



Application for Licence Amendment

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

Licence Number	L8464/2010/2
Licence Holder	FMG Solomon Pty Ltd
ACN	128 959 179
File Number	DER2013/001363-2
Premises	Solomon Mine 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
Date of Report	28/09/2023
Decision	Revised licence granted

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

Table of Contents

1. Decision summary	4
2. Scope of assessment	4
2.1 Regulatory framework	4
2.2 Application summary	4
2.2.1 Additional injection bores for groundwater supplementation	4
2.2.2 Kangi wastewater treatment plant	5
2.2.3 Proposed amendments to existing licence conditions	5
2.2.4 Exclusions	6
3. Legislative context	7
3.1 Mining Act 1978	7
3.2 Part IV of the EP Act	7
3.2.1 Approval history	7
3.2.2 Section 45c amendment	7
3.3 Rights in Water and Irrigation Act 1914 (RiWI Act)	8
4. Risk assessment	8
5. Source-pathways and receptors	8
5.1.1 Emissions and controls	8
5.1.2 Receptors	10
5.2 Risk ratings	11
5.3 Detailed risk assessment for additional re-injection sites for abstracted groundwater	13
5.3.1 Overview of risk event	13
5.3.2 Characterisation of emission and potential impact	13
5.3.3 Criteria	13
5.3.4 Licence holder controls	14
5.3.5 Assessment and risk rating	14
5.3.6 Additional regulatory controls	14
6. Consultation	15
7. Decision	15
8. Conclusion	16
8.1 Summary of amendments	17
References	18
Appendix 1: Summary of consultation undertaken by the department	19
Appendix 2: Summary of the licence holder's comments on risk assessment and draft conditions	27
Appendix 3: Aboriginal heritage near the Karijini supplementation area	30

Table 1 Amendments proposed to be incorporated into the existing licence	5
Table 2: Licence holder controls	9
Table 3: Sensitive environmental receptors and distance from prescribed activity	10
Table 4 Risk assessment of potential emissions and discharges from the premises during operation.....	12
Table 5: Summary of licence amendments	17
Figure 1 Aboriginal heritage - lodged sites – 11267 and 39565.....	30
Figure 2 Aboriginal Heritage Places identified by survey (not currently lodged with DPLH).....	31

1. Decision summary

Licence L8464/2010/2 is held by FMG Solomon Pty Ltd (licence holder) for the Solomon Mine (the premises), located in Mount Sheila, WA.

This Amendment Report documents the assessment of potential risks to the environment from proposed changes to the emissions and discharges during the operation of the premises. As a result of this assessment, amended licence L8464/2010/2 has been granted.

2. Scope of assessment

2.1 Regulatory framework

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

2.2 Application summary

On 24 September 2022, the licence holder submitted an application to the department to amend licence L8464/2010/2 (the existing licence) under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The following amendments to the existing licence are being sought:

- Removal of infrastructure requirements in Table 6 that have now been constructed and determined as compliant by the department;
- Amendment to sampling frequency in Table 12 (emission point references);
- Amendments to Table 17 to now specify comparison of groundwater monitoring results against the water quality threshold values identified in *Solomon Water Quality Threshold Assessment Rev 2* (SRK 2021); and
- Amendment to Table 3 to authorise disposal of used tyres within mine pit voids.

In addition, the licence holder sought authorisation for the following changes to operations at the premises:

- Construction of four supplementation bores for the Karijini 2A Supplementation Scheme, to prevent the drawdown of the Karijini National Park water levels and remain compliant with regulatory conditions depicted in Condition 13-1(1) of MS1062 and the provisions of the approved Karijini Management Plan (SO-PL-EN-0024); and
- Replacement of the process treatment component of the Kangi WWTP.

The licence holder has not proposed any changes to authorised design or production throughput capacities on the existing licence.

2.2.1 Additional injection bores for groundwater supplementation

The licence holder currently operates an approved injection borefield named the Karijini Supplementation Scheme, comprising two injection bores near the boundary of Karijini National Park. The scheme commenced in 2021 and is intended to protect against potential impacts caused by groundwater abstraction at the Southern Fortescue Borefield. Predictive modelling indicates that without any supplementation, groundwater levels at Karijini are projected to decline over time.

The licence holder is proposing to expand the scheme by installing four additional bores (and associated pipelines and control panels). The proposed locations of the new bores are outside the current prescribed premises boundary on tenement L47/713 (see Figure 8 of the amended licence).

An expanded Mine Development Envelope (MDE) from 36,602 ha to 37,061 ha to cater for the creation of three separate groundwater supplementation areas was granted in accordance with a s45C amendment to Ministerial Statement 1062 (MS 1062) on 7 June 2023. The expanded MDE enables clearing of native vegetation to prepare the drill pad and access areas (see details in Section 3.2).

2.2.2 Kangi wastewater treatment plant

The licence holder has proposed replacement of the Kangi wastewater treatment plant (WWTP) which has reached its operational life expectancy. The WWTP will continue to operate at the approved treatment throughput of 660,000 m³ per day (including 60 m³ per day from site ablutions). The existing WWTP will be operated until upgrades have been commissioned and operations stabilised in the replacement WWTP.

The new WWTP will be located adjacent to the existing plant (refer to Figure 2 of the amended licence). Key infrastructure includes a 457 kL balance tank, 225 kL anoxic tank, 600 kL aeration/decant tank, 225 kL effluent tank and 225 kL sludge tank. A 1,000 kL emergency overflow pond will capture spills and stormwater runoff in the vicinity of the WWTP.

Treated effluent will continue to be discharged to the irrigation spray field, while sludge collected from the treatment process will be directed to the sludge tank. Liquid sludge is removed and taken off-site by a licensed carrier for disposal at an appropriately licensed waste facility or processed on-site, where the sludge is dewatered and turned into a spadable material that is disposed within the site's waste landfill facilities.

The department advised the licence holder on 7 September 2022 that the proposed replacement works are considered maintenance and do not require a works approval, given there is no change to inputs, the treatment process and treated water quality, spray field discharge operations and WWTP performance monitoring.

2.2.3 Proposed amendments to existing licence conditions

The licence holder has proposed several amendments to conditions in the existing licence. These proposed amendments are provided in Table 1.

Table 1 Amendments proposed to be incorporated into the existing licence

Existing condition	Proposed amendment	Justification
4	Amend Table 3 to include provision to dispose 'used' tyres into existing mine pit voids	Disposal of used tyres to mine pit voids will provide flexibility in disposal locations.
9	Remove design and construction requirements for: <ul style="list-style-type: none"> • Tailings storage facility (TSF) embankment lift • Tailings delivery • Decant facility • Decant line to Gee-pit • Gee-pit • Kings East Managed Aquifer Recharged 	Infrastructure has been constructed and Environmental Compliance Report submitted and endorsed by the department.

Existing condition	Proposed amendment	Justification
	<ul style="list-style-type: none"> • 17 ML raw water storage facility • 7 ML raw water storage facility • Queens turkeys nest 	
10	Delete condition	Redundant condition, given the relevant infrastructure has been constructed.
20	Amend Table 12 to specify that when six-monthly water quality sampling is undertaken samples are only to be collected when discharge is occurring	Ensure that stagnant water is not captured during sampling given it is not representative of water quality discharged to groundwater at these emission points.
30	Amend Table 17 to specify that groundwater monitoring results reported under Condition 24, Table 16, are compared against site specified trigger values in the <i>Solomon Water Quality Threshold Assessment Rev 2</i> (FMG-SO-AS-EN-0071).	In 2021 a water quality threshold assessment was undertaken on water chemistry data for each aquifer and surface water grouping within the Solomon Hub area. The assessment proposed updated water quality threshold values for water quality monitoring that distinguished between aquifers. Therefore, these revised trigger values should replace the existing, preliminary Investigative Trigger Values (ITVs) and Low Risk Trigger Values (LRTVs) set in the 2015 document <i>Life of Mine Geochemistry Programme – Site Specific Trigger Values</i> (45-SY-EN-0001).
33	Delete condition	Redundant condition, given compliance documents for the relevant infrastructure have been submitted to the department.

2.2.4 Exclusions

In the application submitted on 24 September 2022, the licence holder proposed the construction and operation of a new tailings storage facility and mobile batching plant. The Delegated Officer determined that given both require significant construction works they should be assessed and authorised via works approval and have therefore been excluded from the scope of this amendment. The applicant sought a works approval (W6802/2023/1) to authorise construction and operation of these two items which was approved on 3 July 2023.

Used tyre disposal

The licence holder also proposed to dispose used tyres to additional mine pit voids in the Valley of Queens mining area. However, preliminary review of the proposed location identified that the Valley of the Queens mining area is situated within the Priority 2 (P2) Millstream Water Reserve (West Pilbara) Public Drinking Water Source Area (PDWSA).

Used tyres are classified as ‘inert waste type 2’ under the *Landfill Waste Classification and Waste Definitions 1996* and their burial is currently permitted at the premises as a Category 64 activity (Class II putrescible landfill). According to the *Water Quality Protection Note 25: Land use compatibility tables for public drinking water source areas* (DWER 2021), any waste management disposal facility including the disposal of class I/II landfill and used tyres are incompatible within a P2 area. Further, *WQPN 24: Landfilling with inert materials* (September

2015) advises that establishment of inert landfills in P2 areas are incompatible with the department's water source protection policy and are to be excluded from these areas.

Following issue of this advice to the licence holder, this aspect of the amendment application has subsequently been withdrawn by the licence holder and will therefore be excluded from the scope of this amendment.

3. Legislative context

3.1 Mining Act 1978

The proposed expansion to the Karijini 2A Supplementation Scheme is consistent with the approved Solomon Mine Consolidated (Version 1) Mining Proposal (REG ID:93518).

3.2 Part IV of the EP Act

3.2.1 Approval history

The development and operation of Solomon Iron Ore Mine, including the Southern Borefield and Lower Fortescue Borefield, was assessed by the Environmental Protection Authority (EPA) in the EPA's Report and Recommendations 1386 and approved under Ministerial Statement 862, which was issued on 20 April 2011.

In 2014, a proposal for an expansion to allow site production to continue for 30 years from 2016 was assessed by the EPA, which included an increase in abstraction from the existing Southern Borefield. The updated proposal was approved under MS 1062 on 03 October 2017. Key environmental factors assessed for the updated proposal included Flora and Vegetation, Terrestrial Fauna, Subterranean Fauna, Hydrological Processes, Inland Waters Environmental Quality, Rehabilitation and Decommissioning (integrating factor) and Offsets (integrating factor).

The licence holder developed a Karijini Management Plan (FMG 2019) to meet the requirements of Conditions 13-1 and 13-2 of MS 1062. The purpose of the plan is to ensure no drawdown of groundwater occurs at the boundary of, or within, Karijini National Park. Standing water level threshold triggers were developed and set in the Plan to monitor changes in groundwater level and potential mounding impacts to vegetation from the supplementation scheme. However, the Delegated Officer notes there is no specific requirement under Part IV to monitor ambient groundwater quality for the assessment of potential impacts from the supplementation scheme on changes to groundwater chemistry at the premises.

3.2.2 Section 45c amendment

The licence holder applied under s45C of the EP Act (initially on 22 January 2019, with revised submissions made on 3 September 2020, 18 December 2020, 12 October 2021, 20 September 2022 and 7 December 2022) for the following operational changes relevant to this assessment:

- Expand the MDE by 459 ha (from 36,602 ha to 37,061 ha) to cater for the creation of three separate groundwater supplementation areas (including the Karijini supplementation area); and
- Allow abstraction of water supply from the Lower Fortescue Borefield via the Railway Development Envelope.

The s45C application was approved on 7 June 2023, subject to no additional clearing within Yindjibarndi Native Title determination area. The expanded MDE encompasses the water infrastructure of the expanded Karijini 2A Supplementation Scheme proposed in this application. This will support the objectives of MS 1062, which relate to maintaining water levels for the Karijini National Park (condition 13).

During assessment of the proposed changes the EPA Services identified that additional clearing requested for the expanded Karijini 2A Supplementation Scheme would only occur within the Banjima Native Title Aboriginal Corporation (BNTAC) and Wintawari Guruma Aboriginal Corporation (WGAC) Determination Areas. Further, EPA Services and the Aboriginal Heritage Conservation (AHC) directorate at the Department of Planning, Lands and Heritage (DPLH) agreed that surveys and consultation appeared appropriate for interactions between BNTAC and WGAC and the licence holder.

Three Aboriginal Cultural Heritage Places (Figure 1 and Figure 2, Appendix 3) have been identified near the Karijini supplementation area – lodged sites ID 11267 (artefacts / scatter) and 39565 (Eastern Rockholes) and another site (unnamed) identified during surveys within the area. DPLH was consulted during the Part IV assessment and advised “*The proposed Karijini envelope does not appear to intersect with any registered sites or Aboriginal Heritage Places. However, I note additional Aboriginal Archaeological Places are referenced in this area also that do not appear to be lodged with DPLH. Information regarding such Places should be submitted to the Register of Aboriginal sites, as per the requirements of the AHA, for review and inclusion on the Register of Places and Objects*”.

The EPA considered that the proposed amendments are unlikely to have significant detrimental effect in addition to, or different from, the effect of the original proposal and could be managed in accordance with the EPA’s objective for the Social Surroundings key environmental factor.

The department notes that the licence 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 licence amendment under Part V of the EP Act. The granting of the licence amendment does not remove FMG’s obligations to comply with the AH Act and ACH Act.

3.3 Rights in Water and Irrigation Act 1914 (RiWI Act)

The licence holder is authorised under section 5C of the RiWI Act groundwater licences GWL177976(3) and GWL177974(3) to take a combined volume of 8.1GLpa of groundwater from the Southern Fortescue Borefield. The licence holder is to ensure that activities under these groundwater licences align with other regulatory approvals, including L8464/2010/2.

4. 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.

5. Source-pathways and receptors

5.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this Amendment Report are detailed in Table 2 below.

Table 2 also details the proposed control measures the licence holder has proposed to assist in controlling these emissions, where necessary.

Table 2: Licence holder controls

Emission	Sources	Potential pathways	Proposed controls
Groundwater (fresh to marginal) injected into four new Karijini Supplementation Scheme bores	Groundwater abstracted from the Southern Fortescue Borefield	Direct discharge to surficial or confined aquifer via infiltration, lateral and vertical migration in groundwater	<ul style="list-style-type: none"> • Continuous monitoring of the volume of water discharged through each injection bore of the Karijini supplementation system • Six-monthly monitoring of discharge water quality within delivery pipeline, including analysis of major ions physical parameters and metals • Upper and lower water table level triggers for corrective action (set under Part IV / MS1062) • Trigger response actions set in Karijini Management Plan (FMG 2019) • Monthly monitoring of standing water levels in four existing bores and two proposed bores with groundwater loggers. Bores are located adjacent and down-hydraulic gradient to the Karijini supplementation bores
Raw and treated wastewater	Operation of the replacement Kangi WWTP	Direct discharge to land and runoff via leaks and spills	<ul style="list-style-type: none"> • WWTP compound is built on an earthen bund designed to contain any potential spills and directed to the spill containment pond • Stormwater diverted away from the WWTP via diversion drains with a minimum 0.5 m freeboard • High level audio-visual warning alarms to detect a malfunction in the pumps in the surge control and effluent discharge tanks • Overflow piping will be installed on the balance tank, anoxic tank, aeration/decant tank and effluent tank, plumbed to a below ground emergency overflow lagoon • WWTP tank high level alarm will be activated before, during or following overflow into the containment lagoon occurs, with additional audible alarms, not limited to the following, will be fitted to the WWTP in the event of; <ul style="list-style-type: none"> ○ Tank excessively high level; ○ Tank excessively low level; ○ Motor overload; ○ Effluent pump low flow. ○ An indicating light on the control panel is illuminated for the relevant fault; ○ The HMI screen advises which alarm is present; ○ A common flashing strobe and audible alarm unit is activated. • Back-up float type switches are installed in critical tanks as additional monitoring for the detection of tank excessive levels.

5.1.2 Receptors

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

Table 3 below provides a summary of potential 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)).

Table 3: Sensitive environmental receptors and distance from prescribed activity

Environmental receptors	Distance from prescribed activity
Conservation areas – Karijini National Park	Adjacent to the western boundary of Karijini National Park.
Threatened/Priority flora	Seven priority flora species have been recorded within the premises, being: <ul style="list-style-type: none"> • <i>Gompholobium karijini</i> (Priority 2); • <i>Acacia effusa</i> (Priority 3); • <i>Acacia daweara</i> (Priority 3); • <i>Indigofera gilesii subsp. gilesii</i> (Priority 2); • <i>Eremophila magnifica subsp. magnifica</i> (Priority 4); • <i>Goodenia nuda</i> (Priority 4); and • <i>Lepidium catapycnon</i> (Priority 4).
Priority/Threatened Ecological Communities	Multiple occurrences of Themeda grasslands on cracking clays (Vulnerable Threatened Ecological Community) located adjacent to the southern premises boundary. Multiple occurrences of Brockman Iron cracking clay communities (Priority 1 Ecological Community) located adjacent to the southern premises boundary.
<i>Country Areas Water Supply Act 1947</i> – Public Drinking Water Source Area (PDWSA)	The Milstream Water Reserve Priority 2 PDWSA is about 16 km west of the Karijini 2A Supplementation Scheme injection borefield. Receptor screened out due to distance.
<i>Rights in Water and Irrigation Act 1914</i> – Groundwater Areas	The premises is within the Pilbara Groundwater Area. The water table varies from about 5 to 30 m below ground level.
<i>Rights in Water and Irrigation Act 1914</i> – Surface Water Areas	The premises is within the Pilbara Surface Water Area.
Surface water bodies	Fortescue River South is located 2 km south of the Karijini 2A Supplementation Scheme borefield. A tributary of the Fortescue River is about 1.2 km east of the borefield. Hamersley Gorge, which has high ecological, cultural, and recreational value, is about 4 km east from the Supplementation Scheme borefield. Three streams traverse operational areas of the Solomon mine: Zalamea (southeast flow), Kangeenarina (Central Flow) and Queens (West Flow). The eastern boundary of the Solomon operation is formed by Weelumurra Creek.

<p>Aboriginal Sites and Heritage Places (three sites, two lodged, one identified by survey)</p> <p>Figure 1 and Figure 2 of Appendix 3</p>	<p>Refer to section 3.2.2 for further detail.</p> <p>Receptor screened out as managed under Aboriginal Heritage legislation.</p>
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5.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and considers potential source-pathway and receptor linkages as identified in Section 5. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the licence holder has proposed mitigation measures/controls (as detailed in Section 5), these have been considered when determining the final risk rating. Where the Delegated Officer considers the licence holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the licence holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 4.

The amended licence L8464/2010/2 that accompanies this Amendment Report authorises emissions associated with the operation of the proposed Category 6 and 54 activities. The conditions in the amended licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 4 Risk assessment of potential emissions and discharges from the premises during operation

Risk Event					Risk rating ¹ C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions ² of Licence	Justification for regulatory controls
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Licence holder controls				
Category 6 – dewatering operations								
Operation of an increased number of Karijini 2A Supplementation Scheme injection sites	Groundwater (fresh to marginal) abstracted from the Southern Fortescue Borefield	<p>Direct discharge to surficial or confined aquifer via injection into four new Karijini Supplementation Scheme bores</p> <p>This may lead to changes to groundwater chemistry, causing impacts to local vegetation.</p> <p>Regional impacts may also occur to biodiversity and water quality of nearby environmentally sensitive surface water bodies</p>	<p>Native vegetation, including Threatened/Priority flora within the premises boundary and Karijini National Park</p> <p>RIWI Act Groundwater areas</p> <p>Surface waters about 1.5 km east of the injection sites</p>	Refer to Section 5	<p>C = Moderate</p> <p>L = Unlikely</p> <p>Medium Risk</p>	No	<p>Condition 12 - Amended description of source of dewater to 'Southern Fortescue Borefield' for the Karijini Supplementation Injection Bores</p> <p><u>Condition 23 – Added six-monthly groundwater quality monitoring for the Karijini Supplementation Scheme. Analytical suite includes major ions and metals</u></p> <p>Condition 29 – Ambient groundwater monitoring results now compared to site-specific trigger values detailed in the <i>Solomon Water Quality Threshold Assessment Rev 2.</i></p> <p><u>Condition 29 – Annual reporting of groundwater quality trend analysis to include statistical test to identify statistically significant trends</u></p>	Refer to Section 5.3.6
Category 54 – sewage facility operations								
Operation of the replacement Kangi WWTP	Nutrient-rich raw and treated wastewater	Direct discharge to land and runoff via leaks and spills, causing contamination of local soil and groundwater and adverse impacts to nearby vegetation	<p>Soil</p> <p>Native vegetation, including Threatened/Priority flora within the premises boundary and Karijini National Park</p> <p>RIWI Act Groundwater areas</p>	Refer to Section 5	<p>C = Minor</p> <p>L = Unlikely</p> <p>Medium Risk</p>	Yes	Condition 3 – Infrastructure operational requirements added for Kangi WWTP	The Delegated Officer considers the licence holder proposed infrastructure and operational controls, including bunding around the WWTP, high-level arm system and emergency overflow pond are sufficient to reduce the risk of impact to an acceptable level. These controls have been specified in the amended licence.

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

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

5.3 Detailed risk assessment for additional re-injection sites for abstracted groundwater

5.3.1 Overview of risk event

The injection of abstracted groundwater at four additional supplementation bores, causing the water table to rise and impact baseline groundwater quality, which may adversely impact the health of proximate native vegetation, environmentally sensitive water bodies.

5.3.2 Characterisation of emission and potential impact

Four new re-injection bores will be installed at the Karijini 2A Supplementation Scheme area, expanding the extent to which injection is occurring and increasing the rate of discharge up to 120 L/s (each bore will operate at an injection rate of up to 20 L/s). There is no proposed increase in the annual volume to be discharged via the supplementation scheme, however the Delegated Officer notes the long-term nature of the scheme, which is likely to continue in operation until at least 2040.

Significant changes in groundwater quality can occur in areas where pumped groundwater is reinjected back into an aquifer through a supplementation scheme. This is particularly the case when groundwater in the reinjection area has a very different salinity and/or chemical composition to the recharge water. Under these conditions, the mixing of local groundwater with the reinjection water can alter the chemical composition of water in a mixing zone within the aquifer. If the reinjection water has a much lower salinity than that of the native groundwater, some minerals can dissolve in the aquifer matrix, which can further change the chemical composition of water in the mixing zone in the aquifer. Elevated concentrations of sulfate in groundwater or surface discharges can also cause the death of sensitive aquatic plants in surface water bodies through the effects of sulfide toxicity (Pastor *et al.*, 2017).

The long-term operation of the supplementation scheme can also cause groundwater mounding, which can lower the oxidation-reduction potential in the reinjection zone. This in turn can lead to the reductive dissolution of iron oxide minerals in the aquifer matrix (depending on the availability of organic carbon) and can cause the release of adsorbed arsenic from these minerals into groundwater. Groundwater mounding also creates a pathway for groundwater with impacted quality to be more readily adsorbed by the roots of native vegetation.

The supplementation scheme is located within the designated Pilbara Groundwater Area and Pilbara Surface Water Area, with the nearest identifiable surface water feature being a tributary of the Fortescue River about 1.5 km east of the borefield. Hamersley Gorge, which has high ecological, cultural, and recreational value, is about 4 km east from the Supplementation Scheme borefield.

The local water table varies from about 5 to 30 m below ground level. Baseline groundwater conditions are not well characterised beyond the eastern premises boundary (i.e. within Karijini National Park) due to the absence of groundwater and surface water monitoring infrastructure, including water table levels, groundwater quality and flow direction. Therefore, it is noted that uncertainties exist within the groundwater model used in the Karijini Management Plan (FMG 2019) to predict groundwater drawdown and associated impacts within Karijini National Park.

5.3.3 Criteria

Groundwater mounding and changes to water table height are managed by a monitoring program with triggers developed under Part IV of the EP Act (see Section 3.2). However, no monitoring of potential impacts to groundwater quality is currently undertaken with respect to the Karijini 2A Supplementation Scheme at the premises. Therefore, the focus of this risk

assessment is to assess potential impacts to groundwater quality, including changes to physical and chemical parameters. Injection water quality and baseline data can be assessed against the existing site-specific trigger values in the *Solomon Water Quality Threshold Assessment Rev 2* (SRK Consulting 2021), which derives trigger values from available baseline water quality data and the 95% species limit of protection for aquatic ecosystems defined in the Australia and New Zealand Environment and Conservation Council (ANZECC) *Guidelines for Fresh and Marine Water Quality* (ANZECC 2000).

5.3.4 Licence holder controls

Existing and proposed controls are listed in Table 2 above. In reviewing these controls, the Delegated Officer notes that the licence holder currently monitors standing water levels but not groundwater quality in the vicinity of the Karijini Supplementation Scheme.

5.3.5 Assessment and risk rating

Baseline water quality data indicates the surficial aquifer to which pumped groundwater is re-injected in the vicinity of the Karijini Supplementation Scheme is fresh to marginal (i.e. less than 1,000 mg/L TDS). The quality of water abstracted from the Southern Fortescue Borefield also ranges from fresh to marginal, with TDS generally less than 1,000 mg/L.

In 2021, sulphate concentrations were 74-78 mg/L in the delivery pipeline to the Karijini Supplementation bores. This is within the range of sulphate concentrations measured in alluvial aquifer baseline data collected before the scheme commenced in 2018, which identified a median ambient sulphate concentration of 42 mg/L and maximum concentration of 280 mg/L. The premises trigger value for sulphate is 1,000 mg/L, which is based on the ANZECC guideline value to protect livestock drinking water.

The data above indicates that the key parameters of concern (namely salinity and sulphates) in the re-injected groundwater are comparable in concentration to the target aquifer.

Consequence

The Delegated Officer considers that changes to water quality from the supplementation scheme could have mid-level on-site impacts to native vegetation in the vicinity of the scheme. Therefore, the Delegated Officer has determined that the consequence of the expanded supplementation scheme impacting native vegetation would be **Moderate**.

Likelihood

In consideration of site monitoring data and existing controls, particularly trigger levels set under Part IV to prevent mounding, the Delegated Officer considers the risk event will probably not occur in most circumstances. Therefore, the Delegated Officer has determined the likelihood of the expanded supplementation scheme impacting native vegetation through changes to groundwater quality and mounding to be **Unlikely**. The Delegated Officer considers that implementation of existing controls will also prevent impacts to the nearest surface water ecosystems, particularly those within Karijini National Park.

Overall risk rating

The Delegated Officer has applied the consequence and likelihood ratings described above to the Risk Criteria table in the *Guidance Statement: Risk Assessments* (DWER 2020a) and determined that the overall rating for the risk of the expanded supplementation scheme impacting native vegetation to be **Medium**. This risk event rating is acceptable, subject to the regulatory controls specified in Section 5.3.6.

5.3.6 Additional regulatory controls

The assessment identified that the overall risk of impact is medium. Existing monitoring of groundwater levels in the vicinity of the scheme is a key control to prevent harm to sensitive

native vegetation from changes to groundwater quality. This control also acts to mitigate the potential release of adsorbed arsenic from these minerals into groundwater. However, given the long-term operation of the scheme, which may also be subject to further expansion or re-injection increases, and uncertainty around the hydrogeological setting east of the scheme toward surface receptors within Karijini National Park, the Delegated Officer has specified that groundwater quality is to be monitored in at least one location in the vicinity of the Karijini Supplementation Scheme. This monitoring will inform characterisation of the local hydrogeological setting and aquifer chemistry and any potential impacts to groundwater.

The chemical constituents of principal concern in groundwater are salinity, sulfate, bicarbonate, arsenic and some metals. Consequently, the suite of analytes is to include the following:

- Standing water level
- The full suite of major cations and anions, and total dissolved solids;
- pH and electrical conductivity
- Total phosphorus
- The metalloids arsenic and selenium; and
- The suite of metals specified in existing ambient groundwater monitoring at the premises (Table 16 of the existing licence).

Sampling is to occur at the proposed groundwater monitoring bore AS-MB038S on a minimum six-monthly basis, with parameters reported and compared to the site-specific trigger values in the *Solomon Water Quality Threshold Assessment Rev 2* (SRK Consulting 2021). This bore has been identified as having sufficient distance from the injection site, between the scheme and surface water bodies to the east within Karijini National Park. In addition, the licence holder is to monitor for trends in contaminant concentrations at this bore.

The emission source and description for the Karijini Supplementation bores was also amended to clarify that injected water may only be sourced from the Southern Fortescue Borefield, with reference to mine pit dewater removed.

6. Consultation

A summary of the consultation undertaken by the department is provided in Appendix 1 and a summary of the licence holder's comments on the risk assessment and draft conditions is provided in Appendix 2.

7. Decision

The Delegated Officer has reviewed the applicant proposed amendments and considers that operation of the expanded Karijini Supplementation Scheme and replacement Kangi WWTP do not pose an unacceptable risk of impacts to the environment, subject to regulatory controls specified in the amended licence. This determination on the supplementation scheme is based on the following:

- Re-injection water quality is comparable to the receiving surficial aquifer;
- Groundwater mounding caused by the scheme poses the greatest risk of harm to native vegetation in creating a pathway for impact and is currently mitigated through groundwater monitoring specified under Part IV of the EP Act; and
- A review of all controls currently in place under Part IV of the EP Act.

The Delegated Officer has imposed the following additional regulatory controls on the revised licence to minimise the risk of impacts to environmental receptors from the re-injection scheme and WWTP emissions:

- Six-monthly monitoring of groundwater quality in the vicinity of the Karijini Supplementation Scheme; and

- Operational controls, including an earthen bund around the WWTP and high-level alarms on tanks.

The Delegated Officer is satisfied the above controls, once implemented, will lower the overall risk profile of the premises. In addition, the proposed changes to licence conditions outlined in Table 1 are considered acceptable with the licence revised accordingly and amendments to Conditions 4, 9, 10, 23, 29 and 32 summarised in Table 5. The one exception is the request to delete Condition 33, which is still required for the submission of a compliance reports for the Weelumurra Creek borefield bores.

The prescribed premises boundary has also been amended to incorporate the four additional reinjection bores of the expanded Karijini Supplementation Scheme area.

Revised water quality threshold values

The departments contaminated sites branch completed a technical review of the proposed revised water quality threshold values presented in the *Solomon Water Quality Threshold Assessment Rev 2* (SRK Consulting 2021). The review identified that although the groundwater quality threshold values were developed using a statistical methodology that is outlined in the Australian and New Zealand water quality guidelines, this approach has some limitations, including:

- The methodology assumes that the sample population is normally distributed which is not necessarily the case (water quality data more commonly conform to a log-normal distribution);
- The use of standard deviations from the mean is not necessarily the best indicator of the upper limit of background levels of an analyte (many overseas jurisdictions use upper tolerance limits (UTLs) instead, which can also be calculated using non-parametric methods);
- A statistically derived upper concentration threshold based on a regional dataset may not be applicable to the local hydrogeochemical conditions for groundwater near a sensitive water body; and
- They do not apply to parameters where decreases are of environmental concern (such as bicarbonate-ion concentrations and pH).

Due to these limitations, the revised water quality values must not be the sole indicators of increased risks of environmental harm. Instead, they should be coupled with an indicator of progressive changes in groundwater quality, such as a statistical analysis of contaminant concentration trends. Therefore, the Delegated Officer has specified that annual reporting must also provide an indicator of water quality trends using non-parametric Mann-Kendall tests or a comparable statistical test. If these tests indicate that there has been a statistically significant increase (or, in the case of pH and bicarbonate concentrations, a decrease) in one or more chemical parameters over at least four sampling events (two successive annual periods), additional management measures are to be triggered. These measures include:

- Resampling of the monitoring bore to confirm the trend; and
- Undertaking additional research using mesocosm studies or specific toxicity testing measures to determine more relevant local water quality criteria to protect specific receptors.

8. Conclusion

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

8.1 Summary of amendments

Table 5 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the amended licence as part of the amendment process.

Table 5: Summary of licence amendments

Existing condition	Condition summary	Revised licence condition
3	Containment infrastructure requirements	Amended to include Kangi WWTP operational requirements.
4	Management of waste	Amended to clearly state that 'used' tyres are permitted for disposal as inert waste type 2 to the specified locations. Removal of contingency discharge pipeline and emission point to Kangeenarina Creek, which has been decommissioned.
9	Infrastructure construction requirements	Removed Category 5 and 6 infrastructure that has been built and approved by the department.
12	Point source emissions to groundwater	Added four Karijini Supplementation Scheme injection bores at authorised emission points. Amended description of source water to 'Southern Fortescue Borefield'
23	Ambient groundwater monitoring	Replacement of TSF1 groundwater monitoring bore GQ3 (TSF1-MB-006D) with TSF1-MB-006DR. Addition of proposed bore AS-MB038S to list of bores to be sampled for groundwater quality
29	Annual Environmental Report	Amended to include reporting of groundwater quality in bore AS-MB038S and statistical test to determine statistically significant changes in parameter concentrations.
32	Notification requirements	Removed reference to Category 5 infrastructure that has been built.
Schedule 1	Maps	Figure 1 updated with amended prescribed premises boundary Figure 2 replaced with map of four new Karijini Supplementation Scheme injection bores yet to be constructed Figures 4, 10 and 15 replaced with updated images Figure 8 added to display all Karijini Supplementation Scheme injection bores and groundwater monitoring bores.
Schedule 2	Premises boundary coordinates	Redundant Notification form removed. Premises boundary coordinates added, given premises boundary does not align with all Mining Tenement boundaries.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. Department of Water and Environmental Regulation (DWER) 2021, *WQPN 25 - Land use compatibility tables for public drinking water source areas*, published 31 August 2021.
5. FMG 2019, *Karijini Management Plan Revision 3* (SO-PL-EN-0024), prepared for the Solomon Hub mining operations.
6. SRK Consulting 2021, *Solomon Water Quality Threshold Assessment, Rev 2*, prepared for the Solomon Hub mining operations (SO-PL-EN-0024).
7. Pastor, J, Dewey, B, Johnson, NW, Swain, EB, Monson, P, Peters, EB and Myrbo, A, 2017, *Effects of sulfate and sulfide on the life cycle of Zizania palustris in hydroponic and mesocosm experiments*. *Ecological Applications*, **27(1)**, 321-336. The paper is available from web site <https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1002/eap.1452>.

Appendix 1: Summary of consultation undertaken by the department

Condition	Summary of Licence Holder's comment	Department's response
Local Government Authority (Shire of Ashburton) advised of proposal (6 December 2022)	No comments received.	N/A.
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal (6 December 2022)	No comments received.	N/A.
Department of Planning, Lands and Heritage (DPLH) advised of proposal (16 December 2022)	No comments received.	N/A.
Yindjibarndi Ngurra Aboriginal Corporation (YNAC) advised of proposal (6 December 2022)	Comments received 23 December 2022 and 7 July 2023: Yindjibarndi Ngurra Aboriginal Corporation (YNAC), Yindjibarndi Aboriginal Corporation (YAC) and the Yindjibarndi Nation have not provided consent for the mining operations being undertaken at Solomon Mine, nor for future expansion.	The department has noted these comments and has liaised with the State Solicitor's Officer specifically around Future Acts under the <i>Native Title Act 1993</i> (NT Act) in relation to this assessment. Based on the information provided, the Delegated Officer has determined to proceed with granting this licence amendment. Assessments related to the taking of water under the RIWI Act are still under assessment with the department.
	We note that the taking of water is a Future Act and the YNAC is afforded procedural rights in the <i>Native Title Act 1993</i> . The YNAC has not received any notification in relation	

Licence: L8464/2010/2

Condition	Summary of Licence Holder's comment	Department's response
	<p>to the proposed amendment. It is incumbent on the DWER to ensure that the relevant procedures have or will be followed in considering whether to grant or amend a licence.</p> <p>The proponent provides no consideration as to Native Title in their submission. We encourage the DWER to seek assurances via the State Solicitor that the requirements of the <i>Native Title Act 1993</i> have or will be complied with in relation to the any decision regarding this amended water licence application.</p>	
	<p>Concerns pertaining to Yindjibarndi people living on the primary land use area, deemed 'exclusive' native title, located immediately north of the Solomon Mine, including impacts from mine operation and lack of consultation regarding the installation of groundwater monitoring infrastructure in this area.</p>	<p>The Delegated Officer notes that the cited groundwater monitoring infrastructure is not associated with any conditions specified on the Part V licence and is therefore not within the scope of this assessment.</p> <p>In accordance with current procedures, the Department referred the application and supporting documentation to all relevant stakeholders. All stakeholder comments have been considered within DWER's decision report. A summary of the stakeholders which were contacted is given in this Table.</p>
	<p>Inadequate information provided to properly inform Yindjibarndi people to comment on current licence amendment application</p>	<p>Although the <i>Aboriginal Cultural Heritage Act 2021</i> (ACH Act) is in the process of being repealed, the Licence Holder is required to meet its obligations under the <i>Aboriginal Heritage Act 1972</i> (AH Act). This is a separate regulatory process to that of applying for a licence amendment under Part V of the EP Act. The granting of the licence amendment does not remove the obligation which FMG has under the Aboriginal Heritage laws.</p> <p>The Department acknowledges that it has opportunities to improve its engagement with traditional owners. The Department will propose extensive changes to the way it consults with Traditional owners and is embedding actions within its Reform Roadmap. The Department's commitment is also more broadly demonstrated through its implementation of a Reconciliation Action Plan to build partnerships and establish systems to include Aboriginal knowledge in decision-making for looking after the state's water resources and the environment.</p>

Condition	Summary of Licence Holder's comment	Department's response
	<p>Any approval granted by the Department which may facilitate harm to Aboriginal Cultural Heritage, and which is knowingly informed by inappropriate and unendorsed surveys, effectively pre-empts the separate assessment and approvals processes required under the ACH Act. Further, YAC considers that such an approval may establish a position by the State Government on harm to Aboriginal Cultural Heritage, which potentially undermines independent consideration by the Aboriginal Cultural Heritage Council and due process under the Act.</p> <p>YAC therefore requests that, if the DWER cannot in good faith reject the proponent's application for an amendment to license L8464/2010/2, then a decision on the application be deferred pursuant to section 57(4a) of the EP Act, until such time as the separate assessment and approvals process under the ACH Act can be undertaken.</p>	<p>As mentioned above, the licence holder is required to meet its obligations under Aboriginal Heritage laws and the granting of this licence amendment does not remove FMG's obligations under it.</p> <p>Regarding the suitability of Aboriginal Cultural Heritage surveys at the premises, the Delegated Officer notes that the works proposed in this amendment application occur solely within Banjima Native Title Aboriginal Corporation (BNTAC) and Wintawari Guruma Aboriginal Corporation (WGAC) Determination Areas.</p> <p>During assessment of the proposal under section 45C of the EP Act for MS 1062, EPA Services and DPLH agreed that surveys and consultation appeared appropriate for interactions between the BNTAC and WGAC. Further, regarding all proposed works assessed under s45C, it was agreed that the proposal would be refined to utilise existing and approved disturbance areas for works located within the Yindjibarndi Native Title Determination Area.</p>
	<p>Yindjibarndi people have limited to no access into the Solomon Hub area and no Aboriginal Cultural Heritage Management plan exists with the Yindjibarndi People for impacts associated with the mine.</p>	<p>Access to the mine is typically managed through liaison with the licence holder and captured in land use agreements. However, the Delegated Officer acknowledges that no such agreement is in place. The Department acknowledges your concerns around land access however this does not fall within the assessment scope of this application.</p>
	<p>There is insufficient baseline data obtained in relation to ongoing water monitoring regime for mining activities. For example, there appear to be extensive gaps in the baseline water monitoring data provided within table 3 (page 7) of the <i>Solomon Water Quality Threshold Assessment (Rev 2)</i> provided in support of the application. This includes a reliance on 'possible baseline' data in some cases, and an absence of any data since prior to 2010 in other cases. It is unclear how appropriate water quality and quantity thresholds can be established without a properly completed water monitoring regime.</p>	<p>The adequacy of baseline data was assessed during the Part IV approval process prior to the granting of MS 862 and MS 1062. The risk assessment considered baseline data gaps in relation to the Karijini supplementation area and off-site groundwater systems to the east within Karijini National Park. Additional groundwater quality monitoring was specified to ensure the risk is reduced to an acceptable level to prevent impacts to receptors.</p> <p>The department's Principal Hydrogeologist completed a technical review of the proposed revised water quality threshold values presented in the <i>Solomon Water Quality Threshold Assessment Rev 2</i>. The review identified some limitations in the methodology used</p>

Condition	Summary of Licence Holder's comment	Department's response
		<p>and therefore the revised water quality values will not be considered the sole indicators of increased risks of environmental harm.</p> <p>The Delegated Officer has specified that annual reporting must also provide an indicator of water quality trends using non-parametric Mann-Kendall (or similar) tests. If a rising trend is identified for a contaminant concentration in groundwater, the licence holder must investigate the cause and commence appropriate corrective action. Failing that the department has powers under the EP Act to ensure necessary response is taken to rectify the root cause and prevent harm to the environment.</p>
	<p>Supporting documentation lacks detail regarding the design and capacity of the proposed replacement WWTP being assessed under the current licence amendment application.</p> <p>Clarification on the upper occupancy limit at the Kangi Camp, which is afforded by the WWTP. If the WWTP provides an increase to the upper occupancy limit, then information should be provided on how an excess of 2,200 persons at the site may alter environmental emissions and what additional impact this will have on environmental values inclusive of water quality and treated wastewater management.</p>	<p>The department requested further information from the licence holder on this activity, which is documented in section 2.2.2 of this report. The replacement of the Kangi WWTP is considered to comprise of maintenance activities given there are no changes to throughput, no changes to emissions and no change to disposal of waste generated during the treatment process. The risk profile for these activities has not been increased by these changes. Operational controls have been added to the amended licence to address potential spills and leaks including maintenance of bunding around the WWTP, installation of tank high-level alarms and directing overflow to the emergency pond.</p>
	<p>Do not support the disposal of any waste material (including tyres), including the additional disposal locations being assessed under the current licence amendment application.</p>	<p>The disposal of tyres at the premises is an existing authorised activity under prescribed premises Category 64, following historical assessment of the risks associated with this activity. The new disposal location proposed in this amendment application was identified by the department as occurring within a Public Drinking Water Source Area (PDWSA) and is therefore an incompatible land use within the PDWSA. The licence holder removed this activity from the scope of the amendment application therefore nothing additional in relation to these activities has been authorised.</p>
	<p>It is unclear how the DWER intends to conduct an assessment of indirect and cumulative impacts on subterranean fauna, groundwater systems, groundwater</p>	<p>Under Part V of the Act, the department has undertaken an assessment of the licence amendment consistent with its published Regulatory Framework, <i>Guideline: Risk Assessments (2020)</i> which provides for consideration of the risk of impacts from emissions and</p>

Licence: L8464/2010/2

Condition	Summary of Licence Holder's comment	Department's response
	<p>dependant ecosystems (GDE) and surface water flows across the broader Pilbara region (including the Fortescue River floodplain), when the proponent has not provided such information.</p> <p>Lack of information in application on how the proposed groundwater extraction and reinjection contributes to cumulative ground and surface water impacts across the Pilbara region, based on robust groundwater monitoring data. For example, it is unclear how the proposed amendment interacts in a cumulative context with existing licenses, such as L8621/2011/1, licensed with Roy Hill Iron Ore Pty Ltd.</p> <p>Lack of information in application on how an increase to the groundwater extraction and re-injection program impacts surface water flows to downstream environmental receptors, including the Millstream Chichester National Park and Millstream Water Resource Protection Area.</p>	<p>discharges to the environment and human health from prescribed activities under Schedule 1 of the <i>Environmental Protection Regulations</i>.</p> <p>The risk assessment has considered direct and cumulative impacts to surface and groundwater systems, including GDE, within areas considered to potentially be impacted by the activities proposed in this licence amendment application, including potential cumulative impacts. Controls have been specified to monitor potential impacts to groundwater quality from the additional supplementation bores, while changes to groundwater levels are managed under MS 1062.</p> <p>Potential impacts to subterranean fauna were assessed by the EPA under the Part IV of the EP Act and identified subterranean fauna as a key environmental factor and set conditions accordingly, including the requirement to develop a Subterranean Fauna Management Plan detailing further surveys and management actions.</p> <p>Given their distance from proposed activities, Millstream Chichester National Park (~60 km north of the premises) and Millstream Water Resource Protection Area (17.5km northwest) were not identified as relevant receptors to potential emissions from the proposed activities under this licence amendment application.</p>
	<p>How an increase to the groundwater extraction and re-injection program affects the outcomes of the Karijini Management Plan. Further information on the extent and outcomes of consultation by the DWER and proponent with parties affected by the Karijini Management Plan, including the Department of Biodiversity, Conservation and Attractions, should be provided.</p>	<p>There is no proposed change to the groundwater abstraction volumes from the Southern Fortescue Borefield or re-injection rates in this licence amendment application. The proposed changes relate to the installation of four new re-injection points to provide additional supplementation of groundwater levels impacted by abstraction within the Southern Fortescue borefield, supporting the objectives of the Karijini Management Plan.</p> <p>However, the department is currently assessing two separate groundwater licence amendment applications submitted by the licence holder for increased groundwater abstraction under the provisions of the <i>Rights in Water and Irrigation Act 1914</i>, to increase take from the Stockyards Borefield GWL174095 from 1.3GLpa to 3GLpa, and increase take from the Dewatering Borefield groundwater licence GWL175139 from 18GLpa to 25GLpa.</p>

Licence: L8464/2010/2

Condition	Summary of Licence Holder's comment	Department's response
		<p>These are separate assessment processes for which the Department will contact YNAC in due course by formal correspondence.</p>
	<p>How an increase to the groundwater extraction and re-injection program impacts groundwater sensitive vegetation, based on robust monitoring data incorporating leaf water potential data.</p>	<p>As outlined above, there are no changes proposed to groundwater abstraction of re-injection rates under this application. Internal advice from Environmental Protection Authority Services (EPAS) was sought in relation to this application. EPAS indicated potential impacts to vegetation from the re-injection scheme are primarily managed under MS1062 which specifies groundwater level triggers to protect against mounding and therefore preventing a pathway for groundwater with impacted quality to be more readily adsorbed by the roots of native vegetation.</p> <p>In addition, the Delegated Officer has determined that ongoing monitoring is a key control that is to be specified in the Part V licence to monitor potential impacts to groundwater quality from the additional supplementation bores proposed in this amendment application. Ongoing monitoring of groundwater levels and quality will be used to identify potential risk to groundwater dependant vegetation and trigger any necessary management action to prevent impact.</p>
	<p>Whether the Yindjibarndi people's ability and right to utilise the Kangeenarina Creek for safe drinking water will be eroded by increases to the groundwater extraction and re-injection program.</p> <p>There is a material risk of indirect and cumulative impacts to known ACH places, confirmed registered sites, and drinking water sources outside the Solomon Hub activity area. These include (but are not limited to):</p> <ul style="list-style-type: none"> • Ganyjingarringunha Ngurra (Place ID 33577) • YIN15-026 (ID 36615) • YIN15-025 (ID 36614) • YIN15-024 (ID 36613) • YIN15-017 (ID 36598) 	<p>Kangeenarina Creek was not identified as a receptor that may be impacted by potential emissions due to the separation distance (17.8 km north-west of supplementation area) from the proposed activities. In addition, groundwater monitoring has been specified in the licence as a key control to mitigate potential impacts near and down-hydraulic gradient to the injection sites. Potential impacts to Aboriginal Heritage Places from the construction and operation of the expanded Karijini 2A Supplementation Scheme were assessed under the s45C amendment to MS1062. EPA Services considered that the proposed amendments are unlikely to have significant detrimental effect in addition to, or different from, the effect of the original proposal and could be managed in accordance with the EPA s objective for the Social Surroundings key environmental factor.</p>

Condition	Summary of Licence Holder's comment	Department's response
	<ul style="list-style-type: none"> • YIN15-016 (ID 36597) • YIN15-012 (ID 36594) <p>The documentation shows no consideration as to indirect or cumulative impacts to such matters, despite their consideration being a requirement of DWER policy.</p>	
	<p>The primary land use area, deemed 'exclusive' native title, located immediately north of the Solomon Mine has experienced significant dust emissions and noise from the Solomon Mine operations.</p> <p>Information on indirect impacts associated with implementation of the license amendment, including dust, noise and light emissions associated with construction and operation, and how these impacts are proposed to be appropriately mitigated. These impacts should be considered in the context of YAC's notification to the department (dated 1 April), of excessive and inordinate dust and noise emissions from the Solomon operations, which obstruct the Yindjibarndi people from practicing their Native Title rights and interests.</p>	<p>Under Part V of the Act, the department has undertaken an assessment of the licence amendment 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 and human health from prescribed activities under Schedule 1 of the <i>Environmental Protection Regulations</i>.</p> <p>Potential dust, noise and light emissions from the proposed construction works and operations were considered in the assessment of potential impacts to human health. Each of these emissions were screened out due to the distance to receptors, including the Native Title Determination areas of Yindjibarndi #1. Further, only minor dust, light and noise emissions are expected during construction given the nature of the construction works and the short-term duration. During operation of the Kangi WWTP and expanded Karijini supplementation scheme, these emissions are considered negligible and therefore no realistic risk event has been identified in the assessment.</p>
	<p>Discussion on how the proposal aligns with the requirements of the DWER's <i>Use of mine dewatering surplus policy</i>, specifically how the proponent intends to create opportunities for using dewatering surplus to ensure maximum community benefit.</p>	<p>The Karijini groundwater supplementation scheme is intended to meet the objectives set in MS1062 to maintain groundwater levels in Karijini National Park, rather than service as a disposal option for surplus mine dewater. Maintenance of groundwater levels along the border of Karijini National Park will protect cultural values and amenity associated with groundwater dependant ecosystems and groundwater fed surface features within the park including Hamersley Gorge</p> <p>Currently, only water drawn from the Southern Fortescue Borefield is permitted to be re-injected via the Karijini supplementation scheme. When mine water demands at the premises exceed dewatering</p>

Condition	Summary of Licence Holder's comment	Department's response
		supply, excess requirements for water are also sourced from the Southern Fortescue Borefield.
Wintawari Guruma Aboriginal Corporation advised on 6 December 2022)	Concerned particularly with the practice of reinjecting water, which may be of different origin or quality, into aquifers.	A detailed risk assessment (section 5.3 of this decision report) was undertaken to assess potential impacts to groundwater quality and vegetation at the re-injection sites, as well as surface water ecosystems further down-gradient. The assessment was informed by technical advice received from the department's internal contaminated sites branch regarding the re-injection of water with different quality to the receiving aquifer. The Delegated Officer noted that there is no significant difference in water quality between the re-injected water and target aquifer. It was determined that the risk associated with activity is acceptable, subject to regulatory controls, including monitoring standing water levels and groundwater quality monitoring between the supplementation scheme and Karijini National Park.
Wirilu-Murra Yindjibarndi Aboriginal Corporation (WMYAC)	No comments received.	N/A.

Appendix 2: Summary of the licence holder's comments on risk assessment and draft conditions

Condition	Summary of Licence Holder's comment	Department's response
3 (Table 2)	<p>Minor revision to the wording on the requirements of the Kangi WWTP to ensure consistency across all FMG Operational Site Licences approved by DWER. Specifically, Fortescue requests for the removal of the prescriptive requirement for the WWTP alarms to activate prior to discharge into the emergency overflow pond.</p> <p>The reason for this request is to address the potential for malfunction in the WWTP infrastructure during an unlikely emergency event. In such a situation, the high-level alarms may not activate before discharge into the emergency overflow pond, which could result in potential non-compliance.</p> <p>Fortescue believes that the removal of the requirement for alarm activation prior to discharge will provide operational flexibility whilst still achieving the intended outcomes of this condition.</p>	Proposed change accepted and condition amended accordingly.
4 (Table 3) 12 (Table 7) 19 (Table 11)	<p>The contingency discharge pipeline to Kangeenarina Creek has been decommissioned. Thereby, it is no longer possible to pump decant water/stormwater from the TSF to Kangeenarina Creek during high rainfall events.</p> <p>Fortescue requests for the removal of the contingency discharge of TSF decant water/stormwater to Kangeenarina Creek during high rainfall events as it is no longer applicable.</p> <p>Consequently, FMG also request:</p> <ul style="list-style-type: none"> • Remove contingency discharge 'Emission point' from Table 7 • Remove contingency discharge pipeline to Kangeenarina Creek 'Emission point' sampling parameters from Table 11 	Proposed change accepted and condition amended accordingly.
6 (Table 4)	To address the incorrect information provided in the depth and timescale columns for Inert Waste Type 2 and Putrescible waste, Fortescue requests that these columns are	Proposed change accepted and condition amended accordingly.

Condition	Summary of Licence Holder's comment	Department's response
	<p>corrected in accordance with the corrections provided.</p> <p>The requested corrections will ensure and maintain consistency across the Solomon licence and other FMG Operational Site Licences approved by DWER.</p>	
9 (Table 6)	<p>Add the word 'injection' to accurately reflect the intended purpose of the borefield.</p> <p>This requested change aligns with the wording stated in the requirements (design and construction) in Condition 9, Table 6.</p>	Proposed change accepted and condition amended accordingly.
20 (Table 12)	<p>The four proposed Karijini Supplementation Scheme bores, KIN004, KIN005, KIN006, and KIN007, are missing from the table.</p> <p>Therefore, Fortescue requests for a minor update to Condition 20, Table 12 to add these (missing) bores to the existing Karijini Supplementation Scheme bores namely KIN002R2 and KIN003.</p>	Proposed change accepted and condition amended accordingly.
24 (Table 16)	<p>Remove TSF1 groundwater monitoring bore GQ3 (TSF1-MB-006D) and replace with TSF1-MB-006DR.</p> <p>Additionally, Fortescue also requests for the replacement of the proposed Karijini Monitoring bore AS-MB045S with AS-MB038S. The rationale for this change is due to the better dataset available at AS-MB038S.</p> <p>Fortescue notes that monitoring bore AS-MB038S is much closer to the proposed Karijini Supplementation Scheme bores. From a monitoring perspective, this replacement will lead to better monitoring outcomes from a suitably located representative bore.</p> <p>Therefore, Fortescue requests for the following changes namely:</p> <ul style="list-style-type: none"> • removal of TSF1-MB-006D and replacement with TSF1-MB-006DR; and • removal of Karijini Monitoring bore AS-MB045S, and replacement with AS-MB038S. 	Proposed change accepted and condition amended accordingly.
30 (Table 17)	<p>Remove requirement to conduct the Mann-Kendall Test and replacement with another appropriate statistical test. This requested change will align with the wording provided in other Fortescue Part V licences, thereby ensuring consistency. It is important to note that while the Mann-Kendall is relatively effective and robust, there are specific requirements that must be met for the data to be considered suitable. If the data does not meet these requirements, the Mann-Kendall Test may not be applicable to provide the intended data</p>	Proposed change accepted. Condition amended to include option to use a similar, statistical test to identify and potentially statistically significant trends.

Condition	Summary of Licence Holder's comment	Department's response
	<p>and intent.</p> <p>Therefore, Fortescue requests for the removal of the requirement to conduct the Mann-Kendall Test and replacement with another appropriate statistical test.</p>	
33 (Table 19)	<p>Minor formatting error in the wording of the condition. The condition appears to be a partial sentence.</p> <p>Therefore, Fortescue requests for the correction of the formatting error in the condition to avoid any confusion or misinterpretation.</p>	Formatting error noted and corrected.
33 (Table 19)	<p>Correct wording on the condition to refer to supplementation infrastructure in opposition to mine dewatering infrastructure. The use of the word supplementation infrastructure aligns with the proposed activities associated with the licence amendment and provides further clarity in the condition.</p> <p>Therefore, Fortescue requests for the wording in the condition to be changed and refer to supplementation infrastructure.</p>	Proposed change accepted and condition amended accordingly.
Schedule 1, Figure 1	Remove Figure 1 from the Solomon licence L8464/2010/2.	<p>Replaced with updated premises boundary Figure.</p> <p>Figure 2 consolidated with Figure 1 to show premises boundary and key infrastructure.</p>
Schedule 1, Figure 2	Insert new figure displaying proposed Karijini supplementation bores.	Figure insert accordingly.
Schedule 1, Figures 4, Figure 10, Figure 15	Replace with updated figure provided.	Figure replaced / updated accordingly.

Appendix 3: Aboriginal heritage near the Karijini supplementation area

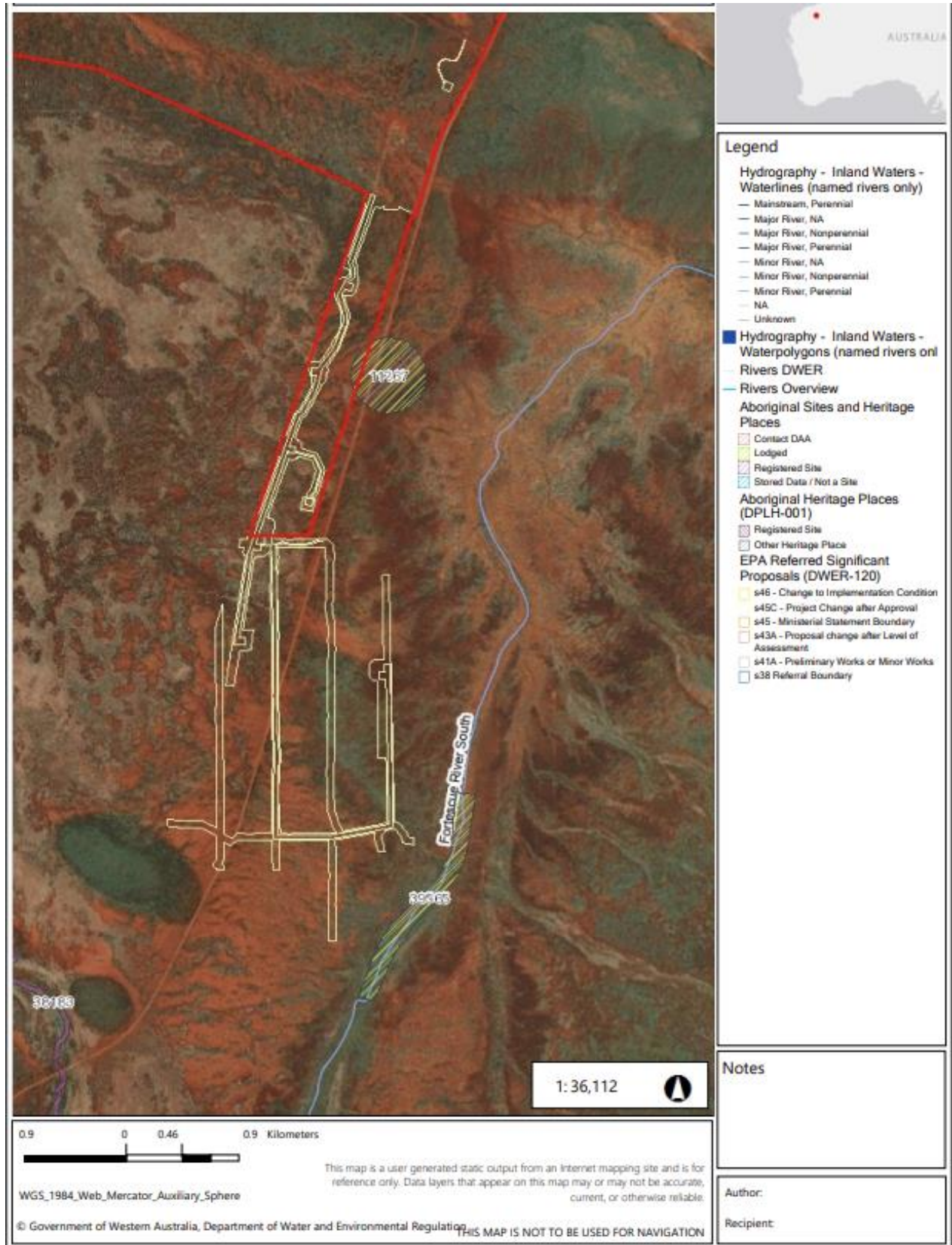


Figure 1 Aboriginal heritage - lodged sites – 11267 and 39565

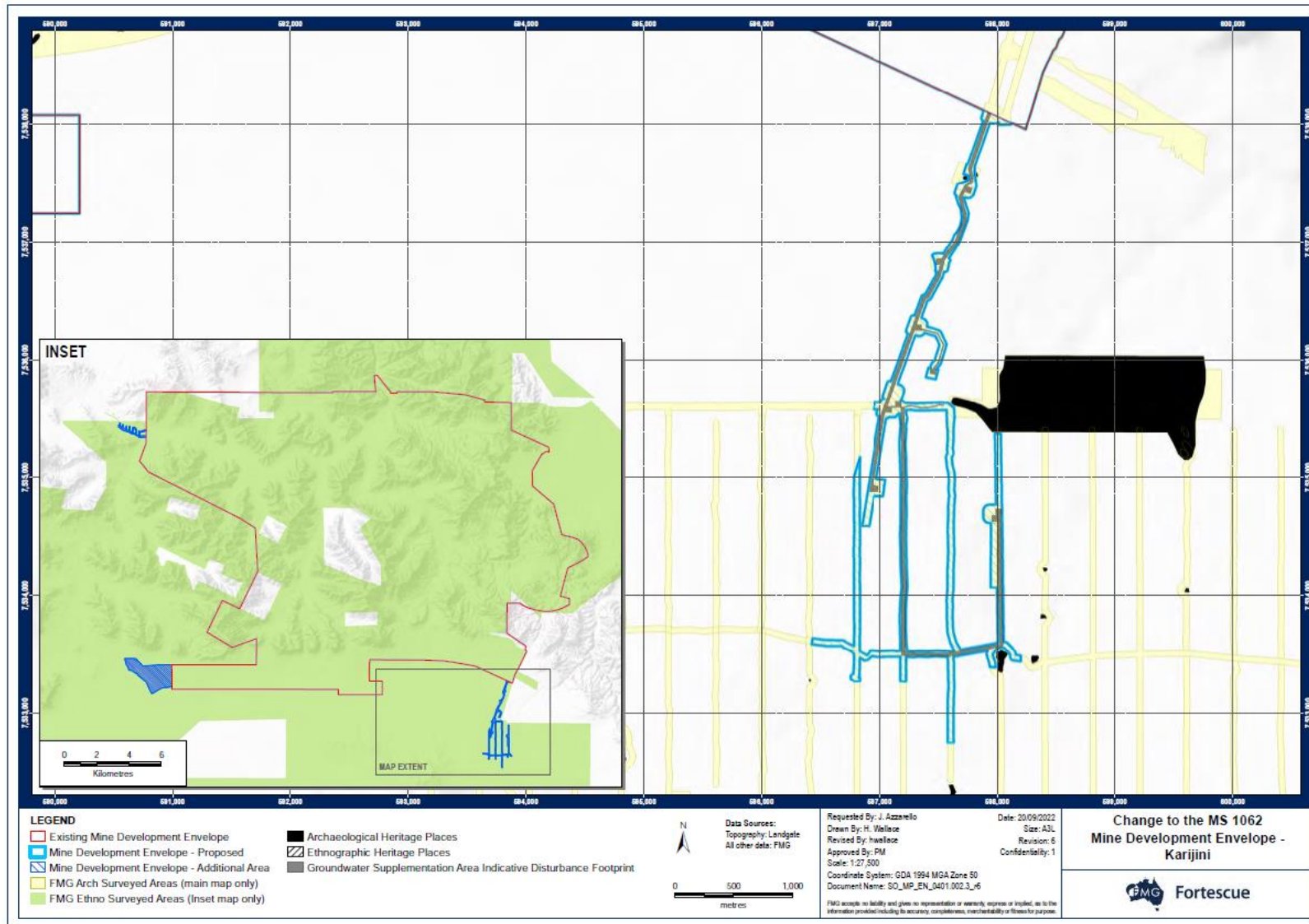


Figure 2 Aboriginal Heritage Places identified by survey (not currently lodged with DPLH)

Licence: L8464/2010/2

IR-T15 Amendment report template v3.0 (May 2021)