



**Licence Number** L7178/1997/11

**Licence Holder** Dampier Salt Limited

**ACN** 008 706 590

**File Number:** DER2014/001046

**Premises** Dampier Salt – Lake MacLeod  
AML 70/245, L09/10, L09/11, L09/17 and L09/18  
Blowholes Road  
CARNARVON WA 6701

**Date of Amendment** 20 March 2018

## Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act) as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

Date signed: 20 March 2018

**Danielle Eyre**

**Senior Manager**

**Industry Regulation (Resource Industries)**

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

# Definitions and interpretation

## Definitions

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

**Table 1: Definitions**

Term	Definition
AACR	Annual Audit Compliance Report
ACN	Australian Company Number
AER	Annual Environment Report
Amendment Notice	refers to this document
AS 4156.6 – 2000	Australian Standard AS 4156.6 – 2000: Determination of Dust/moisture Relationship for Coal.
ASS	Acid Sulfate Soils
Category/ Categories/ Cat.	categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department Administering the <i>Environmental Protection Act 1986</i> Locked Bag 33 Cloisters Square PERTH WA 6850 <a href="mailto:info@dwer.wa.gov.au">info@dwer.wa.gov.au</a>
CS Act	<i>Contaminated Sites Act 2003 (WA)</i>
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>

Existing Licence	The Licence issued under Part V, Division 3 of the EP Act and in force prior to the commencement of and during this Review
Licence Holder	Dampier Salt Limited
m <sup>3</sup>	cubic metres
Minister	the Minister responsible for the EP Act and associated regulations
MS	Ministerial Statement
Mtpa	million tonnes per annum
NEPM	National Environmental Protection Measure
Noise Regulations	<i>Environmental Protection (Noise) Regulations 1997 (WA)</i>
Occupier	has the same meaning given to that term under the EP Act.
PASS	Potential Acid Sulfate Soils
pH <sub>F</sub>	refers to the field pH, which is a field determination of pH in a soil: water (deionized) paste
pH <sub>FOX</sub>	refers to the field peroxide pH, which is a field determination of pH in a soil:water mixture following reaction with hydrogen peroxide.
Prescribed Activities	is defined in DWER's <i>Guidance Statement: Risk Assessments</i> to include the primary activities which fall within the description of the category of prescribed premises in Schedule 1 to the EP Regulations.
Prescribed Premises	has the same meaning given to that term under the EP Act.
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report.
Risk Event	as described in <i>Guidance Statement: Risk Assessment</i>
UDR	<i>Environmental Protection (Unauthorised Discharges) Regulations 2004 (WA)</i>
µg/m <sup>3</sup>	micrograms per cubic metre

## Amendment Notice

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the Licence issued under the EP Act for a prescribed premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

This notice is limited only to an amendment to gypsum production at Lake MacLeod (the Premises). No changes to the aspects of the original Licence (L7178/1997/11) relating to Categories 14, 58, 58A or 64 have been requested by Dampier Salt Limited (the Licence Holder). Through review of Premises activities in relation to gypsum production, DWER has considered further amendments to Category descriptions and approved Premises production capacities (refer to *Amendment description*). DWER has not reassessed the risks of Prescribed Activities not related to the amendment application through this Amendment Notice.

DWER intends to commence within the next six months a detailed risk review of the Licence to align the Licence with the risk based Regulatory Framework.

The following guidance statements have informed the decision made on this amendment:

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

## Amendment description

On 14 August 2017, the Licence Holder applied to increase the authorised gypsum production capacity at the Premises from 500,000 tonnes to 3,000,000 tonnes per annual period. Increased throughputs are expected to be achieved through means of more efficient infrastructure and equipment utilisation throughout the annual period and no infrastructure works are required.

Gypsum is non-metallic mineral and as such production was previously classified as Category 80 (non-metallic mineral processing) and shiploading as Category 58 (bulk material loading or unloading [other than salt]). However, gypsum is also a salt and is produced and extracted using a similar process to the solar salt manufacturing for halite also conducted at the Premises. Therefore DWER has determined that it is more appropriate to classify gypsum production at Lake MacLeod as a Category 14 activity (solar salt manufacturing) and gypsum shiploading as Category 58A (bulk material loading or unloading [salt]).

Premises production capacities for Category 58A are limited by the design capacity of ship loading infrastructure. As there is only one berth and shiploader at the Premises there are no proposed increases to the approved daily rates of bulk material loading (salt) required through this Amendment Notice.

Table 2 below outlines the proposed changes to the Licence.

**Table 2: Proposed category and throughput capacity changes**

Category	Category description	Category production or design capacity	Approved Premises production capacity
14	Solar salt manufacturing	Not applicable	<del>3 100 000 tonnes per annual period</del> 6 100 000 tonnes per annual

			period
58	Bulk material loading or unloading (other than salt)	100 tonnes or more per year	50 000 tonnes per day
58A	Bulk material loading or unloading (salt)	100 tonnes or more per year	84 000 tonnes per day
64	Class II or III putrescible landfill site	20 tonnes or more per year	60 tonnes per annual period
80	Non-metallic mineral processing	100 tonnes or more per year	500 000 tonnes per annual period

Gypsum is present within the Lake MacLeod lake bed and requires washing to remove brine and chloride minerals. Depending on the grade of product required for export (salt content), the method used to wash and extract gypsum will involve two processes: in-situ leaching; and the more traditional method of heap leaching.

Traditional heap leaching methods, involving the excavation of raw gypsum by excavating the lake surface using heavy mobile equipment and trucking to one of two stockpile pads, will continue at the Premises with leachates directed by drainage channels to discharge at points SW6 or SW7 shown in Figure 1. The gypsum operation at the Premises is operated on a campaign basis, based on market demand and shipping movements, which currently equates to over approximately 250 days per year.

The Licence Holder proposes to increase production capacity using an in-situ method of washing gypsum. In-situ leaching involves digging a trench around the target material and applying water to the surface. Water is leached and collected in the drain before being discharged to SW7. As excavation progresses throughout the operational area, additional emission points will be required to discharge water further into Lake MacLeod. Therefore the



**Figure 1: Gypsum extraction and stockpiling locations and surface water discharge points**

Licence Holder has requested to authorise discharges from point SW8 (Figure 1) and will require additional emission points in the future.

Extraction and washing of gypsum using this method will reduce the number of truck movements and excavator activity required to ship gypsum and as a result increases the Licence Holder's capacity to conduct the gypsum operation on a full time basis, producing higher volumes of gypsum.

Gypsum produced using the in-situ method is expected to have a higher content of fines than dredging processes which remove particles finer than 70 microns in diameter. The Licence Holder argues that this will result in the moisture being retained within the gypsum stockpile for longer periods and increase the surface area of stockpiles, increasing the likelihood of particles binding.

The stockpile footprint at the ship loader is not anticipated to change as haulage to Cape Cuvier will be conducted on per ship needs basis. However, a continuous stockpile may be required at Cape Cuvier as shipments are more regular. Ship movements at Cape Cuvier will still be limited by swell size and wind speeds, reducing the likelihood of a stockpile being placed at Stockpile 2 during forecast high wind conditions. The moisture content of gypsum at the Cape Cuvier stockpile is anticipated to be approximately 3%.

The Licence Holder proposes for production to gradually increase to 3 million tonnes per annual period (Mtpa) by 2020. At this rate total leachate discharges are expected to be approximately 2,200 m<sup>3</sup> per day from gypsum operations. Total water requirements for gypsum and salt operations at the Premises equate to approximately 57% of the Licence Holder's authorised abstraction volume under Groundwater Licence GWL56934.

Under the existing licence, the Licence Holder is required to monitor leachate quality on a biannual basis. As shown in Table 3, monitoring from March 2016 to present has revealed fluctuations in the pH of leachate collected at gypsum stockpile drainage points SW6 and SW7. Based on this limited information there may be Potential Acid Sulfate Soils (PASS) within the target area for gypsum extraction.

**Table 3: Measured pH from discharge points SW6 and SW7**

Sample date	2/03/2016	25/08/2016	1/06/2017	23/08/2017	24/10/2017	21/11/2017
SW6	No flow	3.7	Not analysed	No flow	7.8	7.9
SW7	6.9	4.1	No flow	Not analysed	7.3	6.9

As no gypsum leaching occurred in the second half of 2015 there was no discharge from these emission points and no samples were taken in 2015.

## Other approvals

The Licence Holder has provided the following information relating to other approvals as outlined in Table 4.

**Table 4: Relevant approvals**

Legislation	Number	Approval
<i>Evaporites (Lake MacLeod) Agreement Act 1967</i>	Mineral Lease 245SA (AML70/245)	Approval to mine potash and other evaporites and other allied mining and ancillary industries.
<i>Rights in Water and Irrigation Act 1914</i>	GWL 56934	Groundwater abstraction from the Sandstone Birdrong aquifer up to 3,350,000kL per annum.

## Amendment history

Table 5 provides the amendment history for L7187/1997/11 since 1 January 2015.

**Table 5: Licence amendments**

Instrument	Issued	Amendment
L7178/1997/11	19/03/2018	Amendment Notice 1 – increase to authorised gypsum production capacity
L7178/1997/11	01/10/2015	Licence reissue – increase in solar salt production from 2.9 Mtpa to 3.1 Mtpa and the reinstatement of Category 80 for gypsum production.

## Location and receptors

Table 6 below lists the relevant sensitive land uses in the vicinity of the Prescribed Premises which may be receptors relevant to the proposed amendment. The Premises is comprised of three areas where Primary Activities occur:

- Gypsum mining on Lake MacLeod – approximately 13 km east of Cape Cuvier;
- Solar salt mining – approximately 23 km south east of Cape Cuvier; and
- Port operations at Cape Cuvier.

**Table 6: Receptors and distance from activity boundary**

Residential and sensitive premises	Distance from Prescribed Activity
Residential Premises	Closest residential premises is Quobba Homestead, approximately 10 km west of the salt production facility and 20 km south of Cape Cuvier.
Minilya Roadhouse	Minilya roadhouse is located approximately 30 km east of the Premises' boundary.

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

**Table 7: Environmental receptors and distance from activity boundary**

Environmental receptors	Distance from Prescribed Premises
Public Drinking Water Source Areas	The Carnarvon Water Reserve is greater than 60 km south east of gypsum production.
Lake MacLeod	Gypsum production occurs within Lake MacLeod, which is listed in the Directory of Important Wetlands in Australia. The northern portion of Lake MacLeod (approximately 9 km north of gypsum mining) is listed as a proposed Ramsar wetland (DEC, 2009).
Regional Parks	No regional parks are located within a 30 km radius of proposed activities.

## Risk assessment

Table 8 below describes the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments*. The table identifies whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

**Table 8: Risk assessment for proposed amendments during operation**

		Risk Event				Consequence rating	Likelihood rating	Risk	Reasoning
Source/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts					
Cat 14 Solar salt manufacturing	Extraction and washing of gypsum at Lake MacLeod	Dust: associated with stockpiles	None	Air	Health and amenity impacts	N/A	N/A	N/A	No receptor present.
		Waste: Discharge of leachates to surface waters and generation of Acid Sulfate Soils during extraction and groundwater drawdown.	Contamination of surface waters and surface water dependent ecosystem	Direct discharge of leachate via drainage channels	Adverse impacts to the health and survival of surface water dependent ecosystem	Moderate	Possible	Medium	<p>Sensitive ecosystems of high value within Lake MacLeod are located north of gypsum operations with surface water flows moving in a south direction.</p> <p>There exists some uncertainty around the effects of the in-situ process and increasing throughputs on the groundwater quality. As there may be some mid-level impacts within the Lake MacLeod system the consequence has been assessed as <i>moderate</i>.</p> <p>There exists some uncertainty regarding the potential for Acid Sulfate Soils (ASS) in Lake MacLeod, which is described as moderate to low risk for ASS. Groundwater will not be lowered to below previous drawdown levels required for heap leaching processes using the proposed in-situ process. However, previous extraction methods will continue to be used and are expected to increase as a result of throughput expansions meaning that ASS risks are still present.</p> <p>The Licence Holder notes that the iron content in the target gypsum mining areas is low, indicating a low ASS risk. However, based on short-term monitoring data provided to DWER, the pH of leachate from gypsum stockpiles can fluctuate and was recorded as low as 3.7 and 4.1 at SW6 and SW7 respectively.</p> <p>Taking into consideration historical monitoring data and the reported low iron content of the product, the risk event will probably not occur in most circumstances. However, the likelihood is rated as <i>possible</i> as there exists some uncertainty based on limited information and large fluctuations in the pH of leachate.</p> <p>The overall risk rating is <b>Medium</b>.</p>
Cat 58 Bulk material loading or unloading	Movement of gypsum from stockpiles at Cape Cuvier and transport via hoppers and conveyors to load into a vessel.	Spills during ship loading	Marine environment	None	Toxicological and physiological impacts to the marine environment	N/A	N/A	N/A	Gypsum is loaded onto a vessel using a telescopic chute so a spill event is highly unlikely. During normal operations the most likely pathway for gypsum to access the marine environment is via air (dust).
		Dust: associated with gypsum handling and stockpiling	None	Air	Human health and amenity impacts	N/A	N/A	N/A	No receptor present.
		Dust settling in the marine environment	Dust settling in the marine environment	Dust being transported by air and settling in the marine environment	Toxicological and physiological impacts to the marine environment	Slight	Likely	Medium	<p>Although the higher percentage of particles &lt;70µg reduces the potential for dust from stockpiles, the higher content of fines also increases the likelihood that particles that do enter the marine environment will take a longer time to settle.</p> <p>Dissolution tests of Lake MacLeod gypsum have identified that the product is poorly soluble. Zinc, copper, lead and mercury were all found to be below detectable levels. The major leachates from gypsum include sodium, sulfate and calcium, which are all components of seawater suggesting dust is unlikely to result in detectable changes to the chemistry of localised seawater.</p> <p>Therefore the greatest risk to the marine environment is increased turbidity, which is expected to result in minimal impacts at a local scale (<i>slight</i> consequence).</p> <p>Dust being generated at Cape Cuvier from the stockpile and during product movement will probably settle in the marine environment in most circumstances where winds are in an offshore direction (<i>likely</i>).</p> <p>The overall risk rating is <b>Medium</b>.</p>



## Decision

Following the risk assessment of the proposed activities the Delegated Officer has determined that the proposed increase in throughputs can be approved subject to additional licence conditions.

Where available, Licence Holder controls for the management of surface water discharges and dust emissions from shiploading activities at Cape Cuvier have been conditioned on the Licence to ensure that risks are reduced to acceptable levels.

The full risk based review will commence in 2018 and will be informed by in-field monitoring data required through this amendment notice.

### Category descriptions and authorised throughputs

The Delegated Officer has determined that gypsum is a type of salt that is produced by solar evaporation resulting in the crystallisation of the gypsum. Minor administrative amendments to category descriptions have been made to reflect this view. No increases to the approved Category 58 daily load-out rates are required as the proposal involves greater utilisation of ship loading equipment throughout the annual period as opposed to increasing the daily ship loading rates.

### Bulk material loading requirements

The Licence Holder has indicated that it is not possible to apply further moisture to gypsum product due to product specification requirements. Therefore gypsum dust being deposited into the ocean is likely to occur, resulting in increased turbidity in a localised area. Dust emissions are most likely during gypsum handling processes where gypsum is dropped from height into the vessel's hold or at the point of stacking at Stacker 2 on Cape Cuvier.

A condition has been placed on the Licence to reduce the drop height of gypsum at the ship loader and stockpile using existing dust control infrastructure and management measures described in the Licence Holder's document: *Rio Tinto (2017) Gypsum Operations Dust Management Plan*.

### Discharge point monitoring

Future discharge point SW8 has been added to the authorised discharge locations to allow for progressive extraction of gypsum further into Lake MacLeod.

The Delegated Officer has determined that due to uncertainty regarding the potential for ASS in Lake MacLeod, increased monitoring frequencies are required, particularly for pH which now requires monthly monitoring at leachate discharge points. In-field testing of Titratable Acidity is also required at leachate emission points on a monthly basis to measure the likelihood of ASS occurring.

Additional indicators of ASS have also been applied to the parameters monitored at leachate discharge points in selenium and bicarbonate (alkalinity). Elevated concentrations of selenium may be released from disturbed acid sulfate soils, and this element can be biomagnified in local food webs potentially affecting bird populations. Selenium is also highly mobile under neutral to alkaline conditions. The addition of bicarbonate is necessary to determine whether there is a risk that leachate from the gypsum processing area will acidify after discharge to the salt lake.

### In-field pH testing

Prior to abstracting groundwater at points of proposed gypsum excavation, the Licence Holder will be required to conduct in-field pH testing.

As there exists a proposed Ramsar wetland (not listed) within the norther area of Lake MacLeod, approximately 9 km to the north of gypsum operations, it is possible that migratory

birds may visit the area. Therefore DWER has applied the precautionary principle when amending the licence to require in-field pH testing of future gypsum extraction areas as an early warning indicator of ASS.

The identification of PASS or ASS by the Licence Holder is expected to instigate further management action including, but not limited to the following two options:

- (a) relocating to another area for gypsum extraction; or
- (b) treating the leachate discharges into Lake MacLeod with a neutralising agent such as lime during discharge and until it is neutralised.

The fact that low and variable pH values have been measured in leachate from the gypsum processing area suggests that shallow sediments in the trenching area have the potential to become ASS when disturbed. However, insufficient information is currently available to determine the magnitude of the environmental hazard that may be caused by disturbing these materials without adequate management measures being put in place.

An analysis of leachate discharge monitoring and in-field pH data will be used to better inform the risk to the Lake MacLeod ecosystem at this time.

## Licence Holder's comments

The Licence Holder was provided with the draft Amendment Notice on 16 March 2018. Comments received from the Licence Holder have been considered by the Delegated Officer as shown in Appendix 2.

## Amendment

1. The *Prescribed premises category* table is amended by the deletion of the text shown in strikethrough and insertion of the red text shown in underline below:

Category number	Category description	Category production or design capacity	Approved Premises production or design capacity
14	Solar salt manufacturing	Not applicable	<del>6</del> 3 100 000 tonnes per annual period
58	<del>Bulk material loading or unloading (other than salt)</del>	<del>400 tonnes ore more per year</del>	50 000 tonnes per day
58A	Bulk material loading or unloading (salt)	100 tonnes ore more per <u>day</u> year	84 000 tonnes per day
64	Class II or III putrescible landfill site	20 tonnes ore more per year	60 tonnes per annual period
<del>80</del>	<del>Non-metallic mineral processing</del>	<del>400 tonnes ore more per year</del>	<del>500 000 tonnes per annual period</del>

2. The Licence is amended by insertion of Condition 1.3.7 as shown by the insertion of the red text shown in underline below:

### 1.3.7 The Licence Holder must

- (a) reduce the drop height of gypsum at the ship loader to as low as reasonably practicable; and
- (b) transfer gypsum to Stockpile 2 using a stacker equipped with a chute; for the purpose of reducing the exposure of gypsum to wind.

3. Condition 2.2.1 of the Licence is amended by the insertion of the red text shown in underline below:

2.2.1 The Licensee shall ensure that where waste is emitted to surface water 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.

<b>Table 2.2.1: Emission points to surface water</b>			
<b>Emission point reference</b>	<b>Emission point reference on Map of emission points</b>	<b>Description</b>	<b>Source including abatement</b>
SW1	Discharge point 1 (wet salt stockpile discharge)	Outlet pipe into Lake MacLeod from wet salt stockpile.	Wet salt stockpile discharge of excess water to Lake MacLeod.
SW2	Discharge point 2 (wet salt stockpile discharge)		
SW3	Discharge point 3 (wash plant brine overflow)	Overflow pipe into Lake MacLeod from Wash Plant	Salt wash brine from Wash Plant overflow point
SW4	Discharge point 4 (Truckwaste, lube bay & reverse osmosis plant Discharge Point)	Unlined pond on Lake MacLeod from which truck wash bay, Lube bay and Reverse Osmosis plant (at salt operations) discharge into.	Wastewater from truck wash bay via a triple interceptor.
SW5	Discharge point 5	Outlet pipe into ocean from truck wash bay at Cape Cuvier.	Wastewater from truck wash bay via a triple interceptor.
SW6	Gypsum Discharge point 1	Outlet pipe into Lake MacLeod from Gypsum Stockpile 1.	Wastewater from heap leach pad for Gypsum Stockpile 1.
SW7	Gypsum Discharge point 2	Outlet pipe into Lake MacLeod from Gypsum Stockpile 8 drainage system.	Wastewater from heap leach pad for Gypsum Stockpile 8.
<u>SW8</u>	<u>Gypsum Discharge point 3</u>	<u>Outlet pipe into Lake MacLeod from in-situ drainage systems.</u>	<u>Wastewater from in-situ heap leach areas located within Lake MacLeod.</u>

4. Condition 3.1.2 of the Licence is amended by the deletion of text shown in strikethrough and the insertion of the red text shown in underline below:

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; and
- (c) six monthly monitoring is undertaken at least 5 months apart.

5. Condition 3.2.1 of the Licence is amended by the deletion of text shown in strikethrough and the insertion of the red text shown in underline below:

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

<b>Table 3.2.1: Monitoring of point source emissions to surface water</b>			
<b>Emission point reference</b>	<b>Parameter</b>	<b>Units</b>	<b>Frequency</b>
SW4	Total Recoverable Hydrocarbons	mg/L	Quarterly
SW5			
SW6 SW7 <u>SW8</u>	Chloride, sulfate, sodium, magnesium, potassium, calcium, total suspended solids, arsenic, beryllium, boron, cadmium, chromium, copper, fluoride, lead, mercury, nickel, total nitrogen, total phosphorus,	mg/L	<del>Six monthly</del> <u>Quarterly</u>

	<u>selenium, bicarbonate</u>		
	Electrical conductivity <sup>1</sup>	µS/cm	<del>Six monthly</del> <u>Quarterly</u>
	pH <sup>1</sup>	-	<del>Six monthly</del> <u>Monthly</u>
	<u>Titrateable Acidity<sup>1</sup></u>	<u>mg/L</u>	<u>Monthly</u>

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

6. The licence is amended by insertion of Condition 3.4.1 as shown by the red text shown in underline below:

### **3.4 Acid Sulfate Soil Monitoring**

3.4.1 Prior to groundwater abstraction at Lake MacLeod, the Licence Holder must conduct and record in-field Acid Sulfate Soil investigations prior to the commencement of each gypsum extraction campaign in accordance with the steps outlined in Schedule 3, or using a method as approved by the CEO.

3.4.2 The Licence Holder must maintain accurate records of in-field testing that includes:

- (a) a visual observation of the strength of the reaction;
- (b) pH<sub>F</sub> and pH<sub>FOX</sub> values for each test;
- (c) the difference between pH<sub>F</sub> and pH<sub>FOX</sub> values for each test ( $\Delta$ pH); and
- (d) any management actions undertaken following the identification of Potential Acid Sulfate Soils or Acid Sulfate Soils that may include, but not be limited to:
  - i. relocating the disturbance area to another location; or
  - ii. treating the leachate from the associated emission point specified in Table 3.2.1 with a neutralising agent (lime).

3.4.3 The Licence Holder must provide notification to the CEO of any sampling event where the pH<sub>F</sub>, as measured in accordance with the steps outlined in Schedule 3, is equal to, or less than 4.

3.4.4 Notification required by condition 3.4.3 must be provided within 30 days of the sampling event and include:

- (a) the Titrateable Acidity measured at the emission point;
- (b) the most recent quarterly monitoring results for that emission point;
- (c) a map of the sampling location with MGA coordinates and a north facing arrow; and
- (d) any management actions undertaken that include, but not be limited to:
  - i. relocating the disturbance area to another location; or
  - ii. treating the leachate from the associated emission point specified in Table 3.2.1 with a neutralising agent (lime).

7. Condition 4.2.1 of the Licence is amended by the insertion of the red text shown in underline below:

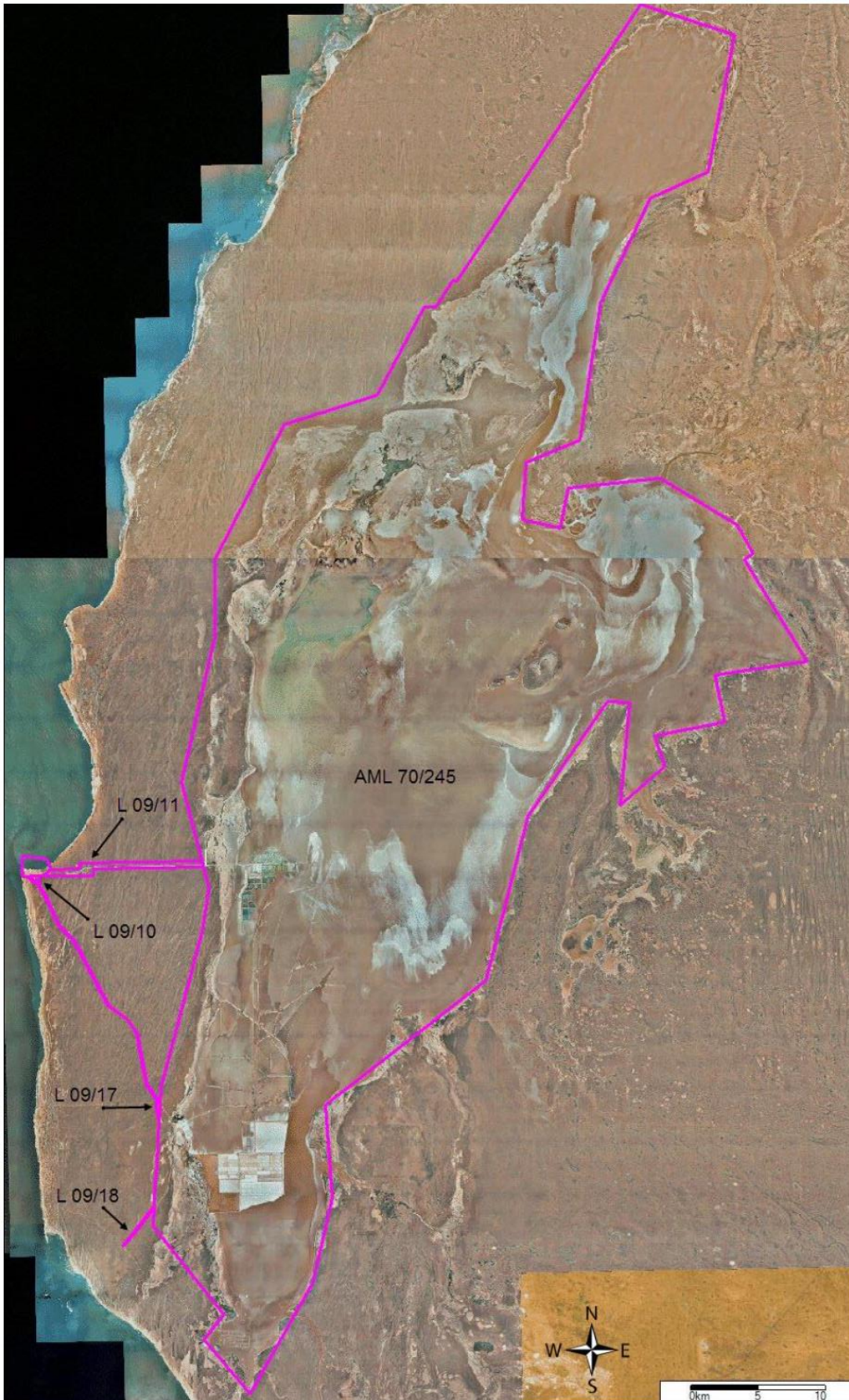
### **4.2 Reporting**

4.2.1 The Licensee shall submit to the CEO an Annual Environmental Report within 120 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.

<b>Table 4.2.1: Annual Environmental Report</b>		
<b>Condition or table (if relevant)</b>	<b>Parameter</b>	<b>Format or form1</b>
-	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	Discharge to water monitoring results	
Table 3.3.1	Discharge to land monitoring results	
<a href="#"><u>3.4.2</u></a>	<a href="#"><u>Acid Sulfate Soil investigation data and management actions required by Condition 3.4.1</u></a>	<a href="#"><u>Presented in the format shown in Schedule 3 (Table S-3)</u></a>
4.1.3	Compliance	Annual Audit Compliance Report (AACR)
4.1.4	Complaints summary	None specified

8. The Premises map shown in Schedule 1 is replaced with the figure below.



9. The map depicting emission points defined in Table 2.2.1 and as shown in Schedule 1 is replaced with the figure below.



**Legend**

- Emission point
- RO/Bore water pipeline

10. The map depicting Cape Cuvier infrastructure as shown in Schedule 1 is replaced with the figure below.



Legend

- Emission point
- Damper Salt Tenements



11. The licence is amended by insertion of Schedule 3 as shown below:

### **Schedule 3: Acid Sulfate Soils investigation<sup>1</sup>**

#### ***Minimum number of samples***

1. Two boreholes per hectare of disturbance.
2. For each borehole, conduct tests at intervals on the soil profile of 0.25 metres or at least one test per horizon, whichever is lesser.
3. Boreholes must be extended to at least 0.5 metres below the depth of extraction.

#### ***pH<sub>F</sub> test procedure***

1. Calibrate battery powered field pH meter and record calibrated reading on a data sheet.
2. Use of separate racks for the pH<sub>F</sub> and pH<sub>FOX</sub> tests.
3. Remove approximately one teaspoon of soil from the profile. Place approximately ½ teaspoon of the soil into the pH<sub>F</sub> test tube and place ½ teaspoon of the soil into the pH<sub>FOX</sub> test tube for the corresponding pH<sub>FOX</sub> test described below. Ensure that these two sub-samples come from the same depth and that they are similar in characteristics.
4. Place enough deionised water (pH 5.5) in the pH<sub>F</sub> test tube to make a paste similar to 'grout mix' or 'white sauce', stirring with a skewer or similar to ensure all soil 'lumps' are removed.
5. Do not leave the soil samples in the test tubes without water for more than 10 minutes.
6. Immediately place the pH meter with spear point electrode into the test tube, ensuring that the spear point is totally submerged in the soil:water paste.
7. Measure the pH<sub>F</sub> using a pH meter with spear point electrode.
8. Wait for the reading to stabilise and record the pH measurement in Table S-3.

#### ***pH<sub>FOX</sub> test procedure***

1. Adjust the pH of the hydrogen peroxide to 5.0–5.5 before going into the field.
2. Ensure the pH<sub>FOX</sub> test tubes do not contain any deionised water.
3. Add a few drops at a time of 30 per cent peroxide (H<sub>2</sub>O<sub>2</sub>) adjusted to pH 4.5–5.5 to the soil in the pH<sub>FOX</sub> test tube rack and stir the mixture. Test tubes must be heat-resistant.
4. Do not add the peroxide to the test tube in which the pH<sub>F</sub> test was conducted.
5. Ensure that there is no cross contamination of samples in the test tube rack.
6. Rate the reaction using a scale of L = low reaction, M = medium reaction, H = high reaction, X = extreme reaction, V = volcanic reaction. Record this rating in Table S-3.
7. Wait for the soil/peroxide mixture to cool and measure the pH<sub>FOX</sub> using a pH meter with spear point electrode.

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<sup>1</sup> Further guidance is provided in Department of Environment Regulation (2015) *Identification and investigation of acid sulfate soils and acidic landscapes*, Government of Western Australia.

8. Wait for the reading to stabilise and record the  $\text{pH}_{\text{FOX}}$  measurement in Table S-3.
9. Record the difference between  $\text{pH}_{\text{F}}$  and  $\text{pH}_{\text{FOX}}$  in Table S-3.

**Records**

1. Record investigation results in the format presented in Table S-3.

**Table S-3: Acid Sulfate Soil monitoring**

$\text{pH}_{\text{F}}$	$\text{pH}_{\text{FOX}}$	$\Delta\text{pH}$	Reaction rate (L, M, H, X or V)	Management actions undertaken

## Appendix 1: Key documents

	Document title	In text ref	Availability
1.	Licence L7178/1997/11 Dampier Salt – Lake MacLeod	L7178/1997/11	Accessed at: <a href="http://www.dwer.wa.gov.au">www.dwer.wa.gov.au</a>
2.	Department of Environment and Conservation (2009) Resource Condition Report for a Significant Western Australian Wetland: Lake MacLeod System.	DEC, 2009	Accessed at: <a href="https://www.dpaw.wa.gov.au/images/documents/conservation-management/wetlands/rcm029_lake_macleod_condition_report.pdf">https://www.dpaw.wa.gov.au/images/documents/conservation-management/wetlands/rcm029_lake_macleod_condition_report.pdf</a>
3.	Department of Environment Regulation (2015) Identification and investigation of acid sulfate soils and acidic landscapes, Government of Western Australia.	DER, 2015	Accessed at: <a href="https://www.der.wa.gov.au/your-environment/acid-sulfate-soils/69-ass-guidelines">https://www.der.wa.gov.au/your-environment/acid-sulfate-soils/69-ass-guidelines</a>
4.	DER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Environment Regulation, Perth.	N/A	Accessed at <a href="http://www.dwer.wa.gov.au">www.dwer.wa.gov.au</a>
5.	DER, October 2015. <i>Guidance Statement: Setting conditions</i> . Department of Environment Regulation, Perth.		
6.	DER, November 2016. <i>Guidance Statement: Risk Assessments</i> . Department of Environment Regulation, Perth.		
7.	DER, November 2016. <i>Guidance Statement: Decision Making</i> . Department of Environment Regulation, Perth.		
8.	Rio Tinto (2017) Gypsum Operations Dust Management – Management Plan Version 7.0.	Rio Tinto, 2017	DWER records (A1536702)
9.	Toxikos (2013) Gypsum-Marpol Annex V Classification: Report No. 7376-02. Prepared for Dampier Salt Limited.	Toxikos, 2013	DWER records (A1536702)

## Appendix 2: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amendment Notice on 13 March 2018 for review and comment. The Licence Holder responded on 16 March 2018 waiving the remaining comment period (until 3 April 2018). No comments were submitted on the conditions of the draft Amendment Notice however, clarification was provided on the risk assessment.

Section	Summary of Licence Holder comment	DWER response
Page 5, paragraph two, Reference to “excavation of raw gypsum by dredging”	The dredge was decommissioned in 2010 and is no longer used for gypsum extraction. Traditional heap leaching is carried out by excavation using heavy mobile equipment (HME). Please note this information in the Amendment Notice.	Noted. Sentence amended to refer to the excavation process.
Page 9, paragraph 11, reference to “close proximity to RAMSAR wetland”	<p>DSL would like to clarify that the northern ponds of Lake MacLeod are not RAMSAR listed. Please refer to map of RAMSAR listed sites in Western Australia (<a href="https://rsis.ramsar.org/">https://rsis.ramsar.org/</a>). Please remove this statement from the Amendment Notice.</p> <p>Leachate is discharged from the approved emission points SW6 and SW7 at the gypsum operation, located approximately 15 km south of the nearest northern pond. As the gypsum operation is located ‘down-gradient’ (the direction of flow at Lake MacLeod is north to south) from the ponds it is not possible for the leachate water to impact on the ponds.</p>	Noted. Statement corrected to note that the listing is proposed only. However, DWER notes that threatened, migratory and specially protected bird species have been identified in the area.