



Licence

Environmental Protection Act 1986, Part V

Licensee: Sandfire Resources NL

Licence: L8558/2011/1

Registered office: Level 2, 31 Ventnor Ave
WEST PERTH WA 6005

ACN: 105 154 185

Premises address: DeGrussa Copper-Gold Project
Mining Tenement: M52/1046
MEEKATHARRA WA 6642
As depicted in Schedule 1

Issue date: Thursday, 20 December 2012

Commencement date: Monday, 24 December 2012

Expiry date: Saturday, 23 December 2017

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	2,050,000 tonnes per annual period
6	Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.	50,000 tonnes or more per year	2,000,000 tonnes per annual period
52	Electric power generation: premises (other than premises within category 53 or an emergency or standby power generation plant) on which electrical power is generated using a fuel.	10 megawatts or more in aggregate (using a fuel other than natural gas)	19 megawatts in aggregate
54	Sewage facility: premises on which sewage is treated (excluding septic tanks), or from which treated sewage is discharged onto land or into waters	100 cubic metres or more per day	240 cubic metres per day
64	Class II putrescible landfill	20 tonnes or more per year	1,300 tonnes per annual period



Conditions

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

Date signed: 3 December 2015

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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.

DER's industry licensing role

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

DER has responsibilities under Part V of the *Environmental Protection Act 1986* (the Act) for the licensing of prescribed premises. Through this process DER regulates to prevent, control and abate pollution and environmental harm to conserve and protect the environment. DER 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 with 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, it 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

Sandfire Resources NL (Sandfire) was issued *Environmental Protection Act 1986* licence L8558/2011/1 on the 23 June 2011 for the DeGrussa Copper-Gold Project (Project).

The Project has been assessed as a prescribed premises, under the following categories in Schedule 1 of the *Environmental Protection Regulations 1987*:

- 5 - Processing or beneficiation of metallic or non-metallic ore;
- 6 - Mine dewatering;
- 52 – Electric power generation;
- 54 – Sewage facility; and
- 64 - Class II putrescible landfill.

The Project is located on mining tenement M52/1046 (as depicted in Schedule 1) within the Shire of Meekatharra, approximately 900 kilometres (km) north of Perth and 150 km north of Meekatharra.

Sandfire mine ore at the Project and use a crushing and screening plant and floatation circuit to produce copper product. A small amount of ore is also sent to the nearby Plutonic Gold Mine for processing to produce gold.

Prescribed activities that produce emissions and discharges at the Premises include, tailings discharged to the tailings storage facility, irrigation to land with treated wastewater, dewatering to a local creek line, power generation, crushing and screening, and disposal of waste at the landfill.

The Licence has been amended to include the installation of a dual liner system along the existing embankments of the DeGrussa Tailings Storage Facility and an increase in the throughput for category 5. The Licence has also been update to the latest licence version.

The last 5 licences and works approvals issued for the Premises are:

Instrument log		
Instrument	Commenced	Description
L8558/2011/1	1/08/2013	Licence amendment – Increase category 6 throughput
W5697/2014/1	18/08/2014	New application for works approval – Category 6 and 64
L8558/2011/1	9/10/2014	Licence amendment – refire conversion and incorporate changes from completed works under W5697/2014/1.
L8558/2011/1	27/11/2014	Licence amendment – additional dewatering discharge to North Creek
W5866/2015/1	19/10/2015	New Works Approval – increase throughput for category 6 and expanded landfill area
L8558/2011/1	3/12/2015	Licence amendment – increase throughput for category 5 and installation of synthetic liner to the TSF



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*;

'annual period' means the inclusive period from 1 January until 31 December each year;

'AS 4323.1' means the Australian Standard AS4323.1 *Stationary Source Emissions Method 1: Selection of sampling positions*;

'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 5667.10' 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 or target is measured or a monitoring result is obtained;

'CEMS' means continuous emissions monitoring system;

'CEMS Code' means the current version of the Continuous Emission Monitoring System (CEMS) Code for Stationary Source Air Emissions, Department of Environment & Conservation, Government of Western Australia;

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

'CEO' for the purpose of correspondence means;
Chief Executive Officer
Department Administering the Environmental Protection Act 1986
Locked Bag 33
CLOISTERS SQUARE WA 6850
Email: info@der.wa.gov.au

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

'Licence' means this Licence numbered L8558/2011/1 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;

'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;



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

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

‘RL’ means Reduced Level which refers to equating elevations of survey points with reference to a common assumed datum;

‘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;

‘Stage 3’ means the level between 570.0 metres RL to 575.5 metres RL at the DeGrussa Tailings Storage Facility;

‘STP dry’ means standard temperature and pressure (0°Celsius and 101.325 kilopascals respectively), dry;

‘TSF’ means Tailings Storage Facility; and

‘USEPA’ means United States (of America) Environmental Protection Agency.

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.

1.1.5 Nothing in the Licence shall be taken to authorise any emission that is not mentioned in the Licence, where the emission amounts to:

- (a) pollution;
- (b) unreasonable emission;
- (c) discharge of waste in circumstances likely to cause pollution; or
- (d) being contrary to any written law.

1.2 General conditions

1.2.1 The Licensee shall operate and maintain all pollution control and monitoring equipment to the manufacturer’s specification or any relevant and effective internal management system.

1.2.2 The Licensee shall immediately recover, or remove and dispose of spills of environmentally hazardous materials outside an engineered containment system.

1.2.3 The Licensee shall:

- (a) implement all practical measures to prevent stormwater run-off becoming contaminated by the activities on the Premises; and
- (b) treat contaminated or potentially contaminated stormwater as necessary prior to being discharged from the Premises.¹

Note1: The *Environmental Protection (Unauthorised Discharges) Regulations 2004* make it an offence to discharge certain materials into the environment.



1.3 Premises operation

1.3.1 The Licensee shall only accept waste on to the landfill if:

- a) it is of a type listed in Table 1.3.1;
- b) the quantity accepted is below any quantity limit listed in Table 1.3.1;
- c) it meets any specification listed in Table 1.3.1; and
- d) it conforms to the description in the documentation supplied by the producer and holder.

Table 1.3.1: Waste acceptance

Waste	Quantity Limit	Specification
Clean fill	None specified	None specified
Inert Waste Type 1	Combined total of 1,300 tonnes per annual period	None specified
Putrescible waste		
Special Waste Type 2		
Inert Waste Type 2	100 used tyres are stored	Used tyres only

1.3.2 The Licensee shall ensure that cover is applied to waste in the tipping area in accordance with Table 1.3.2 and that sufficient stockpiles of cover are maintained on site at all times for the tipping area of the site to be covered, in accordance with this condition, at least twice.

Table 1.3.2: Cover requirements

Waste type	Material	Depth	Timescale
Putrescible Wastes	Inert and incombustible material	A minimum of 200 mm. No waste is to be left exposed after covering	Cover shall be applied fortnightly

1.3.3 The Licensee shall ensure that any dewatering effluent shall only be managed in the following manner:

- (a) Used for dust suppression in a manner that minimises damage to surrounding vegetation; or
- (b) Discharged in accordance with condition 2.3.1, or
- (c) Used for process water.

1.3.4 The Licensee shall ensure that tailings are only discharged into dams with the relevant infrastructure requirements and at the location specified in Table 1.3.3 and identified in Schedule 1.

Table 1.3.3: Containment infrastructure

Containment point reference	Material	Infrastructure requirements
TSF	Tailings	Lined to achieve a permeability of 10^{-9} metres per second or less

1.3.5 The Licensee shall manage dams in Table 1.3.3 such that:

- (a) a minimum top of embankment freeboard of 500mm is maintained; and,
- (b) methods of operation minimise the likelihood of erosion of the embankments by wave action.

1.3.6 The Licensee shall:

- (a) undertake inspections as detailed in Table 1.3.4;
- (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 1.3.4: Inspection of infrastructure

Scope of inspection	Type of inspection	Frequency of inspection
Tailings pipelines	Visual integrity	Daily
Return water lines	Visual integrity	Daily
Embankment freeboard	Visual to confirm required freeboard capacity is available	Daily
Dewatering discharge pipelines	Visual integrity	Weekly

- 1.3.7 The Licensee shall ensure that all pipelines containing environmentally hazardous substances are either:
- equipped with telemetry systems and pressure sensors along pipelines to allow the detection of leaks and failures;
 - 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 inspections.
- 1.3.8 The Licensee shall install additional dewatering discharge pipelines in accordance with construction methods and commitments from the document titled, Itzstein-Davey, F. *Amendment to Environmental Licence L8558/2011/1* [Memorandum]. MBS Environmental, 26 November 2014 and Form P4 *Application to transfer or amend a licence, works approval or registration*, Sandfire Resources NL, 24 November 2014.
- 1.3.9 The Licensee shall construct Stage 3 at the DeGrussa Tailings Storage Facility in accordance with the documentation detailed in Table 1.3.5:

Table 1.3.5: Construction Requirements¹

Document	Parts	Date of Document
DeGrussa Copper Mine, <i>Addendum to DER Licence L8558/2011/1 Amendment</i> , Sandfire Resources NL, 17 September 2015.	All, including Drawings	17 September 2015
Freea Itzstein-Davey, email, <i>DeGrussa TSF Liner</i> , 27 October 2015	All	27 October 2015

Note 1: Where the details and commitments of the documents listed in condition 1.3.9 are inconsistent with any other condition of this Licence, the conditions of this Licence shall prevail.

- 1.3.10 The Licensee shall ensure the limits specified in Table 1.3.6 are not exceeded.

Table 1.3.6 Production or design capacity limits

Category ¹	Category description ¹	Premises production or design capacity limit
5	Processing or beneficiation of metallic or non-metallic ore	2,050,000 tonnes of ore per annual period
6	Mine dewatering	2,000,000 tonnes per annual period
52	Electrical power generation	19 megawatts in aggregate
54	Sewage facility	240 cubic metres per day

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



2 Emissions

2.1 General

- 2.1.1 The Licensee shall record and investigate the exceedance of any descriptive or numerical limit specified in any part of section 2 of this Licence.

2.2 Point source emissions to air

- 2.2.1 The Licensee shall ensure that where waste is emitted to air from the emission 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: Emission points to air

Emission point reference	Emission Point
Generators 1 to 12	Stack

2.3 Point source emissions to surface water

- 2.3.1 The Licensee shall ensure that where waste is emitted to surface water 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: Emission point to surface water

Emission point reference and location on Map of emission points	Description	Source including abatement
North Creek Discharge point	Dewatering discharge point to North Creek	Dewatering effluent from mining of ore

- 2.3.2 The Licensee shall not cause or allow point source emissions to surface water greater than the limits listed in Table 2.3.2.

Table 2.3.2: Point source emission limits to surface water

Emission point reference	Parameter	Limit (including units)	Averaging period
North Creek Discharge point	Total dissolved solids	3,500 mg/L	Spot sample

- 2.3.3 The licensee shall discharge mine dewatering effluents via the discharge point in a manner which minimises erosion and scouring impacts, and reduces the likelihood of surface ponding.

2.4 Emissions to land

- 2.4.1 The Licensee shall ensure that where waste is emitted to land from the emission point 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: Emission points to land

Emission point reference	Description	Source including abatement
Irrigation area - WWTP1	Discharge of treated wastewater by irrigation to land	Accommodation camp waste water treatment plant
Irrigation area - WWTP2	Discharge of treated wastewater by irrigation to land	Mine administration waste water treatment plant



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 unless stated in Condition 3.1.1(b);
- (b) all wastewater sampling is conducted in accordance with AS/NZS 5667.10;
- (c) all groundwater sampling is conducted in accordance with AS/NZS 5667.11;
- (d) all microbiological samples are collected and preserved in accordance with AS/NZS 2031; and
- (e) all samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured unless indicated otherwise in 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) annual monitoring is undertaken at least 9 months apart, and
- (d) two yearly monitoring is undertaken at least 18 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 and the requirements of the Licence.

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 air

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

Table 3.2.1: Monitoring of point source emissions to air

Emission point reference	Parameter	Units ¹	Frequency ²	Method
Generators 1 to 12	Volumetric flow rate	m ³ /min	Every two years	USEPA Method 2
	Sulphur dioxide	mg/m ³ g/min		USEPA Method 6
	Nitrogen oxides	mg/m ³ g/min		USEPA Method 7E or 7D
	Carbon monoxide	mg/m ³ g/min		USEPA Method 10
	Plant production feed rate	tonnes per hour		None specified
	Stack moisture content	-		None specified
	Stack temperature	degrees c		None specified

Note 1: All units are referenced to STP dry

Note 2: Monitoring shall be undertaken to reflect normal operating conditions and any limits or conditions on inputs or production.

3.2.2 The Licensee shall ensure that sampling required under Condition 3.2.1 of the Licence is undertaken at sampling locations in compliance with the AS 4323.1 or relevant part of the CEMS Code.



- 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.

3.3 Monitoring of point source emissions to surface water

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

Table 3.3.1: Monitoring of point source emissions to surface water			
Emission point reference	Parameter	Units	Frequency
North Creek Discharge point	Volumetric flow rate	m ³ /day	Continuous
North Creek Discharge point	Arsenic, cadmium, chromium, copper, lead, nitrate-nitrogen, selenium, sulphate, total dissolved solids, total recoverable hydrocarbons, total suspended solids, total acidity and zinc	mg/L	Quarterly
North Creek Discharge point	pH	-	Quarterly

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 point source emissions to land			
Monitoring point reference	Parameter	Units	Frequency
Discharge to irrigation area - WWTP1 and Discharge to irrigation area - WWTP2	pH ¹	-	Quarterly
	<i>E.coli</i>	cfu/100mL	
	Biochemical Oxygen Demand	mg/L	
	Residual chlorine ²		
	Total Phosphorus		
	Total Nitrogen		
	Total Suspended Solids		
	Volumes of wastewater discharged to the environment	m ³	Continuous

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

Note 2: In-field non-NATA accredited analysis permitted for residual chlorine measurement.



3.5 Ambient environmental quality monitoring

3.5.1 The Licensee shall undertake the monitoring specified in Table 3.5.1.

Table 3.5.1: Monitoring of ambient groundwater quality

Monitoring point reference	Parameter	Units	Averaging period	Frequency
TMB01, TMB04, TMB5, TMB6, TMB7 and TMB08	arsenic	mg/L	Spot sample	Quarterly
	cadmium			
	chromium			
	copper			
	lead			
	pH ¹	-		
	selenium	mg/L		
	standing water level	mbgl		
	sulphate	mg/L		
	total dissolved solids			
	total acidity			
	zinc			

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

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 shall ensure that:

- (a) any person left in charge of the Premises is aware of the conditions of the Licence and has access at all times to the Licence or copies thereof; and
- (b) any person who performs tasks on the Premises is informed of all of the conditions of the Licence that relate to the tasks which that person is performing.

4.1.3 The Licensee shall complete an Annual Audit Compliance Report indicating the extent to which the Licensee has complied with the conditions of the Licence, and any previous licence issued under Part V of the Act for the Premises for the previous annual period.

4.1.4 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 within 90 calendar days after the end of the annual period. 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 ¹
-	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
Table 3.2.1	Specified monitoring of point source emissions to air	Tabulate
Table 3.3.1	Specified monitoring of point source emissions to surface water	WR1
Table 3.4.1	Specified monitoring of point source emissions to land	LR2
Table 3.5.1	Monitoring of ambient groundwater quality	GR3
4.1.3	Compliance	Annual Audit Compliance Report (AACR)
4.1.4	Complaints summary	None specified

Note 1: Forms are in Schedule 2

4.2.2 The Licensee shall ensure that the annual environmental report also contains:

- (a) any relevant process, production or operational data recorded under Condition 3.1.3;
- (b) an assessment of the information contained within the report against previous monitoring results and Licence limits; and
- (c) a list of any original monitoring reports submitted to the Licensee from third parties in the reporting 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 requirement ¹	Format or form ²
-	Any failure or malfunction of any pollution control equipment or any incident, which has caused, is causing or may cause pollution.	Part A: As soon as practicable but no later than 5pm of the next usual working day. Part B: As soon as practicable	N1
Table 1.3.5	Construction of Stage 3 at the DeGrussa Tailings Storage Facility	Notify the CEO in writing within 14 days following the completion of the works for Stage 3 as specified in condition 1.3.9. The written notification shall: (a) confirming that the works were constructed in accordance with condition 1.3.9 and Table 1.3.5; and (b) be signed by a person authorised to represent the License Holder and contain the printed name and position of that person within the company. Following submission of the written notification, the Licensee shall operate Stage 3 in accordance with the conditions of this Licence.	Not specified



Table 2.3.2	Limit exceedance	Within 72 hours of becoming aware that a limit has been exceeded.	

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

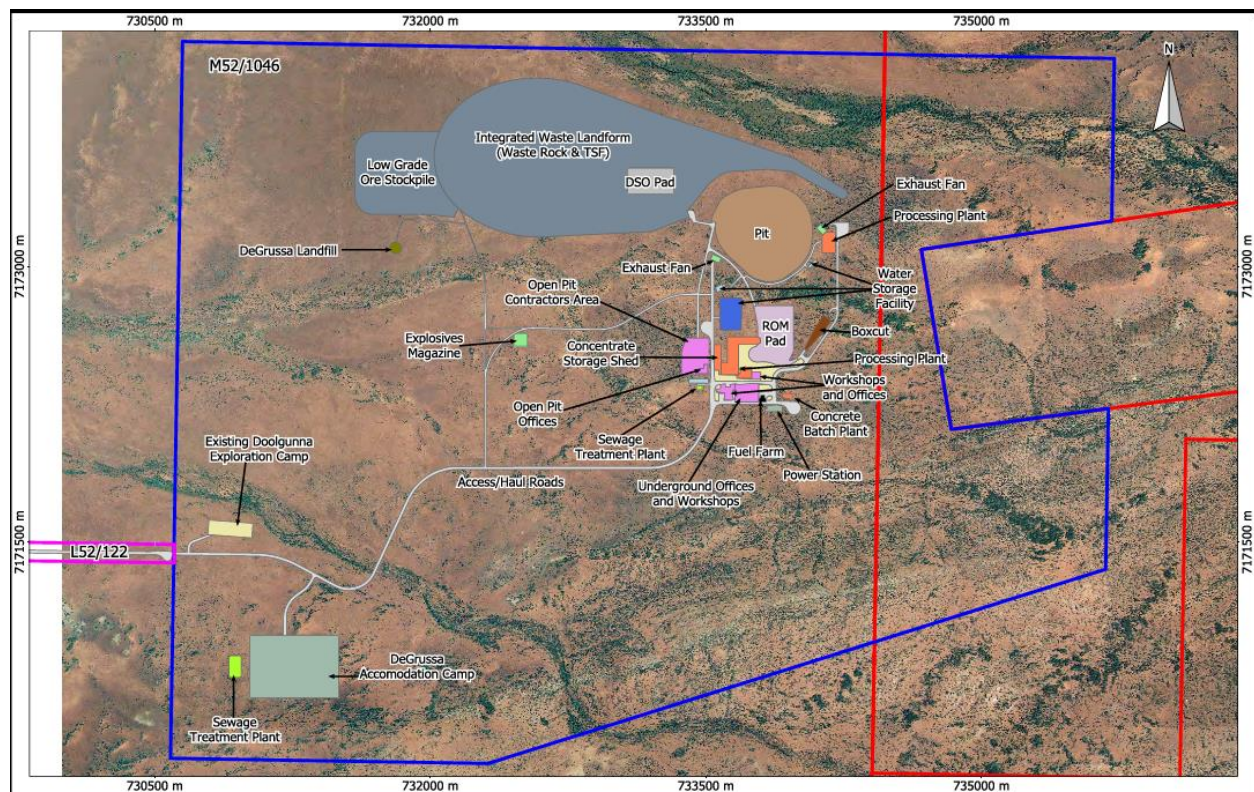
Note 2: Forms are in Schedule 2



Schedule 1: Maps

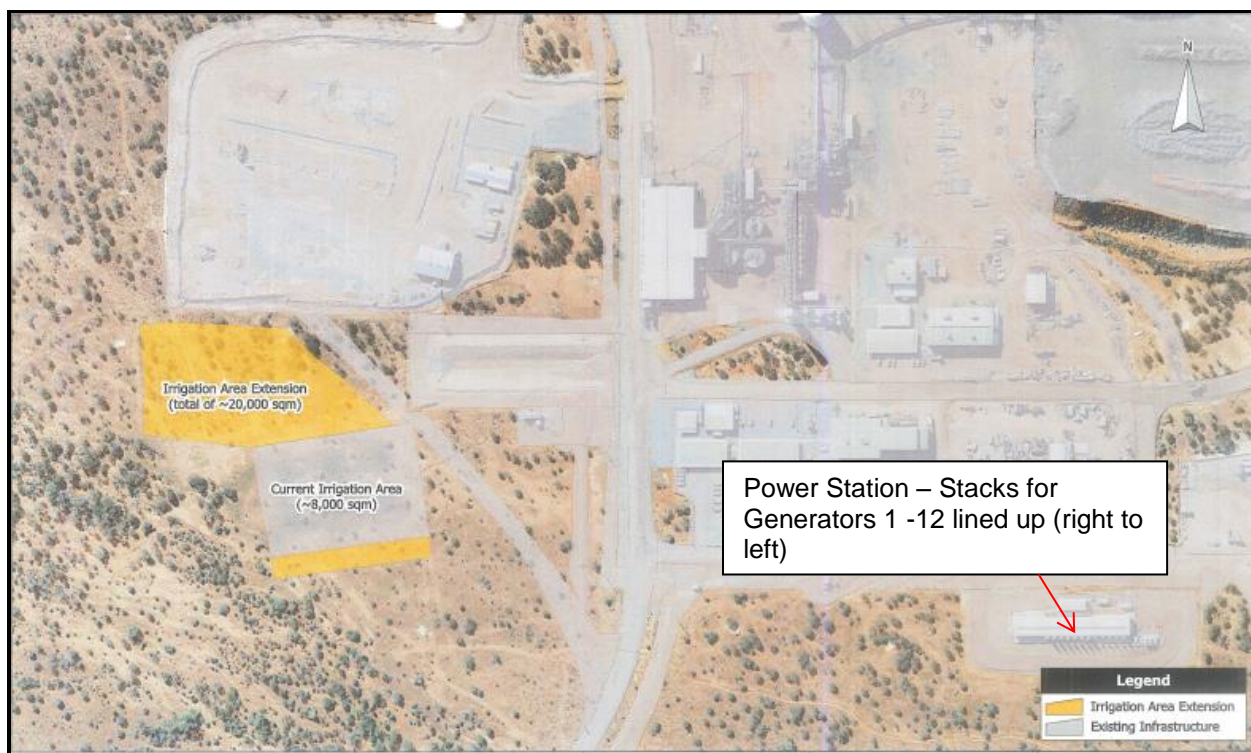
Premises map

The Premises is shown in the map below. The blue line depicts the Premises boundary.

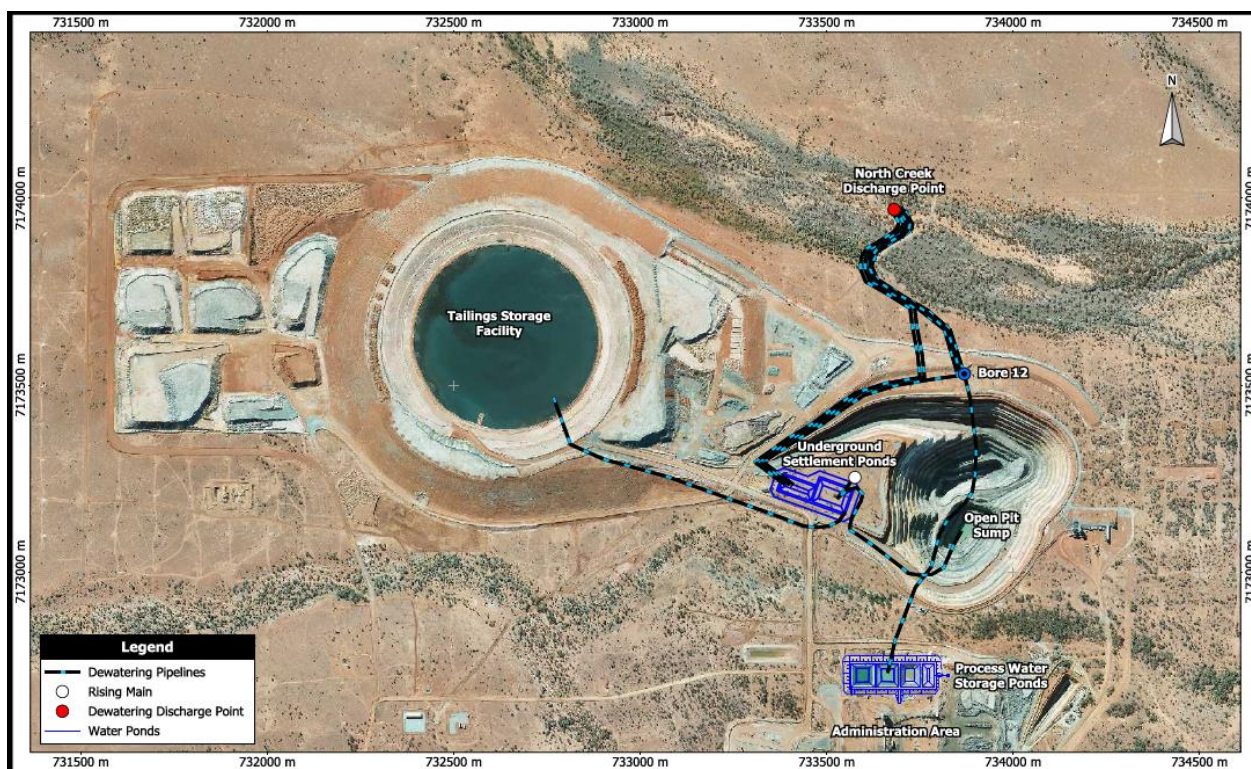


Map of emission points

The location of the emission point defined in Table 2.2.1 is shown below.

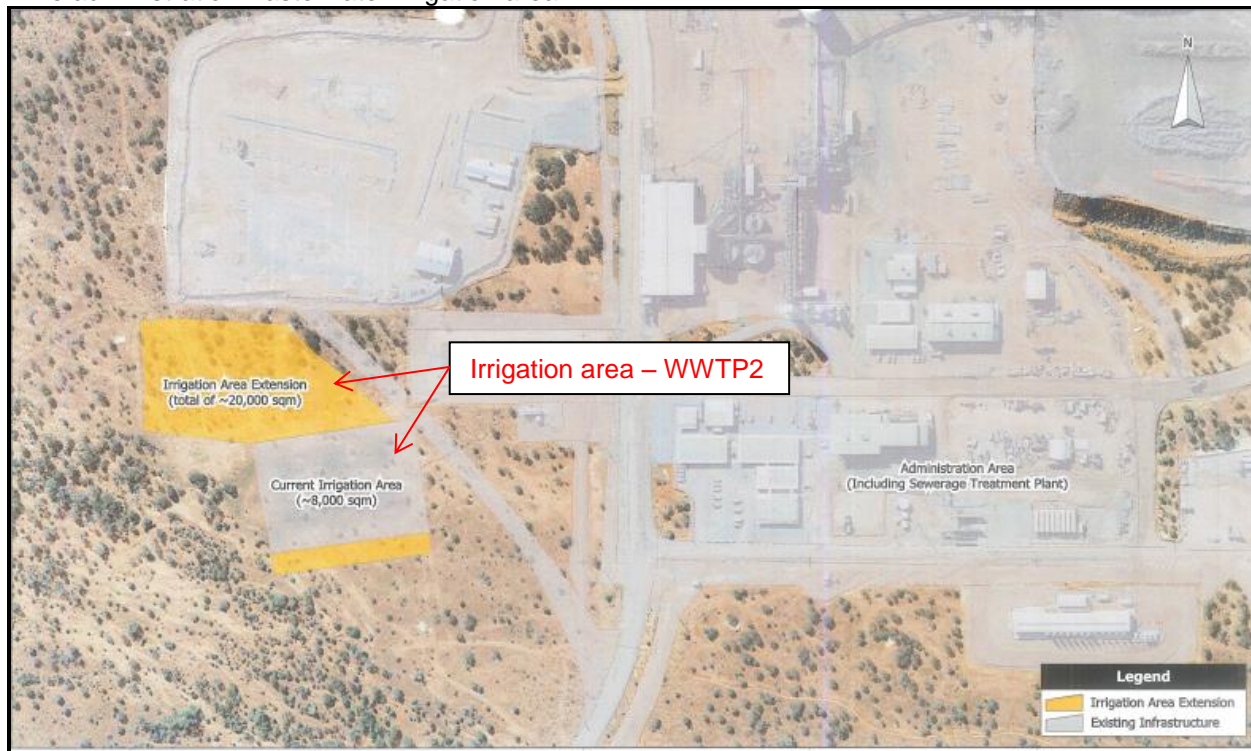


The location of the emission point defined in Table 2.3.1 is shown below.

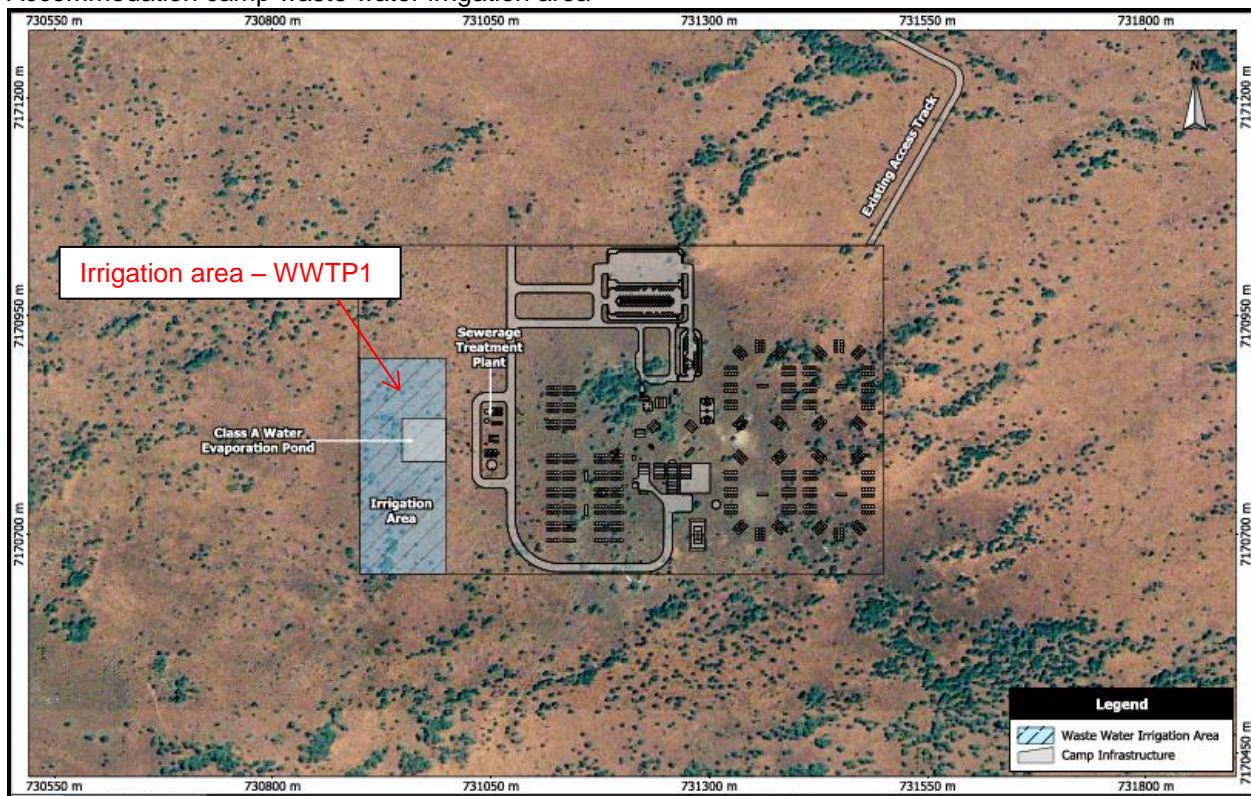


The location of the emission points defined in Table 2.4.1 are shown below.

Mine administration waste water irrigation area

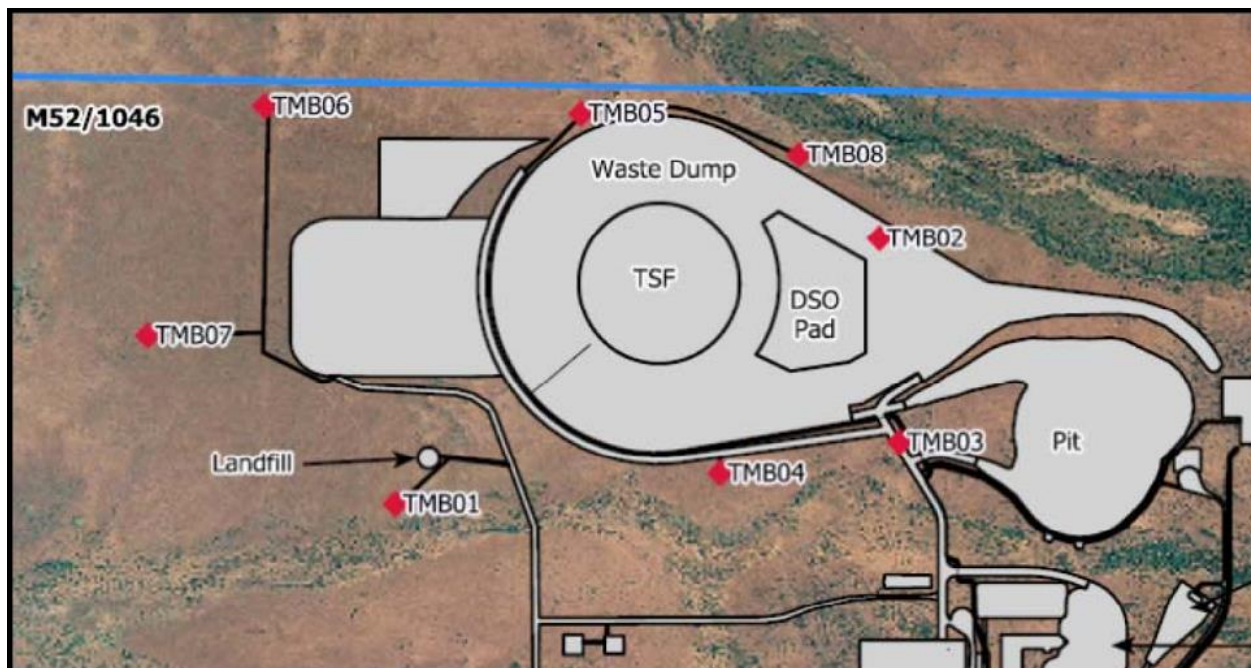


Accommodation camp waste water irrigation area



Map of monitoring locations

The locations of the monitoring points defined in Table 3.5.1 are shown below.



Landfill Area Map

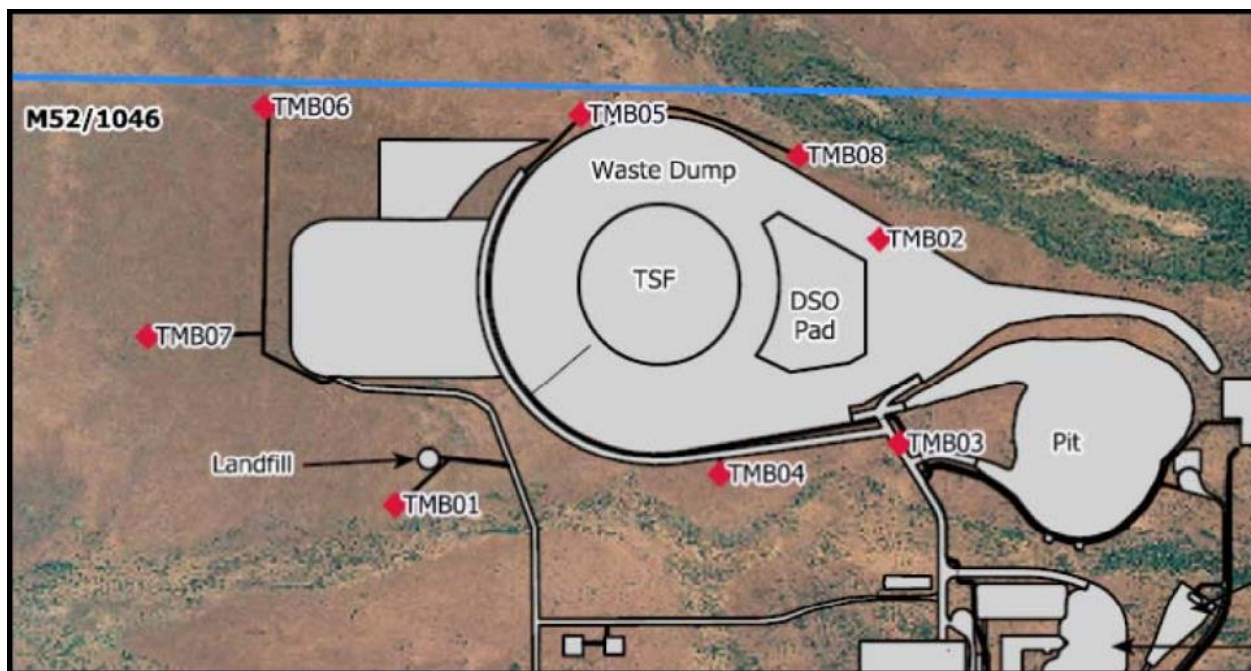
The areas in which the disposal of waste by landfilling may take place is show in the map below.





Map of storage locations

The location of the storage area (TSF) defined in Table 1.3.3 is shown 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.

ANNUAL AUDIT COMPLIANCE REPORT PROFORMA

SECTION A LICENCE DETAILS

Licence Number:	Licence File Number:
Company Name: Trading as:	ABN:
Reporting period: _____ to _____	

STATEMENT OF COMPLIANCE WITH LICENCE CONDITIONS

1. Were all conditions of the Licence complied with within the reporting period? (please tick the appropriate box)

Yes ☐ Please proceed to Section C

No ☐ Please proceed to Section B

Each page must be initialled by the person(s) who signs Section C of this Annual Audit Compliance Report (AACR).

Initial:



SECTION B

DETAILS OF NON-COMPLIANCE WITH LICENCE CONDITION.

Please use a separate page for each Licence condition that was not complied with.

a) Licence condition not complied with:	
b) Date(s) when the non compliance occurred, if applicable:	
c) Was this non compliance reported to DER?:	
<input type="checkbox"/> Yes <input type="checkbox"/> Reported to DER verbally Date _____ <input type="checkbox"/> Reported to DER in writing Date _____	<input type="checkbox"/> No
d) Has DER taken, or finalised any action in relation to the non compliance?:	
e) Summary of particulars of the non compliance, and what was the environmental impact:	
f) If relevant, the precise location where the non compliance occurred (attach map or diagram):	
g) Cause of non compliance:	
h) Action taken, or that will be taken to mitigate any adverse effects of the non compliance:	
i) Action taken or that will be taken to prevent recurrence of the non compliance:	

Each page must be initialled by the person(s) who signs Section C of this AACR

Initial:



SECTION C

SIGNATURE AND CERTIFICATION

This Annual Audit Compliance Report (AACR) must only be signed by a person(s) with legal authority to sign it. The ways in which the AACR must be signed and certified, and the people who may sign the statement, are set out below.

Please tick the box next to the category that describes how this AACR is being signed. If you are uncertain about who is entitled to sign or which category to tick, please contact the licensing officer for your premises.

If the licence holder is		The Annual Audit Compliance Report must be signed and certified:
An individual	<input type="checkbox"/> <input type="checkbox"/>	by the individual licence holder, or by a person approved in writing by the Chief Executive Officer of the Department of Environment Regulation to sign on the licensee's behalf.
A firm or other unincorporated company	<input type="checkbox"/> <input type="checkbox"/>	by the principal executive officer of the licensee; or by a person with authority to sign on the licensee's behalf who is approved in writing by the Chief Executive Officer of the Department of Environment Regulation.
A corporation	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	by affixing the common seal of the licensee in accordance with the <i>Corporations Act 2001</i> ; or by two directors of the licensee; or by a director and a company secretary of the licensee, or if the licensee is a proprietary company that has a sole director who is also the sole company secretary – by that director, or by the principal executive officer of the licensee; or by a person with authority to sign on the licensee's behalf who is approved in writing by the Chief Executive Officer of the Department of Environment Regulation.
A public authority (other than a local government)	<input type="checkbox"/> <input type="checkbox"/>	by the principal executive officer of the licensee; or by a person with authority to sign on the licensee's behalf who is approved in writing by the Chief Executive Officer of the Department of Environment Regulation.
a local government	<input type="checkbox"/> <input type="checkbox"/>	by the chief executive officer of the licensee; or by affixing the seal of the local government.

It is an offence under section 112 of the *Environmental Protection Act 1986* for a person to give information on this form that to their knowledge is false or misleading in a material particular. There is a maximum penalty of \$50,000 for an individual or body corporate.

I/We declare that the information in this annual audit compliance report is correct and not false or misleading in a material particular.

SIGNATURE: _____

NAME:
(printed) _____

POSITION: _____

DATE: ____/____/____

SIGNATURE: _____

NAME:
(printed) _____

POSITION: _____

DATE: ____/____/____

SEAL (if signing under seal)



Licence: L8558/2011/1
Form: WR1
Name: Monitoring of point source emissions to surface water

Licensee: Sandfire Resources NL
Period :

Emission point	Parameter	Limit	Result ¹	Sample date & times
Dewatering discharge as described in condition 2.3.1	arsenic		mg/L	
	cadmium		mg/L	
	chromium		mg/L	
	copper		mg/L	
	lead		mg/L	
	nitrate-nitrogen		mg/L	
	pH		-	
	selenium		mg/L	
	sulphate		mg/L	
	total dissolved solids	3,500	mg/L	
	total petroleum hydrocarbons		mg/L	
	total suspended solids		mg/L	
	total acidity		mg/L	
	Volumetric flow rate		m ³ /day	

Notes

1: All units are referenced to STP dry

Signed on behalf of: Sandfire Resources NL Date:



Licence: L8558/2011/1
Form: LR2
Name: Monitoring of point source emissions to land

Licensee: Sandfire Resources NL
Period :

Emission point	Parameter	Result ¹	Sample date & times
Discharge to irrigation area - WWTP1	<i>E.coli</i>	cfu/100 mL	
	Biochemical Oxygen Demand	mg/L	
	Residual chlorine	mg/L	
	Total Phosphorus	mg/L	
	Total Nitrogen	mg/L	
	Total Suspended Solids	mg/L	
	Volumes of waste water discharged to the environment	m ³ /day	
Discharge to irrigation area – WWTP2	<i>E.coli</i>	cfu/100 mL	
	Biochemical Oxygen Demand	mg/L	
	Residual chlorine	mg/L	
	Total Phosphorus	mg/L	
	Total Nitrogen	mg/L	
	Total Suspended Solids	mg/L	
	Volumes of waste water discharged to the environment	m ³ /day	

Notes

1: All units are referenced to STP dry

Signed on behalf of: Sandfire Resources NL Date:



Licence: L8558/2011/1
Form: GR3
Name: Monitoring of ambient groundwater quality

Licensee: Sandfire Resources NL
Period :

Monitoring point	Parameter	Result	Sample date & times
TMB01, TMB04 – TMB08	arsenic	mg/L	
	cadmium	mg/L	
	chromium	mg/L	
	copper	mg/L	
	lead	mg/L	
	pH	mg/L	
	selenium	mg/L	
	standing water level	mbgl	
	sulphate	mg/L	
	total dissolved solids	mg/L	
	total acidity	mg/L	
	zinc	mg/L	

Signed on behalf of Sandfire Resources NL: Date:



Licence: L8558/2011/1
Form: N1

Licensee: Sandfire Resources NL
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	



Part B

Any more accurate information on the matters for notification under Part A.	
Measures taken, or intended to be taken, to prevent a recurrence of the incident.	
Measures taken, or intended to be taken, to rectify, limit or prevent any pollution of the environment which has been or may be caused by the emission.	
The dates of any previous N1 notifications for the Premises in the preceding 24 months.	

Name	
Post	
Signature on behalf of Sandfire Resources NL	
Date	



Decision Document

Environmental Protection Act 1986, Part V

Proponent: Sandfire Resources NL

Licence: L8558/2011/1

Registered office: Level 2, 31 Ventnor Ave
WEST PERTH WA 6005

ACN: 105 154 185

Premises address: DeGrussa Copper-Gold Project
Mining Tenement: M52/1046
MEEKATHARRA WA 6642

Issue date: Thursday, 20 December 2012

Commencement date: Monday, 24 December 2012

Expiry date: Saturday, 23 December 2017

Decision

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

Decision Document prepared by: Paul Anderson
Licensing Officer

Decision Document authorised by: Alana Kidd
Manager Licensing



Contents

Decision Document	1
Contents	2
1 Purpose of this Document	2
2 Administrative summary	3
3 Executive summary of proposal and assessment	4
4 Decision table	6
5 Advertisement and consultation table	11
6 Risk Assessment	12
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1 Purpose of this Document

This decision document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER'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	2,050,000 tonnes per annual period
	6	2,000,000 tonnes per annual period
	52	19 megawatts in aggregate
	54	240 cubic metres per day
	64	1,300 tonnes per annual period
Application verified	Date: 1/9/2015	
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		
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 type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input type="checkbox"/> Assessed under Part IV <input type="checkbox"/>
Is the proposal subject to Ministerial Conditions?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Ministerial statement No: EPA Report No:
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 Sandfire Resources NL (Sandfire) DeGrussa Copper-Gold Project (Project) is located approximately 900 km north of Perth and 150 km north of Meekatharra in the Gascoyne Region of Western Australia. The Project is located on Mining Tenement M52/1046. *Environmental Protection Act 1986* Licence L8558/2011/1 for the Project was issued on 23 June 2011.

Sandfire mines ore by open cut and underground methods and processes the ore onsite by using crushing and screening and flotation techniques to produce copper concentrate. Sandfire is licensed for the following Schedule 1 *Environmental Protection Regulations 1987* categories:

- 5 - Processing or beneficiation of metallic or non-metallic ore;
- 6 - Mine Dewatering;
- 52 - Electric power generation;
- 54 - Sewage facility; and
- 64 - Class II landfill.

The Department of Environment Regulation (DER) received a Licence amendment application from Sandfire on the 6 August 2015. The application related to an increase in their processing plant throughput and an increase in the amount of dewatering effluent discharged. An addendum to this Licence amendment application was received from Sandfire on the 17 September 2015 to include the proposed Stage 3 DeGrussa Tailings Storage Facility (TSF) extension.

Sandfire has now requested on the 23 September 2015 that they only wish to proceed with an amendment to the Licence to include an increase in throughput of the processing facility and the installation of Stage 3 at the TSF. Any increase in the dewatering throughput could not be assessed at this Licence amendment stage. Works Approval W5866/2015/1 was issued to Sandfire on the 19 October 2015 which included the installation of additional dewatering discharge pipelines and discharge areas, and an increase in the dewatering discharge throughput. These works are yet to be completed and a compliance document as required by the Works Approval has not been submitted to DER.

This Licence amendment for category 5 is to increase the throughput from 1,700,000 tonnes per annual period to 2,050,000 tonnes per annual period. The increase is achievable by improved ore handling and processing improvements to maximise capacity and efficiency. No additional infrastructure or power generation is required to support the increased processing plant throughput. Ore will continue to be sourced from the existing underground mine, but no additional surface storage for mine waste or ore is required. Tailings will continue to be disposed in the TSF via existing discharge pipelines. DER considers the proposed increase in throughput for category 5 has not significantly changed the risk profile of emissions and discharges from the Premises since the last Licence amendment. Therefore DER has not amended conditions relating to emissions and discharges.

Sandfire are also extending the double liner system along existing embankments of the TSF. Embankments of the TSF were constructed to a height of 575.5 metres (m) Reduced Level (RL) during 2011/2012 in accordance with Works Approval 4960/2011/1 (now inactive). A double liner system consisting of compacted clay and High Density Polyethylene (HDPE) has been installed along these embankments to a height of 570 m RL where process tailings are currently being deposited (Stage 2). The liner system will now be extended along existing embankments, between 570.0 to 575.5 m RL so tailings can be deposited into the Stage 3 level. DER considers the proposed extension of the double liner system at the TSF has not significantly changed the risk profile of emissions and discharges from the Premises since the last Licence amendment. Therefore DER has not amended conditions relating to the discharge or storage of tailings material in the TSF and the monitoring of the TSF.



As part of this Licence amendment process, DER has converted the Licence into the latest version 2.9. Justification is provided for each change or alteration to a condition which has occurred as part of this conversion process.

DER considers this Licence amendment has not significantly changed the risk profile of the Premises and therefore no change has been made to the Licence expiry date which is currently the 23 December 2017.



4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987* and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the decision document.

DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L = Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
General conditions	L1.2.1 to L1.2.3	Operation Condition 1.2.2 which refers to the code of practice for the storage and handling of dangerous goods is no longer applied to licences and has therefore been removed. All references made in the Interpretation section have been removed.	Application supporting documentation. General provisions of the <i>Environmental Protection Act 1986</i> . <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> .
Premises operation	L1.3.1 to L1.3.10	Construction & Operation Table 1.3.1 of condition 1.3.1 has been amended to include the quantity limit for wastes accepted onto the Premises landfill. The combined total of 1,300 tonnes per annual period includes Inert Waste Type 1, Inert Waste Type 2, Putrescible waste and Special Waste Type 2. This has been included in the Licence to ensure the Licensee does not exceed the approved throughput for category 64 at the Premises. Stockpiles of clean fill are stored at the landfill and are used for covering of waste and is therefore not considered a material that is accepted for burial.	Application supporting documentation. General provisions of the <i>Environmental Protection Act 1986</i> .



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L = Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>Quantity limit of '100 used tyres are stored' has been removed from Table 1.3.1 of condition 1.3.1 because the Premises has not been assessed as a prescribed premises category 57 which allows the storage of used tyres in numbers greater than 100. Additionally, the provisions of the <i>Environmental Protection Regulations 1987</i> apply whereby storage of used tyres in excess of 100 is a prescribed alteration of the environment unless it is done so in accordance with conditions of the Licence.</p> <p>Details of DER's assessment and decision making for the inclusion of condition 1.3.9 is included in Appendix A.</p> <p>The recording and the establishment of limits for process throughputs will be included in the Licence through condition 1.3.10 – Production or design capacity limits. This has been included in the Licence to ensure the Licensee does not exceed the approved throughputs for each category of the Licence.</p> <p>Production or design capacity for category 5 has been increased from the current licenced amount of 1,700,000 tonnes per annual period to 2,050,000 tonnes per annual period. The increase has been achieved by improving ore handling and processing improvements to maximise capacity and efficiency. These improvements have come through:</p> <ul style="list-style-type: none">• internal upgrades to processing design ('tweaking' the plant with no new infrastructure);• improved crushing and screening;• reduction in recirculation of scats; and• improved technology to deal with the process flow. <p>No additional infrastructure has been required and no alteration to any of the pollution control equipment has been needed. No significant change has occurred to the risk profile of emissions and discharges from the Premises as a result of the throughput increase.</p>	<p><i>Environmental Protection Regulations 1987</i>, Part 6 Regulation 12.</p>



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
Point source emissions to surface water including monitoring	L2.3.1 to L2.3.3, L3.3.1	<p>Operation Condition 2.3.2 has been amended by removing point source emission targets to surface water and replacing with a point source emission limit to surface water for total dissolved solids (TDS). Details of DER's assessment and decision making are included in Appendix A.</p>	<p>Application supporting documentation.</p> <p>General provisions of the <i>Environmental Protection Act 1986</i>.</p> <p><i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i>.</p>
Emissions to land including monitoring	L2.4.1 to L2.4.2, 3.4.1	<p>Operation Existing condition 3.4.1 requires monitoring the Wastewater Treatment Plant (WWTP) discharge to land. Targets for the discharge were applied through condition 2.4.2 however have been removed from the Licence. Limits have not been applied as the irrigation of treated wastewater to land is considered a low risk. DER's assessment and decision making is provided below.</p> <p><u>Emission Description</u> <i>Emission:</i> Treated wastewater discharged to the irrigation area during operation. <i>Impact:</i> Contamination of surrounding land, groundwater and eutrophication of nearby surface waters. <i>Controls:</i> The Project is situated in a semi-arid region with average annual rainfalls of between 200 and 250 mm and pan evaporation rates of about 3 000 mm per year. Depth to groundwater is 40 -50 metres below ground level. The Project area is characterised by low permeability saprolite clays and bedrock with only minor</p>	



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p>fracturing. The nearest potential surface water (John's Creek) is greater than one kilometre away however rarely contains water (only during cyclonic events). The nearest permanent surface water is 40 km away. Sandfire has in place a management plan for the operation of the batch plant and irrigation of the treated wastewater. Premises inspections undertaken by DER show the plant is operating in accordance with the requirements of the Licence. Previous sampling results indicated the WWTP discharge was exceeding Licence targets for Nitrogen on a number of occasions during the first few years of operations. However, Sandfire has made a number of improvements to the WWTP batch plant since that time and the results have now consistently remained at a level DER considers acceptable.</p> <p><u>Risk Assessment</u> <i>Consequence:</i> Insignificant. <i>Likelihood:</i> Rare. <i>Risk Rating:</i> Low</p> <p><u>Regulatory Controls</u> Licence conditions:</p> <ul style="list-style-type: none">• Condition 2.4.1 identifies the discharge areas for the treated wastewater.• Condition 3.4.1 requires monitoring of the discharged treated wastewater. Parameters monitored include volume, faecal coliforms, total phosphorus and total nitrogen, residual chlorine, suspended solids and biochemical oxygen demand. Monitoring for Ph has been included in the parameters requiring analysis. As a consequence of limited retention times, in-field non-NATA accredited analysis is permitted for pH measurements.• analysis for pH can be conducted in the field using• Reporting conditions. Sandfire are required to report on the WWTP data and compare this to previous results as part of the AER. <p><u>Residual Risk</u></p>	



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<i>Consequence:</i> Insignificant. <i>Likelihood:</i> Rare <i>Risk Rating:</i> Low	
Information	L5.1.1 to 5.1.4 L5.2.1 to 5.2.2 L5.3.1 to 5.3.3	Operation Table 5.2.1 and 5.3.1 have been amended to reflect updates to table numbers and new notification requirements for completed works under condition 1.3.9 and limit exceedance of table 2.3.2. Conditions 5.3.2 and 5.3.3 have been removed from the Licence as they are no longer applicable because targets have been removed from the Licence.	Application supporting documentation. General provisions of the <i>Environmental Protection Act 1986</i> .



5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
19/11/2015	Proponent sent a copy of draft instrument	No comments received	N/A



6 Risk Assessment

Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

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

Appendix A

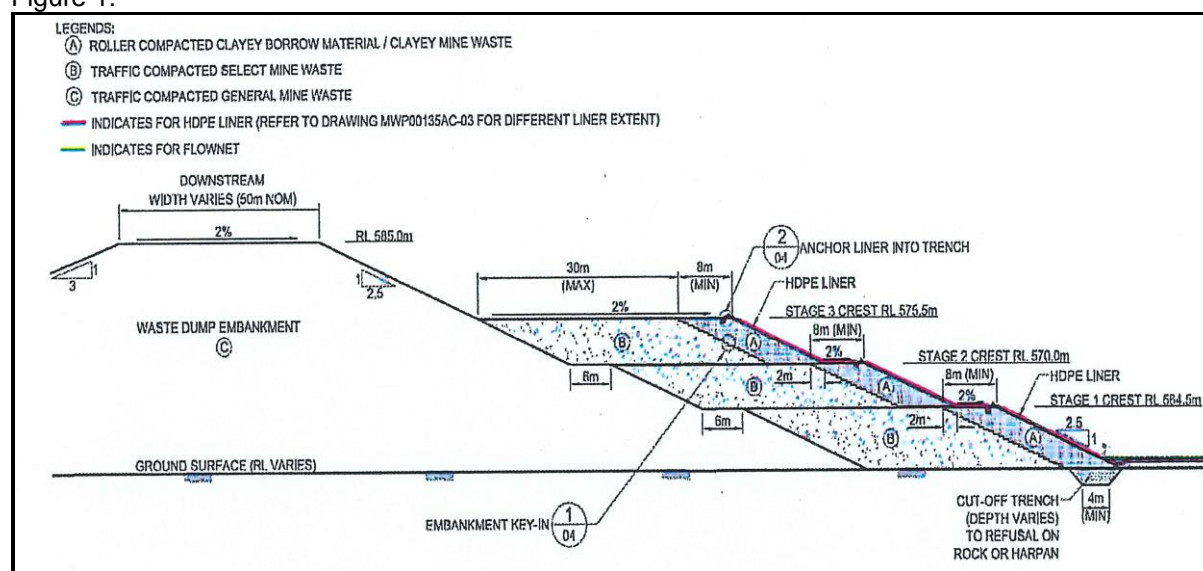
Emission Risk Assessment – Construction of an additional inner Tailings Storage Facility lined embankment

Condition 1.3.9 has been included in the Licence to ensure the Licensee constructs Stage 3 at the TSF in accordance with the submitted documentation.

The existing TSF is located 500 metres northwest of the processing plant within the Waste Rock Dump. DER conducted an emission risk assessment of the TSF via Works Approval W4960/2011/1, issued 7 July 2011 for its construction. The operation of the TSF is subject to the conditions of this environmental Licence L8558/2011/1. Sandfire are extending the double liner system along existing embankments of the TSF. Embankments of the TSF were constructed to a height of 575.5 metres (m) Reduced Level (RL) during 2011/2012 in accordance with Works Approval 4960/2011/1 (now inactive). A double liner system consisting of compacted clay and High Density Polyethylene (HDPE) has been installed along these embankments to a height of 570 m RL where process tailings are currently being deposited (Stage 2). The liner system will now be extended along existing embankments, between 570.0 to 575.5 m RL so tailings can be deposited into the Stage 3 level.

The TSF was constructed by placing mine waste around the outer edge of the alignment selected for the inner containment embankment for the TSF such that a void was formed inside the Waste Rock Dump. The engineered containment embankment was formed by placing controlled, compacted earthworks around the inner annulus of the Waste Rock Dump. This embankment was formed to retain the tailings. As the Waste Rock Dump has been formed, the void has been maintained and this allows for further controlled, compacted earthworks to be placed around the inner circumference of the void to form a perimeter containment boundary between waste rock and the deposited tailings. A compacted layer of low permeability (10^{-7} metres per second (m/s)) clay material has been placed against the mine waste for Stage 1 and Stage 2. The placement and compaction of the natural clay layer provides a surface free of sharp objects and protrusions to lay a HDPE liner on. The inner batter of the compacted embankment (against which tailings is deposited) is covered by a one millimetre HDPE liner. This forms a double liner system for the walls comprising compacted clay and artificial liner. Figure 1 below shows a cross section of the construction method used for the TSF.

Figure 1:





Other key environmental controls incorporated into the original design and construction of the TSF are:

- A compacted layer of low permeability clay material (1×10^{-10} m/s) was placed over the base of the TSF area to an average thickness of one metre;
- A two millimetre thick HDPE liner was placed over the compacted clay layer at the base of the TSF;
- An underdrainage water collection system, placed across the base of the TSF, comprising of a Flownet and a protective layer of Geotextile material and associated slotted collection pipes placed over the HDPE liner to capture water that percolates through the tailings during operation of the facility; and
- The underdrainage system discharges by gravity to an external sealed tank.

Process tailings are currently being discharged into the Stage 2 level which is nearing capacity. Sandfire propose to increase the capacity of the TSF inner embankment by constructing Stage 3. Stage 3 construction involves the following:

- Reshaping existing inner batters of the Stage 3 TSF level.
- Reshaping existing decant access way.
- Formation of a compacted clay embankment on existing inner batters of the Stage 3 level and decant area.
- Installation of A34 Geotextile and HDPE liners on existing inner batters of the Stage 3 level and decant area (extending the liner system from the Stage 2 area).
- relocation of the tailings discharge, decant return and seepage water return pipework to the embankment of the Stage 3 level (RL 575.0 metre).

Stage 3 will utilise approximately 80,000 cubic metres of clay material which was stockpiled for this purpose. This clay material originated from the DeGrussa Open Pit and has been assessed as suitable for consideration as construction material with a very low permeability of 10^{-6} to 10^{-7} m/s (Coffey Mining, 2011).

The current height of the TSF will not change. Tailings will continue to be transferred from the processing plant to the TSF circumference via existing discharge pipelines.

Emission Description

Emission: Discharge of tailings into a tailings storage facility.

Impact: Contamination of groundwater and elevated groundwater levels due to seepage.

Contamination of surrounding land and impacts to vegetation due to overtopping.

Controls: Only minor amounts of floatation chemicals used in the process. Process water is good quality (less than 1,500 total dissolved solids). A compacted layer of low permeability clay material (1×10^{-10} m/s) was placed over the base of the TSF area to an average thickness of one metre. A two millimetre thick HDPE liner was placed over the compacted clay layer at the base of the TSF. Underdrainage collection system that drains to sealed collected tank. Walls of TSF lined with compacted layer of low permeability clay material (1×10^{-6} to 1×10^{-7} m/s) and one millimetre HDPE liner. Series of ambient groundwater monitoring bores with results to date showing there has been no discernible seepage from the TSF or any groundwater impacts. TSF management plan.

Risk Assessment

Consequence: Minor.

Likelihood: Rare.

Risk Rating: Low

Regulatory Controls

Licence conditions:

- Condition 1.2.2 requires the Licensee to recover or remove any spills from containment systems.
- Condition 1.3.4 requires tailings are only discharged into containment infrastructure that complies with the requirements of the Licence.



- Condition 1.3.5 requires the Licensee to ensure a minimum freeboard of 500 mm is maintained at the TSF, and methods of operation are to minimise embankment erosion.
- Condition 1.3.6 requires the Licensee to undertake routine inspections of the TSF and the discharge and return pipelines.
- Condition 3.5.1 requires the Licensee to undertake quarterly ambient groundwater sampling from the TSF groundwater monitoring bores. Sampling results are to be presented in the Annual Environmental Report as required by condition 5.2.1.
- Reporting conditions.

Residual Risk

Consequence: Insignificant

Likelihood: Rare

Risk Rating: Low

Point source emissions to surface water including monitoring

Emission Risk Assessment - Operations

Condition 2.3.2 has been amended by removing targets for pH, TDS and Total Petroleum Hydrocarbons (TPH) emissions to surface water, and setting a limit for TDS. DER's justification for this amendment is presented below. Impacts to creek beds by erosion and localised groundwater mounding have not been considered in this assessment for the removal of targets and the setting of a limit.

Sandfire is currently licenced to discharge up to 2,000,000 tonnes per annual period of dewatering effluent to the North Creek. The dewatering discharge effluent is made up of collected underground mine water, open pit water and water from the dewatering groundwater bore (DWB12).

The hydrogeology of the Project area is characterised by low permeability saprolite clays and bedrock with only minor fracturing. There are no clear continuous aquifers in the region, with only one highly constrained and localised higher permeability zone (referred to as the Caprock aquifer). All localised aquifers that have been identified are categorised as the fractured rock type. However, the term aquifer is probably not appropriate given the permeability and constrained nature. All units in the area are more correctly referred to as aquitards. Fractured rock aquifers at the Project occur within caprock at depths of 40 to 50 m.

There are no permanent water bodies, wetlands or groundwater dependent ecosystems near the Project. The nearest water body is the Gascoyne River located 40 km away. The Project's surface water catchment consists of three weekly incised drainage systems that drain west northwest into an ephemeral tributary of the Gascoyne River. North Creek where dewatering effluent is discharged, is the most significant of the ephemeral watercourses and is 200 to 300 m wide overall with numerous braided shallow channels, most of which are relatively densely vegetated. Main channel length is 16.2 km.

North Creek, which is generally referred to as a drainage channel, is dry for the majority of the time and carries runoff following significant storm events during the summer months when the potential exposure to high intensity cyclonic rainfall is greatest. On average these types of events occur only a couple of times a decade.

Groundwater quality at the Project is generally fresh to slightly brackish, neutral to slightly alkaline with a naturally high nitrate/nitrite concentration. Water from the open pit (up to 12 L/s) has a slightly higher salinity level due to pit wall washing and evaporation concentration, however, this is not expected to have an impact because it is combined with the fresher underground mine water at the discharge location. With exception of selenium, heavy metal and metalloid concentrations are well below guideline values (ANZECC 2000 for Livestock and Fresh Water) with most below detectable



limits. The pit water selenium concentrations are twice as high as both guideline values, however the ferruginous soil type at the Project is expected to remove most of the selenium by surface adsorption. Water quality parameter results for North Creek Discharge during 2014 are provided in Table 2. Sampling of the discharge waters commenced during 2014 when the Licence was amended to include routine sampling.

Table 2: Water Quality results for North Creek Discharge

Analyte	Apr-14	Jun-14	Aug-14	Dec-14
TSS (mg/L)	BLD	127	BLD	17
Acidity (mg/L)	BLD	3	5	BLD
NO ₃ (mg/L)	44	52	53	52
Sulfate (mg/L)	160	250	240	320
Arsenic (mg/L)	BLD	BLD	BLD	BLD
Cadmium (mg/L)	BLD	BLD	0.0002	BLD
Chromium (mg/L)	BLD	0.003	0.002	0.003
Copper (mg/L)	BLD	0.0025	BLD	0.061
Lead (mg/L)	BLD	BLD	BLD	BLD
Selenium (mg/L)	BLD	0.0045	0.004	0.0045
Zinc (mg/L)	BLD	-	0.01	0.07
TRH	BLD	BLD	BLD	BLD

BLD means below level of detection

TRH presented in Table 2 above is described as the Total Recoverable Hydrocarbons analysed in the sample. Total Petroleum Hydrocarbons (TPH) is presented in the current Licence and is the equivalent of the more recently used TRH.

Water quality results for pH and TDS analysis for samples taken from dewatering bore (DWB12), the underground settlement ponds (underground and open pit water combined) and the discharge to North Creek is provided in Table 3. The TDS of water from the underground mine increased slightly when a fractured dolomite unit was intercepted however this has now reduced.

Table 3: pH and TDS results for North Creek discharge point, underground settlement ponds and dewatering bore 12.

Date	pH			TDS (mg/L)		
	Discharge Point	Settlement Ponds	DWB12	Discharge Point	Settlement Ponds	DWB12
Apr - 2014	7.99	-	7.99	970	-	970
Jun - 2014	7.95	8.1	7.9	1,420	3,400	860
Aug - 2014	7.6	8	8.3	900	2,600	820
Dec - 2014	8.4	-	7.7	1,600	1,500	770

Emission Description

Emission: Discharge of mine dewatering effluent into a creek.

Impact: Reduction in surface water quality. Reduction in quality of local groundwater. Contamination of soils with heavy metals.

Controls: Quarterly monitoring of dewatering discharge effluent. Underground and Pit water combined with fresher groundwater from DWB12 before discharge to lower overall TDS. Low permeability saprolite clays and bedrock with only minor fracturing which reduces ground seepage. Discharge water is sourced from local groundwater and therefore of similar quality. High evaporation rates for this region (3,000 mm per year) assisting in reducing the amount of seepage. Settlement ponds prior to discharge. The nearest water body is the Gascoyne River located 40 km away.



Risk Assessment

Consequence: Insignificant

Likelihood: Unlikely

Risk Rating: Low

Regulatory Controls

Condition 2.3.2 of the Licence requires the Licensee to target point source emissions to surface water at or below those stated in the Licence. Targets are currently imposed in the Licence for pH, TDS and TPH for dewatering discharge waters.

Works Approval W5866/2015/1 was issued to Sandfire on the 19 October 2015 for the installation of additional dewatering pipelines, new dewatering discharge locations and increasing the dewatering discharge volumes. The works are yet to be completed. Also included in the assessment was the raising of the target for TDS in dewatering effluent discharge from 1,500 to 3,000 mg/L to reflect the quality of the groundwater experienced in the underground operations. Monitoring data shows that while the water in the dewatering bore has a TDS of up to 970 mg/L, water from the open pit and underground mine have a recorded combined TDS of up to 3,400 mg/L which is higher than the Licence target. As most dewatering water is from the open pit and underground mine, and the dewatering bore may not always produce better quality water to dilute the TDS of the discharge, there has been times when compliance with the target has not been achieved. Sandfire exceeded the 1,500 mg/L TDS Licence target in December 2014 by 100 mg/L. Therefore, the setting of targets and limits for TDS in dewatering discharge effluents and has been assessed as part of this Licence amendment.

DER does apply emission limits to a licence as a primary environmental regulatory control where necessary and appropriate.

Potential downstream use for the dewatering discharge effluent is for stock watering. TDS of groundwater at the premises is below 3,400 mg/L. Therefore in order to prevent impacts to the environment in the discharge area, DER has imposed limits for TDS. There are no adopted standards or guidelines for TDS values for discharge waters to creek lines. The ANZECC (2000) guidelines for livestock drinking water recommend a maximum TDS of 4,000 mg/L (page 9.3-11) so no adverse effects occur to livestock. Groundwater at the Project is naturally up to 3,400 mg/L TDS in some areas. Therefore taking all these factors into account, DER considers it appropriate to set a Licence limit of 3,500 mg/L for TDS in dewatering discharge waters.

There are no adopted standards for TRH values for discharge waters to creek lines. Previous sampling of the dewatering effluent waters since 2012 indicates there have been no hydrocarbons present. There are no sensitive receptors and depth to groundwater is greater than 17 m below ground level. Quarterly monitoring for TRH (requires amending from TPH) still applies in the Licence. Therefore taking all these factors into account, DER has determined that the setting of a limit for TPH in dewatering discharge waters is not necessary.

A limit has not been considered for pH because sampling results for groundwater and dewatering discharge effluent indicate pH has remained steady as neutral to slightly alkaline and is not considered a risk to the environment. Quarterly monitoring for pH still applies in the Licence.

Condition 3.3.1 of the Licence requires routine monitoring of point source emissions to surface water.

Residual Risk

Consequence: Insignificant

Likelihood: Unlikely

Risk Rating: Low