	-
Co	mg/L	<b>0.011</b>	0.0028	0.0028	0.0028	0.0028	<b>0.006</b>	<b>0.017</b>	<b>0.0035</b>	<b>0.073</b>	0.0028
Cr	mg/L	<b>0.017</b>	0.001	0.001	<b>0.006</b>	<b>0.0048</b>	<b>0.0072</b>	<b>0.016</b>	<b>0.0086</b>	<b>0.12</b>	0.001
Cs	mg/L	-	-	-	-	-	-	-	-	-	-
Cu	mg/L	0.0073	<b>0.042</b>	<b>0.0123</b>	<b>0.01</b>	<b>0.026</b>	0.007	<b>0.298</b>	0.0055	<b>0.086</b>	0.0014
Fe	mg/L	<b>1.5</b>	<b>6.94</b>	<b>39.8</b>	0.3	<b>0.41</b>	<b>0.3</b>	<b>6.2</b>	<b>2.6</b>	<b>0.54</b>	0.3§
Hg	mg/L	<b>0.0007</b>	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	<b>0.001</b>	<b>0.0018</b>	0.0006
La	mg/L	-	-	-	-	-	-	-	-	-	-
Li	mg/L	-	-	-	-	-	-	-	-	-	-



Table 11 FMG 2021 internal ITV's - aquifer specific continued

Parameter		Bedrock	Bedrock (TSF)	CID	Dolomite (LF)	Dolomite (SF)	Palaeo-channel	Alluvial	Pool	Surface Water	ANZECC 95% of Species Limit of Protection
		n=85	n=11	n=446	n=31	n=33	n=232	n=296	n=72	n=11	
		Threshold values									
Mn	mg/L	1.9	<b>5.076</b>	<b>2.58</b>	1.9	1.9	1.9	<b>7.39</b>	1.9	<b>9</b>	1.9
Mo	mg/L	0.034	0.034	0.034	0.034	0.034	<b>0.044</b>	<b>0.055</b>	0.034	0.034	0.034§
Ni	mg/L	0.1298	0.044	<b>0.044</b>	0.0836	0.1298	0.1298	<b>0.19</b>	0.0836	<b>0.082</b>	0.011
Pb	mg/L	0.0177	0.0085	0.0085	0.0133	0.0177	0.0177	0.0085	0.0133	<b>0.071</b>	0.0034
Rb	mg/L	-	-	-	-	-	-	-	-	-	-
Sb	mg/L	0.009	0.009	<b>0.024</b>	0.009	0.009	0.009	0.009	0.009	0.009	0.009§
Sc	mg/L	-	-	-	-	-	-	-	-	-	-
Se	mg/L	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
Si	mg/L	-	-	-	-	-	-	-	-	-	-
Sn	mg/L	<b>0.006</b>	0.003	<b>0.048</b>	<b>0.0094</b>	0.003	<b>0.0528</b>	<b>0.018</b>	<b>0.0047</b>	0.003	0.003§
Sr	mg/L	-	-	-	-	-	-	-	-	-	-
Th	mg/L	-	-	-	-	-	-	-	-	-	-
Ti	mg/L	-	-	-	-	-	-	-	-	-	-
Tl	mg/L	<b>0.00005</b>	<b>0.00005</b>	<b>0.00024</b>	0.00003	0.00003	<b>0.00025</b>	<b>0.00025</b>	<b>0.00005</b>	<i>0.00003</i>	0.00003§
U	mg/L	0.0005	0.0005	<b>0.0026</b>	0.0005	0.0005	0.0005	<b>0.0032</b>	<b>0.013</b>	0.0005	0.0005§
V	mg/L	0.006	0.006	<b>0.024</b>	0.006	0.006	0.006	0.006	<b>0.01</b>	0.006	0.006§
W	mg/L	-	-	-	-	-	-	-	-	-	-
Y	mg/L	-	-	-	-	-	-	-	-	-	-
Zn	mg/L	<b>0.15</b>	<b>1.73</b>	<b>5.2</b>	<b>0.053</b>	<b>0.25</b>	<b>0.073</b>	<b>0.35</b>	<b>0.079</b>	<b>0.66</b>	0.008
NH <sub>3</sub> -N	mg/L	<b>1.3</b>	0.9	<b>3.86</b>	0.9	0.9	-	0.9	0.9	<b>1.7</b>	0.9
(NO <sub>2</sub> +NO <sub>3</sub> ) (as N)	mg/L	<b>5.5</b>	<b>7.5</b>	<b>5.4</b>	2.4**	<b>3.5</b>	<b>11.2</b>	<b>17.8</b>	2.4**	2.4**	2.4**
Total Nitrogen	mg/L	-	-	-	-	-	-	-	-	-	-
Total Phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-
Reactive Phosphorus (as P)	mg/L	-	-	-	-	-	-	-	-	-	-

§Low reliability guideline value (ANZECC and ARMCANZ, 2000); values reported below limits of reporting (LOR) shown in italics; Threshold Values above the ANZECC 95% SLP (or HM SLP, were applicable) are shown in bold; n/a not applicable; EC (Electrical Conductivity), TDS (Total Dissolved Solids); \* ANZECC livestock drinking water guideline values; \*\* ANZECC 95% SLP value for nitrate (as N).

**Table 12 Monitoring of mine dewater (delivery pipeline) for the Kangeenarina Creek Supplementation System**

Parameter	Units	SOL-FM012 (SSWE001)		SOL-FM013 (SSWE002)	
Sample Date		28/02/21	30/08/21	28/02/21	30/08/21
pH	pH units	7.50	7.37	7.10	7.39
EC	µS\cm	251	264	274	416
TDS	mg/L	163	172	178	270
Na	mg/L	19.0	23.8	20.0	51.2
K	mg/L	6.0	7.2	5.0	18.8
Ca	mg/L	9.0	10.1	11.0	10.6
Mg	mg/L	12.0	13.0	13.0	13.9
Cl	mg/L	30	36	34	89
CaCO3	mg/L	56	59	67	29
SO4	mg/L	9	10	10	16
NO3	mg/L	2.65	3.22	0.81	6.95
Al	mg/L	<0.005	<0.005	<0.005	<0.005
Sb	mg/L	<0.0002	<0.0002	<0.0002	<0.0002
As	mg/L	0.001	<0.0002	0.0003	0.0006
Be	mg/L	<0.0001	<0.0001	<0.0001	<0.0001
B	mg/L	0.148	0.09	0.15	0.119
Cd	mg/L	0.00011	<0.00005	<0.00005	<0.00005
Cr	mg/L	0.0002	<0.0002	0.0019	0.0504
Co	mg/L	<0.0001	<0.0001	0.0001	0.0026
Cu	mg/L	0.142	0.0067	0.0007	0.0155
Fe	mg/L	0.002	0.021	0.005	0.016
Mn	mg/L	0.0118	0.007	0.011	0.104
Hg	mg/L	<0.00004	<0.00004	<0.00004	<0.00004
Ni	mg/L	0.0023	<0.0005	0.0138	0.312
Pb	mg/L	0.0309	0.0002	<0.0001	<0.0001
Se	mg/L	0.0003	0.0003	<0.0002	0.0006
Ag	mg/L	0.00003	<0.00001	<0.00001	<0.00001
Zn	mg/L	0.562	0.048	0.002	0.002

**Table 13 Major cations and anions for bores near Brad valley**

Sample Point	Date	pH	EC	NOx as N	Alkalinity	CaCO3	Bicarbonate	Carbonate	Hardness as CaCO3	TDS	NH3	Ca	Cl	Mg	NO3	NO3 as N	NO2	NO2 as N	PO4	K	Na	SO4
Unit	-	pH units	uS/cm	mg/L																		
Criteria	ANZECC 95% SLP	6.5 - 8.5		2.4	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-
	ITV 2014	6.2 - 7.9	1030	5	-	977	298	-	370	-	1.3	68	127	48	22	5	-	-	-	13	74	75
	ITV 2021 (bedrock aquifer)	6.5 - 8.5	-	5.5	-	-	-	-	-	3000	1.3	-	-	-	-	5.5	-	-	-	-	-	1000
MPB002R	31/05/2023	4.5	1,900	< 0.005	< 5	< 5	< 5	< 5	200	1,000	0.095	49	620	18	< 0.02	< 0.005	< 0.02	< 0.005	< 0.005	3.5	19	< 1
KIP081	31/05/2023	6.2	530	0.21	< 5	94	94	< 5	170	380	< 0.005	24	71	28	0.92	0.21	< 0.02	0.0056	< 0.005	9.2	36	66
KIP096	8/03/2023	6.8	660	0.013	< 5	100	100	< 5	160	370	0.0057	20	120	26	0.053	0.012	< 0.02	< 0.005	< 0.005	8.9	59	51
MPB002R	8/03/2023	4.6	1,700	0.012	< 5	< 5	< 5	< 5	200	1,100	0.084	49	510	19	0.052	0.012	< 0.02	< 0.005	< 0.005	3.8	21	< 1
SMB1054-D	8/03/2023	6.4	540	1.8	< 5	98	98	< 5	160	340	0.16	21	78	26	7.8	1.8	< 0.02	< 0.005	0.24	8.4	37	51

**Table 14 Water quality information collected for MPB001R**

Sample Point	Date	EC	pH	TDS	CaCO3	HCO3	CO3	P	Cl	F	NO2+N O3 as N	SO4	S																								
Units	-	uS/cm	pH units	mg/L																																	
Criteria	ANZECC 95% SLP		6.5 - 8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	ITV 2014	1030	6.2 - 7.9	-	977	298	-	0.1	-	-	5	75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	ITV 2021 (bedrock aquifer)	-	6.5 - 8.5	3000	-	-	-	-	-	-	-	5.5	1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MPB001R	14/04/2019	628	8.1	350	111	135	< 1	< 0.1	74	0.49	0.34	95.4	32																								
	6/04/2019	621	7.2	350	98	120	< 1	< 0.1	77	0.48	0.55	100	33																								
Sample Point	Date	Bi	Ce	Cs	La	Li	Rb	Sc	Th	Tl	W	Al	Sb	As	Ba	Be	B	Cd	Ca	Cr																	
Units	-	mg/L																																			
Criteria	ANZECC 95% SLP	0.0007	-	-	-	-	-	-	-	-	-	-	0.009	0.013	-	-	-	0.37	0.0002	-	0.001																
	ITV 2014	0.0001	0.0005	0.0049	0.005	0.054	0.044	0.00025	0.0001	0.0001	0.002	0.05	0.025	0.003	0.17	0.001	0.42	0.0011	68	0.0047																	
	ITV 2021 (bedrock aquifer)	0.0007	-	-	-	-	-	-	-	-	0.00005	-	0.055	0.009	0.013	-	0.0005	0.54	0.0011	-	0.017																
MPB001R	14/04/2019	< 0.0001	< 0.0005	0.002	< 0.005	0.02	0.029	< 0.0005	< 0.0001	0.0004	< 0.002	< 0.005	0.0016	0.004	0.026	< 0.001	0.29	< 0.0001	28.8	< 0.0005																	
	6/04/2019	< 0.0001	< 0.0005	0.002	< 0.005	0.018	0.028	< 0.0005	< 0.0001	0.0001	< 0.002	< 0.005	0.0002	0.001	0.022	< 0.001	0.27	< 0.0001	25.9	< 0.0005																	
Sample Point	Date	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	K	Se	Ag	Na	Sr	Sn	Ti	U	V	Zn																	
Units	-	mg/L																																			
Criteria	ANZECC 95% SLP	0.0028	0.0014	0.3	0.0034	1.9	0.0006	0.034	0.011	0.011	13	0.011	0.00005			0.003		0.0005	0.006	0.027																	
	ITV 2014	0.0025	0.007	0.46	0.038	48	0.54	298	0.01	0.055	13	0.01	0.0001	74	0.19	0.012	0.0005	0.0032	0.01	0.088																	
	ITV 2021 (bedrock aquifer)	0.011	0.0073	1.5	0.0177	-	1.9	0.0007	0.034	0.1298	-	0.011	0.0005	-	-	0.006	-	0.0005	0.006	0.15																	
MPB001R	14/04/2019	< 0.005	< 0.0001	0.029	< 0.0001	30.8	0.091	< 0.0001	< 0.02	0.02	11	0.003	< 0.0001	40.1	0.082	< 0.0001	< 0.0005	< 0.0001	< 0.005	0.01																	
	6/04/2019	< 0.005	0.0011	0.22	< 0.0001	32.5	0.035	< 0.0001	< 0.02	0.02	11	< 0.001	< 0.0001	41.2	0.083	< 0.0001	< 0.0005	< 0.0001	< 0.005	0.056																	



**Table 15 Surface water quality information for Zalamea Creek and Kangeenarina Creek**

Sample Point	Date	pH	EC	Total PAH	TDS	TSS	Alkalinity - Hydroxide	Alkalinity as CaCO3	Alkalinity - Bicarbonate	Alkalinity - Carbonate	Hardness as CaCO3	Total P	SO4	N	Al	Sb	As	Ba	Be	B
Unit		pH units	uS/cm	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
S_Zalamea_SW_NAL_01	13/02/2020	7.5	210	< 0.1	140	290	< 5	68	68	< 5	45	< 0.05	14	1.1	0.18	< 0.001	< 0.001	0.13	< 0.0005	0.44
S_KingsOPF_SW_NAL_K12	10/02/2020	6.1	30	< 0.1	18	63	< 5	6	6	< 5	6	< 0.05	1	0.7	0.05	< 0.001	< 0.001	0.014	< 0.0005	0.04
Sample Point	Date	Cd	Ca	Cl	Cr	Co	Cu	Fe	Pb	Mg	Mn	Hg	Mo	Ni	K	Se	Na	Sn	Zn	
Unit		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
S_Zalamea_SW_NAL_01	13/02/2020	< 0.0001	8	15	< 0.001	< 0.001	0.001	0.15	< 0.001	6.2	< 0.005	< 0.00005	0.001	< 0.001	5.2	< 0.001	25	< 0.001	0.045	
S_KingsOPF_SW_NAL_K12	10/02/2020	< 0.0001	1.2	3	0.001	< 0.001	< 0.001	0.07	< 0.001	0.9	0.05	< 0.00005	< 0.001	0.001	2	< 0.001	1.2	< 0.001	0.042	

## Appendix 2: Summary of YNAC stakeholder comments received

Table 16 Summary of YNAC stakeholder comments received

DWER line item ref	Short description	Summary of stakeholder comments	Department's response
Comments received in December 2022 (in response to licence amendment which originally included Brad TSF, now assessed under this works approval)			
1	Concerns regarding applicant methods used to evaluate risk associated with surface run-off and seepage	<ul style="list-style-type: none"> <li><i>“it appears FMG has openly pursued an inferior 2D modelling of the impacts from the Brad TSF as opposed to 3D modelling. The models seem integral to properly evaluating the risks and management measures required in relation to run-off and groundwater seepage. This has implications for management of impacts to Kangeenarina Creek in particular, located 5km from the TSF.”</i></li> </ul>	<p>DWER notes that the 2D numeric modelling undertaken was primarily in relation to stability analysis, tailings placement and assessment of concept closure. The department notes that TSF embankment stability and safety are regulated under the <i>Mining Act 1978</i>. Brad TSF was approved under mining proposal environmental registration 111671 on 14 October 2022. The TSF design was reviewed from a geotechnical perspective and deemed acceptable. Please refer to section 2.3.3 for further detail.</p> <p>With respect to surface water run-off and seepage these are included within the decision report as noted below.</p> <p><u>Surface water run off</u></p> <p>DWER has assessed the risk associated with stormwater run-off (see section 3.2 of this decision report) from the TSF and has included a requirement that stormwater be managed on the works approval.</p> <p><u>Seepage</u></p> <p>Technical advice was sought from the department's principal hydrogeologist regarding the suitability and reliability of the methods used</p>

			to calculate seepage. The methodology was found to be sound and it was recommended that the water balance be monitored on an on-going basis. The department has consequently conditioned the requirement for water balance monitoring and other conditions. See section 3.3.2 and 3.3.6 of the decision report for further detail.
2	Concerns regarding Kangeenarina Creek – used for drinking water	<ul style="list-style-type: none"> <li>• <i>“This creek [Kangeenarina] is very significant to Yindjibarndi people”</i></li> <li>• <i>“We note that Kangeenarina Creek is a source of drinking water for Yindjibarndi people when visiting Ngurra and undertaking their recognised and protected Native Title Rights and Interests. This risk is not considered in relation to the Brad TSF”.</i></li> </ul>	<p>The department acknowledges the significance of Kangeenarina Creek to the Yindjibarndi people. A detailed risk assessment with respect to potential impacts of seepage on the Kangeenarina and Zalamea creeklines has been undertaken in section 3.3 of this decision report and technical advice sought from the department’s principal hydrogeologist.</p> <p>As a result of the risk assessment several controls have been placed on the works approval to help mitigate risk of impact to the Kangeenarina and Zalamea creeklines.</p>
3	Concerns regarding other nearby sensitive receptors	<ul style="list-style-type: none"> <li>• <i>“The surrounding environment to the Brad TSF includes the Karijini National Park, identified threatened ecological communities, nationally significant wetlands and RAMSAR sites. The Millstream Chichester National Park and Millstream Water Resource Protection Area are also downstream of the facility.”</i></li> </ul>	<p><u>Millstream water reserve</u></p> <p>The Millstream water reserve has been risk assessed within section 3.3 of this decision report. Several controls have consequently been placed on the works approval to help mitigate risk of impact to the water reserve.</p> <p><u>Other sensitive receptors:</u></p> <p>Sensitive receptors near Brad TSF are summarised in section 3.1.2 of this decision report and a risk assessment for potential impact discussed in section 3.2.</p> <p>The closest Ramsar site is the located ~44 km east of the TSF and, given the distance, has not been included within the risk assessment.</p>



			<p>The Millstream Chichester national park is located ~60 km north of the TSF and, given the distance, has not been included within the risk assessment.</p> <p>Priority ecological communities – the “Brockman Iron cracking clay” and Themeda grasslands are approximately 7.4 km and 9.6 km from the TSF respectively and, given the distance, have not been included within the risk assessment</p>
4	YNAC encourages DWER to ensure more time and technical resources are given to Yindjibarndi to review this and future applications	<p><i>“On the principles and basis of procedural fairness in providing comment, we would encourage the DWER to ensure more time and technical resources are given to Yindjibarndi to review this and future applications where the proponent fails to properly consult with affected persons.”</i></p>	<p>The department is currently in the process of updating procedures regarding consultation with Aboriginal peoples and knowledge holders, this includes provision for additional response time. YNAC’s comments will be referred internally for consideration as part of this process.</p> <p>For this application, the department has followed current procedures, and provided additional time for YNAC to comment on the application.</p>
5	YNAC consider Part IV to be a significant proposal for the purposes of Part IV of the EP Act.	<p>YNAC consider that the scope of the application warrants assessment under Part IV of the Act, indicating the scale of the operation – the tailings storage volume being equivalent to 35 Melbourne Cricket grounds. To this effect:</p> <ul style="list-style-type: none"> <li>• The proponent has not provided an EIA assessment in accordance with the EPA’s “statement of environmental principles, factors, objectives and aims of EIA” to enable a proper determination as to whether the application is “significant”.</li> <li>• It is unclear to YNAC therefore how DWER has determined that only a works approval was required when reviewing the original submission;</li> <li>• In YNAC’s view the proposal includes a significant</li> </ul>	<p>Internal advice from Environmental Protection Authority Services (EPAS) was sought in relation to this application. EPAS indicated that under ministerial statement MS 862, the proposal was defined to including tailings storage to be constructed in valley pits. Additionally, EPA Report 1588 for ministerial statement MS1062 indicates that TSFs are to be regulated under Part V of the EP Act and that regulation of a TSF under Part V is appropriate to meet the EPA’s objectives for this aspect of the proposal. EPAS indicated “it can be considered that the activity can be approved under Part V of the EP Act and does not require further assessment under Part IV of the EP Act”.</p>

		<p>discharge of waste – and indicates that this could fall within a prescribed class for referral to Part IV under section 38 of the Act; and</p> <ul style="list-style-type: none"> <li>• YNAC intends to refer the proposal to Part IV.</li> </ul>	
		<ul style="list-style-type: none"> <li>• The tailings dam poses a massive risk to the environment both in terms of ongoing contamination through seepage but also wall failure</li> <li>• YNAC notes previous tailings dam failures and indicated the Brumadinho dam is 1/5 of the total projected volume of the Brad TSF, and caused environmental destruction and death relevant at an international scale</li> </ul>	<p>A detailed risk assessment with respect to tailings storage facility seepage has been included within section 3.3 of this decision report.</p> <p>The department notes that TSF embankment stability and safety are regulated under the <i>Mining Act 1978</i> which is administrated by the Department of Mines, Industry Regulation and Safety. Brad TSF was approved under mining proposal environmental registration 111671 on 14 October 2022. The TSF design was reviewed from a geotechnical perspective and deemed acceptable. Please refer to section 2.3.3 for further detail.</p>
6	<p>The proponent has failed to consult adequately with YNAC. Either DWER or FMG should consult in greater detail with YNAC before a decision is made on the application.</p>	<ul style="list-style-type: none"> <li>• The works approval application supporting document includes no detail of consultation with any other stakeholder.</li> <li>• The proponent has made no efforts to meaningfully engage on these proposals with the Yindjibarndi people.</li> <li>• YNAC do not consider the extent of consultation to meet the standard of the industry. The avoidance of consultation meets not even the lowest threshold. YNAC encourages DWER to either consult in greater detail itself with effected interest stakeholders, or require the proponent to achieve consultation outcomes which align with other resource extraction companies operating in Western Australia prior to making a decision on the application.</li> </ul>	<p>In accordance with current procedures, the department has sought comment on the application from all relevant stakeholders. A summary of stakeholders contacted by the department is detailed in section 4 of this decision report.</p> <p>The department acknowledges there are opportunities to improve engagement with traditional owners and are considering YNAC's comments in further detail. Comments raised relating to department procedures for engagement with traditional owners will be addressed separately via formal correspondence to YNAC.</p>
7	<p>A large amount of technical detail has been provided, with no specific</p>	<ul style="list-style-type: none"> <li>• Generic emails loaded with large volumes of technical information and no offer of support is not</li> </ul>	<p>The department acknowledges there are opportunities to improve engagement with</p>

	content assisting Yindjibarndi to understand potential risks to country. Clearer information should be provided prior to a decision being made by DWER.	<p>what YNAC considers to meet industry standards on consultation with First Nations People</p> <ul style="list-style-type: none"> <li>• YNAC is not provided with financial support to respond to these proposals, which continue to cause on-going destruction of Yindjibarndi country and cultural heritage.</li> <li>• The platform for communicating complex issues limits Yindjibarndi advisors to be fully informed on the proposal and its impact to country.</li> <li>• There are thousands of pages of technical documentation to review and no specific content assisting Yindjibarndi or other potentially affected stakeholders regarding the potential risks to country.</li> <li>• Clearer information and detail should be provided to Yindjibarndi to review and comment on prior to a decision being made by DWER.</li> </ul>	traditional owners and are considering YNAC's comments in further detail. Comments raised relating to department procedures for engagement with Traditional Owners will be addressed holistically in due course.
8	The potential for seepage and dam break failure associated with Brad TSF do not meet the objectives and principles of the act.	<ul style="list-style-type: none"> <li>• In YNAC's view it is unclear how health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations. Further information is required to be able to reach a conclusion on this objective of the EP Act.</li> <li>• It is unclear how FMG is making "reasonable and practicable measures to minimise the generation of waste and its discharge into the environment". There appears to be no information in the application as to how FMG is making continuous improvement through mining operations. Additional information is required to demonstrate this object of the act is being achieved.</li> </ul>	<p>The object and principles guide the overall application of the powers of the Act. The principles are matters to which the Environmental Protection Authority (EPA) has regard under its powers to assess and report on proposals and schemes under the Act. Part IV of the Act makes provisions for the EPA to undertake an environmental impact assessment of significant proposals, proposals of a prescribed class, strategic proposals and land-use planning schemes. Two ministerial statements have been issued for the Solomon project under Part IV of the EP Act, MS 862 (issued 20 April 2011) and MS 1062 (issued 3 October 2017).</p> <p>Under Part V of the Act, the department has undertaken an assessment of the works approval application consistent with its published Regulatory Framework, <i>Guideline: Risk Assessments (2020)</i> which provides for consideration of the risk of impacts from emissions and discharges to the environment</p>



			<p>and human health from prescribed activities under Schedule 1 of the <i>Environmental Protection Regulations</i>. Proposed activities are risk assessed on a case by case basis. Licensing and approval decisions, including conditions imposed on a works approval or licence, will be proportionate to the level of risk (consequence and likelihood) that the activity poses to public health and the environment.</p> <p>DWER has assessed risk from the proposed activities in sections 3.2 and 3.3 of this decision report and included conditions within the works approval to help mitigate risk from the proposed activities.</p>
		<ul style="list-style-type: none"> <li>• Lack of detail regarding the proponents ability to manage seepage or catastrophic failure of the wall</li> <li>• Concerns regarding dam break failure and potential impacts to Kangeenarina Creek;</li> <li>• Kangeenarina Creek has environmental and cultural values of the highest significance to the Yindjibarndi people. The “likely” retention of a spill/failure is an unacceptable level of risk in the eyes of the Yindjibarndi. It appears the assessment and modelling of these risks is undertaken without any independent or peer review of the data and assumptions which underpin the conclusions made. This suggests a lack of scientific and engineering design certainty in the proposal, which could lead to serious or irreversible damage to the natural environment and Aboriginal cultural heritage.</li> <li>• YNAC requests the precautionary principle of the Act be upheld and that an independent review of the design and the risks and assumptions be undertaken.</li> </ul>	<p><u>Seepage</u></p> <p>A detailed risk assessment with respect to tailings storage facility seepage has been included within section 3.3 of this decision report.</p> <p><u>TSF embankment failure</u></p> <p>TSF embankment stability, safety and mine closure are regulated under the <i>Mining Act 1978</i>. Brad TSF was approved under mining proposal environmental registration 111671 on 14 October 2022. The TSF design was reviewed from a geotechnical perspective and deemed acceptable. Please refer to section 2.3.3 for further detail.</p>

		<ul style="list-style-type: none"> <li>The proposal suggests the TSF has a design life of ten years. YNAC are unclear on what outcome is at the completion of the ten year period and where the tailings are to be disposed of and how this integrates with longer term closure and rehabilitation planning for the area</li> </ul>	
9	<p>Inadequate information has been provided by the applicant for DWER to consider the social surroundings. Detailed heritage surveys should be undertaken by the LACHS or Yindjibarndi Nugurra PBC. Information previously used does not align with the new ACH Act.</p>	<ul style="list-style-type: none"> <li>Proposed TSF is located in an area of great significance to the Yindjibarndi people.</li> <li>Information previously used by the proponent to indicate minimal or no risk to Aboriginal Cultural Heritage in association with their operations are not aligned with the minimum requirements of the new Aboriginal Cultural Heritage Act 2021 (the ACH Act).</li> <li>Whilst section 18's may be in place for certain areas, there remains clear risk to the ongoing harm of ACH as defined by the ACHA Act both through the direct actions which could be permitted by these proposals, and the cumulative impacts enabled by the grant of approvals for these proposed activities</li> <li>The application includes no consideration to Aboriginal Cultural Heritage or the social surroundings guidance of the EPA and the interactions of Yindjibarndi's people strong connection of Cultural Heritage in physical formations with respect to flora and fauna, geological and topographical features and the amenity of the area.</li> <li>There is inadequate information provided by the applicant for DWER to consider and determine there is no risk to social surroundings and further information. This should include detailed heritage surveys undertaken either by the LACHS or by the Yindjibarndi Nugurra PBC</li> </ul>	<p>The department consulted with DPLH and received comment with respect the proposal and the AH Act and subsequent ACH Act (summarised in section 2.3.2). DPLH comments were provided to FMG and the department recommends in this decision report that FMG consider and address comments before commencing works.</p> <p>The department notes that the works approval holder is required to meet its obligations under the AH Act and subsequent ACH Act which is a separate regulatory process to that of applying for a works approval under Part V of the EP Act. The granting of the works approval does not remove FMG's obligations to comply with the AH Act and ACH Act.</p> <p>The department are also considering YNAC's comments in further detail. Comments raised relating to department procedures for engagement with traditional owners will be addressed separately via formal correspondence to YNAC.</p>

10	<p>Yindjibarndi want the adjoining land uses to be considered as more being more sensitive than FMG have indicated – given they have the right to occupy and use the area immediately adjoining FMG’s tenure.</p>	<ul style="list-style-type: none"> <li>• The consideration of sensitive receptors by the proponent is not accurate. The Yindjibarndi people have a right to occupy, enjoy and use the area immediately adjoining FMG’s tenure. It includes a right to live that area.</li> <li>• In YNAC’s view, the area immediately adjoining the operations and potentially affected by this proposal should be treated as “sensitive land uses” noting Yindjibarndi people who choose to reside in these areas would be sensitive to the emissions of the adjoining operations in terms of noise, light, dust, odours, gases. Site specific analysis of the impacts should be modelled on the recognition Yindjibarndi people have legal rights to take up residence adjoining this operation and the ability to do so should not be hindered by unreasonable emissions from the adjoining industrial land use.</li> <li>• The Yindjibarndi people also have legal right to take water and to use and/or enjoy resources, other than minerals and petroleum, for sustenance within the area. There is potential to cause significant harm to the health and well-being of Yindjibarndi people who have, continue to and will in the future, take sustenance from the nearby surface and groundwater resources. These areas should be treated as areas that provide drinking water to the public and therefore be afforded the same consideration as “Public drinking water source areas” within DWER policy and guidance. Lack of consideration of this factor could lead to contamination of a water source used for consumption by Yindjibarndi people placing their health and well-being at risk.</li> </ul>	<p>The area immediately adjoining FMG’s tenure is located approximately 6.8 km north of the proposed Brad TSF. Given this distance, it is unlikely that fugitive emissions including noise and dust would impact sensitive receptors. DWER has therefore not included a risk assessment for more sensitive land uses. DWER has risk assessed nearby receptors as detailed in section 3.1.2 of the decision report.</p> <p>The department has also conducted a detailed risk assessment for potential impacts to Kangeenarina Creek, Zalamea Creek and the Millstream Water Reserve in section 3.3 of the decision report.</p>
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## Appendix 3: Summary of applicant's comments on risk assessment and draft conditions

Condition	Summary of applicant's comment	Department's response
N/A cover page	In a response to a request for confirmation of throughput rate for category 5 activities, FMG indicated the throughput reflect that current on licence L8464/2010/2: not more than 95,300,000 tonnes per annual period.	The works approval has been updated with the throughput indicated by FMG.
Conditions 2 and 3	FMG request wording for the critical containment infrastructure (CCI) conditions to be modified to state that infrastructure be constructed in "general accordance" with the design and construction requirements to be allowed operational flexibility.	The department considers it appropriate, on the basis of risk, to ensure that CCI meets its requirements prior to any form of operation commencing. With this type of infrastructure, the department recognises both the potential environmental impact, and the practical inability to easily rectify issues, once the containment infrastructure is in use. The CCI condition will consequently remain unchanged. For modifications, FMG will be required to apply for a works approval amendment.
Conditions 2 and 3	FMG requests modifying the approval so that the eastern saddle embankment will be constructed as part of stage 2 (rather than stage 1 as originally applied for)	The department consulted DMIRS with respect to this late stage modification to the proposed activities. DMIRS indicated that, from the TSF design report provided, it is not possible to build the eastern saddle embankment other than during stage 1 as the tails deposition will cut off access to that area during TSF operations.  The department forwarded this advice to FMG, who withdrew their request and indicated that the approval should be issued for the proposed works initially applied for.
Conditions 2 and 3	FMG requests the removal of the number of vibrating wire piezometers (VWP) to be installed during stage 1 to provide operational flexibility on site. Rather, FMG requests for the flexibility to be able install as many VWP's as required to the satisfaction of a TSF engineer. The proposed wording is as follows:  "Install VWPs as per the Design Engineer specifications and maintain instrument operability to the satisfaction of the TSF Engineer of Record who shall review instrumentation and operation through Quarterly and annual reporting to ensure suitable monitoring of failure modes are maintained"	The department notes that it is appropriate for the number and placement of VWP's be determined by the design engineer and has revised the condition accordingly. The department notes that FMG is responsible for ensure all appropriate approvals are in place as required under the <i>Mining Act 1978</i> .
Condition 2	DWER requested FMG provide a figure detailing the proposed stormwater / surface water management for Brad TSF	FMG has provided a surface water management figure.

Condition 4	FMG request modification of wording for condition 4 to state that infrastructure be constructed in “ <b>general</b> ” accordance with the design and construction requirements of condition to, to be allowed operational flexibility.	The department considers it appropriate, on the basis of risk that FMG be required to comply with the requirements currently detailed in condition 4. The wording of the condition will consequently remain unchanged. Should modifications be required, please contact the department for advice regarding whether this will require a works approval amendment.
	FMG requests removal for the requirement to install on-site weather stations given there are existing and functional weather stations across the Solomon Mine that are adequate for collection of rainfall and evaporation data for the mine site.	Given the existing weather stations on-site, the department has removed the requirement for weather station installation.
Condition 4 and condition 21	FMG proposed rewording of CBP “material storage shed” with “semi-enclosed materials bay(s).”	The department accepts this change and has modified the condition.
Condition 5	FMG requests removal of MB-008, originally proposed for installation, to be constructed with stage 2 of the works.	The department notes that monitoring well MB-008 is the only well to the southeast of the TSF and an important monitoring location to detect potential impacts from seepage associated with TSF operation. Installation prior to stage 1 will allow comparison with groundwater quality and levels prior to commencing TSF operation. The requirement to install MB-008 prior to time limited operations for stage 1 will therefore be maintained.
	FMG requests that the wells be constructed in accordance with the standards set in the “ <i>Minimum Construction Requirements for Water Bores in Australia</i> ” instead of the ASTM D5092/D5092M-16: <i>Standard practice for design and installation of groundwater monitoring bores</i> currently conditioned.	Internal technical advice was sought from the department’s principal hydrogeologist, who indicated that the ASTM standard should be used in this instance for monitoring bore installation, rather than the “Minimum construction requirements for water bores in Australia” which is more generalised advice for all bore types. The condition will therefore remain unchanged.
Condition 6 (and associated hyporheic zone monitoring in conditions 7, 16 and 24)	FMG requests removal of the condition requiring installation of monitoring points specifically targeted to detect impacts to the hyporheic zone. They propose to utilise existing shallow groundwater monitoring bores KMB12S along Kangeenarina Creek and SMB1052-D along Zalamea creek	The hyporheic zone is “that part of the groundwater-river interface which is water-saturated and in which there is exchange of water from the stream into the riverbed sediments and then returning to the stream, within timescales of days to months.” Groundwater monitoring bores target the aquifer rather than the hyporheic zone and would not be fit for purpose.  A requirement to install hyporheic monitoring points, as determined by a suitably qualified hydrogeologist, will remain on the works approval.

Condition 7 and 24	FMG requests removal of groundwater monitoring well SMB1056-S (which it originally proposed for monitoring seepage impacts along strike with the dolerite dyke) and that FMG just be required to monitor SMB1062-D.	The department notes that SMB1056-S is more likely to be screened across a shallow aquifer, which could detect impacts associated with TSF seepage (i.e even if the well is dry now, it may have the potential to detect water at other times of the year, or mounding associated with seepage). The requirement to monitor both SMB1056-S and SMB1056-D will be maintained. If, during the monitoring periods as specified by the works approval, the monitoring well is found to be dry, this can be recorded as per the groundwater monitoring reporting requirements as detailed under condition 27.
Condition 7 and 24	FMG requests removal of parameters Chromium III, VI and titanium so that monitoring on the works approval is consistent with that currently monitored under licence L8464/2010/2.	Given that this works approval application is for a new TSF, the department has requested monitoring for a larger analytical suite than currently licenced so that relevant groundwater chemistry comparisons can be made with pre-operational conditions. The suite will be reviewed again at the time of licence amendment.  Additionally, in a report provided by FMG, it was indicated that the tailings material has a “moderate potential for titanium leaching” (Tetra Tech, 2012). The department therefore considers it appropriate that these parameters are included within the works approval monitoring suite.
Condition 7	FMG requests that a footnote for dissolved oxygen be included to allow in-field non-NATA accredited analysis.	Footnote 1 is a reference to the comment “In-field non-NATA accredited analysis permitted.” The monitoring conditions have been updated so that the footnote is included for dissolved oxygen for all tables.
Conditions 10 (Brad TSF stage 1) and 12 (Brad TSF stage 2)	FMG requests a revision on the time allowable for submission of the critical containment infrastructure report (CCIR) from 30 days to 90 days.	Whilst the department will grant additional time for the CCIR, note that FMG may only commence time limited operations for infrastructure once the department has received and assessed the CCIR as per the <a href="#">Industry Regulation Guide to Licensing</a> .
Condition 11	FMG has proposed that the condition be modified to provide further clarity regarding the type of engineer certifying the infrastructure, that is: <ul style="list-style-type: none"> <li>• suitably qualified geotechnical engineer that each item of critical containment infrastructure of a geotechnical nature (embankment, VWPs and Surface Water Management); and</li> </ul>	The department agrees that clarifying the type of engineer is appropriate and has modified the condition.



	<ul style="list-style-type: none"> <li>• suitably qualified mechanical engineer that each item of critical containment infrastructure of a mechanical nature (pipelines and appurtenant structures).</li> </ul> <p>FMG has requested that the CCIR condition be modified to include “if applicable, review, verification and acceptance of construction variations by the respective qualified engineers”</p>	<p>The purpose of the CCIR is for the Department to confirm that the environmental controls on containment infrastructure are properly constructed before materials are deposited in the containment cell.</p> <p>The department considers it appropriate, on the basis of risk, to ensure that critical containment infrastructure meets its requirements prior to any form of operation commencing. The design and construction requirements conditioned are considered necessary for controlling emissions from the operation of the TSF. With this type of infrastructure, the department recognises both the potential environmental impact, and the practical inability to easily rectify issues, once the containment infrastructure is in use.</p> <p>This variation will therefore not be included. For modifications, FMG will be required to apply for a works approval amendment.</p>
Conditions 13 and 15	For both CCIR and environmental compliance report (ECR) conditions FMG has request they provide either “as constructed plans” <del>and</del> or “detailed site plans”.	The as constructed plans refer to the construction of the infrastructure itself, whereas the detailed site plan refers to the infrastructures location and dimension. The condition is a standard reporting requirement and will remain unchanged.
Condition 17	<p>FMG requests for the removal of:</p> <ul style="list-style-type: none"> <li>• condition 17(g): a diagram with aerial image overlay showing all monitoring locations and depicting groundwater level contours, flow direction and hydraulic gradient (relevant site features including discharge points and other potential sources of contamination must also be shown); and</li> <li>• condition 17 (i): a clerical error which is a duplication of condition 17(h)</li> <li>• the requirement that the values be compared against the “Guideline assessment and management of contaminated sites” in condition (h). FMG requests that the data instead be compared internally developed against site specific trigger values.</li> </ul>	<p>Condition 17(g) Groundwater level contours, flow direction and hydraulic gradient information are key in the department’s “source-pathway-receptor” risk assessment process. Groundwater data is dynamic and should be monitored over time (one point in time is not sufficient) and updated with data from new monitoring points (i.e the new groundwater monitoring wells proposed for installation surrounding Brad TSF). The condition is also a standard reporting requirement, and will remain unchanged.</p> <p>Condition 17(h) was duplicated by administrative error and condition 17(i) will be removed.</p> <p>Condition 17(h): a comparison against the “Guideline assessment and management of contaminated sites” will provide useful information to the department and will be maintained within the condition. FMG is welcome to additionally include comparison with internally developed site-specific criteria within the report.</p>

	FMG suggests that 17(g) is “not relevant to this works approval and the stated information was provided in the works approval supporting documentation”	
Condition 18	FMG requests that condition 18 be modified to include text indicating that the CEO must notify the works approval holder that the CCIR meets the requirements for that item of infrastructure “within 5 business days and or other suitably negotiated timeframe”.	The department uses a risk based approach to determine the time required for the department to assess the CCIR, known as the ‘CCIR assessment period’. The CCIR assessment period will generally be between 10 - 45 business days, depending on the complexity and risk of the works. For further detail please see the <a href="#">Industry Regulation Guide to Licensing</a> . The condition is standard and will not be modified.
Condition 19	FMG requests that condition 19 be modified so that the department must provide a response “within 5 business days and or other suitably negotiated timeframe”.	Unlike the critical containment infrastructure condition, the department’s assessment of the environmental compliance report does not delay commencement of time limited operations for non-critical containment infrastructure. For further detail please see the <a href="#">Industry Regulation Guide to Licensing</a> . The condition is standard and will not be modified.
Condition 20	FMG requests that the time limited operations for condition 20(b) is modified to remove the following:  (b) until such time as a licence for that item of infrastructure is granted in accordance with Part V of the Environmental Protection Act 1986, <del>if one is granted before the end of the period specified in condition 20(a).</del>	Modification of this condition has the potential to affect the period allowable under time limited operations. Time limited operations is set to between 90 and 180 calendar days to allow for the assessment of the licence application following construction. For further detail please see the <a href="#">Industry Regulation Guide to Licensing</a> . The condition is standard and will not be modified.
Condition 21	FMG requests that the visual inspections required by condition 21, item 1 (d) be undertaken “daily” instead of “every shift”	Daily inspections are considered sufficient. The condition has been modified.
	FMG requests that visual inspections of pipelines take place every 24 hours instead of every 12 hours.	Given that the pipelines are equipped with telemetry and automatic cut-outs, daily visual inspections are considered sufficient. The condition has been modified.
	FMG requests fortnightly, rather than weekly, inspections of the VWP’s to ensure integrity and that telemetry is downloading to a central storage location.	Fortnightly inspections of the VWP’s are considered sufficient. The condition has been modified.
Condition 28	FMG requests that condition 28 be modified to remove the requirement for site rainfall and evaporation be determined by a weather station previously required for installation by condition 4.	As there are existing weather stations on-site, the condition has been modified to “as determined by an on-site weather station”.  Reference to treated wastewater was included by administrative error and has been removed.

	They have also requested removal that the “volume of treated waste water” deposited by monitored.	
Proposed new condition	<p>FMG requests addition of the following condition:</p> <p>“The Works Approval Holder must not depart from the design and construction requirements specified in Table 1 except:</p> <p>(a) where such departure is minor in nature and does not materially change or affect the infrastructure; or</p> <p>(b) where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment; and</p> <p>(c) and all other conditions in this Works Approval are still satisfied”</p>	<p>This is no longer a standard condition included on new instruments due to recent internal legal advice and will therefore not be included in the works approval. Should any modifications be required, please contact the department for advice regarding whether this will require a works approval amendment.</p>

## Appendix 4: Application validation summary

SECTION 1: APPLICATION SUMMARY					
Application type					
Works approval	<input checked="" type="checkbox"/>				
Licence	<input type="checkbox"/>	Relevant works approval number:	None	<input type="checkbox"/>	
		Has the works approval been complied with?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
		Has time limited operations under the works approval demonstrated acceptable operations?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
		Date Report received:			
Renewal	<input type="checkbox"/>	Current licence number:			
Amendment to works approval	<input type="checkbox"/>	Current works approval number:			
Amendment to licence	<input type="checkbox"/>	Current licence number:			
		Relevant works approval number:	N/A	<input type="checkbox"/>	
Registration	<input type="checkbox"/>	Current works approval number:	None	<input type="checkbox"/>	
Date application received	23 December 2022				
Applicant and Premises details					
Applicant name/s (full legal name/s)	FMG Solomon Pty Ltd				
Premises name	Solomon Iron Ore Mine				
Premises location	E47/1011, E47/1334, E47/1532, M47/1409, M47/1410, M47/1411, M47/1413, M47/1431, M47/1453, M47/1466, M47/1473, M47/1474, M47/1475, L47/293, L47/294, L47/296, L47/301, L47/351, L47/360, L47/362, L47/363, L47/367, L47/381, E47/382, L47/391, L47/392, L47/397, L47/471, L47/472, L47/710, L47/711, L47/813, L47/814, P47/1279, P47/1286, P47/1287, P47/1304, P47/1305, P47/1735, P47/1736 and portion of E47/1319, E47/1333, E47/1398, E47/1399, E47/1447, E47/3094, E47/3464, L47/361 and L47/713.				
Local Government Authority	Shire of Ashburton				
Application documents					
HPCM file reference number:	DER2023/000004				
Key application documents (additional to application form):	<ul style="list-style-type: none"> <li>• FMG Solomon Mine – Works Approval Application Form;</li> <li>• Attachment 1B – ASIC Company summary;</li> <li>• Attachment 1C – Environmental Protection Act 1986 Legal</li> </ul>				



	<p>Authority;</p> <ul style="list-style-type: none"> <li>• Attachment 2 – Prescribed Premises location;</li> <li>• Attachment 7 – Siting and location;</li> <li>• FMG Fortescue 2022, <i>Solomon Mine Works Approval Application Supporting Document</i>, dated 23 December 2022;</li> <li>• Pattle Delamore Partners Ltd 2021, Solomon Hub, Brad Pit Tailings Storage Facility – Groundwater Assessment: Ref 00067-RP-EG-0004 Rev0, Prepared for Red Earth Engineering Pty Ltd, dated 26 October 2021;</li> <li>• Appendix A - Red Earth Engineering Pty Ltd 2021, <i>Solomon Brad TSF Detailed Design - Basis of Design</i> - Document Number: SO21OP018A-00067-BD-GN-0001, Prepared for Fortescue Metals Group Ltd, dated 26 October 2021;</li> <li>• Appendix E - Red Earth Engineering Pty Ltd 2021, <i>Solomon Brad TSF Water Balance Model</i> - Document Number: SO21OP018A-00067-RP-EG-0007 Rev1, Prepared for Fortescue Metals Group Pty Ltd, dated 26 October 2021;</li> <li>• Appendix I - Red Earth Engineering Pty Ltd 2021, <i>Solomon Brad TSF Detailed Design Civil Construction Technical Specification</i> - Document Number: SO21OP018A-00067-SP-CN-0001 Rev0, Prepared for Fortescue Metals Group Ltd, dated 2 August 2021; and</li> <li>• Red Earth Engineering Pty Ltd 2021, <i>Solomon Brad TSF Detailed Design Report</i> - Document Number: SO21OP018A-00067-SP-CN-0001 Rev0, Prepared for Fortescue Metals Group Ltd, dated 18 November 2021.</li> </ul>
<b>Scope of application/assessment</b>	
<p>Summary of proposed activities or changes to existing operations.</p>	<p><u>Category 5 activities (Brad Tailings Storage Facility (TSF))</u> Construction of the new valley Brad TSF (338.2 ha footprint) in three stages utilising the exhausted Brad Pit void.</p> <p><u>New Category 77 activities (Concrete Batching Plant)</u> Construction of the new PEC4 mobile Concrete Batching Plant to service the Stage 4 Pilbara Transmission Project.</p> <p><u>Category 64 landfill activities (Solomon Landfill facility)</u> Extension of the existing Class II Solomon Landfill facility.</p>

**Category number/s (activities that cause the premises to become prescribed premises)**

**Table 1: Prescribed premises categories**

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 5: Processing or beneficiation of metallic or non-metallic ore.	95,300,000 tonnes per annum.	No change.
Category 77: Concrete batching or cement products manufacturing: premises on which cement products or concrete are manufactured for use at places or premises other than those premises.	3000 tonnes per annum	
Category 64: Class II putrescible landfill site	14,000 tonnes per annum	No change.

**Legislative context and other approvals**

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Ministerial statement No: 1062 EPA Report No: 1588 MS assessed proposal to Develop and operate the Solomon Iron Ore Mine, including the Southern Borefield and Lower Fortescue Borefield, and operate the existing Hamersley Rail line.
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Reference No:
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Certificate of title <input type="checkbox"/> General lease <input type="checkbox"/> Expiry: Mining lease / tenement <input type="checkbox"/> Expiry: Other evidence <input type="checkbox"/> Expiry: "No change to lease" given as reason for not demonstrating occupancy. Occupancy evidence identified in previous application.
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Approval: N/A Expiry date: N/A If N/A explain why? The Applicant has indicated on the

		Application form that proposed activities are included within the Solomon Mine Site.
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: N/A Any clearing of vegetation for the Brad TSF and potentially for the Concrete Batching Plant will be limited to in accordance with MS 1062.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A No clearing is proposed in controlled catchments.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Licence/permit No: <ul style="list-style-type: none"> <li>• GWL175139(2) Solomon Dewatering</li> <li>• GWL177976(1) Southern Fortescue Borefield</li> <li>• GWL176913(2) Solomon Injection Supply</li> <li>• GWL177110(2) Solomon Camp Water Supply</li> </ul>
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: Pilbara Type: Proclaimed Groundwater Area and Surface Water Area Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Regional office: North West
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: Milstream Water Reserve Priority: P2 Are the proposed activities/ landuse compatible with the PDWSA (refer to <u>WQPN 25</u> )? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Relevant areas of this proposal (Karijini 2A supplementation scheme) is about 15 km outside of PDWSA.

<p>Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i>)</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p><i>Mining Act 1978</i> <i>Rights in Water and Irrigation Act 1914</i></p>
<p>Is the Premises within an Environmental Protection Policy (EPP) Area?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>N/A</p>
<p>Is the Premises subject to any EPP requirements?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>N/A</p>
<p>Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i>?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Contaminated Sites ID: 9684 Approximate spatial representation of Solomon Mine, Kings Ore Processing Facility (suspected contamination) Classification: Report not substantiated. Date of classification: 26 April 2016</p>