



Licence

Environmental Protection Act 1986, Part V

Licensee: Chichester Metals Pty Ltd

Licence: L8454/2010/2

Registered office: 87 Adelaide Terrace
EAST PERTH WA 6004

ACN: 109 264 262

Premises address: Christmas Creek Mine Site
Tenements E46/610, E46/612, M46/320, M46/321, M46/322, M46/323, M46/324, M46/325, M46/326, M46/327, M46/328, M46/329, M46/330, M46/331, M46/332, M46/333, M46/334, M46/335, M46/336, M46/337, M46/338, M46/339, M46/340, M46/341, M46/342, M46/343, M46/344, M46/345, M46/346, M46/347, M46/348, M46/349, M46/350, M46/351, M46/352, M46/353, M46/354, M46/355, M46/403, M46/406, M46/412, M46/413, M46/414, M46/415, M46/416, M46/417, M46/418, M46/419, M46/420, M46/421, M46/422, M46/423, M46/424, G46/7, L46/49, L46/56, L46/58, L46/86, L46/87, L46/106, L46/111 E46/566 and L46/66
MULGA DOWNS WA 6751
As depicted in Schedule 1

Issue date: Thursday, 20 August 2015

Commencement date: Monday, 24 August 2015

Expiry date: Saturday, 23 August 2036

Prescribed premises category

Schedule 1 of the *Environmental Protection Regulations 1987*

Category number	Category description	Category production or design capacity	Approved premises production or design capacity
5	Processing or beneficiation of metallic or non-metallic ore	50,000 tonnes or more per year	77,000,000 tonnes per Annual Period
6	Mine dewatering	50,000 tonnes or more per year	43,000,000 tonnes per Annual Period (injected)
52	Electric power generation	10 MW or more in aggregate (using a fuel other than natural gas)	56 MW
54	Sewage facility	100 cubic metres or more per day	1,040 cubic metres per day
57	Used tyre storage	100 tyres or more	2,000 tyres



64	Class II putrescible landfill	20 tonnes or more per year	10,000 tonnes per Annual period
73	Bulk storage of chemicals	1,000 cubic metres in aggregate	15,183.1 cubic metres in aggregate

Conditions

This Licence is subject to the conditions set out in the attached pages.

Date signed: 14 July 2017

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Alana Kidd
Manager Licensing – Resource Industries

Officer delegated under section 20
of the *Environmental Protection Act 1986*



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Introduction

This Introduction is not part of the Licence conditions.

As of 1 July 2017, the Department of Environment Regulation (DER), the Office of the Environmental Protection Authority (OEPA) and the Department of Water (DoW) amalgamated to form the Department of Water and Environmental Regulation (DWER).

DWER was established under section 35 of the *Public Sector Management Act 1994* and is responsible for the administration of the *Environmental Protection Act 1986* along with other legislation.

DWER's industry licensing role

The Department of Water and Environment Regulation (DWER) is a government department for the state of Western Australia in the portfolio of the Minister for Environment. DWER's purpose is to advise on and implement strategies for a healthy environment for the benefit of all current and future Western Australians.

DWER has responsibilities under Part V of the *Environmental Protection Act 1986* (the Act) for the licensing of prescribed premises. Through this process DWER regulates to prevent, control and abate pollution and environmental harm to conserve and protect the environment. DWER also monitors and audits compliance with works approvals and licence conditions, takes enforcement action as appropriate and develops and implements licensing and industry regulation policy.

Licence requirements

This Licence is issued under Part V of the Act. Conditions contained within the Licence relate to the prevention, reduction or control of emissions and discharges to the environment and to the monitoring and reporting of them.

Where other statutory instruments impose obligations on the Premises/Licensee the intention is not to replicate them in the licence conditions. You should therefore ensure that you are aware of all your statutory obligations under the Act and any other statutory instrument. Legislation can be accessed through the State Law Publisher website using the following link:

<http://www.slp.wa.gov.au/legislation/statutes.nsf/default.html>

For your Premises relevant statutory instruments include but are not limited to obligations under the:

- *Environmental Protection (Unauthorised Discharges) Regulations 2004* – these Regulations make it an offence to discharge certain materials such as contaminated stormwater into the environment other than in the circumstances set out in the Regulations.



- *Environmental Protection (Controlled Waste) Regulations 2004* - these Regulations place obligations on you if you produce, accept, transport or dispose of controlled waste.
- *Environmental Protection (Noise) Regulations 1997* – these Regulations require noise emissions from the Premises to comply with the assigned noise levels set out in the Regulations.

You must comply with your licence. Non-compliance with your licence is an offence and strict penalties exist for those who do not comply.

Licence holders are also reminded of the requirements of section 53 of the Act which places restrictions on making certain changes to prescribed premises unless the changes are in accordance with a works approval, licence, closure notice or environmental protection notice.

Licence fees

If you have a licence that is issued for more than one year, you are required to pay an annual licence fee prior to the anniversary date of issue of your licence. Non payment of annual licence fees will result in your licence ceasing to have effect meaning that it will no longer be valid and you will need to apply for a new licence for your Premises.

Ministerial conditions

If your Premises has been assessed under Part IV of the Act you may have had conditions imposed by the Minister for Environment. You are required to comply with any conditions imposed by the Minister.

Premises description and Licence summary

The Christmas Creek Mine Site (Christmas Creek) is owned and operated by Chichester Metals Pty Ltd (Licensee), a wholly owned subsidiary of Fortescue Metals Group Ltd (Fortescue). Christmas Creek is part of Fortescue's Pilbara Iron Ore and Infrastructure Project, comprising a series of iron ore mines located in the Pilbara region and related rail and port infrastructure for ore export through Port Hedland.

Christmas Creek is located approximately 111 km north east of Newman. Christmas Creek mine lies between 1 – 10 km north of the Fortescue Marsh, listed as a Nationally Important Wetland of Australia (Environment Australia 2001) and the largest wetland in the Pilbara.

Christmas Creek has been in operation since 2010. No significant communities are in the vicinity of the mine site and the nearest neighbours include:

- Roy Hill Station which is approximately 30 km southeast;
- Marillana Homestead which is approximately 41 km from the site;
- Roy Hill mine which is currently being developed adjacent to Christmas Creek on the south eastern side of the mine; and
- Cloudbreak Mine located immediately to the west.

The mine comprises a series of open pits, serviced by two ore processing facilities (OPFs) with mobile screening and crushing units supporting the OPFs. Tailings are generated from the OPFs and are deposited into tailings cells constructed from previously mined pits. Currently two tailings storage facilities (TSFs) are in operation; Windich, Flinders Strip 12 and Flinders In-Pit. Processed ore is transferred to rail and transported to Fortescue's port at Port Hedland for export.

The mine site sits over three main connected aquifers, the fresh-brackish Tertiary Detritals, brackish Marra Mamba formation and the hypersaline Oakover formation. Water supply is provided by groundwater abstraction from local borefields, both brackish and hypersaline in water quality, and is authorised by groundwater licences issued by the former Department of Water (As of 1 July 2017, the Department of Water amalgamated to form the Department of Water and Environmental Regulation (DWER)). As approximately 70% of the ore body lies below the water table, mine dewatering provides a large amount of the water supply for Christmas Creek. Excess



groundwater and process water (including tailings decant water) is returned to either the Marra Mamba or Oakover formation aquifers by bore reinjection, dependent on salinity.

Supplementary infrastructure at the mine site includes a putrescible landfill, two bioremediation areas, fuel storage areas, a diesel fuelled power station and two wastewater treatment plants (WWTP), one servicing the Construction Camp and the other the Operations Camp, known as the Construction Camp WWTP and Karntama WWTP, respectively.

This Licence is the result of an amendment sought by the Licensee to implement the following changes:

- Condition 1.2.2 (Table 1.2.1) -
 - updates to remove references to individual tailings storage facilities (TSF), settlement and transfer ponds;
 - specify that a supernatant water collection and return system be used only when a recoverable volume of water is present; and
 - remove the containment infrastructure requirements specified for the Flinders In-Pit TSF (Amendment Notice 1);
- Condition 1.2.5 (Table 1.2.3) – remove “clean fill” as a waste type and include a provision to allow for clean fill to be used as cover to cap landfill trenches;
- Condition 1.2.8 – remove condition 1.2.8 and reference to the “Mobile Crushing and Screening Environmental Management Procedure”;
- Condition 1.2.10 (Table 1.2.6)
 - remove the design and construction specifications for the Karntama Village Sludge Unit as the facility has been constructed; and
 - include design and construction specifications for a new settlement pond to be constructed;
- Condition 1.2.11 – remove the specification relating to the Flinders In-Pit TSF which allows tailings to only be deposited to no more than 2 metres below the pre-mining groundwater level (imposed via Amendment Notice 1 issued 28 February 2017);
- Condition 3.2 – remove the point source air emissions monitoring requirements associated with the power station;
- Condition 3.4.1 (Table 3.4.1) – remove volumetric flow rate from the saline and brackish reinjection monitoring requirements specified in Table 3.4.1;
- Condition 3.6.1 (Table 3.6.1) – remove the requirements to sample for Benzene, Toluene, Ethyl benzene and Xylene (BTEX) in water from the CCY1 and CCY2 treatment used for dust suppression;
- Condition 3.7.1 (Table 3.7.1) – inclusion of a footnote on Table 3.7.1 specifying “*No sample required if bore is dry*” to avoid potential non-compliances if the TSF monitoring bores are dry due to mine dewatering in the area and change monitoring frequency to six monthly;
- Condition 4.2.1 (Table 4.2.1)
 - update the reference to the telemetric controls on the saline reinjection infrastructure as the Licensee is currently trialling the use of improved technologies; and
 - remove the requirement to report the average percentage of sulfur content of diesel fuel used; and
- Condition 4.3.1 (Table 4.3.1) – remove the requirement to verify the permeability of the pit wall (Amendment Notice 1). Details of the pit wall were provided in the first compliance document for the Flinders In-Pit TSF, submitted to the former Department of Environment Regulation (As of 1 July 2017, the Department of Environment Regulation amalgamated to form the Department of Water and Environmental Regulation (DWER)) on 1 March 2017.



The Licences and Works Approvals issued for the Premises are:

Instrument log		
Instrument	Issued	Description
W4623/2009/1	22/02/2010	Ore Processing Facility works approval
W4626/2010/1	22/02/2010	Construction Camp Wastewater Treatment Facility works approval
W4682/2010/1	28/06/2010	Putrescible Landfill works approval
W4643/2010/1	08/07/2010	Power Station of 28 MW capacity works approval
L8454/2010/1	23/08/2010	Licence issued for Christmas Creek Camp Wastewater Treatment Facility operation, category 54
W4724/2010/1	02/09/2010	Christmas Creek Village Wastewater Treatment Plant
W4733/2010/1	11/10/2010	Operations Camp Wastewater Treatment Facility works approval
L8454/2010/1	09/12/2010	Licence amendment to include putrescible landfill, category 89
W4739/2010/1	20/12/2010	Hydrogeological Investigations for Christmas Creek Water Management Scheme works approval
W4790/2010/1	20/12/2010	Vasse Tailings Storage Facility works approval
W4782/2010/1	17/01/2011	Hydrocarbon Storage works approval
W4924/2011/1	18/07/2011	Second Ore Processing Facility, Remote Crushing Hub and Overland Conveyor works approval
L8454/2010/1	10/11/2011	Licence amendment to authorise power station operation category 52, ore processing facility category 5, additional WWTP, Tailings Storage Facility (TSF) and supporting infrastructure
W4996/2011/1	19/12/2011	Christmas Creek Hillside East Borefield Extension works approval
W5001/2011/1	05/12/2011	Power station expansion to 54 MW capacity works approval
L8454/2010/1	12/03/2012	Licence amendment to include category 6 (dewatering) and category 73 (bulk storage of chemicals)
W5120/2012/1	05/07/2012	Additional bulk fuel storage works approval
W5210/2012/1	09/08/2012	Windich TSF works approval
W5309/2012/1	04/03/2013	Christmas Creek Water Management Scheme infrastructure works approval
W5363/2012/1	15/04/2013	Vasse above ground tailings storage facility works approval
L8454/2010/1	13/06/2013	Amendment initiated by Licensee to increase the capacities authorised in categories 5, 6, 52, 54 and 73.
L8454/2010/1	15/08/2013	Amendment initiated by Licensee to authorise increase in capacity of category 6 to 43 Mt/a
L8454/2010/1	12/12/2013	Amendment initiated by Licensee to construct and operate mobile crushing and screening facilities and operate Vasse TSF
W5425/2013/1	11/07/2013	Windich TSF 2 works approval
L8454/2010/2	20/08/2015	Licence reissue and amendment to add Windich TSF2 and update to new template Licence
L8454/2010/2	7/7/2016	Licence amendment for approval to construction the Flinders Strip 12 In-Pit TSF, Windich Above-Ground TSF and the Karntama Village WWTP sludge handling unit, update prescribed premises boundary, increase category 73 approved



		design capacity, replace category 89 with category 64, inclusion of conditions for the reinjection of mine dewater and removal of requirement to implement the Water Management Scheme, and inclusion of a 2 MW Caterpillar C175 generator as an emission point to air.
L8454/2010/2	28/02/2017	Amendment Notice 1 Approval to construct and operate the Flinders In-Pit TSF (below water table tailings deposition), update the Vasse and Windich TSF groundwater monitoring requirements, changes to the requirements for controls on sewage pipelines, update the containment infrastructure requirements, changes to the used tyre storage requirements and include total dissolved solids in the WWTP monitoring suite.
L8454/2010/2	DRAFT	Licence amendment to update the containment infrastructure requirements in Table 1.2.1, include a provision in Table 1.2.3 to allow clean fill to be used as cover material, remove reference to the Mobile Crushing and Screening Environmental Management Procedure, remove reference to infrastructure which has been constructed, removal of the Flinders In-Pit TSF deposition limit, removal of the air emission monitoring requirements.

Severance

It is the intent of these Licence conditions that they shall operate so that, if a condition or a part of a condition is beyond the power of this Licence to impose, or is otherwise *ultra vires* or invalid, that condition or part of a condition shall be severed and the remainder of these conditions shall nevertheless be valid to the extent that they are within the power of this Licence to impose and are not otherwise *ultra vires* or invalid.

END OF INTRODUCTION



Licence conditions

1 General

1.1 Interpretation

1.1.1 In the Licence, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 For the purposes of this Licence, unless the contrary intention appears:

'Act' means the *Environmental Protection Act 1986*;

'AHD' means the Australian height datum;

'Annual Period' means a 12 month period commencing from 1 January until 31 December;

'Annual Audit Compliance Report' means a report in a format approved by the CEO as presented by the Licensee or as specified by the CEO from time to time and published on the Department's website;

'AS/NZS 5667.1' means the Australian Standard AS/NZS 5667.1 *Water Quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples*;

'AS/NZS 5667.6' means the Australian Standard AS/NZS 5667.6 *Water Quality – Sampling – Guidance on sampling of rivers and streams*;

'AS/NZS 5667.10' means the Australian Standard AS/NZS 5667.10 *Water Quality – Sampling – Guidance on sampling of waste waters*;

'AS/NZS 5667.11' means the Australian Standard AS/NZS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters*;

'averaging period' means the time over which a limit is measured or a monitoring result is obtained;

'CEO' means Chief Executive Officer;

'CEO' for the purposes of-notification means:

Director General
Department Administering the Act
Locked Bag 33 Cloisters Square
PERTH WA 6850
Email: info-der@dwer.wa.gov.au;

'Clean Fill' has the meaning defined in the Landfill Definitions;

'Department' means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the Act;

'freeboard' means the distance between the maximum water surface elevations and the top of retaining banks or structures at their lowest point;



'GLpa' means gigalitres per annum;

'HDPE' means high density polyethylene;

'Inert Waste Type 1' has the meaning defined in the Landfill Definitions;

'Landfill Definitions' means the document titled "Landfill Waste Classification and Waste Definitions 1996" published by the Chief Executive Officer of the Department of Environment as amended from time to time;

'Licence' means this Licence numbered L8454/2010/2 and issued under the Act;

'Licensee' means the person or organisation named as Licensee on page 1 of the Licence;

'mbgl' means metres below ground level;

'MW' means megawatts;

'NATA' means the National Association of Testing Authorities, Australia;

'NATA accredited' means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis;

'NTU' means Nephelometric Turbidity Unit;

'normal operating conditions' means any operation of a particular process (including abatement equipment) excluding start-up, shut-down and upset conditions, in relation to stack sampling or monitoring;

'Premises' means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Licence;

'putrescible waste' has the meaning defined in the Landfill Definitions;

'quarterly' means the 4 inclusive periods from 1 January to 31 March, 1 April to 30 June, 1 July to 30 September, 1 October to 31 December;

'Schedule 1' means Schedule 1 of this Licence unless otherwise stated;

'Schedule 2' means Schedule 2 of this Licence unless otherwise stated;

'spot sample' means a discrete sample representative at the time and place at which the sample is taken;

'WWTP' means wastewater treatment plant; and

'µS/cm' means microsiemens per centimetre.

1.1.3 Any reference to an Australian or other standard in the Licence means the relevant parts of the standard in force from time to time during the term of this Licence.

1.1.4 Any reference to a guideline or code of practice in the Licence means the version of that guideline or code of practice in force from time to time, and shall include any amendments or replacements to that guideline or code of practice made during the term of this Licence.



1.2 Premises operation

- 1.2.1 The Licensee shall ensure that all pipelines or sections of pipelines containing tailings are either:
- equipped with telemetry; or
 - equipped with automatic cut-outs in the event of a pipe failure; or
 - provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections.
- 1.2.2 The Licensee shall ensure that the waste material specified in Table 1.2.1 is only stored and/or treated within vessels or compounds listed in Table 1.2.1 and identified on the map of containment infrastructure in Schedule 1, in accordance with the requirements specified within Table 1.2.1.

Table 1.2.1: Containment infrastructure		
Storage vessel or compound	Material	Requirements
Windich TSF 1 Windich TSF 2 Vasse TSF Flinders In-Pit TSF	Tailings	<ul style="list-style-type: none"> Maintain a minimum freeboard equivalent to that required to contain a 1 in 100 year storm event over 72 hours from the operational pond surface to lowest elevation of perimeter embankment Install, maintain and operate a supernatant water collection and return system only when a recoverable volume of water is present.
Flinder's Decant Settlement Pond, Franco's Turkey's Nest (Village Road), Ollies Turkey's Nest, Remote Crushing Hub 2 Evaporation Pond, M16, TLO Settlement Pond (Jeffer), Windich Decant Sediment Pond and Vasse Decant Settlement Pond	Brackish water	<ul style="list-style-type: none"> Earthen Pond; and Minimum vertical freeboard of 100 mm
OPF1 Turkey's Nest, OPF2 Turkey's Nest, Ruby Turkey's Nest, Akmar Turkey's Nest, Baltic Turkey's Nest, Caspian Turkey's Nest, Charlton Turkey's Nest, Codgers Transfer Pond,	Saline or Brackish water	<ul style="list-style-type: none"> HDPE liner; and Minimum vertical freeboard of 200 mm



Crank Transfer Pond, Erin Turkey's Nest, Eyre Turkey's Nest, Gatehouse Turkey's Nest, Helsinki Turkey's Nest (RCH1), Laura's Turkey's Nest, Windich Ponds x 3 and Young ¹ Settlement Ponds		
CCY1 Treatment Ponds 1, 2 and 3	Potentially hydrocarbon contaminated treated wastewater from the CCY1 oily water separator	<ul style="list-style-type: none"> • HDPE liner; and • Minimum vertical freeboard of 200 mm
CCY2 Treatment Ponds 1 and 2	Potentially hydrocarbon contaminated treated wastewater from the CCY2 oily water separator	<ul style="list-style-type: none"> • HDPE liner; and • Minimum vertical freeboard of 200 mm
Power Station pond	Potentially hydrocarbon contaminated treated wastewater from the Bulk Diesel Storage Facility oily water separator	<ul style="list-style-type: none"> • HDPE liner; and • Minimum vertical freeboard of 200 mm

Note 1: Containment infrastructure requirements apply to Young Settlement Pond following construction and submission of compliance documentation, as required under condition 4.3.1 of this Licence.

1.2.3 The Licensee shall:

- (a) undertake inspections as detailed in Table 1.2.2;
- (b) where any inspection identifies that an appropriate level of environmental protection is not being maintained, take corrective action to mitigate adverse environmental consequences as soon as practicable; and
- (c) maintain a record of all inspections undertaken.

Table 1.2.2: Inspection of infrastructure		
Scope of inspection	Type of inspection	Frequency of inspection
Tailings delivery pipelines	Visual integrity	Daily whilst operational
Tailings decant water return pipelines	Visual integrity	Daily whilst operational
Tailings storage facility embankment freeboard	Visual to confirm required freeboard capacity is available	Daily whilst operational
Saline water infrastructure (transfer ponds, settlement ponds and pipelines)	Visual integrity	Daily



- 1.2.4 The Licensee shall undertake annual water balance for the TSFs. The water balance shall as a minimum consider the following:
- site rainfall;
 - evaporation;
 - tailings return water recovery volumes;
 - seepage recovery volumes; and
 - volumes of tailings deposited.
- 1.2.5 The Licensee shall ensure that where wastes produced on the Premises are not taken off-site for lawful use or disposal, they are managed in accordance with the requirements in Table 1.2.3.

Table 1.2.3: Management of waste ^{1 2 3}		
Waste type	Management strategy	Requirements
Sewage	Biological, physical and chemical treatment	1,040 m ³ /day cumulatively
Used tyres	Storage	<ul style="list-style-type: none"> Not more than 2,000 used tyres shall be stored at the premises at any one time; Used tyre stacks shall not exceed 500 tyres per stack and 5 m in height; Used tyre stacks are to be stored no less than 6 m from any other tyre stacks; and The waste tyre stockpiles shall not exceed 1000 m² in area
	Burial in waste rock materials or completed mining voids	<ul style="list-style-type: none"> Tyres must be placed in cells of less than 1000 tyres and only in those locations shown on the Map of emission points in Schedule 1; Cover of at least 1 m of waste rock will be placed over each cell; and Cell locations where tyres are to be buried will be surveyed and the latitude and longitude recorded
Inert Waste Type 1	Receipt, handling and disposal of waste by landfilling	<u>All waste types</u> <ul style="list-style-type: none"> No more than 10,000 tonnes per year of all waste types cumulatively shall be disposed of by landfilling; Disposal of waste by landfilling shall only take place within the landfill area shown on the Map of emission points in Schedule 1; Disposal of untreated timber and concrete in mining voids and waste rock facilities shall only occur at the locations shown on the Map of emissions points in Schedule 1; Waste shall be placed in a defined trench or within an area enclosed by earthen bunds; The active tipping area shall be restricted to a maximum linear length of 60 m; and Construction, operation and decommissioning of landfill cells can occur
Putrescible Waste		
Clean Fill and Bioremediated soils as described for Class II Waste within "Landfill Classification and Waste Definitions 1996 and as amended"		



		<p>within the defined landfill area providing there is no waste within:</p> <ul style="list-style-type: none"> ○ 100 m of any surface water body; and ○ 3 m of the highest level of the water table aquifer
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Note 1: Requirements for landfilling tyres are set out in Part 6 of the *Environmental Protection Regulations 1987*.

Note 2: Additional requirements for the acceptance and landfilling of Controlled waste (including asbestos and tyres) are set out in the *Environmental Protection (Controlled Waste) Regulations 2004*.

Note 3: Clean fill can also be used as cover for landfill capping.

1.2.6 The Licensee shall ensure that cover is applied and maintained on landfilled wastes in accordance with Table 1.2.4 and that sufficient stockpiles of cover are maintained on site at all times.

Table 1.2.4: Cover requirements ¹			
Waste Type	Material	Depth	Timescales
Putrescible waste	Inert and incombustible material	300 mm	As soon as practicable, but at least weekly, after deposit
All waste		1,000 mm	Within three months of the final waste load in each trench

Note 1: Additional requirements for the covering of tyres are set out in Part 6 of the *Environmental Protection Regulations 1987*.

1.2.7 The Licensee is to ensure that windblown waste within and outside the landfill area is collected on at least a monthly basis and returned to the active tipping area.

1.2.8 The Licensee shall ensure the limits specified in Table 1.2.5 are not exceeded.

Table 1.2.5: Production or design capacity limits ¹		
Category ₁	Category description¹	Premises production or design capacity limit
5	Processing or beneficiation of metallic or non-metallic ore	77,000,000 tonnes per annual period
6	Mine dewatering	43,000,000 tonnes per annual period reinjected
52	Electric power generation	56 MW
73	Bulk storage of chemicals	15,183.1 cubic metres in aggregate

Note 1: *Environmental Protection Regulations 1987*, Schedule 1.

1.2.9 The Licensee shall construct the Windich Above-Ground TSF, Flinders In-Pit TSF and Young Settlement Pond in accordance with the documentation and specifications detailed in Table 1.2.6. The Licensee must not depart from the design and construction requirements specified in Table 1.2.6 except:

- (a) where such departure is minor in nature and does not materially change or affect the infrastructure; or
- (b) where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment;

and all other conditions in this Licence are still satisfied.



Table 1.2.6: Infrastructure to be constructed ¹	
Infrastructure	Specifications (design and construction)
<i>Windich Above-Ground TSF</i>	
1) Embankment construction	In accordance with, <i>Windich Above-Ground Tailings Storage Facility – Detailed Design</i> (SRK Consulting, October 2015)
2) Tailings delivery	Use of existing Windich TSF 1 and Windich TSF 2 tailings delivery pipelines and spigot arrangements
3) Supernatant Water Recovery	Use of the existing Windich TSF 1 and Windich TSF 2 water recovery pump, pipelines and turkey's nest
<i>Flinders In-Pit TSF</i>	
1) Waste rock dump extension	Extension of the existing waste rock dump between the existing Flinders Strip 12 TSF and Flinders In-Pit TSF to Relative Level 435 m Australian Height Datum (AHD)
2) Tailings deposition pipeline	<ul style="list-style-type: none"> • New pipeline installed between the Ore Processing Facility 2 and crest of the Flinders Pit constructed of 400 mm HDPE with polyethylene lining • Pipelines around crest of the Flinders Pit constructed of 450 mm HDPE • Four spigots on the northern pit crest • Two spigots on the southern pit crest • Flow meters installed at the start and end of the deposition pipelines • Pressure sensors installed along deposition pipelines with appropriate infrastructure installed to alert the ore processing facility control room of a leak or failure
3) Supernatant water recovery	<ul style="list-style-type: none"> • HDPE return water pipeline from the Flinders In-Pit TSF to Ore Processing Facility 2 process water pond
Young settlement pond	<ul style="list-style-type: none"> • HDPE liner • Overflow weir • Level sensors and equipped with telemetry infrastructure

Note 1: Where the details and commitments of the documents listed in Condition 1.2.9 are inconsistent with any other condition of this Licence, the conditions of this Licence shall prevail.

1.2.10 The Licensee shall operate the Windich Above-Ground TSF and Flinders In-Pit TSF in accordance with the conditions of this Licence, following submission of the compliance document required under condition 4.3.1.

1.2.11 The Licensee shall implement a leak detection system on the saline/hypersaline pipelines, as identified on the map of environmentally sensitive areas depicted in Schedule 1, in accordance with the following implementation schedule:

- (a) Phase 1 – Detailed engineering of the optimal leak detection system following on site pilot testing and procurement of new equipment to be completed by quarter 1 of the 2018 financial year; and
- (b) Phase 2 – Installation, testing and commissioning of the leak detection system to be completed by quarter 4 of the 2018 financial year.



2 Emissions

2.1 Point source emissions to air

2.1.1 The Licensee shall ensure that where waste is emitted to air from the emission points in Table 2.1.1 and identified on the map of emission points in Schedule 1, it is done so in accordance with the conditions of this Licence.

Table 2.1.1: Emission points to air			
Emission point reference and location on Map of emission points	Emission Point	Emission point height (m)	Source, including any abatement
A1 – A27	27 x 2 MW Cummins diesel genset	9.4	Diesel fired genset engine; low sulphur diesel fuel
A28	1 x 2 MW Caterpillar C175 genset	9.4	

2.2 Point source emissions to surface water

2.2.1 The Licensee shall ensure that where waste is emitted to surface water from the nominated contingency discharge points in Table 2.2.1 and identified on the map of emission points in Schedule 1 it is done so in accordance with the conditions of this Licence.

Table 2.2.1: Point source emissions to surface water		
Emission point reference	Description	Source, including any abatement
DP11 (W1) CCDP01 (W2) CCDP02 (W3) CCDP03 (W4)	Contingency discharge of mine dewater in the event that reuse, reinjection, in pit disposal and temporary storage are not available or have been exhausted	Mine dewater

2.3 Point source emissions to groundwater

2.3.1 The Licensee shall ensure that where waste is emitted to groundwater from the emission points in Table 2.3.1 and identified on the map of emission points in Schedule 1, it is done so in accordance with the conditions of this Licence.

Table 2.3.1: Emissions to groundwater			
Emission point reference		Description	Source including abatement
<u>Saline Injection Zone</u>	<u>Brackish Injection Zone</u>	Direct injection below ground	Water from mine dewatering
SAI01	HSB42		
SAI01A	HSB43		
SAI02	HSB44		
SAI03A	HSB45		
SAI03B	HSB46		
SAI04	HSB47		
SAI04A	HSB48		
SAI04B	HSB49		
SAI05	HSB50		
SAI05B	HSB51		
SAI06	HSB52		



SAI07	HSB53		
SAI08	HSB54		
SAI09	HSB55		
SAI10	HSB56		
SAI11	HSB57		
SAI12	HSB58		
SAI12a	HSB59		
SAI12b	HSB60		
SAI13	HSB61		
SAI13A	HSB62		
SAI14	HSB63		
SAI14A			
SAI15			
SAI15A			
SAI16			
SAI16A			
SAI16B			
SAI17			
SAI17B			
SAI18			
SAI18B			
SAI19			
SAI20			
SAI20A			
SAI20B			
SAI21			
SAI21A			
SAI21B			
SAI22			
SAI22A			
SAI23			
SAI23R			
SAI23A			
SAI24			
SAI25			
SAI26			
SAI27			
SAI28			

2.4 Emissions to land

2.4.1 The Licensee shall ensure that where waste is emitted to land from the emission points in Table 2.4.1 and identified on the map of emission points in Schedule 1, it is done so in accordance with the conditions of this Licence.

Table 2.4.1: Emissions to land

Emission point reference	Description	Source including abatement
L1 – Karntama irrigation area	Pipe feeding irrigation area of 13 ha	Treated wastewater from Karntama WWTP and reverse osmosis reject water
L2 – Construction Camp irrigation area	Pipe feeding irrigation area of 15 ha	Treated wastewater pipeline from Construction Camp WWTP



3 Monitoring

3.1 General monitoring

3.1.1 The Licensee shall ensure that:

- (a) all water samples are collected and preserved in accordance with AS/NZS 5667.1;
- (b) all wastewater sampling is conducted in accordance with AS/NZS 5667.10;
- (c) all surface water sampling is conducted in accordance with AS/NZS 5667.4 or AS/NZS 5667.6 as relevant;
- (d) all groundwater sampling is conducted in accordance with AS/NZS 5667.11; and
- (e) all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured unless indicated otherwise in the relevant table.

3.1.2 The Licensee shall ensure that:

- (a) monthly monitoring is undertaken at least 15 days apart;
- (b) quarterly monitoring is undertaken at least 45 days apart;
- (c) six monthly monitoring is undertaken at least 5 months apart; and
- (d) annual monitoring is undertaken at least 9 months apart.

3.1.3 The Licensee shall ensure that all monitoring equipment used on the Premises to comply with the conditions of this Licence is calibrated in accordance with the manufacturer's specifications.

3.1.4 The Licensee shall, where the requirements for calibration cannot be practicably met, or a discrepancy exists in the interpretation of the requirements, bring these issues to the attention of the CEO accompanied with a report comprising details of any modifications to the methods.

3.2 Monitoring of point source emissions to surface water

3.2.1 The Licensee shall undertake the monitoring in Table 3.2.1 according to the specification in that table.

Table 3.2.1: Monitoring of point source emissions to surface water				
Emission point reference	Parameter	Limit	Units	Frequency
DP11 (W1) CCDP01 (W2) CCDP02 (W3) CCDP03 (W4)	Electrical conductivity	15,000	µS/cm	1) 30 minutes following commencement of discharge 2) 24 hourly intervals thereafter during the duration of the contingency discharge event
	Turbidity	100	NTU	
	Cumulative water meter readings	-	m ³	1) prior to discharge event at the designated discharge point 2) 24 hourly intervals for the duration of the contingency discharge event



3.3 Monitoring of point source emissions to groundwater

3.3.1 The Licensee shall undertake the monitoring in Table 3.3.1 according to the specification in that table.

Table 3.3.1: Monitoring of point source emissions to groundwater			
Emission point reference	Parameter	Units	Frequency
Each saline and brackish reinjection emission point referenced in Table 2.3.1	Cumulative volume ¹	GLpa	Annually
CCSP001 (Hillside East Brackish Injection Borefield) CCSP0011 and CCSP0015 (Saline Injection Borefield)	pH ²	-	Six monthly when reinjecting
	Electrical Conductivity	µS/cm	
	Total Dissolved Solids	mg/L	
	Total Suspended Solids	mg/L	
	Major cations and anions – Sodium Potassium Calcium Magnesium Chloride Alkalinity Sulfate Nitrate	mg/L	
	Metals, Metalloids and Non-metals - Aluminium Antimony Arsenic Beryllium Boron Cadmium Chromium Cobalt Copper Iron Manganese Mercury Nickel Lead Selenium Silver Zinc	mg/L	

Note 1: Determined using water balance calculations consistent with the *Christmas Creek Groundwater Operating Strategy* (CC-PH-HY-0002).

Note 2: In-field non-NATA accredited analysis permitted.

3.4 Monitoring of emissions to land

3.4.1 The Licensee shall undertake the monitoring in Table 3.4.1 according to the specifications in that table.



Table 3.4.1: Monitoring of emissions to land			
Emission point reference	Parameter	Units	Frequency
L1, L2	Volumetric flow rate of effluent discharged to irrigation	m ³ /day	Monthly
	Volumetric flow rate of effluent discharged to dust suppression	m ³ /day	Monthly
	Biochemical Oxygen Demand	mg/L	Quarterly
	Total suspended solids	mg/L	Quarterly
	Total dissolved solids ²	mg/L	Quarterly
	pH ¹	-	Quarterly
	Total Nitrogen	mg/L	Quarterly
	Total Phosphorus	mg/L	Quarterly
	<i>E. coli</i>	cfu/100mL	Quarterly

Note 1: In-field non-NATA accredited analysis permitted.

Note 2: Analysis of total dissolved solids applies to emission point L1 only.

3.5 Process monitoring

3.5.1 The Licensee shall undertake the monitoring in Table 3.5.1 according to the specifications in that table.

Table 3.5.1: Process monitoring				
Emission point reference	Monitoring point location	Parameter	Units	Frequency
CCY1 and CCY2 treatment ponds	Final treated wastewater storage pond prior to reuse for dust suppression	Volumetric flow rate	m ³ /day	Monthly
		Total Recoverable Hydrocarbons	mg/L	
		Total Dissolved Solids	mg/L	

3.6 Ambient environmental quality monitoring

3.6.1 The Licensee shall undertake the monitoring in Table 3.6.1 according to the specifications in that table.

Table 3.6.1 Monitoring of ambient groundwater quality				
Monitoring point reference and location ²	Parameter	Units	Averaging period	Frequency
Windich Above-Ground Tailings Storage Facility				
WDM02 WDM08 (786171 E, 7522569 N) WDM12 (784780 E, 7521869 N) WDM13 (786744 E,	Standing water level	mbgl	Spot sample	Six monthly
	pH ¹	-		
	Electrical conductivity	µS/cm		
	Total Dissolved Solids	mg/L		
	Major cations and anions – Sodium	mg/L		



7520716 N)	Potassium Calcium Magnesium Chloride Sulfate			
WDM22				
WDM26	Dissolved metals, metalloids and non- metals – Aluminium Antimony Arsenic Beryllium Boron Cadmium Cobalt Chromium Copper Iron Manganese Mercury Nickel Lead Selenium Silver Thallium Uranium Zinc	mg/L		
Flinders Strip 12 In-Pit Tailings Storage Facility				
FLM06	Standing water level	mbgl	Spot sample	Monthly
	pH ¹	-	Spot sample	Quarterly
FLM08	Electrical conductivity	µS/cm	Spot sample	Quarterly
FLM17	Total Dissolved Solids	mg/L	Spot sample	Quarterly
CCE04MB	Major cations and anions Sodium Potassium Calcium Magnesium Chloride Sulfate	mg/L	Spot sample	Quarterly
	Dissolved metals, metalloids and non- metals – Aluminium Antimony Arsenic Beryllium Boron Cadmium Cobalt Chromium Copper Iron	mg/L	Spot sample	Quarterly



	Manganese Mercury Nickel Lead Selenium Silver Thallium Uranium Zinc			
Vasse Tailings Storage Facility				
VAM01 (780528 E, 7525182 N)	Standing water level	mbgl	Spot sample	Quarterly
	pH ¹	-		
VAM02 (781048 E, 7525249 N)	Electrical conductivity	µS/cm		
	Total Dissolved Solids	mg/L		
VAM04 (781631 E, 7526182 N)	Major cations and anions – Sodium Potassium Calcium Magnesium Chloride Sulfate	mg/L		
	Dissolved metals, metalloids and non-metals – Aluminium Antimony Arsenic Beryllium Boron Cadmium Cobalt Chromium Copper Iron Manganese Mercury Nickel Lead Selenium Silver Thallium Uranium Zinc	mg/L		
Mine dewater reinjection				
CCFMM01_S CCFMM01_D CCFMM02_S CCFMM02_D CCFMM03_S CCFMM03_D	Standing water level	mbgl	Spot sample	Six monthly
	pH ¹	-		
	Electrical conductivity	µS/cm		



CCFMM04_S CCFMM04_D HSMB29_D HSMB29_S SAM59_D SAM59_S SAM07_D SAM07_S SAM12_S SAM12_D SCX01_S SCX03_S SCX06 (All) SCX06_S SCX06_D	Total Dissolved Solids	mg/L		
	Major cations and anions – Sodium Potassium Calcium Magnesium Chlorine Alkalinity Sulfate Nitrate	mg/L		
	Metals, metalloids and non-metals – Aluminium Antimony Arsenic Beryllium Boron Cadmium Cobalt Chromium Copper Iron Manganese Mercury Nickel Lead Selenium Silver Zinc	mg/L		

Note 1: In-field non-NATA accredited analysis permitted.

Note 2: No sample required if bore is dry.

4 Information

4.1 Records

4.1.1 All information and records required by the Licence shall:

- (a) be legible;
- (b) if amended, be amended in such a way that the original and subsequent amendments remain legible or are capable of retrieval;
- (c) except for records listed in 4.1.1(d) be retained for at least 6 years from the date the records were made or until the expiry of the Licence or any subsequent licence; and
- (d) for those following records, be retained until the expiry of the Licence and any subsequent licence:
 - (i) off-site environmental effects; or
 - (ii) matters which affect the condition of the land or waters.

4.1.2 The Licensee must submit to the CEO an Annual Audit Compliance Report indicating the extent to which the Licensee has complied with the conditions in this Licence for the Annual Period.



4.1.3 The Licensee shall implement a complaints management system that as a minimum records the number and details of complaints received concerning the environmental impact of the activities undertaken at the Premises and any action taken in response to the complaint.

4.2 Reporting

4.2.1 The Licensee shall submit to the CEO an Annual Environmental Report by 31 March each year. The report shall contain the information listed in Table 4.2.1 in the format or form specified in that table.

Table 4.2.1: Annual Environmental Report		
Condition or table (if relevant)	Parameter	Format or form
-	Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken	None specified
-	Update on the implementation of telemetric controls on the saline reinjection infrastructure, as detailed in the document <i>Application to Amend Licence L8454/2010/2 (UID-67507)</i> , 9 March 2017	None specified
Table 2.4.1	L1 and L2 – representative photographs of the irrigation areas, summary of vegetation health and weed management (within the irrigation areas) implemented during reporting period	None specified
3.2.1	Contingency discharge monitoring	None specified
3.3.1	Groundwater reinjection monitoring	None specified
Table 3.4.1	Monitoring of emissions to land and interpretation of results against plant design specifications	None specified
Table 3.5.1	Process monitoring results and interpretation of results	None specified
Table 3.6.1	Ambient groundwater monitoring results; and a comparison of results from the Windich, Vasse and Flinders Strip 12 TSFs groundwater monitoring bores against the site specific trigger values detailed in the document, <i>Life of Mine Geochemistry Programme – Site Specific Trigger Values (45-SY-EN-0001)</i> . Details of investigations conducted, including outcomes, environmental impacts and remedial actions, in relation to trigger exceedances and a discussion of any trends identified.	None specified
4.1.2	Compliance	None specified
4.1.3	Complaints summary	None specified

4.2.2 The Licensee shall ensure that the Annual Environmental Report also contains:

- an assessment of the information contained within the report against previous monitoring results; and
- a list of any original monitoring reports submitted to the Licensee from third parties for the annual period and make these reports available on request.

4.3 Notification

4.3.1 The Licensee shall ensure that the parameters listed in Table 4.3.1 are notified to the CEO in accordance with the notification requirements of the table.



Table 4.3.1: Notification requirements			
Condition or table (if relevant)	Parameter	Notification requirement¹	Format or form²
-	Breach of any limit specified in the Licence	Part A: As soon as practicable but no later than 5pm of the next usual working day. Part B: As soon as practicable	N1
1.2.9	The Licensee shall submit a compliance document to the CEO, following the construction of each of the Windich Above-Ground TSF, Flinders In-Pit TSF and Young Settlement Pond. The compliance document shall: (a) Certify that the works were constructed in accordance with the document "Licence Amendment Application Supporting Information – Christmas Creek CC-AP-EN-0065 (Windich TSF), "Licence Amendment Application Supporting Information – Christmas Creek CC-AP-EN-0066 (Flinders In-Pit TSF) or correspondence dated 9 March 2017 "Application to Amend Licence L8454/2010/2" (Young Settlement Pond); and (b) Be signed by a person authorised to represent the Licensee and contain the printed name and position of that person within the company.	Prior to commencement of commissioning.	None specified
1.2.11	Saline/hypersaline water pipeline telemetry installation	Within 14 days of the completion of works, notify the CEO in writing on the completion of each phase of the saline/hypersaline leak detection system, and provide a report to the CEO which describes the work undertaken and outcome of each phase of implementation.	None specified
2.2.1	Contingency discharge	Within 3 days of cessation of the discharge; and including results from the monitoring required under condition 3.2.1	None specified
3.1.4	Calibration report	As soon as practicable	None specified

Note 1: Notification requirements in the Licence shall not negate the requirement to comply with s72 of the Act

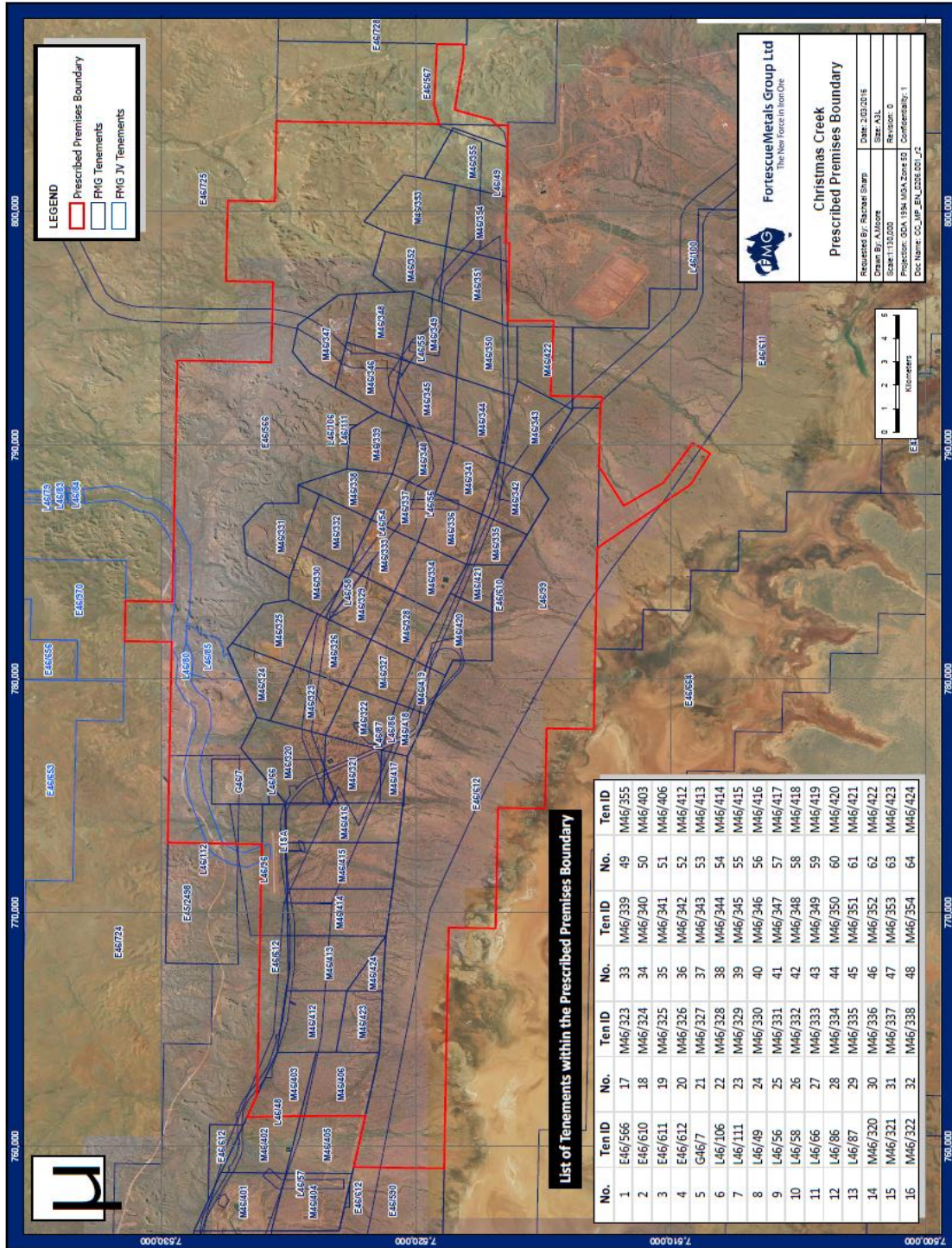
Note 2: Forms are in Schedule 2



Schedule 1: Maps

Premises map

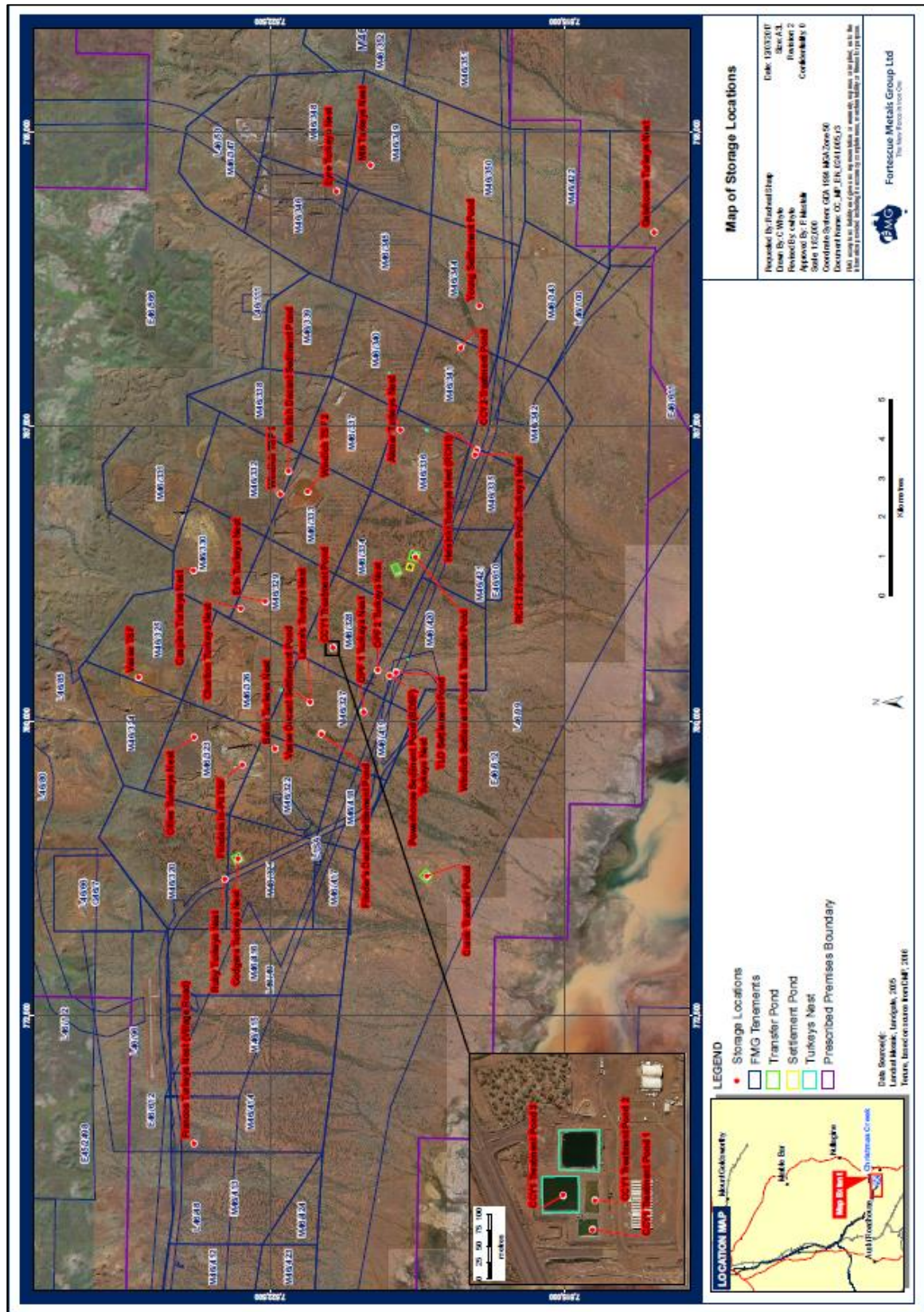
The Premises is shown in the map following. The red line depicts the Premises boundary.





Map of containment infrastructure

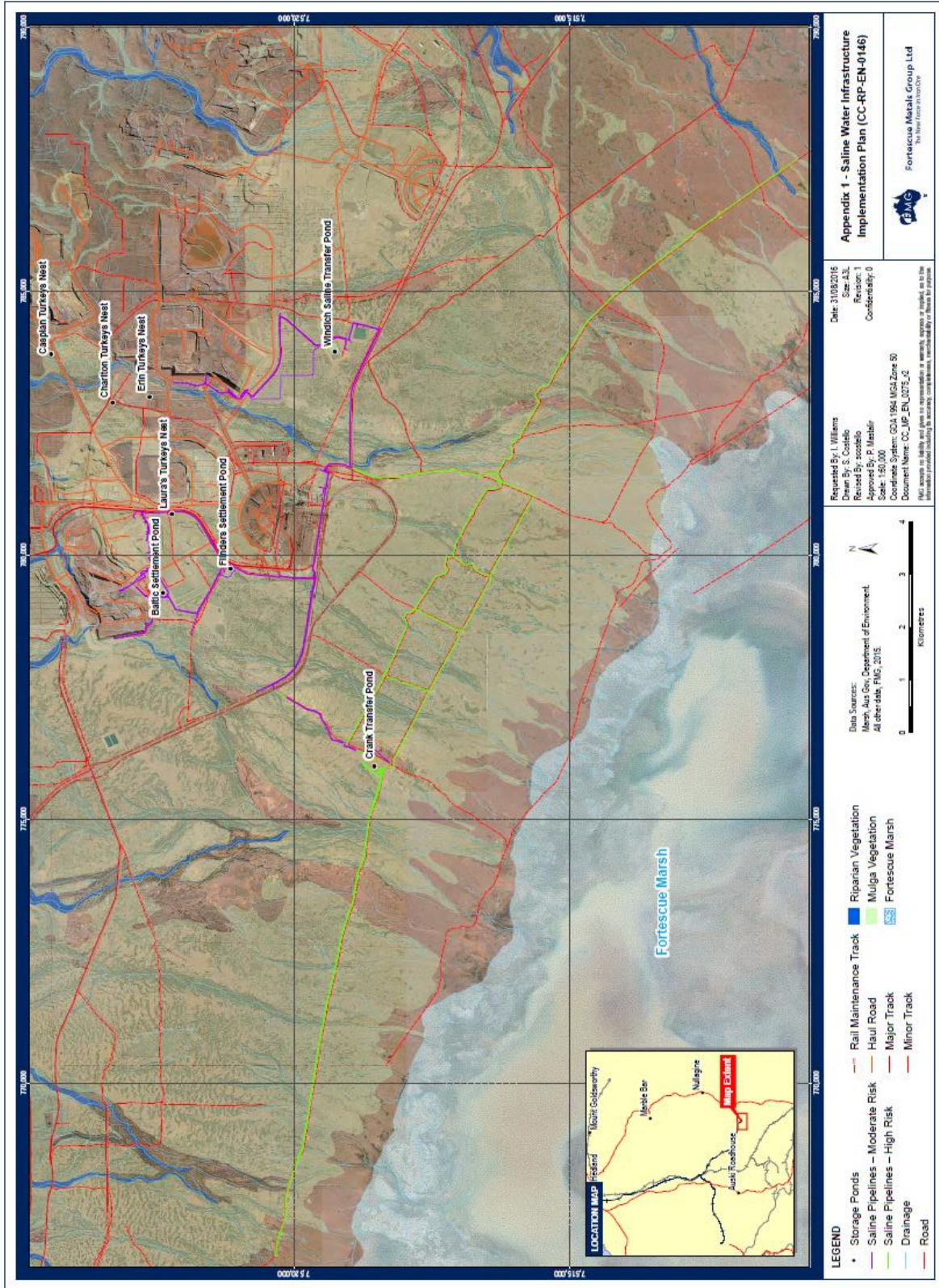
The location of the containment infrastructure defined in Table 1.2.1 are shown in the map below.





Map of environmentally sensitive areas

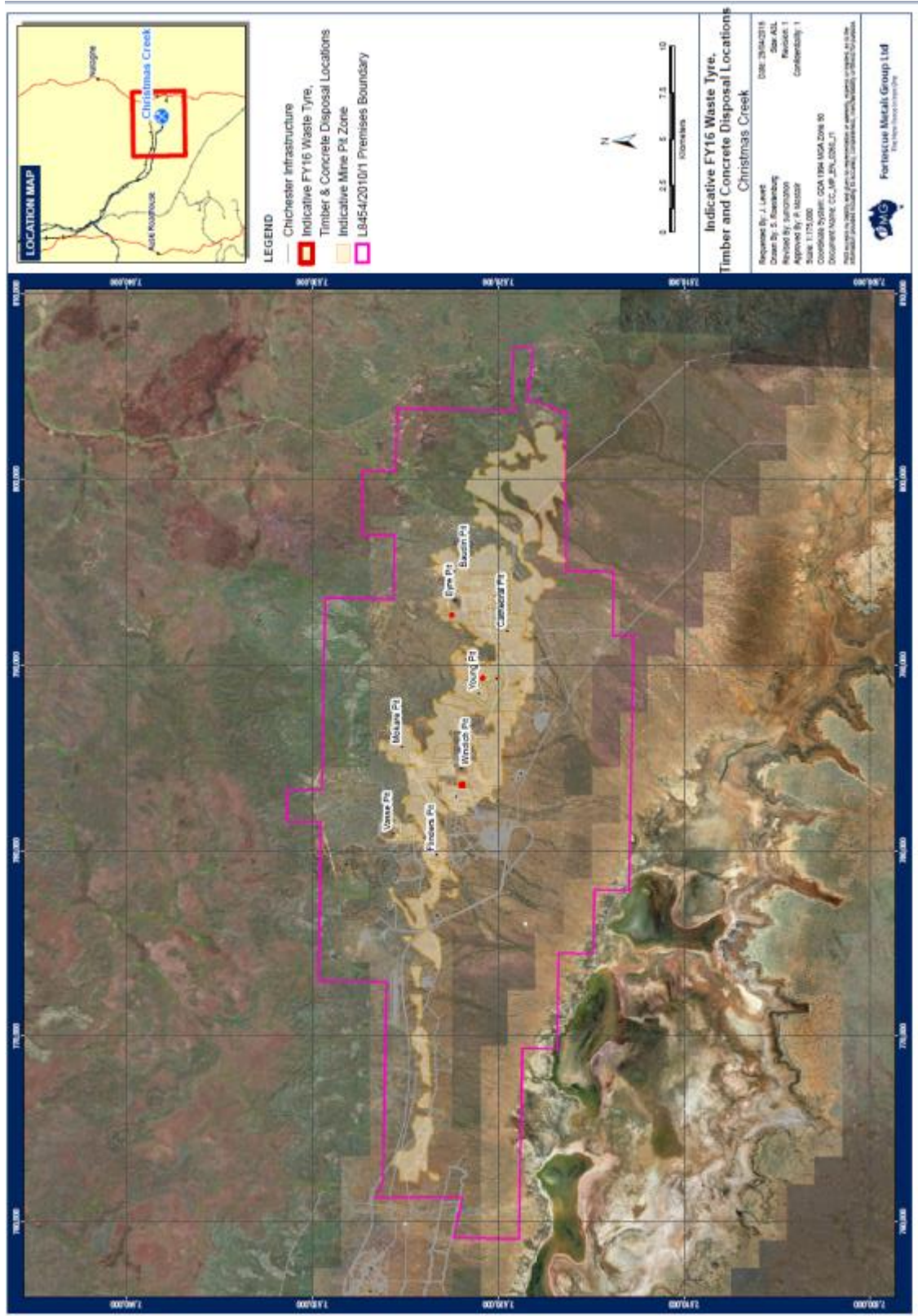
The locations of the environmentally sensitive areas referred to in condition 1.2.11 are shown in the map below.





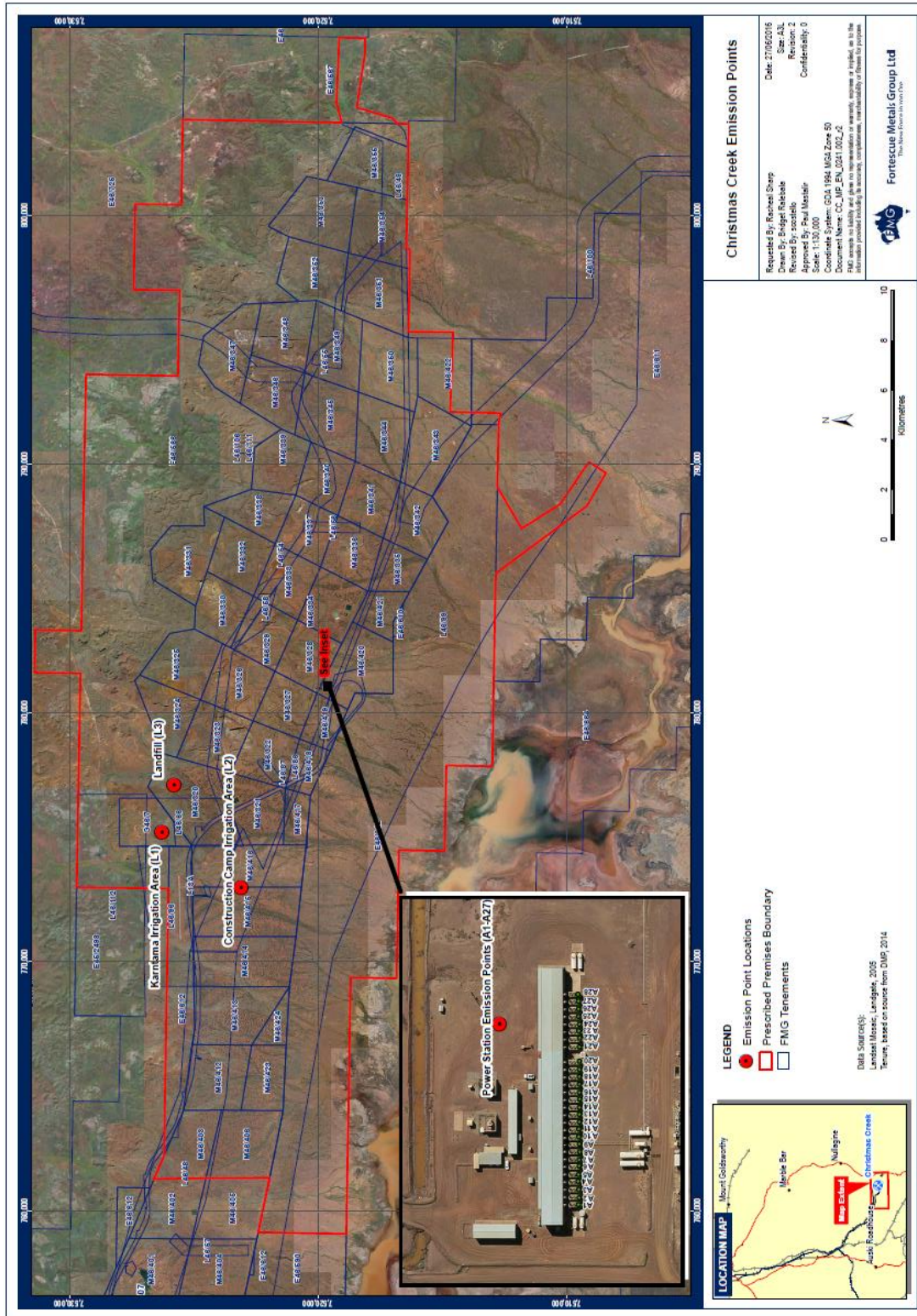
Maps of emission points and monitoring locations

The locations of the used tyres and construction waste disposal locations, defined in Table 1.2.3 are shown in the map below.



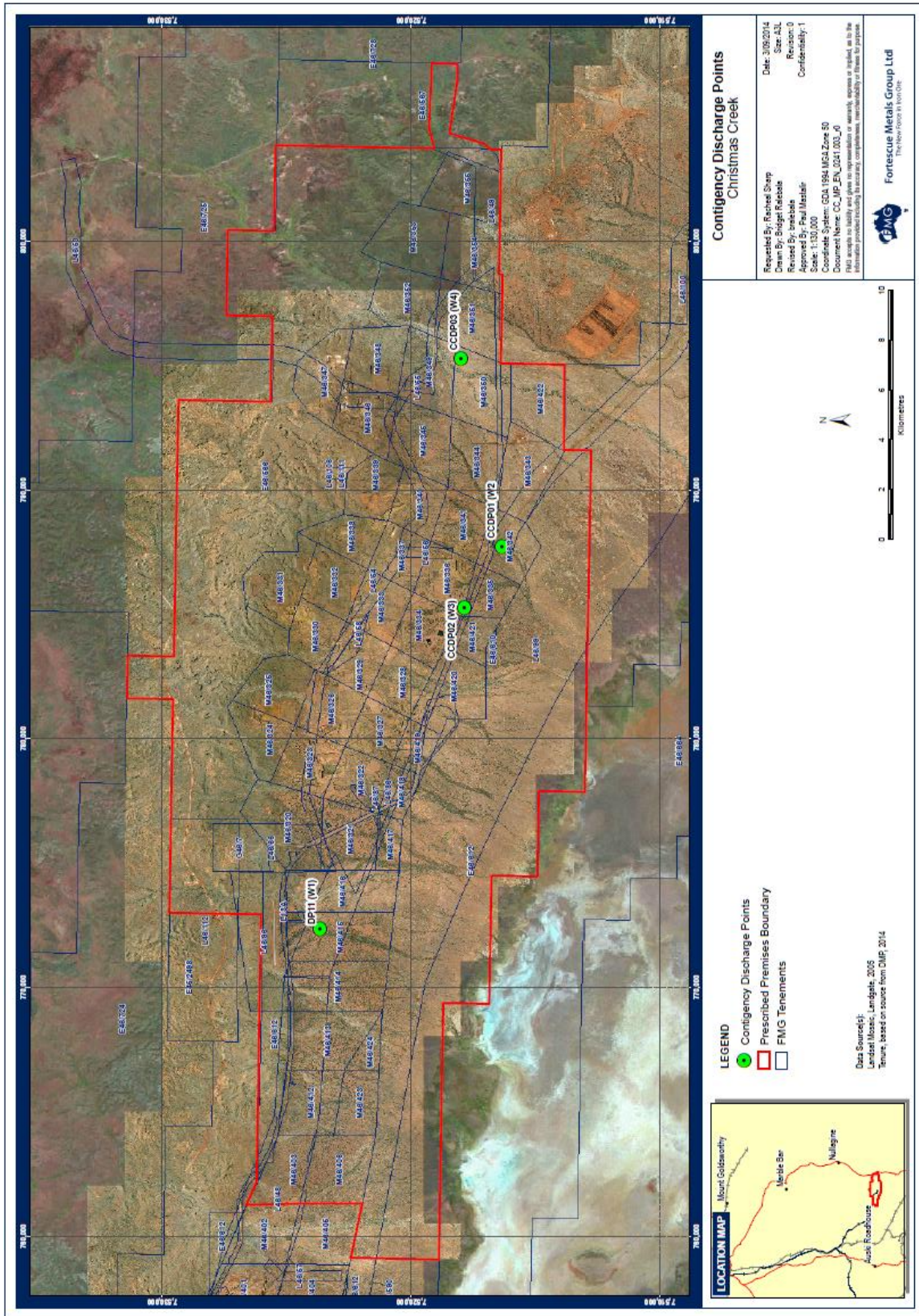


The locations of the emission points defined in Tables 2.1.1 and 2.4.1 and monitoring locations defined in 3.4.1 are shown in the map below.



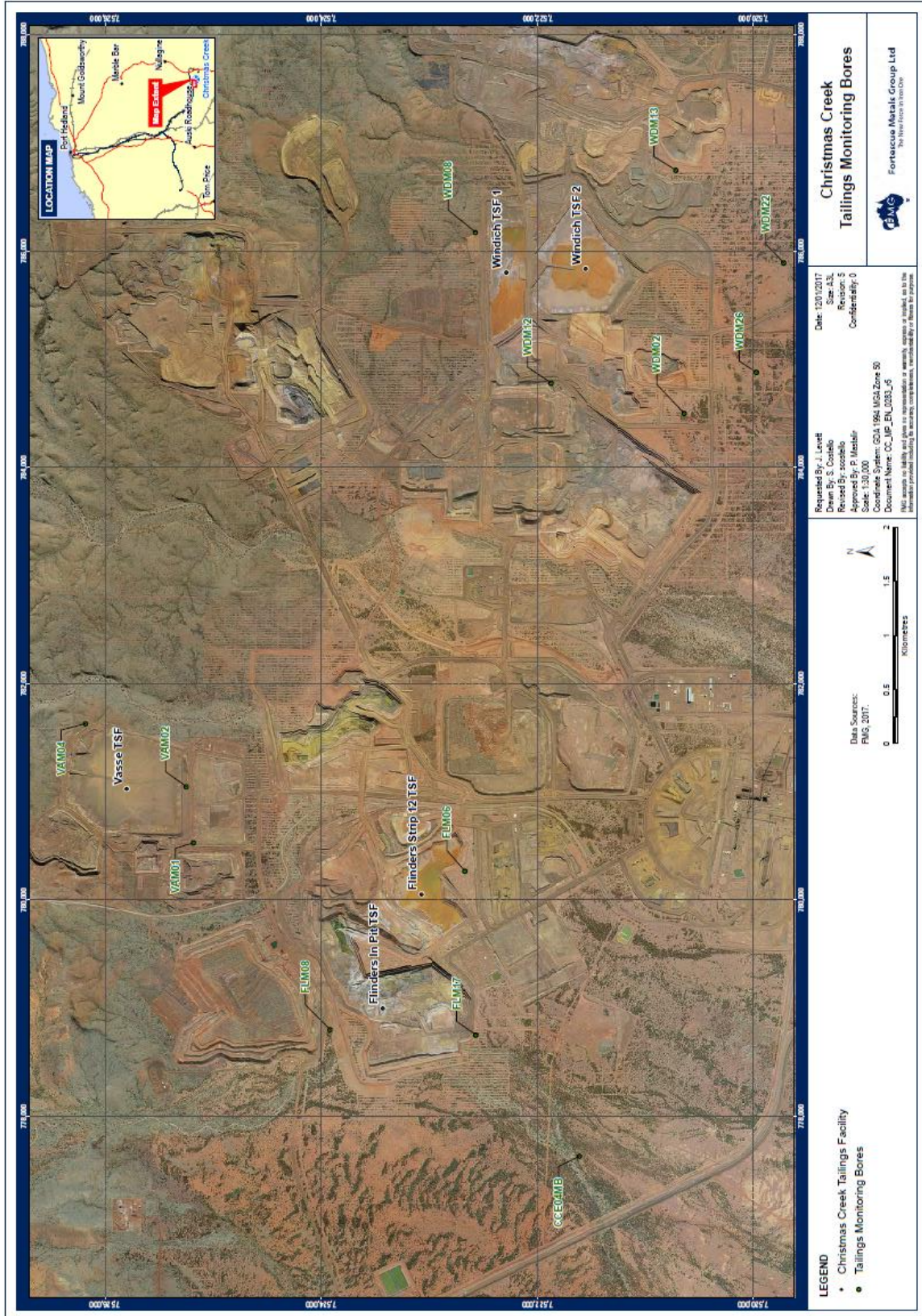


The locations of the emission points defined in Table 2.2.1 and monitoring locations defined in Table 3.2.1 are shown in the map below.





The locations of the TSF monitoring points defined in Table 3.6.1 are shown in the map below.





Schedule 2: Reporting & notification forms

These forms are provided for the proponent to report monitoring and other data required by the Licence. They can be requested in an electronic format.

Licence: L8454/2010/2 Licensee: Chichester Metals Pty Ltd
Form: N1 Date of breach:

Notification of detection of the breach of a limit.

These pages outline the information that the operator must provide.
Units of measurement used in information supplied under Part A and B requirements shall be appropriate to the circumstances of the emission. Where appropriate, a comparison should be made of actual emissions and authorised emission limits.

Part A

Licence Number	
Name of operator	
Location of Premises	
Time and date of the detection	

Notification requirements for the breach of a limit	
Emission point reference/ source	
Parameter(s)	
Limit	
Measured value	
Date and time of monitoring	
Measures taken, or intended to be taken, to stop the emission	

Name	
Post	
Signature on behalf of Chichester Metals Pty Ltd	
Date	



Decision Document

Environmental Protection Act 1986, Part V

Licensee: Chichester Metals Pty Ltd

Licence: L8454/2010/2

Registered office: 87 Adelaide Terrace
EAST PERTH WA 6872

ACN: 109 264 262

Premises address: Christmas Creek Mine Site
Tenements E46/610, E46/612, M46/320, M46/321, M46/322, M46/323,
M46/324, M46/325, M46/326, M46/327, M46/328, M46/329, M46/330,
M46/331, M46/332, M46/333, M46/334, M46/335, M46/336, M46/337,
M46/338, M46/339, M46/340, M46/341, M46/342, M46/343, M46/344,
M46/345, M46/346, M46/347, M46/348, M46/349, M46/350, M46/351,
M46/352, M46/353, M46/354, M46/355, M46/403, M46/406, M46/412,
M46/413, M46/414, M46/415, M46/416, M46/417, M46/418, M46/419,
M46/420, M46/421, M46/422, M46/423, M46/424, G46/7, L46/49, L46/56,
L46/58, L46/86, L46/87, L46/106, L46/111 E46/566 and L46/66
MULGA DOWNS WA 6751

Issue date: Thursday, 20 August 2015

Commencement date: Monday, 24 August 2015

Expiry date: Saturday, 23 August 2036

Decision

Based on the assessment detailed in this document the Department of Water and Environmental Regulation (DWER), has decided to issue an amended Licence. DWER considers that in reaching this decision, it has taken into account all relevant considerations and the Licence and its conditions will ensure that an appropriate level of environmental protection is provided

Decision Document prepared by: Haley Brunel
Licensing Officer

Decision Document authorised by: Alana Kidd
Delegated Officer



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1 Purpose of this Document

This decision document explains how the department has assessed and determined the application and provides a record of DWER’s decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DWER’s assessment and decision making under Part V of the *Environmental Protection Act 1986*. Other approvals may be required for the proposal, and it is the proponent’s responsibility to ensure they have all relevant approvals for their Premises.

2 Administrative summary

Administrative details		
Application type	Works Approval	<input type="checkbox"/>
	New Licence	<input type="checkbox"/>
	Licence amendment	<input checked="" type="checkbox"/>
	Works Approval amendment	<input type="checkbox"/>
Activities that cause the premises to become prescribed premises	Category number(s)	Assessed design capacity
	5	77 million tonnes per year
	6	43 million tonnes per year (injected)
	52	56 MW using fuel other than natural gas
	54	1,040 cubic metres per day
	57	2,000 used tyres
	64	10,000 tonnes per annual period
73	15,183.1 cubic metres in	



		aggregate
Application verified	Date: N/A	
Application fee paid	Date: N/A	
Works Approval has been complied with	Yes <input type="checkbox"/>	No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Compliance Certificate received	Yes <input type="checkbox"/>	No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Commercial-in-confidence claim	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Commercial-in-confidence claim outcome	N/A	
Is the proposal a Major Resource Project?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the <i>Environmental Protection Act 1986</i> ?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
		Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input checked="" type="checkbox"/>
Is the proposal subject to Ministerial Conditions?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
		Ministerial statement No: 1033 EPA Report No: 1567
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the <i>Environmental Protection Act 1986</i>)?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	Department of Water consulted Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises within an Environmental Protection Policy (EPP) Area	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If Yes include details of which EPP(s) here.		
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If Yes, include details here, eg Site is subject to SO ₂ requirements of Kwinana EPP.		

3 Executive summary of proposal and assessment

The Christmas Creek Mine Site (Christmas Creek) is owned and operated by Chichester Metals Pty Ltd (Licensee), a wholly owned subsidiary of Fortescue Metals Group Ltd (FMG). Christmas Creek has been assessed as a “prescribed premises” as it meets the requirements of categories 5, 6, 52, 54, 64 and 73 under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations). Christmas Creek has been in operation since 2010.

Christmas Creek encompasses the following mine and infrastructure:

- open pits;
- run of mine (ROM) pads;
- waste rock dumps;
- remote crushing hub (RCH);
- permanent and mobile ore processing facilities (OPFs);
- tailings storage facilities (TSFs);
- mine dewatering and reinjection infrastructure;
- diesel powered power station;
- wastewater treatment plants and associated spray fields;
- water treatment plant;



- putrescible and inert landfills;
- bulk and satellite fuel storage;
- bioremediation facility;
- workshops and washdown bays; and
- accommodation and administration buildings.

Christmas Creek is located approximately 110 kilometres (km) north of Newman and approximately 70 km south-west of Nullagine in the Pilbara region of Western Australia (Figure 1). The site is within the Mulga Downs and Hillside pastoral leases. Christmas Creek is located directly east of the Cloudbreak Iron Ore Mine which is also owned and operated by the Licensee; and directly west of the Roy Hill Iron Ore Mine which is owned and operated by Roy Hill Iron Ore Pty Ltd.



Figure 1. Regional location of Christmas Creek

Descriptions of the primary activities which fall within the description of the category of prescribed premises in Schedule 1 of the EP Regulations, and of related activities are described below.

Premises description

Category 5 – Processing or beneficiation of metallic or non-metallic ore

The mine comprises a series of open pits, serviced by two OPFs. Mobile crushing and screening facilities support the operation of the OPFs. Two ore products, Rocket and Special Fines, are produced at Christmas Creek.

OPF1 and associated infrastructure covers approximately 238 hectares (ha) and consists of a plant feed system, primary crusher, scrubbing and screening house containing primary and product screens, secondary, tertiary and rolls crushers, desanding plant and ore stockpiles. OPF1 has a design capacity of 29 million tonnes per annum (Mtpa).

OPF2 and associated infrastructure covers approximately 127 ha and consists of a primary crusher, coarse ore storage, wet scrubbing, jig plant (to remove shale), crushing area including secondary and tertiary crushers, desanding plant, stockpiles, stacker and reclaimer. OPF2 has a design capacity of 48 Mtpa.



The RCH operated at Christmas Creek comprises of two ROM bins and apron feeders, mineral sizer for surface mine material, gyratory crusher for drill and blast material, crushed ore vault and transfer conveyors. Ore from the RHC is transferred to the OPFs for further processing via a 7 km long overland conveyor.

To reduce silica and alumina content, low grade ore is subject to wet processing through two desand plants, located at OPF1 and OPF2. Approximately 4 Mtpa of tailings residue, a by-product of the wet processing, is disposed of via deposition into in-pit TSFs. There is currently four TSFs at Christmas Creek; Vasse, Windich, Flinders Strip 12 and Flinders In-Pit TSFs. Currently, only Windich, Flinders Strip 12 and Flinders in-Pit TSF are operational. Tailings deposition into Vasse TSF has ceased as the facility has reached its storage capacity.

Mobile crushing and screening facilities are operated to support the permanent OPFs. No clearing of vegetation is undertaken for the mobile plants, which are generally located in cleared areas adjacent to the OPFs or pits, at remote ROMs or in existing laydown areas. The number of mobile plants on site varies in response to specific operational and construction requirements. In aggregate the permanent OPFs and mobile plants have a production capacity of 77 Mtpa.

Iron ore is transported via rail to FMG's Anderson Point Materials Handling Facility in Port Hedland for export.

Category 6 – Mine dewatering

Groundwater abstraction is undertaken to enable the mining of ore below the water table and provide mine site water supply. Extracted groundwater is used onsite where possible for purposes such as dust suppression and ore processing. Abstracted water in excess of demand is disposed of via injection into the same interconnected aquifer from which the water was taken. The Licensee is currently licensed under Licence L8454/2010/2 to reinject up to 43 GLpa of mine dewater at Christmas Creek.

The mine site sits over three main connected aquifers, the fresh-brackish Tertiary Detritals, brackish Marra Mamba formation and the hypersaline Oakover formation. As approximately 70% of the ore body lies below the water table, mine dewatering provides a large amount of the water supply for Christmas Creek. Excess groundwater is returned to either the Marra Mamba or Oakover formation aquifers by bore reinjection, dependent on salinity.

There is currently 22 brackish water injection bores installed at Christmas Creek, located in areas west of the active mining area (Hillside East). Reinjection in this area typically targets the mineralised Marra Mamba Formation. Saline injection is undertaken between the southern limit of the resource area and the northern limit of the Fortescue Marsh. The Oakover Formation is the target aquifer of the saline reinjection and has a salinity which is typically between 30,000 mg/L to 150,000 mg/L TDS. There is currently 48 saline injection bores in operation at Christmas Creek.

Injection systems consist of networks of injection bores and interconnected pipelines. Water is injected to the bore via a downhole flow control valve, which eliminates air from entering the hole.

Transfer and settlement ponds facilitate the bulk flow transfer and/or settlement of suspended material in mine dewater. Separate facilities exist for the purpose of handling brackish and saline water. All ponds are lined with high density polyethylene (HDPE) and saline transfer ponds have telemetry infrastructure to monitor water level and water level trends. The information is displayed as live data, displayed remotely and SMS messages are sent for any breaches of pre-set levels.

Polyethylene pipe, which complies with Australian Standards, is used to convey water around site. Valves and booster pumps are regularly installed along bulk lines to allow for isolation of sections



should damage occur or during maintenance activities. Flow meters located throughout the water delivery and distribution network are installed in accordance with the *Guidelines for Water Meter Installation* (DoW, 2009) for the purpose of recording flow volumes. Pressure gauges are installed on bulk pipelines approximately every kilometre.

The Licensee is currently undertaking improvements to the saline conveyance infrastructure at Christmas Creek to improve the management of the potential risks associated with the uncontrolled release of saline water to the environment. The Licensee has identified environmentally sensitive areas where telemetry infrastructure will be installed on existing water pipelines, with the aim of improving the detection of uncontrolled releases to accelerate operator response, thereby minimising environmental impacts. This improvement program will be implemented in a staged approach, to be completed by quarter 4 of the 2018 financial year.

Category 52 – Electric power generation

The Christmas Creek Power Station comprises of 28 x 2 megawatt (MW) diesel fuelled Cummins QSK78-G9 generators which provide power for the mine site. Diesel required for the operation of the power station is stored in the existing bulk fuel storage facility at Christmas Creek.

Category 54 – Sewage facility

The Licensee operates two, Category 54 wastewater treatment plants (WWTPs) at Christmas Creek; the Construction Camp WWTP and Karntama Camp WWTP. The WWTPs have a combined design capacity of 1,040 cubic metres per day (m³/day). Treated wastewater from the WWTPs is discharged to land via two separate irrigation areas.

The Licensee operates a sludge handling unit at the Karntama Camp WWTP to treat and dispose of sludge onsite, as opposed to having it removed for offsite disposal. Approximately 3,000 litres per day of sludge is processed, resulting in approximately 320 tonnes of biosolids requiring disposal annually. The biosolids are disposed of within the existing landfill at Christmas Creek in accordance with the *Landfill Waste Classification and Waste Definitions 1996*, as amended (DER 2009). Wastewater produced during the treatment process is returned to the Karntama Village WWTP for treatment. Construction of the Karntama sludge handling unit was approved via an amendment to Licence L8454/2010/2 issued 7 July 2016.

Twelve small Biomax systems, with throughputs less than 20 m³/day, are also operated within the premises; with treated wastewater discharged to separate irrigation areas. These small WWTPs do not meet the production or design capacity of a Category 85 prescribed premises, as specified in Part 2 of Schedule 1 of the EP Regulations. There are no cumulative impacts associated with the operation of the Biomax systems and subsequent discharge of treated wastewater, as treated water is directed to separate irrigation areas. The Delegated Officer has considered the size of the WWTPs and lack of cumulative impacts; and determined not to consider the Biomax systems further in this assessment. The Licensee has a responsibility to comply with the legislative requirements of other government regulators with respect to the operation of these systems, including but not limited to the WA Department of Health. It is also noted that the provisions of the *Environmental Protection (Unauthorised Discharges) Regulations 2004* may apply.

Category 57 – Used tyre storage

The Licensee stores up to 2,000 used tyres on site at any one time in two separate tyre storage areas located at the Central Contractors Yard 1 (CCY1) and Central Contractors Yard 2 (CCY2).

Category 64 – Class II putrescible landfill

The Licensee operates a Class II putrescible landfill at Christmas Creek which accepts up to 5,000 tonnes of waste per annum, as well as a number of used tyre and untreated timber/concrete disposal



locations within waste rock dumps and mining voids. In aggregate, the putrescible and inert waste landfills accept up to 10,000 tonnes of waste per annum.

Category 73 – Bulk storage of chemicals, etc

Christmas Creek has three significant fuel storage areas; the bulk fuel storage facility, the CCY1 and CCY2. These storage areas are supplemented by seven satellite fuel storages around the operational area. A number of smaller mobile fuel storage areas are operated onsite. These mobile facilities are regularly moved, in cases weekly, to where mining is actively taking place. Fuel storage pods of less than 4,000 litres are also located onsite, associated with the groundwater abstraction pumps. These fuel pods are also regularly moved depending on operational requirements. The permanent fuel storage areas and their fuel storage capacity is shown in Table 1.

Table 1: Summary of the fuel storage facilities at Christmas Creek

Location Name	No. of Tanks	Tank Volume (L)	Total Volume (L)
Bulk Fuel Storage Facility	2	3,521,117	7,042,234
Power Station 1 & 2	2	110,000	220,000
Power Station 3	1	52,400	52,400
Power Station 4	1	20,200	20,200
JV and KC Camp	2	10,000	20,000
CCY1	6	100,000	600,000
CCY2	36	110,000	3,960,000
CCY1 MLG Crushing	1	55,000	55,000
CCY2 Young Dome	2	110,000	220,000
CCY2 Orica	1	62,000	62,000
LV's	1	18,000	18,000



	1	19,000	19,000
Diggers Workshop	5	20,000	100,000
Rebuild Workshop	3	55,000	165,000
	3	35,000	105,000
	3	10,000	30,000
CCA Hydrocarbon Tanks	5	80,000	400,000
	4	15,000	60,000

Related activities

The Christmas Creek bioremediation facility and Karntama Camp reverse osmosis (RO) plant do not meet the description of the category of prescribed premises in Schedule 1 of the EP Regulations, however are related to the primary activities and give rise to emissions and discharges; and have therefore been considered in this assessment.

Bioremediation facility

A Bioremediation facility is located near the Windich pit. The facility consists of three pads approximately 25 m in length and width and lined with HDPE liner. The contaminants in the soil to be remediated are hydrocarbons, primarily diesel, hydraulic oil and engine oil.

Water treatment plant

The Licensee operates the Karntama Camp RO plant at Christmas Creek to treat bore water to an acceptable quality for potable use. The design capacity of the RO plant is 375,000 kilolitres per annum. Approximately 200,247 kL of potable water and up to 97,706 kL of reject water is produced annually. Reject water from the treatment process is discharged to the Karntama Camp WWTP irrigation area, accounting for 40% of the irrigated wastewater.

Location and siting

Sensitive land uses

No significant communities are located in the vicinity of Christmas Creek. The nearest sensitive land uses include Roy Hill Station and Marillana Homestead, located 30 km and 41 km respectively from Christmas Creek. There are three pastoral bores located within the premises boundary; these being 22 Mile bore, Ricks bore and Gorge bore. Figure 2 below depicts the location of these bores within the premises boundary.

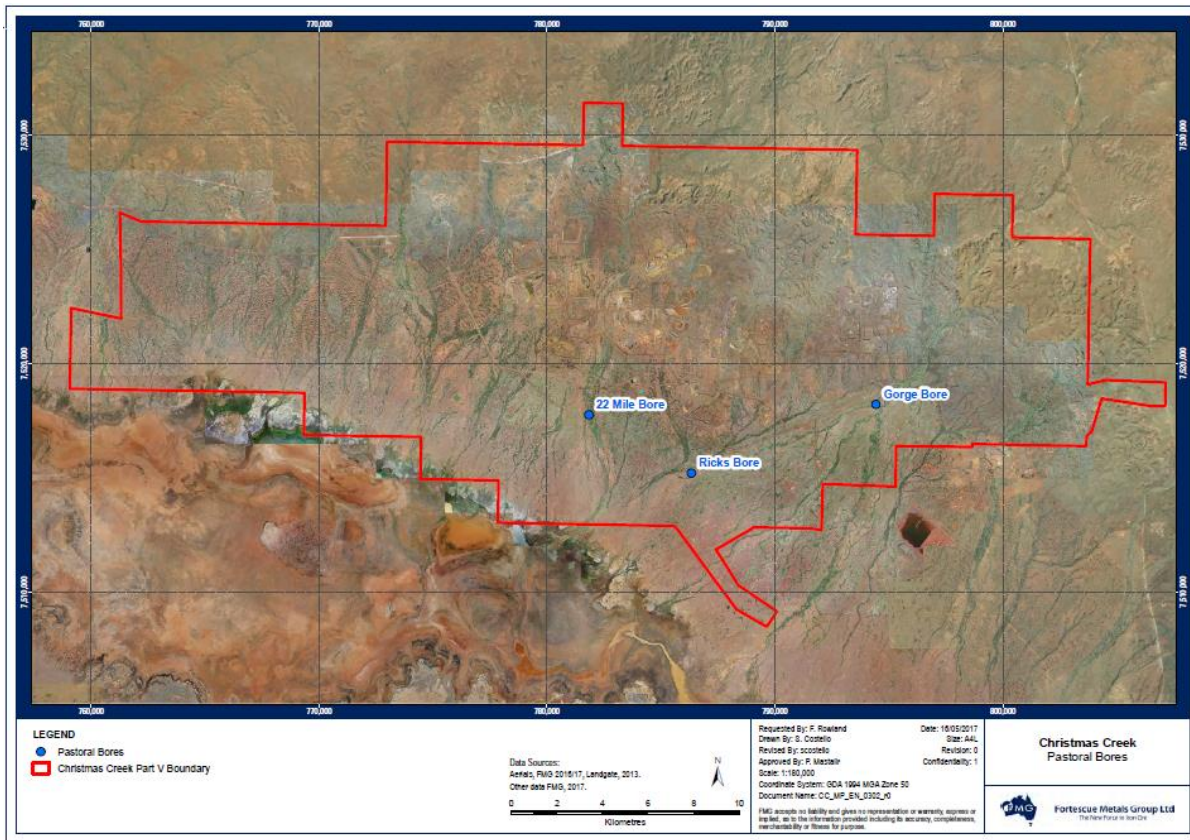


Figure 2. Pastoral bore locations

The workforce for Christmas Creek operates on a fly-in/fly-out basis and is housed at the accommodation camps located within the prescribed premises boundary. As the accommodation camps are operated by the Licensee, they are not considered by DWER to be a sensitive land use or receptor for the purpose of assessing the risks of emissions and discharges associated with the operation of the prescribed activities.

Aboriginal heritage surveys have been undertaken across the site since 2003 which have identified 1,573 heritage sites across Chichester Metal's Christmas Creek and Cloudbreak mine sites. A Cultural Heritage Management Plan has been prepared for the site and the Licensee is required to comply with the requirements of the *Aboriginal Heritage Act 1972*.

Specified Ecosystems

The Guidance Statement: *Environmental Siting* (DER 2016) describes specified ecosystems as areas of high conservation value and special significance that may be impacted as a result of activities upon or emissions and discharges from prescribed premises. The specified ecosystems relevant to Christmas Creek are identified below.

Christmas Creek lies between 1 km to 10 km north of the Fortescue Marsh, which is listed in the Directory of Important Wetlands in Australia (2001) and also listed as a Priority 1, Priority Ecological Community (PEC) by the former Department of Parks and Wildlife (Parks and Wildlife 2016). Figure 3 depicts the location of Christmas Creek relative to Fortescue Marsh. The Christmas Creek mine development envelope intersects the Fortescue Marsh management zones, 1a Northern Flank (highest environmental significance) and 3a Kulbee Alluvial Flank (lowest environmental significance), as defined in the Environmental Protection Authority's (EPA) Section 16(3) of the EP Act advice for



the Fortescue Marsh. The mine development envelope is adjacent to zone 1b Marsh, which is also of highest environmental significance (EPA 2013).

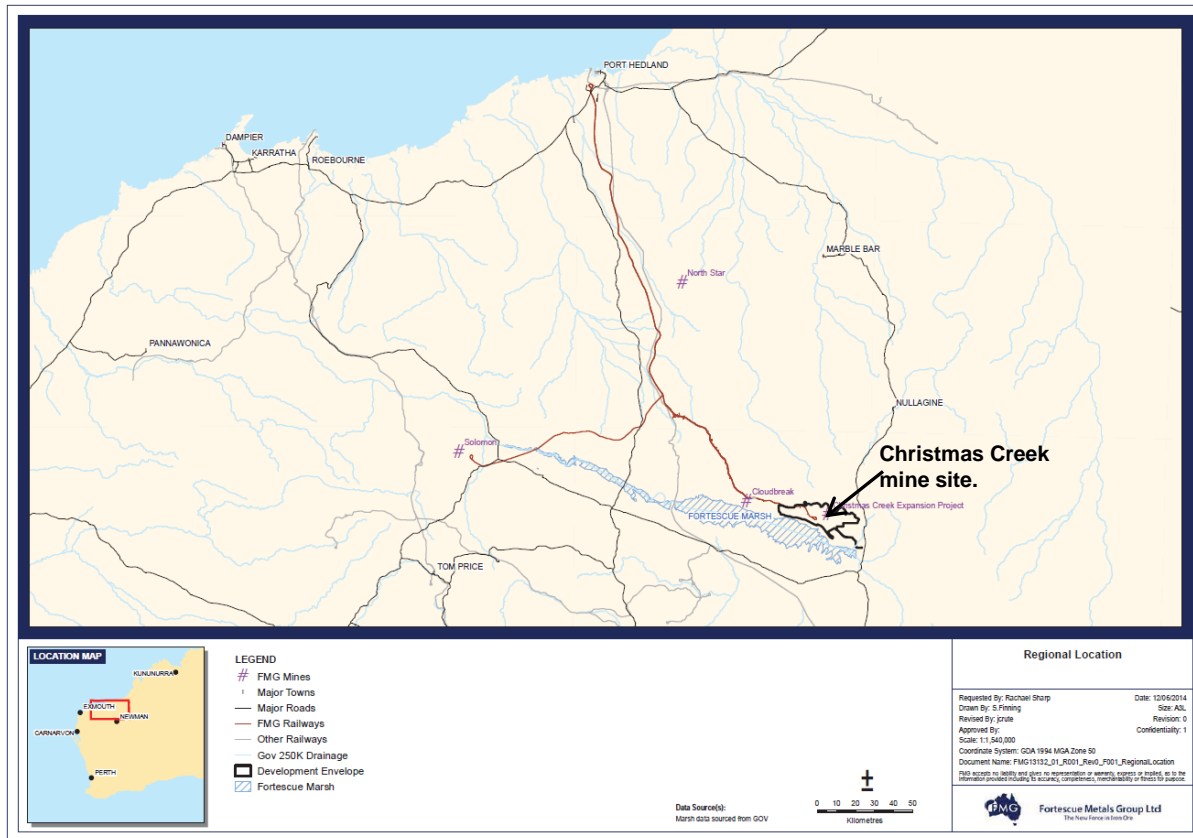


Figure 3. Location of Christmas Creek relative to the Fortescue Marsh

Ecologically important vegetation communities in and adjacent to Christmas Creek include Mulga, Samphire and Coolibah/River Red Gum Vegetation. Mulga vegetation is located within the Fortescue Marsh management zones 1a and 3a (EPA 2013). Mulga is significant as in this area it is the northern extent of Mulga vegetation in Western Australia and is floristically diverse from other Mulga vegetation in the bioregion (EPA 2016). Samphire is locally restricted to the Fortescue Marsh and contains conservation significant flora identified as a value for management zone 1b (EPA 2013). Coolibah and River Red Gum have been identified as ecologically important vegetation communities, occurring along creek lines in and adjacent to the premises.

The Christmas Creek mine development envelope also intersects the proposed Fortescue Marsh Conservation Reserve, which includes pastoral lease exclusion areas. Once established, the conservation reserve will be managed by the Department of Biodiversity, Conservation and Attractions. The EPA recommended in the Section 16(3) of the EP Act advice on *Cumulative environmental impacts of development in the Pilbara region* (EPA 2014) that the lease exclusion area be afforded the highest possible level of conservation tenure (EPA 2016).

Flora and vegetation surveys have identified 15 priority flora within the survey area, comprising five species of Priority 1, one Priority 2, six Priority 3 and two Priority 4.



There are no Threatened flora species pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or Declared Rare Flora (DRF) pursuant to the *Wildlife Conservation Act 1950* (WC Act) recorded within the survey area.

Four habitat types have been identified within the mine development envelope which are likely to support conservation significant fauna (EPA 2016), as follows:

- Marsh (Low halophytic shrubland) – potential habitat for the Greater Bilby and migratory birds;
- Drainage Line and Alluvial Plain (Creekline and shrubland and/or eucalypt open woodland) – potential foraging habitat for Pilbara Olive Python and Pilbara Leaf-nose Bat, and potential habitat for Short Range Endemic (SRE) invertebrate species;
- Low Hill (Spinifex covered hills and ranges) – potential habitat for the Northern Quoll and the Night Parrot, and potential SRE habitat; and
- Stony plain (Snakewood and Mulga woodland) – potential SRE habitat.

Surveys undertaken as part of the Christmas Creek Iron Ore Mine Expansion Project have recorded 313 invertebrate fauna species (43 mammals, 165 birds, 99 reptiles and six amphibians). This included seven species protected under the EPBC Act and WC Act, including:

- Northern Quoll – endangered under the EPBC Act and Schedule 1 under the WC Act;
- Night Parrot – endangered under the EPBC Act and Schedule 1 under the WC Act;
- Greater Bilby – vulnerable under the EPBC Act and Schedule 1 under the WC Act; and
- Pilbara Leaf-nosed Bat – vulnerable under the EPBC Act and Schedule 1 under the WC Act.

The Northern Quoll, Night Parrot and Greater Bilby are identified as values in the Fortescue Marsh management zones 1a and 1b (EPA 2013).

Vegetation and flora

Vegetation within the Christmas Creek project area consists of a mosaic of low woodland with Mulga in valleys and hummock grasslands, low open tree steppe with snappy gum (*Eucalyptus leucophloia*) over *Triodia wiseana*, and kanji (*Acacia pyrifolia*) over soft Spinifex and *Triodia wiseana* hummock grasslands. The project area occurs within the Fortescue Botanical District of the Eremaean Botanical Province (Beard 1975).

Topography

The regional topography is dominated by the Hamersley Plateau in the south and the Chichester Ranges in the north, separated by the Fortescue Valley. The pre-mining topography of the area can be described as gently undulating, with a maximum relief from the Fortescue Valley to the Chichester Ranges of approximately 50-200 metres (m).

Geology and soils

Christmas Creek is located in the Hamersley Basin area of the Pilbara craton. The Chichester Ranges dominates the landscape, comprised of the south dipping Marra Mamba Formation which is overlain by a Quaternary/Tertiary sedimentary sequence, and underlain by the black shales of the Jeerinah Formation at the top of the Fortescue Group. The Oakover Formation comprises a sequence of lacustrine carbonate, silcrete and mudstone rocks that have been deposited in the paleodrainage of the Fortescue Valley (FMG 2014). The orebody mined at Christmas Creek occurs within the mineralised Marra Mamba Formation.

Superficial soils at Christmas Creek comprise clayey gravels and silty gravels, and include fill, alluvium and/or detrital material.



Regional hydrology

Christmas Creek is located in the upper Fortescue River catchment which is subject to localised thunderstorm and cyclonic rainfall events, which generally occur between December to April and can result in very large runoff events (FMG 2013). Numerous creeks from the southern and northern flanks of the Fortescue Valley discharge to the Fortescue Marsh. From the Chichester Ranges, surface water flows in a southerly direction, through the project area, to the Fortescue Marsh.

Broad scale flooding of the Fortescue Marsh occurs on a frequency of about one year in ten, with inundation persisting for three to six months (EPA 2012). Yintas (semi-permanent pools) are located along the northern shoreline of the Fortescue Marsh. Channel flow occurs in the northern part of the project area and sheet flow occurs over land in the broad shallow front within the southern portion of the project area.

Surface water runoff is generally of low salinity and turbidity, which increases during peak periods of flooding. Water stored on the Fortescue Marsh dissipates through evaporation and seepage. The evaporation process increases water salinity levels in the marsh, which is believed to seep into the valley floor alluvial deposits (FMG 2011).

The primary mechanisms for groundwater recharge in the area are infiltration recharge from direct rainfall and local stream flow on Marra Mamba Formation and Tertiary detrital/alluvium, infiltration recharge associated with ponding on the Fortescue Marsh and inflow from aquifers located to the north of the project area. The groundwater system beneath the Fortescue Marsh is considered to be a closed system with limited outflow to the west beneath the Goodardarie Hills.

Groundwater in the project area is generally brackish (>500 milligrams per litre (mg/L) TDS and becomes increasingly saline towards the Fortescue Marsh and with depth (>100,000 mg/L TDS). Salinity increases with depth, with the upper tertiary detritals having a salinity of 1,000 to 2,000 mg/L TDS, Marra Mamba formation reaching up to 6,000 mg/L TDS and the deeper Lower Marra Mamba and Wittenoom formations having a salinity of 5,000 to 11,000 mg/L TDS. The Oakover Formation to the south of the resource area has monitored TDS of up to 150,000 mg/L (EPA 2012).

Meteorology

The climate of the Pilbara is arid tropical, characterised by low and variable rainfall, high daily temperatures, high diurnal temperatures and high evaporation rates. The estimated average rainfall at Christmas Creek is 459 mm and the average annual evaporation is estimated at 3,300 mm. The 1 in 100 year Average Recurrence Interval (ARI), 72-hour storm event for the mine area is approximately 4.8 mm/hour, or a 345 mm event.

Clearing

Ministerial Statement (MS) 1033 published on 8 August 2016 for the Pilbara Iron Ore and Infrastructure project (Christmas Creek Mine, East-West Railway and Mindy Mindy Mine) – Revised Proposal approves the clearing of 17,956 ha of vegetation within a 32,868 ha mine development area.

Part IV of the EP Act

Development of Christmas Creek was authorised by the Minister for Environment under Part IV of the EP Act upon issue of MS707 on 16 December 2005. The Christmas Creek Water Management Scheme (CCWMS) project was referred to the EPA in 2010 and involved an expansion of the dewatering and reinjection scheme at Christmas Creek to allow access to ore below the water table. The CCWMS was approved under MS871 on 8 August 2011.

The Christmas Creek Iron Ore Mine Expansion was referred to the EPA on 5 November 2013 and involves an expansion to the existing mining footprint, permanent waste landforms, tailings disposal, conveyors, roads, drainage and other associated mine infrastructure. The expansion project was



approved under MS1033 (Pilbara Iron Ore and Infrastructure project (Christmas Creek Mine, East-West Railway and Mindy Mindy Mine) – Revised Proposal) on 8 August 2016. MS1033 specifies that the implementation conditions in MS707 and MS871 no longer apply in relation to the proposal from the date of issue of MS1033.

The Christmas Creek Iron Ore Mine Expansion, approved by the EPA under MS1033, will allow iron ore production at Christmas Creek to continue at a rate of 46 to 55 Mtpa, with peaks of up to 85 Mtpa; and mine dewater and reinjection to increase from 50 GLpa to a maximum of 110 GLpa. MS1033 has also increased the approved rate of tailings deposition from 4 Mtpa to 11 Mtpa to a life of project maximum of 144 Mtpa. The Delegated Officer notes that the approved production capacity for Category 5 and 6 currently imposed through Licence L8454/2010/2 will need to be increased prior to the Licensee increasing the rates of ore processing, tailings deposition and mine dewatering as approved under MS1033. A separate licence amendment application will be required to assess works required to facilitate these increases.

The EPA's recommendation to the Minister for Environment with respect to the Christmas Creek Iron Ore Mine Expansion were documented in the *Report and recommendations of the Environmental Protection Authority, Christmas Creek Iron Ore Mine Expansion*, Report 1567 (EPA 2016), which resulted in the issue of MS1033.

The EPA identified the following factors as the key environmental factors during the course of its assessment of the proposal:

1. hydrological processes/inland waters environmental quality (impacts from drawdown and mounding of groundwater, potential changes in surface flow regimes and potential changes in water quality);
2. flora and vegetation (direct impacts from clearing and indirect impacts from groundwater drawdown and mounding, and change to surface water flows);
3. subterranean fauna (potential impacts from loss of habitat due to dewatering and excavation of mine pits);
4. terrestrial fauna (potential impacts from loss of habitat for conservation significant fauna species from clearing of vegetation);
5. rehabilitation and decommissioning (potential long-term impacts to vegetation and fauna habitat if rehabilitation is unsuccessful, and potential long-term impacts to aquifer water quality once dewatering and reinjection ceases); and
6. offsets (to counterbalance the significant residual impacts to native vegetation and vegetation in the proposed Fortescue Marsh Conservation Reserve and Fortescue Marsh management zone 1a.

Other approvals

Iron Ore (FMG Chichester Pty Ltd) Agreement Act 2006

Christmas Creek is subject to the *Iron Ore (FMG Chichester Pty Ltd) Agreement Act 2006*, which ratifies and authorises the development of mining of iron ore by the Licensee within a defined area of the Chichester Ranges, and defines the assistance to be provided by the State government. The Department of Jobs, Tourism, Science and Innovation is responsible for administering this Act.

EPBC Act

On 13 November 2013, the Christmas Creek Iron Ore Mine Expansion project was determined to be a controlled action under the EPBC Act due to potential impact on Matters of National Environmental Significance; listed threatened species and communities, and listed migratory species. The proposal was assessed according to the Bilateral Agreement between the Commonwealth and Western Australian governments. The Christmas Creek Iron Ore Mine Expansion was approved under the EPBC Act on 3 January 2017 (EPBC 2013/7055).



Rights in Water and Irrigation Act 1914 (RIWI Act)

Groundwater abstraction is undertaken to enable mining below the water table and provide mine site water supply. Groundwater is abstracted in accordance with Section 5C licences issued pursuant to the RIWI Act. In accordance with the requirements of the Section 5C licence, the Licensee has developed the *Christmas Creek Groundwater Operating Strategy* (CC-PH-HY-0002, Revision 6, April 2016). This strategy documents the operation of the dewatering, injection and process water supply systems and the management systems to be implemented to monitor and mitigate potential impacts. The Groundwater Operating Strategy requires quarterly and annual monitoring summary reports, and a triennial groundwater monitoring review to be submitted to the Department of Water.

Amendment Notice 1

Amendment Notice 1 for Licence L8454/2010/2 was issued 28 February 2017 and approved the construction and operation of the Flinders In-Pit TSF (below and above water table tailings deposition) and a number of other changes to the conditions of Licence L8454/2010/2, including:

- changes to the Vasse and Windich TSF groundwater monitoring bore locations;
- updates to the visual monitoring requirements for the TSF embankment freeboard;
- removal of the requirements for sewage pipelines to be equipped with specific controls;
- updates to the containment infrastructure requirements;
- updates to the tyre storage requirements;
- emissions to land monitoring requirements (inclusion of TDS for emission point L1);
- removal of condition 4.1.2 relating to implementation of improvement IR3 which required a review of the TSF groundwater monitoring network; and
- minor administrative updates to condition 5.1.2 (AACR reporting requirements) and definitions.

Licence amendment – July 2017

On 9 March 2017 the Licensee submitted an application for an amendment to the Christmas Creek licence under section 59B of the EP Act. The Licensee has applied to make the following changes:

- Condition 1.2.2 (Table 1.2.1) -
 - updates to remove references to individual tailings storage facilities (TSF), settlement and transfer ponds. The Delegated Officer has determined not to implement this change as for compliance and enforcement purposes individual storage locations should be identified;
 - specify that a supernatant water collection and return system be used only when a recoverable volume of water is present; and
 - remove the containment infrastructure requirements specified for the Flinders In-Pit TSF (imposed via Amendment Notice 1 issued 28 February 2017);
- Condition 1.2.5 (Table 1.2.3) – remove “clean fill” as a waste type and include a provision to allow for clean fill to be used as cover to cap landfill trenches;
- Condition 1.2.8 – remove condition 1.2.8 and reference to the “Mobile Crushing and Screening Environmental Management Procedure”;
- Condition 1.2.10 (Table 1.2.6)
 - remove the design and construction specifications for the Karntama Village Sludge Unit as the facility has been constructed; and
 - include design and construction specifications for a new mine dewater settlement pond to be constructed;



- Condition 1.2.11 – remove the specification relating to the Flinders In-Pit TSF which allows tailings to only be deposited to no more than 2 metres below the pre-mining groundwater level (imposed via Amendment Notice 1 issued 28 February 2017);
- Condition 3.2 – remove the point source air emissions monitoring requirements associated with the power station;
- Condition 3.4.1 (Table 3.4.1) – remove volumetric flow rate from the saline and brackish reinjection monitoring requirements specified in Table 3.4.1;
- Condition 3.6.1 (Table 3.6.1) – remove the requirements to sample for Benzene, Toluene, Ethyl benzene and Xylene (BTEX) in water from the CCY1 and CCY2 treatment used for dust suppression;
- Condition 3.7.1 (Table 3.7.1) – inclusion of a footnote on Table 3.7.1 specifying “*No sample required if bore is dry*” to avoid potential non-compliances if the TSF monitoring bores are dry due to mine dewatering in the area and change monitoring frequency to six monthly;
- Condition 5.2.1 (Table 5.2.1)
 - update the reference to the telemetric controls on the saline reinjection infrastructure as the Licensee is currently trialling the use of improved technologies; and
 - remove the requirement to report the average percentage of sulfur content of diesel fuel used; and
- Condition 5.3.1 (Table 5.3.1) – remove the requirement to verify the permeability of the pit wall, as imposed via Amendment Notice 1. Details of the pit wall were provided in the first compliance document for the Flinders In-Pit TSF, submitted to DER on 1 March 2017.

The Delegated Officer has considered the changes proposed by the Licensee, as described above. The outcome of the Delegated Officer’s assessment and decision making with respect to the proposed changes is described further in Section 4 of this Decision Document. Section 4 also documents updates to the conditions of the Licence which have been implemented to align the Licence with changes implemented via Amendment Notice 1.



4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and Guidance Statements: *Decision Making* (DER 2017) and *Risk Assessments* (DER 2017a). Where other references have been used in making the decision they are detailed in the Decision Document.

DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
General conditions	Conditions 1.1.1 to 1.1.4	<p>Definitions for terms used in the Licence are specified under condition 1.1.1 and 1.1.2. Conditions 1.1.3 and 1.1.4 refers to references made to Australian or other standards and codes of practice meaning the relevant parts and version of that standard, guideline or code of practice.</p> <p>As amended via Amendment Notice 1 on 28 February 2017, definitions for 'Annual Audit Compliance Report' and 'Department' have been included in the Licence and the definition for 'CEO' updated.</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i></p> <p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i></p> <p>Environmental and water assessments relating to mining and mining-related activities in the Fortescue Marsh management area (Report 1484, Western Australia Environmental Protection Authority, July 2013)</p>
Premises operation	Conditions 1.2.1 to 1.2.11	<p>The OPFs and TSFs at Christmas Creek meet the description and production or design capacity of a Category 5 prescribed premises, as described in Schedule 1 of the EP Regulations. Dust and noise emissions associated with the OPFs have been assessed in the relevant sections of this document. Stormwater management at the OPFs and operation of the TSFs have been assessed under Premises operation, detailed in Appendix A.</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i></p> <p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i></p>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>The Licensee also operates a number of facilities, ancillary to the primary activity of mining and ore processing, that meet the description and production or design capacity of Categories of prescribed premises, as described in Schedule 1 of the EP Regulations.</p> <p>These facilities include mine dewater infrastructure (Category 6), a power station (Category 52), WWTPs (Category 54), tyre storage (Category 57), putrescible and inert landfills (Category 64) and bulk and satellite fuel facilities (Category 73). DWER's assessment and decision making with respect to the emissions and discharges associated with the operation of this ancillary infrastructure are detailed in Appendix A (Premises operation), Appendix B (point source air emissions), Appendix C (point source emissions to land), Appendix D (point source emissions to groundwater) and Appendix E (point source emissions to land).</p> <p>Stormwater management Stormwater potentially contaminated with hydrocarbons, sediment, nutrients and/or metals from operational and cleared areas may be discharged to the environment, impacting on sensitive receptors. DWER's assessment and decision making with respect to stormwater management at Christmas Creek are detailed in Appendix A.</p> <p>Operation of mobile crushing and screening facilities As part of this Licence amendment, the emissions and discharges associated with the operation of the mobile crushing and screening facilities within the prescribed premises have been reassessed.</p> <p>Fugitive dust is the primary emission associated with the operation of the mobile crushing and screening facilities. Dust management at Christmas Creek, including at the mobile crushing and screening facilities, has been assessed in Appendix F.</p>	<p><i>Mobile Crushing and Screening Environmental Procedure – Chichester Operations</i> (Fortescue Metals Group Limited, 14 May 2014, CH-PR-EN-0001)</p> <p>Environmental and water assessments relating to mining and mining-related activities in the Fortescue Marsh management area (Report 1484, Western Australia Environmental Protection Authority, July 2013)</p> <p><i>Contaminated Sites Guidelines Assessment and Management of Contaminated Site: Contaminated Sites Guidelines</i> (DER, December 2014)</p> <p><i>Drainage Management Plan</i> (FMG, Revision 0, 31 December 2014)</p>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>Stormwater management at the crushing and screening facilities has also been considered, as there is potential for surface water, groundwater and vegetation to be impacted by stormwater runoff contaminated with hydrocarbons and/or sediment. This assessment is detailed in Appendix A.</p> <p>As documented in Appendix A, the risk of dust emissions from the crushing and screening facilities have been assessed as low. The Delegated Officer has determined to remove the following condition (previously 1.2.8), from Licence L8454/2010/2, consistent with the Guidance Statement: <i>Risk Assessments</i> (DER 2017a), and recent administrative changes implemented at the department: <i>“The Licensee shall ensure that the construction and operation of the mobile crushing and screening facilities is undertaken in accordance with the provisions outlined in the document “Mobile Crushing and Screening Environmental Management Procedure – Chichester Operations” (Fortescue Metals Group Limited, 14 May 2014, CH-PR-EN-0001).”</i></p> <p>Amendment Notice 1 <u>Condition 1.2.1</u> Amendment Notice 1 issued 28 February 2017, updated condition 1.2.1 to remove the requirements for sewage pipelines to be equipped with telemetry, automatic cut-outs or secondary containment. Sewage from the accommodation villages is gravity fed in PVC pipes to a number of collection sumps, equipped with level sensors and alarms (audible and flashing lights) if sumps overflow or pumps fail. From the sumps, sewage is pumped to the WWTP via buried PVC pipes. WWTPs are also surrounded by an access road/firebreak which separates the villages from undisturbed areas. The Delegated Officer considers these controls adequate to manage potential pipeline ruptures and/or leaks of the WWTP</p>	



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>pipelines. Condition 1.2.1 of Licence L8454/2010/2 has been updated consistent with the change implemented via Amendment Notice 1, with reference to the WWTP pipelines removed.</p> <p><u>Condition 1.2.2 (Table 1.2.1)</u> Amendment Notice 1 updated the containment infrastructure requirements specified in Table 1.2.1 of Licence L8454/2010/2, as requested by the Licensee following an internal review of the water storage compounds across the premises. Various minor updates to the names and materials stored in the settlement ponds, transfer ponds, turkey's nests and the CCY2 Treatment Ponds 1 and 2 were implemented via Amendment Notice 1, and have been included in amended Licence L8454/2010/2.</p> <p><u>Condition 1.2.3 (Table 1.2.2)</u> Amendment Notice 1 updated the visual monitoring requirements for TSF embankment freeboard in Table 1.2.2 from 'Daily' to 'Daily whilst operational'. A recent survey of the Vasse TSF undertaken by the Licensee has indicated that the facility has a freeboard of 1.5 m, which provides sufficient capacity for a storm event greater than a 1 in 100 year, 72 hour storm event. The Delegated Officer considered this change to present a low risk to human health and the environment and Licence L8454/2010/2 has been updated to include this change to the visual monitoring requirements for TSF embankment, consistent with Amendment Notice 1.</p> <p><u>Condition 1.2.5 (Table 1.2.3)</u> Amendment Notice 1 updated the tyre storage requirements specified in Table 1.2.3 to specify tyre 'stockpiles' as opposed to 'stockpile', to capture the two separate used tyre stockpiles operated at the CCY1 Workshop and the CCY2 Workshop. Licence L8454/2010/2 has been updated to</p>	



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>include this minor update.</p> <p><u>Condition 1.2.10 (Table 1.2.6)</u> Amendment Notice 1 updated Table 1.2.6 to include design and construction specifications for the Flinders In-Pit TSF. Table 1.2.6 in Licence L8454/2010/2 has been updated to now include the design and construction requirements for the Flinders In-Pit TSF. The specifications relating to the Flinders Strip 12 TSF and Karntama Village WWTP sludge handling unit have been removed, as compliance documentation for construction of this infrastructure has been submitted to DWER, in accordance with the reporting requirements of Licence L8454/2010/2.</p> <p>The Delegated Officer has also updated Condition 1.2.10 to specify that the Licensee must not depart from the specifications in Table 1.2.6, unless where such departures are minor in nature, do not materially change or affect the infrastructure; or where such departure improves the functionality of the infrastructure and does not increase the risks to public health, public amenity or the environment. This will provide flexibility to the Licensee to implement minor changes without having to apply for separate amendments.</p> <p>Licence amendment – July 2017 The Delegated Officer has considered the changes requested by the Licensee in the amendment application made on 9 March 2017 and implemented the following changes:</p> <p><u>Condition 1.2.2</u> In accordance with the amendment application made by the Licensee, Table 1.2.1 has been updated to specify that a supernatant water collection and return system only needs to be used when a recoverable</p>	



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>volume of water is present. The Delegated Officer considers this to be a reasonable approach and will not increase the risks to public health, public amenity or the environment.</p> <p><u>Condition 1.2.5</u> The Delegated Officer has considered the Licensee's request to remove "clean fill" as a waste type and determined not to change this specification as "clean fill" is listed in the <i>Landfill Waste Classification and Waste Definitions 1996</i> (As amended December 2009) as a waste type permitted to be disposed of in a Class II putrescible landfill. However, a note has been added to Table 1.2.3 to allow clean fill to be used as a cover to cap landfill trenches.</p> <p><u>Condition 1.2.9 (previously 1.2.10)</u> The Delegated Officer has updated Table 1.2.6 to include construction requirements for the Young Settlement Pond, in accordance with the Licensee's amendment application.</p> <p><u>Condition 1.2.11</u> The Delegated Officer has imposed condition 1.2.11; consistent with the request made by the Licensee in the amendment application. Condition 1.2.11 relates to the implementation of a leak detection system on saline pipelines and is discussed further in Appendix A.</p>	
Point source emissions to air including monitoring	Condition 2.1.1	DWER's assessment and decision making with respect to air emissions associated with the Christmas Creek power station are detailed in Appendix B.	Ambient Air Assessment Criteria, National Environmental Protection Measure (Ambient Air Quality)



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
			Application supporting documentation
Point source emissions to surface water including monitoring	Conditions 2.2.1 and 3.3.1 (updated)	The contingency discharge of mine dewater to creek lines has been reassessed as part of this amendment; and as a result conditions 2.2.1 and 3.3.1 updated to include specific emission points and monitoring requirements as opposed to referencing the discharge procedure. DWER's assessment and decision making with respect to the contingency discharge of dewatering water to creek lines are detailed in Appendix C.	<p>General provisions of the <i>Environmental Protection Act 1986</i> <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i></p> <p><i>Dewatering Contingency Discharge Procedure (CH-PR-EN-0003_Rev4, FMG December 2014)</i></p> <p>Australian Standard AS/NZS 5667.1 – Water Quality – Sampling – Guidance on the Design of sampling programs, sampling techniques and the preservation and handling of samples</p> <p>Australian Standard AS/NZS 5667.11 – Water Quality – Sampling – Guidance on the sampling of groundwaters</p>
Point source emissions to	Conditions 2.3.1 and 3.3.1	DWER's assessment and decision making with respect to the reinjection of dewatering water at Christmas Creek are detailed in Appendix D.	<i>Cloudbreak Groundwater Operating Strategy (CB-PH-</i>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
groundwater including monitoring			<p>HY-0009)</p> <p><i>Cloudbreak Water Management Scheme</i> (FMG, Rev 9, December 2015)</p> <p>General provisions of the <i>Environmental Protection Act 1986</i></p> <p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i></p> <p>Australian Standard AS/NZS 5667.1 – Water Quality – Sampling – Guidance on the Design of sampling programs, sampling techniques and the preservation and handling of samples</p> <p>Australian Standard AS/NZS 5667.11 – Water Quality – Sampling – Guidance on the sampling of groundwaters</p>
Emissions to land including monitoring	Conditions 2.4.1 and 3.4.1	DWER's assessment and decision making with respect to the discharge of treated wastewater and reverse osmosis reject water (via irrigation to designated spray fields) from the Christmas Creek WWTP's and Karntama Village RO Plant are detailed in Appendix E.	<p>General provisions of the <i>Environmental Protection Act 1986</i></p> <p><i>Environmental Protection</i></p>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>Amendment Notice 1 <u>Condition 3.4.1</u> Amendment Notice 1 updated the water quality monitoring suite for emission point L1 (outlet pipe to the Karntama WWTP irrigation area) to include TDS. Currently, the RO reject water from the Karntama Village RO plant is discharged to land at the Karntama irrigation area via the Karntama WWTP irrigation tank. The RO reject water accounts for approximately 40% of the volume of waste water discharged to the irrigation field. Condition 3.4.1 has been updated, in accordance with Amendment Notice 1, to include TDS in the suite of monitoring for the Karntama WWTP. These results will be reported to DWER for review in the Annual Environmental Report.</p>	<p><i>(Unauthorised Discharges) Regulations 2004</i></p> <p>Australian Standard AS/NZS 5667.1 – Water Quality – Sampling – Guidance on the Design of sampling programs, sampling techniques and the preservation and handling of samples</p> <p>Australian Standard AS/NZS 5667.11 – Water Quality – Sampling – Guidance on the sampling of groundwaters</p>
Fugitive emissions	N/A	DWER's assessment and decision making with respect to fugitive dust and light emissions are detailed in Appendix F.	<p>General provisions of the <i>Environmental Protection Act 1986</i></p> <p><i>Conservation Significant Fauna Management Plan (100-PL-EN-0022)</i></p>
Odour	N/A	There are no significant odour emissions associated with the emissions undertaken at Christmas Creek. The Delegated Officer notes that minor odour emissions may occur from the operation of the putrescible landfill and WWTPs; and that the nearest potential sensitive receptor is Roy Hill Station located approximately 30 km from the premises. This is considered a sufficient buffer distance to prevent odour impacting on Roy Hill Station.	<p><i>Guidance Statement Risk Assessments (DER February 2017)</i></p> <p>General provisions of the <i>Environmental Protection Act 1986</i></p>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		In accordance with the Guidance Statement: <i>Risk Assessments</i> (DER 2017a), the Delegated Officer has not undertaken an assessment of odour emissions from the premises as there is not considered to be a receptor at risk of being impacted by odour emissions from the premises. As previously noted, the onsite accommodation camps are not considered by DWER to be sensitive receptors for the purpose of assessing emissions and discharges from the activities undertaken on the premises.	
Noise	N/A	<p>DWER's assessment and decision making with respect to noise emissions are detailed below.</p> <p><u>Emission description</u> <i>Emission:</i> Noise and vibrations from operation of equipment and vehicles.</p> <p><i>Impact:</i> Impacts to amenity of sensitive receptors. Noise and vibrations may force terrestrial fauna away from existing habitats into new areas increasing risk of predation or causing conflict with existing fauna assemblages.</p> <p><i>Controls:</i> Christmas Creek is located approximately 30 km from the nearest pastoral homestead, which the Delegated Officer considers to be a sufficient buffer to prevent noise impacting the amenity of the homestead residents.</p> <p>Noise modelling was conducted as part of the Public Environmental Review assessment for Christmas Creek and showed noise emissions significantly below the <i>Environmental Protection (Noise) Regulations 1997</i>.</p> <p>Low-noise plant and equipment is used where practicable. Noise</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i></p> <p>Guidance Statement: <i>Risk Assessments</i> (DER 2017a)</p> <p><i>Environmental Protection (Noise) Regulations 1997</i></p> <p><i>Conservation Significant Fauna Management Plan</i> (100-PL-EN-0022)</p> <p><i>Chichester Operations Noise and Vibration Management Plan</i> (CB-PL-EN-0007)</p>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>emissions from the mobile crushing and screening plants are minimised with the use of protection shields around motors, and rubber lines and protective barriers. Inspections and maintenance of exhaust and silencing systems on machinery, equipment and vehicles is conducted as required.</p> <p>Condition 8-3 of MS1033 requires Chichester Metals to continue to implement the <i>Conservation Significant Fauna Management Plan</i> (100-PL-EN-0022), until the Chief Executive Officer of the EPA has confirmed in writing that the revised management plan required under MS1033 meets the environmental objective for fauna management.</p> <p>The <i>Conservation Significant Fauna Management Plan</i> specifies key management actions for conservation significant fauna management, including strategies to minimise the potential impacts from noise and vibrations. Where noise emissions may result in significant impacts to conservation significant fauna, mitigation measures will be incorporated into planned activities in accordance with the <i>Chichester Operations Noise and Vibration Management Plan</i> (CB-PL-EN-0007).</p> <p><u>Risk assessment:</u> <i>Consequence:</i> The Delegated Officer notes that the closest sensitive human receptor to Christmas Creek is a pastoral homestead located approximately 30 km away. Impacts to the amenity of this receptor from noise and vibrations are not expected.</p> <p>The Delegated Officer has determined that mid-level on-site impacts and low level off-site impacts at a local scale to fauna could occur from noise and vibrations. Therefore, the Delegated Officer considers the consequence to be moderate.</p> <p><i>Likelihood:</i> The Delegated Officer has considered the size and extent of</p>	



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>the machinery in use (24 hours per day) and considers that an impact to fauna species from noise and vibration could occur at some time. Therefore, the Delegated Officer considers the likelihood to be possible.</p> <p><i>Risk rating:</i> The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for noise emissions and vibrations to be medium.</p> <p><u>Regulatory controls</u> Noise and vibration impacts to conservation significant fauna species are addressed under the management plans currently implemented under MS1033, pursuant to Part IV of the EP Act. Conditions relating to the management of noise and vibration to minimise potential impacts to fauna have not been applied to the Licence as sufficient regulation is provided under Part IV of the EP Act.</p> <p>The Delegated Officer notes that the <i>Environmental Protection (Noise) Regulations 1997</i>, as well as the general provisions of the EP Act with respect to the causing of pollution and environmental harm apply.</p> <p><u>Residual risk assessment:</u> <i>Consequence:</i> Moderate <i>Likelihood:</i> Possible <i>Risk rating:</i> Medium</p>	
Monitoring general	Conditions 3.1.1 to 3.1.4	General monitoring conditions are included in this Licence to ensure monitoring is carried out in accordance with the relevant standards, at appropriate intervals and submitted to and tested by a NATA accredited laboratory for analysis; and that monitoring equipment is appropriately	Australian Standard AS/NZS 5667.1 – Water Quality – Sampling – Guidance on the Design of sampling programs,



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		maintained and calibrated.	<p>sampling techniques and the preservation and handling of samples</p> <p>Guidance Statement: <i>Setting Conditions</i> (DER 2015)</p>
Process monitoring	Condition 3.5.1	<p>Dust suppression Treated wastewater from the CCY1 and CCY2 storage ponds is used on site for dust suppression. The Licensee also sources bore water for use in dust suppression.</p> <p>DWER's assessment and decision making with respect to the use of treated wastewater and bore water for dust suppression is detailed below.</p> <p><u>Emission description</u> <i>Emission:</i> Saline and potentially hydrocarbon contaminated treated wastewater discharged to land when used for dust suppression. In 2016, TDS in reuse water from the treated wastewater ponds ranged from 2,600 mg/L to 17,700 mg/L, which is considered of saline quality (DoW 2016).</p> <p>Brackish/saline bore water is also used for dust suppression. In 2016, 2,789,956 kilolitres of groundwater was used for dust suppression at Christmas Creek.</p> <p><i>Impact:</i> Treated wastewater from the CCY1 and CCY2 is of saline quality and could contain elevated levels of hydrocarbons which could contaminate surface water, groundwater and/or terrestrial environments, adverse impacts on flora, fauna and aquatic biota.</p> <p>Overspray and runoff of saline groundwater used for dust suppressions</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i></p>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>may impact on the health of vegetation adjacent to mine access and haul roads.</p> <p><i>Controls:</i> <i>Treated wastewater ponds</i> Monthly monitoring of water from the CCY1 and CCY2 final treatment pond is undertaken for total recoverable hydrocarbons (TRH), BTEX and TDS. Results provided in the 2016 reporting period Annual Environmental Report submitted in accordance with the reporting requirements of Licence L8454/2010/2, indicate the TRH in discharge water did not exceed 10 mg/L. TDS is water ranged from 2,600 mg/L to 17,700 mg/L. Water from the two ponds is used for dust suppression on and around the disturbed land of the active mining areas.</p> <p><i>Groundwater used for dust suppression</i> The Cloudbreak Iron Ore Mine is located adjacent to the Christmas Creek operations, and is also owned and operated by the Licensee. The Delegated Officer notes that the environmental setting, including the regional hydrology, topography, vegetation and flora, is relatively consistent between the two premises. Noting this, the Delegated Officer has made reference to the EPAs assessment of the Cloudbreak Life of Mine Project and studies undertaken for Cloudbreak mine relating to the use of saline water for dust suppression.</p> <p>In Report 1429 for the Cloudbreak Life of Mine Project, the EPA acknowledged the potential impacts to vegetation associated with the use of saline water for dust suppression. The EPA also noted that a study was undertaken to characterise the salt balance relating to dust suppression, the pathways by which salt may enter the surrounding environment and the sensitivity of environmental receptors of the salt loading.</p>	



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>The Licensee has advised that two studies have been undertaken regarding saline water used for dust suppression. The <i>Assessment of Salt Movement from Saline Water Dust Suppression Areas – Cloudbreak (Astron 2012)</i> determined the baseline salt in the landscape. The study found that the natural level of salt present in the landscape is low in areas of mulga vegetation.</p> <p>Worley Parsons investigated the impacts to surface water and found that low rainfall events sufficient to induce small volumes of saline road runoff (but not significant catchment runoff), are likely to pose the greatest risk to sheet-flow dependant on mulga, shallow rooted vegetation or ecological communities associated with creeks (Worley Parsons 2011).</p> <p>In correspondence dated 12 August 2016 regarding the compliance assessment of the Christmas Creek 2015 Annual Environmental Report, the Licensee advised that vegetation health monitoring required by approvals issued under Part IV of the EP Act is not indicating any adverse impacts to vegetation as a result of the reuse of water onsite for dust suppression. Further to this, the Licensee advised that where saline or hypersaline water is proposed to be used on site, risk assessments are undertaken to ensure where saline water is used for dust suppression it is managed so that saline water does not enter vegetation.</p> <p>Specific controls include the preferential use of brackish water for dust suppression, with higher EC water used in active mining pits, roads accessing these mining pits and major haul roads accessed by heavy vehicles. These areas do not have surrounding or adjacent vegetation. Lower EC water is used on other access roads, which are commonly accessed by light vehicles. The Licensee has advised that irrigation spray contact with vegetation is minimised via the presence of windrows on the side of the major haul roads.</p>	



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p><u>Risk assessment</u> <i>Consequence:</i> The Delegated Officer has considered the volume of water being used for dust suppression and determined that low level on site impacts and minimal offsite impacts at a local scale to vegetation could occur from the reuse of treated wastewater and use of saline/hypersaline groundwater for dust suppression. Therefore, the Delegated Officer considers the consequence to be minor.</p> <p><i>Likelihood:</i> The Delegated Officer has considered the operator controls in place to manage the overspray of saline water on mine access and haul roads and use of treated wastewater in active mining areas, and determined the consequence will not occur in most circumstances. Therefore, the likelihood of the consequence is unlikely.</p> <p><i>Risk rating:</i> The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for treated wastewater and saline groundwater used for dust suppression to be medium.</p> <p><u>Regulatory controls</u> The Delegated Officer notes that existing condition 3.5.1 requires the monthly monitoring of treated wastewater used for dust suppression from CCY1 and CCY2. Volumetric flow rate, TRH and TDS is monitored, with results reported in the Annual Environmental Report. The Delegated Officer notes that vegetation health from salt accumulation is also managed under Part IV of the EP Act; and the Licensee has developed and implements the <i>Vegetation Health Monitoring and Management Plan</i> to meet these obligations.</p>	



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>The Delegated Officer has removed the requirement to monitor for BTEX from condition 3.5.1, as requested by the Licensee. This is on the basis that BTEX is represented by C₆-C₁₀ fraction and diesel is represented in the C₁₀-C₁₆ and C₁₆-C₃₄, which would be picked up by TRH.</p> <p><u>Residual risk assessment</u> <i>Consequence:</i> Minor <i>Likelihood:</i> Unlikely <i>Risk rating:</i> Medium</p>	
Ambient quality monitoring	Condition 3.6.1	<p>Condition 3.6.1 specifies the ambient environmental quality monitoring requirements for the premises. Ambient groundwater monitoring has been imposed to identify potential impacts to groundwater as a result of the operation of the landfill, TSFs and the reinjection of mine dewater.</p> <p>DWER's assessment and decision making with respect to the operation of the TSFs and landfill is detailed in Appendix A (Premises operation), which includes further discussion regarding the ambient groundwater monitoring requirements.</p> <p>DWER's assessment and decision making with respect to the reinjection of mine dewater is detailed in Appendix C (Emissions to groundwater including monitoring), which includes further discussion regarding the ambient groundwater monitoring requirements.</p> <p>Amendment Notice 1 <u>Condition 3.6.1</u> Amendment Notice 1 updated the ambient groundwater quality monitoring requirements for the Vasse and Windich TSFs; including removal of bore VAM03 due to an obstruction within the bore casing and replacement of bores planned to be destroyed as a result of the progression of mining.</p>	<p>Australian Standard AS/NZS 5667.1 – Water Quality – Sampling – Guidance on the Design of sampling programs, sampling techniques and the preservation and handling of samples</p> <p>Australian Standard AS/NZS 5667.11 – Water Quality – Sampling – Guidance on the sampling of groundwaters</p>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>These updates have been implemented in the amended Licence and an updated figure showing the revised locations of the monitoring bores included in Schedule 1 of the Licence.</p> <p>The Delegated Officer determined to include thallium in the TSF groundwater analytical suite via Amendment Notice 1. This decision followed the review of the <i>Chichester Groundwater Quality – Operational Tailings Storage Facilities Review (45-SY-EN-0004)</i>, submitted by the Licensee to satisfy the requirements of improvement condition 4.1.2 of Licence L8454/2010/2. The TSF ambient groundwater monitoring requirements specified in condition 3.7.1 (now condition 3.6.1) have been updated to include thallium in the suite of parameters sampled in groundwater at the TSFs.</p>	
Meteorological monitoring	N/A	No specified conditions relating to meteorological monitoring are included in this Licence.	N/A
Improvements	Condition 4.1.1 and 4.1.2 (previous)	<p>Amendment Notice 1 Amendment Notice 1 removed conditions 4.1.1 and 4.1.2 as the Licensee submitted the <i>Chichester Groundwater Quality – Operational Tailings Storage Review (45-SY-EN-0004)</i>, Fortescue Metals Group, November 2016), which satisfied the requirements of improvement IR3. The report was reviewed, and as a result the Delegated Officer determined to include thallium in the groundwater monitoring suite for the TSFs. This monitoring requirement was also implemented via Amendment Notice 1. No further action was deemed necessary. As a result, Licence L8454/2010/2 is now being updated to remove conditions 4.1.1 and 4.1.2 from the Licence, consistent with Amendment Notice 1.</p>	<i>Chichester Groundwater Quality – Operational Tailings Storage Review (45-SY-EN-0004, November 2016)</i>
Information	Conditions 4.1.1 to 4.1.3	Conditions 4.1.1, 4.1.2 and 4.1.3 have been applied to the Licence and require the appropriate management of records and information,	General provisions of the <i>Environmental Protection Act</i>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
	Conditions 4.2.1 and 4.2.2 Condition 4.3.1	<p>submission of an Annual Audit Compliance Report and implementation of a complaints management system.</p> <p>Conditions 4.2.1 has been applied to the Licence to require the submission of an Annual Environmental Report, including the information specified in Table 4.2.1. Condition 4.2.2 requires a comparison of results against previous monitoring results and Licence limits.</p> <p>Condition 4.3.1 specifies notification requirements, specifically relating to limit breaches, contingency discharge events and submission of compliance documentation for works approved and constructed under Licence L8454/2010/2. Condition 4.3.1 has been updated at the time of this amendment, as described below.</p> <p>Flinders Strip 12 TSF and Karntama Camp sludge handling unit At the time of this amendment, the notification requirements specified in Table 4.3.1 are being updated to remove the requirement to submit compliance documentation for the Flinders Strip 12 TSF and Karntama Village WWTP sludge handling unit. Approval for construction of this infrastructure was implemented via an amendment to Licence L8454/2010/2 issued 7 July 2016. The Licensee submitted two separate compliance documents, dated 15 July 2016 and 29 July 2016, confirming construction of this infrastructure, satisfying the requirements of condition 4.3.1.</p> <p>Flinders In-Pit TSF Condition 4.3.1 is also being amended to update the notification requirements relating to the compliance reporting for the Flinders In-Pit TSF, for which partial compliance documentation has been received.</p> <p>The Flinders In-Pit TSF was approved via Amendment Notice 1, issued 28 February 2017. Amendment Notice 1 amended condition 4.3.1 of Licence</p>	1986 <i>Licence Amendment Application Supporting Information – Christmas Creek (CC-AP-EN-0065)</i> <i>Licence Amendment Application Supporting Information – Christmas Creek (CC-AP-EN-0066)</i>



DECISION TABLE			
Licence section	Condition number	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>L8454/2010/2 to include the requirement for compliance documentation to be submitted following construction of the Flinders In-Pit TSF tailings delivery pipelines. The compliance document also needed to verify the permeability of the pit wall to demonstrate that the layer is pervious and will channel groundwater around the tailings. The Licensee submitted partial compliance documentation on 1 March 2017, confirming installation of:</p> <ul style="list-style-type: none">• TSF delivery pipeline, including flow meter and pressure sensor, from OPF1 into the Flinders In-Pit TSF and one spigot; and• Floating suction line, portable pump, return water pipeline, including a flow meter with telemetry, from the TSF to the existing settlement pond. <p>As required by condition 4.3.1, the Licensee also indicated that the pit walls are at least four orders of magnitude more permeable than the tailings material.</p> <p>Separate compliance documentation will be required when the remaining works (pit crest tailings pipeline, tailings pipeline from OPF2, pipeline extension from Flinders Strip 12 TSF, return water pipeline to OPF2 and flowmeter at the TSF end of the tailings delivery pipeline) have been constructed.</p>	
Licence Duration	N/A	Licence L8454/2010/2 expires 23 August 2036.	Notice of Amendment of Licence Expiry Dates, 29 April 2016



5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
9/06/2017	Licensee provided with draft licence and decision document for comment.	The Licensee provided comments (Appendix G) on the draft Licence and a signed waiver form on 16 June 2017 Additional comments were also received from the Licensee on 13 July 2017	Refer to Appendix G



6 Risk Assessment

Note: This matrix is taken from the Guidance Statement: Risk Assessments (DER 2017a).

Table 2: Emissions Risk Matrix

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High



Appendix A

Premises operation

Stormwater management

Emission description

Emission: Potentially contaminated and sediment laden stormwater from operational areas (landfill, bioremediation facility, treated wastewater irrigation areas, works areas (ROM, OPFs, workshops) and fuel storage areas).

Impact: Contamination of surrounding land and surface water drainage systems. Potential impacts on ecology of surface water from the addition of nutrients, heavy metals and/or hydrocarbons. Increased turbidity and downstream sedimentation impacting aquatic biota and ecosystems.

Stormwater drainage from the mine site flows south to the Fortescue Marsh, a highly conservation significant wetland. The Fortescue Marsh is a listed Priority 1 Ecological Community by the Department of Biodiversity, Conservation and Attractions. This means that the Marsh is currently poorly surveyed and is a Priority 1 (with 1 being the highest priority from 1-4) for biological survey, given the community is ecologically significant and possibly threatened.

Christmas Creek is subject to high seasonal rainfall, particularly during the January – March cyclone season, where significant amounts of stormwater will flow through the ephemeral creeks as channel flow and overland as sheet flow, resulting in inundation of the Marsh. During periods of lower rainfall, runoff migrates towards the Marsh via the ephemeral creeks.

The vegetation most likely to be affected by contaminated stormwater is the Samphire species, which relies on surface water flows in the Marsh. Secondary impacts to bird and other fauna species that utilise the Marsh may result.

Controls: A drainage swale at OPF1 captures surface flow before intercepting the OPF. From the swale, captured stormwater is diverted to a settling pond prior to discharge.

All major fuel storages (CCY1, CCY2, heavy vehicle workshop and the bulk diesel fuel facility) are concrete bunded according to the requirements of AS1940:2004 *'The storage and handling of flammable and combustible liquids.'* Satellite fuel facilities are earthen bunded with HDPE lining to isolate potential spills from stormwater. Of the 7 satellite fuel facilities, 3 (Mokare, Flinders and Windich) have HDPE lined sumps to collect any potentially contaminated stormwater. The heavy vehicle and light vehicle wash bays have ramps and containment bunds installed at the entry and exit to ensure that wash-down water is directed back into the facilities for treatment.

Diversion channels and embankment bunds have been constructed to divert surface water away from the landfill facility. Chemicals and hydrocarbons are stored in lined bunds. These measures will help to prevent stormwater contamination occurring at the landfill.

No infrastructure is located in the ephemeral creeks and design and location of new infrastructure aims to mitigate impacts to sheet flow. Internal design procedures require a risk assessment to be completed to demonstrate that the location minimises impacts to vegetation, sheet flow, and that creeks are conserved.

The EPA identified hydrological processes/inland waters environmental quality as key environmental factors during their assessment of the Christmas Creek Expansion Project, documented in the *Report and recommendations of the Environmental Protection Authority, Christmas Creek Iron Ore Mine*



Expansion, Report 1567 (EPA 2016). The EPA did not recommend any separate conditions relating to hydrological processes (surface water) during operations, however condition 7-3 of MS1033 requires the management plan required under condition 5-1 to address impacts on conservation significant flora and vegetation health including from, but not limited to, changes to groundwater levels and groundwater quality, changes to surface flows, dust and weeds.

The Delegated Officer notes that condition 7-4 of MS1033 requires the Licensee to continue to implement the *Surface Water Management Plan* (100-PL-EN-1015) until the CEO of the EPA is satisfied that the management plans required under MS1033 satisfies the requirements of that approval. The objective and scope of the existing *Surface Water Management Plan* (FMG 2014) is to:

- identify key environmental activities that have the potential to cause impacts to surface water;
- identify potential impacts to surface water caused by contamination, excessive erosion and downstream sedimentation resulting from activities on the premises and direct and indirect impacts on flora, fauna and vegetation during all stages of Chichester Metals operations;
- provide guidance to facilitate robust and consistent use and design of drainage infrastructure;
- provide guidance for site specific monitoring and reporting of water quality, flow and drainage infrastructure; and
- describe the management actions that when implemented, will minimise environmental impacts on surface water.

The plan identifies vegetation clearing, ground disturbance, construction of infrastructure, open pit mining, ore processing, stockpiling and waste rock dumps and waste disposal as the key activities which have the potential to impact on surface water flow regimes and water quality across the operations (FMG 2014). The plan documents a number of key management actions for surface water management for the key activities, including but not limited to:

- minimisation of clearing and vegetation disturbance;
- conducting a risk assessment to determine the likelihood of a change to the surface water regime that may lead to unacceptable environmental impacts;
- locate, design, construct and operate drainage infrastructure to design specifications that reflect risk assessment outcomes;
- bunding of iron ore stockpiles designed to minimise impact to surface water flow volume, flow regimes and turbidity;
- use erosion minimisation strategies, such as sediment basins, bunding and vegetated batters to control surface water sediment and water quality from ore stockpiles;
- management of chemicals and hydrocarbons in accordance with the *Chemical and Hydrocarbon Management Plan* (45-PL-EN-0011);
- provide hydrocarbon and chemical spill control training and equipment to appropriate staff and contractors; and
- keep clean and potentially contaminated stormwater separate, managing contaminated stormwater prior to release to the environment.

Risk Assessment

Consequence: The Delegated Officer notes the Fortescue Marsh is located between 1 to 10 km from the premises and has determined that the impact from discharges of contaminated and/or sediment laden stormwater could result in short term impacts to the Fortescue Marsh; an area of high conservation value. Therefore, the Delegated Officer considers the consequence to be major.

Likelihood: The Delegated Officer has considered the applicant controls (infrastructure located above the 100 ARI flood level, stormwater diversion infrastructure and water treatment systems) and determined that an impact to sensitive receptors from the discharge of contaminated and/or sediment laden stormwater will probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of the consequence to be unlikely.



Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for discharges of contaminated and/or sediment laden stormwater to the environment to be **medium**.

Regulatory Controls

The Delegated Officer notes that surface water, including stormwater management, is managed by the Licensee in accordance with the *Surface Water Management Plan*, currently implemented under conditions of MS1033. The new plan required under condition 5-1 of MS1033 must also address impacts on conservation significant flora and vegetation health from changes to surface flows.

The Delegated Officer has not imposed conditions relating to the management of stormwater as potential impacts are addressed and managed under the Ministerial approvals issued under Part IV of the EP Act.

The Delegated Officer notes the general provisions of the EP Act with respect to the causing of pollution and environmental harm apply, as will the provisions of relevant subsidiary legislation, including the *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

Residual Risk Assessment

Consequence: Major

Likelihood: Unlikely

Risk Rating: Medium

Bulk and satellite fuel facilities

Emission description

Emission: Seepage of hydrocarbons to soil or groundwater from leaking bulk and satellite fuel facilities. Hydrocarbon spills outside of containment infrastructure during refuelling and fuel transfer activities.

Impact: Contamination of soil and/or groundwater, impacting the health of ecosystems receiving groundwater in the area.

Controls: The bulk fuel facility comprises of self-bunded tanks, located within a concrete bunded hardstand to capture any spills or leaks. The facility is controlled by a Programmable Logic Controller and HMI (human machine interface) which monitor and manage the fuel facility. Fuel unloading facilities are contained within a bunded area with breakaway couplings and dry brake fittings installed at each service vehicle refuelling point. The duty tank for unloading is indicated by a flashing beacon that enables the tanker driver to readily identify which tank is receiving fuel. All tanks and pipelines are located above ground.

Concrete bunding compliant with AS1940:2004 has been constructed at the CCY1 and at the Heavy Vehicle Workshop. A buried HDPE liner covered by earthen bunding is in place at the satellite fuel facilities: Windich, Mokare and Flinders. All tanks are fitted with overflow warning alarms to prevent accidental spillage.

Contaminated runoff at the CCY1 and CCY2 is directed via a sump to an oil/water separator. Treated oily water from the CCY1 and CCY2 OWSs is directed to a series of treatment ponds. Final treated wastewater is reused onsite for dust suppression.

Management measures in place to reduce hydrocarbon incidents include training personnel in chemical management and spill response. The Licensee has developed the *Chemical and Hydrocarbon Management Plan* (100-PL-EN-0011, FMG July 2014) to meet the requirements of MS690 (Anderson Point Port and North-South rail) and MS707 (East-West Rail and Christmas Creek



Mine). The plan identifies potential direct and indirect impacts of chemical and hydrocarbons and develops management measures to minimise potential environmental impacts associated with chemical and hydrocarbons transport, storage, handling and disposal.

Risk Assessment

Consequence: The Delegated Officer has determined that the impact from spills/leaks of hydrocarbons from bulk and satellite storage areas could result in mid-level onsite impacts and low-level offsite impacts at a local scale. Therefore, the Delegated Officer considers the consequence to be moderate.

Likelihood: The Delegated Officer has considered the frequent use, size and number of fuel storage facilities at Christmas Creek; and determined that an environmental impact from spills/leaks from hydrocarbon storage areas could occur at some time. Therefore, the Delegated Officer considers the likelihood to be possible.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for leaks/spills of hydrocarbons to the environment from fuel storage areas to be **medium**.

Regulatory Controls

The Delegated Officer notes that the Licensee has developed and implements the *Chemical and Hydrocarbon Management Plan* (100-PL-EN-0011, FMG July 2014), in accordance with Ministerial approval (MS707) issued under Part IV of the EP Act. The *Dangerous Goods Safety Act 2004* provides for the safe storage, handling and transport of dangerous goods; and applies to the fuel storage facilities located at Christmas Creek.

The Delegated Officer is not imposing any specified conditions for the management of hydrocarbons, as sufficient regulatory control is currently imposed through approvals issued pursuant to Part IV of the EP Act, as well as the *Dangerous Goods Safety Act 2004*, administered by the Department of Mines, Industry Regulation and Safety.

Fuel storage areas at Christmas Creek will be subject to DWER inspections, during which the management measures in place to minimise potential environmental impacts associated with chemical and hydrocarbons transport, storage, handling and disposal will be considered. The general provisions of the EP Act with respect to the causing of pollution and environmental harm apply, and discharges of hydrocarbons may be subject to the *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

Residual Risk Assessment

Consequence: Moderate

Likelihood: Possible

Risk Rating: Medium

Tailings storage facilities

Tailings produced from the OPF1 and OP2 desand plants are currently deposited into the existing Windich TSF, Flinders Strip 12 TSF and/or Flinders In-Pit TSF. Flinders Strip 12 TSF receives tailings from OPF1 and Windich TSF receives tailings from OPF2. Flinders In-Pit TSF is partially constructed and is currently only receiving tailings from OPF1, however on completion of works will also receive tailings from OPF2. Deposition into the Vasse TSF has ceased as the facility has reached its storage capacity.

Tailings delivery pipelines convey tailings from the OPFs to the respective TSF. Spigots located along the TSFs crest walls deposit tailings into the mined out voids. Mobile water pumps, floating



suction lines and return water pipelines have been installed on the TSFs to convey supernatant water from the TSFs to turkey's nests at the OPFs for reuse in the OPF process water circuit.

Windich TSF

Construction of the Windich TSF has been undertaken in a staged approach. Tailings deposition initially commenced into mined out pit voids being Windich TSF 1 (mining strips 8 and 9) and Windich TSF 2 (mining strips 10-13). The two facilities were subsequently incorporated into one above ground TSF by constructing an embankment wall along the western and southern boundaries of the two facilities. The Windich Above-Ground TSF was approved via an amendment to Licence L8454/2010/2, issued 7 July 2016. The works are being implemented in two stages:

- Stage 1 – waste rock backfill in the adjacent pit used to raise the embankment wall at the western end of TSF 1 by 7 m to provide capacity for approximately 6 months of tailings production; and
- Stage 2 - further extension of the western embankment wall adjacent to Windich TSF 2 and an additional embankment wall along the southern boundary of TSF 2. Stage 2 will be undertaken in two phases:
 - Phase 1 – raise TSF 2 embankment walls by 6 m utilising mine pit backfill in the downstream Windich mining strips; and
 - Phase 2 – a further raise of the embankment walls by 7 m.

The Windich Above-Ground TSF has capacity for approximately 3 years of tailings production.

The Licensee has submitted compliance documentation, confirming the implementation of Stage 1. Further compliance documentation will be required following completion of Stage 2.

Flinders Strip 12 TSF

The Flinders Strip 12 TSF has been used as a satellite in-pit TSF in the mined out pit void at Flinders Pit Strip 12. Prior to the commencement of tailings deposition, the void was backfilled to above the pre-mining water table. The TSF is bound to the north, west and east by backfill mineral waste. The southern boundary is the pit wall. The Flinders Strip 12 TSF has an estimated capacity of 6.9 million tonnes and an operational life of 16-17 months.

The Flinders Strip 12 TSF was approved via an amendment to Licence L8454/2010/2, issued 7 July 2016. The Licensee submitted compliance documentation for construction of the Flinders Strip 12 TSF on 29 July 2016, in accordance with conditions of Licence L8454/2010/2, confirming that the construction works associated with the Flinders Strip 12 TSF have been completed.

Flinders In-Pit TSF (below water table tailings storage)

Traditionally, the Licensee has backfilled pits with waste rock to pre-mining groundwater levels and then commenced tailings deposition above the pre-mining groundwater level. The Flinders In-Pit TSF will be completely backfilled with tailings, as opposed to backfilling with waste rock to the pre-mining groundwater level. Essentially, this will result in a portion of the tailings being situated below the water table once mine dewatering in the vicinity ceases and groundwater levels recover. The Flinders mined out pit has been excavated to Relative Level (RL) 374 m Australian Height Datum (AHD) at its lowest point. The pre-mining water table is at 410 mAHD, being approximately 36 m higher than the lowest point of the mined out pit.

The Flinders In-Pit TSF will receive tailings produced at both OPF1 and OPF2; providing storage for more than five years of tailings at current rates. Tailings deposition occurs at a rate of approximately 270,000 dry tonnes per month. The existing waste rock dump which separates the Flinders In-Pit TSF from the existing Flinders Strip 12 TSF will be extended using waste material from nearby mine pits. The extension will be constructed to a RL of 435 mAHD and require up to 15 m of fill material in some areas. The extension will be 80 m wide and approximately 300 m long. The waste rock



embankment will be required after approximately two years of operation of the TSF once tailings reach RL 431 m AHD (SRK Consulting 2016).

Amendment Notice 1 was issued on 28 February 2017, which approved the construction of the Flinders In-Pit TSF. Based on the outcome of the risk assessment undertaken for the operation of the TSF, a limit was imposed under Amendment Notice 1 to restrict tailings deposition to at least two metres below the pre-mining water table; ensuring the TSF would function as an evaporative sink thereby mitigating the risk of groundwater flow through the tailings potentially transporting soluble contaminants to sensitive receptors.

In the amendment application submitted on 9 March 2017, the Licensee requested the tailings deposition limit be removed from the Licence. The Licensee submitted the *Christmas Creek Triennial Groundwater Monitoring Review* report for review in order to determine the extent to which groundwater flow from the pit would have the potential to affect environmental receptors.

The outcome of the reassessment of the Flinders In-Pit TSF, and outcome of the review of the triennial groundwater monitoring is presented in the relevant section below.

Normal operation (above and below the water table storage, all facilities)

Emission description

Emission: Tailings produced through the beneficiation of iron ore deposited into the TSFs. Seepage from the TSF into surrounding groundwater. Acidic and/or metalliferous drainage from embankment construction materials and tailings could occur.

The fresh groundwater that rides over the diffuse saline water interface near the Fortescue Marsh discharges to the surface, which is a potential groundwater pathway to transmit chemical constituents into the Fortescue Marsh. It is acknowledged that the water is lost by evaporation so a distinct seepage face will not appear at the surface. Similarly, brine beneath the marsh area is also recirculating and also discharges to the surface near the edge of the marsh, bringing nutrients and other chemical constituents to the surface within the wetland.

While there is a potential pathway to the Fortescue Marsh, the rate of transmission is likely to be very slow due to the low permeability of the sediments that underlie the marsh and the very slow rate of groundwater flow and hypersaline water recirculation.

Impact: Increasing the water table from seepage may impact on local vegetation, if it results in the growth medium becoming water logged. Mulga (*Acacia aneura*) is widespread in the surrounding mine site area and particularly prone to impacts from groundwater mounding. Seepage may impact on groundwater quality by changing the salinity of the aquifer or increasing metals' concentration in underlying soils or groundwater. Impacts to beneficial groundwater uses, including use of groundwater for livestock watering. It is noted that the nearest pastoral bore is located approximately 3 km from the Windich TSF.

Controls: The TSFs have been designed to meet ANCOLD and Department of Mines, Industry Regulation and Safety requirements, with a tailings beach formed to reduce seepage during operations. Supernatant water is recovered from the TSFs and directed to the OPFs for reuse in processing. Approximately 40% of seepage is expected to occur during the first three months of the TSF operation before the floor has been covered by the tailings in its entirety.

The Licensee has undertaken sampling and analysis of 189 samples of tailings material from Christmas Creek, with results indicating that the tailings have no likelihood of generating acid. The tailings geochemical characterisation assessment indicates there is a low likelihood of leaching of some metals including aluminium, barium, chromium, copper and zinc.



Analysis of tailings supernatant water indicated a high likelihood of cadmium, chromium, mercury and zinc, with a low likelihood of boron, rubidium and uranium occurring in any seepage, at low concentrations.

The Delegated Officer acknowledges that under geochemically reducing conditions; cadmium, zinc, cobalt, mercury, nickel, antimony, selenium and thallium are elements of potential environmental concern that could have elevated concentrations in leachate after a prolonged period of leaching. Solubility is likely to be enhanced under hypersaline conditions due to the formation of highly soluble metal/metalloid chloride complexes. The Delegated Officer understands that the potential leaching of these elements has been tested, with the exception of thallium. Thallium is known to be highly toxic to a range of environmental receptors, including livestock, and therefore, the Delegated Officer has determined to include thallium in the analytical suite monitored in groundwater at the TSFs.

Selenium has been identified in groundwater samples and is elevated in bores directly down gradient of the existing TSFs. It is likely a result of seepage, but does not appear to be considerably mobile and has not been identified in bores further down gradient. The *Chichester Groundwater Quality – Operational Tailings Storage Facilities Review* (45-SY-EN-0004, FMG November 2016) was submitted to satisfy a previous improvement condition (IR3) imposed on Licence L8454/2010/2. Following a review of the report, the Delegated Officer accepts that selenium is unlikely to cause adverse environmental impacts, due to the lack of a substantial groundwater pathway to transmit the contaminant to environmental receptors.

The Licensee has advised that the natural groundwater regime of the region has been significantly altered due to the dewatering and reinjection activities and a cone of depression has been created by mine dewatering which forces groundwater to flow in the opposite direction; back towards the mining area as opposed to towards the Fortescue Marsh. The Delegated Officer notes that a potential groundwater pathway to transmit chemical constituents into the Fortescue Marsh exists, although it is severely interrupted by the current mine dewatering operations and the rate of transmission is likely to be limited, whilst operations continue.

Following a review of the *Christmas Creek Triennial Groundwater Monitoring Review*, the Delegated Officer acknowledges that it is unlikely that any contamination from the mine site in the shallow aquifer would have a significant impact on environmental receptors in the Fortescue Marsh due to the generally clayey nature of sediments in this aquifer, the long travel times and the lack of direct hydraulic interconnection between this aquifer and the surface water flow system in the marshes. Similarly, it is likely that there is negligible discharge of groundwater from the underlying deeper aquifers into the Fortescue Marsh because upward leakage of groundwater would be impeded by the presence of a significant clayey aquitard that overlies the Oakover Formation.

With respect to the operation of the Flinders In-Pit TSF (below and above water table deposition of tailings), SRK Consulting undertook a groundwater impact assessment (SRK Consulting 2014). This assessment reports that the impacts to groundwater from backfilling with tailings are indistinguishable from the current method of tailings disposal, whereby pits are backfilled with waste rock prior to the commencement of tailings deposition.

The Licensee's hydraulic model provided with the application for the Flinders In-Pit TSF assumed that the blast damaged rock within the pit wall would provide a pervious layer and divert groundwater flow around the tailings mass, thereby decreasing groundwater flow through the tailings and potential transport of soluble contaminants to sensitive receptors. In the partial compliance documentation submitted on 1 March 2017, the Licensee confirmed that the pit walls are at least four orders of magnitude more permeable than the tailings material. The Delegated Officers notes that this should assist in groundwater being channelled around the tailings, as opposed to through it.



Groundwater is expected to continue to flow towards the Flinders pit after mine closure due to the effects of evaporation. Therefore, it is considered that there would be negligible risk of soluble contaminants within the Flinders In-Pit TSF causing offsite environmental impacts from groundwater discharge. It is also considered that the risks of offsite impacts would not change significantly if tailings deposition were to take place at a higher elevation than 2 m below the pre-mining water table elevation. Noting the above, as well as the outcome of the review of the *Christmas Creek Triennial Groundwater Monitoring Review*, the Delegated Officer has determined to remove the deposition limit for the Flinders In-Pit TSF currently imposed through Amendment Notice 1.

Risk Assessment

Consequence: The Delegated Officer has considered the findings of the recent TSF groundwater review conducted at Christmas Creek which demonstrates there is not a substantial groundwater pathway to transmit contaminants to environmental receptors and determined that low level onsite impacts and minimal offsite impacts at a local scale will occur from TSF seepage. Therefore the Delegated Officer considers the consequence to be minor.

The Delegated Officer notes that the salinity and pH of supernatant water is similar to background water quality; and that it will be removed as required to encourage the consolidation of tailings to minimise seepage. It is also noted that studies conducted by the Licensee have demonstrated a low risk of generation of acidic and/or metalliferous drainage from the embankment construction materials and tailings.

Likelihood: The Delegated Officer has determined that an environmental impact due to TSF seepage will probably not occur in most circumstances. Therefore, the Delegated Officer considers the consequence to be unlikely.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for TSF seepage to the environment to be **medium**.

Regulatory Controls

The Delegated Officer has imposed ambient groundwater monitoring requirements through condition 3.6.1, to ensure that changes to groundwater quality and levels as a result of seepage from the TSF are identified. The Licensee will be required to report monitoring results annually as part of the Annual Environmental Report, required under reporting condition 4.2.1.

Residual Risk Assessment

Consequence: Minor

Likelihood: Unlikely

Risk Rating: Medium

Abnormal operation/emergency situation

Emission description

Emission: Overtopping of the TSFs, rupture of the tailings and return water pipelines, releasing tailings or return water into the surrounding environment.

Impact: Deterioration of surface water, soil and groundwater quality. A spill of tailings may impact on surrounding vegetation, dependant on location and volume of waste discharged.

Controls: TSFs are designed to accommodate rainfall from a 1 in 100 year Annual Recurrence Interval (ARI), 72-hour duration storm event, in addition to the normal operating freeboard of 0.5 m. Removal of supernatant water is carried out as required. Regular visual inspections of tailings pipelines and TSFs to monitor freeboard.



The Licensee has committed to the monitoring of embankments for stability including freeboard.

Risk Assessment

Consequence: The Delegated Officer has considered the geochemical characterisation of the tailings/return water and location of infrastructure in already disturbed areas and determined that the environmental impact of a discharge of tailings or return water could result in low level onsite impacts and minimal off site impacts at a local scale. Therefore, the Delegated Officer considers the consequence to be minor.

Likelihood: The Delegated Officer has considered the location of the TSF infrastructure and determined that an environmental impact due to tailings and return water discharges will probably not occur in most circumstances. Therefore, the Delegated Officer considers the consequence to be unlikely.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for tailings and return water discharging to the environment to be **medium**.

Regulatory Controls

The Delegated Officer has applied condition 1.2.1 to ensure systems are in place to monitor and isolate pipelines transferring tailings and return water. Conditions 1.2.2 and 1.2.3 have been included in the Licence, specifying the Licensee's controls with respect to maintaining adequate freeboard on the TSFs and conducting daily visual integrity inspections of tailings pipelines, water return lines and the TSFs embankment freeboard. Condition 1.2.4 requires annual water balances to be undertaken for the TSFs, which will be reported as part of the Annual Environmental Report required under condition 4.2.1.

Residual Risk Assessment

Consequence: Minor

Likelihood: Rare

Risk Rating: Low

Saline water pipelines

Emission description

Groundwater abstracted to facilitate mining below the water table is transferred to the bore reinjection system via a network of pipelines, which are raised or buried at regular intervals to allow the flow of the surface water and aid in the movement of fauna.

Emission: Spill of saline water from above ground pipelines.

Impact: A spill of saline water may impact on conservation significant Mulga vegetation health dependant on location.

Controls: All water conveyance infrastructure is inspected daily by maintenance personnel, checking for water leaks, controls and condition of containment dams.

Flow meters and pressure gauges are located at key locations on transfer pipelines, approximately every 1 km, to allow the Licensee to undertake water balance calculations and identify if there are any losses from the system. A notification message (SMS) is sent when the flow meters detect any unplanned reduction in flow so corrective management actions can be implemented. If leaks are detected, the location is isolated and repaired. Flow meters on all bores are tested for accuracy and calibrated by in-situ validation, twice a year or as per manufacturer specifications.



Valves are regularly installed along bulk lines to allow for isolation of sections should damage occur, or for maintenance activities.

Licence L8454/2010/2 was issued on 20 August 2015. At the time of the licence reissue, improvement condition 4.1.1 was imposed on the Licence to address the implementation of appropriate controls on saline water pipelines and water transfer ponds. Through improvement IR1 the Licensee was required to submit a report which:

- identifies environmentally sensitive areas and/or sensitive receptors potentially at risk of being impacted by unplanned discharges of saline/hypersaline water from the existing saline water pipelines;
- identifies which of the following measures will be implemented to minimise the likelihood, duration and subsequent impacts of discharges of saline/hypersaline water from pipelines to the environment:
 - (a) equipped with telemetry;
 - (b) equipped with automatic cut-outs in the event of a pipe failure; or
 - (c) provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections; and
- provides timeframes for the implementation of the appropriate measures identified

Under improvement IR2 the Licensee was to finalise the design, install and commission the water level sensors and telemetry on the saline water transfer ponds associated with the dewatering and reinjection network.

On 31 December 2015, the Licensee submitted the *Saline Water Infrastructure Environmental Improvement Assessment* which identified environmentally sensitive areas containing Mulga (*Acacia aneura*) or Phreatophytic (*Eucalyptus camaldulensis* and *Eucalyptus victrix*) dominated vegetation units in areas that are not scheduled for mining or other ground disturbing activities within the current five year mine plan. A leak detection system is currently being implemented at Christmas Creek using telemetry infrastructure on the pipelines in the environmentally sensitive areas potentially at risk of being impacted by unplanned discharges of saline/hypersaline water.

The Licensee is proposing to supersede the proposed telemetry infrastructure detailed in the above report by an improved technology which recently became available which has the potential to provide leak detection with a more accurate location facilitating a quicker response time to contain and therefore reduce impact of a saline/hypersaline water discharge. The technology uses a Fibre Option cable installed along pipelines to detect a possible leak using real-time spectral analysis to highlight when conditions have changed. The use of this technology is currently under pilot testing at Christmas Creek. The Licensee has requested an extension of the implementation timeframe (quarter 4 of the 2018 financial year) to ensure that the technology is effectively ratified prior to implementation as an optimal Leak Detection solution (FMG 2017a).

Risk Assessment

Consequence: The Delegated Officer has considered previous incidents involving unplanned discharges of saline water at the Licensee's neighbouring Cloudbreak Iron Ore Mine and notes that significant volumes of saline/hypersaline water is conveyed across the premises at Christmas Creek (43 GLpa). Based on these factors the Delegated Officer has determined that discharges of saline/hypersaline water could result in midlevel onsite impacts to Mulga and/or Phreatophytic vegetation exposed. Therefore, the Delegated Officer considers the consequence to be moderate.

Likelihood: The Delegated Officer has considered the applicant controls (daily visual inspections and telemetry system on pipelines in environmentally sensitive areas) and previous incidents on similar premises and determined that an impact to vegetation from the discharge of saline/hypersaline water



could occur at some time. Therefore, the Delegated Officer considers the likelihood of the consequence to be possible.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for discharges of saline water from pipelines during operation to be **medium**.

Regulatory Controls

To ensure that pipeline leaks, ruptures and/or spills are identified and responded to quickly, the Delegated Officer has updated condition 1.2.3 to require daily visual inspections of saline water infrastructure, including saline pipelines, consistent with the existing operator controls.

The Delegated Officer has also imposed condition 1.2.11 which requires the implementation of controls on the saline pipelines in the environmentally sensitive areas in accordance with the phased approach to implementation, as advised by the Licensee (FMG 2017a). Condition 4.3.1 has been updated to include notification requirements at the completion of each phase of works.

Residual Risk Assessment

Consequence: Moderate

Likelihood: Unlikely

Risk Rating: Medium

Transfer and settlement ponds

Emission description

Emission: Spill of saline water from overtopping of transfer and settlement ponds.

Impact: A spill of saline water may impact on vegetation health dependant on location.

Controls: Leak detection is undertaken via regular visual inspections of pipework, ponds and fittings. Information collected on the saline transfer ponds, via telemetry includes water level, distance to overflow and water level trends. This information is displayed as live data, displayed remotely and SMS messages are sent for any breaches in pre-set levels. There is also the ability to control pumps remotely. A 200 mm vertical freeboard is maintained on all transfer and settlement ponds.

Risk Assessment

Consequence: The Delegated Officer has determined that the environmental impact from discharges of saline/hypersaline water from ponds to the environment could result in low level onsite impacts. Therefore, the Delegated Officer considers the consequence to be minor.

Likelihood: The Delegated Officer has considered the applicant controls (daily visual inspections and telemetry systems) and determined that an impact to vegetation from the discharge of saline/hypersaline water from the overtopping of saline ponds will not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of the consequence to be unlikely.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for discharges of saline water from the overtopping of saline ponds during operation to be **medium**.

Regulatory Controls

The Delegated Officer has given regard to the applicant controls and considers that daily visual inspections and the use of telemetry infrastructure lower the likelihood of an environmental impact occurring.



Condition 1.2.1 specifies waste containment infrastructure utilised at the Christmas Creek mine, including the saline water ponds, and the requirements to be maintained on this infrastructure to ensure a sufficient level of environmental protection is achieved, including the maintenance of a minimum vertical freeboard to prevent overtopping and a HDPE liner.

Residual Risk Assessment

Consequence: Minor

Likelihood: Rare

Risk Rating: Low

Landfill

The Christmas Creek putrescible landfill is a trench type facility which accepts up to 5,000 tonnes per annum of waste. The maximum dimensions of each trench is 30 m in length, 5 m in width and 4 m in depth and are excavated to a maximum depth of 3 m below ground level. Only one trench is open and used at a time. Approximately 230 trenches will be accommodated at capacity. The maximum tipping area open at any time will be no greater than 30 m in length and 2 m above ground in height. The tipping area is enclosed with a stock proof fence.

The Licensee also disposes of used tyres, pipelines concrete and untreated wood in mining pits and waste rock dumps.

In aggregate, up to 10,000 tonnes per annum of waste is disposed of to the putrescible and inert landfills.

Emission description

The Licensee operates a landfill for disposal of up to 10,000 tonnes of putrescible and inert waste per annum. Inert materials (tyres, disused pipelines and concrete) and untreated wood is disposed of in mining pits and waste rock dumps.

Emission: Potential leachate generation from inert and putrescible landfills.

Impact: Contamination of soil and groundwater, impacts to ecosystems receiving groundwater discharge from the addition of hydrocarbons, nutrients and heavy metals. Impacts to pastoral groundwater uses in the area.

Controls: Depth to groundwater at the putrescible landfill is 25 metres below ground level (premining level) and generally flows in a southerly direction towards the Fortescue Marsh, located approximately 4 km from the landfill. There is no potable drinking water supply bores located down gradient of the landfill. The nearest pastoral bore to the putrescible landfill is 22 Mile bore; located approximately 9 km from the landfill.

Site controls on the types of waste deposited to landfill and restrictions on access (the landfill is fenced) are in place; and management of the landfill requires weekly coverage of landfill trenches with at least 300 mm of inert material. No clinical or asbestos waste is disposed of to the putrescible landfill and chemical and hydrocarbons are stored in lined bunds and/or mobile spill pallets, and removed from site by a licensed contractor for disposal at an appropriately licensing facility.

Diversion channels and embankment bunds have been constructed to divert surface water away from the landfill facility.

Groundwater in the area of the landfill is subject to drawdown from the mine dewatering activities being conducted to access the ore bodies, and hence the depth to groundwater is increased and the



impact of leachate mitigated. A groundwater monitoring bore has been established adjacent to the putrescible landfill to monitor standing water level on a biannual basis. Monitoring results since May 2016 show the bore being dry, indicating that the aquifer has been depleted in the landfill area due to dewatering in the adjacent mining pits.

Risk Assessment

Consequence: The Delegated Officer has determined that the environmental impact associated with landfill leachate could result in midlevel onsite impacts and low level offsite impacts at a local scale. Therefore, the Delegated Officer considers the consequence to be moderate.

Likelihood: The Delegated Officer has considered the depth to groundwater (25 m), surface water management (diversion channels and embankment bunds) and distance to the closest water course (80 m) and determined that an impact to groundwater and aquatic ecosystems could occur at some time. Therefore, the Delegated Officer considers the likelihood to be possible.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for leachate from the landfill during operation to be **medium**.

Regulatory Controls

The Delegated Officer has specified waste management requirements under condition 1.2.5 and landfill cover requirements under condition 1.2.6. These conditions ensure appropriate waste acceptance and management is implemented on site, consistent with the assessed design capacity of the landfill.

The Licensee has advised (FMG 2017b) that the groundwater monitoring bore adjacent to the landfill is dry. The Delegated Officer accepts that this is an indication that the aquifer in the vicinity of the landfill has been depleted as a result of dewatering activities in the adjacent mine pit. Therefore, the Delegated Officer has not imposed groundwater monitoring requirements at this stage. However following the cessation of mine dewatering in the vicinity of the landfill and the recovery of the groundwater levels, an assessment will be required to determine if further regulatory controls (e.g. groundwater monitoring) is required.

Residual Risk Assessment

Consequence: Moderate

Likelihood: Unlikely

Risk Rating: Medium

Bioremediation facility

Emission description

Emission: Runoff from the bioremediation treatment cells containing elevated concentrations of hydrocarbons and heavy metals.

Impact: Contamination of soil, surface water and groundwater in the area, impacts to fauna and ecosystem disruption. Potential impacts to the Fortescue Marsh, which receives groundwater and surface water from the project area.

Controls: The facility consists of three pads approximately 25 m in length and width and lined with HDPE liner to act as a barrier to underlying soil and groundwater. It is anticipated that only one pad will be used during the life of the facility. The depth to groundwater is approximately 20 to 25 m below the facility (maximum wet season level). The site is located on flat terrain and at least 100 m from any water course. It is predicted that the facility will process approximately 750 tonnes of contaminated soil per year.



The contaminants in the soil to be remediated are hydrocarbons, primarily diesel, hydraulic oil and engine oil. Sampling and analysis is conducted once the soil has reached the final cell in the bioremediation pad. The quality of the end use soil will meet with the Health Investigation Levels for Total Petroleum Hydrocarbons for commercial and industrial premises as recommended by DWER's Science and Planning Branch. It is then to be used in the rehabilitation of backfill mined pits.

Stormwater is managed with the use of earthen bunding to divert stormwater discharges away from bioremediation areas.

The bioremediation pad in use is monitored weekly to ensure it is being managed appropriately. The pad is sprayed with water weekly, tilled/turned monthly and chemically treated quarterly, or as required. A Bioremediation Log Book is maintained which records the date, volume, origin and known or likely contaminant material.

With respect to the reuse of bioremediation soils, the Licensee will need to ensure that the Soil Ecological Screening Levels and Health Screening Levels outlined in the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM) are met; and will also need to develop site-specific Ecological Investigation Levels that protect groundwater quality and aquatic ecosystems from potential soil leachate in accordance with Appendix B of Schedule B5b of the NEPM. The Delegated Officer notes the Licensee's responsibility under the *Contaminated Sites Act 2003* to report known or suspected contaminated sites to DWER.

Risk Assessment

Consequence: The Delegated Officer has considered the distance to the nearest drainage line (at least 100 m) and depth to groundwater (approximately 25 m below ground level) and determined contaminated runoff will result in minimal onsite impacts. Therefore, the Delegated Officer considers the consequence to be slight.

Likelihood: The Delegated Officer has considered the cell design, incorporating HDPE liner and earthen bunding to divert stormwater, and determined that an impact to groundwater and aquatic ecosystems will probably not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood to be unlikely.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for leachate from the landfill during operation to be **low**.

Regulatory Controls

The Delegated Officer notes the general provisions of the EP Act, with respect to the causing of pollution and environmental harm apply, as will the provisions of relevant subsidiary legislation, including the *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

The Delegated Officer notes that the provisions of the *Contaminated Sites Act 2003* also apply.

Residual Risk Assessment

Consequence: Slight

Likelihood: Unlikely

Risk Rating: Low



Appendix B

Point source emissions to air including monitoring

Point source emissions to air are generated from the Christmas Creek Power Station which comprises a series of 27 x 2 MW Cummins QSK78-G9 diesel fired generators. The installation of these gensets occurred in two stages and was subject to two works approvals:

- W4643/2010/1 – first stage installation of 14 diesel gensets; and
- W5001/2011/1 - installation of additional 13 diesel gensets.

Each 2 MW unit has an exhaust duct, which emits to air. Key emissions are products of diesel combustion: particulates, carbon monoxide, sulphur dioxide and oxides of nitrogen. The Licensee has modelled the potential effects on air quality from emissions to air using TAPM and Ausplume which are accepted by DWER as suitable models.

FMG supplied design criteria for the Cummins 2 MW diesel gensets as follows in Table 3:

Table 3: Point source emission rates for Cummins QSK78-G9 generator	
Emission Type	Modelled Emissions (mg/Nm ³)
NO _x	3252
SO _x	47
CO	4049
Hydrocarbons	472

The results of modelling of the power station is presented in the Table 4 below and represent the maximum ground level concentrations predicted by the dispersion modelling at Marillana Station, as compared to the *National Environmental Protection (Ambient Air Quality) Measure* (NEPM).

Table 4: Ambient concentrations of air pollutants compared to the NEPM				
Emission Type	Averaging period	Maximum at receptor (µg/m ³)	NEPM criteria (µg/m ³)	Percentage of guideline
NO _x	1 hour	145	247	59%
	Annual	5.6	62	9%
SO _x	1 hour	8.0	572	1.4%
	24 hours	1.8	229	0.8%
CO	8 hours	1,101	11,254	9.8%
PM ₁₀	24 hours	38	50	75%
PM _{2.5}	24 hours	27	25	107%

Emission description

Emission: Combustion gases (CO, NO_x, SO_x, BTEX) and particulates from diesel generators (normal operation).

Impact: Reduced local air quality at the nearest sensitive receptors. Emissions modelling demonstrated the emission may cause a breach of NEPM ambient air standards for PM_{2.5} at the Marillana homestead (41 km from the premises) for one 24 hour period per annum. However, this modelling was conservative, as the modelled condition assumed all gensets are operating at full load under adverse meteorological conditions.



Controls: The nearest sensitive land uses include Roy Hill Station and Marillana Homestead, located 30 km and 41 km respectively from the Christmas Creek power station.

Despite modelling indicating a potential exceedance of PM_{2.5} at Marillana Homestead, the likelihood of this exceedance occurring is expected to be minimal as modelling of ambient air emissions have been based on conservative emission estimates. The Licensee indicated that the estimated emissions are based on a worst case scenario of all generators operating simultaneously. The Delegated Officer accepts that all of the turbines will not be operated at any one time and therefore PM_{2.5} emissions will most likely be less than those predicted.

Additionally, PM_{2.5} concentrations modelled were based on manufacturer specifications which combine PM₁₀ and PM_{2.5}. It is estimated that the actual PM_{2.5} emissions are 80% of that modelled resulting in an overestimation by 20%. The Delegated Officer notes that given this conservative modelling it is anticipated that the emissions from the expanded power will be within the NEPM guidelines.

Risk Assessment

Consequence: The Delegated Officer notes that the nearest human receptors are Roy Hill Station and Marillana Homestead, located approximately 30 km and 41 km respectively from Christmas Creek. The Delegated Officer considers this a sufficient buffer, and there will be minimal impacts to the health and amenity of this receptor. Therefore, the Delegated Officer has determined the consequence to be slight.

Likelihood: The Delegated Officer has determined that an impact to sensitive receptors would only occur in exceptional circumstances. Abatement and maintenance procedures are in place. With respect to the modelled ambient PM_{2.5} concentrations at Marillana Station, the Delegated Officer notes that modelling was conservative and actual concentrations are likely to be 20% less than those modelled. Therefore, the Delegated Officer considers the likelihood of the consequence to be rare.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for air emissions during operation to be **low**.

Regulatory Controls

The Delegated Officer has specified the point source air emission locations under condition 2.1.1. The risk associated with point source air emissions has been assessed as low, therefore no further regulatory controls are being applied to the Licence.

The Licensee will be required to report air emissions to DWER annually through the annual fee application process. The Licensee will be required to include the air emission calculations as part of the annual fee submission, based on an appropriate emission estimation technique, for example monitoring data, National Pollution Inventory guides or emission factors.

As a result of the revised risk assessment undertaken for point source emissions to air, the Delegated Officer has determined to remove the air emissions monitoring requirements specified under previous condition 3.2.1. Conditions 3.2.2 and 3.2.3 related to the sampling and analysis of air emissions have also been removed based on the outcome of the revised risk assessment.

Previous conditions 3.2.1, 3.2.2 and 3.3.3 stated:

- 3.2.1 *The Licensee shall undertake the monitoring of a sample of six (6) emission points in Table 3.2.1 and identified on the map of emission points in Schedule 1, according to the specifications in that table, on a rotational basis such that all emission points are tested at least once within a 5 year period.*



Table 3.2.1: Monitoring of point source emissions to air

Emission point reference	Parameter	Units¹	Averaging period	Frequency	Method
A1- A28	Nitrogen oxides	mg/m ³ g/s	60 min	Annual	USEPA Method 7E
A1- A28	Carbon monoxide	mg/m ³ g/s	60 min	Annual	USEPA Method 10

Note 1: All units are referenced to STP dry and 15% O₂.

3.2.2 The Licensee shall ensure that sampling required under Condition 3.2.1 of the Licence is undertaken at sampling locations in accordance with the AS 4323.1.

3.2.3 The Licensee shall ensure that all non-continuous sampling and analysis undertaken pursuant to condition 3.2.1 is undertaken by a holder of NATA accreditation for the relevant methods of sampling and analysis.

Residual Risk Assessment

Consequence: Slight

Likelihood: Rare

Risk Rating: Low



Appendix C

Point source emissions to surface water including monitoring

Emission description

Emission: In the event that it is not able to be managed through reuse, bore reinjection or in pit disposal or temporary storage, excess mine dewater may be discharged via 4 discharge points to ephemeral creeks, draining south towards the Fortescue Marsh.

Impact: Impacts to the riparian vegetation communities in the ephemeral creeks.

Discharges of excess mine dewater has the potential to impact on the natural surface flow regime of the Fortescue Marsh, impact on vegetation (in particular Samphire) and habitat for species of national significance.

The Fortescue Marsh is the largest ephemeral wetland in the Pilbara and is of high conservation value with species of national significance and is part of a complex array of alluvial aquifers and groundwater systems. The Marsh has been divided into six zones with two each of high environmental significance, medium environmental significance and low environmental significance. Zone 1a, of high environmental significance, is located on the northern side of the Marsh, closest to the contingency discharge points.

Controls: The Licensee has developed the *Dewatering Contingency Discharge Procedure* (CH-PR-RN-00003_Rev4, FMG December 2014) to ensure that the contingency discharge of groundwater is appropriately managed at Christmas Creek.

Dewatering discharge at designated discharge points is only undertaken as a contingency measure, where levels of Electrical Conductivity in the water to be discharge is less than 15,000 $\mu\text{S}/\text{cm}$ and where turbidity level in the water to be discharged is less than 100 nephelometric turbidity units (NTU). Water quality is monitored prior to, during and at the cessation of discharge.

Risk Assessment

Consequence: The Delegated Officer has considered the operator controls which include discharge limits for Electrical Conductivity and turbidity; and determined that low level onsite impacts and minimal offsite impacts at a local scale would occur from the contingency discharge of mine dewater. Therefore, the Delegated Officer has determined the consequence to be minor.

Likelihood: The Delegated Officer has determined that an impact to sensitive receptors will not occur in most circumstances, as the contingency discharge is used infrequently, only in the event that reuse, reinjection, in pit disposal and temporary storage are not available or been exhausted. Therefore, the Delegated Officer considers the likelihood to be unlikely.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for the contingency discharge of mine dewater to creek lines to be **medium**.

Regulatory Controls

Previous conditions 2.2.1 and 2.2.2 stated:

“The Licensee shall ensure that where waste is emitted to surface water from the nominated contingency discharge points it is done so in accordance with the ‘Dewatering Discharge Contingency Procedure’ (Fortescue Metals Group Limited, 8 December 2014, CH-PR-EN-0003).”



“The Licensee shall undertake the monitoring of point source emissions to surface water as per the ‘Dewatering Discharge Contingency Procedure’ (Fortescue Metals Group Limited, 8 December 2014, CH-PR-EN-0003).”

The Delegated Officer has updated condition 2.2.1 to specify the four emissions points from which the contingency discharge of mine dewater may occur in the event that reuse, reinjection, in pit disposal and temporary storage are not available or have been exhausted.

Condition 3.2.1 has been updated to specify the monitoring requirements for surface water emissions and specify limits for Electrical Conductivity and NTU, consistent with the operator controls specified in the *Dewatering Contingency Discharge Procedure*, which were considered by the Delegated Officer in assessing the consequence of the contingency discharge. The Licensee will also be required to monitor the cumulative volume of discharge during contingency discharge events.

Condition 4.3.1 requires the Licensee to report to DWER following a contingency discharge, including the results of the monitoring undertaken during the event.

Residual Risk

Consequence: Minor

Likelihood: Unlikely

Risk Rating: Medium



Appendix D

Emissions to groundwater including monitoring

The Delegated Officer notes that impacts to conservation significant vegetation and subterranean fauna (stygofauna and troglofauna) from changes in groundwater levels and quality as a result of reinjecting mine dewater have been assessed by the EPA under Part IV of the EP Act. Conditions have been imposed on MS1033 to address the potential impacts to vegetation and subterranean fauna associated with the reinjection of mine dewater.

Conservation significant vegetation

Condition 5-1 has been imposed on MS1033 and requires the development of an Outcome-based Condition Environmental Management Plan to demonstrate that the environmental outcomes specified in condition 7-1 will be met. The environmental outcomes specified under condition 7-1 of MS1033 relates to maintaining the health of Mulga, Samphire and Coolibah/River Red Gum vegetation; and conservation significant flora within the Christmas Creek Mine Development Envelope. Condition 7-3 requires the Outcome-based Condition Management Plan to address impacts on conservation significant flora and vegetation health including from, but not limited to changes to groundwater levels and groundwater quality, changes to surface flows, dust and weeds. MS1033 requires the Outcome-based Condition Environmental Management Plan to specify; threshold criteria to demonstrate compliance with the environmental outcomes, trigger criteria that provide an early warning that the threshold criteria may not be met, monitoring, trigger level actions and threshold contingency actions.

The Delegated Officer notes that under condition 7-4 of MS1033, the Licensee is required to continue to implement the management plans required under MS871 for the CCWMS until the CEO of the EPA has confirmed that the Outcome-based Condition Environmental Management Plan satisfies the requirements of MS1033. These plans include the *Vegetation Health Monitoring and Management Plan* (CCOPL-EN-0004), the *Significant Flora and Vegetation Management Plan* (45-PL-EN-0017), the *Fortescue Marshes Management Plan* (45-PL-EN-0009) and the *Surface Water Management Plan* (100-PL-EN-1015).

Subterranean fauna

Condition 9-1 of MS1033 requires the Licensee to manage the implementation of the proposal to minimise impacts to subterranean fauna species that have been identified through baseline surveys to have potentially restricted distributions or potentially restricted habitat. Under MS1033, the Licensee is required to undertake further targeted surveys for the proposed expansion. A management-based Condition Environmental Management Plan for potentially restricted subterranean fauna will need to be developed and implemented if surveys indicate that one or more subterranean fauna species has a restricted distribution and/or a restricted habitat.

The Delegated Officer has considered the Part IV of the EP Act approvals issued for Christmas Creek, and with respect to the reinjection of mine dewater has restricted DWER's assessment to potential environmental impacts to changes to groundwater quality, and subsequent impacts to beneficial use of groundwater. The potential environmental impacts to vegetation and subterranean fauna associated with mounding and changes to groundwater quality as a result of reinjection of mine dewater have been addressed under conditions of MS1033, issued under Part IV of the EP Act.



Emission description

Emission: Groundwater is abstracted from dewatering borefields to enable below water table mining. Water is used for dust suppression, ore processing, earthworks and construction. Excess groundwater abstracted from the dewatering operation is reinjected into suitable aquifers.

Groundwater injection is undertaken with brackish water in areas west of the active mining area and typically targets the Marra Mamba Formation. There is currently no active brackish injection occurring at Cloudbreak.

Saline injection is undertaken between the southern limit of the resource area and the northern limit of the Fortescue Marsh. The Oakover Formation is the target aquifer of the injection. It has a salinity which is typically between 30,000 mg/L and 150,000 mg/L. At each injection location there is generally a flow meter and a down-hole water level sensor. The down-hole and flow sensors are complemented by regular visual inspections of the pipework and fittings and manual recordings of meter readings.

Impact: Changes in groundwater quality as a result of the discharge of higher salinity water into fresh water zones of the aquifer. Impacts to other groundwater users in the area (pastoral bores). Saline water injected into areas with fresh or brackish water quality (less than 6,000 mg/L TDS) has the potential to increase salinity. Salinity above 6,000 mg/L TDS could limit the potential use of the water for stock watering and other beneficial uses (FMG 2011).

Controls: The Licensee monitors groundwater levels and field Electrical Conductivity monthly at pastoral bores to ensure the water resource is being maintained (FMG 2016).

Groundwater abstraction at Christmas Creek is currently regulated pursuant to the *Rights in Water and Irrigation Act 1914*. The *Christmas Creek Groundwater Operating Strategy*, prepared as a condition of the 5C licence, outlines the planned operation of dewatering, injection and process water supply systems at Christmas Creek and the management systems that will be employed to monitor and mitigate potential impacts.

Monthly monitoring of the standing water level and Electrical Conductivity in pastoral bores is undertaken by the Licensee, in accordance with the *Christmas Creek Groundwater Operating Strategy*. Data is reported quarterly in accordance with conditions of the 5C licence.

The Licensee has implemented an extensive monitoring bore network to measure impacts of groundwater dewatering, reinjection and borefield operations on water resources, the environment and other users. Ambient groundwater monitoring is undertaken twice yearly from a number of locations across the brackish and saline injection areas.

The Delegated Officer also notes that mine dewater is reinjected to compatible aquifers, minimising the likelihood of there being significant impacts to groundwater quality.

Risk Assessment

Consequence: The Delegated Officer has determined that mid level onsite impacts and low level offsite impacts at a local scale could occur to sensitive receptors from changes to groundwater quality as a result of reinjection of mine dewater. Therefore, the Delegated Officer has determined the consequence to be moderate.

Likelihood: The Delegated Officer has determined that an impact to sensitive receptors could occur at some time. Therefore, the Delegated Officer considers the likelihood of the consequence to be possible.



Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for the reinjection of mine dewater to be **medium**.

Regulatory Controls

Condition 2.3.1 specifies the groundwater emission points, comprising of reinjection bores located in the saline and brackish injection zones. Condition 3.3.1 specifies three points along the water conveyance infrastructure from which reinjection water is monitored, one location for the sampling of brackish water and two locations for the sampling of saline water.

Condition 3.6.1 includes ambient groundwater monitoring requirements to identify potential impacts to groundwater quality and levels as a result of the reinjection of mine dewater. The monitoring of pastoral bores has not been included as the monthly monitoring of standing water levels and Electrical Conductivity is undertaken by the Licensee in accordance with the approved *Christmas Creek Groundwater Operating Strategy*.

Under condition 4.2.1, the Licensee will be required to report the results of monitoring to DWER in the Annual Environmental Report for review.

Comprehensive regulation of impacts to vegetation is provided for under Part IV of the EP Act, therefore the Delegated Officer considers no further regulation under Part V of the EP Act is required.

Residual Risk Assessment

Consequence: Moderate

Likelihood: Possible

Risk Rating: Medium



Appendix E

Emissions to land including monitoring

Construction Camp WWTP

The process for treating wastewater at the Christmas Creek Construction Camp involves an activated sludge WWTP (Stornaway) designed to treat wastewater for a maximum of 500 people.

Raw wastewater is pumped from the pump station to an in-ground bar screen which removes inorganic material from the wastewater and disposes it to the waste bin. The wastewater is then transferred to the balance tank which allows the inflow of wastewater to be controlled, preventing the facility from experiencing load shocks during peak use periods. From the balance tank, waste water is discharged into the anoxic tanks which are continuously mixed by the anoxic mixer. The wastewater is then gravity fed to the aeration tanks, each with two blowers and associated valves and piping that deliver process air to the aeration tanks. Liquor is fed from the aeration tank into the inlet of the clarifier where solids are provided sufficient time to settle out, before passing through a settling tube and being gravity fed to the final effluent tank.

A sequencing batch reactor (SBR) WWTP (Tristar) also operates at the Construction Camp and utilises the same balance tank, irrigation tank, anaerobic digester, polymer storage tank, geotubes and PVC lined bund to contain the geotubes as the activated sludge WWTP. Screened wastewater is stored in the balance tanks which feeds wastewater to both facilities. Wastewater fed into the Tri-Star SBR facility is deposited into the SBR tank for processing. The biological treatment process of oxidation, nitrification, de-nitrification, sedimentation and aerobic sludge digestion takes place at the SBR tank.

Treated effluent from both WWTPs is directed to the 200,000 L irrigation tank prior to being disposed of through a surface irrigation system. The irrigation area is located approximately 11.5 km south of the treatment facility and construction camp, and covers an area of approximately 13 ha.

Karntama Camp WWTP

The process for treating wastewater at the Christmas Creek Operations Camp involves an MBR, designed to treat wastewater for a maximum of 1,600 people. Following treatment of the wastewater, treated effluent is to be stored in tanks for use in dust suppression around site, landscaping, for irrigation of the camp sports oval, and for use on the irrigation area.

The majority of treated wastewater from the WWTPs is used around the Christmas Creek site for dust suppression. Use of the irrigation field mainly occurs during periods of heavy rainfall when dust suppression is not required. The irrigation area is located approximately 600 m south of the treatment facility and operations camp, and covers an area of approximately 15 ha.

Reject water from the Karntama Camp RO plant is discharged to the Karntama Camp WWTP irrigation area, accounting for 40% of the irrigated wastewater.

Emission description

Emission: Treated effluent from the Construction Camp and Karntama Camp WWTPs discharged to land via irrigation to designated spray fields. Reject water from the site's RO plant is also discharged to the Karntama Camp WWTP irrigation area.

Impact: Effluent discharged as irrigation to land has the potential to result in degraded or waterlogged land, with soil or groundwater contamination arising where the effluent is either saline, turbid, nutrient



enriched, and/or contaminated with metals. Secondary impacts to vegetation may also result from effluent discharge that is of poor quality or in quantities such that offsite impacts may occur.

Controls: Depth to groundwater is greater than 10 m and the nearest drainage line is located approximately 55 m from the Karntama Camp WWTP irrigation area and 215 m from the Construction Camp WWTP irrigation area.

Pooling of irrigated treated wastewater and surface runoff is unlikely due to vegetation uptake and the high evaporation rate experienced in the region (approximately 3 m per year).

Intermittent discharge of effluent to the irrigation fields occurs to prevent potential ponding and run-off. Irrigation fields have been sized appropriately to ensure acceptable nutrient loading rates are achieved. The irrigation area is fully fenced and signed to restrict personnel from entering the area and prevent unauthorised access. The fence is a minimum of 5 m from the sprinkler spray pattern to allow for spray drift. High level alarms have been incorporated into the WWTPs to alert staff of potential overflows; and automatic shutoff shut off valves are a feature of the SBR facility at the Construction Camp to prevent overspill.

With respect to the inspection, maintenance and monitoring associated with the WWTPs, the Licensee has advised that:

- weekly inspections and maintenance of the WWTPs and associated infrastructure is undertaken;
- weekly monitoring and recording of effluent volume and pH is conducted; and
- monthly monitoring of the treated wastewater quality is undertaken, including biochemical oxygen demand, total suspended solids, total nitrogen, total phosphorus, TDS and coliforms.

The Delegated Officer also notes that a licensed contractor carries out inspections and full services of the WWTPs on a quarterly basis as required by the Department of Health.

During the 2015 reporting period concentrations of total nitrogen in treated wastewater from the Karntama Camp WWTP ranged from 20 mg/L to 32 mg/L, exceeding the plant specification of 10 mg/L. The Licensee has advised water quality data for the Karntama Camp potable water supply borefield, which supplies the RO plant, indicates the average nitrate concentration of the potable water supply is 59 mg/L. The concentration of nitrate in a sample of RO reject water taken on 8 August 2016 was 25.6 mg/L. The Delegated Officer accepts that elevated nitrogen levels in the irrigated wastewater could be from naturally occurring nitrate concentrations in the camp potable water supply.

Risk Assessment

Consequence: The Delegated Officer has considered the siting of the WWTP and irrigation areas, the high evaporation rates experienced in the Pilbara region, depth to groundwater and local hydrology (surface and groundwater flows towards the Fortescue Marsh); and determined that low level onsite impacts and minimal offsite impacts at a local scale could occur as a result of the irrigation of treated wastewater or tank overflow. Therefore, the Delegated Officer has determined the consequence to be minor.

Likelihood: The Delegated Officer has considered the operator controls (frequent inspections, appropriately sized irrigation areas) and determined that an environmental impact will not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of the consequence occurring to be unlikely.



Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for discharges to land to be **medium**.

Regulatory Controls

Condition 2.4.1 is imposed to specify the emission points to land.

The Delegated Officer has imposed condition 3.4.1, requiring the Licensee to monitor water quality on a quarterly basis. Limits for wastewater quality have not been included, however the Licensee will be required to report the quarterly monitoring results in the Annual Environmental Report and provide an interpretation of results against the WWTP design specifications.

The general provisions of the EP Act with respect to the causing of pollution and environmental harm will apply, as will the provisions of relevant subsidiary legislation, including the *Environmental Protection (Unauthorised Discharges) Regulations 2004*.

Residual Risk Assessment

Consequence: Minor

Likelihood: Unlikely

Risk Rating: Medium



Appendix F

Fugitive emissions

Fugitive dust emissions

Emission description

Emission: There is the potential for dust to be generated from mining related activities such as crushing and screening, stockpiling, machinery loading, train loading and vehicle movement. Dust is also generated during periods of high winds, low rainfall and high evaporation rates. The dust emissions should be relatively inert being predominantly iron ore.

Impact: Human health and amenity impacts. Dust containing particles of less than 10 micrometres in diameter have been associated with diminishing lung function and dust in high volumes does interfere with comfort and amenity for the public.

The premises is between 1 km to 10 km from the Fortescue Marsh and is partially located within the Northern Flank Management Zone 1a, which is regarded as having high conservation value, and also in Zone 3b which has a low level of conservation significance. These zones are as per WA Environmental Protection Agency Report 1484 *Environmental and water assessments relating to mining and mining-related activities in the Fortescue Marsh management area*.

Localised impacts on vegetation from dust deposition can occur due to dust forming a physical barrier, restricting photosynthesis and respiration. Dust can also be abrasive to the leaf surface which may result in decreased productivity and changes to the vegetation structure. Fauna can also be expected to be impacted upon by dust emissions either directly or indirectly as the vegetation is used for habitat or a source of food. Any impact to flora is likely to be reversed during rainfall events during the wet season, thus long term impacts are not likely.

Controls: The closest human receptor is Roy Hill Station located 30 km from the premises.

At the OPFs, dust is controlled by the use of misting and deluge sprays on ROM hoppers and primary gyrator crusher and grizzly, water sprays on transfer points, dry screens are covered on scrubbers and screens, surge bins and belt feeder and crusher discharge chutes on secondary and tertiary crushers. The moisture content of both ROM and final product is continuously monitored through the use of moisture analysers installed after the primary crusher, prior to the stacker and before the train loader.

The Delegated Officer notes that condition 5-1 of MS1033 requires the Licensee to develop an Outcome-based Condition Management Plan for Christmas Creek. Condition 7-3 of MS1033 requires the plan to address impacts on conservation significant flora and vegetation health including from, but not limited to changes to groundwater levels and groundwater quality, changes to surface flows, dust and weeds.

Risk Assessment

Consequence: The Delegated Officer has considered the distance to the nearest sensitive receptor (approximately 30 km) and determined that minimal impacts to the amenity of this receptor will occur. The Delegated Officer has determined that minimal onsite impacts to vegetation will occur. Even in areas most impacted by dust, it is likely that the natural dust tolerance of Pilbara vegetation species will prevent widespread vegetation impacts. Therefore, the Delegated Officer has determined the consequence to be slight.



Likelihood: The Delegated Officer has considered the Licensee's controls to manage dust and determined that adverse impacts to the environment from fugitive dust emissions will not occur in most circumstances. Therefore, the Delegated Officer considers the likelihood of the consequence to be unlikely.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for fugitive dust emissions to be **low**.

Regulatory Controls

The Delegated Officer is not imposing any specified conditions relating to fugitive dust emissions as the risk has been assessed as low given the location of the premises relative to the nearest sensitive receptor. Due to the distance to sensitive receptors, the Delegated Officer is satisfied that the general provisions of the EP Act provide sufficient regulatory control for the management of dust.

The Delegated Officer notes that impacts from dust on conservation significant flora and vegetation is addressed under MS1033.

Residual Risk Assessment

Consequence: Slight

Likelihood: Unlikely

Risk Rating: Low

Fugitive light emissions

Emission description

Emission: Light spillage from operational areas.

Impact: Potential impacts on sensitive fauna species.

Controls: Condition 8-3 of MS1033 requires the Licensee to continue to implement the *Conservation Significant Fauna Management Plan* (100-PL-EN-0022), until the Chief Executive Officer of the EPA has confirmed in writing that the revised management plan required under MS1033 meets the environmental objective for fauna management.

The *Conservation Significant Fauna Management Plan* specifies key management actions for conservation significant fauna management, including the directing of lights onto active construction and operational areas to minimise the potential light overspill resulting in fauna disturbance, injuries or death.

Risk Assessment

Consequence: The Delegated Officer has determined that low level onsite impacts and minimal offsite impacts at a local scale could occur to sensitive fauna. Therefore, the Delegated Officer has determined the consequence to be minor.

Likelihood: The Delegated Officer has determined that an impact to sensitive fauna could occur at some time; Christmas Creeks operates 24 hours a day and light spillage from operational areas impacting on fauna during night operations is possible. Therefore, the Delegated Officer considers the likelihood to be possible.

Risk Rating: The Delegated Officer has compared the consequence and likelihood ratings described above through the Emissions Matrix (Table 2) and determined that the overall rating of risk for fugitive light emissions to be **medium**.



Regulatory Controls

The Delegated Officer is not applying specific regulatory controls relating to fugitive light emissions at this time as the *Conservation Significant Fauna Management Plan*, implemented under Part IV of the EP Act includes provisions relating to the protection of sensitive fauna species from light spillage.

Residual Risk Assessment

Consequence: Minor

Likelihood: Possible

Risk Rating: Medium



Appendix G

Licensee comments on the draft Licence, dated 16 June 2017 (FMG 2017c) and 13 July 2017 (FMG 2017d) and DWER's response

Table 1.2.1

The Licensee has stated (FMG 2017c) that:

Table 1.2.1 contains some missing ponds.

- M16 is a brackish water pond with an earthen liner.
- CCY2 treatment ponds 1 and 2 contain potentially hydrocarbon contaminated treated wastewater from CCY2 oily water separator rather than contaminated treated from Bulk Diesel Storage Facility oily water separator.
- Power station pond contains potentially hydrocarbon contaminated treated from the Bulk Diesel Storage Facility oily water separator and has a HDPE liner.
- Flinders pond is now a brackish pond and should be removed to the "brackish water" line of Table 1.2.1, along with the Windich and Vasse Decant Settlement Ponds.

The Licensee recommended (FMG 2017d) that:

Reference to the individual names of these TSFs and ponds be removed and referred to a "TSFs", "settlement ponds" and "transfer ponds" as this would not change the requirement for the ponds to be lined, but would mitigate a licence amendment application should a pond be changed from a saline to a brackish pond.

DWER response:

Table 1.2.1 has been updated to include reference to the missing ponds and as per FMG 2017d.

Reference to the individual names of the TSFs and ponds will be retained. The Delegated Officer has determined not to implement this change as for compliance and enforcement purposes individual storage locations should be identified.

The HDPE lined saline or brackish ponds are already grouped together in Table 1.2.1, so if a pond was to be changed from saline to brackish, it is already within the correct grouping.

The Licensee also requested (FMG 2017d):

The freeboard requirement for brackish water ponds be removed or changed from 200 mm to 100 mm. Based on the brackish water ponds being shallow and smaller in size and a freeboard being difficult to maintain. The Licensee has stated that "*Brackish water also poses a lower risk for environmental harm as these ponds are located in already cleared areas. The risk of overtopping for brackish ponds is considered low*".

DWER response:

The freeboard requirement for brackish water ponds only has been changed from 200 mm to 100 mm, in order to ensure a sufficient level of environmental protection is achieved and to reduce the risk of overtopping.

The Licensee will need to ensure all containment infrastructure is well managed in the event of rainfall events.



Table 2.3.1

The Licensee has requested that:

Bore SAI23 be changed to SAI23R in Table 2.3.1 as the casing of the bore SAI23 is damaged and a replacement bore SAI23R has been constructed.

DWER response:

Table 2.3.1 has been updated to include SAI23R while retaining SAI23 as the Licensee has stated that the replacement bore is not yet drilled and will be drilled in the same location (FMG 2017d). A new map including SAI23/SAI23R was provided by the Licensee.

Table 3.6.1

The Licensee has stated:

Table 3.6.1 has VAM03 included as a monitoring point. The amendment Notice 1 (dated 28 February) had removed the requirement to monitor VAM03.

DWER response:

Reference to VAM03 within Table 3.6.1 under Vasse Tailings Storage Facility has been removed.

The Licensee has also requested that:

The monitoring frequency of Table 3.6.1 be changed to six monthly, which is consistent with the Cloudbreak licence (L8199/2007/2).

DWER response:

Table 3.6.1 has been updated so that the requirement for quarterly monitoring for the Windich Above-Ground TSF and Vasse TSF has been changed to six monthly.

The requirement for quarterly monitoring for the Flinders Strip 12 In-Pit TSF has been retained based on commitments made in Amendment Notice 1 by the Licensee.

Table 4.2.1

The Licensee has stated that:

“Condition 1.2.11 of the draft Licence refers to a revised leak detection system, which supercedes the “Saline Water Infrastructure – Implementation Plan Christmas Creek” (CC-RP-EN-0146, 30 June 2016). Table 5.2.1 still references the “Saline Water Infrastructure – Implementation Plan Christmas Creek” (CC-RP-EN-0146, 30 June 2016)”.

The Licensee has recommended that:

The text in Table 4.2.1 “Update on the implementation of telemetric controls on the saline reinjection infrastructure, as detailed in the document Saline Water Infrastructure – Implementation Plan (CC-RP-EN-0146, 30 June 2016), be removed as the reporting for the leak detection system is included in Table 4.3.1 (reference to condition 1.2.12) “Saline/hypersaline water pipeline telemetry installation” requiring “Within 14 days of the saline/hypersaline leak detection system, and provide a report to the CEO which describes the work undertaken and outcome of each phase of implementation”.

DWER response:

The text in Table 4.2.1 as documented above has been changed to read “Update on the implementation of telemetric controls on the saline reinjection infrastructure, as detailed in the document *Application to Amend Licence L8454/2010/2 (UID-67507), 9 March 2017*”.



DWER has retained this condition as it will provide an update within the Annual Environmental Report (due 31 March each year) on how the installation works are progressing if not yet completed. Rather than just receiving a notification in accordance with condition 4.3.1 once completed.



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FMG 2017a, Application to Amend Licence L8454/2010/2, Fortescue Metals Group, 9 March 2017

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