



Licence Number	L7178/1997/11
Licence Holder	Dampier Salt Limited
ACN	008 706 590
File Number:	DER2014/001046-2
Premises	Dampier Salt – Lake MacLeod Blowholes Road CARNARVON WA 6701 Part of Mining Tenements: AML 70/245, L09/10, L09/11, L09/17 and L09/18
Date of Report	3 April 2020
Decision	Licence amendment granted

1. Definitions

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

Table 1: Definitions

Term	Definition
AACR	Annual Audit Compliance Report means a report in a format approved by the CEO as presented by the licence holder or as specified by the CEO from time to time and published on the department's website.
ACN	Australian Company Number
AER	Annual Environment Report
amendment report	refers to this document.
ASS	Acid Sulfate Soils
Category / categories	categories of prescribed premises as set out in Schedule 1 of the EP Regulations.
CEO	means Chief Executive Officer of the Department of Water and Environmental Regulation. "submit to / notify the CEO" (or similar), means either: Director General Department administering the <i>Environmental Protection Act 1986</i> Locked Bag 10 Joondalup DC WA 6919 or: info@dwer.wa.gov.au
Delegated Officer	an officer under section 20 of the EP Act
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
EP Regulations	<i>Environmental Protection Regulations 1987 (WA)</i>
km	kilometres
licence holder	refers to the occupier of the premises, being the person specified on the front of the licence as the person to whom this licence has been granted.
prescribed premises	has the same meaning given to that term under the EP Act.
premises	refers to the premises to which this amendment report applies, as specified at the front of this amendment report.

2. Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended licence L7178/1997/11 in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act), as set out in this amendment report. The licence document (L7178/1997/11) has been updated accordingly to reflect this amendment.

This licence amendment is limited only to:

- reflect the removal of conditions relating to Acid Sulfate Soil (ASS) field testing;
- incorporate the amendment notices 1 and 2 issued in March 2018 and November 2018 respectively, as listed in the licence amendment history (Table 2);
- update the style and appearance of the licence;
- include definitions for measurement abbreviations to enable measurements to be listed in their abbreviated form;
- delete the redundant AACR form set out in schedule 2;
- include a copy of the current N1 form; and
- correct clerical mistakes and unintentional errors.

The incorporation of the amendment notices does not change the obligations of the Dampier Salt Limited (licence holder) and no additional risk assessment has been undertaken in consolidating the notices.

This licence amendment has been informed by the department's Regulatory Framework which is available at <https://dwer.wa.gov.au/regulatory-documents>.

3. Background

The licence holder holds licence L7178/1997/11 at Dampier Salt - Lake MacLeod, part of Mining Tenements AML 70/245, L09/10, L09/11, L09/17 and L09/18, approximately 33km north of Carnarvon. The licence includes Category 14 (solar salt manufacturing) which is relevant to solar salt and gypsum extraction activities within Lake MacLeod. Licence amendment notice 1 authorised 6,100,000 tonnes of solar salt and gypsum production at the premises.

Gypsum is extracted from Lake MacLeod using heap leaching and in-situ leaching methods. Leachates are collected in drainage channels and discharged to Lake MacLeod at numerous discharge points. The licence holder is required to monitor the quality of discharge against trigger criteria and undertake management actions in the event triggers are exceeded.

In addition to monitoring leachate from gypsum extraction operations, licence amendment notice 1 prescribed the requirement for ASS field testing within planned gypsum extraction blocks, due to the potential for ASS in Lake MacLeod sediments.

4. Purpose and scope of assessment

On 25 March 2019, the licence holder applied to amend the licence, requesting the removal of Condition 3.4 relating to ASS field testing. Condition 3.4 on the licence requires field ASS testing within planned gypsum extraction blocks prior to extraction activities. No other changes have been requested by the licence holder.

In support of the licence amendment application, the licence holder has undertaken ASS field testing within planned additional gypsum extraction blocks and proposes that ASS was not identified based on the testing completed. Figure 1 below illustrates the ASS investigation locations.

The licence holder proposes that monitoring of surface water discharged from the gypsum

extraction blocks and associated triggers for management actions, are acceptable to manage the risk of acidic drainage discharge to Lake MacLeod, without the requirement to undertake additional ASS field testing

5. Decision

Licence amendment notice 1 identified that the disturbance of groundwater and lake bed sediments in the gypsum extraction process may generate acidified and metalliferous drainage. Such drainage may potentially discharge to the lake bed surrounding the gypsum mining areas. Licence conditions were therefore set including ASS field testing within planned gypsum extraction blocks and monitoring of leachate discharged from the extraction blocks.

The licence holder's measurements of pH and pHFOX of the evaporite sediments suggest that although there are likely to be some sulfide minerals present within the evaporite sequence (suggested by pH changes of the order of 2 between the two measurements); there are enough carbonate minerals present in the sediments to prevent their acidification. Consequently, the pHFOX measurements rarely dropped below 5 in the testing that has been carried out by the licence holder.

Geological information for Lake MacLeod (Logan, 1987) suggests that the mineralogy and geochemistry of the evaporites in the salt-lake system are spatially uniform over large areas of the system, and this is supported by the relative uniformity of the ASS field tests that have been carried out to date.

The Delegated Officer has reviewed the outcomes of the ASS field testing conducted in accordance with conditions 3.4.1 and 3.4.2 of the licence. Geological information and the results of soil testing suggest that further soil testing will not be required to adequately manage the risk of acidification of drainage from gypsum mining areas in Lake MacLeod.

In light of this determination, Condition 3.4 relating to ASS monitoring has been removed from the licence, section 7 of this report outlines the changes made to the licence.

The licence holder is advised that DWER may undertake a Licence review in the future in accordance with section 59(2) of the EP Act and *Guidance Statement: Risk Assessments*.

The basis for the licence review includes the following:

- DWER's objective to review the risks associated with the prescribed premises. DWER acknowledges that risk assessments are point in time assessments and additional information may become available which further informs the risk assessment.
- Leachate monitoring data provided by the licence holder (for the period May 2018 to November 2019) indicates there remains potential for acidification and metal toxicity to occur at the gypsum extraction areas and surrounding discharge areas. Reported fluoride levels also require a review to assess the associated risks.

Further information on the review of risk assessments and licence reviews is available within the *Guidance Statement: Risk Assessments* (February 2017) and *Guideline: Industry Regulation Guide to Licensing* (June 2019).

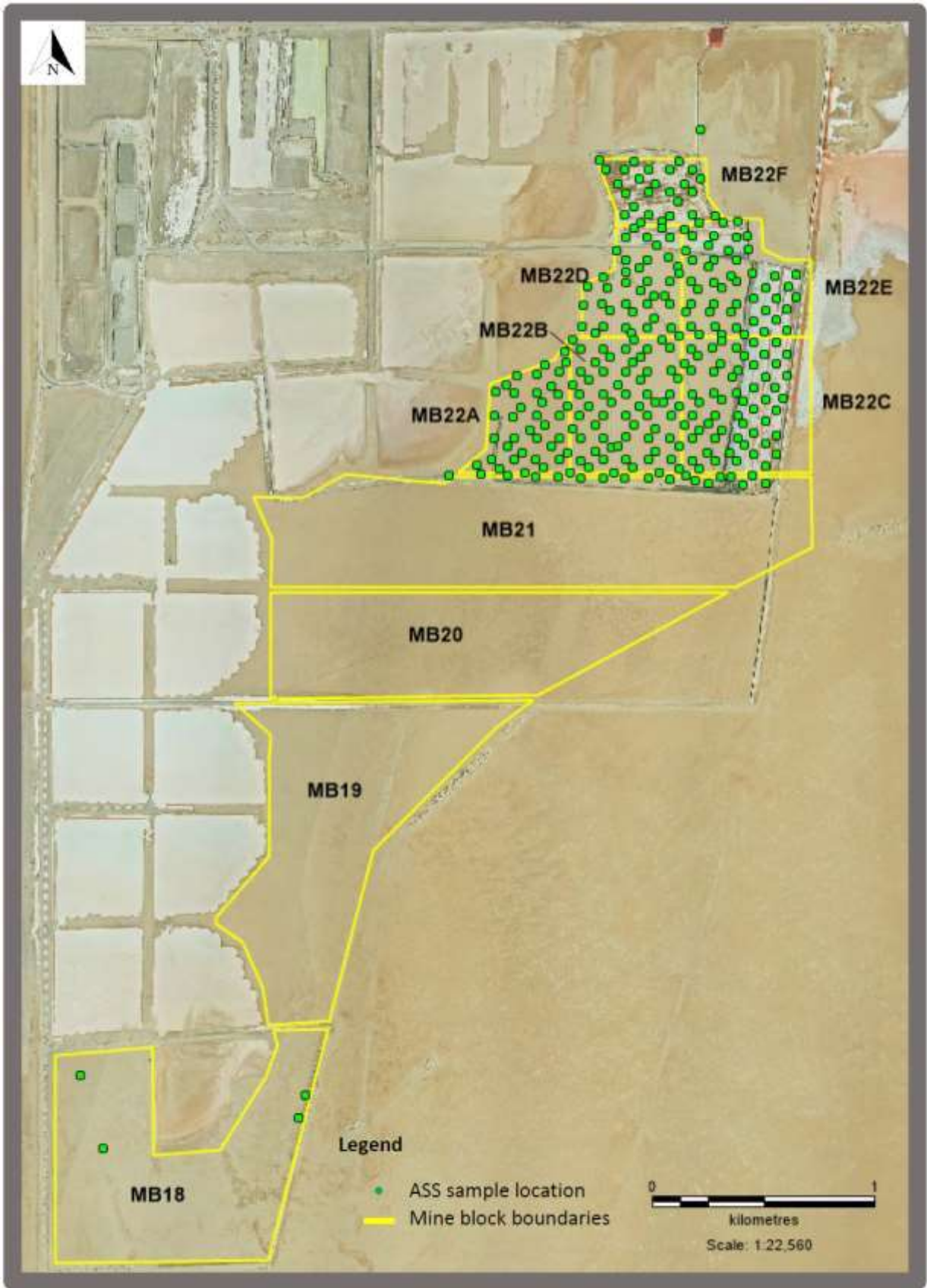


Figure 1: Gypsum extraction blocks and ASS investigation locations

6. Amendment history

Table 2 provides the amendment history for licence L7178/1997/11.

Table 2: Licence amendment history

Issued	Instrument number	Summary of changes
20 March 2018	L7178/1997/11	Amendment Notice 1: <ul style="list-style-type: none"> to increase gypsum production capacity and reclassify gypsum production as a Category 14 and Category 58A; amendment to monitoring program for discharges to Lake Macleod; and addition of ASS investigation and management conditions.
15 November 2018	L7178/1997/11	Amendment Notice 2: <ul style="list-style-type: none"> to allow for the addition of emission point SW11 for the dewatering of Lake MacLeod; to allow for the relocation of discharge points as gypsum mining expands within the proposed mining area; addition of trigger criteria for management actions, associated with discharges to Lake Macleod; and amendment to ASS monitoring and management conditions.
3 April 2020	L7178/1997/11	Removal of conditions relating to ASS field testing. Amalgamation of the licence with amendment notices 1 and 2.

7. Summary of amendments

Table 3 provides a summary of the key amendments to licence L7178/1997/11 and will act as record of implemented changes.

Table 3: Key amendments to licence L7178/1997/11

Relevant section heading or Condition No.	Amendments
Premises description and licence summary	The paragraph was updated to include all Mining Tenements.
Category 14 & 58A– Gypsum mining, salt manufacturing and bulk loading operations	<p>The first paragraph was originally included under the Category 80 & 58 heading of the issued licence.</p> <p>On 20 March 2018 an amendment notice was issued, which reclassified gypsum production as a Category 14 and Category 58A.</p> <p>The Category 80 & 58 heading has therefore been removed in the licence amalgamation, however the original paragraph is still included and has been inserted under Category 14 & 58A.</p>

Relevant section heading or Condition No.	Amendments
Table 1: Definitions	<ul style="list-style-type: none"> • 'AACR' and 'approved form' – with the deletion of the redundant AACR form in the amalgamated licence (the AACR form was originally located in Schedule 2 of the issued licence). This AACR definition has been updated to provide further clarity and direction on where to obtain the approved form. • AS/NZS 5667.1 – Condition 3.1.1(a) of the issued licence states “<i>all water samples are collected and preserved in accordance with AS/NZS 5667.1</i>”. The definition for this Standard has therefore been included in the licence as part of the amalgamation. • AS/NZS 5667.9 – Condition 3.1.1(c) of the issued licence states “<i>all surface water sampling is conducted in accordance with AS/NZS 5667.4, AS/NZS 5667.6 or AS/NZS 5667.9 as relevant; and</i>”. The definition for this Standard has therefore been included in the licence as part of the amalgamation. • CEO – this definition has been updated to reflect the change in name of the department and the new department address. • Landfill Definitions – this definition has been updated to reflect the change in name of the department. • Licence – this definition has been updated to provide clarity on the referenced Act. • 'ha', 'km', 'm', 'mg/L', 'mm', 'µS/cm' and 'm³/min'– the definitions for these measurement abbreviations have been incorporated so that measurements can be listed in their abbreviated form throughout the licence.
Acid sulfate soil monitoring: <ul style="list-style-type: none"> • Condition 3.4.1 • Condition 3.4.2 • Condition 3.4.3 • Condition 3.4.4 	Removed from licence
Reporting: <ul style="list-style-type: none"> • Condition 4.2.1 	Amended – ASS investigation data and associated management action information is not required to be submitted with the Annual Environmental Report
Schedule 2 – AACR Report Proforma	Removed from licence The AACR Form template approved by the CEO for use is available via DWER's external website
Schedule 2 – N1 Form	Included a copy of the current N1 form
Schedule 3 – ASS investigation	Removed from licence

8. Consultation

Stakeholder consultation undertaken at the licence amendment assessment stage is detailed in Table 4.

Table 4: Stakeholder consultation

Method	Comments received	DWER response
Applicant referred draft documents (26 March 2020)	On 2 April 2020 the Applicant waived the comment period.	Licence amendment granted.

9. Conclusion

Based on the assessment in this amendment report, the Delegated Officer has determined that licence L7178/1997/11 will be amended as outlined above.

Digitally signed by
Lauren Fox
Lauren Fox
Date: 2020.04.03
07:59:10 +08'00'

Lauren Fox
A/MANAGER, RESOURCE INDUSTRIES
REGULATORY SERVICES

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

Appendix 1: Key documents

No.	Document title	In text ref	Availability
1.	<ul style="list-style-type: none"> • Licence L7178/1997/11 • Amendment Notice 1 • Amendment Notice 2 	Licence	Available online at www.dwer.wa.gov.au
2.	Application to amend Licence, received on 25 March 2019. Including: <ul style="list-style-type: none"> • Application form • Map of Acid Sulfate Soil sample locations • Acid Sulfate Soil investigation data 	Application	DWER record A1775375
3.	Application to amend licence, supplementary information (surface water monitoring data), received on 10 April 2019	Application	DWER record A1780451
4.	Logan, B.W., 1987. <i>The MacLeod Evaporite Basin, Western Australia: Holocene Environments, Sediments and Geological Evolution</i> . American Association of Petroleum Geologists, Volume 44.	Logan, 1987	https://doi.org/10.1306/M44465

Appendix 2: Acid Sulfate Soils (ASS) Sampling Location Coordinates

Location	Easting	Northing
MB22F_1	761748.21	7318251.11
MB22F_2	761852.31	7318251.11
MB22F_3	761950.34	7318251.11
MB22F_4	762049.12	7318251.11
MB22F_5	761748.97	7318146.24
MB22F_6	761850.79	7318149.28
MB22F_7	761948.06	7318148.52
MB22F_8	762049.12	7318150.04
MB22F_9	761748.21	7318048.98
MB22F_10	761851.55	7318048.22
MB22F_11	761947.3	7318047.46
MB22F_12	762049.89	7318048.22
MB22F_13	762149.43	7318046.7
MB22F_14	761663.1	7318251.11
MB22F_15	761634.98	7318294.42
MB22F_16	761789.24	7318292.14
MB22F_17	761812.04	7318211.6
MB22F_18	761987.58	7318287.58
MB22F_19	762087.12	7318210.08
MB22F_20	762012.65	7318188.05
MB22F_21	761986.06	7318112.05
MB22F_22	761885.75	7318188.05
MB22F_23	761714.77	7318188.05

Location	Easting	Northing
MB22F_24	761784.69	7318086.98
MB22F_25	761815.84	7318016.31
MB22F_26	761915.38	7318018.59
MB22F_27	762082.56	7318016.31
MB22F_28	762187.43	7318014.79
MB22F_29	762250.5	7318018.59
MB22F_Trench	762084	7318432
MB22E_1	762316.97	7317785.06
MB22E_2	762421.92	7317774.9
MB22E_3	762377.91	7317722.43
MB22E_4	762477.77	7317725.82
MB22E_5	762323.74	7317673.34
MB22E_6	762423.61	7317675.04
MB22E_7	762377.91	7317620.87
MB22E_8	762476.08	7317625.95
MB22E_9	762323.74	7317575.17
MB22E_10	762423.61	7317576.86
MB22E_11	762374.52	7317524.39
MB22E_12	762474.39	7317527.78
MB22E_13	762516.7	7317781.67
MB22E_14	762515.01	7317680.12
MB22E_15	762250	7317750

Location	Easting	Northing
MB22E_16	762225	7317775
MB22E_17	762250	7317850
MB22E_18	762300	7317894
MB22E_19	762297	7317954
MB22E_20	762210	7317890
MB22E_21	762250	7317950
MB22E_22	762048.78	7317953.6
MB22E_23	762147.67	7317953.6
MB22E_24	762048.78	7317849.31
MB22E_25	762147.67	7317849.31
MB22E_26	762145.87	7317746.81
MB22E_27	762043.37	7317750.41
MB22E_28	762046.97	7317649.72
MB22E_29	762144.07	7317651.52
MB22E_30	762250.16	7317651.52
MB22E_31	762250.16	7317545.44
MB22E_32	762151.26	7317549.03
MB22E_33	762045.17	7317549.03
MB22E_34	762118.9	7317914.04
MB22E_35	762014.61	7317985.97
MB22E_36	762020.01	7317887.07
MB22E_37	762120.7	7317816.94
MB22E_38	762075.74	7317714.45

Location	Easting	Northing
MB22E_39	762180.03	7317719.85
MB22E_40	762020.01	7317615.56
MB22E_41	762129.68	7317615.56
MB22E_42	762221.39	7317615.56
MB22E_43	762077.55	7317513.06
MB22E_44	762180.03	7317514.86
MB22E_45	762280.72	7317514.86
MB22D_1	761750	7317950
MB22D_2	761790	7317990
MB22D_3	761850	7317950
MB22D_4	761891	7317911
MB22D_5	761911	7317990
MB22D_6	761950	7317950
MB22D_7	761710	7317890
MB22D_8	761750	7317850
MB22D_9	761810	7317810
MB22D_10	761850	7317850
MB22D_11	761944	7317861
MB22D_12	761987	7317816
MB22D_13	761749	7317791
MB22D_14	761556	7317546
MB22D_15	761751	7317747
MB22D_16	761850	7317749
MB22D_17	761950	7317750
MB22D_18	761749	7317648
MB22D_19	761850	7317649
MB22D_20	761950	7317648

Location	Easting	Northing
MB22D_21	761954	7317544
MB22D_22	761849	7317544
MB22D_23	761749	7317544
MB22D_24	761650	7317546
MB22D_25	761646	7317648
MB22D_26	761558	7317646
MB22D_27	761577	7317727
MB22D_28	761650	7317769
MB22D_29	761670	7317722
MB22D_30	761683	7317620
MB22D_31	761615	7317518
MB22D_32	761778	7317519
MB22D_33	761876	7317583
MB22D_34	761992	7317510
MB22D_35	761992	7317790
MB22D_36	761922	7317686
MB22D_37	761818	7317713
MB22D_38	761781	7317617
MB22D_39	761876	7317684
MB22C_1	762322.05	7317478.69
MB22C_2	762423.61	7317478.69
MB22C_3	762374.52	7317424.53
MB22C_4	762474.39	7317426.22
MB22C_5	762325.43	7317375.44
MB22C_6	762425.3	7317380.52
MB22C_7	762376.21	7317322.97
MB22C_8	762472.69	7317324.66

Location	Easting	Northing
MB22C_9	762322.05	7317275.57
MB22C_10	762420.22	7317277.27
MB22C_11	762377.91	7317221.41
MB22C_12	762459.16	7317224.8
MB22C_13	762323.74	7317177.4
MB22C_14	762423.61	7317174.02
MB22C_15	762379.6	7317124.93
MB22C_16	762323.74	7317074.15
MB22C_17	762423.61	7317058.91
MB22C_18	762377.91	7317025.06
MB22C_19	762323.74	7316975.98
MB22C_20	762427	7316974.29
MB22C_21	762379.6	7316923.51
MB22C_22	762320.35	7316877.81
MB22C_23	762377.91	7316847.34
MB22C_24	762046.97	7317450.14
MB22C_25	762142.28	7317451.93
MB22C_26	762250.16	7317453.72
MB22C_27	762251.95	7317351.24
MB22C_28	762147.67	7317347.65
MB22C_29	762046.97	7317349.44
MB22C_30	762048.78	7317246.95
MB22C_31	762147.67	7317248.75
MB22C_32	762250.16	7317252.35
MB22C_33	762251.95	7317148.06
MB22C_34	762151.26	7317148.06
MB22C_35	762048.78	7317146.26

Location	Easting	Northing
MB22C_36	762048.78	7317047.36
MB22C_37	762149.47	7317049.16
MB22C_38	762253.75	7317047.36
MB22C_39	762248.36	7316946.67
MB22C_40	762151.26	7316946.67
MB22C_41	762048.78	7316944.87
MB22C_42	762075.74	7317415.97
MB22C_43	762180.03	7317482.5
MB22C_44	762282.52	7317415.97
MB22C_45	762226.79	7317318.87
MB22C_46	762174.64	7317381.81
MB22C_47	762016.4	7317380.01
MB22C_48	762079.34	7317210.98
MB22C_49	762180.03	7317219.97
MB22C_50	762277.13	7317216.38
MB22C_51	762120.7	7317112.09
MB22C_52	762014.61	7317108.49
MB22C_53	762278.93	7317113.89
MB22C_54	762280.72	7317014.99
MB22C_55	762215.99	7316982.63
MB22C_56	762181.83	7317081.52
MB22C_57	762117.1	7316984.43
MB22C_58	762081.14	7316910.71
MB22C_59	762081.14	7317085.12
MB22C_60	762278.93	7316840.58
MB22C_61	762224.98	7316876.54
MB22C_62	762172.84	7316876.54

Location	Easting	Northing
MB22C_63	762124.29	7316842.38
MB22C_64	762018.21	7316881.93
MB22C_65	762064.95	7316854.97
MB22B_1	761782.35	7317385.3
MB22B_2	761613.81	7317388.06
MB22B_3	761584.79	7317310.69
MB22B_4	761511.58	7317288.59
MB22B_5	761688.41	7317208.45
MB22B_6	761714.65	7317287.21
MB22B_7	761884.58	7317207.07
MB22B_8	761919.12	7317209.84
MB22B_9	761584.79	7317190.5
MB22B_10	761548.87	7317446.08
MB22B_11	761651.1	7317450.23
MB22B_12	761750.57	7317450.23
MB22B_13	761850.04	7317450.23
MB22B_14	761950.9	7317451.6
MB22B_15	761952.27	7317350.76
MB22B_16	761845.9	7317348
MB22B_17	761751.96	7317348
MB22B_18	761649.73	7317348
MB22B_19	761548.87	7317346.61
MB22B_20	761544.73	7317243
MB22B_21	761649.73	7317244.38
MB22B_22	761751.96	7317244.38
MB22B_23	761850.04	7317244.38
MB22B_24	761949.51	7317247.15

Location	Easting	Northing
MB22B_25	761514.34	7317490.29
MB22B_26	761681.5	7317411.54
MB22B_27	761785.11	7317491.67
MB22B_28	761815.51	7317411.54
MB22B_29	761912.22	7317490.29
MB22B_30	761985.43	7317313.45
MB22B_31	761815.51	7317312.07
MB22B_32	761952.27	7317146.29
MB22B_33	761850.04	7317147.68
MB22B_34	761753.34	7317146.29
MB22B_35	761651.1	7317147.68
MB22B_36	761544.73	7317146.29
MB22B_37	761547.49	7317048.21
MB22B_38	761651.1	7317048.21
MB22B_39	761749.2	7317050.97
MB22B_40	761851.43	7317045.44
MB22B_41	761949.51	7317049.59
MB22B_42	761953.66	7316950.12
MB22B_43	761851.43	7316948.74
MB22B_44	761749.2	7316948.74
MB22B_45	761648.34	7316948.74
MB22B_46	761546.11	7316947.36
MB22B_47	761501.9	7316890.71
MB22B_48	761698.08	7316890.71
MB22B_49	761899.78	7316890.71
MB22B_50	761990.96	7317187.74
MB22B_51	761812.75	7317187.74

Location	Easting	Northing
MB22B_52	761789.25	7317108.99
MB22B_53	761615.18	7317107.61
MB22B_54	761510.19	7317088.27
MB22B_55	761687.02	7317008.14
MB22B_56	761717.42	7317009.52
MB22B_57	761885.96	7317086.89
MB22B_58	761990.96	7316911.43
MB22B_59	761989.58	7317010.9
MB22B_60	761883.2	7316986.04
MB22B_61	761782.35	7316914.19
MB22B_62	761615.18	7316986.04
MB22B_63	761584.79	7316912.81
MB22B_64	761949.88	7316863.95
MB22B_65	761850.98	7316865.75
MB22B_66	761748.49	7316865.75
MB22B_67	761647.8	7316867.55
MB22B_68	761547.11	7316869.35
MB22A_1	761319.55	7317082.74
MB22A_2	761453.55	7317147.68
MB22A_3	761450.79	7317046.82
MB22A_4	761450.79	7316951.5
MB22A_5	761345.79	7316951.5
MB22A_6	761348.56	7317048.21
MB22A_7	761348.56	7317146.29
MB22A_8	761246.32	7317142.15
MB22A_9	761250.47	7317048.21
MB22A_10	761247.7	7316951.5

Location	Easting	Northing
MB22A_11	761151	7316951.5
MB22A_12	761160.67	7317049.59
MB22A_13	761160.67	7317147.68
MB22A_14	761081.93	7316928.01
MB22A_15	761101.26	7316889.33
MB22A_16	761298.82	7316890.71
MB22A_17	761280.86	7317186.36
MB22A_18	761388.62	7317108.99
MB22A_19	761490.85	7317187.74
MB22A_20	761417.63	7317010.9
MB22A_21	761450.79	7317348
MB22A_22	761449.4	7317247.15
MB22A_23	761349.93	7317248.53
MB22A_24	761247.7	7317252.67
MB22A_25	761166.2	7317256.81
MB22A_26	761264.28	7317328.65
MB22A_27	761349.93	7317335.56
MB22A_28	761388.62	7317378.39
MB22A_29	761479.8	7317435.03
MB22A_30	761482.56	7317385.3
MB22A_31	761414.87	7317281.68
MB22A_32	761376.19	7317211.22
MB22A_33	761211.78	7317287.21
MB22A_34	761218.69	7317012.28
MB22A_35	761287.77	7316981.89
MB22A_36	761383.09	7316915.57
MB22A_37	761492.23	7316980.51

Location	Easting	Northing
MB22A_38	761184.16	7316911.43
MB22A_39	761448.21	7316872.94
MB22A_40	760957.33	7316881.93
MB22A_41	761347.52	7316874.74
MB22A_42	761218.06	7316878.34
MB18A_1_1	759301	7314185
MB18A_1_2	759408	7313858
MB18D_1_1	760284	7313994
MB18D_1_2	760312	7314099

Appendix 3: Historical decision report and amendment notices



Decision Document

Environmental Protection Act 1986, Part V

Proponent: Dampier Salt Limited

Licence: L7178/1997/11

Registered office: 37 Belmont Avenue
BELMONT WA 6104

ACN: 008 706 590

Premises address: Dampier Salt – Lake Macleod
AML 70/245, Blowholes Road
CARNARVON WA 6701

Issue date: Thursday, 1 October 2015

Commencement date: Sunday, 4 October 2015

Expiry date: Friday, 3 October 2025

Decision

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

Decision Document prepared by: Christine Pustkuchen
Licensing Officer

Decision Document authorised by: Alana Kidd
Delegated Officer



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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 Reissue <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
	14	3 100 000 tonnes per annum
	58	50 000 tonnes per day
	58A	84 000 tonnes per day
	64	60 tonnes per annum
	80	500 000 tonnes per annum
Application verified	Date: 19/08/2015	
Application fee paid	Date: 31/08/2015	
Works Approval has been complied with	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	
Compliance Certificate received	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input 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 type="checkbox"/> No <input checked="" 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 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 Lake MacLeod site has operated since the 1960's under the *Evaporites (Lake MacLeod) Agreement Act 1967*, Dampier Salt Limited took control of the premises in 1978. The premises is located within the Shire of Carnarvon and is approximately 50 kilometres north of Carnarvon. It is located on Mining tenement AML 70/245 which covers approximately 220 000 hectares of land, covering the majority of Lake MacLeod.

Category 14 & 58A– Salt Manufacturing and bulk loading operation

The saturated brine contained in Lake MacLeod is approximately 10 times saltier than normal seawater, eliminating the need for a series of concentration ponds normally required at other salt mines to evaporate water to reach “salting” point (sodium chloride saturation).

A collection ditch has been cut into the halite layer to recover brine from Lake MacLeod. The brine is pumped at an average rate of 55 cubic metres per minute from the collection ditch into 8.5 kms of transport channel to a common collection point. There are thirty three crystallisers, averaging 23 ha each, used for salt production. Once deposited in the crystallising ponds the brine is further evaporated and salt is deposited on top of a pre-formed floor of salt. Deposition is stopped by draining the remaining brine when about three quarters of the sodium chloride has been deposited and before other salts come out of solution in significant quantities. The residual brine is called bitterns and contains high concentrations of potassium, magnesium and other salts. Bitterns are discharged from the crystallisers into a holding pond on the lake's surface where the water is evaporated. The resulting solid bitterns represent a significant resource which is also harvested.

Harvesting of salt is carried out using a laser controlled salt cutter with an average capacity of 1000 tonnes per hour discharging directly into three 60 tonne trailers hauled by a prime mover. The harvested salt is then washed at the salt wash plant to remove impurities off the salt. Once washed the salt is stockpiled and allowed to drain for approximately 6 weeks for the moisture content to fall below 2.5 %. Once the salt has finished draining, it is hauled by road trains, 24 km to a 200 000 tonne stockpile at Cape Cuvier for shipment. Reclaim for ship loading is by dozers which push the salt into a hopper, which then feeds to a conveyor system under the stockpile. The conveyor system transports the salt to the ship loader which feeds the salt onto the vessel at the wharf.

The premises production capacity can vary significantly depending on weather conditions. Dampier Salt Limited wishes to increase the approved premises capacity by 200 000 tonnes per year from 2 900 000 to 3 100 000 tonnes per year as part of this reissue. The increase is due to the reinstatement



of crystalliser F1 in 2012 (no significant works were required for this increase and therefore was not subject to a works approval).

An increase in the approved capacity for category 58A – bulk material loading or unloading (salt) has also been assessed as part of this reissue. No additional works has been carried out. The maximum rate of the CV3 conveyor for the ship loader is 3500 SPT/hour, this equates to a maximum capacity of 84 000 tonnes per day. Due to the requirements to move ships during loading it is unlikely that the maximum capacity would be achieved and it is expected that approximately 77 000 tonnes per day will be shipped.

Category 80 & 58- Gypsum Mining and bulk loading operation

Dampier Salt Limited wishes to re-commence its Gypsum mining operation on a campaign basis over approximately 250 days. Gypsum mining is carried out on the premises by excavation of raw gypsum from the lake surface. This is achieved through using an excavator and truck mining method. As mobile equipment is used on the dry lake surface, mining is planned to be completed during the dry period when there is no flooding of the lake. Following excavation, heap leaching of the gypsum stockpiles occurs with sprinklers using bore and fresh water (the latter produced from bore water using a reverse osmosis plant at the gypsum facility) on existing gypsum leach pads. This washes sodium chloride (salt) minerals from the gypsum stockpiles to the required levels of less than 150 parts per million chloride. The gypsum is then transported to Cape Cuvier where it is stockpiled and shipped at an annual production rate of approximately 500 000 tonnes per annum.

The gypsum operation was originally operational, under Category 12, in 1997 until 2008 when it ceased. Due to a re-evaluation of the market for the gypsum product from Lake MacLeod, it is proposed to re-establish mining operations under Category 80 (W5269/2012/1). Category 80 has been added to the licence during this reissue. A change to the approved premises capacity for Category 58 – bulk material loading or unloading (other than salt) has been made as part of this reissue to correct an error on the previous licence version. The maximum capacity for category 58 should be 50 000 tonnes which is based on the maximum size ship used for Gypsum shipments.

Category 64 - Landfill

The Lake Macleod operation disposes of inert waste and tyres at a landfill area on the premises. Some putrescible waste, in the form of used timber, is also disposed of at the landfill. All other wastes, including putrescible from the offices and crib rooms, are sent off site to the Shire of Carnarvon landfill facility in Carnarvon. The landfill facility uses a deep trench of around 3 to 4 metres deep to dispose of waste.



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	<p>Condition 1.2.1 requires pollution control and monitoring equipment to be maintained. This condition replaces condition 4 on the previous Licence.</p> <p>Condition 1.2.2 requires the recovery and disposal of spills. This condition replaces Condition 9 and 11.</p> <p>Condition 1.2.3 has been added to the Licence to replace conditions 2, 3 and 12, which relate to preventing stormwater run-off from becoming contaminated by the operations. Condition 1.2.3 will ensure that contaminated stormwater will be treated prior to disposal off-site.</p> <p>Conditions relating to storage of environmentally hazardous chemicals such as fuel have been removed from the new format licence (i.e. old condition 5). This is as a result of a change in DER policy regarding the regulation of low risk environmentally hazardous chemical storage.</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i>.</p> <p><i>Environmental Protection (Unauthorised discharges) Regulations 2004</i>.</p>
Premises operation	L1.3	<p>Condition 1.3.1 sets out the process requirements for managing wastes produced and landfilled onsite. This condition replaces conditions 13 (waste acceptance), 15(i), 15(ii), 15(vi) (landfill operational requirements) and 16 (tyres).</p> <p>Condition 1.3.2 sets out cover requirements at the landfill. This condition replaces conditions 15(iii) and 16(iv).</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i>.</p> <p><i>Environmental</i></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>Condition 1.3.3 relates to the management of windblown wastes. This condition replaces conditions 15(iv) and 15(v).</p> <p>Condition 1.3.4 relates to fires at the landfill facility. This condition replaces condition 14.</p> <p>Condition 1.3.5 has been added to the licence to ensure that bitterns are contained within the bitterns holding ponds onsite and is not discharged anywhere else. The bitterns holding ponds have been constructed in the same way as the site's processing ponds (crystallisers), where a section of the lake's surface has been enclosed with an earthen levee. Dampier Salt has stated that the water within the holding ponds is evaporated and the resulting solid bitterns are a significant resource which has been identified as meeting quality specification for a number of customers and has been harvested directly from the holding ponds for sale since 2013. As a result bitterns have not been considered a discharge as part of this reissue.</p> <p>Hydrocarbon contaminated soil is treated onsite at a bioremediation facility. It is constructed on an old borrow pit area and has a compacted earthen floor and bund. A premises operation condition relating to soil remediation occurring within landform cells have been added to the licence (Condition 1.3.6).</p>	<p><i>Protection (Unauthorised discharges) Regulations</i></p> <p>Contaminated Sites Management Series, Bioremediation of hydrocarbon-contaminated soils in Western Australia (Department of Environment, October 2004).</p>
Emissions general	L2.1.1	Descriptive limits will be set through conditions of the licence and therefore condition regarding recording and investigation of exceedances of limits has been included.	N/A
Point source emissions to air including monitoring	N/A.	There are no point source emissions to air from the premises. No specified conditions relating to point source emissions to air has been included in the licence.	N/A.
Point source emissions to surface water		Condition 2.2.1 authorises discharge points to surface water (Lake MacLeod). This condition replaces condition 1 from the previous licence. Bitterns holding ponds have been removed as a discharge point (see premises operation section). Additional	General provisions of the <i>Environmental</i>



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
including monitoring		<p>discharge points have been added to ensure all previously approved discharges to surface water associated with the salt operations is captured by the licence. These discharge points are Discharge point 4 (Outlet pipe into Lake MacLeod from truck wash bay, Lube bay and RO plant at salt operations) and Discharge point 5 (outlet pipe into ocean from truck wash bay at Cape Cuvier).</p> <p>Condition 3.2.1 set out monitoring required for discharge points 4 and 5 (monitoring of total recoverable hydrocarbons (TRH) in truck wash bay discharge into lake Macleod and ocean at Cape Cuvier). This condition replaces condition 18 on the previous licence version. The frequency of monitoring has been increased from six months to quarterly. This will ensure the monitoring results provide a more accurate description of the TRH level within the discharge.</p> <p>Condition 2.2.2 has also been added to the licence to ensure the level of TRH within the wastewater discharges is below 15mg/L. This brings the licence in line with Dampier Salt's other similar licences (L7183 and L7182) and Water Quality Protection Note 68.</p> <p>Operation Two new discharge points to Lake MacLeod have been assessed as part of this reissue. Gypsum Discharge points 1 & 2 have arisen from the works approval for the reinstatement of the gypsum operations onsite.</p> <p><u>Emission Description</u> <i>Emissions:</i></p> <ul style="list-style-type: none"> Discharge of wastewater from heap leach pads (at stockpile 1 and stockpile 8) into Lake MacLeod. Approximately 1600-2200m/day is discharged over the leaching period (6-8 months of the year) (discharge points 1 & 2). Hydrocarbon spills and leaks from mobile equipment to the lake surface. <p><i>Impacts:</i></p>	<p><i>Protection Act 1986.</i></p> <p><i>Environmental Protection (Unauthorised discharge) Regulations</i></p> <p>Application supporting documents</p> <p>Water Quality Protection Note 68 Mechanical equipment washdown (Department of Water, March 2006).</p>



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<ul style="list-style-type: none"> Impacts to fringing vegetation at the discharge point due to isolated localised flooding of the area. Impact to lake water quality from hydrocarbon spills <p><i>Controls:</i></p> <ul style="list-style-type: none"> Photographic monitoring of heap leach pad leachate discharge areas to monitor impact; Refuelling of mobile equipment will be conducted by mobile trucks that are equipped with spill kits; Major servicing of equipment will not occur on the lake; No mining operations will be conducted during flood conditions reducing the risk of hydrocarbon spills reaching sensitive receptors such as the Northern Ponds; and All spills will be cleaned as per the Dampier Salt Hydrocarbon spill response procedure. <p><u>Risk Assessment</u> <i>Consequence:</i> Insignificant <i>Likelihood:</i> Unlikely <i>Risk Rating:</i> Low</p> <p>Heap leaching will be undertaken with sprinklers and bore water and desalinated water supplied from the onsite reverse osmosis (RO) plant. The pads are located adjacent to Lake Macleod from which the gypsum is sourced and leached with local groundwater (mixed with water from RO plant). No chemicals or other materials are added to the process. The discharge consists of sodium chloride component of the extracted gypsum with the addition of saline groundwater and RO water and therefore has a lower salinity level than lake water however other parameters are expected to be similar. The discharge from the leaching pads is not considered to pose a significant environmental risk as the constituents of the leachate is expected to be similar to the receiving environment. All water from the facility is contained by the trench surrounding</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>the pads which drain the water to the lake surface.</p> <p>Dampier Salt has stated that no significant impacts were observed during the previous gypsum mining operation. To monitor the impacts of the discharge Dampier Salt propose to conduct quarterly photographic monitoring of the discharge area. Monitoring points will be established at the discharge point to cover areas of potential impact. The frequency of the photographic monitoring will be evaluated after two years of operation.</p> <p>The use of excavators for mining gypsum will create potential for hydrocarbon spills on the lake surface. The management measures proposed by Dampier Salt will ensure that the risk to the local lake environment from hydrocarbon spills is low.</p> <p><u>Regulatory Controls</u> Condition 3.2.1 has been added to the licence requiring Dampier Salt to undertake six monthly monitoring at the gypsum discharge points for the following parameters: chloride, sulfate, sodium, magnesium, potassium, calcium, total suspended solids, arsenic, beryllium, boron, cadmium, chromium, copper, fluoride, lead, mercury, nickel, total nitrogen, total phosphorus, electrical conductivity and pH. This will allow Dampier Salt to demonstrate that the constituents of the discharge is similar to the receiving lake environment as expected.</p> <p><u>Residual Risk</u> <i>Consequence:</i> Insignificant <i>Likelihood:</i> Unlikely <i>Risk Rating:</i> Low</p>	
Point source emissions to groundwater including	N/A.	There are no point source emissions to groundwater from the premises. No specified conditions relating to point source emissions to groundwater have been included in the licence.	N/A.



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
monitoring			
Emissions to land including monitoring	L2.3	<p>Condition 2.3.1 authorises discharges to land and has been added to the licence to ensure all previously approved discharges to land associated with the salt operations is captured by the licence. The new discharge points are; Discharge point 6 (Biomax treated wastewater Irrigation area), Discharge point 7 (seepage from unlined lab neutralisation pit) and Gypsum Discharge Point 3. Discharge points 6 & 7 have not been re-assessed as part of this reissue.</p> <p>Operation Discharges to land that have been assessed as part of this reissue relate to the new gypsum mining operation. This includes Gypsum Discharge Point 3.</p> <p><u>Emission Description</u> <i>Emission:</i></p> <ul style="list-style-type: none"> • Discharge of leachate from base of heap leaching pads and trenches to land; • Spills and leaks of hydrocarbons; and • Discharge of possible hydrocarbon contaminated stormwater/wash water to land from the gypsum fuel facility/truck wash into a sandy sump (Gypsum Discharge Point 3). <p><i>Impact:</i> Contamination of soil and groundwater. <i>Controls:</i></p> <ul style="list-style-type: none"> • Appropriate design of heap leach pad base and trenches (compacted subsoils and in-situ material); • Appropriate design of hydrocarbon storage area; and • Treatment of hydrocarbon contaminated stormwater/truck wash water via a triple interceptor prior to discharge. <p><u>Risk Assessment</u> <i>Consequence:</i> Insignificant</p>	<p>General provisions of the <i>Environmental Protection Act 1986</i>.</p> <p><i>Environmental Protection (Unauthorised discharge) Regulations</i></p> <p>Application supporting documents</p> <p>Water Quality Protection Note 68 Mechanical equipment washdown (Department of Water, March 2006).</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><i>Likelihood: Unlikely</i> <i>Risk Rating: Low</i></p> <p>The base of the heap leach pads have been constructed from compacted subsoils and in-situ material which has been built up with low grade gypsum material to ensure that there is minimal seepage from the heap leach pads. Under abnormal operations (base of pad malfunctions or high leachate load) seepage may occur from the base of the pad. Seepage from the base of the pads in not considered to pose a significant environmental risk as the nature of the leachate is similar to the lake water and groundwater within the receiving saline environment.</p> <p>Hydrocarbons (diesel, oils, greases etc.) will be used during the mining and processing operations by light and heavy vehicles as well as miscellaneous equipment such as generators. All hydrocarbons will be stored in the fuel facility previously in use at the gypsum operation. All hydrocarbon storage and dispensing facilities have been constructed in compliance with Australian Standard 1940-2004. Waste oils are stored in a bunded facility and are removed from the site by a licensed carrier.</p> <p>All contaminated stormwater that falls within the gypsum fuel facility and truck wash water is captured and treated via a triple interceptor prior (cleaned as required) to discharge to a sandy sump (Gypsum discharge point 3). The volumes of water discharged are expected to be minimal. The discharge location is within a sandy sump that previously received the concentrated discharge from the Reverse Osmosis plant. The sump also acts as a dam to capture any overflow from the artesian water storage dam.</p> <p><u>Regulatory Controls</u> Condition 1.2.2 replaces existing conditions 9 & 11 to ensure all spills of environmentally hazardous materials are cleaned up as soon as practicable.</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>Condition 3.3.1 has been added to the licence to include monitoring of the wastewater from Gypsum discharge point 3 (L3). A limit has also been added to the licence (condition 2.3.2) to ensure the level of total recoverable hydrocarbon within the wastewater discharge to the sump will be below 15 mg/L. This brings the licence in line with Dampier Salt's other similar licences (L7183 and L7182) and Water Quality Protection Note 68.</p> <p><u>Residual Risk</u> <i>Consequence:</i> Insignificant <i>Likelihood:</i> Unlikely <i>Risk Rating:</i> Low</p>	
Fugitive emissions		<p>Operation <u>Emission Description</u> <i>Emission:</i> Fugitive dust emission from gypsum stockpile at Cape Cuvier port and from levees and haul roads. <i>Impact:</i> Nuisance dust potentially impacting on the marine environment. Reduced visual amenity with dust clouds visible from long distances over water. There are no nearby residences, closest being 10 km away. <i>Controls:</i> Dampier Salt Ltd has committed to undertaking the following dust management measures at the gypsum stockpile;</p> <ul style="list-style-type: none"> • Schedule gypsum haulage (uncovered trucks) and stockpiling at Cape Cuvier around the arrival of ships (to minimise stockpiling time); • Transport just enough material to load onto the ship so no long term stockpiling of gypsum; • Target loading and shipping to the lowest wind speed months where practicable; • As much as practicable, hauling, stacking and ship-loading of gypsum will be scheduled to occur in the lowest wind-speed months of 1 April to 1 September 	<p>Gypsum Operations Dust Management Plan, doc number JA-MPL-1462</p> <p>General provisions of the <i>Environmental Protection Act 1986</i>.</p> <p>Application supporting documents</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>(there is a weather station on site);</p> <ul style="list-style-type: none"> • During transporting and stockpiling, gypsum ships will, as much as is practicable be scheduled consecutively at Cape Cuvier; • Gypsum operations will also be reduced or halted at the discretion of the Production Supervisor if dust levels become excessive due to high wind speeds;and • Water cannot be used for dust suppression on the stockpile due to the moisture requirement of the gypsum product. <p><u>Risk Assessment</u> <i>Consequence:</i> Minor <i>Likelihood:</i> Unlikely <i>Risk Rating:</i> Moderate</p> <p>Along with the proposed dust management controls and the distance to sensitive receptors (Quobba Homestead, which is approximately 10 km west of the salt facility and 20 km south of the port facility at Cape Cuvier) it is unlikely that dust emissions will have a significant impact on the surrounding environment.</p> <p>A Marine Impact Assessment was conducted at Lake MacLeod in 2010 by consultants MScience. The purpose of this study was to assess the level of impact wind derived gypsum has on the local marine environment at Cape Cuvier Port. The study concluded that it appears unlikely that the marine environment at Cape Cuvier has been significantly impacted by the gypsum deposited into the local marine environment from wind erosion off the existing gypsum stockpile. Consultants MScience stated that as the natural mined gypsum of Lake McLeod has only trace amounts of other contaminants of concern (e.g. copper, chromium and lead), well below guideline levels (e.g. ANZECC and NAGD); it is unlikely that contamination has occurred. The lack of influence is also evidenced by an observed 'healthy' coral habitat within the reef zone found at the base of the Cape Cuvier cliffs within the port area.</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>This assessment supports the assumption that stockpiling of gypsum prior to shiploading from the new gypsum operation will not have a significant impact on the local marine environment.</p> <p><u>Regulatory Controls</u> Condition 17 on the old format Licence has been removed from the licence. This condition required photographs to be taken on a quarterly basis at 5 locations at Cape Cuvier to monitor the impact of dust from the existing gypsum stockpile on the surrounding marine environment. These photographs have not been useful in determining the impact of dust on the environment at the Cape and therefore this condition has been removed from the licence.</p> <p>Fugitive dust conditions 6, 7 and 8 on the previous licence have been removed from the licence. These conditions have been replaced by Condition 2.4.1. Dampier Salt has committed to implementing their internal dust management plan (Gypsum Operations Dust Management Plan, doc number JA-MPL-1462) to ensure dust emission do not significantly impact the local environment. Condition 2.4.1 has been added to the licence requiring Dampier Salt to comply with their Dust Management plan at all times.</p> <p><u>Residual Risk</u> <i>Consequence:</i> Minor <i>Likelihood:</i> Unlikely <i>Risk Rating:</i> Moderate</p>	
Odour	N/A.	There are no odour emissions from the premises. No specified conditions relating to odour emissions have been included in the licence.	N/A.
Noise	N/A.	<p>Operations</p> <p><u>Emission Description</u> <i>Emission:</i> Noise emissions from mobile equipment such as excavators at Lake MacLeod, loading and unloading activities at the gypsum operation and Cape Cuvier.</p>	Environmental Protection (Noise) Regulations 1997



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		<p><i>Impact:</i> Nuisance noise impacting nearby sensitive receptors. <i>Controls:</i> Separation distance from sensitive receptors.</p> <p><u>Risk Assessment</u> <i>Consequence:</i> Insignificant <i>Likelihood:</i> Unlikely <i>Risk Rating:</i> Low</p> <p>Due to the gypsum mining operation occurring on a campaign basis (6-8 months of the year) and the distance to nearby sensitive receptors (12km away from Quobba Station) it is unlikely that noise emissions will have a significant impact on the local environment.</p> <p><u>Regulatory Controls</u> No specified conditions regarding noise emission are required to be added to the licence. Dampier salt will be required to comply with the Environmental Protection (Noise) Regulations 1997.</p> <p><u>Residual Risk</u> <i>Consequence:</i> Insignificant <i>Likelihood:</i> Unlikely <i>Risk Rating:</i> Low</p>	
Monitoring general	L3.1.1-3.1.4	<p>Condition 3.1.1 are included on licences where monitoring is required. This condition replaces Conditions 19 and 20 on the previous licence.</p> <p>Condition 3.1.2-3.1.4 are conditions that are included on licences where emission monitoring and ambient quality monitoring is required.</p>	Australian Standard AD/NZS 5667.1 – Water Quality Sampling – Guidance on the Design of sampling,



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
			programs, sampling techniques and the preservation and handling of samples.
Monitoring of inputs and outputs	N/A.	Monitoring requirements for inputs and outputs have not been re-assessed as part of this reissue. As the previous Licence did not have conditions requiring input and output monitoring no specified conditions have been included in this section.	N/A.
Process monitoring	N/A.	Monitoring requirements for process monitoring have not been re-assessed as part of this reissue. As the previous Licence did not have conditions requiring input and output monitoring no specified conditions have been included in this section.	N/A.
Ambient quality monitoring	L3.3.1	No Ambient quality monitoring conditions are required to be added to the licence. Condition 17, which required photographs to be taken on a quarterly basis at 5 locations at Cape Cuvier to monitor the impact of dust from the existing gypsum stockpile on the surrounding marine environment, has been removed from the licence. These photographs have not been useful in determining the impact of dust on the environment at the Cape and therefore are unnecessary.	General provisions of the <i>Environmental Protection Act 1986</i> . <i>Environmental Protection (Unauthorised discharges) Regulations 2004</i>
Meteorological monitoring	N/A.	Monitoring requirements for meteorological monitoring have not been re-assessed as part of this reissue. As the previous Licence did not have conditions requiring meteorological monitoring no specified conditions have been included in this section.	N/A.
Improvements	N/A.	No improvement conditions are required to be added to the licence.	N/A.
Information	L4	Condition 4.2.1 and 4.2.2 relates to the requirement of an Annual Environmental Report (AER) (which includes the Annual Audit Compliance report (AACR)) to be	N/A.



DECISION TABLE			
Works Approval / Licence section	Condition number W = Works Approval L= Licence	Justification (including risk description & decision methodology where relevant)	Reference documents
		submitted at the end of the annual period. This Condition replaces Conditions 21(a), 21(b) and 22 of the previous Licence. Condition 4.3.1 relates to the notification of a licence limit to the CEO.	
Licence Duration	N/A.	As emissions have been re-assessed it is considered appropriate to extend the licence duration to 10 years. DER has considered licence duration consistent with its guidance statement: <i>Licence Duration</i> , DER, May 2015 and determined that the licence will be issued for a period of 10 years.	Guidance statement: <i>Licence duration</i> , DER, May 2015



5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
22/09/2015	Proponent sent a copy of draft instrument.	Response to questions within documents received.	Responses noted and changes made where applicable



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



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 info@dwer.wa.gov.au
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 ³	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 _F	refers to the field pH, which is a field determination of pH in a soil: water (deionized) paste
pH _{FOX}	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 ³	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	3 100 000 tonnes per annual period 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 m³ 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 Medium.</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 <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 Medium.</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	6 3 100 000 tonnes per annual period
58	Bulk material loading or unloading (other than salt)	400 tonnes ore more per year	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
80	Non-metallic mineral processing	400 tonnes ore more per year	500 000 tonnes per annual period

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.

Table 2.2.1: Emission points to surface water			
Emission point reference	Emission point reference on Map of emission points	Description	Source including abatement
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.

Table 3.2.1: Monitoring of point source emissions to surface water			
Emission point reference	Parameter	Units	Frequency
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	Six monthly <u>Quarterly</u>

	<u>selenium, bicarbonate</u>		
	Electrical conductivity ¹	µS/cm	Six monthly <u>Quarterly</u>
	pH ¹	-	Six monthly <u>Monthly</u>
	<u>Titrateable Acidity¹</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_F and pH_{FOX} values for each test;
- (c) the difference between pH_F and pH_{FOX} values for each test (Δ 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_F, 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:

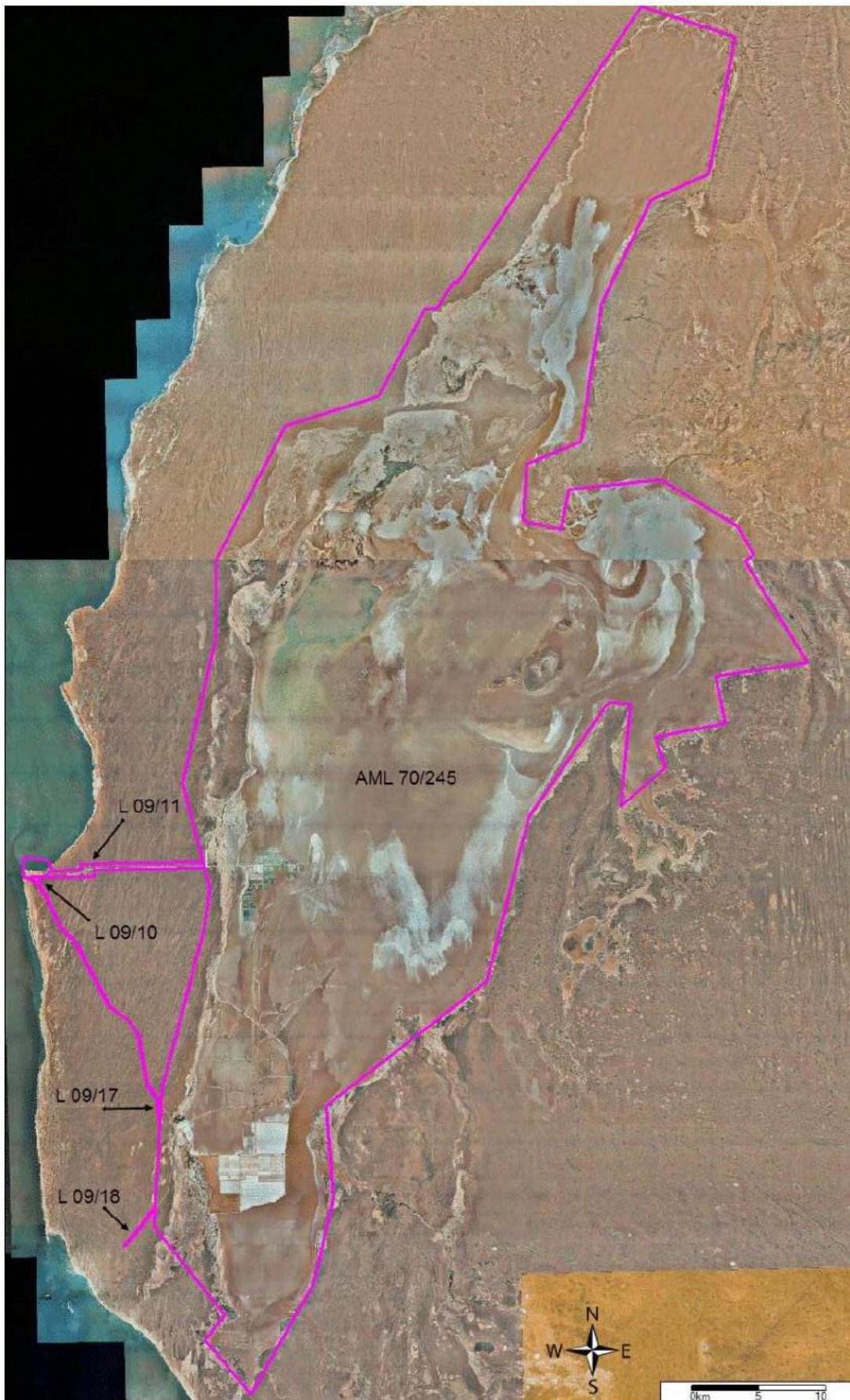
4.2 Reporting

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

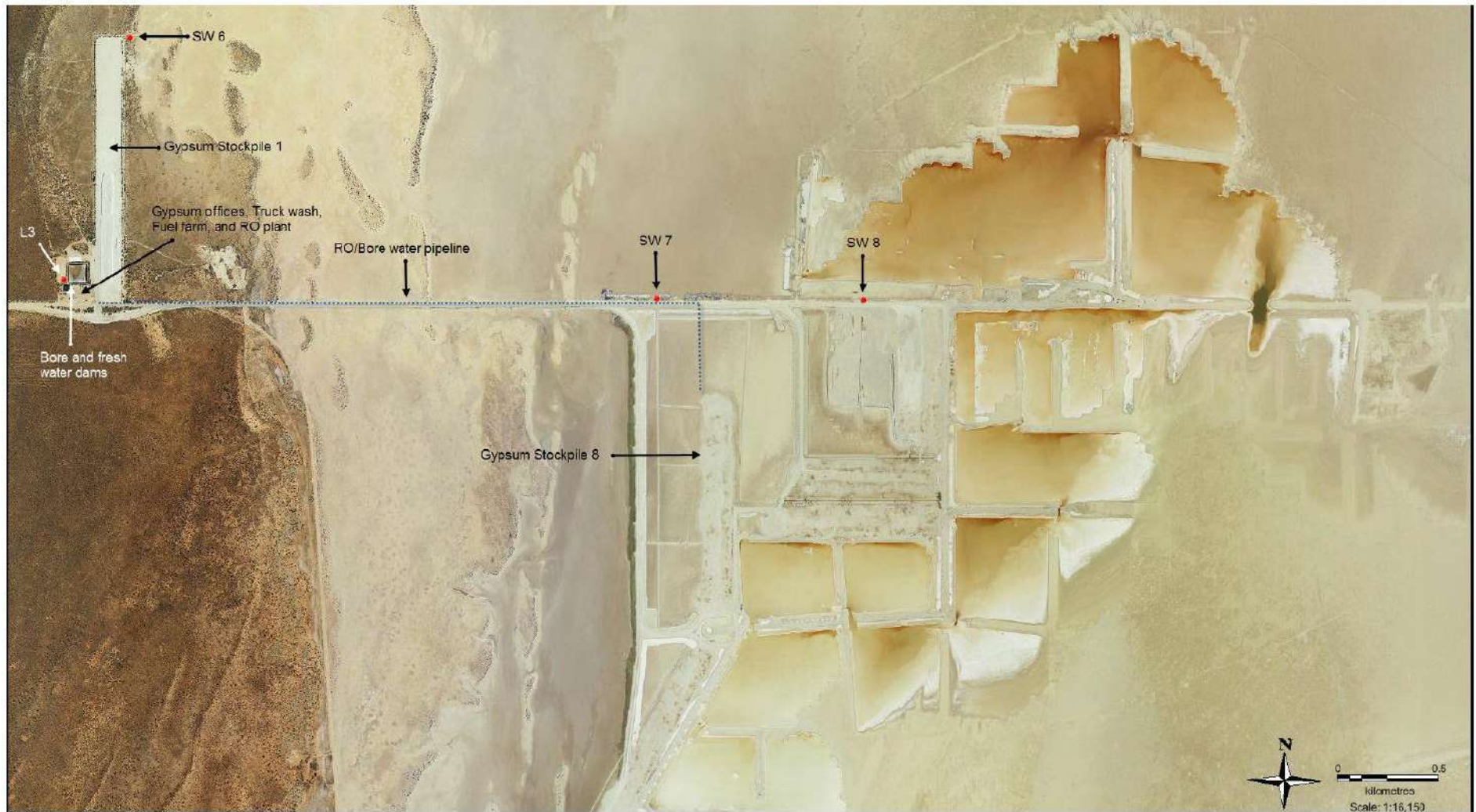
information listed in Table 4.2.1 in the format or form specified in that table.

Table 4.2.1: Annual Environmental Report		
Condition or table (if relevant)	Parameter	Format or form1
-	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	
3.4.2	Acid Sulfate Soil investigation data and management actions required by Condition 3.4.1	Presented in the format shown in Schedule 3 (Table S-3)
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 investigation¹

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_F 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_F and pH_{FOX} tests.
3. Remove approximately one teaspoon of soil from the profile. Place approximately ½ teaspoon of the soil into the pH_F test tube and place ½ teaspoon of the soil into the pH_{FOX} test tube for the corresponding pH_{FOX} 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_F 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_F 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_{FOX} test procedure

1. Adjust the pH of the hydrogen peroxide to 5.0–5.5 before going into the field.
2. Ensure the pH_{FOX} test tubes do not contain any deionised water.
3. Add a few drops at a time of 30 per cent peroxide (H₂O₂) adjusted to pH 4.5–5.5 to the soil in the pH_{FOX} 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_F 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_{FOX} using a pH meter with spear point electrode.

¹ 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 pH_{FOX} measurement in Table S-3.
9. Record the difference between pH_{F} and pH_{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

pH_{F}	pH_{FOX}	ΔpH	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: www.dwer.wa.gov.au
2.	Department of Environment and Conservation (2009) Resource Condition Report for a Significant Western Australian Wetland: Lake MacLeod System.	DEC, 2009	Accessed at: https://www.dpaw.wa.gov.au/images/documents/conservation-management/wetlands/rcm029_lake_macleod_condition_report.pdf
3.	Department of Environment Regulation (2015) Identification and investigation of acid sulfate soils and acidic landscapes, Government of Western Australia.	DER, 2015	Accessed at: https://www.der.wa.gov.au/your-environment/acid-sulfate-soils/69-ass-guidelines
4.	DER, July 2015. <i>Guidance Statement: Regulatory principles</i> . Department of Environment Regulation, Perth.	N/A	Accessed at www.dwer.wa.gov.au
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 (https://rsis.ramsar.org/). 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.



Licence Number L7178/1997/11

Licence Holder Dampier Salt Limited

ACN 008 706 590

File Number DER2014/001046-1

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 15 November 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.



Clarrie Green

A/Manager, Licensing (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
ACN	Australian Company Number
Amendment Notice	refers to this document
ASS	Acid Sulfate Soils
Category/ Categories	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 info@dwer.wa.gov.au
Delegated Officer	an officer under section 20 of the EP Act
Department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DWER	Department of Water and Environmental Regulation
EP Act	Environmental Protection Act 1986 (WA)
EP Regulations	Environmental Protection Regulations 1987 (WA)
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
mg/L CaCO ₃	milligram per litre as calcium carbonate
neutralisation	the process whereby acid produced by the oxidation of iron sulfides is counteracted by the addition of an ameliorant such as lime (CaCO ₃)
pH	the intensity of the acidic or basic character of a solution, used as

	a measure of the acidity of alkalinity of a soil of water body.
pH _F	refers to the field pH, which is a field determination of pH in a soil: water deionized paste
pH _{FOX}	refers to the field peroxide pH, which is a field determination of pH in a soil: water mixture following reaction with hydrogen peroxide
Prescribed Premises	has the same meaning given to that term under the EP Act.
Risk Event	as described in Guidance Statement: Risk Assessment
TTA	Means total titration acidity, which is a measure of the actual acidity. The acidity measured by titration with dilute sodium hydroxide following extraction with potassium chloride solution.

Amendment Notice

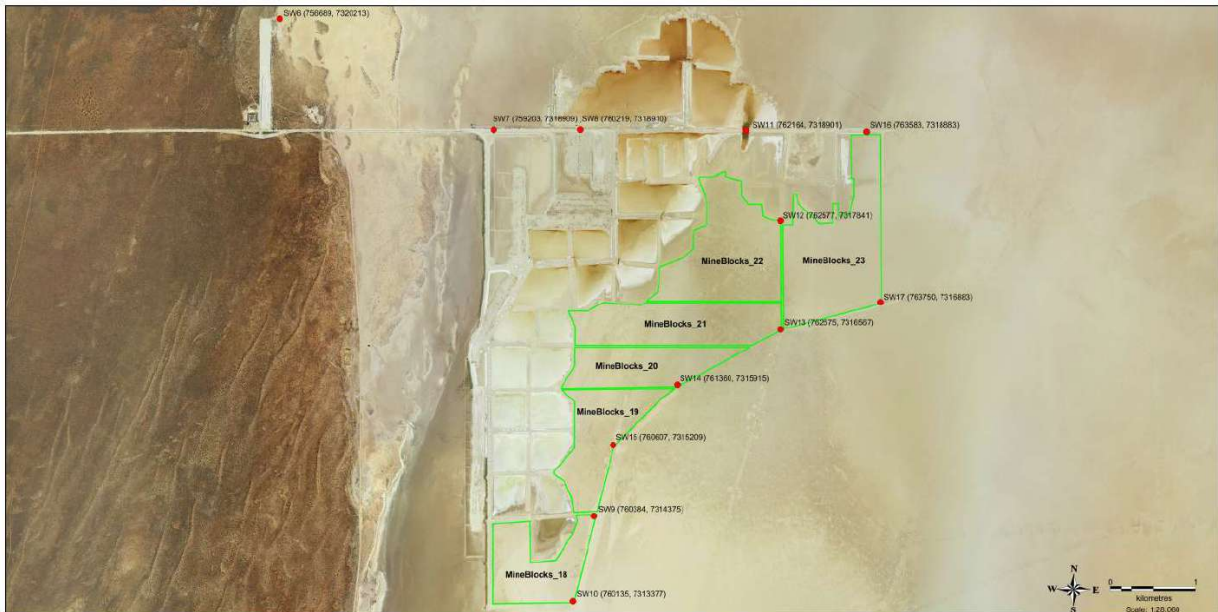
This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend the Licence issued under the EP Act for a Prescribed Premises as set out below. This notice of amendment is given under section 59B(9) of the EP Act.

This notice is limited only to an application received by the Department of Water and Environmental Regulation (DWER) on 27 July 2018, to allow for the addition of emission point SW11 for the dewatering of Lake MacLeod and the relocation of discharge points as gypsum mining expands within the proposed mining area. The proposed mining area is approximately 5 km south from existing discharge points SW7 and SW8 and the area has been segregated into six gypsum extraction areas identified as Mine Blocks 18 to 23 with a total of nine discharge point locations shown in Figure 1.

However, the Licence Holder has applied only to discharge from a maximum of two leachate discharge points per Mine Block to demonstrate no increase in discharge rates compared to current operations. The discharge points will be progressively relocated as gypsum is extracted from each Mine Block. Mining discharges at emission points SW6, SW7 and SW8 are expected to continue existing gypsum extraction and stockpiling methods (as opposed to the in-situ extraction method).

The in-situ extraction method involves the relocation of up to two leachate discharge points during temporary dewatering done in preparation of gypsum extraction. The discharge points are required for the in-situ method of washing gypsum which involves digging a trench around the target material and washing the salt from the target gypsum with desalinated water. Water is leached and collected in the drain before being discharged to Lake MacLeod. This Amendment Notice assesses the overall risk to the identified sensitive receptors associated with the emission points within the proposed Mine Blocks discharging onto Lake MacLeod and the potential for Acid Sulfate Soils (ASS).

This Amendment Notice applies to Category 14 gypsum production at Lake MacLeod and no changes to the aspects of the Existing Licence relating to Categories 58A or 64 have been requested by Dampier Salt Limited. There are no changes to the throughputs or prescribed activities as a result of this amendment.



Legend

- Surface Water Emission points (MGA coordinates)
- Future Gypsum Mine block areas (MB18 – MB23)

Figure 1: Proposed mining area for gypsum extraction with future surface water emission points (Source: Rio Tinto, 2018)

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)*

Discharge monitoring

The Licence Holder is required to monitor for key indicators of Potential Acid Sulfate Soils (PASS) and ASS during and prior to gypsum extraction. ASS are naturally occurring soils, sediments and peats commonly found in low-lying land bordering the coast, or estuarine and saline wetlands that contain sulfide minerals. Disturbing and exposing ASS to oxygen has the potential to cause significant impacts to the sensitive receptors by creating an acidic environment. Lake MacLeod is classified as moderate to low risk of ASS disturbance and is vulnerable to acidification.

The Licence Holder is required to monitor and record emissions at authorised emission points in accordance with condition 2.2.1 and ASS with conditions 3.2.1 and 3.4 of the Existing Licence (L7178/1997/11). While the Existing Licence includes a notification of a risk event for soil monitoring where the pH_F is less than 4 (Condition 3.4.3), there are no notification requirements, management triggers or limits for risk events associated with surface water discharges of pH and Total Titration Acidity (TTA) specified on the Existing Licence.

TTA monitoring results detailed below indicate the presence of stored sulfide irons and other sulfidic minerals (stored acidity in the form of hydrolysable metals) that have the potential to increase acidification.

Surface water discharge results

Licence: L7178/1997/11

Monthly infield testing results for pH and TTA were both sampled on 2 May 2018, 27 June 2018 and 25 July 2018 for emission points SW6 and SW7. Emission point SW8 was not sampled due to no flow and has not been assessed in this notice.

The trigger criteria and action required provided in Table 2 is referenced from the National ASS Guidance (2018) and used to assess surface water monitoring.

Table 2: Trigger criteria used to assess surface water monitoring

Trigger Criteria TTA mg/L CaCO ₃ and pH	Action required based on National Acid Sulfate Soils Guidance (2018)
TTA <40 mg/L, pH > 6	Continue with infield monitoring
TTA <40 mg/L, pH > 4-6	Undertake neutralisation treatment (liming)
TTA 40 to 100 mg/L, pH > 6	Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/ trenches or other treatment system to allow removal of iron and other metals. Undertake neutralisation treatment (liming)
TTA 40 to 100 mg/L, pH 4-6	Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/ trenches or other treatment system to allow removal of iron and other metals. Undertake neutralisation treatment (liming)
TTA > 100 mg/L CaCO ₃	Effluent should be aerated to precipitate dissolved iron and directed to a series of settlement basins/ trenches or other treatment system to allow removal of iron and other metals. Increase neutralisation treatment (liming) rate.
pH < 4	Increase neutralisation treatment (liming) advise the appropriate authorities immediately who will advise appropriate action.

Monitoring results in Table 3 below show that emission point SW6 had all three samples fall within a neutral pH range of 7.3 to 7.8 with TTA range of 6 to 34 mg/L CaCO₃. Emission point SW6 discharges had TTA results within the trigger criteria specified in Table 2 (40 mg/L CaCO₃, pH > 6) and had a pH that is greater than 6 indicating that ASS generation is unlikely from the extraction of stockpiled material.

Emission point SW7 had all three samples within a pH range of 6.5 to 7.2 with higher levels of TTA within a range of 130 to 200 mg/L CaCO₃ (Table 3). The TTA at emission point SW7 exceeds the trigger criteria of TTA > 100 mg/L CaCO₃ (Table 2). This indicates the presence of sulfide irons, not the actual total concentrations that are readily soluble and exchangeable to a reaction (National ASS Guidance 2018).

Acidic water is defined with a pH less than six and is an indication for the potential generation of ASS (DER 2015b). Emission points SW6 and SW7 had a pH range greater than 6 (6.5 to 7.8) shown in Table 3 and acidic water was not indicated to be discharging directly onto Lake MacLeod.

Table 3 : Measured pH and TTA for emission point SW6 and SW7 against National ASS Guidance (2018) trigger criteria

Emission Point	Date Sampled	pH	TTA mg/L CaCO ₃	National ASS Guidance 2018 Trigger Criteria
SW6	02/05/2018	7.8	6	< 40 mg/L (CaCO ₃) and pH >6
	27/06/2018	7.3	34	
	25/07/2018	7.5	31	
SW7	02/05/2018	6.5	200	TTA > 100 mg/L (CaCO ₃)
	27/06/2018	7.2	130	
	25/07/2018	7	170	

Soil monitoring results

Soil monitoring parameters and trigger criteria used to assess the actual presence of ASS are shown in Table 4 below. The monitoring results for all Mine Blocks were not greater than the trigger criteria set within DWER guidance *Identification and investigation of acid sulfate soils and acidic landscapes (2015a)*.

Table 4: Trigger criteria for ASS generation for soil monitoring (DER2015a)

Parameter	ASS Trigger criteria	Soil monitoring results
pH _F	<4	All pH _F results were greater than 7
pH _{FOX}	<3	All pH _{FOX} results were greater than 6
ΔpH	> than a one unit change	Mine Blocks 18A, 22D changes in pH were less than 1 Mine Block 18D had changes greater than 1
Reaction rate	significant	Low reaction rates observed

Soil monitoring was sampled on 19 April, 22 May and 22 August. All soil samples were taken from a depth between 0.25 m and 2.75 m. All soil samples for all Mine Blocks indicated a neutral to slightly alkaline pH_F and all pH_{FOX} samples were greater than the trigger criterion of pH_{FOX} < 3 (Table 4). There were no significant reactions that occurred with any of the soil samples across all Mine Blocks and monitoring data indicated no management action was required. The presence of ASS was not indicated across all soil samples.

Mine Block 18D indicated a decrease in acidity with pH_{FOX} values between 6.22 and 6.38 with a slightly higher change in ΔpH (1.65). Decreasing acidity increases the potential risk of ASS.

Amendment history

Table 5 provides the amendment history for L7178/1997/11 since 2015.

Table 5: Licence amendments

Instrument	Issued	Amendment
L7178/1997/11	20/03/2018	Amendment Notice 1 To increase gypsum production capacity and reclassify gypsum production as a Category 14 and 58A.
L7178/1997/11	1/10/2015	Licence Reissue To change the format of the licence and the addition of discharge points to land and surface water. Increase in solar salt production 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.

Table 6: Receptors and distance from activity boundary

Sensitive receptors	Distance from Prescribed Premises
Human Receptor	Quobba Homestead is approximately 23 km south west of the gypsum production. Carnarvon town is up to 70 km south east of the proposed Mine area and discharge points Cape Cuvier is 18 km west of the proposed Mine area and discharge points.
Marine Water	The marine coastline is more than 17 km west to the proposed Mine area and discharge points.
Drinking Water Reserve	The Carnarvon drinking water reserve is greater than 60 km south east from the proposed Mine area and discharge points.
Lake MacLeod	Direct discharge onto Lake MacLeod The potential for ASS within Lake MacLeod has been classified as moderate to low risk <3m from the surface and is vulnerable to acidification. Lake Macleod is listed in the <i>Directory of Important Wetlands in Australia</i> and described as an outstanding example of a major coastal lake with unique assemblage of wetland types.
Threatened Ecological Communities Threatened and Priority Flora	An invertebrate assemblage with priority flora is within 20 km north of the discharge point's and surface water movement flows south. Threatened fauna are 4.3km west from the proposed Mine area and discharge points.

Risk assessment

Below describes the Risk Events associated with the amendment consistent with the *Guidance Statement: Risk Assessments* to identify whether the emissions present a material risk to public health or the environment, requiring regulatory controls.

Identification of emissions, pathways and receptors

In undertaking its risk assessment, DWER has identified all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires a detailed risk assessment. To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission has been screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission has not been risk assessed further and will be screened out through Table 7 below.

Table 7: Identification of emissions, pathways and receptors

Risk Events					Continue to detailed risk assessment	Reasoning	
Sources/Activities	Potential emissions	Potential receptors	Potential pathway	Potential adverse impacts			
Cat 14 Solar salt manufacturing	Gypsum mining/ excavation and vehicle movements on unsealed access roads	Noise	No residences or other sensitive receptors in proximity	Air / wind dispersion	None	No	No receptor present
		Dust			None	No	No receptor present
	Gypsum extraction and washing of gypsum from in-situ leaching	Waste: Discharge of leachates to surface waters	Lake MacLeod: Contamination to surface waters, groundwater. Surface waters and/or groundwater dependent ecosystems	Direct discharge of leachate via drainage channels	Impacts to the health and survival of surface water dependent ecosystems	No	There are no increases in surface water discharge volumes relevant to this notice and therefore contaminants within discharged leachates is not further assessed. Monitoring results have indicated a risk of ASS from existing activities and therefore acidification is further considered in this Amendment Notice.
	ASS: generation of acid sulfate soils/ acidic water discharges	Lake MacLeod: Contamination to surface waters and/or groundwater Surface water and groundwater dependent ecosystems	Direct contamination to Lake MacLeod from exposing ASS to air.	Impacts to the health and survival of groundwater and surface water dependent ecosystems	Yes	A review of DWER's geospatial mapping system has identified Lake MacLeod as a moderate to low risk for the disturbance of ASS and vulnerable to acidification.	

Risk Assessment – Acid Sulfate Soils (ASS)

Description of Risk Event

Lake MacLeod is vulnerable to acidification and the potential presence of ASS and acidic water from gypsum operations have the potential to cause significant impacts. The disturbance of ASS during activities associated with gypsum extraction and the method of in-situ washing of gypsum may result in the exposure of ASS to air, producing sulfuric acid and resulting in the discharge of acidic water directly onto Lake MacLeod.

Description of potential adverse impacts from ASS

Gypsum extraction that results in the disturbance of ASS may cause adverse impacts by contaminating the wetland through the dissolution of toxic metals as a result of acidification, which may degrade wetland dependent ecosystems. Acidification can reduce ecological biodiversity and the overall integrity of the wetland's ecosystem (DER 2015b; National ASS Guidelines 2018).

Criteria for assessment

The National ASS Guidance (2018) trigger criteria specified in Table 3 has been used to assess the surface water discharge results. Soil monitoring is assessed in accordance with the Existing Licence conditions and the *Guideline: Identification and investigation of acid sulfate soils in acidic landscapes* (DER 2015a) (refer to Table4).

Licence Holder Controls

The Licence Holder has applied to extract gypsum out of the Mine Blocks depicted in Figure 1 discharging leachate from a maximum of two emission points in each Mine Block at any one time. Therefore there is no proposed increase to the rate of discharge. No further controls have been proposed by the Licence Holder.

Consequence

Lake MacLeod is of ecological importance as it is listed as a wetland of national and international importance. The Delegated Officer has determined that should the disturbance of ASS occur through activities associated with gypsum extraction, mid-level on site impacts may arise. Therefore the consequence has been assessed to be **moderate**.

Likelihood of Risk Event

Monitoring results from sampling events conducted in 2016 to present indicate a fluctuating pH range in both annual periods and signs of potential acidification. Monitoring results at SW7 exceeded trigger criteria shown in Table 2 and decreasing acidity was indicated at Mine Block 18D. Based on monitoring conducted at the Premises, the Delegated Officer has determined that the likelihood to be **possible** as ASS disturbance could occur at some time.

Overall rating of Risk Event

The Delegated Officer has compared the consequence and likelihood ratings described above and determined that the overall rating for the risk of ASS on Lake MacLeod and the sensitive receptors during gypsum operations is **Medium**.

Decision

The disturbance of ASS should be avoided wherever possible. Based on recent monitoring data, the Delegated Officer has determined that the relocation and operation of leachate discharge points presents an acceptable level of risk, subject to additional monitoring and management actions conditioned. The Delegated Officer has also made this determination based on the maximum of two discharge points operated per Mine Block at any time to ensure that there are no increases in discharge rates.

In accordance with s.4A of the EP Act, the Delegated Officer has given consideration to the principles; the precautionary principle and the principle of conservation of biological diversity and ecological integrity. Lake MacLeod is vulnerable to acidification and there remains uncertainty around the impacts of key gypsum extraction activities in undisturbed areas of the lake.

Conditions have been applied through this Amendment Notice to require the Licence Holder to manage surface water discharges in accordance with National ASS Guidance (2018). Management may include either:

- avoiding extraction at areas of high ASS risk; and/or
- aerating surface water discharges to precipitate dissolved iron and directed to a series of settlement basins/ trenches; and/or
- undertake a neutralisation treatment (liming) at the area of extraction.

The Licence Holder will continue to be required to monitor emission points in accordance with the conditions set in the Existing Licence. The Delegated Officer has determined that additional monitoring and active management will reduce the risk of generating ASS and direct discharges of acidic water onto Lake MacLeod.

Licence Holder's comments

The Licence Holder was provided with the draft Amendment Notice on 14 November 2018. No comments were received with the Licence Holder electing to waive the 21 day consultation period.

Amendment

1. Condition 2.2.1 of the Licence is amended by the insertion of the underlined red text and deletion of text in strikethrough shown 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.

Table 2.2.1: Emission points to surface water			
Emission point reference	Emission point reference on Map of emission points	Description	Source including abatement
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 (Truck waste, 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 <u>SW5</u>	Outlet pipe into ocean from truck wash bay at Cape Cuvier.	Wastewater from truck wash bay via a triple interceptor.

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SW6	Gypsum Discharge point 1 <u>SW6</u>	Outlet pipe into Lake MacLeod from Gypsum Stockpile 1.	Wastewater from heap leach pad for Gypsum Stockpile 1.
SW7	Gypsum Discharge point 2 <u>SW7</u>	Outlet pipe into Lake MacLeod from Gypsum Stockpile 8 drainage system.	Wastewater from heap leach pad for Gypsum Stockpile 8.
SW8	Gypsum Discharge point 3 <u>SW8</u>	Outlet pipe into Lake MacLeod from in-situ drainage systems.	Wastewater from in-situ heap leach areas located within Lake MacLeod.
<u>SW11</u>	<u>SW11</u>		
<u>Mine Block 18</u>	<u>SW9 & SW10</u>		
<u>Mine Block 19</u>	<u>SW15</u>		
<u>Mine Block 20</u>	<u>SW14</u>		
<u>Mine Block 21</u>	<u>SW13</u>		
<u>Mine Block 22</u>	<u>SW11 & SW12</u>		
<u>Mine Block 23</u>	<u>SW16 & SW17</u>		

2. Condition 2.2.2 of the Licence is amended by the insertion of the underlined red text shown below:

2.2.2 The Licensee shall must:

- (a) not cause or allow point source emissions to surface water greater than the limit listed in Table 2.2.2; and
(b) perform the management actions specified in Table 2.2.2 where Trigger Criteria is exceeded.

Table 2.2.2: Point source emission limits and Management Trigger Criteria to surface water					
Emission point reference	Parameter	Limit (including units)	Trigger Criteria	Averaging period	<u>Management Actions</u>
SW4 SW5	Total Recoverable Hydrocarbons	15 mg/L	<u>N/A</u>	Spot sample	<u>N/A</u>
<u>SW6</u> <u>SW7</u> <u>SW8</u> <u>SW9</u> <u>SW10</u> <u>SW11</u> <u>SW12</u> <u>SW13</u> <u>SW14</u> <u>SW15</u> <u>SW16</u> <u>SW17</u>	<u>pH¹</u> <u>Titrateable Acidity¹</u>	<u>N/A</u>	<u>pH <6; and</u> <u>Titrateable Acidity</u> <u>>100 mg/L</u> <u>CaCO₃</u>	<u>Monthly</u>	<u>The Licence Holder must:</u> <ul style="list-style-type: none"> • <u>aerate leachate to precipitate dissolved iron and directed to a series of settlement basins/trenches; and/or</u> • <u>undertake neutralisation treatment (liming); and/or</u> • <u>relocate the disturbance area to another location.</u>

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

3. The Licence is amended by the insertion of Condition 2.2.3 in red underlined text

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shown below:

2.2.3 The Licence Holder must only discharge leachate from Mine Blocks, depicted Schedule 1, from a maximum of two emission points at any one time.

4. Condition 3.2.1 of the Licence is amended by the insertion of the underlined red text shown below:

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 surface water			
Emission point reference	Parameter	Units	Frequency
SW4	Total Recoverable Hydrocarbons	mg/L	Quarterly
SW5			
SW6 SW7 SW8 <u>SW9</u> <u>SW10</u> <u>SW11</u> <u>SW12</u> <u>SW13</u> <u>SW14</u> <u>SW15</u> <u>SW16</u> <u>SW17</u>	Chloride, sulfate, sodium, magnesium, potassium, calcium, total suspended solids, arsenic, beryllium, boron, cadmium, chromium, copper, fluoride, lead, mercury, nickel, total nitrogen, total phosphorus, selenium, bicarbonate	mg/L	Quarterly
	Electrical conductivity ¹	µS/cm	Quarterly
	pH ¹	-	Monthly
	Titrateable_Acidity ¹	mg/L	Monthly

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

5. Condition 3.4.2 of the Licence is amended by the insertion of the underlined red text and deletion of the text shown in strikethrough below:

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

- (a) pH and TTA in accordance with Table 2.2.2;
- (b) a visual observation of the strength of the reaction;
- (c) pH_F and pH_{FOX} values for each test;
- (d) the difference between pH_F and pH_{FOX} values for each test (Δ pH); and any management actions undertaken following the identification of Potential Acid Sulfate Soils or Acid Sulfate Soils in accordance with Table 2.2.2 that may include, but not be limited to:
 - (i) relocating the disturbance area to another location; and/or
 - (ii) treating the leachate from the associated emission point ~~specified in Table 3.2.1~~ with a neutralising agent (lime); and/or
 - (iii) aeration of leachate to precipitate dissolved iron and directed to a series of settlement basins/trenches.

6. Condition 3.4.3 of the Licence is amended by the insertion of underlined red text shown below:

3.4.3 The Licence Holder must provide notification to the CEO of any sampling event where:

- (a) the pH_F, as measured in accordance with the steps outlined in Schedule

- 3, is equal to, or less than 4;
- (b) the pH is equal to or less than 4; or
- (c) the TTA exceeds 100 mg/L CaCO₃.

7. Condition 3.4.4 of the Licence is amended by the insertion of underlined red text and deletion of text shown in strikethrough below:

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

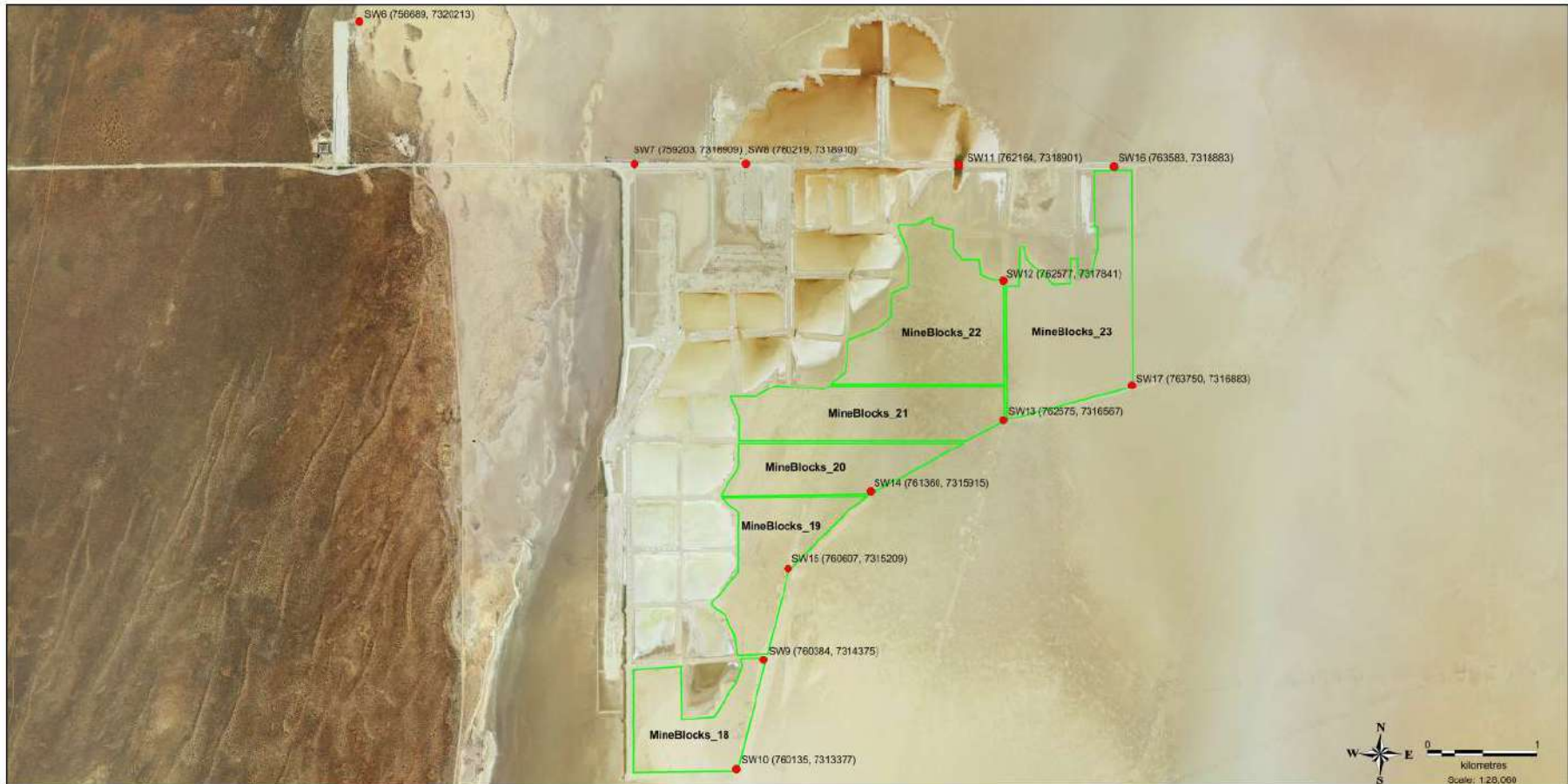
- (a) the Titratable Acidity measured at the emission point;
- (b) the most recent quarterly and monthly monitoring results for that emission point;
- (c) a map of the sampling location with MGA coordinates and a north facing arrow; and
- (d) any management actions undertaken that include, but not be limited to management actions in accordance with Table 2.2.2.
 - 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).~~

8. Condition 4.2.1 of the Licence is amended by the insertion of underlined red text shown below:

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.

Table 4.2.1: Annual Environmental Report		
Condition or table (if relevant)	Parameter	Format or form
-	Summary of any failure or malfunction of any pollution control equipment and any environmental incidents that have occurred during the annual period and any action taken	None specified
Table 3.2.1	Discharge to water monitoring results	
Table 3.3.1	Discharge to land monitoring results	
3.4.2	Acid Sulfate Soil investigation data and management actions required by Condition 3.4.4 <u>3.4.2</u>	<u>Pre-extraction monitoring data to be</u> presented in the format shown in Schedule 3 (Table S-3)
4.1.3	Compliance	Annual Audit Compliance Report (AACR)
4.1.4	Complaints summary	None specified

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

- Surface Water Emission points (MGA coordinates)
- Future Gypsum Mine block areas (MB18 – MB23)

Licence: L7178/1997/11

IR-T08 Amendment Notice (Major) template v2.0 (July 2017)

Appendix 1: Key documents

	Document title	In text ref	Availability
1	DER, June 2015. <i>Guideline: Identification and investigation of acid sulfate soils and acidic landscapes</i>	DER 2015a	Accessed at www.dwer.wa.gov.au
2	DER June 2015. <i>Guideline. Treatment and management of soil and water in acid sulfate soil landscapes</i>	DER 2015b	Accessed at www.dwer.wa.gov.au
3	Water Quality Australia June 2018. <i>National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments</i>	National ASS guidance 2018	Accessed at http://waterquality.gov.au/SiteCollectionDocuments/dewatering-acid-sulfate-soils.pdf
4	Annual environmental report 2016	AER 2016	DWER records (A1429996)
5	Annual environmental report 2017	AER 2017	DWER records (A1663198)
6	Directory of important wetlands in Australia: Information sheet Lake MacLeod		accessed at www.environment.gov.au
7	DER, July 2015. <i>Guidance Statement: Regulatory principles.</i> Department of Environment Regulation, Perth.		accessed at www.dwer.wa.gov.au
8	DER, October 2015. <i>Guidance Statement: Setting conditions.</i> Department of Environment Regulation, Perth.		
9	DER, February 2017. <i>Guidance Statement: Risk Assessments.</i> Department of Environment Regulation, Perth.		
10	DER, February 2017. <i>Guidance Statement: Decision Making.</i> Department of Environment Regulation, Perth.		
11	DER, November 2016. <i>Guidance Statement: Environmental Siting</i> Department of Environment Regulation, Perth		