



Amendment Report

Licence Number L8464/2010/2

Licence Holder FMG Solomon Pty Ltd

ACN 128 959 179

File Number: 2010/003105

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,
P417/1305, 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 15 January 2020

Decision Grant licence

1. Definitions and interpretation

Definitions

In this Amendment Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Amendment Report	refers to this document
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the <i>Environmental Protection Act 1986</i> Locked Bag 10 JOONDALUP DC WA 6919 info@dwer.wa.gov.au
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Review
Licence Holder	FMG Solomon Pty Ltd
m ³	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations

Term	Definition
MS	Ministerial Statement
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997 (WA)</i>
Occupier	has the same meaning given to that term under the EP Act.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Amendment Report applies, as specified at the front of this Amendment Report.
Revised Licence	the amended Licence issued under Part V, Division 3 of the EP Act, with changes that correspond to the assessment outlined in this Amendment Report.
Risk Event	as described in <i>Guidance Statement: Risk Assessment</i>
RIWI Act	<i>Rights in Water and Irrigation Act 1914 (WA)</i>

2. Amendment Description

The following guidance statements have informed the assessment and decision outlined in this Amendment Report:

- *Guidance Statement: Regulatory Principles (July 2015)*
- *Guidance Statement: Setting Conditions (October 2015)*
- *Guidance Statement: Licence Duration (August 2016)*
- *Guidance Statement: Decision Making (June 2019)*
- *Guidance Statement: Risk Assessment (February 2017)*
- *Guidance Statement: Environmental Siting (November 2016)*

2.1. Purpose and scope of assessment

On 9 September 2019 the Licence Holder applied to amend Licence L8464/2010/2. The following amendments were requested:

- Increasing the Premises Production or Design Capacity to undertake Category 6: Mine dewatering from 5,500,000 tonnes per year to 25,000,000 tonnes per year consistent with Ministerial Statement 1062;
- Additional water infrastructure for storage and disposal of groundwater abstracted through mine dewatering;
- Reverse Osmosis (RO) Plant (1800 kL per day) installation at Kangi Camp;
- Installation of the Queens Crushing Facility;
- Additional fuel storage at Solomon Stores;
- Removal of two upstream tailings storage facility (TSF) 1 groundwater monitoring bores for the licence; and
- Additional tailings line at the Kings Valley Ore Processing Facility.

Construction of an additional thickener at the Kings Valley Ore Processing Facility was originally included in the scope of the amendment application. On 16 October 2019 the Licence Holder requested removal of the thickener from the scope of this application.

Impacts associated with abstraction or and drawdown of groundwater are regulated under the RIWI Act and have not been assessed further. Potential impacts associated with disposal of groundwater abstracted for the purpose of mine dewatering are within the scope of this assessment.

Table 2 summarises proposed changes to prescribed premises categories authorised under the current licence. Proposed amendments are detailed further.

Table 2: Proposed design or throughput capacity changes

Category	Current design or throughput capacity	Proposed design or throughput capacity	Description of proposed amendment
5	Not more than 95,300,000 tonnes per annual period	No change to design or throughput capacity	The Licence Holder proposes to: <ul style="list-style-type: none"> • construct and operate a crushing facility at Queens Mining Pit • Remove two TSF monitoring bores • Duplicate the tailings line.
6	5,500,000 tonnes per annual period	24,000,000 tonnes per annual period	The Licence Holder proposes: <ul style="list-style-type: none"> • To store additional water in turkey nests and ponds • Additional conveyance pipelines • To expanded supplementation programs at Kangeenarina Creek and Weelumurra Creek • Duplicate subsurface infiltration pipeline at Kangeenarina Creek • Construct an injection borefield near the boundary of Karijini National Park
54	Not more than 1,178 cubic metres per day	No change to design or throughput capacity	n/a
57	2,500 tyres	No change to design or throughput capacity	n/a
61	110,000 tonnes per annual period	No change to design or throughput capacity	n/a
62	6,000 tonnes per annual period	No change to design or throughput capacity	n/a
64	14,000 tonnes per annual period	No change to design or throughput capacity	n/a
73	Not more than 9,500 cubic metres in aggregate	9,560 tonnes per year	The Licence Holder proposes to install 60,000L (2x30,000L tanks) of diesel fuel storage at the new Solomon Stores location.

2.1.1 Additional Water Infrastructure

The Licence Holder currently undertakes groundwater abstraction at the Solomon mine for the purposes of water supply and mine dewatering. Groundwater abstraction is subject to licences issued under the RIWI Act. Table 3 describes key characteristics of the additional water infrastructure proposed.

Table 3: Key characteristics of proposed additional water infrastructure

Aspect	Proposed amendment
Key parameters	<p>Storage of additional abstracted groundwater within existing containment infrastructure:</p> <ul style="list-style-type: none"> • Kangi 17ML raw water storage facility (earthen ponds) • Kangi 7ML raw water storage facility (earthen ponds) • new turkeys nests and ponds for storage of abstracted groundwater <p>Conveyance infrastructure:</p> <ul style="list-style-type: none"> • additional pipelines will be required to convey water to the supplementation site at Kangeenarina Creek, Weelumurra Creek and the boundary of the Karijini National Park. <p>Injection and supplementation infrastructure - Kangeenarina Creek</p> <ul style="list-style-type: none"> • duplication of subsurface infiltration line (~1km) at Kangeenarina Creek to provide redundancy and to allow a higher flow rate for subsurface supplementation consistent with MS1062. • Provision for a contingency disposal option, for excess groundwater not required for supplementation purposes and which exceeds the storage capacity of the supplementation system, into the existing Kangi Infiltration Trench, located approximately 5km south-west of the existing supplementation and infiltration infrastructure. <p>Injection and supplementation infrastructure- Weelumurra North</p> <ul style="list-style-type: none"> • No amendments proposed to the existing system. <p>Injection borefield- Karijini National Park</p> <ul style="list-style-type: none"> • Construction of an injection borefield near the boundary of the Karijini National park to supplement groundwater levels against potential impacts of groundwater abstraction at the Southern Fortescue Borefield. • Two injection bores to be constructed: KIN001 (598,258mE, 7539182mN) KIN002 (598,096mE, 7538612mN)
Inputs	Up to 25 GL per annum of groundwater abstracted from mine pits to be discharged (Solomon CID). The water quality of the abstracted groundwater is considered fresh to marginal.
Outputs	<ul style="list-style-type: none"> • Reuse onsite for processing and operational water supply (including dust suppression). • Injection for the purpose of supplementation along the boundary of Karijini National park. • Injection, subsurface disposal and surface disposal for the purpose of supplementation of Kangeenarina and Weelumurra Creeks

2.1.2 Reverse Osmosis Plant

The Licence Holder proposes to install and operate a reverse osmosis (RO) plant at the Kangi Camp to treat water sourced from the Southern Fortescue Borefield for potable use. The expected discharge volume from the RO plant is approximately 0.1 GL per annum and therefore it falls below the threshold for prescribed premises category 85B or category 54A as specified in the EP Regulations.

Up to 360kL/day of reject water is expected to be generated from RO plant operations which will either report to:

- the mine dewatering distribution network (currently authorised through the licence

- L8464 and MS1062); or
- the Kangi Camp wastewater treatment plant irrigation spray fields .(emission point reference L2 on current licence); or
- dust suppression around the mine site and garden reticulation around the camp; or
- process water.

Accordingly this risk assessment will review acceptability of the discharges associated with the RO plant operation (combined discharge). Table 4 summarises anticipated reject water quality results from operation of the RO Plant.

Table 4: Output Reject water quality from RO Plant (anticipated)

Parameter	Reverse Osmosis Plant Reject Output
Calcium (mg/L)	227
Chloride (mg/L)	552
Magnesium (mg/L)	170
pH	8.5
Potassium (mg/L)	35
Sodium (mg/L)	320
Total Dissolved Solids (mg/L)	3500
Alkalinity as CaCO ₃ (mg/L)	1270
Sulfate as SO ₄ turbidimetric (mg/L)	200

QUEENS CRUSHING FACILITY

The Licence Holder proposes to construct and operate a crushing facility at the Queens Mining Pit. Ore from the Queens Mining Pit and Queens ROM stockpiles will undergo primary crushing and screening at the proposed Queens Crushing Facility, prior to transport to overland conveyor to the Kings Ore Processing Facility for further processing. The Queens Crushing Facility will consist of a ROM bin, crusher, chute, apron feeder and conveyor. The primary crushed ore will be transported via the overland conveyor to the Kings OPF, approximately 10km away, for further processing.

The incorporation of the Queens Crushing Facility will not impact the overall capacity of ore processing at the premises. Figure 1 below shows indicative layout of the Queens crushing facility.

3. Other approvals

The Licence Holder has provided the following information relating to other approvals as outlined in Table 5.

Table 5: Relevant approvals

Legislation	Number	Approval
<i>Environmental Protection Act 1986 – Part IV</i>	Ministerial Statement 1062	To expand the Solomon Iron Ore Mine Project in order to sustain production for an additional 30 years from 2016. Supplementation of the Kangeenarina Creek using abstracted groundwater is a requirement of Ministerial Statement (MS) 1062.
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	EPBC 2010/5567	Solomon Iron Ore Project – construction and operation of two mining areas, namely the Kings and Firetail deposits, and a new heavy duty standard gauge railway line and rail spur.
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	EPBC 2014/7275	Expansion of existing mining operations at Solomon Iron Ore Project
<i>Rights in Water and Irrigation Act 1914</i>	Groundwater Licences: GWL175139(2) GWL177976(1) GWL176913(2) GWL177110(2)	Solomon Dewatering Southern Fortescue Borefield Solomon Injection Supply Solomon Camp Water Supply
<i>Mining Act 1978</i>		

4. Amendment history

Table 6 provides the amendment history for works approvals and licence amendments for this Premises

Table 6: Works approval and Licence amendments for this Premises

Instrument	Issued	Amendment
W4645/2010/1	22 April 2010	Works approval for construction of Castle Camp WWTP
L8464/2010/1	14 October 2010	New licence for Castle Camp WWTP
W4846/2010/1	3 March 2011	Works approval for Castle Camp upgrade to category 54
W4881/2011/1	3 November 2011	Works approval for Dally Camp WWTP
W4900/2011/1	23 June 2011	Works approval for Direct Shipping Ore Processing Plant
W4930/2011/1	4 August 2011	Works approval for Mobile Crushing Plant
W4932/2011/1	4 August 2011	Works approval for Stockyard Mobile Crushing Plant
W4940/2011/1	4 August 2011	Works approval for Ellie Camp WWTP

W5088/2011/1	9 February 2012	Works approval for Kangi Camp WWTP and waste transfer station
L8464/2010/1	9 February 2012	Licence amendment increase capacity
W5110/2011/1	3 November 2011	Works approval for Processing plant and tailings facility
L8464/2010/1	14 June 2012	Licence amendment increase capacity
W5192/2012/1	19 July 2012	Works approval for Bulk fuel facility
W5246/2012/1	1 November 2012	Works approval for Central Facilities Infiltration trench
L8464/2010/1	21 February 2013	Licence amendment add category 5, 12 and 73
W5407/2013/1	7 July 2013	Works approval for an additional Ore Mobile Crushing Facility
W5429/2013/1	29 August 2013	Landfill and Waste Transfer Station
L8464/2010/1	5 December 2013	Licence amendment increase capacity category 5 and update the licence template
W5690/2014/1	25 September 2014	Works approval for construction of three OPFs (two at Kings and one at Firetail)
L8464/2010/1	12 February 2015	Licence amendment to increase capacity of categories 5 and 73, and add category 64
L8464/2010/1	23 April 2015	Licence amendment to include categories 57 and 61
L8464/2010/2	15 October 2015	Licence renewal and amendment to upgrade Dally Camp WWTP, include discharges from OWS as emissions to land, change the TSF monitoring requirements and update the prescribed premises boundary
L8464/2010/2	2 June 2016	Licence amendment for works approval to construct landfill and waste transfer station
L8464/2010/2	15 May 2017	Licence amendment to approve TSF embankment lift, remove OWS discharge and monitoring locations, increase category 57 and 73 approved design capacities and include additional inert waste disposal location
L8464/2010/2	19 June 2017	Licence amendment to remove the Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAC) monitoring requirements from Tables 2.2.2, 3.2.1 and 3.4.1
L8464/2010/2	18 January 2018	Licence amendment to remove ambient groundwater monitoring bore GQ8 (WF-MB001S) at the landfill from Table 3.5.1
L8464/2010/2	7 December 2018	Licence amendment for upgrades to the Dally Camp WWTP
L8464/2010/2	15 May 2019	Licence amendment to include category 6 (mine dewatering) including emissions points and associated monitoring requirements and to change the premises boundary
L8464/2010/2	15 January 2020	This amendment for additional water infrastructure for storage and disposal of groundwater abstraction through mine dewatering, installation of the Queens Crushing Facility, additional fuel storage at Solomon Stores and removal of two upstream tailings storage facility (TSF) 1 groundwater monitoring bores.

5. Location and receptors

Table 7 below lists the relevant sensitive land uses in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 7: Receptors and distance from activity boundary

Residential and sensitive premises	Distance from Prescribed Premises
Hamersley Station	33km south west of the Premises
Hamersley Gorge (tourist precinct)	13km south of the Premises
Youngaleena Aboriginal Community	56km east of Premises

Table 8 below lists the relevant environmental receptors in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment.

Table 8: Environmental receptors and distance from activity boundary

Environmental receptors	Distance from Prescribed Premises
Threatened/Priority flora	<p>Seven priority flora species have been recorded within the Premises, being:</p> <ul style="list-style-type: none"> • <i>Gompholobium karjini</i> (Priority 2) • <i>Acacia effusa</i> (Priority 3) • <i>Acacia dawsoniana</i> (Priority 3) • <i>Indigofera gilesii</i> subsp. <i>gilesii</i> (Priority 2) • <i>Eremophila magnifica</i> subsp. <i>magnifica</i> (Priority 4) • <i>Goodenia nuda</i> (Priority 4) • <i>Lepidium catapycnon</i> (Priority 4)
Threatened/Priority fauna	<p>The following conservation significant species have been recorded within the Premises:</p> <ul style="list-style-type: none"> • Northern Quoll (Endangered under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) and Schedule 2 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>) • Pilbara Leaf-nosed Bat (Vulnerable under the EPBC Act and Schedule 3 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>) • Pilbara Olive Python (Vulnerable under the EPBC Act and Schedule 3 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>) • Pilbara Barking Gecko (Priority 2) • Fork Tailed Swift (Migratory under the EPBC Act and Schedule 5 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>) • Western Pebble-mound Mouse (Priority 4) • Ghost Bat (Vulnerable under the EPBC Act and Schedule 3 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>) • Gane's Blind snake (Priority 1) • Peregrine Falcon (Other Specially Protected under the EPBC Act and Schedule 7 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>) • Eastern Great Egret (Migratory).
Department of Biodiversity Conservation and Attractions managed	<ul style="list-style-type: none"> • Karijini National Park located adjacent to south east corner of the Premises

lands and waters	<ul style="list-style-type: none"> Mungaroona Range Nature Reserve located approximately 30km north east of the Premises
Priority/Threatened Ecological Communities	<p>Multiple occurrences of Themeda grasslands on cracking clays (Hamersley Station, Pilbara), Threatened Ecological Community (Vulnerable) located adjacent to the southern boundary of the Premises.</p> <p>Multiple occurrences of Brockman Iron cracking clay communities, Priority 1 Ecological Community, located adjacent to the southern boundary of the Premises.</p>
Important Wetlands – Western Australia RAMSAR Sites	Fortescue Marshes located approximately 16km east of the Premises. Fortescue Marsh is also listed as a Priority 1 ecological community
<i>Country Areas Water Supply Act 1947</i> – Public Drinking Water Source Area (PDWSA)	Millstream Water Reserve (West Pilbara), located approximately 600m west of the Premises, is a Priority 2 PDWSA
Rights in Water and Irrigation Act 1914 – Groundwater Areas	Pilbara Groundwater Area – intersected by the Premises
Rights in Water and Irrigation Act 1914 – Surface Water Areas	Pilbara Surface Water Area – intersected by the Premises
Surface water bodies	<p>Fortescue River South located 2km east of the Premises</p> <p>Three streams traverse operational areas of the Solomon mine: Zalamea (South East Flow), Kangeenarina (Central Flow) and Queens (West Flow). The eastern boundary of the Solomon operation is formed by Weelumurra Creek.</p>

6. Risk assessment

Table 9 and Table 10 below describe the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. Both tables identify whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Table 9: Risk assessment for proposed amendments during construction

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
Construction of new infrastructure, including: <ul style="list-style-type: none"> • Additional water infrastructure (pipelines) • Queens crushing facility • Two fuel storage tanks • Additional tailings line • Reverse Osmosis plant 	Dust	Air/windborne pathway causing potential impacts to amenity.	None specified	Slight	Rare	Low	The Delegated Officer considers that the separation distance from sensitive receptors is adequate to mitigate any adverse amenity impacts associated with dust or noise emissions associated with construction. No further assessment is required.	General Provisions of the EP Act apply. Noise Regulations apply.
	Noise	The nearest residential receptor is 33km south west of the premises. Nearest tourist precinct is 13km south of the premises.						

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Department's Guidance Statement: Risk Assessments (February 2017)

Table 10: Risk assessment for proposed amendments during operation

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
Category 6: Mine dewatering								
<p>Abnormal operation:</p> <p>Contingency disposal of dewatering water via the proposed duplicated subsurface infiltration pipeline at Kangeenarina Creek</p>	<p>Abstracted groundwater (Groundwater quality is considered fresh to marginal.)</p> <p>The Queens Mining area contains an area of lignite which may be impacted by dewatering and mobilise metals/metalloids in dewatered water.</p>	<p>Direct discharge of dewatered water via infiltration may cause mounding and impact vegetation if not managed appropriately.</p> <p>Dewatering discharge may impact surface water quality in creek systems. Premises is located within proclaimed Pilbara Groundwater and Surface Water areas.</p> <p>Groundwater table depth is 10-30 metres below ground level.</p>	<p>Supplementation will be undertaken in accordance with the Kangeenarina Pools Supplementation Plan, 2018.</p> <p>Discharge water quality and standing water levels at Kangeenarina Creek Infiltration System will continue to be monitored as per requirements of current licence L8464.</p> <p>Potential impacts on vegetation health due to supplementation activities will be managed in accordance with the Vegetation Health Monitoring and Management Plan (100-PL-EN-1020) as per requirements of MS1062.</p> <p>Lignite Management Plan is currently being prepared. Until then MS1062 requires the Licence Holder to ensure that the extent of dewatering in the Queens area does not approach within 10m (horizontal or vertical) of the lignite body.</p>	Minor	Rare	Low	<p>EP Act Part IV approval and Ministerial Statement 1062 regulates supplementation of creek system and specifies requirements relating to vegetation surveys. Licence L8464 specifies monitoring requirements for discharge water quality as secondary controls to ensure dewatering. No significant adverse impacts have been observed on account of current operations. Proposed contingency disposal via the duplicated infiltration pipeline is a redundancy measure in the event of failure or blockage of existing subsurface infiltration pipeline.</p>	<p>The Delegated Officer has determined that conditions of current licence are adequate and no additional regulatory controls required to manage contingency disposal.</p> <p>Current monitoring requirements specified in Condition 3.3.1 will apply when dewatering disposal is being undertaken via the duplicated pipeline.</p>

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
<p>Normal operation:</p> <p>Disposal of dewatering water into existing Central Facilities Infiltration Trench (Kangi Infiltration Trench)</p>	<p>Abstracted groundwater is generally fresh to marginal.</p> <p>The Queens Mining area contains an area of lignite which may be impacted by dewatering and mobilise metals/ metalloids in dewatered water.</p>	<p>Direct discharge of dewatered water via infiltration may cause mounding and impact vegetation if not managed appropriately.</p> <p>Dewatering discharge may impact surface water quality in creek systems.</p>	<p>Potential impacts on vegetation health due to supplementation activities will be managed in accordance with the Vegetation Health Monitoring and Management Plan (100-PL-EN-1020) as per requirements of MS1062.</p> <p>Lignite Management Plan is currently being prepared. Until then MS1062 requires the Licence Holder to ensure that the extent of dewatering in the Queens area does not approach within 10m (horizontal or vertical) of the lignite body.</p>	Minor	Unlikely	Medium	<p>Licence Holder commitments in the Solomon Groundwater Operation Strategy and requirements under MS1062 are adequate to manage potential impacts to groundwater.</p>	<p>Requirement to monitor the volume of dewater disposed to Kangi Infiltration Trench will be added to the licence as a secondary measure to verify the site water balance assumptions used by the Licence Holder.</p>
<p>Normal operation:</p> <p>Disposal of dewatering water via injection borefield (Stage 1) near the boundary of the Karijini National Park</p>		<p>Premises is located within proclaimed Pilbara Groundwater and Surface Water areas. Groundwater table depth is 10-30 metres below ground level.</p>	<p>Minimum vertical freeboard of 100mm will be maintained when storing abstracted groundwater in current raw water storage facility.</p> <p>Solomon Combined Groundwater Operating Strategy dated 26 July 2019, prepared to meet requirements under RIWI Act, guides the ongoing review and reporting of overall site water balance (incorporating dewatering, supplementation, storage/disposal).</p>	Minor	Unlikely	Medium		

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
<p>Abnormal operation: Pipeline failure causing discharge of mine dewater to land</p>	<p>Abstracted groundwater is generally fresh to marginal.</p> <p>The Queens Mining area contains an area of lignite which may be impacted by dewatering and mobilise metals/ metalloids in dewatered water.</p>	<p>The premises is located within proclaimed Pilbara surface water areas. Dewatered water, with elevated metal/metalloid concentrations, may impact surface water quality of creek systems.</p>	<p>Pipelines are equipped with pressure monitoring equipment (upstream and downstream) which allow for water pressure to be maintained within the safe limits of the pipe and to allow for leak detection.</p> <p>Lignite Management Plan is currently being prepared as required by MS1062. Minimum vertical freeboard of 100mm will be maintained when storing abstracted groundwater in current raw water storage facility.</p> <p>Solomon Combined Groundwater Operating Strategy dated 26 July 2019, prepared to meet requirements under RIWI Act, guides the ongoing review of water balance (incorporating dewatering, supplementation, storage/disposal).</p>	Minor	Rare	Low	<p>Quality of dewater is fresh to brackish and no adverse impacts to vegetation in the event of accidental discharge is expected. The Delegated Officer has considered that the applicant controls are adequate to manage potential risks to the environment.</p>	<p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> apply.</p>
<p>Abnormal operation: Overtopping of containment infrastructure used for storing dewatering water</p>				Minor	Rare	Low		
Category 5: Processing or beneficiation of ore								
Crushing of ore at Queens Crushing Facility	Noise	Air/windborne pathway causing potential impacts to amenity.	None specified	Slight	Rare	Low	The Delegated Officer considers that the separation distance from sensitive receptors is adequate to mitigate any adverse	<p>General Provisions of the EP Act apply.</p> <p>Noise Regulations apply.</p>

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
	Dust	The nearest residential receptor is 33km south west of the premises. Nearest tourist precinct is 13km south of the premises.	The mining infrastructure will be engineered with tight clearances and flexible sealing arrangements to contain fugitive dust. The infrastructure is designed with automated water sprays.				amenity impacts associated with dust or noise emissions during operation. The premises is an existing operation. The Department's Incident and Complaints Management System does not have any record of complaints/ incidents associated with fugitive dust or noise emissions from the premises. No further assessment is required.	
	Sediment	Overland runoff causing potential contamination of stormwater runoff resulting in degradation of surface water quality. Three surface water streams intersect the premises.	Sediment basins, diversion drains are maintained on site for stormwater management.	Minor	Unlikely	Low	Current regulatory controls for stormwater management are adequate.	Condition 1.2.11 to be amended to require Licence Holder to maintain sediment basins at Queens Crushing Facility

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
<p>Abnormal operation:</p> <p>Discharge of tailings from the additional tailings line between Kings Valley OPF and TSF1</p>	Discharge of tailings due to pipeline failure	<p>Direct discharge to land causing contamination of soil. Indirect discharge / infiltration causing contamination of groundwater / surface water.</p> <p>Groundwater table depth is 10-30 metres below ground level. Groundwater quality is fresh to marginal.</p> <p>Three surface water streams intersect the premises.</p>	Flow meters will be installed at the start and end of the proposed tailings delivery pipe, to allow for leak detection. The delivery pipe will include a 10mm HDPE liner.	Moderate	Unlikely	Medium	<p>The applicant's controls and existing licence conditions are sufficient manage potential discharge from pipelines.</p>	<p>Condition 1.2.1 specifies infrastructure and inspection requirements for pipelines.</p> <p>Condition 1.2.6 requires daily visual inspection for pipeline integrity and a requirement to undertake corrective action when necessary.</p> <p>Condition 1.2.8 and Table 1.2.5</p>
Category 73: Bulk fuel storage								
Fuel storage at Solomon stores (new location)	Hydrocarbon leaks or spills	<p>Spill and/or breaches of containment causing direct discharge to land resulting in soil contamination. Indirect discharge/ infiltration through soil resulting in groundwater/ stormwater contamination.</p> <p>Groundwater table depth is 10-30 metres below ground level.</p>	<p>In accordance with AS1940, the proposed tanks will be suitable for the storage of >1,000 L of C1 diesel fuel and as such will include:</p> <ul style="list-style-type: none"> • High level alarm to minimise the risk of overfilling • Double-walled construction (or integral secondary containment). <p>The tanks will be located on hardstand areas and traffic management infrastructure such as bollards or other guards will be in place to</p>	Moderate	Unlikely	Medium	The applicants proposed controls are considered sufficient to manage the risk of spills/ emissions of hydrocarbon emissions.	<p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> apply.</p>

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
		Groundwater quality is fresh to marginal.	reduce the likelihood of interactions with vehicles accessing fuel from the tanks.					
Discharge of Reverse Osmosis Plant Reject Water Stream								
Discharge of RO Reject via irrigation or dust suppression	Reject water from the RO plant is expected to have elevated concentrations of dissolved solids, hardness and turbidity. Metal/metalloid concentrations may be elevated	Discharge of RO Reject water via irrigation may impact native vegetation.	Discharge of RO Reject water via irrigation is not the preferred option. Priority will be given to use in existing supplementation and reinjection network. A maximum of 345kl/day of RO reject water will report to irrigation tank if required. Irrigation will be undertaken within an existing area as authorised in the current licence. RO Reject water will be fed into the final irrigation tank (existing) for chlorination and will be diluted approximately 50 times before discharge. Irrigation will be undertaken to prevent waterlogging, pooling and wastewater will be evenly distributed over the irrigation area. Irrigation generated runoff will be prevented as required by current licence Condition 1.2.4. RO reject water will be fed to existing dust suppression network at a dilution rate of 50:1.	Slight	Possible	Low	Disposal of RO reject by irrigation is not the preferred option. Information submitted on 19 December 2019 shows that Boron and Fluoride concentrations in undiluted RO Reject water stream may exceed the ANZECC Guidelines (livestock) however RO reject will not be directly discharged to the environment and will be diluted with existing irrigation tank water (50:1). Rate of discharge of RO brine will be regulated through current regulatory controls targeted at preventing overspray, waterlogging and runoff. Existing irrigation area is adequate to accommodate RO Reject water stream.	
		Indirect discharge via soil infiltration may impact groundwater quality. Groundwater table depth is 10-30 metres below ground level. Groundwater quality is fresh to marginal.						
		Runoff of excess of water may impact surface water quality. Three surface water streams intersect the premises.						

Risk Event				Consequence rating ¹	Likelihood rating ¹	Risk ¹	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/ Activities*	Potential emissions	Potential receptors, pathway and impact	Applicant controls					
Discharge of RO Reject via direct injection/ infiltration into groundwater		Direct discharge via reinjection/ infiltration may impact groundwater quality and dependent ecosystem. Groundwater table depth is 10-30 metres below ground level. Groundwater quality is fresh to marginal.	RO reject water will be fed to existing mine water supply pipeline and will be mixed with water from the Southern Fortescue Borefield and from dewatering sources. It is expected to be diluted by approximately 150:1 before being used as process water or as water for supplementation.	Minor	Possible	Medium	Existing surface water and groundwater monitoring requirements specified in the licence L8464 are adequate for ongoing protection of environmental values of surface water and groundwater resources at the premises. Information submitted on 19 December 2019 shows that Boron and Fluoride concentrations in undiluted RO Reject water stream may exceed the ANZECC Guidelines (livestock) however RO reject will not be directly discharged to the environment and will be diluted with existing supplementation/ reinjection network (150:1). Given this, the final discharge quality is not expected to be significantly different to discharge quality authorised under current licence L8464 and MS1062.	Licence conditions will be specified to: <ul style="list-style-type: none"> • limit the RO Reject disposal volume • require the Licence Holder to undertake RO Reject water quality analysis and submit a report to the CEO
Discharge of RO Reject into surface water streams		Direct discharge may impact surface water quality and dependent ecosystem.	Supplementation will be undertaken in accordance with the Kangeenarina Pools Supplementation Plan, 2018. Discharge water quality and standing water levels at Kangeenarina Creek Infiltration System will continue to be monitored as per requirements of current licence L8464. Potential impacts on vegetation health due to supplementation activities will be managed in accordance with the Vegetation Health Monitoring and Management Plan (100-PL-EN-1020) as per requirements of MS1062. Current licence conditions specify monitoring requirements for point source emissions to surface water and groundwater which will be continued.	Minor	Possible	Medium		<ul style="list-style-type: none"> • not commence disposal of RO brine onsite until monitoring data is submitted to the CEO • require ongoing regular monitoring of the RO reject stream

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Department's Guidance Statement: Risk Assessments (February 2017)

7. Consultation

Comments on this application were invited from the Department of Mines, Industry Regulation and Safety. A response was received on 13 January 2020. Comments are summarised in Table 9 below.

Table 9: Summary of consultation

Method	Comments received	DWER response
E-mail received 13 January 2020	DMIRS does not have any comments regarding proposed additional water infrastructure for storage and disposal of groundwater abstracted through mine dewatering. The proposed new infrastructure is located within disturbance footprint approved under the Mining Act 1978 in accordance figures provided with the Mining Proposal (Reg ID 83816).	Noted.
	DMIRS does not have any comments regarding proposed Reverse Osmosis plant at Kangi Camp. The proposed Reverse Osmosis plant is located within disturbance footprint approved under the Mining Act 1978 in accordance figures provided with the Mining Proposal (Reg ID 83816). Application for approval of pipelines and irrigation field, under the same mining proposal, is currently under assessment by DMIRS.	Noted. Grant of the licence amendment does not preclude the Licence Holder from the obligation to obtain other regulatory approvals.
	Proposed Queens Crushing Facility will be located on M47/1411 within the Priority 2 Millstream Water Reserve Public Drinking Water Source Area. Condition 32 on current Mining Tenement prohibits mineral processing activities and tailings storage within this area. FMG is seeking modification to this condition and assessment is underway. DMIRS has sought preliminary advice from DWER which indicates that construction of the Queens Crushing Facility is unlikely to impact on the Millstream Water Reserve.	Noted. Impacts from Construction and Operation of the proposed Queens Crushing Facility have been considered in the risk assessment. No direct discharge to land/groundwater resource is proposed during operation of the crushing facility. The activity is also consistent with other infrastructure currently operating at the premises.
	DMIRS will seek clarification from FMG regarding location of the proposed additional fuel storage infrastructure as part of Mining proposal assessment. It is also understood that fuel will be stored in commercial tanks, in compliance with relevant Australian Standards and Dangerous Goods requirements and managed in accordance with FMG's Chemical and Hydrocarbon Management Plan. DMIRS has no additional comments	Noted. Location of Bulk Fuel Facility is as shown in the map of emission points in the Licence.
	The application document does not provide sufficient details regarding implications of removal of the two upstream groundwater monitoring bores near Tailings Storage Facility (TSF1). The removal of these bores is not mentioned in the mining proposal currently under assessment by DMIRS.	Additional information was requested from the Licence Holder in September 2019 as part of validating the application. Licence Holder's response has been considered and included in this assessment.
	DMIRS has no comments regarding proposed additional tailings line at the Kings Valley Ore Processing Facility	

8. Conclusion

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

8.1. Summary of amendments

Table 10 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 10: Licence amendments

Condition No.	Proposed amendments
1.2.2	Authorisation of containment infrastructure to stored reverse osmosis plant reject water stream.
1.2.3	Specification of waste management requirements for the reverse osmosis plant reject water stream.
1.2.10	Updates to premises production or design capacity limits specified in Table 1.2.6 for Category 6 and Category 73.
1.2.11	Updating condition text in 1.2.11(a) to include reference to Queens Crushing Facility.
1.2.12	New condition requiring the licence holder to submit a wastewater quality monitoring report for the reverse osmosis plant reject water stream.
1.2.13	New condition restricting the use of reverse osmosis plant reject water stream for irrigation or supplementation of surface water streams or reinjection into groundwater until the monitoring and analysis required by condition 1.2.12 is complete.
2.2.1	Amendment to Table 2.2.1 authorising discharge of mine dewater from all pits within the prescribed premises boundary into Kangeenarina Creek Supplementation System consistent with MS1062.
2.3.1	Amendment to Table 2.3.1 authorising discharge of mine dewater from all pits within the prescribed premises boundary via Kangeenarina Creek Infiltration System, Weelumurra North Supplementation Injection Bores and the proposed Karijini Supplementation Injection Bores consistent with MS1062.
2.4.1	Amendment to Table 2.4.1 to authorise emissions to land from irrigation of reverse osmosis reject water and contingency discharge of mine dewater to the Central Facilities Infiltration Trench (Kangi Infiltration Trench)
3.3.1	Administrative amendment to Table 3.3.1 to update reference to Weelumurra North Supplementation Injection Bores. Specifying monitoring requirements for proposed Karijini supplementation bores.
3.4.1	Amendment to Table 3.4.1 to require monitoring of reverse osmosis reject water discharged via irrigation
3.6.1	Amendment to Table 3.6.1 to require monitoring of reverse osmosis reject water stream

3.7.1	Amendment to Table 3.7.1 to remove reference to decommissioned monitoring bored (GQ4 and GQ6)
4.2.1	Amendment to Table 3.6.1 to include reference to monitoring requirements for reverse osmosis plant reject water stream
4.3.1	Amendment to Table 4.3.1 to remove reference to submission of construction compliance document for Dally Camp wastewater treatment plant which has been received by the Department.

Alana Kidd
 Manager, Resource Industries
 INDUSTRY REGULATION

An officer delegated by the CEO under section 20 of the EP Act

Appendix 1: Key documents

	Document title	In text ref	Availability
1	Licence L8464/2010/2 – Solomon mine	L8464/2010/2	accessed at www.dwer.wa.gov.au
2	Application Form for Solomon Mine Licence Amendment and Supporting Documents – SO-00000-AP-EN-0001	N/A	DWER records (A1821771, A1818964,A1818962,A1818957)
3	Ministerial Statement 1062	MS 1062	accessed at www.epa.wa.gov.au/
4	DER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Environment Regulation, Perth.	--	accessed at www.dwer.wa.gov.au
5	DER, October 2015. <i>Guidance Statement: Setting conditions</i> . Department of Environment Regulation, Perth.	--	
6	DER, February 2017. <i>Guidance Statement: Risk Assessments</i> . Department of Environment Regulation, Perth.	--	
7	DER, February 2017. <i>Guidance Statement: Decision Making</i> . Department of Environment Regulation, Perth.	--	

Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Report on 12 December 2019 for review and comment. The Licence Holder responded on 19 December 2019 waiving the remaining comment period (until 7 January 2020). Following comments were received.

Condition	Summary of Licence Holder comment	DWER response
Draft decision report and conditions of the amended licence referred to the Licence Holder on 12 December 2019	<p>Licence Holder's comments were received on 19 December 2019. Licence Holder provided information on anticipated metals and metalloid concentrations in RO Reject Water stream and comparison of the RO Reject Water quality with ANZECC Guidelines (livestock). The Licence Holder also provided clarification on disposal/ reuse hierarchy for RO Reject stream noting that use of RO Reject for irrigation is not the preferred option and confirmed that undiluted RO Reject water will not be directly discharged via irrigation. Clarification was also provided on dilution factors expected when discharging RO Reject water via existing dust suppression/ dewatering supplementation/ reinjection networks and adequacy of existing irrigation area and irrigation infrastructure to accommodate RO reject stream if required.</p> <p>In addition, following specific comments were provided:</p>	The Amendment Report and Risk Assessment has been updated in consideration of information provided by the Licence Holder.
	Table 1.2.1 should not specify RO Reject Water Stream as there is no standalone containment infrastructure for storage of RO Reject water.	Accepted. Table 1.2.1 updated.
	Amend Table 1.2.2 to include dust suppression, garden reticulation and process water, in addition to 'onsite irrigation' already specified, in the management strategy listed for RO Reject Stream.	Accepted. Table 1.2.2 updated.
	Condition 1.2.13 should be amended to state that undiluted RO Reject water stream shall not be used until the water quality analysis report (required by Condition 1.2.12) is submitted.	Accepted. Condition 1.2.13 updated.
	Supplementation of the Kangeenarina Creek is not a contingency measure. Remove these words from Table 2.4.1 in reference to discharge to Kangi Infiltration Trench.	Change noted. Risk assessment reviewed. Table 2.4.1 in the draft licence updated.
	Remove the requirement for ongoing monitoring of RO reject stream from Table 3.6.1 and remove reporting requirement for the same from Table 4.2.1	Accepted. Undiluted RO Reject stream will not be directly discharged to the environment. RO Reject water will be monitored at existing emission points (L2-irrigation and L5- recharge/ supplementation).

Condition	Summary of Licence Holder comment	DWER response
	Remove reference to Dally camp wastewater treatment plant from Table 1.2.8 and Condition 1.2.5 as the construction compliance documents have been submitted to the Department and verified.	Accepted. Reference to Dally Camp WWTP removed from Condition 1.2.5 and Table 1.2.8
	Correct the error in referencing monitoring point reference for monitoring discharge to Kangi Infiltration Trench to L5	Reference in Table 3.4.1 updated to L5.
	Correct TSF groundwater monitoring bore reference in Table 4.2.1	Updated.
	Update map of monitoring points for subsurface supplementation pipeline at Kangeenarina Creek with the new map provided. Previous monitoring locations SOL-FM-010 and SOL-FM-011 are buried and are no longer used. On 8 January, the Licence Holder clarified that monitoring will be undertaken from SOL-FM-012 and SOL-FM-013.	Noted. Map updated. Table 2.3.1 and Table 3.3.1 updated.
	Condition 3.7.1 requires groundwater monitoring from bores GQ1 and GQ2. Monitoring bore GQ2 is blocked and may be redrilled. In the interim, FMG needs option to sample from GQ11 if GQ2 cannot be unblocked.	Accepted. Condition text updated.
	Update reference to Kangi infiltration trench to Central Facilities Infiltration Trench in Table 2.4.1 and Table 3.4.1 to maintain consistency with the works approval for the Central Facilities Infiltration Trench W5246/2012/1	Reference updated in the licence and Decision Report.
	Remove the duplication in monitoring requirement specified in Table 3.4.1 and Table 3.6.1 of previous licence for emission point L3 (oil water separator).	Accepted. Emissions from oil water separator are to be monitored for TRH (Total Recoverable Hydrocarbons) and the licence specifies a limit for the same. Accordingly the duplication in Table 3.6.1 has been removed. Previous licence also referenced in monitoring requirements in Table 3.6.1 for wastewater treatment tanks. These were referenced against monitoring point L3 instead of L2. This administrative error has also been corrected.