

Buckland Dry Creek Pty Ltd

DRY CREEK SALT FIELD

**Integrated Program for Environment Protection and Rehabilitation and Mine
Operations Plan**

Revision 5 v.3 – 250605



Prepared by:

Buckland Dry Creek Pty Ltd with Withers Environmental Risk Strategies Pty Ltd

for

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Document history

Date	Document File Name / Reference No	Purpose of Revision	Issued to
17/12/2014	Dry Creek Salt Field PEPR December 2014.pdf	Revision 1 - Initial PEPR	Andrew Querzoli, DSD
12/9/2015	Dry Creek Salt Field PEPR September 2015.pdf	Revision 2 – for changed compliance point for discharges via SA water outfall and for extension of trial discharges to Gawler River	Andrew Querzoli, DSD
21/03/2017	Dry Creek Salt Field PEPR February 2017.pdf	Revision 3 – for inclusion of all minor changes since Revision 2, and for inclusion of closure operations for PM248	Andrew Querzoli, DSD
09/09/2020	Dry Creek Salt Field PEPR August 2020.pdf	Revision 4 - to enable resumption of brine pumping from Section 2 into Section 1	Andrew Querzoli, DEM
5/6/2025	Dry Creek Salt Field PEPR Revision 5 v.3 - 250605.pdf	Revision 5 v.3 – for a) Existing Holding Pattern Pending resumption of Commercial Salt Production; b) Resumed Commercial Salt Production using brine pumped from Section 3 to Section 1; c) Filling of F, G, H Rows	DEM, Buckland Dry Creek, Australian Salt Works

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Appendix 5	Impact and Risk Assessment – 2 – Resumed Commercial Salt Production • Elements of the Environment • Impact Events • Risk Assessment
Appendix 6	Impact and Risk Assessment - 3 – Filling F, G, H Rows • Elements of the Environment • Impact Events • Risk Assessment
Appendix 7	Plans for Section 2 Pipeline

1 Site Operator and Contacts:

The operator of the Salt Field is Buckland Dry Creek Pty Ltd. Buckland Dry Creek Pty Ltd (ACN 114 007 153; ABN 82 114 007 153) has its registered Head Office at Wayville SA 5034.

Contact Persons: BDC's subcontracted

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2 Declaration of Accuracy

The following declaration is made in accordance with Regulation 65(8) of the *Mining Regulations 2011*.

Company Senior Executive Declaration

On behalf of Buckland Dry Creek Pty Ltd, I declare I have reviewed the content of this revised integrated PEPR / MOP and consider the information has been accurately presented. To ensure the accuracy of the PEPR / MOP:

- I engaged suitably a qualified and experienced consultant (Withers Environmental Risk Strategies Pty Ltd) to prepare this Revision 5 v.3. The work was done by Nick Withers MA Cantab (Engineering Tripos), specialising in environmental impact, risk, and compliance management.
- I was comprehensively briefed on the contents of the final document.

Signed

A handwritten signature in black ink, appearing to be 'Peter Jurkovic', written over a series of horizontal lines.

Peter Jurkovic

Director

Buckland Dry Creek Pty Ltd

Dated: 6 June 2025

3 Purpose, Scope, and Organisation of this Document

3.1 Purpose of the Document

This document is a **revision** (Dry Creek Salt Field PEPR Revision 5) to a DEM approved PEPR (Dry Creek Salt Field PEPR Revision 4).

It is an Integrated Program for Environment Protection and Rehabilitation and Mine Operations Plan.

It concerns:

- The Holding Pattern operations needed until resumption of commercial salt production using brine pumped from Section 3 to Section 1
- The construction and operation of a pipeline in Section 2 of the Salt Field to transfer brine from pond PA5 to an existing pipeline connecting pond PA12 to Section 1
- The resumption of commercial salt production operations using brine pumped from pond PA5 to Section 1
- Progressive rehabilitation and closure in parts of the Salt Field not required for commercial salt production operations or for residual operations

Please refer Figure 3-1 and 3-2, and Table 3-1.

Pursuant to this revised PEPR:

- There will be no change to operations in Sections 3 and 4 of the Salt Field that are permitted by the Dry Creek Salt Field PEPR Revision 4
- In respect of Section 2 of the Salt Field:
 - there will continue to be **no pumped discharge of brine from pond PA5 into pond PA6** and thence flowing into pond PA7 to pond PA9 for pumping into pond PA10 to flow to pond PA11. It is noted that this movement of brine through Section 2 into Section 1 is permitted by the Dry Creek Salt Field PEPR Revision 4 but prevented by the existing Environmental Direction in force since December 2020. There is no intent in this PEPR Revision 5 to seek a change to that Environmental Direction. This means that the conditions in Section 2 ponds PA6 to PA11, established by the approved Holding Pattern from 2014 to late 2019 and then restored by the Environmental Direction would continue unchanged under this PEPR Revision 5.
 - there will be pumping of brine from pond PA5, at the south end of Section 3 into:
 - **either** the existing pipeline that discharges into the SA Water Bolivar outfall pursuant to the existing EPA licence for this discharge. This pumping would continue until the new pipeline is constructed and operational, and thereafter it would occur only when needed as a contingency. This discharge is permitted by the Dry Creek Salt Field PEPR Revision 4, and this PEPR Revision 5 entails no changes to the mode or conditions for this discharge permitted by the Dry Creek Salt Field PEPR Revision 4
 - **or** a new pipeline when this has been constructed and is operational. The purpose of this pipeline is to bypass ponds PA6 to PA12 and enable transfer of brine from Section 3 into Section 1 of the Salt Field, via an existing pipeline that connects PA12 to ML6514 in Section 1. That transfer is permitted by the Dry Creek Salt Field PEPR Revision 4, but this PEPR Revision 5 is required because the mode of transfer differs from that described in or envisaged by the Dry Creek Salt Field PEPR Revision 4.

- In Sections 1, 3 and 4 of the Salt Field the operations will comprise:
 - Those permitted by the Dry Creek Salt Field PEPR Revision 4, namely:
 - Pending resumption of commercial salt production, the continuation of the Residual and Holding Pattern operations
 - The filling and associated works to complete and close F, G and H row crystallisers and the F, and G row pits in Section 1
 - The crystallisation of salt from brine, and all works necessary to rehabilitate and prepare those parts of Section 1 to be used for resumed commercial salt production.
 - Operations to prepare the rest of the Salt Field for commercial salt production operations
 - The harvesting, washing and removal of salt from Section 1 as part of residual operations, pending the resumption of commercial salt production
 - The operations provided for in this PEPR Revision 5, namely
 - For resumed commercial salt production, the crystallisation, processing and dispatch of salt from brine received from pond PA5, using the rehabilitated and prepared parts of Section 1.
 - The construction, operation and maintenance of the pipeline system to supply brine from Pond PA5 to Section 1 for commercial salt production
 - The operation and maintenance of “in commission” ponds in Sections 3 and 4, required for the supply of brine for commercial salt production
 - The continuation of the maintenance as described in the Dry Creek Salt Field PEPR Revision 4 of “out of commission” ponds in Sections 2, 3 and 4, not required for the supply of brine for commercial salt production
 - The control of water levels in the Section 2 ponds PA6 to PA9 below defined limits

As the Salt Field is under two types of tenure with different regulatory regimes under the *Mining Act 1971*, this document provides an integrated:

- Program for Environment Protection and Rehabilitation (PEPR) for the leased mining tenements; and
- Mine Operations Plan (MOP) for the private mines.

This PEPR / MOP will undergo a number of further controlled revisions as the complexity of the issues posed by the site means that the investigation, design, and implementation of closure will happen in stages, with works proceeding at different times and rates in different parts of the site.

Each revision to this PEPR / MOP will be prepared in steps – consultation draft, submission for approval, final approval. It is intended that the development of each revision of the PEPR / MOP will be the subject of consultation with relevant government agencies and the community so that it is informed by knowledge of their issues.

Table 3-1: Summary of operations covered by this PEPR / MOP

(This Table 3-1 is to be read in conjunction with Figures 3-1 and 3-2)

Section of Salt Field	Operations Permitted by the Dry Creek Salt Field PEPR Revision 4	Operations Permitted by the Dry Creek Salt Field PEPR Revision 4 to Continue under the Dry Creek Salt Field PEPR Revision 5 <i>These operations do not trigger the need for the PEPR Revision 5</i>	Additional or Changed Operations under the Dry Creek Salt Field PEPR Revision 5 <i>These operations trigger the need for the PEPR Revision 5</i>
Section 1 (South of Dry Creek)			
	Filling and associated works in parts of PM 248 in Section 1 as described in Part 4.	Yes, in F, G, H Row Crystallisers	
	Residual operations in Section 1 including washing or dissolving salt and removing commercially useable salt from the site.	Yes, until Section 1 (except for F, G, H Row Crystallisers) changed to prepare it to enable commercial salt production from new brine received from the pump at PA12 in Section 2	Operations in Section 1 (except for F, G, H Row Crystallisers) to produce commercially useable salt from new brine received from the pump at PA12 in Section 2: - Operation and Maintenance of Final Areas and Crystallisers and their infrastructure - Operation and maintenance of Salt Harvesting and Washing / Refining, Loading and Dispatch systems - Operation and maintenance of “Mag Brine” production storage, loading and despatch systems - Operation and maintenance of Bitterns discharge systems
	Disposal of salt residues that cannot be recovered for commercial use.	No, no longer needed	
	Functional separation of land needed for residual operations in Section 1 from that to be used for constructing the Northern Connector.	No, this operation completed	
	Pilot trial for design of filling for Bulk Earthworks for Closure	No, this operation completed	
	Trial of discharge of brine to North Arm Creek or to the Port River.	No, not required	Investigate the need for and options for supplementary bitterns discharge to North Arm Creek
	Trial for the design of filling of F and G Row pits with salt residues.	No, no longer required	
	Receipt of brine pumped from Section 2 into Section 1, and preparatory work for resuming salt production in part of Section 1	Yes, noting this entails: - Receipt, containment, and management of brine pumped from the pump at PA12 in Section 2 into Section 1 - Design and implementation of rehabilitation, and preparatory work for managing the received brine and resuming salt production in Section 1	
	Operation and maintenance of infrastructure	Yes, noting this entails: - Operation and maintenance of stormwater drains, detention, and discharge systems - Operation and maintenance of bunds, roadways, site security in Section 1 - Operation and Maintenance of bore water supply systems - Operation and maintenance of office, workshop, and store	
Section 2 (Dry Creek to St Kilda Road)	All of Section 2		
	Resumption of brine flows through Section 2, and discharge of brine from Section 2 into Section 1 and from Section 3 into Section 2 (PA5 into PA6)	Yes, except this will be via a new pipeline such that no brine is pumped into pond PA6 from PA5, thereby sustaining: - compliance with the 2020 Environmental Direction, and - the regime of seasonal fluctuations in water levels and salinities in Ponds PA6 to PA11 established by the PEPR permitted Holding Pattern between 2014 and 2019	Construction and commissioning, then operation and maintenance of: - the new pipeline to transfer brine from PA5 to the pump at PA12 and the existing pipeline constructed across Dry Creek to send brine from Section 2 into Section 1, and - the associated brine pumping system
	Investigations of Acid Sulphate Soil conditions	No, operation completed	

Section of Salt Field	Operations Permitted by the Dry Creek Salt Field PEPR Revision 4	Operations Permitted by the Dry Creek Salt Field PEPR Revision 4 to Continue under the Dry Creek Salt Field PEPR Revision 5 <i>These operations do not trigger the need for the PEPR Revision 5</i>	Additional or Changed Operations under the Dry Creek Salt Field PEPR Revision 5 <i>These operations trigger the need for the PEPR Revision 5</i>
	SA Water Trials of nutrient removal from treated effluent from Port Adelaide	No, operation completed. The tenement owner will require SA Water, as per the agreement made for these trials, to conduct, at its cost and to the satisfaction of the tenement owner, such environmental assessments, rehabilitation and infrastructure removal as necessary.	
	Operation and maintenance of infrastructure, with no input of brine from PA5	Yes, noting this entails operation and maintenance of bunds, roadways, site security in Section 2	Investigate options for either a) the re-incorporation of one or more of PA6 to PA11, into renewed salt production operations or for b) completion and closure of one or more of PA6 to PA11.
Sections 3 and 4 (St Kilda Road to Middle Beach)	All of Section 3 and Section 4		
	Drain to import excess fresh water from Smith Creek into XC3	Yes. This is a back-up contingency measure potentially available to help manage water levels and salinities in a part of Section 3 when the only permitted discharge from pond PA5 is into the SA Water outfall, and weather conditions limit the rate of this permitted discharge. It has not yet been needed or used. Once the transfer of brine from PA5 to Section 1 is operational, this contingency measure should no longer be needed, but will be retained in case of future need.	
	Trial of discharge to the Gawler River from Pond XE6.	Yes. This is a contingency measure implemented to help manage water levels and salinities in Sections 3 and 4. It has been, and if needed again would be, implemented under EPA oversight when the only permitted discharge from pond PA5 is into the SA Water outfall, and weather conditions limit the rate of this permitted discharge. Once the transfer of brine from PA5 to Section 1 is operational, this contingency should no longer be needed	
	Management of brine flows, salinities and levels through Sections 3 and 4	Yes, noting that this will continue to entail: • Operation and maintenance of systems for entrainment of sea water at Middle Beach and Chapman's Creek • Operation and maintenance of systems for brine flows through Sections 4 then 3 inundated ponds to PA5, with controlled brine levels and salinities • Operation and maintenance of bunds, roadways, site security in Sections 3 and 4	Following the commencement of pumping brine via the pipeline from PA5 through to Section 1, management of brine flows, salinities and levels through Sections 3 and 4: • Requires maintenance of the existing infrastructure, systems and controls to discharge, from time to time, excess brine from PA5 to the SA Water outfall – with the same EPA Licence conditions as presently apply • Requires the ability to adjust, in the light of experience, the flow rates, water levels and salinities in the Section 3 and 4 ponds to preserve, in different seasonal weather conditions, the compatibility of the salinity and flow rate of brine arriving in PA5 with the capacities of a) the pump / pipeline to transfer brine to Section 1 and b) the infrastructure in Section 1 to receive and process the received brine. • Requires the ability to provide sea water or freshwater to be pumped through the pipeline from PA5 to Section 1 or from Section 1 to PA5 for the purposes of pipeline cleaning and maintenance • Requires investigation of options for providing freshwater or sea water into PA5 for the purposes of adjusting the salinity of the brine in PA5 for pumping through the pipeline to Section 1
	Licensed discharge of brine from PA5 by pumping into the SA Water Outfall	Yes. Once the new pipeline from PA5 to Section 1 is fully operational, this discharge to the SA Water outfall will only be needed as a contingency control measure to help manage water levels and salinities in Sections 3 and 4	
	Draining XF1, XF2, XE4, XC1, XC2, XC2S, and the keeping of these “out of commission” ponds in a free draining condition	Yes.	Investigate options for either a) the re-incorporation of one or more of XF1, XF2, XE4, XC1, XC2, XC2S, XC2E, into renewed salt production operations or for b) completion and closure of one or more of XF1, XF2, XE4, XC1, XC2, XC2S, XC2E

Section of Salt Field	Operations Permitted by the Dry Creek Salt Field PEPR Revision 4	Operations Permitted by the Dry Creek Salt Field PEPR Revision 4 to Continue under the Dry Creek Salt Field PEPR Revision 5 <i>These operations do not trigger the need for the PEPR Revision 5</i>	Additional or Changed Operations under the Dry Creek Salt Field PEPR Revision 5 <i>These operations trigger the need for the PEPR Revision 5</i>
	DEWNR Trial of Tidal Inundation of XB8A for rehabilitation purposes and for provision of shorebird and waterbird habitat	No, Trial operations completed. The tenement owner will require DEWNR / University of Adelaide to conduct, at their cost and to the satisfaction of the tenement owner, such environmental assessments, rehabilitation and infrastructure upkeep or removal as necessary to allow XB8A to be reinstated to its original form and brought back into production.	This pond may be required for commercial salt production and, subject to approval of a further revision to this PEPR/MOP, may be brought back into commission at a date yet to be determined. Until it needs to be brought back into commission, tidal inflows to and outflows from this pond will continue.
	Trials in XC2, XC2S and XE4 of candidate soil amendments to encourage revegetation	No, operation completed	
	Investigations of Acid Sulphate Soil conditions in drained ponds	No, operation completed	
	Lidar survey of ground levels in drained ponds and bathymetry survey (plus sub-bottom profiling) in inundated ponds	No, operation completed	
	Trials of techniques to reduce dust emissions from XC2	No, operation completed	
	Shorebird and Waterbird Habitat Manipulation Trial in XD1 to XA7	No, operation not proceeded with	

3.1.1 Scope of the Document

This PEPR / MOP:

- contains required information for the documentation of changes and revisions and demonstration of compliance of the PEPR /MOP with the Determination TOR 005 and Guideline MG2b.
 - Please refer to:
 - https://www.energymining.sa.gov.au/minerals/mining/regulatory_guidelines; and
 - [https://www.energymining.sa.gov.au/minerals/mining/legislation_and_guidance/terms_of_reference_and_instructions#q=terms of reference](https://www.energymining.sa.gov.au/minerals/mining/legislation_and_guidance/terms_of_reference_and_instructions#q=terms%20of%20reference)
 - The Glossary and Reference sections of the document are in Appendices 1 and 2 respectively.
- provides an overview of the Salt Field, the planning framework, site description and surrounding environment, historical operations, and stakeholder engagement. The purpose is to provide background context for the PEPR / MOP.
- describes the operations for commercial salt production, for the holding pattern and residual operations that continue until commercial salt production resumes, for the preparatory works to enable the resumption of commercial salt production and for the Filling of F, G, H rows in Section 1.
- describes the assessment of environmental impacts and risks and the associated proposed outcomes for each of these groups of operations. The details of the assessments of impacts, risks, & proposed risk management are provided in Appendices and linked to environmental outcomes and measurement criteria listed in Table 14-1
- provides the approach for progressive rehabilitation and closure
- contains Appendices of supporting information.

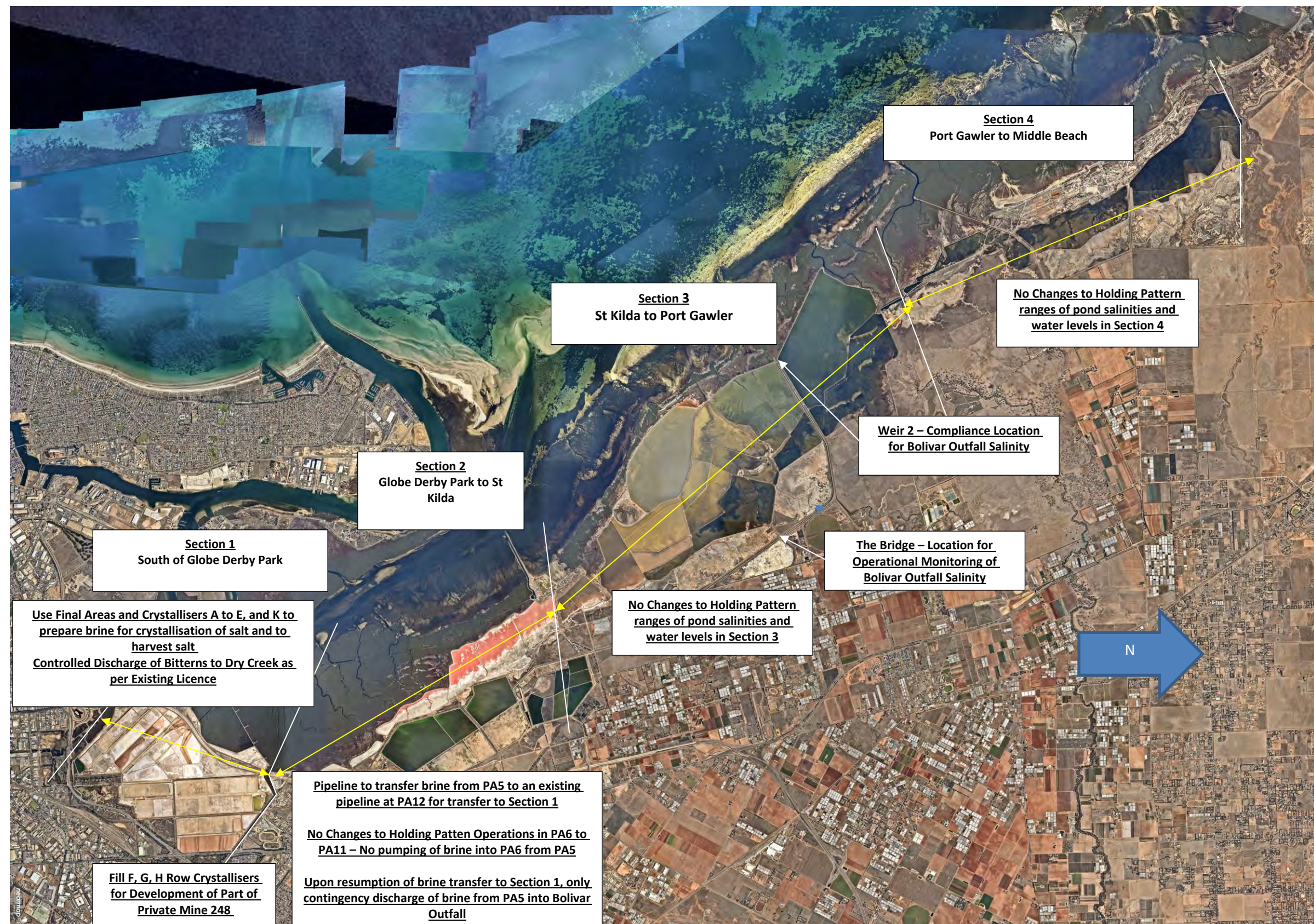


Figure 3-1: Dry Creek Salt Field - area covered by this PEPR / MOP (from Nearmap Image of 15 July 2020) – with Overview of Changes from Holding Pattern to Salt Production Operations

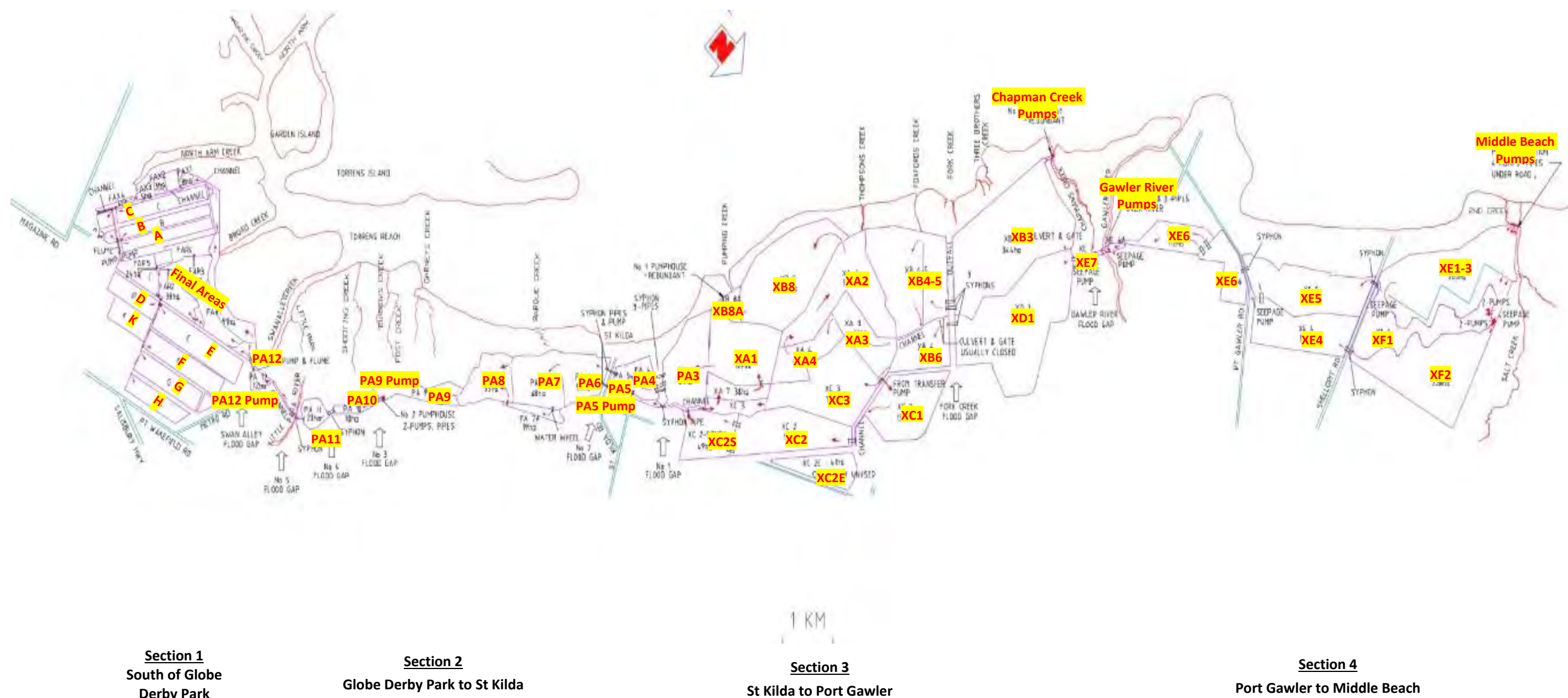


Figure 3-2: Dry Creek Salt Field – The area covered by this PEPR / MOP (showing the Names of the Salinas, Final Areas, and Crystallisers)

4 Record of Revisions and Minor Changes to the PEPR / MOP

Table 4-1: Record of Revisions and Minor Changes to the PEPR / MOP for the Dry Creek Salt Fields

Record of Revisions and Minor Changes to the PEPR / MOP for the Dry Creek Salt Fields			
Description of revision or minor change	Date revision or minor change submitted to DEM (formerly DSD)	Document reference / control number	Date of DSD or DEM or other regulatory authority endorsement
Initial PEPR	17 December 2014	Dry Creek Salt Field PEPR	Initial PEPR
SA Water Trial in PA9	5 December 2014	Minor Change Application 141205.docx	SA Water Trial in PA9
Drain XF1	16 January 2015	Change of Process Application 140930	22 January 2015
Extension of SA Water trial to more of PA9 and to PA10	24 July 2015	Minor Change Application 150724.docx	28 August 2015
Revision 2 – for changed compliance point for discharges via SA Water outfall and for extension of trial discharges to Gawler River	9 October 2015	Dry Creek Salt Field PEPR October 2015.pdf	23 October 2015
Initial trial of Brine Discharges to Port River	23 November 2015 – submitted to DSD and EPA	Email of 23 November 2015, with attached documents: - Brine Main Pressure Test Procedure 151112 - Results of lab tests on brine Main water Sample - AWQC report 140411_P-7	EPA email of 25 November 2015
Pilot Trial for Filling in Section 1 on PM248	21 June 2016	Combined Files - Notification Rev 2 160621.pdf	29 June 2016
Trial Filling of F and G Row Pits on PM 248 with Salt Residues	1 July 2016	- Revised Application for Approval - F & G Row Pits160701.pdf 20155395R005RevE_Trial Plan_160701.pdf - SKMBT_C284e16062810110.pdf	9 August 2016
Trial of Brine Discharge to North Arm and Dry Creeks from ML389 – 391, 702, 5908 and PM248	22 September 2016	Application for Approval - Trial Brine Discharge to Nth Arm and Dry Creeks160922a.pdf	26 October 2016
Extension of SA Water Trial to PA8 and PA7a	Included with Revision 3 of PEPR / MOP	- DSD cover letter - expansion for stage 3.docx - Salt pan Stage 3 expansion proposal Sept 2016 V2.docx - Salt pan Stage two trial progress report final Sept 2016.docx	12 April 2017
DEWNR Tidal Flushing Trial for XB8A	Included with Revision 3 of PEPR / MOP		12 April 2017
Bird Habitat Enhancement Trial in XD1 to XA7	25 October 2016	Planned Habitat Manipulation Trial 161025.docx	12 April 2017

Record of Revisions and Minor Changes to the PEPR / MOP for the Dry Creek Salt Fields			
Description of revision or minor change	Date revision or minor change submitted to DEM (formerly DSD)	Document reference / control number	Date of DSD or DEM or other regulatory authority endorsement
Revision 3 – to capture all the above minor changes since Revision 2 revisions and also to provide for bulk earthworks for filling for closure of PM248	21 March 2017	Dry Creek Salt Field PEPR Revision 3 v.3 Mar 2017	12 April 2017
Revision 4	9 September 2020	Dry Creek Salt Field PEPR Revision 4 v.1 - Sept 2020	December 2020 for MPEPR 2020/039 accompanied by Environmental Direction
Revision 5	6 June 2025	Dry Creek Salt Field PEPR Revision 5 v.3 - 250605	To be determined by DEM

4.1 Scope of PEPR Revisions

This is the fifth version of the PEPR / MOP with revisions to the original document as shown in Table 4-2.

Table 4-2: Scope of each PEPR/MOP revision

Revision	Date	Document File Name	Scope of Works	Chapters changed / added since last integrated PEP / MOP Revision
1	16/12/2014	Dry Creek Salt Field PEPR December 2014.pdf	1. Residual Operations in Section 1 of the Salt Field 2. Holding Pattern in Sections 2 to 4 of the Salt Field 3. Investigations and trials to inform design of the staged closure works 4. Initial communications and engagement.	This was the first version of the PEPR / MOP.
2	8/9/2015	Dry Creek Salt Field PEPR September.pdf	1. Changes related to draining of XF1. 2. Changed compliance point for discharges via SA Water outfall and for extension of trial discharges to Gawler River 3. Other minor changes.	All chapters have been edited
3	10/02/2017	Dry Creek Salt Field PEPR Revision 3.pdf	As above, plus: 1. Restructure of Document into 5 Parts as described above in 3.1.1. 2. Inclusion of the following operations representing minor changes: ▪ In Part 3 - Pilot Trial of Filling in Section 1 ▪ In Part 3 - Phases 1 to 3 of Trial of Filling in F and G Row Pits ▪ In Part 3 - SA Water Trials in Section 2: Including the extension of these trials to	All chapters have been edited

Revision	Date	Document File Name	Scope of Works	Chapters changed / added since last integrated PEP / MOP Revision
			include Ponds PA7a and PA8 as well as PA9 and PA10. - In Part 3 – Habitat Manipulation Trial in Ponds XD1 to XA7 - In Part 3 - Trial of Brine Discharge from Section 1 to North Arm Creek and Dry Creek 3. Inclusion of the following operations representing revisions: - In Part 3 – DEWNR Trial of tidal flushing in Pond XB8A in Section 3 - In Part 4 - Broad scale filling for closure of PM248 4. Surrender of mining tenements: - for the purposes of the construction of the Northern Connector. This also includes the works to create functional separation between the land excised for the Northern Connector and the remainder of Section 1. - As and when decided by Buckland Dry Creek Pty Ltd, and for the purposes of excising parts of mine tenements that have not been functionally used by the operational Salt Field.	
4	9 September 2020	Dry Creek Salt Field PEPR Revision 4 v.1 - Sept 2020	- Define the boundaries of parts of mine tenements surrendered for the purposes of the Northern Connector Freeway; - Include the newly granted mining lease to authorise operations on that lease, and - Include additional information to provide clarity about the movement of brine between Sections 1 & 2 - Highlight that BDC is considering the option of restarting full scale commercial salt operations in 2021 or 2022 (which is not currently authorised through this PEPR / MOP and would be the subject of a future PEPR / MOP submission)	All chapters have been edited
5	5 June 2025	Dry Creek Salt Field PEPR Revision 5 v.3 - 250605	- Updates to references to applicable legislation, policies, guidelines - Consolidated 6 Part document into a single document with a revised table of contents - Edited to: - remove operations, investigations, trials either completed or no longer required - include operations in Section 1 to produce commercially useable salt from the site: - include construction and operation of a pipeline system to transmit brine from PA5 through to Section 1, bypassing Section 2 Ponds PA6 to PA11	All chapters have been edited

Revision	Date	Document File Name	Scope of Works	Chapters changed / added since last integrated PEP / MOP Revision
			- o provide for investigation of the need for and options for supplementary bitterns discharge to North Arm Creek - o provide for investigation of options for a) the re-incorporation of one or more of XF1, XF2, XE4, XC1, XC2, XC2S, XC2E, PA6 to PA12 into renewed salt production operations or for b) completion and closure of one or more of XF1, XF2, XE4, XC1, XC2, XC2S, XC2E, PA6 to PA12 - o revise the impact and risk assessments to address the changes in operations from Revision 4 to this Revision 5 of this PEPR / MOP to and to address experience gained & lessons learnt from the holding pattern and residual operations since their inception in 2013/2014 - o revise the Environmental Outcomes and Measurement Criteria stemming from the revisions to the impact and risk assessments - o revise and clarify the approach to progressive rehabilitation and closure - o remove now redundant appendices - o Include updated impact and risk assessment tables in the appendices - o Include other supporting information in the appendices – for ease of reference.	

5 PEPR Compliance with Ministerial Determination TOR 005 AND Guideline MG2B

Revision 4 of this PEPR / MOP was approved by DEM in December 2020, and as such was assessed to comply with the relevant Ministerial Direction and the relevant Regulations.

The changes to operations that necessitate this Revision 5 of the PEPR/MOP are shown in Table 4-2. In accommodating these changes, the modifications of Revision 4 incorporated in this Revision 5 v.3 of the PEPR/MOP:

- Do not affect the Description of the Environment
- Do not affect the Operations for Holding Pattern and Residual Operations
- Do not affect the Operations for Earthworks Filling of F, G, H rows in Section 1
- Do not affect the operation of the Environmental Direction issued in December 2020
- Do describe both the unchanged and changed operations
- Assess the environmental risks from both the unchanged and the changed operations
- Update the outcome and measurement criteria to cover both the unchanged and changed operations
- Provide an updated plan for progressive rehabilitation and closure

Table 5-1 TOR 005 Information Requirements

INFORMATION REQUIREMENT	Location in PEPR
1. Description of the Environment	
In setting out a statement of criteria in accordance with section 70B(2)(b) of the Mining Act 1971 and setting out strategies and criteria in accordance with regulation 63(b) and (c) of the Mining Regulations 2020, the Minister determines in accordance with regulation 63(1)(e) of the Mining Regulations 2020 that a PEPR must include any new baseline environmental data relevant to the control strategies or criteria set out in clause 4, since the previous description of the environment or criteria was provided (in a proposal, approved PEPR or change to operations proposal). Where changes to the environment are identified, a PEPR must provide an updated description of the environment to describe the changes.	Chapters 8 to 10
2. Description of Mining Operations	
General description and maps / plans of operations	Chapter 8 - Sections 8.3 and 8.4. Chapter 12 Appendix 7
Ore Reserves, products, and market	
Exploration activities	
Mining activities	
Crushing, Grinding, Processing and Product Transport	
Wastes	
Supporting surface infrastructure	
Vegetation clearance	
Mine completion	
Resource inputs	
3. Consultation	
In setting out the result of the consultation undertaken in connection with the proposed operations in accordance with regulation 64of the Mining Regulations 2020, the Minister determines in accordance with regulation 63(1)(e) of the Mining Regulations 2020 that a PEPR must include: • A description of:	Chapter 11

INFORMATION REQUIREMENT	Location in PEPR
- the process undertaken for identifying stakeholders with an interest in, or stakeholders likely to be directly affected by the mining operation; - the process undertaken for the delivery of information to, gathering of feedback from, and responding to those identified stakeholders; if any individual or group of similar affected persons were not able to be consulted, the steps taken to consult with them. - The results of the consultation undertaken with those identified stakeholders, including: - the persons consulted; - any concerns / issues raised; and - the response and steps (if any) taken or proposed to address those concerns.	
4. Environmental Outcomes, Strategies, Criteria and Monitoring	
5.1 Environmental outcomes	Chapters 13 and 14, supported by Appendices 4 to 6
5.2 Control and management strategies	
5.3 Measurement criteria	
5.4 Leading indicator measurement criteria	
5. Operator Capability	
Sufficient information must be provided on each of the factors listed under Regulation 89 In preparing information about the ability of the tenement holder (and any other person who may be acting on behalf of the tenement holder) in accordance with section 70B(2)(d) of the Mining Act 1971, the Minister determines in accordance with regulation 63(3)(e) of the Mining Regulations 2020 that this information must be accompanied by relevant evidence demonstrating that the tenement holder (and any other person who may be acting on behalf of the tenement holder as an operator) has appropriate experience, processes and procedures in place to be able to achieve the environmental outcomes..	As evidenced by: - the information in Chapter 8, Section 8.5 - the detail in the description of Operations in Chapter 12 of this PEPR/MOP - Compliance Reports provided against previous revisions of this PEPR/MOP
7. Lease / Licence	
Where the lease or licence includes specific conditions or requirements that are not environmental outcomes, in accordance with regulation 63(1)(e) a PEPR must include a section that demonstrates where the respective conditions or requirements have been addressed in the PEPR (if relevant) or demonstrates how otherwise they have or will be complied with.	N/A
8. Maps and Plans and Cross-Sections for Description of Operations	
.	Figures in this PEPR / MOP – See the list of Figures in the Table of Contents Compliance Reports provided against previous revisions of this PEPR/MOP
Proposed mining operations plan(s)	N/A
Vertical sections/cross-sections	N/A

6 MOP Compliance with Regulation 72

INFORMATION REQUIREMENT	Location in PEPR
72(2)(a) Operations	
The operations to be carried out at the mine	Chapter 12
72(2)(b) Features of Environment	
The features of the environment that are expected to be affected by operations at the mine.	Chapter 10, Chapter 13 and Chapter 14 with Appendices 4 to 6
72(2)(c) A description of the environmental impacts	
	Chapter 13 and Chapter 14 with Appendices 4 to 6
72(2)(d) Measures that are used, or to be used, to manage, limit or remedy those impacts	
	Chapter 13 and Chapter 14 with Appendices 4 to 6
72(2)(e) The environmental objectives that are expected to be achieved;	
	Chapter 14
72(2)(f) The criteria proposed to be adopted to measure the environmental objectives to be achieved;	
what is to be measured and the form of the measurements that are to be used; and the locations where relevant measurements are to be taken, or how such locations are to be determined; and what is proposed to be taken to constitute the achievement of the relevant objectives (with consideration being given to any inherent errors of measurement); and the frequency of any measurement or monitoring; and any background or control data that is to be used, or how any such data is to be acquired;	Chapter 14
72(2)(g) Leading Indicator criteria	
to the extent (if any) that there is a high level of reliance on control strategies to reduce risk to the environment—set out leading indicator criteria	N/A
72(2)(h) a statement of the capabilities of the person's ability to achieve the environmental objectives	
	As evidenced by: - the information in Chapter 8, Section 8.5 - the detail in the description of Operations in Chapter 12 of this PEPR/MOP - Compliance Reports provided against previous revisions of this PEPR/MOP

7 Tenements Covered by This PEPR/MOP

In the original and subsequent first revision of this PEPR /MOP, the Salt Field comprised 46 Mining Leases and two Private Mines. These are listed in Table 7-1 and Table 7-2. Figure 7-1 shows the mine tenements

Table 7-1: Mining leases included in original PEPR / MOP

Note: (Leases or parts thereof surrendered and so excluded from this Revision 5 of the PEPR / MOP are highlighted by *)

Item No	Mining Lease / Miscellaneous Purpose Licence	Parcel Identifier	Hundred	Next renewal day	Area (ha)	Ponds or location	Underlying tenure (includes partial occupancy)
1	234	S326, S327	Pt Adelaide H105800	31/3/2040	235.13	PA8, PA9 Swan Alley Mangroves	Crown CR 5766/828 CR 5744/249
2	235	Pts of S328, S329	Pt Adelaide	31/3/2040	259	PA10, part PA9, Swan Alley mangroves	Crown CR 5744/250 CR 5766/829
3	237	S324, S325, S535	H105800	31/3/2040	173.2	Parts PA7, PA8	Crown CR 5766/826 CR 5766/827 CR 5760/408
4	357	S322, Pts of S310, S321, S323, S315, D50216 A104	Pt Adelaide	31/6/2040	68	PA6	Crown CR 5766/820 CR 5766/821 CR 5844/945 CR 5766/825 CR 5766/824 CR 5766/823
5	358	Pt S314, F108213 A16	H105800	31/6/2040	18.86	PA5	Crown CR 5766/819 Cheetham Freehold CT 5887/225
6	359	Pts of S512, S513, S514, S515	Pt Adelaide	31/6/2040	202	PA3, PA4, XA1, XB8 and No 1 Flood Gap	Crown CR 5766/835 CR 5766/836 CR 5766/837 CR 5766/838
7	360	Pts of S510, S512	Pt Adelaide H105800	31/6/2040	259	XA1, XA2, XA4 and XB8	Crown CR 5766/834 CR 5766/835

Item No	Mining Lease / Miscellaneous Purpose Licence	Parcel Identifier	Hundred	Next renewal day	Area (ha)	Ponds or location	Underlying tenure (includes partial occupancy)
8	361	S629, Pt of S509	Pt Adelaide H105800	31/6/2040	221	Ponds XB4-5 and XA2	Crown CR 5757/317 CR 5766/833
9	389 *	Pt of D44233 A100	Pt Adelaide H105800	31/3/2040	33	Parts of Ponds FA2, FA3, FA4, FA5	Renewal SA freehold CT 5913/768
10	390 *	D44233 A99, Pt of D44233 A100	Pt Adelaide H105800	31/3/2040	217	Final areas and crystallisers B and C	Renewal SA freehold CT 5913/768 CT 5707/129 CT 5382/774
11	391 *	Pt of D44233 A100	Pt Adelaide H105800	31/3/2040	241	North-western end of the Final areas and crystallisers	Renewal SA freehold CT 5913/768 CT 5707/129 (Crown Land advises that this ML391 also contains CR6186/517)
11a	6514	Pt of D12813 A16 & 12816 A22	Pt Adelaide H105800	31/3/2040	17.59, of which 1.06 is the pond into which brine from Section 2 is discharged	North-western end of the Final areas and crystallisers	Commissioner for Highways
12	392 *	S330, D44233 A106, Pts of S328, S329, S615	Pt Adelaide H105800	31/3/2040	132	5% of lease area used for ponding, rest mangroves	Crown CR 5744/250 CR 5766/829 CR5751/448 CR 5902/103 (Crown Land review advises part of this has become CR 6186-517 with the balance CT6186-516 being a road)
13	404	S506, Pt of S624, S508	Pt Adelaide H105800	31/3/2040	162.68	Pond XB3 and Gawler flood gap	Crown CR 5766/831 CR 5757/317 (Crown Land review advises this may be part of

Item No	Mining Lease / Miscellaneous Purpose Licence	Parcel Identifier	Hundred	Next renewal day	Area (ha)	Ponds or location	Underlying tenure (includes partial occupancy)
							Buckland Park development?) CR 5766/832
14	405	Pt of S510	Pt Adelaide H105800	31/3/2040	157	Ponds XA3, XA4 and XC3	Crown CR 5766/834
15	406	Pts of S512, S513, S514, S515	Pt Adelaide H105800	31/3/2040	144	Pond XC3, XA7, PA3 and PA4	Crown CR 5766/835 CR 5766//836 CR 5766/837
16	416	S337	Pt Adelaide H105800	30/6/2040	4	A wedge of PA8	Crown CR 5780/407 (from Crown Land review, should this be instead 5760/407?)
17	417	Pts of S513, S514,	Pt Adelaide H105800	31/3/2040	13	Pond PA4, No 1 Flood Gap St Kilda	Crown CR 5766/836 CR 5766/837 Out of cadastre
18	418 *	F126162 A6, F207067 A93, Pt of F114617 A56	Pt Adelaide H105800	31/3/2040	2	Strips of roadway and a 0.11 ha corner of Block 3068 Pond PA11	Crown Freehold CT 5828/520 CT 5810/662 Crown Unallocated
19	421	Pts D50216 A104, S323	Pt Adelaide H105800	31/3/2040	4	Western part of Pond PA6	Crown CR 5844/945 CR 5766/825
20	429	Pts F108213 A16, S316, S321, S320	Pt Adelaide H105800	30/6/2040	16.89	Parts of ponds PA5, PA6 and PA7	Cheetham Freehold CT 5887/225 Crown CR 5766/821 CR 5766/823 CR 5766/822
21	439	Pts of R3065 AX, F108216 Q23	Pt Adelaide H105800	31/3/2040	3.2	Part of pond PA11	Cheetham Freehold CT 5199/354 Crown Unallocated
22	440	Pt S327	Pt Adelaide H105800	31/3/2040	4	Swan alley mangroves and Pond PA9	Crown CR 5744/249

Item No	Mining Lease / Miscellaneous Purpose Licence	Parcel Identifier	Hundred	Next renewal day	Area (ha)	Ponds or location	Underlying tenure (includes partial occupancy)
23	441	Pt S326	Pt Adelaide H105800	31/3/2040	2	Pond PA9	Crown CR 5766/828
24	442	Pts of S320, S321, S322, S323	Pt Adelaide H105800	31/3/2040	2	Pond PA9	Crown CR 5766/826
25	443	Pts D50216 A104, S315, S310, S314	Pt Adelaide H105800	31/3/2040	2	Closed road. St Kilda ponds PA5 and PA6	Crown CR 5766/820 CR 5766/821 CR 5766/819 CR 5844/945
26	444	Pt S514	Pt Adelaide H105800	31/3/2040	1	Closed road. Part of Pond PA4	Crown CR 5766/837
27	445	Pts 182, 513	Pt Adelaide H105800	31/3/2040	3	Closed Road. Part of pond PA3	Crown CR 5766/836
28	446	Pt of S512	Pt Adelaide H105800	31/3/2040	4	Closed road. Part of pond XA1	Crown CR 5766/845 Crown Land review advises this is located in Wingfield and is unrelated to this Salt Field)
29	447	Pt S510, S512	Pt Adelaide H105800	31/3/2040	6	Closed road. Part of ponds XA3, XA4, XB8 and XC3	Crown CR 5766/834
30	448	Pt of D50216 A104	Pt Adelaide H105800	31/3/2040	1	Top part of pond PA6	Crown CR 5844/945 Unallocated
31	587	Pt of S624	Pt Adelaide H105800	31/3/2040	182	No 9 Pumphouse and western part of XB3	Crown CR 5757/317 CR5779/709
32	600	Pts of S510, S512, S513	Pt Adelaide H105800	31/3/2040	105	XB8	Crown CR 5766/834 CR 5766/835 CR 5766/836
33	605	S703, S704, S705, Pt of S702	Pt Gawler H140800	31/3/2040	234.73	Salt Creek	Crown OL 12570 (Crown Land advise this cancelled by licensee in 2016) CR 5748/918

Item No	Mining Lease / Miscellaneous Purpose Licence	Parcel Identifier	Hundred	Next renewal day	Area (ha)	Ponds or location	Underlying tenure (includes partial occupancy)
							CR 5748/919 CR 5748/920 CR 5748/921
34	606	S707, S830, Pts of S706, S829	Pt Gawler H140800	31/3/2040	169.97	XE1-3	(Crown Land advise this cancelled by licensee in 2016) CR 5748/922 CR 5744/712 CR 5744/714 CR 5744/715
35	607	S827	Pt Gawler H140800	31/3/2040	19.83	Western portion of pond XE5	Crown CR 5744/713
36	608	S809	Pt Gawler H140800	31/3/2040	206.4	Part of XE6	Crown CR 5769/617 (Crown Land review advises this is part of new Buckland Park Development, Port Gawler)
37	617	Pt S508	Pt Adelaide	31/3/2040	2	Closed road in XB5	Crown CR 5766/832
38	618	Pt S509	Pt Adelaide	31/3/2040	2	Closed road in the southern part of XB4	Crown CR 5766/833
39	702	Pts of D44233 A105, D44233 A104, D44233 A103, D44233 A102	Pt Adelaide H105800	31/3/2040	160	Broad Creek mangroves	Crown CR 5382/777 (Crown Land review advises this may now be CR6179-598 and that this ML702 also contains CR6216/148 and CR6179/598)
40	5205	Pt of F108211 A13	Pt Gawler H140800	30/6/2040	119.19	Pond XF2	Cheetham Freehold CT 5197/300
41	5206	Pt of F108211 A13	Pt Gawler H140800	30/6/2040	155.51	Pond XF2	Cheetham Freehold CT 5197/300

Item No	Mining Lease / Miscellaneous Purpose Licence	Parcel Identifier	Hundred	Next renewal day	Area (ha)	Ponds or location	Underlying tenure (includes partial occupancy)
42	5207	F108211 A14	Pt Gawler H140800	30/6/2040	151.2	Pond XF2	Cheetham Freehold CT 5197/300
43	5208	S34, Pt of D1671 B44	Pt Gawler H140800	30/6/2040	114.06	Ponds XE4 and XE5	Cheetham Freehold CT 5197/302 CT 5197/304
44	5209	S6, Pt of D1671 B44	Pt Gawler H140800	30/6/2040	131.87	Ponds XE4 and XE5	Cheetham Freehold CT 5197/304 CT 5197/315
45	5210	F3965 A1, F3965 A2	Pt Gawler H140800	30/6/2040	31.7	Pond XE6	Cheetham Freehold CT 5197/298 CT 5197/301
46	5908	D 41507 A300, Pts of D63323 A2, D41507 A302	Pt Adelaide H105800	30/6/2040	50.2	K row	Renewal SA Freehold CT 5906/440 City of Salisbury CT 5930/304 CT 5928/43

Hundred and Parcel Identifiers:

F = Filed Plan

D = Deposited Plan

H = Hundred

S = Section

Q = Piece

A = Allotment

B = Block

Tenure Documents:

OL = Licence to Occupy

CT = Certificate of Title

CR = Crown Record

Table 7-2: Private mines included in PEPR / MOP

Note: Mines or parts thereof surrendered and so excluded from this Revision 5 of the PEPR / MOP are highlighted by *

Private Mine #	Hundred	Sections (S), or Allotments (A) and Filed Plans (FP)	Area(ha)	Certificate of Title Vol/Folio
248 *	Port Adelaide H105800	FP 2871 A1 and A2 excluding ETSA easements	316.27	Cheetham Freehold CT 5931/18
199 *	Port Adelaide and Port Gawler H105800 and H140800	F108216 Q23, Q22, Q21, Q20, A19 F108212 A15 F108210 A12 F108207 A9 F108206 A8 F28223 A10, A11 F 3965 A5 S505, S667, S668, S671, S674, S675, S676, S677, S678, S682, S683, S684, S685, S689, S690, S691, S692 F114472 Q11 (includes easements across the sewer outfall) F3965 A7	1292.5	Cheetham Freehold CT 5199/354 CT 5913/692 CT 5297/309 CT 5404/395 CT 5197/299 CT 5197/297 CT 5197/294 CT 5197/307 CT 5154/618 PL CT 5417/486 Freehold CT 5875/910 SA Water Corp Freehold CT 5278/129 CT 5207/813

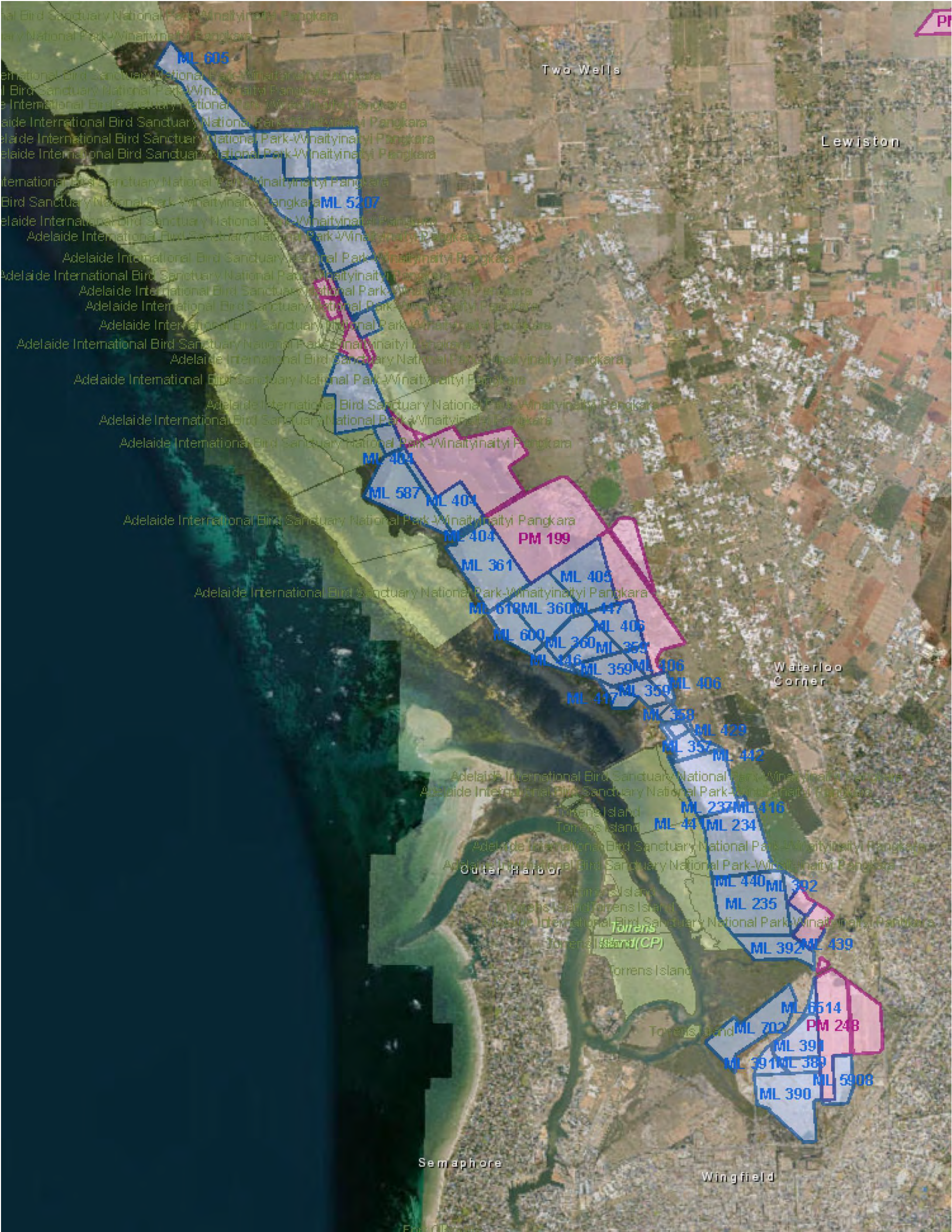


Figure 7-1: The Mine Tenements & Adelaide International Bird Sanctuary

Source: https://map.sarig.sa.gov.au/quickprint/_ags_7ebf1328-1e83-11f0-9112-005056896ce1.pdf, April 2025;

For a more detailed view of the tenements (and their ID's), and also the bordering Parks and Sanctuaries, please visit <https://map.sarig.sa.gov.au>

8 General Description and Location of the Project

8.1 Location and Layout of the Dry Creek Salt Field

The Salt Field occupies approximately 5,500 hectares of land along 28 km of coastline north of Adelaide from Dry Creek to Middle Beach. It comprises a mix of Crown land, land owned by Renewal SA and freehold land owned by BDC.

Mining leases and private mines (see Chapter 7) provide the mining tenure for the mining operations. The mining operations fall within the Hundreds of Port Adelaide and Port Gawler, and the local government areas of City of Salisbury, City of Port Adelaide Enfield, City of Playford and the Adelaide Plains Council. The site is located within the 2008 gazetted boundaries of the Adelaide and Mt Lofty Ranges Natural Resource Management Board¹.

Figures 8-1 to 8-3 shows the approximate boundaries between Sections 1 to 4 of the Salt Field that:

- Were involved in historical operations
- Are involved in the holding pattern and residual operations before commercial salt production resumes
- After resumption of commercial salt production, will be:
 - Either used for resumed salt production operations
 - Out of commission pending either a) re-incorporation into resumed salt production operations or b) allocation to progressive rehabilitation and closure.
- Are or will be the subject of progressive rehabilitation and closure operations

8.2 Summary of Previous Mining Works and Their Cessation in 2013

See Figure 8-1

The Dry Creek Salt Field was established under a set of mining leases by Imperial Chemical Industries in the 1930s to supply salt to its Osborne Soda Ash Plant. The first salt was harvested in 1939. The northern extent of the Salt Field was extended in the 1960s to Middle Beach from Chapman Creek (Bell 2014).

Before the current holding pattern and residual operations, salt production at Dry Creek comprised the growing and harvesting of chemical grade solar salt (NaCl). It was a seasonal process that used a renewable natural resource, rather than extraction of a finite, distinct deposit of a more typical mining operation.

The Salt Field was constructed by establishing bunds on low lying land (approximately 1 to 4 m above sea level) to form a set of interconnected lagoons (salinas). This land originally supported salt marsh, sedgeland and marshes, coastal grasslands and included several estuarine areas. Changes to the topography were minimal. An existing levee, constructed by the government in 1886 / 87 to reduce tidal flooding, formed the western edge of the original extent of the Salt Field (Bell 2014). Earthworks

¹ See <https://cdn.environment.sa.gov.au/marineparks/docs/mp-gen-estuariesinfopack-amlr.pdf>

were conducted to win soil to construct bunds, seepage trenches and syphons under roads, and to provide flow paths where the topography impeded the flow of water. The formation of the salinas changed the existing biodiversity, and the biodiversity that has since developed is regarded as valuable.

To produce salt, sea water was pumped south from Middle Beach through 25 km of condenser ponds to Dry Creek, and in the process became more concentrated as a result of evaporation. High concentration brine was collected at Dry Creek where salt crystallised and was subsequently harvested. For further information refer to Appendix 3.

The harvested product was dissolved in fresh water from groundwater bores to form a purified brine. This brine was pumped via pipeline to Penrice Soda Products at Osborne.

In 1993, the Dry Creek Salt Field, Angaston limestone mine and Osborne Soda Ash plant were sold to Penrice Soda Products Pty Ltd (Penrice). They were operated by Penrice under a Special Mining Enterprise Agreement (SME) with the Crown, dated 1 September 1998. The Salt Field also included some private mines which were not governed by the SME but were operated as specified in the Developmental Programme prepared 11 November 1998 under Regulation 10 of the *Mines and Works Inspection Regulations 1998*. They were and are not operated as separate entities, but rather form part of the integrated salina system of the Salt Field.

In 2005, Penrice divested itself of the Dry Creek Salt Field, which was purchased by Cheetham Salt Limited (a subsidiary of Ridley Corporation Ltd) along with contracted obligations to continue the supply of salt to Penrice in accordance with a long-term supply agreement. Cheetham Salt Limited set up Cheetham (Dry Creek) Pty Ltd to operate the Salt Field. In 2012, Ridley Corporation sold Cheetham Salt Ltd but retained Cheetham (Dry Creek) Pty Ltd, renaming it to Ridley Dry Creek Pty Ltd.

The nature and the conduct of the operations at the Salt Field, conducted by Penrice pursuant to the SME, did not substantially change while salt production continued under Cheetham and then Ridley management.

As a result of the 2005 commercial transaction, Penrice's benefits under the SME were to be assigned to Cheetham (Dry Creek) Pty Ltd (now Buckland Dry Creek Pty Ltd) by means of a new Crown Agreement, and changes to reflect current legislation. Between 2005 and 2012, there were discussions about a new Crown Agreement between Cheetham (Dry Creek) Pty Ltd, Cheetham Salt Limited, and the Minister for Mineral Resources Development for and on behalf of the Crown. These discussions did not produce the new Crown Agreement before Cheetham Salt left the Ridley group in 2012, and Cheetham (Dry Creek) Pty Ltd was renamed to Ridley Dry Creek Pty Ltd and has not been produced since.

In early 2013, Penrice formally advised Ridley Corporation that, following its decision to import soda ash, it would no longer require an on-going supply of salt from the Dry Creek operation from 30 June 2013. Given this, and considering the scale of the field, Ridley Corporation had to make the decision to permanently cease operations and commence the process to close the site.

In 2016, following an expressions of interest process, Ridley Dry Creek Pty Ltd was purchased by Buckland Dry Creek Pty Ltd.

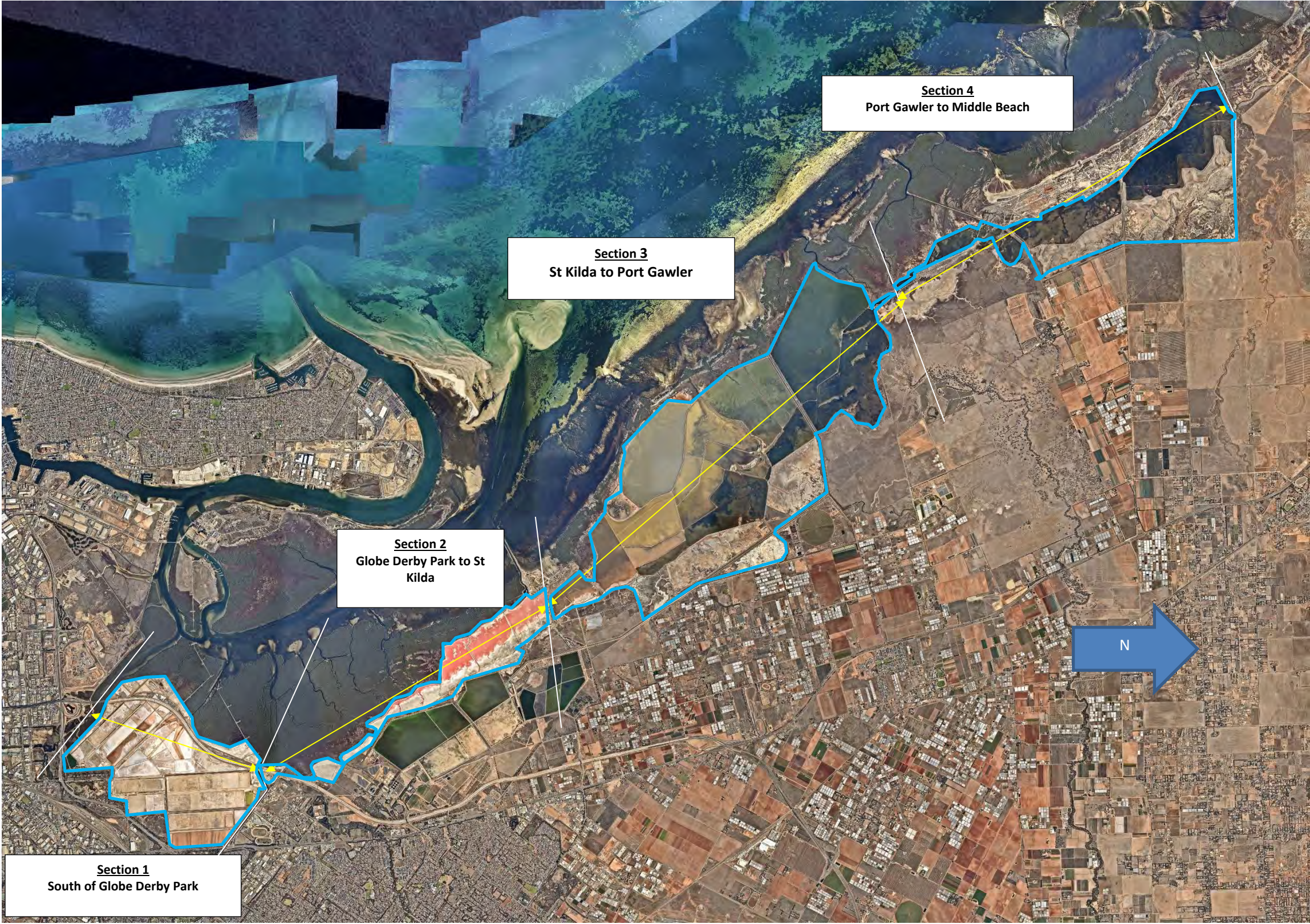


Figure 8-1: Approximate Area of Historical Salt Production Operations

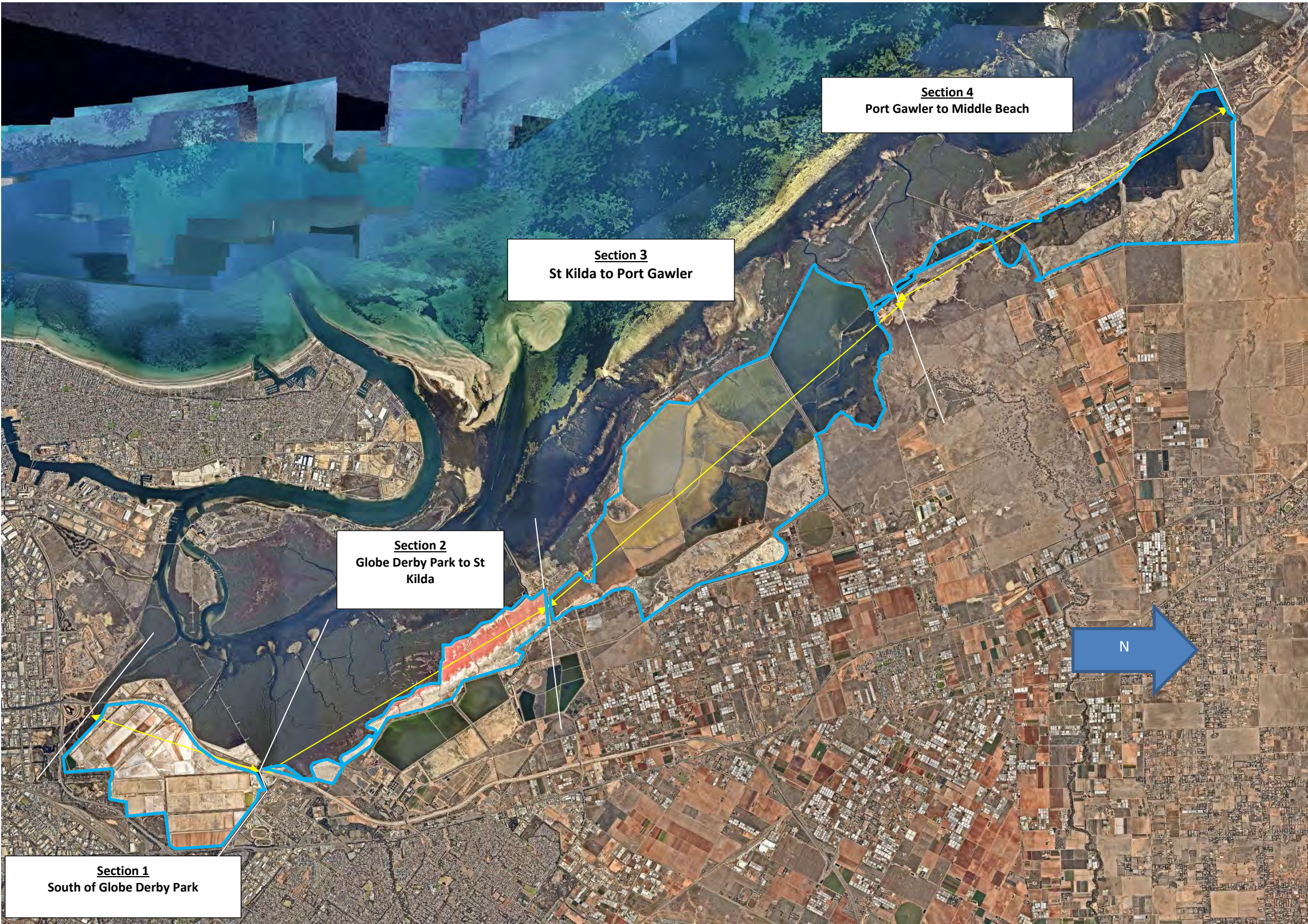


Figure 8-2: Approximate Area of Holding Pattern and Residual Operations (during and since construction of Northern Connector)

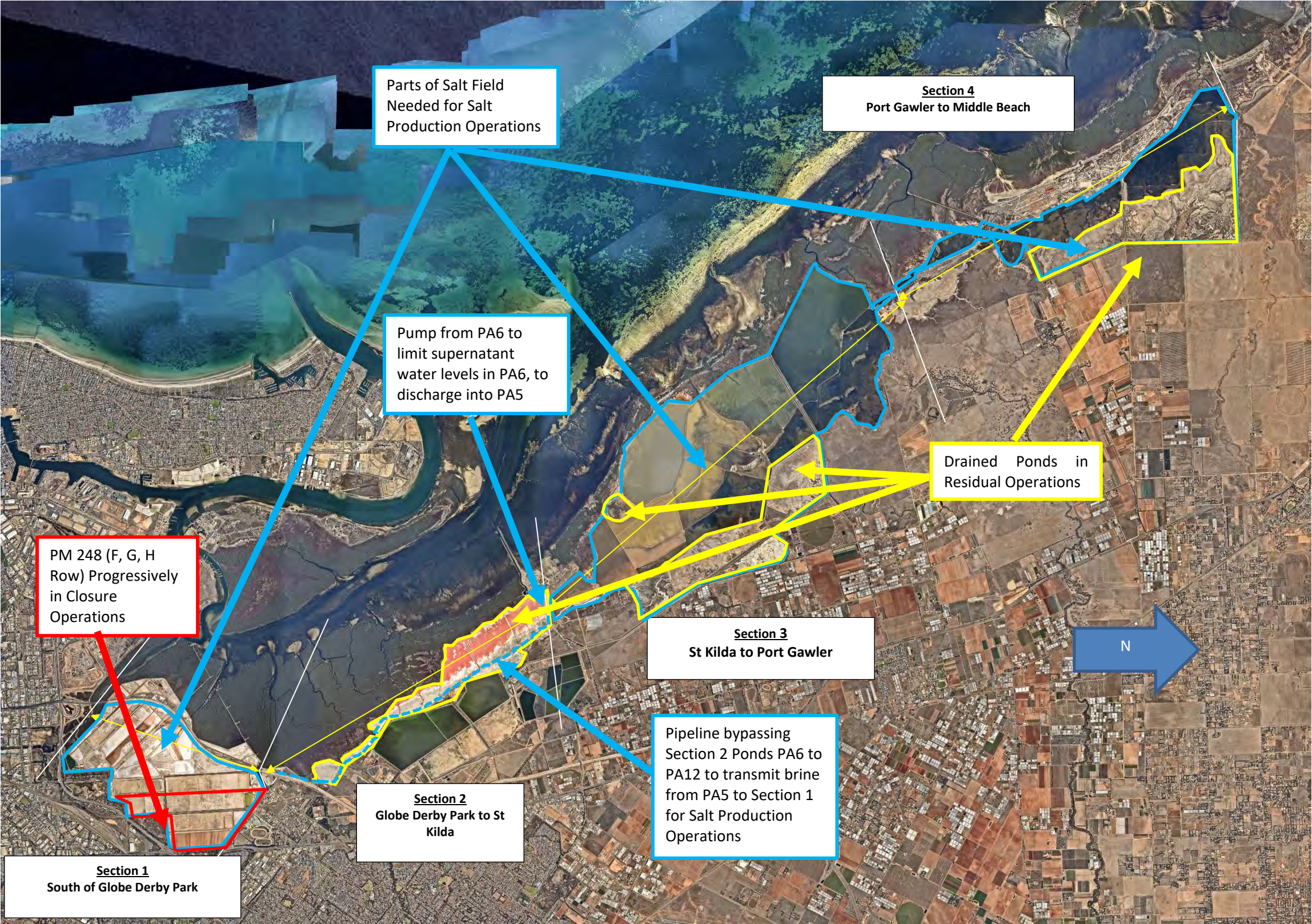


Figure 8-3: Indicative Location of Holding Pattern, Salt Production and Closure Operations for This Revision 5 of the PEPR/MOP

8.3 Summary of Residual and Holding Pattern Operations from 2013 to Resumption of Commercial Salt Production

See Figure 8-2

The cessation of salt production from the historic pumping of brine from Section 2 into Section 1 has entailed:

- cessation of the historic pumping of brine into Section 1, so that no new brine is available from which salt is crystallised in Section 1.
- continued pumping of water from Middle Beach through the salinas to maintain water levels and quality in the ponds that were chosen to remain inundated.
- draining of water from selected salinas so that these became free draining and not require pumped water.
- discharge (into the SA Water Bolivar outfall channel) of water with elevated salt concentrations as a result of evaporation in inundated ponds. This is necessary to prevent excessive salt concentrations in the salinas.
- removal of the existing salt from Section 1.

These activities present a range of hazards with potential consequences for diverse receptors that have variable likelihoods, severities, durations, and degrees of reversibility. The receptors that may experience risk from these hazards and their potential consequences include the following:

- workers at the site
- residents in the local area and / or broader metropolitan Adelaide
- shorebirds (including internationally listed migratory species)
- marine waters and marine species including an important nursery for commercial fish species in an aquatic reserve
- surface water
- flora
- groundwater.

Both the South Australian (SA) Government and BDC are concerned to identify and manage these risks in a prudent manner.

Between February and August 2013, BDC engaged in discussions with South Australian Government agencies (Department of State Development (DSD) (now DEM), Department of Planning, Transport, and Infrastructure (DIT), SA Water, Department for Environment and Water and Natural Resources (DEWNR) (now Department for Environment and Water (DEW)), Environment Protection Authority (EPA), Department of Primary Industries and Regions SA, (PIRSA)).

In August 2013, Ridley was advised by DEM that it was necessary to implement a care and maintenance plan for the site to provide time (i.e., with acceptable and manageable levels of environmental risk) for the investigations and design needed to develop the mine completion PEPR. From August 2013 both Ridley and the key South Australian Government agencies (DEM, SA Water, EPA, DEW, DIT and

PIRSA) worked to determine a practicable care and maintenance plan for the BDC operations. This led to Revision 1 of this PEPR/MOP being produced by December 2014 and approved by DEM. This documented the care and maintenance activities that form the Holding Pattern and Residual Operations.

The current care and maintenance activities forming the Holding Pattern and Residual Operations are set out in Chapter 12 of this PEPR / MOP. **These remain unchanged from the 2017 Revision 3 of this PEPR / MOP, and from the 2020 Revision 4 of this PEPR / MOP**, noting that minor amendments were made in the 2020 revision to provide additional clarity about care and maintenance activities. They have the purposes of:

- implementing residual salt processing operations in Section 1, pending:
 - the filling of F, G, H row crystallisers for their rehabilitation and closure; and
 - resumption of commercial salt production in the balance of Section 1 (now confined to the east of the Northern Connector)
- implementing a Holding Pattern for Sections 2 to 4:
 - maintaining drained ponds and their bunds
 - sustaining water salinity and levels within inundated ponds within target ranges² (using a combination of managed entrainment and licensed pumped discharge), pending the resumption of their commercial salt production;
 - providing opportunities to investigate, in a managed environment, the opportunities and constraints on future land uses in the drained ponds.

In April 2014, following submission of a negotiated document describing a change of process to implement residual operations in Section 1 and a Holding Pattern in Sections 2 to 4, Ridley received a new licence from the EPA and other relevant approvals. That licence has since been further renewed. The current EPA licence is provided in Appendix 3.

Chapter 4 of this Revision 5 of this PEPR / MOP contains a chronology of the revisions and minor changes to this PEPR / MOP since Revision 1.

In July 2020, a new mining lease was granted. This is ML 6514. It reinstates as a mine tenement an area of that part of ML 391 which was surrendered for the purposes of the Northern Connector Freeway.

8.4 Outline of Operations to Prepare for Resuming Commercial Salt Production Operations

See Figure 8-3

At a time that is presently undefined, BDC may wish to close the whole mine to enable redevelopment for other purposes and to close it in a manner that complies with its obligations under the Mining Act.

However, at this point in time BDC intend to restart commercial salt operations using parts of the Salt Field.

² See Table 12-3 and Figure 12-13

The activities to make these operations possible, while continuing to achieve the environmental outcomes required by this PEPR / MOP, entail:

- Building the infrastructure needed to pump brine from PA5 in Section 3 via a pipeline to PA12 in Section 2 to flow through an existing pipeline from PA12 to ML 6514 in Section 1. See Section 12.3 in Chapter 12 for more information.
- Re-establishing the functionality of the Section 1 infrastructure to receive and manage this brine.
 - This movement of brine into Section 1 is necessary to:
 - re-establish the quality of brine needed for the resumption of commercial salt production in Section 1.
 - prevent excessive salt concentrations in the salinas – concentrations that would be incompatible with the environmental outcomes required by this PEPR / MOP - arising from the reducing quantities able to be discharged into the SA Water Bolivar Outfall (due to reducing effluent flow rates in it from the Bolivar STP).
- Making the other preparations needed for the resumption of commercial salt production using the brine pumped into Section 1.
- Maintaining the following activities
 - continued pumping of water from Middle Beach through the salinas (a.k.a. ponds) to maintain water levels and quality in the ponds in Sections 3 and 4 that were chosen to remain inundated. These salinas (and possibly including XB8A at some future time) will be needed for the supply of brine of suitable quality and salinity into Section 1.
 - draining of runoff from drained salinas so that these remain free draining
 - managing the seasonal water levels in the Section 2 ponds PA6 to PA9 below defined limits, while not pumping brine from PA5 into PA6
 - removal of the existing salt from those parts of Section 1 that will not be used to manage the brine received from Section 3 and crystallise new salt from it.

Until mine completion, BDC intends to operate the site as set out in this PEPR and in compliance with its regulatory requirements.

8.5 Environmental Management Framework for the Site

The operator of the Salt Field is now Buckland Dry Creek Pty Ltd (BDC), following sale of Ridley Dry Creek Pty Ltd by Ridley Corporation.

BDC is committed to:

- Implementing standard operating procedures for Dry Creek Salt Field.
- Implementing the DEM endorsed PEPR / MOP for the Salt Field.

- Complying with the EPA Licence for the Salt Field; and
- Complying with other permits and approvals for the Salt Field (e.g., Water Licences, PIRSA Permits etc)

Following DEM approval of this Revision 5 of the PEPR / MOP, BDC will implement the operations to resume salt production with an experienced salt production contractor. That contractor will be responsible for preparing, operating and maintaining the Salt Field to produce salt. It will also assist BFC to maintain the holding pattern in those parts of the Salt Field not required for producing salt. BDC will remain responsible, as owner of the private mines and of the mine leases of the Salt Field:

- To DEM for compliance with this PEPR /MOP
- To EPA for compliance with brine and bitterns discharge licences

BDC will require the salt production company to comply with these documents

To that end, it is envisaged that the salt production contractor will prepare its own

- Environmental Policy for the Salt Field
- Site-specific standard operating procedures that address quality, safety, legislative and environmental aspects of its Salt Field preparation, operations, and maintenance works
- System and procedures to monitor and report compliance with quality, legislative, safety and environmental requirements
- System and procedures for reporting and dealing with non-compliance and emergencies

These documents will need to satisfy BDC's requirements.

9 Legislative Framework

9.1 Relevant Legislation

9.1.1 Mining Act

The *Mining Act and Mining Regulations* provide the framework for the approval and regulation of all mining operations in South Australia and is administered by DEM. The Mining Act is the principal legislation for regulating the operations and closure of the Dry Creek Salt Field.

As noted at Section 8.1, 46 mining leases and two private mines make up the existing operations. The mining leases are currently operated as a Special Mining Enterprise (SME) under sections 56A-D of the Mining Act. Prior to 2011, the documentation required under section 56B of the Mining Act fulfilled the function of a Mining and Rehabilitation Program. Since 2011, a PEPR has been required for mining operations on a mining tenement. Under section 70B of the Mining Act, a PEPR must include information on the:

- mining operations
- environmental outcomes expected to occur as a result of the mining operations
- criteria to measure achievement of environmental outcomes
- ability of the miner to achieve the environmental outcomes.

Further requirements for the content of a PEPR are set out in a Ministerial Determination (TOR 005). The compliance of this PEPR with the Ministerial Determination is shown in Chapter 5

The private mines are not included in the SME but do form part of the integrated salina system of the Salt Field. Land within a private mine is not subject to a mining tenement under the Mining Act. Mining operations on a private mine require approval of a MOP by DEM under the Mining Act. Mining operations on the two private mines that are part of the Dry Creek Salt Field are carried out in accordance with a Development Program prepared under regulation 10 of the *Mines and Works Inspection Regulations 1998* (now regulation 9 of the *Mines and Works Inspection Regulations 2013*). Under transitional arrangements, this program was deemed to be a MOP for the purpose of section the Mining Act.

The current requirements of a MOP are set out in the Mining Regulatory guidelines MG12. A MOP must include:

- a description of the nature and character of the environment (including physical and biological features) that can reasonably be expected to be affected by operations carried out
- objectives relating to:
 - construction and operation of the mine and any related facilities
 - management of potential impacts on the environment
 - ongoing and final rehabilitation of the site, site closure, and future use of the site
- action to be taken in the event of an emergency situation at the site of the mine.
- details of the operations to be carried out at the mine and associated facilities

- procedures to be followed in the event of an incident or situation which gives rise to, or could adversely affect, a matter of environmental significance.

Compliance of this PEPR / MOP with the Mining Regulations is shown in Chapter 6.

It is noted that:

- Ridley Dry Creek Pty Ltd submitted a compliance report to DEM covering its operations under the PEPR / MOP to 31 May 2016 (Ridley 2016).
- BDC effectively took over the operations and responsibility for compliance from 1 June 2016, and has, to date, submitted compliance reports for the years 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, 2022-2023, and 2023-2024.

9.1.2 Environment Protection Act 1993

The *Environment Protection Act 1993* provides for the protection of the environment and defines the functions and powers of the EPA. The Act facilitates the adoption and implementation of environment protection measures and regulates activities, products, substances, and services that, through pollution of production of waste, may cause environmental harm. The Act also regulates the generation, storage, transportation, treatment, and disposal of waste.

Environment protection policies established under section 28 of the Environment Protection Act of particular relevance to the Dry Creek Salt Field include:

- Environment Protection (Air Quality) Policy 2016
- Environment Protection (Noise) Policy 2007
- Environment Protection (Water Quality) Policy 2015.

The environmental outcomes proposed in this PEPR / MOP comply with these policies.

BDC holds EPA licence 40942, issued on 1 April 2021, amended 12 December 2021, and again on 11 September 2023, and expiring on 31 March 2026. This licence is for the following prescribed activities on the Salt Field:

- 1(1) Chemical storage and warehousing facilities
- 1(2)(b) Chemical works: Salt production
- 8(7) Discharge to marine or inland waters.

Important requirements of this licence include:

- Saline water (not Bitterns) may only be discharged into coastal waters at the SA Water Bolivar Waste Water Treatment Plant Outfall Weir (Weir 2)³.

³ Note that for operational safety and convenience, BDC monitors salinity at the Bridge (see Figure 3-2). This is about 10 hours of flow time upstream from Weir 2 (See Figure 3-2). Experience shows that in this flow time salinity reduces (probably as a result of seepage from regional groundwater into the outfall) so that the salinity in water arriving at Weir 2 is lower than that at the Bridge. Also, from time-to-time incoming tides flow over Weir 2 into the outfall and mix with the water it contains.

- The discharge must not have a salinity greater than 45 parts per thousand measured on a 6-hour rolling average. Continuous in-line monitoring of salinity is required and BDC must cease discharge if the salinity criteria is exceeded.
- Bitterns (a solution of bromides, magnesium and calcium salts remaining after sodium chloride is crystallised out of seawater) may only be discharged at specified points. The water quality criteria for bittern discharge are:
 - o suspended solids: less than 80 mg / L + 80% seasonal maximum
 - o pH: 6-5 – 9.2
 - o salinity: hydrography of stream flow causes a permanent change in isohaline patterns of no more than 10% of background variation
 - o oxygen (dissolved): discharge is subject to turbulent flow to ensure it is discharged with highest possible Oxygen saturation.

BDC must also develop and implement a Dredging Notification Plan, Dust Management Plan, Odour Management Plan and Noise Management Plan.

The requirement for a licence for prescribed activities is to ensure such activities do not cause environmental harm. Environmental outcomes and criteria listed in Table 14-1 in this PEPR address the current licence requirements.

9.1.3 Fisheries Management Act 2007

The *Fisheries Management Act 2007* provides for the conservation and management of the aquatic resources of the State, the management of fisheries and aquatic reserves, the regulation of fishing and the processing of aquatic resources, the protection of aquatic habitats, aquatic mammals and aquatic resources and the control of exotic aquatic organisms and disease in aquatic resources.

Section 77 of the Act prohibits disturbance of water beds, or removal or interference with animals or plants, in an aquatic reserve without authorisation. BDC holds a permit to allow discharge of water from the Bolivar Channel Outfall into the St Kilda – Chapman Creek Aquatic Reserve. The permit is subject to the discharge criteria set by the EPA licence.

Until 25 March 2015, BDC also had an exemption under s 115 of the Act allowing use of nets to remove carp from the Bolivar Channel Outfall. That exemption was renewed in 2021 because a period of no discharge to the Outfall. When there is discharge to the Outfall from PA5, the salinity of the water in the outfall channel precludes carp.

The St Kilda – Chapman Creek Aquatic Reserve is considered in this PEPR / MOP to be of environmental value. There is a need for ongoing discharge to the marine environment via the outfall. Consequently, environmental outcomes required by this PEPR / MOP, and the EPA licence requirements consider the protection of this reserve.

9.1.4 PDI Act 2016

The *PDI Act 2016* provides a legislative framework for the planning and regulation of new developments, the use and management of land and buildings, the design and construction of buildings and the maintenance and conservation of land and buildings. The Act does not prevent, or otherwise affect, operations carried out under the Mining Act, or the operation of a private mine.

The Act will apply to the Salt Field when the mining tenements are relinquished. New developments following relinquishment may require approval under the PDI Act. All development applications are assessed against the objectives and principles of the relevant Council development plan. Development plans are self-contained policy documents prepared under, and given statutory recognition under, the PDI Act. Post completion land uses proposed in this PEPR / MOP will need to take account of these development plans.

9.1.5 Native Vegetation Act 1991

The *Native Vegetation Act 1991* provides incentives and assistance to landowners for the enhancement and preservation of native vegetation and acts to control the clearance of native vegetation.

Clearing undertaken for mining activities approved under the Mining Act is exempt from the Native Vegetation Act. This exemption, however, is subject to a requirement that all mining operations (other than exploration) that involve the clearance of native vegetation must be undertaken in accordance with a management plan that the Native Vegetation Council has signified will result in a significant environmental benefit (SEB). The role of the Council for this function has been delegated to DEM.

The intent of SEB is not only to replace the immediate environmental values lost through clearance, but also to achieve a net gain that contributes to improving the condition of the environment and biodiversity of the region. SEB may be made through on ground management and restoration of native habitats as guided by an approved vegetation management plan or by direct monetary contribution into the Native Vegetation Fund. Reference should be made to the “Guide for a Significant Environmental Benefit for the clearance of native vegetation associated with the Minerals and Petroleum Industry, Native Vegetation Council August 2017”.

Some closure strategies in this PEPR / MOP may result in loss of vegetation. If so, a SEB may be required for approval by DEM.

In event there is a need to apply for clearance of native vegetation for future saltfield rehabilitation and closure, guidance that applies to the specific circumstances will be sought from the appropriate authorities⁴.

9.1.6 National Parks and Wildlife Act 1972

The *National Parks and Wildlife Act 1972* provides for the establishment and management of reserves, the conservation of wildlife in a natural environment, and for other purposes such as permits for the keeping of native animals and compliance.

The Act protects all native flora and fauna in South Australia and lists species of state conservation significance in Schedule 7 (Endangered), 8 (Vulnerable) and 9 (Rare) of the Act. There are no approval requirements under this legislation to impact on a listed species. If native vegetation is to be removed, the impacts are assessed under the *Native Vegetation Act 1991*.

⁴ The following document provides current guidance for applications to clear native vegetation:

https://cdn.environment.sa.gov.au/environment/docs/Guide-for-Applications-to-Clear-Native-Vegetation_1-Sept-2024.pdf

9.1.7 Adelaide Dolphin Sanctuary Act 2005

The *Adelaide Dolphin Sanctuary Act 2005* establishes a sanctuary to protect the dolphin population of the Port Adelaide River Estuary and Barker Inlet and its natural habitat and provides for the protection and enhancement of the Port Adelaide River Estuary and Barker Inlet

This applies to BDC in respect of the saltfield, and has been addressed via those parts of the Environmental Risk Assessment, Outcomes and Measurement Criteria that deal with surface water and groundwater impacts (See Sections 13 and 14 of this PEPR/MOP).

All obligations under the Act are addressed in the operation of the Saltfield.

9.1.8 Heritage Places Act 1993

The *Heritage Places Act 1993* makes provision for the identification, recording and conservation of places and objects of non-Aboriginal heritage significance and establishes the South Australian Heritage Council.

9.1.9 Aboriginal Heritage Act 1988

The *Aboriginal Heritage Act 1988* provides for the protection and preservation of Aboriginal heritage.

9.1.10 Landscape South Australia Act 2019

A Water Affecting Activity permit under section 104(4) of the Landscape South Australia Act 2019 may be required from Green Adelaide for any works that constitutes one or more of the following:

- 104(4)(a) Water diversion and storage - erection, construction, modification, enlargement, or removal of a dam, wall, or other structure
- 104(4)(b) Building a structure in a watercourse, lake, or floodplain
- 104(4)(c) Drainage or discharge of water into a watercourse or lake
- 104(4) (d, e, f) Depositing objects or solid material in a watercourse, lake, or floodplain
- 104(4)(g) Excavation or removal of rock, sand or soil from a watercourse, lake, or floodplain
- 104(4)(h) Destroying vegetation growing in a watercourse or lake, or growing on the floodplain of a watercourse

The need for any such permit(s) may be partially negated by section 106(1)(f)(i) of the Act which states that a permit is not required to undertake an activity that is required or authorised by an environment protection policy, an environment protection order, an environmental authorisation, or a clean-up order under the Environment Protection Act 1993.

The discharges of brine or bitterns from the Salt Field ponds are regulated by the Mining Act and the EPA and so it is likely the need for a WAA permit for the drainage or discharge aspects under Section 104(4) is negated.

The conduct of earthworks within the mine tenements – whether within or outside a bunded part of the Salt Field (e.g., a pond or crystalliser) is likewise regulated by the Mining Act and the EPA and so it

is likely the need for a WAA permit for the drainage or discharge aspects under Section 104(4) is negated. It is noted that such earthworks within a bunded part of the Salt Field (e.g., a pond or crystalliser) are conducted on land that has been (due to the history of the Salt Field) and remains isolated from the external watercourses and or floodplain.

There could be a need for a WAA permit for destroying vegetation growing in a watercourse or lake or growing on the floodplain of a watercourse that is outside a bunded part of the Salt Field (e.g., a pond or crystalliser), noting however that this activity is likewise regulated by the Mining Act. It is likely that there is no need for a WAA permit for destroying vegetation growing inside a bunded part of the Salt Field (e.g., a pond or crystalliser).

9.1.11 Other South Australian legislation

Other South Australian legislation relevant to the Dry Creek Salt Field includes, but is not limited to, the following Acts (and associated Regulations):

- Coast Protection Act 1972
- Fire and Emergency Service Act 2005
- Dangerous Substances Act 1979
- Work Health and Safety Act 2012.

9.1.12 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's primary environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places — defined in the EPBC Act as matters of national environmental significance.

The nine matters of national environmental significance protected under the EPBC Act are:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)
- a water resource, in relation to coal seam gas development and large coal mining development.

The only matters relevant to the Dry Creek Salt Field are listed threatened species and ecological communities and listed migratory species. Approval will be required from the Commonwealth

Environment Minister for any actions in this PEPR / MOP that are likely to have a significant impact on these matters.

A referral for closure activities was submitted in January 2015. On 14 February 2015, the delegate of the environment minister determined that the activities required approval and will be assessed on preliminary documentation.

BDC has previously submitted to the Commonwealth Environment Minister a series of self-assessment reports for the impacts of the change from historic salt production to the Holding Pattern on listed threatened species and ecological communities and listed migratory species. These reports were based on data from specifically designed monitoring programmes that are documented in the submitted reports. These reports demonstrated that:

- the change from historic salt production to the Holding Pattern – and specifically the draining of several ponds and the holding Pattern’s regime of water levels and salinities in the remaining inundated Section 3 and 5 ponds - had not had any adverse impact on listed threatened species and ecological communities and listed migratory species.
- the bird habitat established and sustained by the controlled water level and salinity conditions in Sections 3 and 4 of the Salt Field during historic salt production, the holding pattern and during future salt production operations is important in its own right and provides roosting habitats for shorebirds and water birds using the Adelaide International Bird Sanctuary.

Resumption of salt production will secure the capacity to sustain the salinities and water levels in the inundated Section 3 and 4 ponds and does not represent a closure activity. Should any of these inundated ponds be chosen to have its salinity and water level regime changed from that described in this PEPR / MOP, then that could likely have a significant impact on listed threatened species and ecological communities and listed migratory species. This prospect would require referral to the Commonwealth Environment Minister.

The potential impact on these species or communities from future closure activities in drained ponds that support listed threatened species or ecological communities or listed migratory species, will need to be considered, to check if a referral to the Commonwealth Environment Minister is required, or not.

9.2 Other Relevant Policies and Plans

9.2.1 South Australia’s Strategic Plans

Various government departments and agencies have issued Strategic Plans. These get revised and updated at intervals. The applicable and relevant Strategic Plan will be considered in future land use planning for the site.

9.2.2 The 30-Year Plan for Greater Adelaide

The 30-Year Plan for Greater Adelaide was released in 2010 and updated in 2017. For a further update, in September 2024 the State Government released the draft Greater Adelaide Regional Plan for public consultation.

This 30-year plan delivers a planning vision for greater Adelaide, shaping Adelaide’s growth, addressing areas like housing, infrastructure, population and economic growth and sustainability.

The plan designates Section 1 of the Salt Field as a future urban growth area. Parts of other Sections of the Salt Field represent investigation areas or opportunities for future urban growth.

The plan will also be considered in future land use planning for the site.

9.2.3 Adelaide International Bird Sanctuary

The Adelaide International Bird Sanctuary (AIBS) occupies a 60-kilometre stretch of the Gulf of St Vincent coastline from the Barker Inlet to the township of Port Parham, incorporating parts of the Dry Creek Salt Field (Figure 9-1).

The sanctuary's focus is on protecting significant migratory shorebirds, enhancing water quality on Gulf St Vincent, contributing to a more liveable and sustainable city, and providing ecotourism and indigenous employment opportunities.

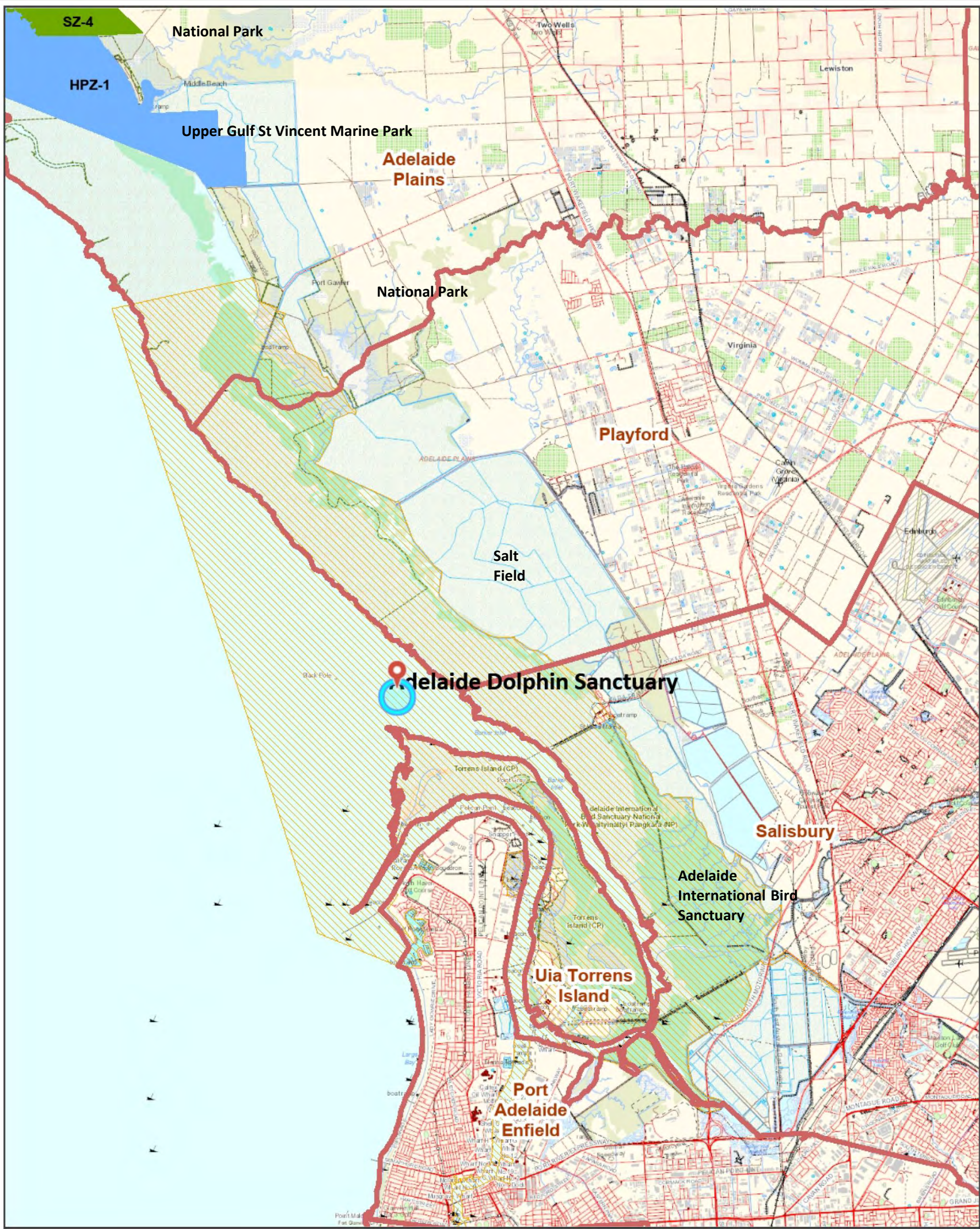
The monitoring done for the self-assessment reports provided to the Commonwealth (and included in past PEPR / MOP compliance reports demonstrated that the bird habitat established and sustained by the water level and salinity conditions in Sections 3 and 4 of the Salt Field during historic salt production, the holding pattern and during future salt production operations is important in its own right, and provides roosting habitats for shorebirds and water birds using the Adelaide International Bird Sanctuary.

Salt production operations will not take place within areas overlapping with the AIBS.

9.2.4 Northern Connector

The Northern Connector is a non-stop motorway connecting the already complete Northern Expressway and South Road Superway links. The 5.5 km road, to the west of Port Wakefield Road, extends from the new Northern Expressway Interchange with Port Wakefield Road at Waterloo Corner to the Port River Expressway and South Road Superway Interchange at Wingfield.

The route for the Northern Connector is shown in Figure 9-2.



Map data is compiled from a variety of sources and hence its accuracy is variable.

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Compiled: 21-Apr-2025
Generated at: www.naturemaps.sa.gov.au
Datum: Geocentric Datum of Australia, 2020
Projection: Web Mercator (Auxiliary Sphere)

Government of South Australia
Department for Environment and Water

Figure 9-1: Adelaide International Bird Sanctuary (shown in green) and other protected areas

Source: <http://spatialwebapps.environment.sa.gov.au/Geocortex/Essentials/GXE414x/REST/TempFiles/A4%20Portrait.pdf?guid=f805731e-41a8-4b98-b304-430a940daf33&contentType=application%2Fpdf>



Figure 9-2: Northern Connector Route Through the Salt Field

Source: Department of Planning, Transport, and Infrastructure

9.2.5 South Australia's Planning and Design Code

South Australia's Planning and Design Code applies planning policies on a property basis

- See <https://code.plan.sa.gov.au/>

To explore which zones and which planning policies apply to each property within the Salt Field it is easiest to access the above website, find the property on the provided map, and then view the code. The web page that then opens provides access to the applicable assessment pathways, property zoning information, and development policies.

The main zones in these development plans that apply to the Salt Field are indicated in Figure 9-3.

9.3 Future Land Use Context

BDC is exploring the options for future land uses in the different parts of the Salt Field. As of the date of preparation of this PEPR / MOP Revision, the following can be stated.

9.3.1 Section 1 - South of Dry Creek

The western part of Section 1 was taken over by DIT for the Northern Connector. It is understood that land, originally in Section 1 and located to the west of the Northern Connector that is surplus to the requirements of the Northern Connector has been transferred back to Renewal SA.

BDC owned land that is covered by mining tenements will ultimately be the subject of mixed-use urban development. To this BDC has started, pursuant to previous revisions of the PEPR / MOP to fill some of this land, in preparation to close the mine in parts of this land to enable that development.

The mine tenement land to the east of the Northern Connector and to the west of the BDC owned land being filled is proposed in this revision of the PEPR / MOP to have its salt production infrastructure rehabilitated and then be used for resumed commercial salt production.

Those intertidal parts of mining tenements in Section 1 that lie outside and west of the sea wall that forms the western boundary of what was the operational Salt Field in Section 1 will stay with or have been returned to the Crown.

9.3.2 Section 2 – Dry Creek to St Kilda

North of Dry Creek to PA6

The mining tenement land associated with almost all of PA12 and some of the land between PA12 and PA11 has been taken over by DIT for the Northern Connector.

The remaining mining tenement land of PA6 to PA12 is presently in holding pattern under this and previous revisions to this PEPR / MOP. It is proposed, in this revision of the PEPR / MOP to flow brine through a pipeline from PA5 to the exit from PA11, thus bypassing PA6 to PA11. From PA11 brine will flow via an existing syphon under the Little Para and then either via an existing channel previously used for this purpose, or a pipeline, into PA12, from where it will be pumped into Section 1.

The remaining mining tenement land of PA6 to PA12 that will not be occupied by the pipeline and systems to transmit brine to Section 1 will remain out of commission.

Those intertidal parts of mining tenements in in this part of Section 2 that lie outside and west of the sea wall that forms the western boundary of what was the operational Salt Field in Section 2 will continue to be leased and managed by BDC from the Crown.

Section 3 – St Kilda to Port Gawler (North of PA4) and Section 4 – Port Gawler to Middle Beach

Ideas for future land uses in these parts of the Salt Field that are presently drained and that are not currently intended to be used for resumed commercial salt production are being explored to establish what combinations may be feasible and desirable. These include:

- shorebird and waterbird habitat conservation
- solar energy production
- carbon sequestration by biological processes
- stormwater management
- horticulture / agriculture
- aquaculture
- salt production
- mixed-use urban development.

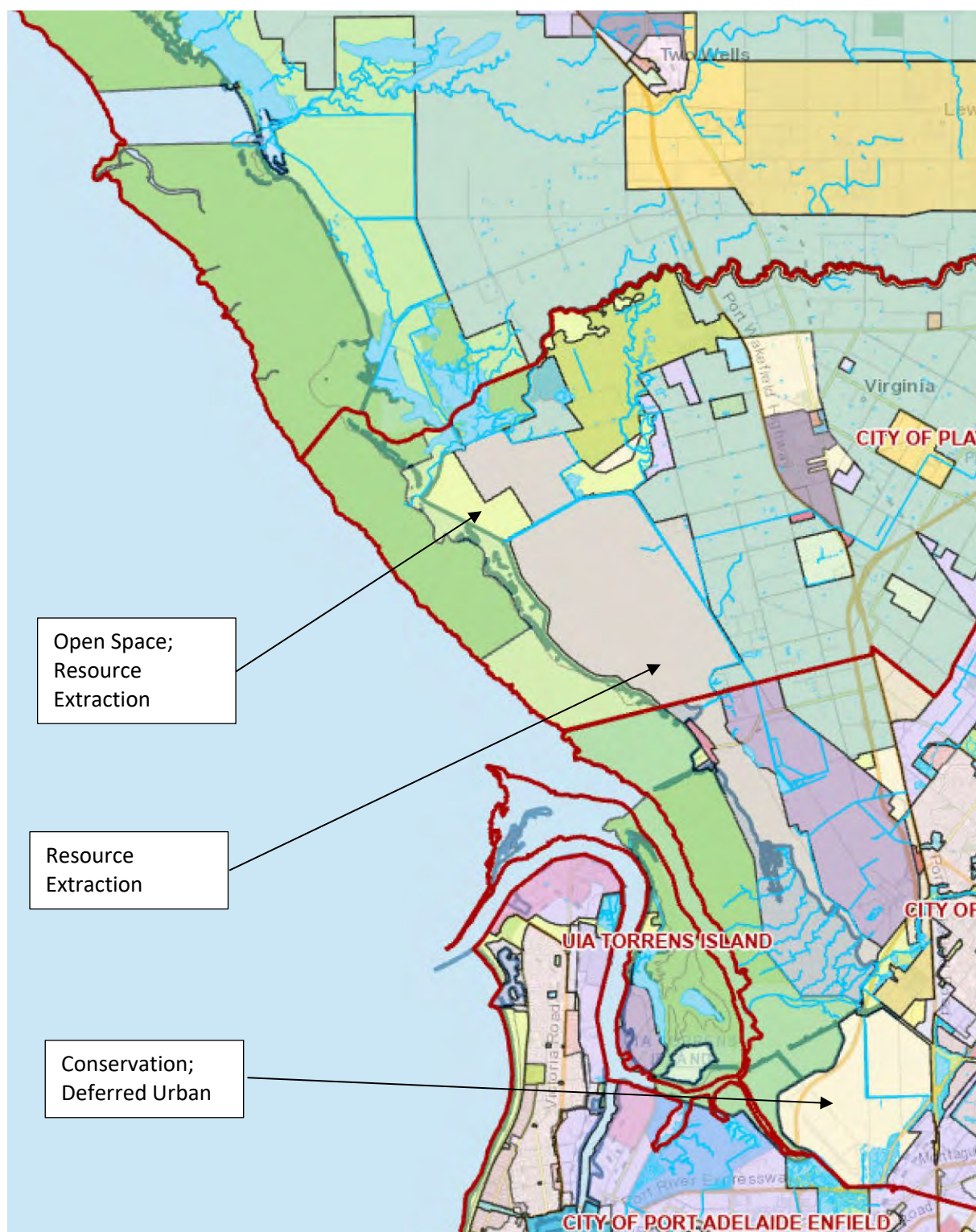


Figure 9-3: Indicative Land use zoning

Source:

https://lsa2.geohub.sa.gov.au/server/rest/directories/arcgisjobs/sappa/ppatlasprintv2_gpserver/j9a86b2e5281840068f29626bbb2fa253/scratch/ef51b5cd951a4dc18477c82f67c57f92.pdf?&rd=8643376

For more detailed information about land use zoning and development policies please visit <https://code.plan.sa.gov.au/> and <https://sappa.plan.sa.gov.au/>

10 Overview of Site and Context

10.1 Overview of Site and Surrounding Land Uses

10.1.1 Location

The southernmost portion of the field is located 14 kms north of Adelaide on the Port Wakefield Road. Mineral Leases and Private Mines provide the mining tenure for the existing operations. In their entirety, the Mineral Leases and Private Mines extend along 35 kms of coastline between Dry Creek and Middle Beach. The mining operations fall within the Hundreds of Port Adelaide and Port Gawler. This area also falls across several local government areas (the City of Salisbury, City of Port Adelaide Enfield, City of Playford and the Adelaide Plains Council). The entire site occurs within the 2008 gazetted boundaries of the Adelaide and Mt Lofty Ranges Natural Resource Management Board.

Although there are many individual Mineral Leases and Private Mines forming the Dry Creek Salt Fields, they are not operated individually but form part of an integrated system.

10.1.2 History

The Dry Creek Salt Fields, Angaston limestone mine and Osborne Soda Ash plant were established in the 1930's by Imperial Chemical Industries. In 1993 all sites were sold to Penrice Soda Products Pty Ltd. In 2005 Penrice Soda Products divested itself of the Dry Creek Salt Fields, which were purchased by Cheetham Salt Ltd a subsidiary of Ridley Corporation and operated under Ridley's ownership supplying salt to Penrice Soda Products until the Salt Field entered a holding pattern in 2014 after the Penrice Soda Ash operation, in 2013, ceased requiring the sodium chloride brine from the Dry Creek Salt Fields. The same entity has owned and operated the Salt Field since 2005 under different company names and different ownership.

10.1.3 Section 1 – South of Globe Derby Park

General Description

This southern-most portion of the Salt Field, essentially encompassing the salt crystallisation pans, is situated adjacent to the northern industrial precincts of Dry Creek and Wingfield. The Barker Inlet and Aquatic Reserve border the salt pans to the west and expansive wetlands generally border the southern and eastern portions of the land, traversing the Salisbury Highway (which extends from the southern boundary and along the eastern side of the land), to connect to Port Wakefield Road.

The land to the south and south-east forms part of Adelaide's major industrial precinct and includes the suburbs of Wingfield, Regency Park, Dry Creek, and Cavan. This industrial precinct is also well serviced by major transport routes, is in close proximity to the Dry Creek rail yards and has direct access to the Port of Adelaide. To the west is the Gillman Resource Recovery Precinct and the future Gillman Industrial Estate (of some 200 Ha).

Development to the east and on the opposite side of Port Wakefield Road is residential and includes the suburbs of Mawson Lakes and Parafield Gardens. Port Wakefield Road provides a natural development barrier and buffer, as do the wetlands.

The Northern Connector traverses along the western boundary of Section 1 on an embankment

Land Use

Most of the land within this section is operational Salt Field production land, provided for the final crystallisation, harvesting, processing, and transporting of the end-product to the Osborne factory. Three hundred and four hectares of this land is freehold land owned by BDC.

Built improvements comprise the site office and stores. Other improvements are generally specialised salt production related, such as pumps, levees, roadways, and ponds. A series of levees protect the salt pans land from uncontrolled flooding from either the sea or the adjoining wetlands.

The freehold land has Private Mine tenements and the balance in section 1 has Mining Leases, however, there are generally no other occupancy rights over the land covered by Mining Leases.

The land is within the City of Salisbury and, under the current Development Plan, is intended to underpin a comprehensive and staged urban development.

Future land uses in Section 1 under this PEPR /MOP include:

- Filling and rehabilitation of the former F, G and H row crystallisers to enable mine completion and closure and then subsequent planned redevelopment for mixed uses.
- Resumption of salt production in the former crystallisers rows A to E and K, and using the associated Final Areas, ponds, drains and infrastructure.

10.1.4 Section 2 – Globe Derby Park to St Kilda

General Description

Extending north for approximately seven kilometres, this Section comprises a series of salt evaporation ponds generally hugging the eastern side of coastal mangrove land owned by the Crown and otherwise designated Aquatic Reserve. The land abutting the east of the salt operation comprises, in the main, the Bolivar Waste Water Treatment Plant, which has its own extensive holding ponds running parallel to the salt evaporation ponds.

This land is generally within the suburb of Dry Creek, in the City of Salisbury. It has a small industrial pocket to the south, centred on Churchill Road, while the balance is largely undeveloped swamp, mangrove, wetlands, and low-lying land, some of which is subject to inundation.

Land Use

The operational portion of this land is concentrated to the north, gradually tapering along the eastern boundary to evaporation ponds adjacent to Globe Derby Park, comprised in a small freehold parcel. The balance of Crown land is non-operational and is part of the 'Barker Inlet and St Kilda Aquatic Reserve' which comprises significant mangrove reserves.

The freehold land has a Private Mine tenement, and the Crown land has a Mining Lease, however there are no other occupancy rights over the Crown land covered by Mining Lease. The ratio of both operational freehold to operational leasehold land and total freehold to total leasehold land is very low.

10.1.5 Section 3 – St Kilda to Port Gawler

General Description

This Section comprises expansive salt evaporation ponds extending for approximately ten kilometres along the coast, from St Kilda in the south to the Gawler River at Port Gawler in the north. It also comprises Crown land along the western strip and freehold land to the east.

Essentially the whole of the freehold land in this stretch is utilised for condenser ponds. All land in this stretch is low lying and subject to inundation. It may require some fill or remediation for alternate development.

The land is within the suburb of Buckland Park, within the City of Playford. A large portion of which (to the east of the BDC land) is low-lying and marginal grazing land or owned by Walker Corp and being developed for residential development.

The freehold land and Crown land for this sector of the salt-field is delineated in Figure 10-1.



Figure 10-1: Land tenure – Section 3 (St Kilda to Port Gawler) ■ = BDC freehold ■ = Crown land

Land Use

The majority of land within this section is operational and there is a relatively even split between freehold land and Crown leasehold land. A few narrow strips of the Crown leased land abutting the coast are not operational and would most likely revert to reserve if not controlled by BDC. The freehold land has a Private Mine tenement, and the Crown land has Mining Leases, however, there are generally no other occupancy rights over the Crown land.

This section comprises the most significant area of operational condenser pans. Both the northern and southern portions taper to provide connectors across the Gawler River flood plain and St Kilda Beach environs, respectively.

10.1.6 Section 4 – Port Gawler to Middle Beach

General Description

This section comprises a stretch of condenser ponds spanning approximately nine kilometres of coastline, from Port Gawler in the south to Middle Beach in the north. The land is essentially within the Adelaide Plains Council

It incorporates both Crown land and freehold land, with the freehold land being to the east of the coastal reserve land and mangroves. Middle Beach provides the sea water inlet for the whole of the salt making operation, this installation being situated on Crown land.

Crown land portions are generally low lying whilst freehold portions are slightly higher. The south-western portion borders on the environmentally sensitive Gawler River floodplain, whilst the north-western portion borders on the equally sensitive Salt Creek floodplain. The land is within the Buckland Park and Port Gawler area, which generally comprises low lying marginal grazing land.

The freehold land and Crown Land for this section is delineated in Figure 10-2.



Figure 10-2: Land tenure – Section 4 (Port Gawler to Middle Beach) ■ = BDC freehold ■ = Crown land

This section comprises mostly operational salt evaporation pans, the significant proportion of which are on freehold land. There are two parcels of Crown land, one to the north and one to the south, separated by the freehold land. Both the freehold land and the Crown land have a Mining Lease tenement. There are no occupancy rights beyond this over the Crown land to the south, while BDC holds Licences to Occupy over the Crown land to the north.

The northern parcel of Crown land, adjacent to Middle Beach, incorporates the saltwater inlet supply for the whole of the Salt Field operation. The northern portion, both freehold and Crown land, encroaches onto the environmentally sensitive Salt Creek floodplain.

The southern parcel of Crown land incorporates condenser pans on the eastern side that channels to the south to connect to the Gawler River floodplain crossover. The balance and majority of the southern Crown land comprises mangroves and low-lying land subject to inundation.

Land abutting to the east is marginal grazing land.

10.2 Topography and Landscape

The Dry Creek Salt Fields lie on the Northern Adelaide Plains within the Flinders Lofty Block IBRA region (Environment Australia, 2000).

The topography of the site is flat low-lying supratidal land. Large salinas (the ponds of the Salt Field) cover most of the area south of Middle Beach. West of the salinas, a band of saltmarsh and mangroves occupies the intertidal zone. Through the Salt Field, there is less than 5 m of topographic relief.

Agricultural land abuts the eastern side of the Salt Field leases. These areas have been extensively levelled and sometimes filled. General elevations are higher than the Salt Field salinas.

10.3 Adjoining Reserves and Sanctuaries

The proximity of the Salt Fields to a number of conservation reserves can be seen in

Figure 9-1. This also shows the location of the Salt Fields relative to the Adelaide International Bird Sanctuary. The reserves are described below.

10.3.1 Adelaide Dolphin Sanctuary

The Adelaide Dolphin Sanctuary (see Figure 9-1) covers a total of 118 km² from the inner Port Adelaide region to Port Gawler and incorporates the Barker Inlet and St Kilda - Chapman Creek Aquatic Reserves. The estuarine habitat and population of transient and resident dolphins, including Indo-Pacific Bottlenose Dolphins (*Tursiops aduncus*), are protected within the sanctuary area.

Objectives of the sanctuary include the recognition of indigenous and other cultural and historical relationships, fostering local interest and participation in the management process, and the promotion of public awareness and ecological importance. The sanctuary is also a popular tourist attraction with activities including dolphin cruises, kayaking, and boating.

This is a specially protected area under the Mining Act, 1971. The activities of the Salt Field do not risk impacting this area except by discharges of brine or bitterns, permitted by approval of this PEPR/MOP and the EPA licence, into the tidal waters via defined points of discharge. The conditions of the approval to discharge are determined by the relevant agencies to protect the environmental values of the park.

10.3.2 Upper Gulf St Vincent Marine Park

The Upper Gulf St Vincent Marine Park (see Figure 9-1) spans the waters of the upper reaches of the gulf north of Parada Point and Port Gawler. The park is for the protection of marine and coastal biodiversity and life-sustaining ecological processes, the protection of natural, European, and Aboriginal cultural heritage, as well as providing for ongoing ecologically sustainable development and use. (See <https://cdn.environment.sa.gov.au/marine-parks/docs/mp-gen-14uppergulfstvincent-managementplan.pdf>)

This is a specially protected area under the Mining Act, 1971. The activities of the Salt Field do not risk impacting this area except by discharges of brine or bitterns, permitted by approval of this PEPR/MOP or EPA licence, into the tidal waters via defined points of discharge. The conditions of the approval to discharge are determined by the relevant agencies to protect the environmental values of the park.

10.3.3 Barker Inlet and St Kilda – Chapman Creek Aquatic Reserves

The Barker Inlet Aquatic Reserve is the southern component of two connected aquatic reserves in the Salt Fields area and extends from North Arm Creek to the St Kilda Boat Channel. The reserve provides for the conservation of seagrass and mangrove communities, as well as the protection of nursery

areas for key recreational and commercial fishing species. The use of fishing devices and removal of marine organisms are restricted within the area, whilst boating and swimming are permissible.

The St Kilda – Chapman Creek Aquatic Reserve ranges from the boat channel at St Kilda to Chapman Creek to the north and is connected to the northern boundary of the Barker Inlet Aquatic Reserve. The reserve protects productive areas for marine food, as well as sheltered marine ecosystems and breeding areas. Boating and the removal of fish by rod and line is permitted within the reserve.

The habitat types within the Barker Inlet and St Kilda-Chapman Aquatic Reserves, including Samphire flats, intertidal mangroves, and intertidal sand and mudflats, are listed in the *Directory of Important Wetlands in Australia* (Environment Australia 2001).

10.3.4 Port Gawler Conservation Park (now part of Adelaide International Bird Sanctuary National Park – Winaityinaityi Pangkara)

This area covers a range of landform features including mangrove forest, tidal flats, Samphire swamp, intermittent sand dunes, and estuarine habitats. The park protects the nursery and habitat areas of commercially important fish and crustacean species. Recreational activities including boating, fishing, and crabbing are popular within the Port Gawler area.

10.3.5 Buckland Park Lake

Buckland Park Lake is a shallow and ephemeral freshwater lake formed by damming of the mouth of the Gawler River. The freshwater habitat provided by the lake is listed in the *Directory of Important Wetlands in Australia* as Nationally Important being the only substantial freshwater habitat on the Adelaide Plains and the single most important breeding habitat for a range of waterfowl within the Adelaide region. It attracts an extremely wide variety of waterbirds that use the lake and associated swamps for feeding, breeding, and roosting. (Environment Australia 2001)

10.4 Climate

The climate on the Northern Adelaide Plains is described as Mediterranean, with cold, wet Winters and hot dry Summers, averaging 420 mm of rain annually. Rainfall occurs between May and September. Strong south- westerly winds occur during Autumn and Spring, with hot northerly winds occurring during Summer. In Winter, a light northerly breeze (the hibernal breeze) blows in the early mornings. Lightning storms occur throughout the year, but with higher intensity in mid to late Spring. Dry Creek Salt Field's weather station records are summarised in Table 10-1

Table 10-1: Climate statistics

Weather Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual total	Annual Daily Average
Av Monthly rain (56 yrs.) (mm)	19.3	20.8	20.7	36.9	53.0	52.7	57.1	48.7	2.6	40.4	23.7	23.6	420.4	
Av Daily Max temp (10yrs) (°C)	26.0	27.8	26.1	21.6	18.5	15.6	14.5	15.5	17.9	20.9	23.6	25.6		21.1
Av Daily Min temp (10yrs) (°C)	15.9	15.6	15.0	11.8	9.6	8.4	7.1	7.6	8.9	11.1	13.2	15.0		11.6
Av Daily Vapour Pressure (10 years) (mmHg)	12.0	11.3	10.7	9.7	9.1	8.4	7.9	8.1	8.6	8.9	10.1	11.2		9.7

Weather Aspect	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual total	Annual Daily Average
Av Daily Wind Speed (7 years) (km/hr)	5.7	4.3	4.0	3.5	3.4	4.1	4.4	4.7	5.6	5.7	5.1	5.3		4.6
Av Monthly Gross Evap. (56 years) (mm)	302	217	217	133	82	56	56	76	109	164.9	274	273	1960	
Av Monthly Nett Evap. (56 years) (mm)	283	197	196	97	28	3	-1	27	86	125	250	250	1539	

Source: Bureau of Meteorology

10.5 Air Quality

Ambient dust levels vary throughout the extent of the Salt Fields. The northern areas are relatively arid and contain unsealed roads which experience a range of vehicular movements. Some adjacent operations (e.g., composting works, biosolids plants, horticultural field preparation) produce visible dust loads in defined areas. In the southern crystallising areas, much of the surrounding land has been developed or is vegetated, resulting in relatively low ambient dust levels.

Ambient air quality is also variable. Odours and smoke are produced from some neighbouring industries such as the Bolivar Sewage Treatment Plant, Jeffries composting plant (green waste and biosolids) and Inghams chicken meat processing plant. Naturally occurring odours also occur from vegetation decay in the adjoining mangrove forests and tidal streams.

10.5.1 Applicable Legislation and Standards

The *Environment Protection (Air Quality) Policy 2016* (NEPM) sets standards for exposure of human receptors to particles such as dust less than PM₁₀ (particulate matter with an equivalent aerodynamic diameter of 10 micrometres or less). Advisory reporting standards are set for PM_{2.5}. These standards are set for protecting human health and well-being.

The *Environment Protection (Air Quality) Policy 2016* sets air quality criteria at the source of emission. These criteria are relevant where the emissions are from point sources where control measures can be applied. This does not apply to the fugitive emissions at this site.

There are no specific regulatory standards for odour. Under the Environment Protection Act, odour is a pollutant. The 'general environmental duty' states that one must not undertake an activity that pollutes or might pollute the environment. In addition, the EPA Odour Assessment Guidelines (EPA 2007) state that 'causing an odour may constitute environmental nuisance, an offence under section 82 of the Act'.

10.6 Flora and Fauna

10.6.1 Habitats

The Dry Creek Salt Fields provide an area of significant habitat value for migratory and resident shorebirds, protection of mangrove and saltmarsh areas from urban incursion, and the absorption of carbon dioxide. This value has been recognised by the inclusion of the area into two wetlands listed in the *Directory of Important Wetlands in Australia* (Environment Australia 2001).

The Salt Fields are recognised by bird watchers and ecologists as an important site for shorebirds. Several stakeholders, such as DEW (as evidenced by inclusion of the area in the proposed Adelaide International Bird Sanctuary) and BirdLife Australia value the Salt Fields as habitat for migratory birds. BirdLife Australia has undertaken a number of bird counts in the area.

The habitat types forming and surrounding the Salt Fields are summarised below. The main habitat types are mapped in Figure 10-3, Figure 10-4 and Figure 10-5.

Intertidal Mangrove

One species of mangrove is present in South Australia; Grey Mangrove (*Avicennia marina*). They grow to a height of about 3 to 5 metres with aerial roots projecting from the substrate that allows periodic inundation. Understorey species are limited, and diversity is low. The most prevalent understorey flora is Samphire species.

Intertidal Saltmarsh (Samphire)

South Australian saltmarshes typically occur behind open coastlines in protected gulfs and are often associated with grey mangrove. Large tracts of saltmarsh occur beyond the limits of where mangrove can grow. The predominant species associated with saltmarsh are samphire (*Sarcocornia* sp.); saltbush, chenopods, salt tolerant grass, Australian salt-marsh grass (*Puccinellia stricta*) and sedges (*Ghania* sp.).

Low Shrubland (Lignum)

This community is associated with large floodplains and, low lying swamps of Gawler River. The community is dominated by Lignum (*Duma florulenta*). The upper storey consists of trees 3m height or greater (*Eucalyptus* sp.) and a mid-storey of medium sized trees and shrubs (*Acacia* sp. and *Myoporum* sp.). The understorey is dominated by salt tolerant shrubs and herbs.

Samphire / Atriplex / Grassland

This community was considered a complex in the transition zone (ecotone) between Supratidal / Stranded Tidal Samphire and Low Shrubland. The figures below indicate the location and extent of the above vegetation communities based on aerial interpretation.

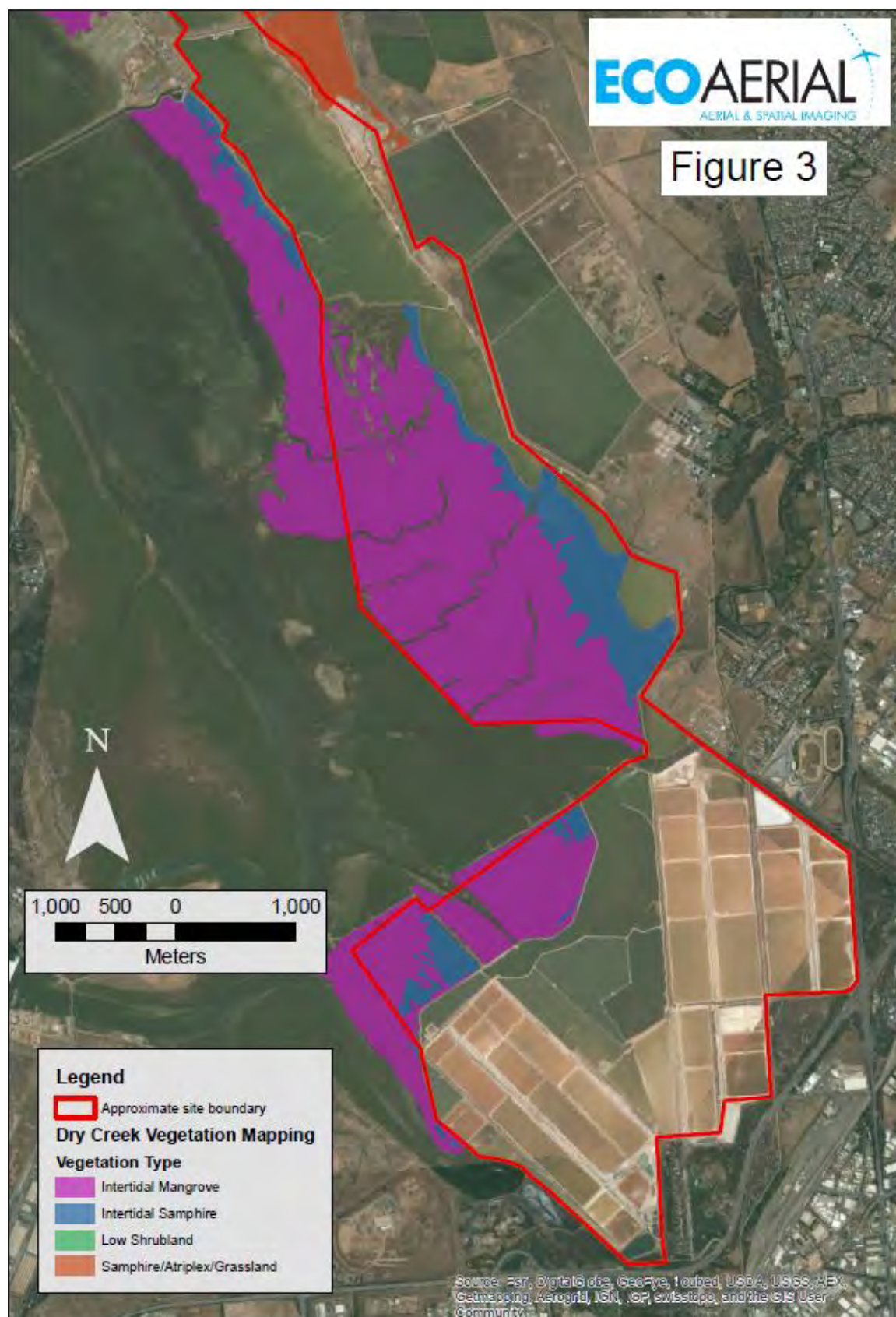


Figure 10-3: Vegetation mapping - southern Salt Fields



Figure 10-4: Vegetation mapping - central Salt Fields

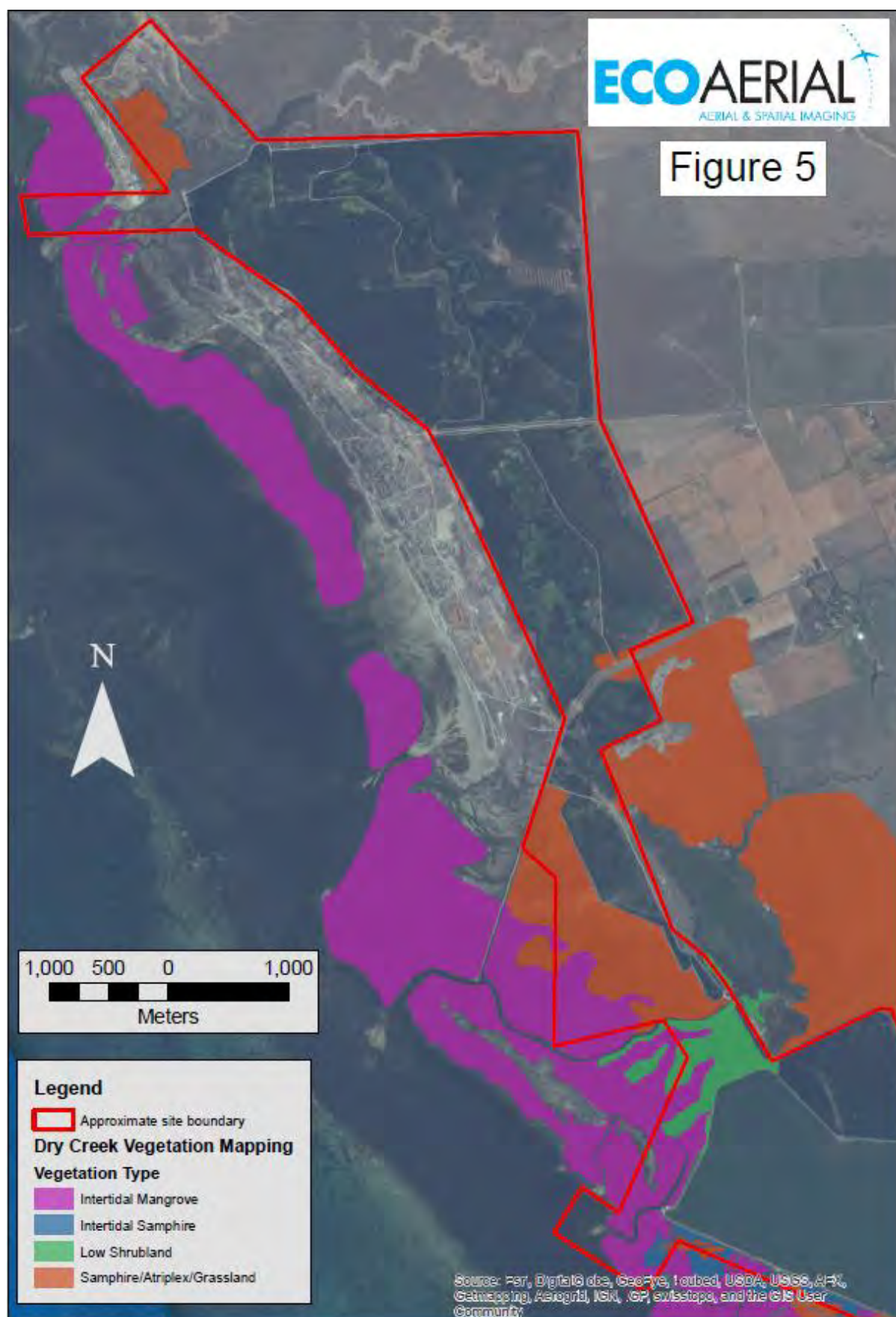


Figure 10-5: Vegetation mapping - northern Salt Fields

The approximate breakdown for each vegetation community within the leasehold is as follows:

Vegetation Community	Area
Dryland Samphire	39ha
Intertidal Mangrove	600ha
Intertidal Saltmarsh (Samphire)	356ha
Intertidal Samphire / Atriplex	98 ha
Planted Sheoak	3.4ha
Samphire / Atriplex / Grassland	65ha

10.6.2 Flora and Fauna Species

Flora species

Twenty-three terrestrial flora species with conservation interest occur, or have the potential to occur within, or near the Salt Field (BL&A 2014a). Seven species are listed under the EPBC Act and 22 are on the National Parks and Wildlife Act (NPW Act). No EPBC Act listed flora species have been recorded on the Salt Field.

The listed Vulnerable Bead Samphire (*Tecticornia flabelliformis*) has been recorded to the north and on the coast to the west of the Salt Fields. EcoAerial (2015) undertook a targeted survey for the Bead Samphire and identified 10 patches with a combined area of 12.7 ha. The largest patch (10.7 ha) was located north of Middle Beach Road in Section 4.

EcoAerial (2015) concluded: ‘Where the species was found to be present within the Salt Field boundaries, it was confined to the coastal side of the westerly bunds in Section 3 and the coastal side of the northerly ponds in Section 4 and not in the operational areas of the Salt Field. As such, the current staged operational shut down of the Dry Creek Salt Fields does not constitute a significant impact on Bead Samphire under the EPBC Act’.

A further two species are protected at the State level: Barren Cane-grass (*Eragrostis infecunda* - Rare) and Southern Saltbush (*Atriplex australasica* - Rare) (BL&A 2014a). The remaining species are significant, or of interest, at the regional level.

One ecological community (Subtropical and Temperate Coastal Saltmarsh) is listed as Threatened under the EPBC Act. This community requires some form of ongoing connection to the tidal regime and the bunds on the Salt Fields provide a physical separation from tidal influence for saltmarsh on the Salt Field (BL&A 2014a).

EcoAerial (2014) found: ‘Where the community was deemed to present within the Salt Field boundaries, it was confined to the coastal side of the westerly bunds and the undeveloped lease north of Middle Beach Road and, not within the decommissioned operational areas of the Salt Field’.

Native fauna

A review of existing information indicated that 84 fauna species (73 bird, eight mammal and three reptile species) listed under the EPBC Act or NPW Act may occur within the Salt Field and surrounding area (BL&A 2014a). The eight mammal species includes four whale species, one fur-seal species and two

bat species. None of these species would be using the habitats available in the Salt Field. The same applies to the three listed reptile species which all occur in the sea (BL&A 2014a).

Two terrestrial birds listed as Threatened under the EPBC Act are considered to have suitable habitat or have been recorded in the Salt Fields. These are the Australasian Bittern (*Botaurus poiciloptilus* – Endangered) and Australian Fairy Tern (*Sternula nereis nereis* – Vulnerable). All records for the Australasian Bittern were from outside the ponds, predominantly to the south of the Salt Fields in the freshwater wetlands. The species prefers permanent water bodies with tall dense vegetation and habitat on the Salt Fields is not suitable (BL&A 2014a). The Australian Fairy Tern has been recorded 20 times on the Salt Fields between 1999 and 2011.

The salinas of the Salt Fields provide significant feeding and roosting habitat for birds. In total, 62 EPBC Act listed migratory bird species have been recorded in the area or are considered likely to occur. This includes 32 listed Migratory shorebirds. Birds are most abundant in Ponds XE1-3. Significant seasonal fluctuations occur in shorebird numbers with counts from 1978 to present ranging from 2112 birds to 58,124. This is primarily due to changes in wider, regional habitat such as water levels at Lake Eyre as well as population trends generally among shorebird species within the East Asia-Australian Flyway (BL&A 2014a).

The use of the Salt Field by birds can be summarised as follows (BL&A 2014a):

- Crystallisation ponds in Section 1 provide little habitat for shorebirds or waterbirds. This is corroborated by Purnell et al. (2012) who assessed this area as being low priority for shorebirds (Priority 4).
- Hypersaline ponds in Section 2 have a poor range of biota, dominated by Brine Shrimp and planktonic microalgae, thereby providing few foraging opportunities for shorebirds and waterbirds. Purnell et al. (2012) found that the southern areas of Section 2 had a low priority for shorebirds, whilst the northern ponds were of high priority due to some suitable habitat characteristics being present.
- Section 3 comprises a mosaic of low and moderate priority hypersaline ponds. These support a diversity of fish, molluscs, and plankton, along with larval stages of brine flies, thereby providing a valuable food source for shorebirds. High numbers of shorebirds and waterbirds have been reported in this Section (Coleman 2013) with peaks exceeding 16,000 birds in the shallower and more saline ponds (Purnell et al. 2012). However, some sections of ponds are not suitable for shorebirds and would be favoured by waterbirds. This Section is particularly important as a high tide roosting and foraging site when the tidal flats cannot be accessed by the shorebirds. The diversity of habitats present is reflected in the pond prioritisation presented in Purnell et al. (2012) which ranges between high and very high priority (Priority 1 and 2).
- Section 4 is primarily dominated by salt ponds that have a similar salinity to intertidal wetlands and most resemble marine ecosystems, compared with ponds in the other Sections. It supports all or most of the macro- and micro-organisms that would be expected to occur in a natural marine environment. Furthermore, some of the northern-most ponds experience some marine influence during particularly high tides or storm surges. These ponds also support seagrass meadows and fish populations, with some of the ponds having been colonised by mangroves. The western ponds were assessed by Purnell et al. (2012) as being Priority 1 habitat, whilst the eastern ponds were Priority 3 and were considered less important for shorebirds. Existing reports suggest high waterbird numbers in Section 4, compared with other bird species/groups (Purnell et al. 2012; Coleman 2013).

Bird surveys have been undertaken at the individual pond level in the spring / summers of 2013 / 14, 2014 / 15, 2015 / 16, and also in 2016 /17. BLA 2015, found that comparisons of data between the surveys completed by end summer 2015 show that the shorebird and other waterbird numbers are within the range of natural variation before and since implementation of the holding pattern. The evaluation of data from the surveys of 2015 / 16 is nearing completion (February 2017) and it is understood that evaluation is confirming that finding.

The fish populations in the Dry Creek salinas are derived from wild fish in Barker Inlet and continue to receive eggs and larvae from wild populations in the gulf and tidal mangrove creeks via seawater pumps. Fish biodiversity is representative of species found locally in Barker Inlet (CEE 2013).

Exotic flora and plant pathogens

Weeds occur sparsely over the extent of the Salt Field's mineral tenements. The most common noxious species include African Boxthorn (*Lycium ferocissimum*), Calomba Daisy (*Oncosiphon suffruticosum*), Artichoke Thistle (*Cynara cardunculus*) and Horehound (*Marrubium vulgare*). Several other environmental weed species including Sea Lavender are widespread or occur in defined locations (*Juncus acutus* and *Casuarina glauca*). No occurrences of plant pathogens such as Phytophthora have been recorded within the Salt Field.

Feral animals

Feral animals at the Salt Fields include resident foxes and rabbits, occasional dogs and cats, and deer that reside on DEW land at Buckland Park and that enter the Salt Fields to browse in the mangrove and saltmarsh areas when green pick is scarce.

10.6.3 Applicable Legislation and Standards

Actions that are likely to have significant impacts on listed threatened species or ecological communities, or listed migratory species, may require approval under the EPBC Act. The Department of the Environment and Energy has published a number of guidelines to assist in determining whether a proposed action is likely to have a significant impact on a matter of national environmental significance. Of particular note are:

- Significant Impact Guidelines 1.1 - Matters of National Environmental Significance
- Significant impact guidelines for 36 migratory shorebird species - Migratory species: EPBC Act draft policy statement 3.21.

As noted at Chapter 9.1.12, a referral for closure activities in inundated ponds in Sections 3 and 4 was submitted in January 2015. On 14 February 2015, the delegate of the Environment Minister determined that the activities required approval and would be assessed on preliminary documentation.

BDC may also be required under the Native Vegetation Act to provide an offset with a significant environmental benefit for any clearance of vegetation.

10.7 Soil Quality

10.7.1 Context

Topsoils in the Salt Fields are typical of saltmarsh / mangrove depositional areas. The soils vary from sandy areas (chenier ridges and sand berm deposits) to a brown silts and clays. Much of the soil is saline or sodic, due to its origin. The underlying soils in the area are historic estuarine muds and sands of an area that was, until recent times, part of the extensive tidal flats bordering Barker Inlet. Much of

the site appears to be the natural surface sediment with very little introduced fill, other than the salina embankments, compared to other nearby areas.

The Salt Field has been operated as a mine since the 1930s. While the soils underlying much of the area contain potential acid sulfate soils (PASS), the permanently ponded nature of the salinas reduces the risk of these soils being oxidised into actual acid sulfate soils (ASS). ASS are discussed in Section 10.7.2 below.

Over the period of the Salt Fields' operation, community and legislative standards relating to the disposal of old building materials have changed. The use of pits for disposal of old masonry and wood is no longer practiced, and all pre-existing pits have been closed and revegetated. The age of the Salt Field means there is potential for some pipes and building materials to include asbestos containing materials. It is not intended to excavate or remove this material under this integrated PEPR / MOP unless it presents an unacceptable occupational health and safety hazard.

10.7.2 Acid Sulfate Soils

BDC has undertaken studies to assess the presence / absence, and spatial and temporal extent / variation of the main types of ASS materials (see Table 10-2) present in a range of locations across the Salt Fields. The acid sulfate soil assessment reports discussed below have previously been provided to DEM appended to approved earlier revisions of this PEPR / MOP.

Acid sulfate soils (ASS) is the term applied to soils that contain elevated concentrations of metal sulfides which generate acidic conditions when exposed to oxygen. The principal sulphide minerals are pyrite (Fe_2S) or monosulfides in the form of iron sulphide (FeS). Acid sulfate soil materials include potential acid sulfate soil material (sulfidic material) and / or actual acid sulfate soil material (sulfuric material), both of which can occur in the same soil profile.

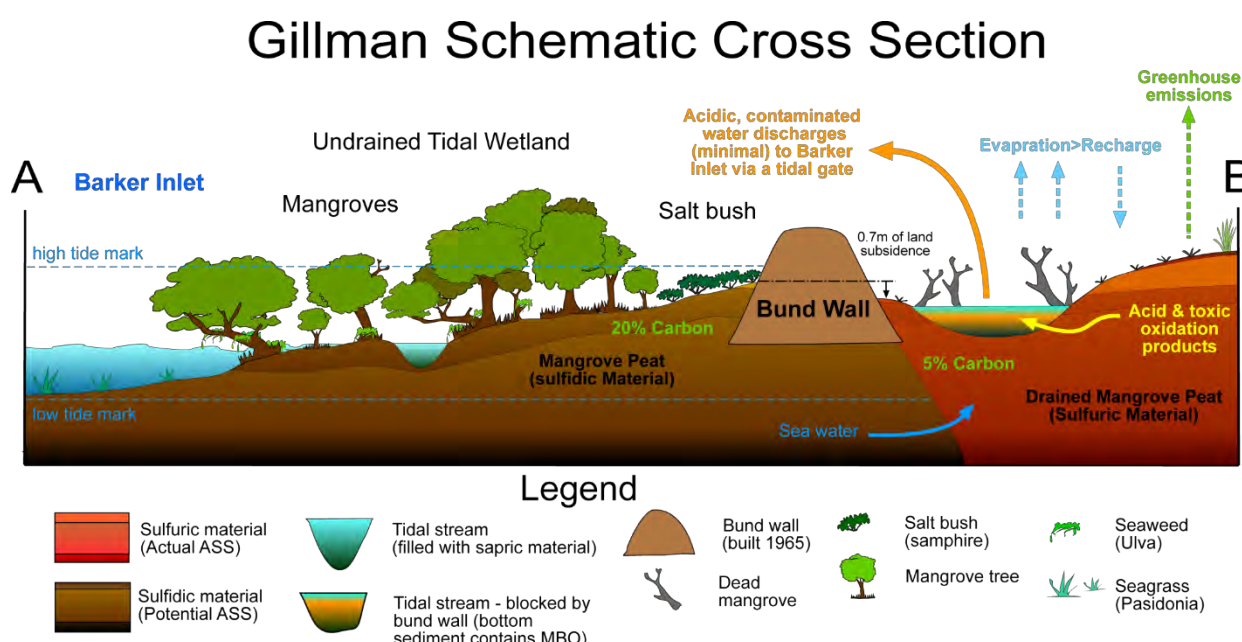
The definitions of acid sulfate soil materials used in this report are those adopted by the Acid Sulfate Soil Working Group of the International Union of Soil Sciences and are set out in Table 10-2.

Acid sulfate soils form in the coastal, estuarine and mangrove swamp environments of Barker Inlet and the Gulf St Vincent as these waterlogged environments are ideal for the formation of sulfide minerals, predominantly iron pyrite (FeS_2). A conceptual model and descriptions of ASS types and sub-types in the region is shown in see Figure 10-6.

Ponds in the Dry Creek Salt Fields have been maintained at a stable depth over time and, as a consequence, substantial amounts of pyrite, iron monosulfides and gypsum have built up in the subaqueous (submerged) acid sulfate soils in the ponds. The cessation of salt production will require draining of numerous hypersaline ponds which has the potential for development of ASS.

Table 10-2: Acid sulfate soil materials definitions

Material	Definition
Potential Acidity	
Sulfidic material	Soil materials containing detectable sulfide minerals: hypersulfidic – potential to produce acidic soils with pH of less than 4 hyposulfidic – soils buffering capacity maintains pH greater than 4. monosulfidic material (FeS) – soils / sediment contains monosulfides. Monosulfidic materials are submerged or waterlogged organic-rich materials that contain considerable concentrations of monosulfides. Monosulfidic black oozes (MBOs) are specific materials characterised by their gel-like consistence (see Plate 10-2).
Actual and Retained Acidity	
Sulfuric material	Soil material that has a pH less than 4.

**Figure 10-6: Conceptual model and descriptions of ASS in the region**

(Source: Acid Sulfate Soil Centre (University of Adelaide) / CSIRO Land and Water)

Section 1

Section 1 occupies what was intertidal and supratidal estuarine land. As plans are created for the closure and redevelopment of Section 1, investigations will be conducted to assess acid sulfate conditions.

The potential for adverse risks from acid sulfate soil conditions in Section1, during the Holding Pattern and Residual Operations is considered negligible because:

- Inside the sea wall, the majority of the original natural soil surface has been covered for decades by fill, and then the operational surfaces, viz:
 - o Engineered floors of the crystallisers and salt stacking bays
 - o The floors of the final areas
 - o Engineered access and haul roads

- o Table drains in the fill.
- 2. The historic and current storage and movement of brine in Section 1 has resulted in salt deposits on the surfaces of the crystallisers, final areas, and interconnecting drains.
- 3. The groundwater levels beneath Section 1 are likely slightly elevated above the natural soil surfaces in what were originally intertidal areas, because of the storage and movement of brine. As a result, it is considered that natural soils in these areas would have been and continue to be kept saturated.
- 4. In what were the supratidal areas, it is less likely (by comparison with the intertidal areas) that the original surface soils would be potentially acid sulphate.
- 5. The saturation levels of salinity coupled with the nature of the operations of Section 1⁵, mitigated against the production of monosulphidic black ooze, as occurred in the condenser ponds in Sections 2 to 4 of the Salt Field. Therefore, this potential source of acid sulfate materials is unlikely to exist in Section 1.

Section 2

Sampling was undertaken at sites for ponds PA3 to PA12 and the adjacent drains, over a 3-month period from December 2013 to March / April 2014 (which included extensive reflooding and drying events). Ponds PA3 to PA12 in Section 2 are mostly covered by a gypsum crust of varying thickness (see Plate 10-2). In some locations, there are low-lying areas where water has remained, or the soil is mostly saturated. To the east, there is a sequence of shallow drains adjacent to ponds PA3 to PA12 and situated below ponds PA3 and PA11. The ponds are bounded on the west by the coastal mangrove swamps and samphire. The Section 3 ponds are located to the north.

The soil classification indicated at the time of the field survey in March / April is summarised as follows (Fitzpatrick et. al 2015):

- Ponds PA3 to PA12
 - o hypersulfidic and hyposulfidic subaqueous sandy/shell grit soils with monosulfidic material
 - o hyposulfidic and hypersulfidic hydrosol loams over clays with monosulfidic material
- PA7a
 - o hyposulfidic subaqueous hydrosol loams over clays with monosulfidic material
 - o hyposulfidic hydrosol loams over clays with monosulfidic material (wet)
- Drains
 - o hyposulfidic subaqueous hydrosol loams over clays with monosulfidic material
 - o sulfuric and hyposulfidic hydrosol loams over clays with salt efflorescences.

⁵ These operations had the purpose of producing pure salt; i.e., not contaminated by algae or other organic matter.

The formation of monosulfidic material is promoted by:

- the highly depositional environment (closed evaporation ponds)
- high organic matter concentrations
- low iron and carbonate concentrations (precipitated early in the salt production process); and
- low re-suspension (due to very slow seawater inflow / throughflow velocities and more sheltered nature of the bunded ponds).

The acidification hazard was assessed as medium for the western segments and low for the eastern segments of ponds PA3 to PA12. The malodour hazard was assessed as medium for both sections. The acidification hazard was assessed as low, and the malodour hazard was assessed as medium for the southern segments and low for the northern segments of pond PA7a.



Plate 10-1: Gypsum crust – Pond PA7 Section 2 December 2013

(Source: Acid Sulfate Soil Centre – University of Adelaide)



Plate 10-2: Hyposulfidic clay soil with monosulfidic material – Pond PA4d March 2014

(Source: Acid Sulfate Soil Centre – University of Adelaide)

Section 3

Section 3 ponds generally do not have gypsum crust surfaces. Except for ponds XB8A, XC1, XC2, XC2S and XC2E, they are permanently inundated with saline water and which covers predominately subaqueous acid sulfate soils. Pond XB8A is open to tidal inundation. Pond XC2E is dry and free draining and is filled with a stockpile of calsilt. Ponds XC1, XC2, and XC2S are dry and free draining.

Each pond in Section 3 is likely to have a unique distribution of ASS sub-types which include:

- hypersulfidic and sapric materials due to widespread and complex distribution of 'dead mangroves'
- hypersulfidic and sapric materials due to widespread and complex distribution of 'shell-grit ridges and layers'
- widespread and complex distribution of subaqueous topography ('small islands' when ponds are partially drained)

Further surveys, sampling and data acquisition are proposed for this section, as part of investigations for closure, when future land uses have been identified.

Section 4

Ponds XF2 and XE4

Sampling was undertaken at sites for ponds XF2 and XE4 between November 2013 and June 2014 following extensive reflooding (from extremely high rainfall events) and drying events. Pond XF2 is situated on the north-eastern side of the Salt Field and is bounded to the north by native samphire and salt bush, in the east by farmland and on the western and southern side mostly by pond XF1. Pond XE4 is located below ponds XF1 and XF2 on the north-eastern side of Salt Field and is bounded to the north by ponds XF1 and XF2, in the east by farmland and on the western side mostly by pond XE3.

At the time of the November survey, the ponds were generally dry with some wetter areas, mostly due to seepage from the adjacent ponds. The soil classification at the time of the field survey (June 2014) is summarised as follows (Fitzpatrick et al 2014):

Pond XF2:

- sulfuric, hypersulfidic, hyposulfidic and monosulfidic (MBO) materials
- subaqueous soils, hydrosols (saturated to a depth of 50 cm below the mineral soil surface), and unsaturated (to a depth of 50 cm below the mineral soil surface)
- clays, loams, and some sands.

Pond XE4:

- hyposulfidic and hypersulfidic clays (dominant)
- hypersulfidic and hyposulfidic subaqueous soil subtypes with high amounts of mostly wet monosulfidic material.
- clays, loams, and some sands.

In general, soil profiles in XF2 comprise sulfuric, hypersulfidic and hyposulfidic clayey soils with high (mostly) to low acidification hazard ratings (see Figure 10-7 below). Profiles in XE4 comprises mostly hyposulfidic and minor hypersulfidic clayey soils with low acidification hazard ratings.

Pond XF1

During investigations in January 2015 Pond XF1 was permanently ponded with saline water and sampling identified mostly hyposulfidic materials (hyposulfidic subaqueous clay soils) with only one sample containing sulfuric material (sulfuric subaqueous clay soil). Most of the profiles sampled encountered thick (0-30 cm) black, organic-rich monosulfidic black ooze materials, which occurred in thicker amounts (>30cm) on the western boundary due to seepage into the drainage trench and also from the adjacent pond. The southern part of pond XF1 is bounded to the west by the coast with sand dunes, native samphire, and mangrove swamps. To the east, pond XF1 is immediately adjacent to pond XF2.

The final soil survey campaign conducted in February 2016 (13 months after the commencement of draining of pond XF1) again identified a wide range of acid sulfate soil subtypes and associated features. In summary, most of pond XF1 was still dominated by the occurrences of hyposulfidic clay soils, which occurred on the more elevated segments on the eastern side of the pond. All the hyposulfidic hydric clay soils occurred in the slightly lower lying segments whereas the hyposulfidic clay soils were restricted to the higher elevated segments of the pond (i.e., along the eastern border). The monohyposulfidic hydrosol clay with organic-rich mat remains restricted to the lowest lying segment of the pond along the western edge of the pond. (Fitzpatrick et al 2016).

Quarterly monitoring following pond drainage showed that only in the south-west corner of pond XF1 did the pond acidification and malodour hazard ratings status changed with time, i.e., parts of the shallow, thin layer of acid sulfate soil materials changed from hypersulfidic to sulfuric after 13 months as this soil dried, especially during summer. The drainage from this part of XF1 remained alkaline however – indicating sufficient neutralising capacity in the soils in the walls and floor of the drains conducting this drainage. The clay soils below the thin layer of acid sulfate - sulfuric soil materials also have alkaline pH, and their low permeability would inhibit seepage to groundwater. Therefore, short term risks from this acidification are considered low and manageable by keeping this part of XF1 well drained. However, the risks would need to be dealt with in the eventual plan for closure of this pond.

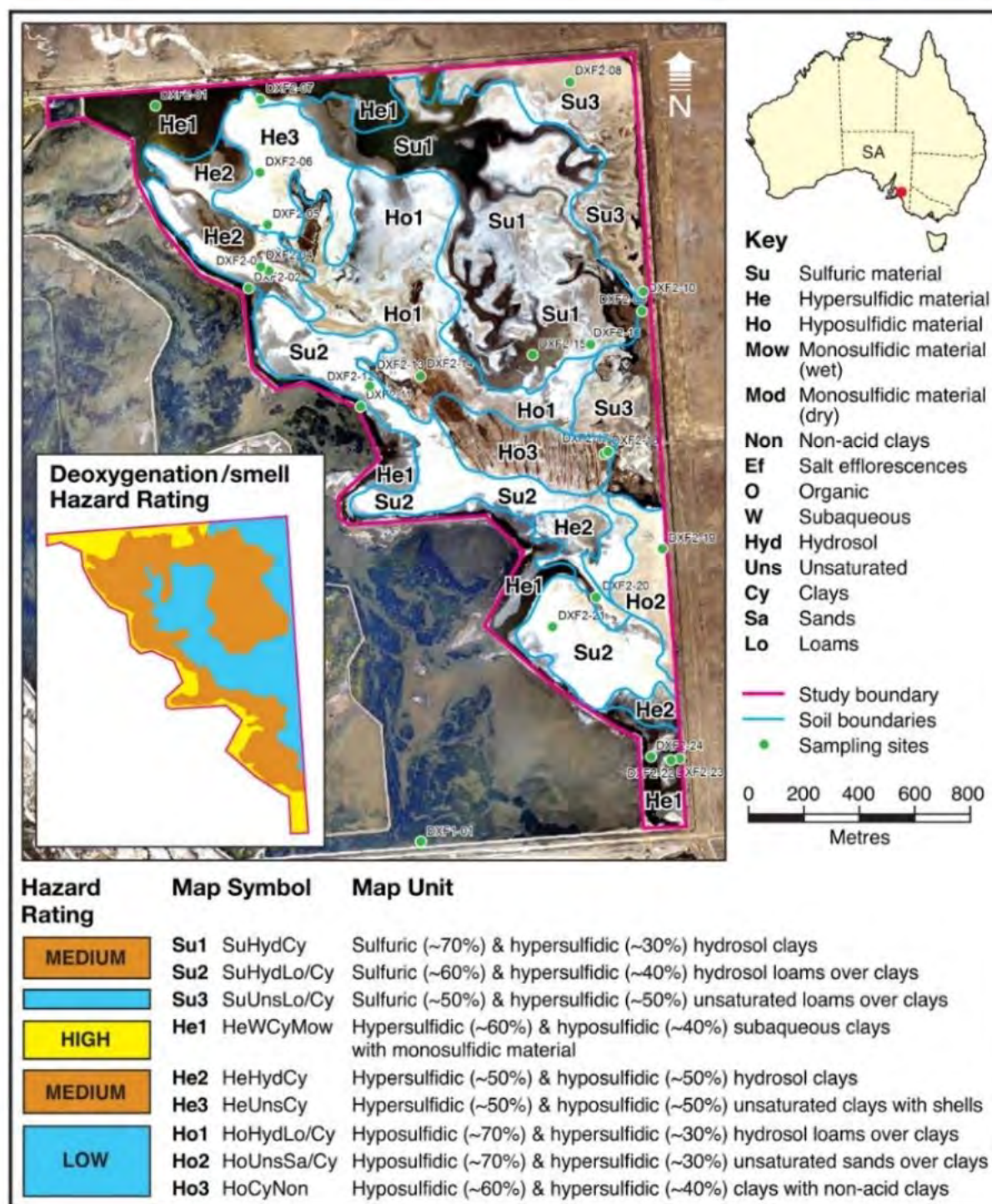


Figure 10-7: Acid sulfate soil classification and acidification hazard rating - pond XF2

10.7.3 Applicable Legislation and Standards

The Environment Protection Act has substantial penalties for causing environmental harm to air, land, surface water and groundwater.

EPA Guideline 638/07 – *Site contamination—acid sulfate soil materials* (November 2007) provides information to those involved in activities that may disturb acid sulfate soil materials (including soil, sediment, and rock), the identification of these materials and measures for environmental management.

If excavation or disturbance of acid sulfate soil material is unavoidable, an Environmental Management Plan must be prepared to the satisfaction of the EPA in accordance with the *EPA Guideline: EPA publication Guidelines for the assessment and remediation of site contamination*.

When determining the sampling density for the assessment of acid sulfate soil materials, reference should be made to Schedule B2 of the *National Environment Protection (Assessment of Site Contamination) Measure* (1999) and *Australian Standards AS 4482.1 Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds*.

Approaches to remediation of acid sulfate soil material for the Barker Inlet and Gillman physiography are set out in *Coastal Acid Sulfate Soil Management Guidelines, Barker Inlet SA Version 1.2* (Thomas et al 2003).

10.8 Surface Water

The operating salinas are permanently filled with saline water. Natural ephemeral watercourses, sea- and land- based floodwaters and stormwater from nearby residential and agricultural areas are channelled through flood gaps that pass around and between the salinas. Surface water drainage lines and flood gaps in the southern Salt Field are shown in Figure 10-9

Seepage drains around the salina ponds are used on the landward side of the ponds to ensure the head of water in the ponds does not cause ‘mounding’ of the groundwater in the surrounding areas, as the Salt Field is underlain by several shallow, hypersaline aquifers in the St Kilda Formation. The brines gathered in these drains, composed both of salina seepage and discharge from the subsurface hypersaline water table from the higher lands to the east, are recycled back into the salina ponds.

10.8.1 Applicable Legislation and Standards

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, updated in 2018, provide an authoritative guide for setting water quality objectives required to sustain current, or likely future, environmental values (uses) for natural and semi-natural water resources in Australia and New Zealand.

In South Australia, the guidelines are incorporated in the *Environment Protection (Water Quality) Policy 2015*. According to https://www.epa.sa.gov.au/files/11256_wqepp_notes_nov2015.pdf:

- Water quality in South Australia is protected by the Environment Protection Act 1993 (EP Act) and the environment protection policies made under it. The Environment Protection (Water Quality) Policy 2015 (WQ EPP 2015) provides the most specific and detailed protection of the state’s surface, marine and underground water sources. The WQ EPP 2015 replaced the previous WQ EPP 2003, following an extensive revision. The WQ EPP 2015 provides the structure for the regulation and management of waters. It is a flexible document that allows values to be changed without undue delay and creates specific controls to deal with particular

situations. It is also used regularly by local councils as part of their general stormwater management programs. The policy regulates both specified activities and diffuse sources of pollution by calling up a range of codes of practice which have legal effect through the policy. The codes are formally recognised as another tier in the statutory enforcement and compliance scheme.

- The WQ EPP 2003 (via clause 4) applied to surface (marine, creeks, and rivers) and underground waters. It also included water within a public stormwater disposal system or irrigation drainage channel. But it did not include water within the pipes and tanks of a water reticulation system; water within a sewage system or wastewater management system; water within a closed tank constructed of or lined with material impervious to water; and swimming pool water. The following amendments were brought into WQ EPP 2015.

Schedule 1 of the Environment Protection Act specifies 'Prescribed activities of environmental significance' that require environmental authorisation from the EPA. This includes discharge to marine or inland waters. As noted at Chapter 9.1.2, BDC has a licence that enables discharge of bitterns and saline water.

10.9 Groundwater

The underlying Tertiary sediments contain several aquifer systems that exhibit significant variations in thickness, lithology, salinity distribution and yield. There are two main deep aquifers that act as the primary source of irrigation water in the region.

(see DEW (2020). Central Adelaide and Northern Adelaide Plains Prescribed Wells Areas 2018-19 water resources assessment, DEW Technical report 2020/30, Government of South Australia, Department for Environment and Water, Adelaide.

https://www.waterconnect.sa.gov.au/Content/Publications/DEW/Adelaide_Plains_2020_WRA_Technical_Note.pdf).

Figure 10-8 is an example of the record of bore water consumption that is provided in each annual PEPR /MOP compliance report. This example comes from 2020-2021. It shows which bores have been used and how the consumption compares with the allocation

It is envisaged that all the bores listed in Figure 10-8 may be used to varying degrees during future holding pattern and salt production operations.

In the 2020-2021 PEPR / MOP compliance report, see Figure 10-8, the extracted volumes were 29.4 ML vs. an allocation of 1177.3 ML for wells 1 to 5 and 8 and 274 ML vs. an allocation of 850 ML for wells 6 & 7. All this are in the T1 aquifer. No water was extracted from the T3 aquifer

10.9.1 T1 Aquifer

The shallowest Tertiary aquifer, known as T1, is the main source of irrigation water in the area south of Waterloo Corner. The top of the aquifer is approximately 60 metres below ground and is composed of Dry Creek sands and Port Willunga limestone. It is wedge shaped with an average thickness of 70 metres in the south, thinning out as it nears the Gawler River.

Underground water salinity ranges from 600 mg/L to 2000 mg/L with lower salinities recorded near the Little Para River to the south. The aquifer is hydraulically connected to the overlying Quaternary aquifer (Q4), which has a salinity ranging from 1820 to 4850 mg/L and is separated from the underlying aquifer by a layer of impervious clay to sandy, silty clay, which extends over the entire region south of the Gawler River

10.9.2 T2 Aquifer

The second underlying Tertiary aquifer known as T2 occurs throughout the entire region. It consists of a large, water bearing layer of well-cemented lower Port Willunga formation limestone which has a thickness between 80 and 120 metres. Salinity levels range from 600 mg/L in the Gawler River area to greater than 3000 mg/L to the north and south. The T2 aquifer is generally not used for crop irrigation purposes in areas south of Waterloo Corner due to high salinity levels and the depth of the aquifer in that region (DEW 2000).

The T1 and T2 aquifers provide freshwater for the local horticulture industry and several other users, including the Dry Creek Salt Field. Freshwater from the Salt Field bores in the T1 aquifer was used in the dissolving operation at Dry Creek. Bores 1, 3, 4 and 5 are located in the Northern Adelaide Plains Proclaimed Wells Area and have a combined allocation of 1,177,255 kL per year. Total dissolved salts in these bores varies between 1500 mg/L and 2300 mg/L. Two bores (6 and 7) are located within the Dry Creek Prescribed Wells Area and have an allocation of 850,000 kL per year. These two bores were also used for the dissolving operation for the historical dissolution of produced salt to manufacture a brine that was pumped to Penrice. That use ceased by 2013.

Since then, bore water has been used to assist washing salt residues recovered Section 1. In resumed salt production that use will continue.

10.9.3 T3 and T4 Aquifers

Two other deeper water bearing aquifers (T3 and T4) have been identified in the area. However, underground water salinity in these saturated sediments exceeds that in T1 and T2 and has been as high as 80,000 mg/L, which is totally unsuitable for any form of crop irrigation use (DEW 2000).

The T3 aquifer provided a flow of salt making brine into pond XB3 near Chapmans Creek. The brine from the T3 bore is approximately twice seawater salinity (50g/L). The brine quality suited its use in 'rebalancing' the water quality in the salina, which had suffered from increased nutrient inputs as a result of the nearby discharge point for the Bolivar WWTP.

Table 10-3 below. The locations of bores within the Salt Fields are shown in Figure 10-9.

BDC holds a licence to extract groundwater from the T1 and T3 aquifers for Salt Field use. There is no intent to seek changes to the wells covered by this licence; no intent to seek additional allocations, and no intent to change the range of purposes, including but not limited that of rebalancing the salinity in XB3 or of purifying the produced salt, for which the bore water is used. Therefore, there is no need for this PEPR / MOP Revision 5 to review the hydrogeology of the T1, T3 or T4 aquifers or to establish impacts to the groundwater resource from the proposed operations.

In the 2020-2021 PEPR / MOP compliance report, see Figure 10-8, it was reported that no water was extracted from the T3 aquifer.

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Table 10-3: Production bore details

Cheetham Bore Number	Departmental Bore Number	Location (Datum GDA, Zone 54)	Aquifer	PWA	Allocation
1	6628_19184 Replaced 6628_04370	Middle of 'A' row 277797 E, 6144588 N	T1	Northern Adelaide Plains Prescribed Wells Area	1,177,255 kL
3	6628_14027	South end of 'G' row 279812 E, 6145153 N	T1	Northern Adelaide Plains Prescribed Wells Area	
4	6628_04356	North end of 'D' row 278658 E, 6144972 N	T1	Northern Adelaide Plains Prescribed Wells Area	
5	6628_13020 Replaced 6628_03438	North end of 'F' row 278862 E, 6146789 N	T1	Northern Adelaide Plains Prescribed Wells Area	
6	6628_13170	Magazine Rd 278756 E, 6142936 N	T1	Dry Creek Prescribed Wells Area	850,255 kL
7	6628_18042	200m West of No6 278322 E, 6142918 N	T1	Dry Creek Prescribed Wells Area	
T3	6528_2005	Chapmans Ck 267417 E, 6158688 N	T3	Northern Adelaide Plains Prescribed Wells Area	1,200,000 kL

10.9.4 Quaternary Aquifer Systems

Aquifers in the shallow Quaternary sediments comprise mainly of clay and silt with thin layers of sand which form minor unconfined and semi-confined systems. Salinity towards the coast is high (up to 15,000 mg/L). The aquifers are not generally used for commercial irrigation purposes because of the high salinity and low yields (DEW 2000). Environmental values at the Salt Field would be expected to relate only to supporting any groundwater dependent ecosystems, which would need to be salt tolerant.

In 2014 Tonkin was commissioned by Adelaide Research and Innovation (ARI) on behalf of Ridley Land Corporation (Ridley) to conduct initial investigations of shallow groundwater to inform ARI's investigations of sulfidic materials (See Section 12.7.2). The Tonkin reports from this work are provided Appendix 10.

10.9.5 Applicable Legislation and Standards

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, updated in 2018, provide an authoritative guide for setting water quality objectives required to sustain current, or likely future, environmental values [use] for natural and semi-natural water resources in Australia and New Zealand. These guidelines are currently under review.

In South Australia, the guidelines are incorporated in the *Environment Protection (Water Quality) Policy*. The main objective of the Water Quality Policy is to achieve the sustainable management of waters, by protecting or enhancing water quality while allowing economic and social development.

Figure 10-8 Example of Record of Bore Water Consumption

BORE WATER USE vs LICENCE ALLOCATIONS - JULY 2019-JUNE 2020																			
		Water Meter Readings							Monthly Use Bores 1-5, 8 (kL = m3)					Combined allocation		Monthly Use Bores 6-7 (kL)		Combined allocation 850,000 kL	
														1,177,255 kL					
		Month	1	3	4	5	6	7	8 (New Meter Readings)	1	3	4	5	8	Cumulative Use Bores 1, 3, 4, 5, 8 (kL)	Remaining from Allocation (kL)	6	7	Cumulative Use Bores 6-7 (kL)
2020	June	399949	172854	1470408	501139	618708	2796873	7098							1,177,255				850,000
2020	July	399949	176209	1470408	501139	659203	2796873	7438	-	3,355	-	-	340	3,695	1,173,560	40,495	-	40,495	809,505
2020	August	399949	180687	1470408	501139	699833	2796873	7778	-	4,478	-	-	340	8,513	1,168,742	40,630	-	81,125	768,875
2020	September	399949	185316	1470408	501139	739785	2796873	8142	-	4,629	-	-	364	13,506	1,163,749	39,952	-	121,077	728,923
2020	October	399949	189382	1470408	501139	780348	2796873	8589	-	4,066	-	-	447	18,019	1,159,236	40,563	-	161,640	688,360
2020	November	399949	197377	1470408	501139	821600	2796873	8923	-	7,995	-	-	334	26,348	1,150,907	41,252	-	202,892	647,108
2020	December	399949	197377	1470408	501139	884769	2796873	9921	-	-	-	-	998	27,346	1,149,909	63,169	-	266,061	583,939
2021	January	399949	197377	1470408	501139	929833	2796873	10913	-	-	-	-	992	28,338	1,148,917	45,064	-	311,125	538,875
2021	February	399949	197377	1470408	501139	973542	2796873	11781	-	-	-	-	868	29,206	1,148,049	43,709	-	354,834	495,166
2021	March	399949	197377	1470408	501139	13334	2796873	12624	-	-	-	-	843	30,049	1,147,206	39,792	-	394,626	455,374
2021	April	399949	197377	1470408	501139	75664	2796873	13381	-	-	-	-	757	30,806	1,146,449	62,330	-	456,956	393,044
2021	May	399949	197377	1470408	501139	116786	2796873	14004	-	-	-	-	623	31,429	1,145,826	41,122	-	498,078	351,922
2021	June	399949	197377	1470408	501139	138574	2813244	14396	-	-	-	-	392	31,821	1,145,434	21,788	16,371	536,237	313,763

Table 1: Licenced Wells and Water Allocations

Local name	Well unit number	Well depth	Well area	Aquifer	Type	Allocation and Licence
A Row						T1
Number 1 bore	6628 - 12184	156 metres	NAP	T1	submersible	combined allocation
O Row						1,177,255 kilolitres
Number 3 bore	6628 - 14027	153 metres	NAP	T1	submersible	Water Licence 211790
D Row						
Number 4 bore	8528 - 4356	115 metres	NAP	T1	shaft	
E Row						
Number 5 bore	6628 - 13020	149 metres	NAP	T1	submersible	
F Row						T1
Number 6 bore	6628 - 13176	165 metres	DC	T1	submersible	combined allocation
Storm Pile						850,255 kilolitres
Number 7 bore	6628 - 16042	162 metres	DC	T1	submersible	Water Licence 211788
G Row						T3
Champana Ck T3 bore	6528 - 2005	364 metres	NAP	T3	submersible	allocation
						1,200,000 kilolitres
						Water Licence 211790

Note: The above table includes extraction from Bore 8. This draws from the T1 aquifer. Even including this bore, the Use does not exceed the allocation

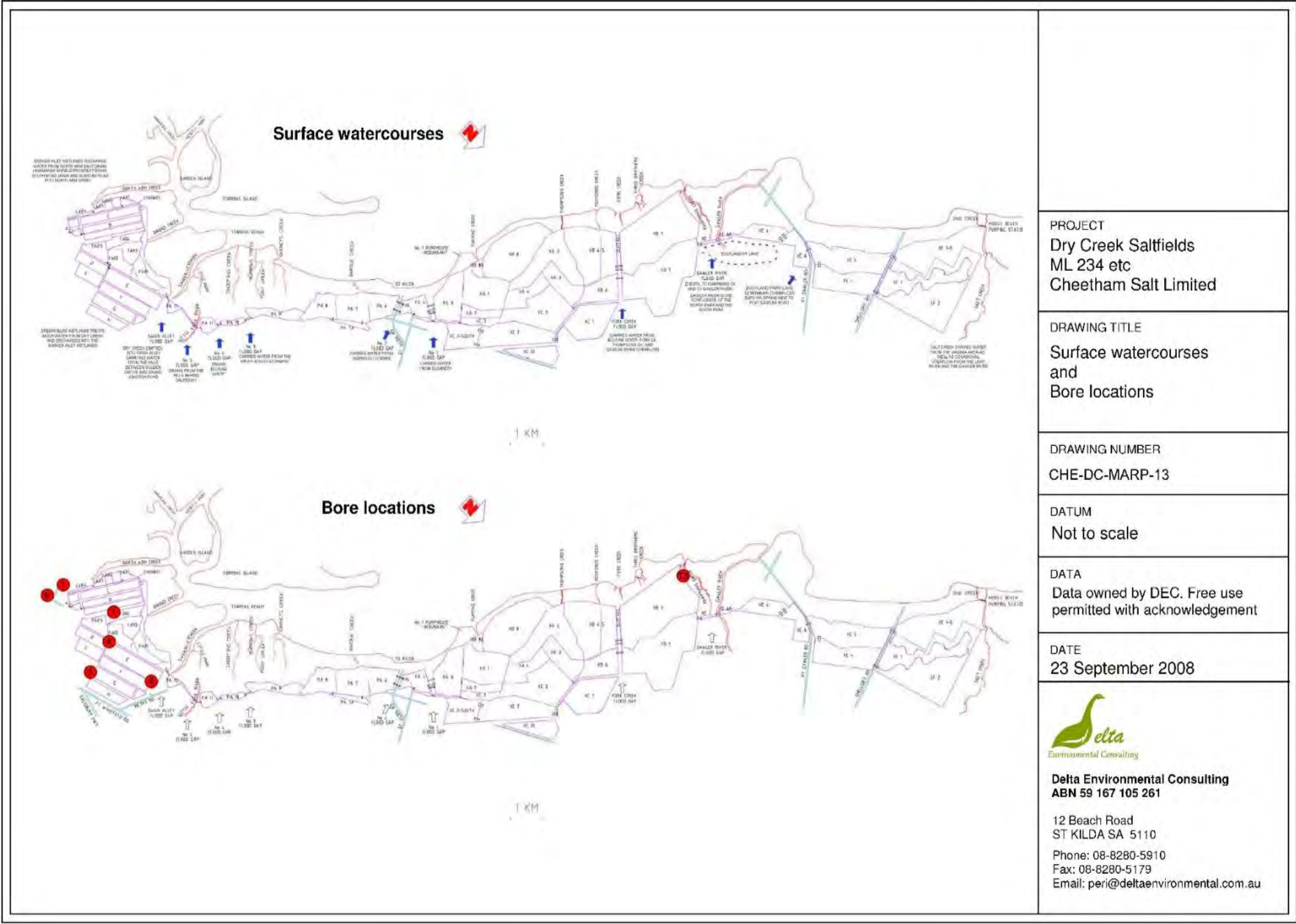


Figure 10-9: Surface water and bore locations

10.10 Noise

The mineral tenements are extensive and occur in areas ranging from remote to localities adjacent to highways. The salina operations occur in rural areas and contribute little to no extra noise to ambient levels. The harvesting operation occurred adjacent to Port Wakefield Road and the Port River Expressway and rarely, if ever, exceeded the ambient noise from those roads.

10.11 Heritage

Items of heritage significance have been recorded in the Salt Field area. They include an aboriginal artefact scatter behind the K Row crystalliser stacking bays, the remains of an Explosives Jetty in ML 702, small remnants of the Explosives Tramway and several shipwrecks. The Salt Field itself has a rich heritage, much of it recorded in photographs maintained at the Dry Creek offices of Cheetham Salt Limited.

There is a current Native Title application over Crown land within the mineral tenements. The claim is the Kurna Peoples Native Title Claim, which covers an area of approximately 8160 km² on the eastern side of Gulf St Vincent.

Remnants of the Tramway from Broad Creek to the Explosives Magazine exist mainly within the Magazine complex outside the Salt Fields, but some small lengths remain within ML702 alongside the old explosives jetty in Broad Creek. The items at Broad Creek are gradually becoming inundated as the mangrove zone subsides and sea-level increases.

Barker Inlet has a rich shipping history and has been used as a ships' graveyard since European settlement. In several areas marked ship's graveyard interpretive trails exist and the DEW keeps a database of all wrecks in the area (DEW 2016). Several wrecks are located within, or immediately adjacent to, the Salt Fields:

- Wreck 1087, the No1 Hulk, is the explosives barge on the seawall of ML702
- Wreck 412, the Dorothy S, is inside ML702 at the intersection of Broad and Bream Creeks
- Wreck 1140, an unknown vessel, is on the western boundary of ML 235, on the same northing as the gap between PA10 and PA11
- Wreck 505, the Florence Maud, is also on the western boundary of ML 235 or just outside it, on the same northing as the gap between PA10 and PA11.

Mapping of shipwreck locations, in relation to the Salt Field, is shown in Figure 10-10.

There are no known sites of geological significance within the Salt Fields. Given the Salt Field has been part of Adelaide's landscape for over 70 years, they may have heritage value in their own right.

10.11.1 Applicable Legislation and Standards

The *Heritage Places Act 1993* makes provision for the identification, recording and conservation of places and objects of non-Aboriginal heritage significance. The *Aboriginal Heritage Act 1988* provides for the protection and preservation of Aboriginal heritage.

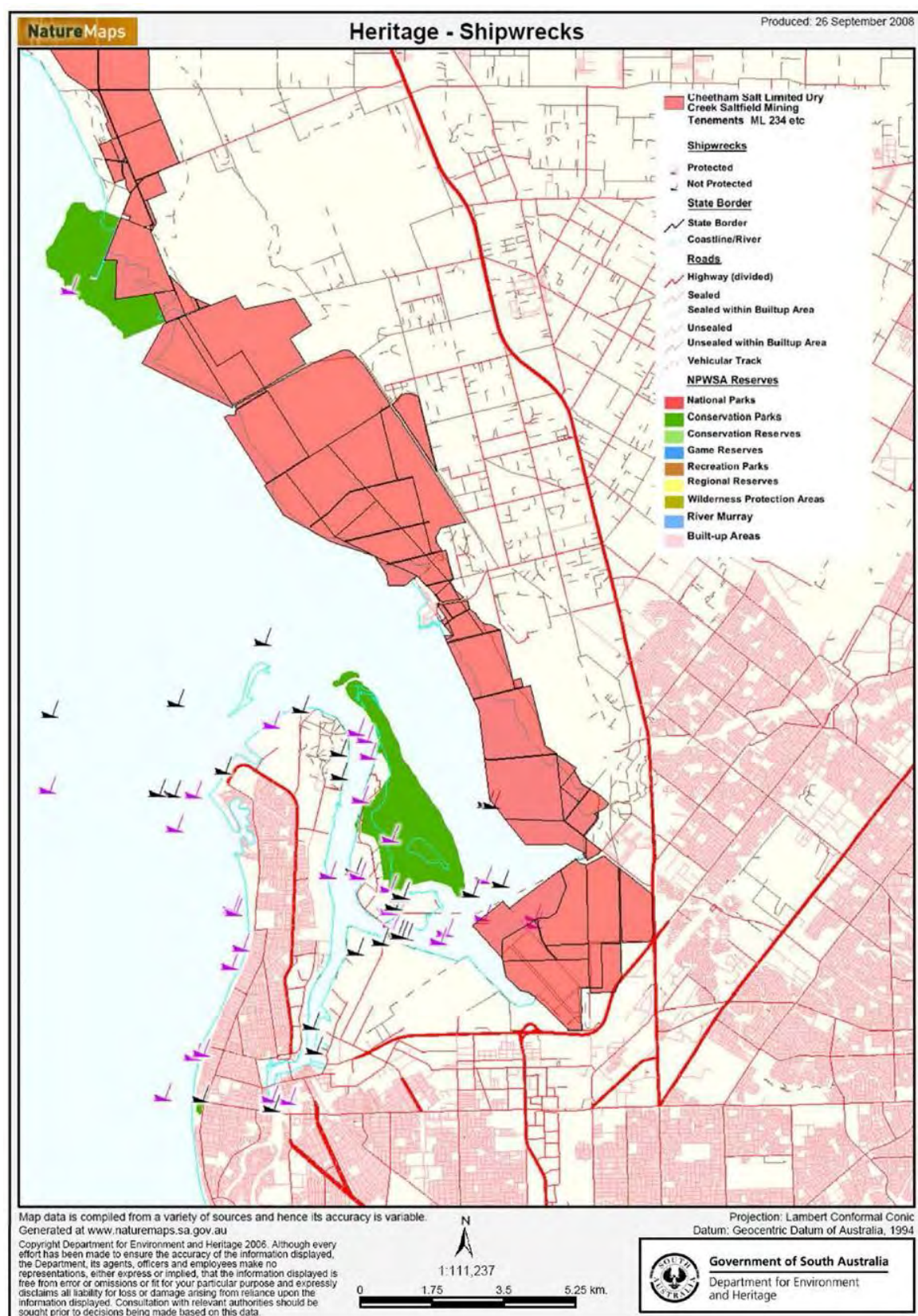


Figure 10-10: Locations of shipwrecks

10.12 Third Party Infrastructure in F, G and H Rows

Third party infrastructure in or close to F, G, and H rows include the Northern Connector, the SEA Gas Pipeline, the Electricity Transmission Lines, the Stormwater Drains.

In applying for the grant of ML6514, to enable brine to be received from the Salt Field into Section 1 for the purposes of resuming salt production, BDC lodged appropriate and acceptable documents for the protection of this infrastructure with DEM, for its consideration prior to the approval of the grant of ML6514.

11 Stakeholder Engagement and Consultation

Table 11-1 identifies the key Stakeholders. The prime purposes of the consultations and engagement activities are to demonstrate that all key stakeholders in the closure and completion of the mine have been apprised of what is planned, had their views considered, and are broadly accepting of the way in which the mine will be closed and completed.

It is anticipated that the Government (State and Local) and proponents of future uses of the closed and completed mine will be undertaking separate and distinct consultation and engagement activities. Those are beyond the scope of this PEPR / MOP.

To date the planning of the closure and completion of the mine have not advanced to the stage where regular consultation and engagement with other than key adjacent landowners, Councils, and State Government Agencies has been merited. Nonetheless Ridley and now BDC have and continue to engage with community organisations and individuals with proximate interests in the site – for the purposes of explaining what has been happening during the Holding Pattern and Residual Operations period, and to listen to and understand complaints and concerns that have been raised.

BDC also maintains complaints register, which records the details of the complaint, the initial response, reporting to State agencies, further action taken and information on how and when the complaint was resolved. There has only been one complaint received in 2014 relating to odour impacts.

11.1 Consultation and Engagement for Residual and Holding Pattern Operations

In early 2013 Ridley initiated communications and engagement with DEM, DIT, and other State Government agencies to explore and chart an agreed pathway towards closure of the site.

By early 2014, the following had been achieved:

- Agreement on a base case closure strategy, with a target program for its investigation, design, approval processes and then implementation.
- Approvals for the residual operations in Section 1, and care and maintenance operations and closure design investigations / trials investigations in Sections 2 to 4.

The communications and engagement since early 2014 are summarised in the Key Communications and Engagement table (see Table 11-2). The focus has been on engaging with:

- local resident groups – to ensure odour concerns are appropriately addressed and to make them aware of the closure planning
- local councils – to brief them on the Holding Pattern and closure planning and discuss potential future land uses
- State Government – through the formal mechanisms described in the Table and meetings on specific issues
- Commonwealth Government – on obligations under the EPBC Act
- Birdlife Australia – on bird monitoring and impacts of migratory birds.

A workshop in July 2014 developed agreed strategic goals for the development, investigation, and design of the Dry Creek Migratory Bird Conservation Area; and clarified regulatory requirements. This involved representatives from DEW, the Adelaide Mt Lofty Region NRM Board, Department of the Environment, Coastal Protection Board, Birdlife Australia, and SA Water.

Table 11-1: Stakeholder roles, interests and BDC's vehicles for consultation and engagement

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
Owner and Operator of Salt Field	Freehold landowner; lessee of Crown land; holder of Mining Leases	BDC Land Corporation	▪ Closure of site to enable handback of Mining Leases; release of Crown leases; and sale of freehold land. ▪ Achievement of the above in shortest reasonable time, while minimising costs and residual liabilities.	Y	Y	Y	Y
State Government	Crown landowner / manager with economic, environmental, social interest in this land	DEW	▪ Administers several licences to occupy that are part of Salt Field ▪ Administers the Adelaide Dolphin Sanctuary, Adelaide International Bird Sanctuary National Park – Winaityinaityi Pangkara and Buckland Park, which share boundaries with Salt Field ▪ Has saltmarsh transects in Crown land of the mine, where the effects of rising sea levels are monitored ▪ Maintains several Crown benchmarks in the field	Y	Y	Y	

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
			- Oversights , via Landscape SA and under the Landscape South Australia Act 2019, the activities of Green Adelaide and the Northern and Yorke regions of SA into which the Dry Creek Salt Field falls. - Oversights the Coast Protection Board				
		Renewal SA	Responsible for strategic planning and implementation of State sponsored urban renewal and urban development projects	Y	Y		
	Regulator / Planning Authority	DEM	- Administration of Mining Act via PEPR / MOP process until site closed under this Act and Mining leases handed back - Coordinates STAG	Y	Y		
		EPA	Licensing of site operations, include discharges to external environment	Y	Y		
		PIRSA	Administration of Fisheries Management Act in respect of discharges from the site into		Y		

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
			the marine environment; and in respect of fish management within the site				
		DIT	Responsible for strategic planning, development approvals and zoning	Y	Y		
	Adjacent landowner	SA Water	Site neighbour. Operates Bolivar Waste Water Treatment Plant. Interested in opportunities to use some of the site for its purposes. Provides permission for access to outfall for site brine discharge	Y	Y		
GBE	Prospective land purchaser / occupier	Flinders Ports	Potentially interested in opportunities to use some of the site for its purposes.		Y		
Local Government	Planning, stormwater management, urban environment management	City of Salisbury, City of Port Adelaide – Enfield, District Adelaide Plains, City of Playford	Councils rate Salt Field land, and some councils have other interests – CoS provides treated storm water from their wetlands for dissolving and has an agreement to use land at the Little Para for saltmarsh retreat.		Y		

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
			St Kilda Mangrove Interpretive Centre built partially within the mining leases, seaweed St Kilda Mangrove Interpretive Centre built partially within the mining leases, seaweed from beach cleaning is stored temporarily on leases				
Commonwealth Government	Regulator	Department of Climate Change Energy, Environment, and Water	- Administers the EPBC Act. - Interested in protection of migratory birds that use the site; and in other matters of national environmental significance.		Y		
Commonwealth, State and Local Government Politicians	Constituent and political party representatives	Susan Close Member for Port Adelaide (SA) (Fed)	Representatives of the interests of people and organisations in their electorates. If Minister of a regulatory authority that has jurisdiction over the site or its activities, then responsible for the administration of the relevant legislation		Y		
		Leesa Vlahos Member for Taylor (SA) Zoe Bettison Member for Ramsay (SA)			Y		

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
		Mark Butler Member for Port Adelaide (Fed) Nick Champion Member for Wakefield					
Site Neighbours		Rural landholding neighbours	Rural neighbours have an interest in the Salt Field as may impact on programs of weed and feral animal control. Likewise, illegal shooters and off-road vehicle users who become bogged can cause loss of stock and capital improvements			Y	Y
		Urban and coastal township neighbours (represented by St Kilda Progress Association and St Kilda and Surrounds Development and Tourism Association)	- Opportunities presented by future land uses at the site and how these may benefit their communities socially, environmentally, and economically. - Safety of houses and land east of the existing field is a potentially significant stakeholder issue for future land uses at the site. Several		Y		Y

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
			residential areas have been developed since the Salt Fields were constructed. Some of these developments are on land which was historically subject to tidal inundation. Some landholders have installed additional protection measures; however complete removal of the seawalls may adversely affect some properties.				
		St Kilda Tramway	Tramline runs along land donated by the Salt Field, between the ponds. The Tramway have concerns about foam on tram tracks.		Y		
		Jeffries Compositing Works	Interested in salinity of groundwater under their operation. Salt Fields have concerns about nutrient-rich composting dust and odours that can emanate from composting works		Y		

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
		Aerial farms, radars, and communication towers	- DSTO has an aerial farm and reflection pad for the Jindalee OTH radar at St Kilda. - Uni has an aerial installation at Shellgrit Rod, Civil Aviation has an aerial at Light Beach		Y		
		Dublin Balefill Tip	- Adjacent to Salt Fields in northern leases. - Balefill operators monitor groundwater to reassure neighbours regarding Balefill leachate		Y		
		South Australian Rifle Association	Rifle range at Light Beach has an overshoot template (exclusion zone) in Light River Delta, across Salt Field tenements		Y		
Special Interest Groups	Bird Habitat Observation and Monitoring	Ornithologists	- Interested to protect bird habitat afforded by the Salt Field. - Passes to 'birdwatching zone' between St Kilda and Port Gawler are provided to bona fide birdwatchers		Y		

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
		BirdLife Australia	- Interested to protect bird habitat afforded by the Salt Field. - Provides monitoring services and advice to DEW under Commonwealth and State funded programmes				
	Honey production	Beekeepers	Several beekeepers lease 'sites' for their hives from the Salt Fields		Y		
	St Kilda Mangroves	St Kilda Mangroves Alliance	- Closure and rehabilitation of the section 2 ponds - Restoration of the tidal wetlands outside these ponds - Closure and rehabilitation of Sections 3 and 4 ponds		Y		
Landscape Boards (responsible to DEW)	Responsible for delivering programs and projects to manage, protect and restore the	Green Adelaide; Northern and Yorke landscape regions	Is a source of grant monies for habitat restoration purposes		Y		

Stakeholder				Vehicles for Consultation and Engagement			
Group	Role	Identity	Interests	STAG STAG meetings were held for the purposes of the Holding Pattern and Residual Operations in the period 2013 to 2015, but since then have been no longer occurring.	Direct Meetings, Correspondence As required	Group Meetings with other stakeholders As required	Other (e.g., newsletter) As required
	region's natural resources						
	Responsible for protection, restoration development and management of the coast and related research	Coast Protection Board	Carries out works, acquires, and deals with coastal land. Also provides funding towards coastal projects.		Y		
Other Third Parties	Potential future landowners / occupiers / managers	Identities to be found by Eol process	Economic, environmental, and social value of the land		Y		Y As needed for Eol process

Table 11-2: Key Communications and Engagement 2014 to October 2016

Organisation / Group	Activities 2014 to October 2016	Issues Arising from Communication / Engagement	
		Issue	Outcome
St Kilda and Surrounds Development and Tourism Association and St Kilda Progress Association Residents / property occupiers on east side of Brooks Road Residents of St Kilda Other residents neighbouring the site	Meetings and email correspondence	Concerns about impacts from odours during episodes of high temperature and low wind speeds Concerns about impacts from windblown dusts on people and properties east of Brooks Road, and emanating from XC2, or XC2E when sufficiently hot, dry windy conditions occur Odour and Dust Diary programme Outstanding invitation from each Association to talk about the approach and anticipated sequence of steps to close the Salt Fields	Odour concerns arose in early 2014. They were investigated and action taken to prevent recurrence. This has been successful in that no subsequent complaints about odours have occurred. We have explained the work we have done to reduce the risk of such dusts occurring. However, the risk cannot be eliminated and remains a source of concern. Explanation of the purpose of the programme. Sourcing of volunteer diarists via the associations We have responded that we will be happy to provide a presentation / hold a discussion
Councils (Adelaide Plains, Playford, Salisbury)	Meetings, emails, See also STAG	Impacts from Holding pattern on site neighbours Possible Mine Closure strategies and opportunities to use different parts of the site for urban stormwater management	Ideas for use of PA4, PA5 and part of PA6 for stormwater management Engagement of Salisbury in discussions and review relating to development of Section 1.
DEM, DIT, EPA, DEW, SA Water	CE Steering Committee Meetings	High level coordination of Government involvement and oversight of the STAG.	Until the sale of Ridley Dry Creek Pty Ltd in 2016, Ridley (as the then mine tenement and freehold landowner) was represented on this Committee. Following that sale, the Committee's focus has changed to be primarily one of coordination within Government of actions arising from STAG deliberations, and so requires no representation from BDC (as the current mine tenement and freehold landowner).
Ridley (to May 2016), BDC (from June 2016), DEM, DIT, EPA, DEW, PIRSA plus SA Water, plus Renewal SA, plus Council representatives	Strategy and Technical Advisory Group (STAG) Meetings STAG meetings were held for the purposes of the Holding Pattern and Residual Operations	Oversight of implementation of Holding Pattern and of the strategy for closure and future land use identification.	The meetings were initially at fortnightly intervals and are now at monthly intervals. The outcomes so far have included: ▪ Endorsement of Ridley's Base Case Closure Strategy ▪ Collaboration between Ridley and Government on joint invitation for EOI's for future uses of Crown and Freehold land at the site ▪ Agreement for Government and Ridley to share costs of ASS investigations, topographic and bathymetric survey and for the EOI process which led to the sale of Ridley Dry Creek Pty Ltd

Organisation / Group	Activities 2014 to October 2016	Issues Arising from Communication / Engagement	
		Issue	Outcome
	in the period 2013 to 2015, but since then have been no longer occurring.		▪ Facilitated: ○ Permitting of Holding Pattern for Sections 2 to 4, with discharge to SA Water outfall from PA5, and trial draining of selected ponds ○ Approval of initial PEPR / MOP for the Holding pattern and for the investigations / trials needed to design closure works ○ Approval of necessary minor changes and also revisions to the PEPR / MOP covering ▪ Facilitated the collaborative review of a master plan for the development of Section 1 that was jointly funded by BDC and Renewal SA ▪ Facilitated surrender of mine tenements over land required by the Northern Connector ▪ Coordinated consideration of strategic options for closure of Sections 2, 3 and 4
DEW plus Commonwealth DoE, plus AMLR NRMB, plus CPB, plus BirdLife Australia	Workshop (2014)	In order to assess options, develop the concept for, and design (and obtain durable regulatory approvals for) the mooted Dry Creek Migratory Bird Conservation Area, there need to be a set of clearly stated strategic goals for this Area; and these goals need to be agreed by Ridley (now BDC), DEW / AML NRMB and by DoE in order for them to be achievable, sustainable, and able to merit regulatory approvals under the relevant legislation. The goal of the workshop was to <u>develop agreed strategic goals</u> that can frame the subsequent: ▪ option development, comparison, and selection ▪ the investigation and design of the Dry Creek Migratory Bird Conservation Area; and ▪ the regulatory approach to the assessment of this design for approval decision making.	Proposition of the following Strategic Goals: Landscape scale (Samphire Coast?) strategic goals 1) Important sites (habitat) continue to support significant numbers of shorebirds at a landscape scale (scale TBD). 2) Through an adaptive process, natural and human-induced changes are managed, informed by robust scientifically based monitoring. 3) Acceptable planning and management arrangements are developed and assured for important sites across private and public land. 4) Security of these measures are assured by statutory mechanisms and other agreements. Salt Field strategic goals 1) That the site at closure continues to contribute to the landscape-scale mosaic of shorebird habitat and ecological productivity. 2) Site condition assessments at closure and adaptive management plans with clear management objectives will be developed and implemented.

Organisation / Group	Activities 2014 to October 2016	Issues Arising from Communication / Engagement	
		Issue	Outcome
DEM, EPA, PIRSA	Meetings, correspondence, reviews of documents	Various issues relating to operational and compliance matters for the Holding Pattern; or to matters requiring minor changes or revisions to the PEPR / MOP	- Variations to the EPA Licence covering the Holding Pattern - DEM's agreement on Environmental Outcomes and Measurement Criteria to apply to the Holding Pattern - Approval under the FMAAct for the water discharges entailed by the Holding Pattern - Reviews of draft submissions for minor changes and revisions to the PEPR / MOP leading to approval of submissions once finalised - Review of the draft PEPR / MOP compliance report leading to approval of this once finalised - Reviews of progress and issues arising from trials and investigations conducted under the PEPR / MOP
DEM and EPA	Site Inspections (monthly originally and now quarterly)	Check environmental condition of site and status of compliance with PEPR / MOP, the EPA Licence and other approvals.	Issues identified are resolved with the necessary documentation.
Renewal SA	Meetings and correspondence	Redevelopment of Section 1. Reuse of Brine Main for Brine disposal to Port River	BDC and Renewal SA have collaborated on a review of the key issues that affect the feasibility of redevelopment of Section 1 for mixed use urban development Permission to trial the reuse of the brine main. Renewal SA owns some of the land outside the site and through which this brine main passes. It therefore owns the brine main in that land.
DCCEEW (formerly DoEE)	Emails and Meetings in Canberra, Site Visit by DoEE staff	Impacts from the Holding Pattern on Matters of National Environmental Significance. Mine closure of the inundated ponds in Sections 3 and 4 Coordination of the Commonwealth and State processes to regulate the changes to the inundated ponds in Sections 3 and 4 for compliance with the EPBC Act and the Mining Act respectively	Submission of annual 'self-assessments' based on monitoring to demonstrate that the impacts have been negligible A referral of the intention to close these ponds that resulted in a determination that changes from the Holding Pattern conditions in these ponds would be a 'controlled action' to be assessed by preliminary documentation. In that referral, responding to the offsetting / mitigation provisions of the EPBC Act and to provide confidence and certainty is the intent to design closure so that 100% of impacts are mitigated within the site under BDC's control, with no need to rely on offsets outside the site on land not under its control, even if within the International Bird Sanctuary. Agreement on a draft charter for this coordination

Organisation / Group	Activities 2014 to October 2016	Issues Arising from Communication / Engagement	
		Issue	Outcome
BirdLife Australia	Meetings, emails	Impacts from the Holding Pattern and impending closure on bird habitat provided by the site, and especially for the migratory Shorebirds	There has been exchange of bird monitoring data with Bird Life Australia BirdLife Australia provide bird monitoring and other services to AMLR NRMB and DEW for the International Bird Sanctuary Area (i.e., covering the Salt Field). Birdlife Australia, with AMLR NRMB advise DEW in discussions about potential impacts to birds from the holding pattern and from the mooted closure
SA Water	Meetings, emails	Access to SA Water land and outfall for discharge from PA5 Trial in Section 2 of treatment of nutrient removal from water from SA Water's Port Adelaide facility.	Agreement on access The trial has been proceeding, accommodated as a minor change to the PEPR / MOP. The trial started in PA9 and PA10 and is being extended to PA8 and PA7a
Flinders Ports	Meetings, emails	Reuse of Brine Main for Brine disposal to Port River	Permission to install a discharge point and trial the reuse of the brine main. Flinders Ports manages the section of the Port River where the brine main passes under.
Port Adelaide Enfield Council	Meetings, emails	Reuse of Brine Main for Brine disposal to Port River	Permission to trial the reuse of the brine main. The Council owns some of the land outside the site and through which this brine main passes. It therefore owns the brine main in that land

11.2 Consultation Undertaken for Resumed Salt Production Operations

The following outlines that DEM – as the primary government agency for the Salt Field was actively consulted about the plan to resume salt production:

- During 2018 DPTI was advised by DEM that salt production would recommence. Upon this advice DPTI consulted with BDC and consequently approved, supplied and installed all relevant infrastructure necessary to link Section 2 to Section 1 of the field disrupted by the construction of the Northern Connector.
- During 2019 DEM and BDC were in regular consultation reviewing all documentation to fast track the recommencement of salt production. DEM agreed to assist in the process to the extent that approval was given to return a mining lease from DPTI to BDC critical in free flow of brine across the Salt Field. This is ML6514.
- The process to apply for the grant of ML6514 included a formal public advertising period
- The approval for ML6514 was granted during July 2020. A case manager and team were assigned by the then DEM Director to fast track the process.
- In addition, during 2020 a minor PEPR / MOP change was approved for the installation of plant and equipment on Section 1 to allow for reinstatement of crystallisers and harvesting and packing of salt for retail and wholesale dispatch. This allowed BDC to expend capital and prepare the facility for salt production.
- All of the events and support given by government departments above suggested a commitment to future salt production.
- BDC operate under a Holding Pattern PEPR / MOP. In order to recommence salt production, changes to Revision 4 of the PEPR / MOP were required to reflect salt production activity. During the period 2020 to June 2024, government agencies' reviews of successive drafts of changes to that PEPR / MOP were facilitated by DEM. There were also multiple meetings between BDC and DEM to discuss both the planned operations to enable resumed commercial salt production and also the details of the required revisions of the PEPR / MOP. From that consultation has come this present Revision 5 of the PEPR / MOP.

11.3 Consultation for Changes to Operations under this Revision 5 PEPR / MOP

Ministerial Determination TR005 states:

CONSULTATION

In setting out the result of the consultation undertaken in connection with the proposed operations in accordance with regulation 64 of the Mining Regulations 2020, the Minister determines in accordance with regulation 63(1)(e) of the Mining Regulations 2020 that a PEPR must include:

- *A description of:*
 - *the process undertaken for identifying stakeholders with an interest in, or stakeholders likely to be directly affected by the mining operation;*
 - *the process undertaken for the delivery of information to, gathering of feedback from, and responding to those identified stakeholders;*
 - *if any individual or group of similar affected persons were not able to be consulted, the steps taken to consult with them.*

- *The results of the consultation undertaken with those identified stakeholders, including:*
 - *the persons consulted;*
 - *any concerns / issues raised; and*
 - *the response and steps (if any) taken or proposed to address those concerns.*

Table 11-3 provides BDC's identification of stakeholders with an interest in, or stakeholders likely to be directly affected by the CHANGES in mining operations set out in this Revision 5 of the PEPR / MOP. This identification assumes that:

- by virtue of each of DEM's approvals of the previous revisions of this PEPR / MOP, the consultation conducted ahead of each approval was deemed by DEM to be satisfactory; and
- in particular, DEM's approval of Revisions of this PEPR / MOP means that all prior consultation was deemed satisfactory for:
 - the transfer of brine from PA5 into Section 1 via a pipeline constructed to connect PA12 to ML6514
 - the preparation of Section 1 to resume commercial salt production using this brine, and the concept of salt production resuming
 - the filling of F, G, H rows preparation to mine closure and completion here
 - the ongoing holding pattern operations in Sections 2 to 4
 - the residual operations in Section 1 pending the receipt of brine into ML6514
- Therefore, this Revision 5 of the PEPR / MOP requires consultation only for
 - Construction and operation of a new pipeline, bypassing section 2 ponds, to transfer brine from PA5 to Section 1 via an existing pipeline between PA12 and ML6514
 - Resumed commercial salt production operations in Section 1, using infrastructure approved to be rehabilitated or created in Revision 4 of the PEPR / MOP.

Table 11-3 shows that the identified stakeholders for this Revision 5 of the PEPR /MOP comprise DEM and government agencies that we understand would be used as referral agencies by DEM when assessing the Revision 5.

11.4 Proposed Consultation and Engagement for Investigation of Future Closure Plans

The planned further communications and engagement activities relating to this PEPR / MOP include:

1. Consultations and discussions with agencies in the development of the strategies / plans for future land uses and the consequent specific closure plans for each area of the site. The development of such plans will be informed by investigations and trials to be conducted to identify feasible future land uses and investigate the issues required to close that area of the site to make it suitable for closure and completion. It is anticipated that such discussions will not just involve regulatory agencies (e.g., DEM, DIT, DEW, EPA, PIRSA, Councils, and Commonwealth DEE) but also extend, as relevant, to other organisations, such as:

- NGO's, like BirdLife Australia
 - Coastal Protection Board
 - SA Water.
2. Once (for the purposes of mine closure and completion) strategies / plans for future land uses become defined sufficiently, BDC intends to hold briefings to which relevant stakeholders will be invited to provide them with information for their consideration and to seek their feedback.

Table 11-3: Stakeholder roles, interests, and assessment of the need to consult with them for this Revision 5 of this PEPR / MOP

Stakeholder				Would the stakeholder have an interest in, or likely to be directly affected by the CHANGE in operations that is the subject of this Revision 5 of the PEPR / MOP?		Comments
Group	Role	Identity	Interests	Construction and operation of a new pipeline, bypassing section 2 ponds, to transfer brine from PA5 to Section 1 via an existing pipeline between PA12 and ML6514, approved to be operated in Revision 4 of the PEPR / MOP	Resumed commercial salt production operations in Section 1, using infrastructure approved to be rehabilitated or created in Revision 4 of the PEPR / MOP	General comment: Each of these stakeholders will have or may have a potential interest in: - The annual PEPR /MOP compliance reports that DEM puts into the public domain - Future changes in operations and / or the future mine closure and completion planning for the different parts of the Salt Field, and that will need future revisions of this PEPR / MOP. As and when these revisions become contemplated, the BDC will need and approach for consultation with these stakeholders will be assessed.
Owner and Operator of Salt Field	Freehold landowner; lessee of Crown land; holder of Mining Leases	Buckland Dry Creek Pty Ltd (BDC)	- Closure of site to enable handback of Mining Leases; release of Crown leases; and sale of freehold land. - Achievement of the above in shortest reasonable time, while minimising costs and residual liabilities.	Y	Y	
State Government	Crown landowner / manager with economic, environmental, social interest in this land	DEW	- Administers several licences to occupy that are part of Salt Field - Administers the Adelaide Dolphin Sanctuary, Adelaide International Bird Sanctuary National Park – Winaityinaityi Pangkara and Buckland Park, which share boundaries with Salt Field - Has saltmarsh transects in Crown land of the mine, where the effects of rising sea levels are monitored - Maintains several Crown benchmarks in the field - Oversights , via Landscape SA and under the Landscape South Australia Act 2019, the activities of Green Adelaide and the Northern and Yorke regions of SA into which the Dry Creek Salt Field falls. - Oversights the Coast Protection Board	Y	Y	Extensive consultation with this stakeholder, via DEM since 2017 led to renewal of Salt Field mine tenements, the granting of ML6514; and the renewal of the EPA licence represents acceptance of the supply of brine into Section 1 and the resumption of commercial salt production – subject to DEM approval of a revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5. Detailed review of and comment on draft of the Revision 5 PEPR / MOP This resulted in the change to the concept of a pipeline bypassing all of Section 2 for transmitting brine from PA5 through to Section 1
		Renewal SA	Responsible for strategic planning and implementation of State sponsored urban renewal and urban development projects	Y	Y	Extensive consultation with this stakeholder, via DEM since 2017 led to renewal of Salt Field mine tenements, the granting of ML6514; and the renewal of the EPA licence represents acceptance of the supply of brine into Section 1 and the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5. Detailed review of and comment on draft of the Revision 5 PEPR / MOP This resulted in the change to the concept of a pipeline bypassing all of Section 2 for transmitting brine from PA5 through to Section 1

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	Regulator / Planning Authority	DEM	- Administration of Mining Act via PEPR / MOP process until site closed under this Act and Mining leases handed back - Uses other government agencies as referral agencies when reviewing or assessing each next revision of the PEPR/MOP	Y	Y	Extensive consultation with this stakeholder, via DEM since 2017 led to renewal of Salt Field mine tenements, the granting of ML6514; and the renewal of the EPA licence represents acceptance of the supply of brine into Section 1 and the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5. Detailed review of and comment on draft of the Revision 5 PEPR / MOP This resulted in a) the change to the concept of a pipeline bypassing all of Section 2 for transmitting brine from PA5 through to Section 1; b) clarification of the environmental outcome and measurement criteria to align more clearly with requirements stemming from the Mining Act; c) clarification of the closure strategy; and d) consequential amendments within the rest of this document
		EPA	Licensing of site operations, include discharges to external environment	Y	Y	Extensive consultation with this stakeholder, via DEM since 2017 led to renewal of Salt Field mine tenements, the granting of ML6514; and the renewal of the EPA licence represents acceptance of the supply of brine into Section 1 and the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5. Detailed review of and comment on draft of the Revision 5 PEPR / MOP This resulted in the change to the concept of a pipeline bypassing all of Section 2 for transmitting brine from PA5 through to Section 1
		PIRSA	Administration of Fisheries Management Act in respect of discharges from the site into the marine environment; and in respect of fish management within the site	No, because this change does not affect the impacts and risk assessments, or environmental outcomes and	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the

Stakeholder				Would the stakeholder have an interest in, or likely to be directly affected by the CHANGE in operations that is the subject of this Revision 5 of the PEPR / MOP?		Comments
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				measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
		DIT	Responsible for strategic planning, development approvals and zoning	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
	Adjacent landowner	SA Water	Site neighbour. Operates Bolivar Waste Water Treatment Plant. Interested in opportunities to use some of the site for its purposes. Provides permission for access to outfall for site brine discharge	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
GBE	Prospective land purchaser / occupier	Flinders Ports	Potentially interested in opportunities to use some of the site for its purposes.	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
Local Government	Planning, stormwater management, urban	City of Salisbury, City of Port Adelaide – Enfield, Adelaide Plains, City of Playford	Councils rate Salt Field land and some councils have other interests – CoS provides treated storm water from their wetlands for dissolving and has an agreement to use land at the Little Para for saltmarsh retreat.	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt

Stakeholder				Would the stakeholder have an interest in, or likely to be directly affected by the CHANGE in operations that is the subject of this Revision 5 of the PEPR / MOP?		Comments
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	environment management		St Kilda Mangrove Interpretive Centre built partially within the mining leases, seaweed St Kilda Mangrove Interpretive Centre built partially within the mining leases, seaweed from beach cleaning is stored temporarily on leases	approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
Commonwealth Government	Regulator	Department of Climate Change Energy, Environment, and Water	- Administers the EPBC Act. - Interested in protection of migratory birds that use the site; and in other matters of national environmental significance.	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
Commonwealth, State and Local Government Politicians	Constituent and political party representatives	See Parliament of SA Parliament of Australia	Representatives of the interests of people and organisations in their electorates. If Minister of a regulatory authority that has jurisdiction over the site or its activities, then responsible for the administration of the relevant legislation	Y	Y	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
Site Neighbours		Rural landholding neighbours	Rural neighbours have an interest in the Salt Field as may impact on programs of weed and feral animal control. Likewise, illegal shooters and off-road vehicle users who become bogged can cause loss of stock and capital improvements	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
		Urban and coastal township neighbours (represented by St Kilda Progress Association and	Opportunities presented by future land uses at the site and how these may benefit their communities socially, environmentally, and economically.	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt

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		St Kilda and Surrounds Development and Tourism Association	Safety of houses and land east of the existing field is a potentially significant stakeholder issue for future land uses at the site. Several residential areas have been developed since the Salt Fields were constructed. Some of these developments are on land which was historically subject to tidal inundation. Some landholders have installed additional protection measures; however complete removal of the seawalls may adversely affect some properties.	approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
		St Kilda Tramway	Tramline runs along land donated by the Salt Field, between the ponds. The Tramway have concerns about foam on tram tracks.	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
		Jeffries Compositing Works	Interested in salinity of groundwater under their operation. Salt Fields have concerns about nutrient-rich composting dust and odours that can emanate from composting works	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
		Aerial farms, radars, and communication towers	- DSTO has an aerial farm and reflection pad for the Jindalee OTH radar at St Kilda. - Uni has an aerial installation at Shellgrit Rod, Civil Aviation has an aerial at Light Beach	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
		Dublin Balefill Tip	- Adjacent to Salt Fields in northern leases. - Balefill operators monitor groundwater to reassure neighbours regarding Balefill leachate	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt

Stakeholder				Would the stakeholder have an interest in, or likely to be directly affected by the CHANGE in operations that is the subject of this Revision 5 of the PEPR / MOP?		Comments
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				approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
		South Australian Rifle Association	Rifle range at Light Beach has an overshoot template (exclusion zone) in Light River Delta, across Salt Field tenements	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
Special Interest Groups	Bird Habitat Observation and Monitoring	Ornithologists	- Interested to protect bird habitat afforded by the Salt Field. - Passes to 'birdwatching zone' between St Kilda and Port Gawler are provided to bona fide birdwatchers	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
		BirdLife Australia	- Interested to protect bird habitat afforded by the Salt Field. - Provides monitoring services and advice to DEW under Commonwealth and State funded programmes	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
	Honey production	Beekeepers	Several beekeepers lease 'sites' for their hives from the Salt Fields	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt

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	St Kilda Mangroves	St Kilda Mangroves Alliance	- Closure and rehabilitation of the section 2 ponds - Restoration for the tidal wetlands outside these ponds - Closure and rehabilitation of Sections 3 and 4 ponds	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5. A full review of intent to commence full commercial salt production was requested by and provided to DEM who consulted with all referral agencies and stakeholders leading to renewal of all Mine Tenements in December 2019. DPTI also consulted DEM before allowing government expenditure to fully reconnect the field after securing confirmation from DEM that salt production would proceed. This enabled BDC to invest in the resumption of salt production. Licences were renewed in Dec 2019 Although there is not a need to consult with this stakeholder group about the changes in operations that give rise to this Revision 5 of this PEPR / MOP, the need for consultation may arise on other matters relating to the Salt Field. In that event the following factors are pertinent to consideration of the appropriate process for that consultation with this stakeholder group: The group has an agenda that is published on its website, and that is opposed to a) the continued existence of the Salt Field as a productive mining tenement and b) the sustaining of the environmental values of the Salt Field that are Matters of National Environmental significance under the EPBC Act (Cth); and that are synergistic

Stakeholder				Would the stakeholder have an interest in, or likely to be directly affected by the CHANGE in operations that is the subject of this Revision 5 of the PEPR / MOP?		Comments
Group	Role	Identity	Interests	Construction and operation of a new pipeline, bypassing section 2 ponds, to transfer brine from PA5 to Section 1 via an existing pipeline between PA12 and ML6514, approved to be operated in Revision 4 of the PEPR / MOP	Resumed commercial salt production operations in Section 1, using infrastructure approved to be rehabilitated or created in Revision 4 of the PEPR / MOP	General comment: Each of these stakeholders will have or may have a potential interest in: - The annual PEPR /MOP compliance reports that DEM puts into the public domain - Future changes in operations and / or the future mine closure and completion planning for the different parts of the Salt Field, and that will need future revisions of this PEPR / MOP. As and when these revisions become contemplated, the BDC will need and approach for consultation with these stakeholders will be assessed.
						with the environmental values of the Adelaide International Bird Sanctuary - The Coleman’s of Delta Environmental appear to be prominent in and influential in this stakeholder group. They have a familial relationship with a person whose employer is known to have a commercial interest in there not being a resumption of commercial salt production from the Dry Creek Salt Field. In that respect, the interests of that employer are aligned with the goal of this stakeholder group to see mine closure and rehabilitation of the Section 2, 3 and 4 ponds - This stakeholder group has a legitimate interest in having confidence that Salt Field operations comply with environmental outcome and measurement criteria in this PEPR / MOP that have the purpose of protecting the mangrove environment outside the Salt Field’s ponds - This stakeholder group indicates on its website that it has the support of a diverse range of community groups and NGO” S – though the nature and extent of that support is not declared. - BDC is aware that this stakeholder group appears to be influential with certain parts of DEW and EPA, and also to have some ability to influence politicians.
Landscape Boards (responsible to DEW)	Responsible for delivering programs and projects to manage, protect and restore the region’s natural resources	Green Adelaide; Northern and Yorke landscape regions	Is a source of grant monies for habitat restoration purposes	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 entailed a was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
	Responsible for protection, restoration development and management of the coast	Coast Protection Board	Carries out works, acquires, and deals with coastal land. Also provides funding towards coastal projects.	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 entailed a was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP).

Stakeholder				Would the stakeholder have an interest in, or likely to be directly affected by the CHANGE in operations that is the subject of this Revision 5 of the PEPR / MOP?		Comments
Group	Role	Identity	Interests	Construction and operation of a new pipeline, bypassing section 2 ponds, to transfer brine from PA5 to Section 1 via an existing pipeline between PA12 and ML6514, approved to be operated in Revision 4 of the PEPR / MOP	Resumed commercial salt production operations in Section 1, using infrastructure approved to be rehabilitated or created in Revision 4 of the PEPR / MOP	General comment: Each of these stakeholders will have or may have a potential interest in: - The annual PEPR /MOP compliance reports that DEM puts into the public domain - Future changes in operations and / or the future mine closure and completion planning for the different parts of the Salt Field, and that will need future revisions of this PEPR / MOP. As and when these revisions become contemplated, the BDC will need and approach for consultation with these stakeholders will be assessed.
	and related research					The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.
Other Third Parties	Potential future landowners / occupiers / managers	Identities to be found by EoI process	Economic, environmental, and social value of the land	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	N, because this change does not affect the impacts and risk assessments, or environmental outcomes and measurement criteria set out in the DEM approved Revision 4 off this PEPR /MOP, and that are relevant to this stakeholder	The application for the granting of ML6514 entailed a was publicly advertised, and was specifically to enable brine to be delivered into Section1 from the rest of the Salt Field for the resumption of commercial salt production – subject to DEM approval of a suitably revised PEPR / MOP (revised from this Revision 5 PEPR/MOP). The DEM approved 2020 Revision 4 of the PEPR / MOP is a public document. It clearly sets out the intent to resume commercial salt production and to transfer brine to Section 1 from PA5.

12 Operations

12.1 Introduction

This Chapter describes the operations for

- The Holding Pattern, noting that the Holding Pattern applies to Sections 2 to 4 of the Salt Field until:
 - The preparatory work for the resumption of commercial salt production requires the delivery of brine from Section 2 into Section 1 in the volumes and with the salinity required to reinstate the floors of the crystallisers and to provide brine for commercial salt crystallisation. At that point in time the operations for water management and the operation and maintenance of the infrastructure to produce brine suitable for delivery into Section 1 cease being a Holding Pattern task and become a task for commercial salt production. In effect this means that from that time the scope of Holding Pattern Operations reduces to concern only the operation of the drained ponds within Sections 2 to 4 of the Salt Field;
- The Residual operations in Section 1 of the Salt Field, noting that:
 - In F, G, H Rows these Residual Operations are complete and have been replaced by the work to fill F, G and H Rows in Section 1. When this work is complete to the satisfaction of DEM BDC will trigger the mine closure and completion processes for the affected parts of PM248. When mine closure and completion is achieved, these affected parts of PM248 cease being in a mine tenement and subject to the Holding Pattern Operations
 - In the balance of Section 1 (noting that this is now confined to land east of the Northern Connector), the preparatory work for the resumption of commercial salt production, and then the operations for commercial salt production will replace the Residual Operations
- The preparations to transmit brine from Section 3 to Section 1 for the purposes of:
 - Sustaining the Holding Pattern Operations and the environmental values of Sections 3 and 4 of the Salt Field; and
 - Providing brine for commercial salt production from Section 1
- Resumed Commercial Salt Production
- The filling of F, G and H Rows in Section 1, which are the first stages in the progressive rehabilitation and closure process (See Chapter 15)

In summary the salt production operations will, making the best use of the areas available.

- Control brine levels, flows and salinities in the inundated ponds in Sections 3 and 4 using operations very similar to those when the Salt Field was in historical production and during the holding pattern. The brine levels and salinities in the ponds will be similar also to those when the Salt Field was in historical production and during the holding pattern. For the purposes of this PEPR / MOP there is no material change in operations in Sections 3 and 4 to those described and permitted by Revision 4 of this PEPR / MOP, and which have been

conducted with acceptable environmental outcomes a) during historical salt production operations to 2013 and b) during Holding Pattern operations since then to date.

- Bypass Section 2 ponds with a new pipeline to carry pumped brine (See Appendix 7). The existing pipeline connecting Section 2 to Section 1 will receive brine from this pipeline for pumping to Section 1. This means that for the purposes of this PEPR / MOP there is no change in operations in Section 2 to those described and permitted by Revision 4 of this PEPR / MOP as modified by the Environmental Direction – except for the operations to a) construct and operate and maintain the new pipeline system for pumping brine from PA5 to the exit of PA11; and b) pump supernatant water from PA6 into PA5 whenever this is needed to keep water levels in PA6 below an agreed value (see below).
- In Section 1, be similar in nature to those used during historical salt production, except using fewer crystallisers and not dissolving produced salt for pumping to Penrice. Instead, the produced salt will be washed and refined and dispatched from the site in crystalline form. These operations will use less bore water than the historical salt production operations. They will also use refurbished crystallisers and a mix of refurbished and new infrastructure. Bitterns discharge will use the existing licensed discharge point (E row flap) to Dry Creek and the discharge criteria in that licence – which are the same as applied during historical salt production and for the holding pattern and residual operations described and permitted by Revision 4 of this PEPR / MOP. Therefore, for the purposes of this PEPR / MOP these operations in Sections 1 are compatible with those described and permitted by Revision 4 of this PEPR / MOP.
- In consequence have similar environmental outcomes and levels of environmental risks as those pertaining during historical salt production and also during the period of the holding pattern when Section 2 ponds PA6 to PA9 were not used to contain brine. The regulatory record of the Salt Field during historic salt production demonstrates the acceptability of the environmental outcomes in this period. Also, the series of annual PEPR / MOP compliance report submitted to DEM from 2014 onwards demonstrates the acceptability of the environmental outcomes during the period of the holding pattern when Section 2 ponds PA6 to PA9 were not used to contain brine. Therefore, there can be confidence that with resumed salt production operations as described herein the environmental risks will continue to be acceptably low and environmental outcomes will comply with the requirements of this PEPR / MOP, which are consistent with those in the previous revisions of this PEPR / MOP which have been approved by DEM.

12.2 Holding Pattern and Residual Operations (until resumption of commercial salt production)

The initial PEPR / MOP for the Holding Pattern and Residual Operations was endorsed (Revision 1 of this document) in March 2014. Since then, there have been endorsed revisions and a number of endorsed minor changes to the PEPR / MOP. The following sections in this revision (Revision 5), describe the current Holding Pattern and Residual Operations, reflecting the cumulative effect of these change

The only changes in these operations from Revision 4 of the PEPR / MOP are:

- In continued compliance with the Environmental Direction issued in December 2020, no discharge of brine from PA5 into PA6

- Therefore, not using ponds PA6 to PA12 as the pathway for brine to reach the pump in PA12, as was envisaged in Revision 4, and instead keeping these ponds in the same way as in the period 2014 to 2019, namely experiencing fluctuations in water level between fully dry to limited inundation due to the balance of seasonal rainfall and evaporation and groundwater seepage inflows, and seepage losses from any contained inundation.
- Following the commencement of pumping brine via the pipeline from PA5 through to Section 1, and for the management of brine flows, salinities and levels through Sections 3 and 4, operations that entail:
 - Maintenance of the existing infrastructure, systems and controls to discharge, from time to time, excess brine from PA5 to the SA Water outfall – with the same EPA Licence conditions as presently apply
 - Adjusting, in the light of experience, the flow rates, water levels and salinities in the Section 3 and 4 ponds to preserve, in different seasonal weather conditions, the compatibility of the salinity and flow rate of brine arriving in PA5 with the capacities of a) the pump / pipeline to transfer brine to Section 1 and b) the infrastructure in Section 1 to receive and process the received brine.
 - Provision of sea water or freshwater to be pumped through the pipeline from PA5 to Section 1 or from Section 1 to PA5 for the purposes of pipeline cleaning and maintenance
 - Investigation of options for providing freshwater or sea water into PA5 for the purposes of adjusting the salinity of the brine in PA5 for pumping through the pipeline to Section 1

12.2.1 Residual Operations in Section 1

The Residual Operations in Section 1 remain those described in Revision 4 of the PEPR / MOP and comprise:

- pumping bore water from the T1 aquifer and sea water to dissolve or wash salt from stockpiles or in crystallisers
- pumping 'MagBrine' into a tanker for use on site or for transport offsite
- workshop operations for the maintenance and repair of equipment
- storage of waste brine from salt washing or brine from dissolved salt
- recrystallisation of brine in crystallisers
 - pumping and storage of stormwater
 - maintenance of existing roads and bunds
 - environmental management as per this PEPR/ MoP under existing management plans and procedures
 - operations of the site office.

- recovery and removal from site of commercially recoverable salt involving:
 - removal of salt from stockpiles and excavation from the crystalliser beds using an excavator and dump truck
 - passing the removed salt through a wash plant using uses bore water to remove soil particles, and other impurities from the salt to achieve a technical specification agreed by the customer for the salt
 - stockpiling the washed salt
 - loading washed salt from stockpile into trucks for transport offsite
 - holding waste water from the salt washing within the site for loss by evaporation. This waste water carries soil particles and the other impurities, and also a percentage of salt.
- Functional separation (now complete) of that land needed for operations in Section 1 from that transferred to DIT for the Northern Connector:

These operations have the purposes of:

- managing crystallised salt, brine, borewater and stormwater within Section 1
- supporting the Holding Pattern in Sections 1 to 4.

These operations also represent either a continuation, or a reduction, in the scale and scope of historical operations.

12.2.2 New Operations in Section 1 (preparation for resumption of commercial salt production)

The new operations in Section 1 are to entail:

- receiving brine pumped from Section 2 through a new pipeline for brine connecting ML 6514 in Section 1 and pond PA 12 in Section 2 – See Figure 12-1 to Figure 12-6.
 - Brine will be delivered to pond PA12 by pumping through a pipeline from pond PA5 in Section 3. This pipeline will bypass ponds PA6 to PA 11 in Section 2.
 - This pumping is necessary to re-establish the quality of brine needed for the resumption of commercial salt production in Section 1.
 - Additionally this pumping is essential as the only sustainable way to prevent excessive summer salt concentrations in some of the Section 3 and 4 salinas – concentrations that would be incompatible with the environmental outcomes required by this PEPR / MOP - arising from the reducing quantities able to be discharged into the SA Water Bolivar Outfall (due to reducing effluent flow rates in it from the Bolivar STP) because of SA water diversions of water to the Northern Adelaide Irrigation Scheme.
- re-establishing the functionality of the Section 1 infrastructure to receive and manage this brine. This will entail a mix of refurbishment, renovation, replacement of existing infrastructure and the construction of new infrastructure.
- once brine is being pumped into those parts of Section 1, to then making the other preparations needed for the resumption of commercial salt production.

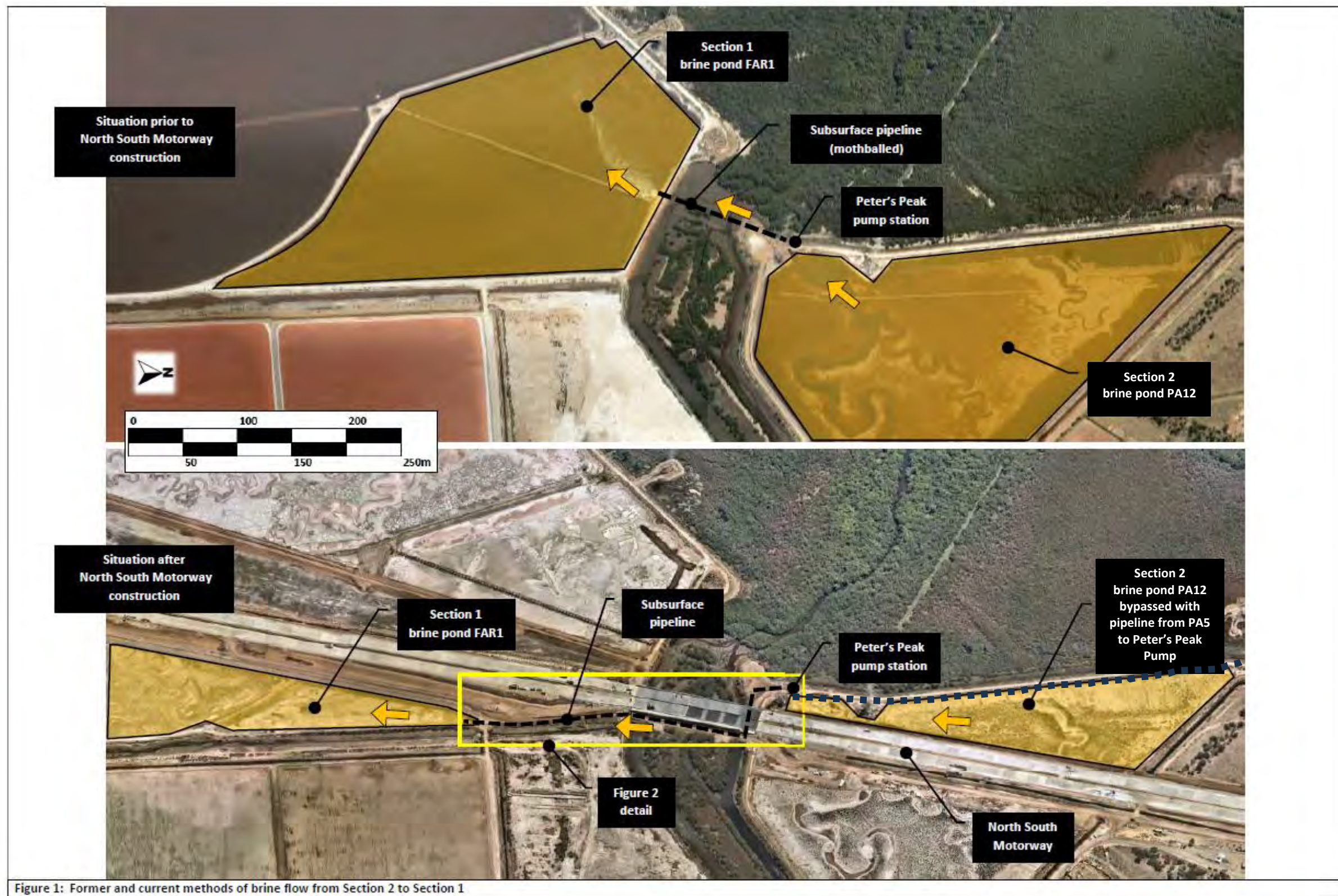


Figure 12-1: Information on Brine Pipeline from Section 2 to Section 1 - A

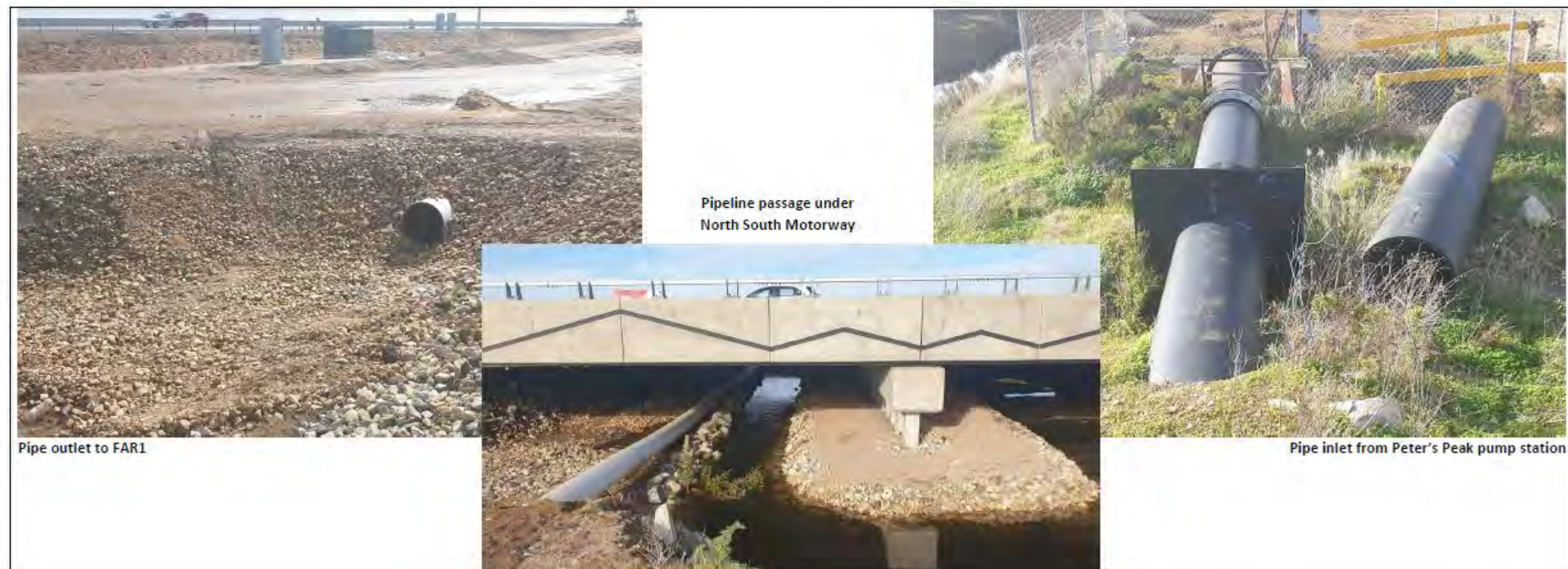


Figure 12-2: Information on Brine Pipeline from Section 2 to Section 1 - B



Figure 12-3: Information on Brine Pipeline from Section 2 to Section 1 - C

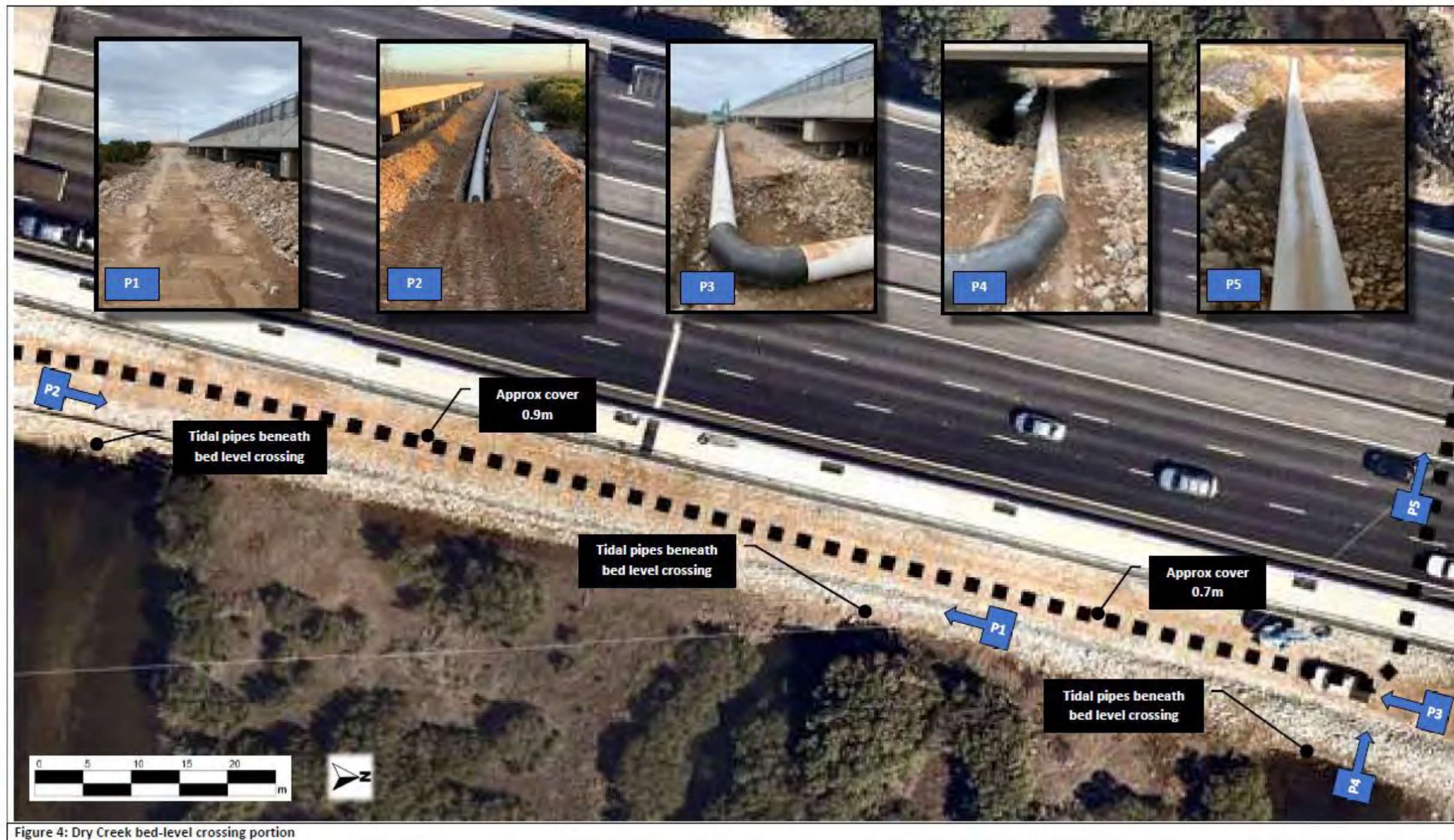


Figure 4: Dry Creek bed-level crossing portion

Figure 12-4: Information on Brine Pipeline from Section 2 to Section 1 - D



Figure 5: south of Dry Creek bed-level crossing

Figure 12-5: Information on Brine Pipeline from Section 2 to Section 1 - E



Figure 6: Southern portion into FAR1

Figure 12-6: Information on Brine Pipeline from Section 2 to Section 1 – F

12.2.3 Holding Pattern Operations in Sections 2 to 4

The Holding Pattern operations are set out below. They remain the same as described in Revision 4 of this PEPR / MOP. The purposes are to:

- Manage the environmental impacts and risks for those parts of the Salt Field no longer involved in commercial salt production;
- Continue to sustain water quality within inundated ponds (using a combination of managed entrainment and licensed pumped discharge from PA5 or, when approved by DEM, flowing brine through a pipeline in Section 2 to Section 1). The aims are to sustain inundated pond water health, inundated pond habitats, and a range of salinities in these ponds between points of sea water entrainment and the ultimate point of discharge that are reasonably analogous to historical operations; and

12.2.3.1 Pond Water Salinity and Level Management Operations

Holding Pattern Water Management is required until the preparatory work for the resumption of commercial salt production requires the delivery of brine from Section 2 into Section 1 in the volumes and with the salinity required to reinstate the floors of the crystallisers and to provide brine for commercial salt crystallisation.

From that point in time:

- the operations for water management to sustain water levels and quality in the ponds for environmental purposes become identical to those needed to produce brine suitable for delivery into Section 1 to help prepare Section 1 to resume commercial salt production, and then to sustain commercial salt production; and therefore
- the operations for water management to sustain water levels and quality in the ponds is no longer a Holding Pattern task.

The Water Management operations include:

- Continuation of the historic operational seawater entrainment at Middle Beach into Section 4.
- Resuming, on an as needed basis, seawater entrainment at Chapman Creek into Section 3. This was previously the operational entrainment location until superseded by Middle Beach.
- Entraining and discharging sufficient volumes of water and managing flows of water between ponds in Section 3 to assist manage water levels and quality within the inundated ponds. Information is provided below about target ranges for water levels. The water quality parameters include Dissolved Oxygen, Temperature, Specific Gravity, and pH. The aim is to stay broadly consistent with values that pertained during normal operations, except to the extent this objective is unavoidably constrained by limits on discharge from PA5. The volumes pumped in any week to manage water levels and quality will be adjusted, as in the past, in light of the following:
 - tide levels and durations at the Middle Beach and Chapman Creek pumps
 - quantities of rainfall and evaporation affecting the Salt Field
 - maximum water level capacities of the ponds
 - water level differences needed between ponds to enable flow through pond connections (gates and siphons)

- o actual flow rates between ponds.
- Discharge of water from PA5:
 - o As per Revision 4 of this PPR / MOP, and as per the existing EPA licence and the existing agreement between DEM and SA Water, pump water into the SA Water Bolivar Outfall
 - o Construct and commission the new pipeline and associated systems to pump brine from PA5 to the exit of PA11, and then
 - o Pump brine from PA5 to the exit of PA11 for it to flow to PA12; pump the brine from PA12 into Section 1; and then
 - o Retain the contingency capacity to pump water into the SA Water Bolivar Outfall

The experience, as documented in PEPR / MOP compliance and other reports to DEM, with the Holding Pattern from 2014 to date is that:

- With discharge from PA5 to the Bolivar Outfall, supplemented with discharge as needed from XE6 to the Gawler River, and with the Ponds XF1, XF2, XE4, XC1, XC2, XC2S having been drained and kept drained:
 - o Over summer months, the total volume of water per ha of inundated ponds entrained in aggregate at Middle Beach pumps and Chapman Creek pumps has been broadly consistent with that entrained at Middle Beach only, during normal historical operations.
 - o Over winter months, the entraining water has been at a lower rate than in summer. During historical operations, little to no water was entrained.
 - o It has been practicable, with some exceptions during the height of summer, to keep salinities in Section 3 and 4 inundated ponds within the target limits. Had Ponds XF1, XF2, XE4, XC1, XC2, XC2S not been drained and kept drained, the constraints on the rate and salinity of discharge to the Bolivar Outfall would have made it impossible to sustain salinities in all of Section 3 and Section 4 ponds within these target limits ranges.
- When limitations to outfall flows occur, or if access to the outfall to discharge brine to it ceases, or if discharge from PA 5 to the Bolivar Outfall is constrained or ceases, then without the capacity to discharge water through Section 2 to Section 1, the water levels and salinities in Section 3 ponds become too high or unstable, especially in summer months. Such issues occurred before the original use of the Bolivar Outfall from 2014 and then in 2019 and 2020, with full discharge to the Bolivar Outfall occurring between 2014 and 2019 and then resuming in 2021. It then takes two or more years to bring summer salinities back within the target range required by this PEPR / MOP.
- The progressive reduction in Bolivar Outfall flows due to SA Water's diversion of water to the Northern Adelaide Irrigation Scheme presents a severe risk to the sustainability of this mode of discharge (i.e. from PA5 to the outfall) as the sole means to sustain acceptable salinities and environmental values in Sections 3 and 4 of the Salt Field. What this requires is the capacity to increase discharge rates from PA5 in hotter, drier summer weather and to reduce these in cooler, wetter weather. This is only possible by sending the brine through to Section 1 for crystallisation there, with subsequent commercial sale or waste disposal of the crystallised salt.

- The draining of XB8A and its use for research by DEW into the consequences of opening this pond to tidal flushing has had no measurable impact on the water management in the rest of Sections 3 and in Section 4.

The Holding Pattern includes flowing the water entrained at Middle Beach through the following ponds (see Error! Reference source not found.):

- In Section 4:
 - from the pumps through XE1-3 into XE5
 - from XE5 and XE6 to the Gawler River Pumps
- In Section 3:
 - from the Gawler River Pumps into XE7
 - from XE7 into XD1
 - from XD1 into XB6 and / or XB3
 - from XB6 into:
 - XA3 then XA4 to XA1 to PA3; or from XA4 to XA2 to XB8 to XA1 to PA3
 - XC3 then XA7 to PA3.
- Flowing the water entrained at Chapman Creek through the following ponds:
 - XB3
 - XB 4-5
 - XA2
 - XB8 to XA1 to PA3
 - XB8A is no longer in use for brine flows
- Flowing the water that arrives in PA3 from the Middle Beach flows and the Chapman Creek:
 - from PA3 to PA4; and
 - from PA4 to PA5.
- Discharging the water that arrives in PA5 by pump into:
 - the pipeline that discharges into the SA Water outfall; or
 - the new pipeline to be constructed to transmit it to the exit from PA11 to then flow to PA12
- Discharging the water that arrives at PA12 by pump into Section 1
- Keeping the following transfer pump facilities or pond connections inactive but able to be used, in case of need.
 - from Pond XE 1-3 to Pond XF2
 - from Pond XF2 to Pond XE4
 - from Pond XE4 to Pond XE5
 - from Pond XB6 to Pond XC1
 - from Pond XD1 to Pond XB3
 - from Pond XA4 to Pond XA2
 - from Pond XC1 to Pond XC2
 - from Pond XC2 to Pond XC2S
 - from Pond XC2S via the channel to Pond PA5
- Keeping the following transfer pump facilities or pond connections inactive but able to be used, in case of need.
 - from Pond PA5 to Pond PA6
 - from Pond PA6 to Pond PA7
 - from Pond PA7 to PA8
 - from Pond PA8 to PA9
 - from Pond PA9 to Pond PA10
 - from Pond PA10 to PA11

- from Pond PA11 to PA12
 - from Pond PA12 into Section 1.
- Using the new pipeline to pump brine from PA12 into ML 6514
- Managing the volume flows through the inundated ponds with a view to achieving water residence times in the ponds that are reasonably similar to or smaller than those typically achieved during historic operations. This will be achieved by suitable adjustments of:
 - entrainment volumes at Middle Beach and Chapman Creek
 - volumes pumped over the Gawler River
 - volumes pumped through the various other internal pumps
 - settings of the gated connections between ponds to manipulate water level differences between the ponds
 - volumes discharged from PA5 into the SA Water outfall, consistent with complying with the 45 ppt salinity limit at the outfall's weir (Weir 2).
 - volumes of brine sent from PA5 to Section 1
- If additional water is required (above what can be supplied from the Chapman Creek pumps) for the flow path involving Ponds XB3, XB4-5, XA2, XB8, then using the connections between XD1 and XB3 and between XA4 and XA2 to divert some of the water entrained in Section 3 from the Gawler River Pumps.
- In addition, a permitted connection has been constructed that allows excess flows (if and when these occur at a time when they would be needed) of low salinity water down Smith Creek to be captured and fed into Pond XC3. This capture can only occur opportunistically (as a response to rainfall events of sufficient magnitude), and because the ability to capture and feed the excess water into XC3 will depend on there being, at the time, a lower level of water in XC3 than in Smith Creek. To date this has not been used.

As a consequence of the above operations, the water levels in the above ponds fluctuate within a managed range that will:

- keep levels, to the extent practicable, within the range of the historic (to 2013) operating water levels in the ponds.
- sustain sufficient water level differences between the ponds to achieve the desired volume flow rates between ponds and hence the residence times that are compatible with managing water quality.
- respond to fluctuations in rainfall and evaporation rates.

The multiplicity of factors that affect water levels in any one pond, coupled with the scale of the overall system, mean that the response of pond water levels to changes in pumping rates and adjustments to pond connections cannot be immediate. The response time for small adjustments is measured in durations of a few to several days and will be longer for bigger adjustments.

It should also be noted that this multiplicity of factors, coupled with the scale and complexities of the Salt Field make calculation of a reliable and sufficiently precise total salt balance for the Salt Field a practical impossibility, because requires knowledge (from robust, measurements and well calibrated models built and tested with sufficient evidence), for each time step in the period for the salt balance, of:

- the seepage fluxes in and out of each pond and their salinity (with salts composition and concentration)

- the water flows entering and leaving each pond their salinity (with salts composition and concentration)
- the evaporation from and the rainfall on each pond
- the fluxes of precipitation to / dissolution of salts from the floor of each pond (with salts composition and masses)

Furthermore, even assuming, hypothetically, a reliable and sufficiently precise total salt balance for the Salt Field could be made, it would serve no practical purpose, and not assist in decisions to regulate or manage the field on a day to day, week to week or month to month basis, because decades of operational experience has demonstrated that the flows, levels and salinities in the Salt Field can and have been managed successfully and have delivered the following outcomes

- the creation and sustaining of habitats that are significant in scale and valuable to listed species of water birds and shorebirds
- commercial salt production with the jobs and economic benefits this engenders
- compliance with EPA licence requirements

12.2.3.2 Management of Discharge from PA5 into the SA Water Bolivar Outfall

The PA5 discharge mixes with the water from SA Water's Bolivar plant so that its salinity reduces by dilution. The management of this discharge from PA5 aims to maximise the discharge to the SA Water outfall while keeping 6 hr moving average salinity at the Bridge below 45 ppt and therefore also at the EPA licence compliance points A (See Figure 12-7) below 45 ppt. This management needs to accommodate:

- seasonal fluctuations in the flow rate of water from Bolivar. The winter flow rates can be 4 to 5 times those in summer
- episodic reductions in flow rate of water from Bolivar due to operations in the Bolivar plant or due to an increase in the supply of the water to the Northern Adelaide Plains irrigators
- diurnal sewage inflow and rainfall induced fluctuations in the flow rate of water from Bolivar
- seasonal increases in the salinity of the brine in PA5.

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Table 1: Discharge Locations

Discharge Identification	Discharge Name	Location Description	Latitude	Longitude
A	Bolivar Channel Outfall	Immediately upstream of the SA Water Bolivar WWTP Outfall Weir called Weir 2	-34.6968°	138.4821°
B	Bitterns Discharge	Pump 8 Discharge Point	-34.815615°	138.557044°
		E Row Drain Flap	-34.795350°	138.578516°
C	Gawler River Discharge	Immediately downstream of the Gawler River Weir	-34.671857°	138.466507°

Table 2: Compliance Criteria

Location Identification	Location	Latitude/Longitude	Nature of Discharge	PARAMETER	COMPLIANCE CRITERIA
A	Immediately upstream of the SA Water Bolivar WWTP Outfall Weir called Weir 2	Latitude -34.6968°	Bolivar Channel Outfall Saline Water Discharge	Salinity	45 parts per thousand measured on a 6 hour rolling average
		Longitude 138.4821°			
B	Pump 8 Discharge Point	Latitude -34.815615°	Bitterns Discharge	Suspended Solids	80 milligrams per litre + 80% seasonal maximum
		Longitude 138.557044°		pH	6.5 – 9.2
	E Row Drain Flap	Latitude -34.795350°		Salinity	The hydrography of stream flow causes a permanent change in isohaline patterns of no more than 10% of the background variation
		Longitude 138.578516°		Oxygen (dissolved)	The discharge is subject to turbulent flow to ensure that it is discharged with highest possible Oxygen saturation
		Longitude 138.466507°			

Figure 12-7: Locations of EPA Licensed Discharge Locations & Compliance Criteria

12.2.3.3 Management of Drained Ponds

The following ponds in Sections 3 and 4 will be kept drained / dry for the duration of the Holding Pattern. There is no intention within this PEPR / MOP to change the drained / dry status of these Ponds. Should this become necessary then this PEPR / MOP will need revision to obtain DEM approval for the change in pond status.

- In Section 4:
 - Ponds XF1; XF2, XE4
- In Section 3:
 - Ponds XC1, XC2, XC2S

These ponds are kept drained by means of table drains or swales that are connected to the seepage drains outside the ponds. The locations of the discharges for these table drains or swales are shown in Figure 12-8. The discharges into the external seepage drains are via pipes installed through the bunds. Limestone rock filters are placed downstream of the pipes to limit sediment transport and also to provide contingency buffering to keep the pH of the discharged water alkaline.

In addition, Pond XB8A, which is presently open to tidal flushing, will remain as such. There is no intention within this PEPR / MOP to change the status of this Pond. Should this become necessary then this PEPR / MOP will need revision to obtain DEM approval for the change in pond status.

In Section 2, Ponds PA6 to PA12 are receiving and will continue receive no pumped water from PA5. This situation will persist when brine is pumped via pipeline from PA5 to the pump in PA12 for pumping to Section 1. This pipeline ensures these brine flows bypass ponds PA6 to PA12.

In the Section 2 ponds PA6 to PA9, groundwater is considered to be keeping the soils below the gypsum cap saturated, by virtue of the relativities of ground levels in the ponds to sea level to the west and to groundwater levels to the east of the site. Indeed, periods of wetter weather can enable this groundwater to rise and seep into and inundate the lower parts of Ponds PA6 to PA9, adding to the effect of direct rainfall. In periods of drier weather, this water can evaporate to dry out these Ponds. When there is water in these ponds with a higher piezometric head than the external groundwater there is also seepage out of these Ponds: a) along the natural drainage courses that transect under the sea bunds; and b) via the floors and external bunds – with the rate of this seepage varying with the difference in piezometric head of the water in the creek lines inside and outside of the sea bund, and the transmissivities of the seepage flow paths.

In the absence of pumped discharge from PA5 into PA6, it appears from monitoring data that periods of wetter weather had the effect of causing water levels in PA6 to PA8 to fluctuate seasonally up to about 1.4 or 1.5 m AHD, from fully drained / dry conditions. It is anticipated that these fluctuations will continue, following the cessation in 2020 of a period of pumped discharge from PA5 into PA6 from late 2019, and the subsequent draining and drying out of Ponds PA6 to PA8.

Section 2 Ponds PA10 and PA11 are at a slightly higher elevation than Ponds PA6 to PA9, such that their floors are above groundwater at all times. In periods of wetter weather, direct rainfall can be sufficient to inundate the lower parts of these ponds. In periods of drier weather, this water can evaporate to dry out these Ponds. When there is water in these ponds with a higher piezometric head than the external groundwater there is also seepage out of these Ponds: a) along the natural drainage courses that transect under the sea bunds; and b) via the floors and external bunds – with the rate of this seepage varying with the difference in piezometric head of the water in the creek lines inside and outside of the sea bund, and the transmissivities of the seepage flow paths.

The floor of PA12 is at a similar elevation to the natural ground levels outside this pond. Observations indicate that, with no inflows of brine, it experiences fluctuations in water levels from dry to partly inundated as a result of seasonal factors and the tides in Dry Creek.

With such natural seasonal fluctuations in water level in Ponds PA6 to PA12 (from dry to partly inundated), there is no need for routine pumping to remove water from them. However contingent capacity will be retained to pump water from PA9 into the pipeline for transfer to Section 1. This contingent capacity is to prevent water levels in PA6 to PA9 exceeding the seasonal high levels of up to about 1.4 or 1.5 m AHD for an extended period. This is to ensure seepage rates and fluxes from these ponds do not exceed for an extended period the ranges implied by this seasonal fluctuation in water levels. In addition, there will be provision for contingent capacity to pump water from PA6 into PA5 should a need arise to lower water levels there.

Experience during the Holding Pattern has indicated that since the draining of the above listed Ponds, no significant acid sulphate soil conditions have emerged that have required mitigation and management.

12.2.3.4 Drain to Import Excess Water from Smith Creek

In October 2014, approval was granted by the then Adelaide Mount Lofty Natural Resource Management Board for the construction and use of a drain to import excess water from Smith Creek to Pond XC3. Following approval from DEM, this drain was constructed in late 2014 as shown in Figure 12-9. It took advantage of an existing syphon under the SA Water outfall, and an existing drain along the north side of pond XC2.

As and when water levels in Smith Creek are higher than those in XC3, and if the salinity levels there would benefit from some dilution, valves can be opened to allow water to flow in. This can only happen opportunistically as it requires high water levels in Smith Creek and low water levels in XC3 for water to flow.

This has not so far been found necessary.



Location No	Discharges from	Discharges to
1	A drain cut on western side of the northern 1/3 of XF1, leading to the north end of XF1	Seepage drains on north side of XF1
2	A depression in the north-western part of XF2	Seepage drains on north side of XF1
3	A natural drainage course within the north-eastern part of XF2	Seepage drains on north side of XF1
4	A natural drainage course within the north-eastern part of XF2	Seepage drains on north side of XF1
5	The north-eastern corner of XE4, but drains the southern end of XF2 via the syphon to XE4	Seepage drains on north side of XE4
6	A drain cut in the southern end of XF1	Seepage drains on south side of XF1
7	A drain cut in the south-western end of XF1	Seepage drains on south side of XF1
8	A depression in the north-western part of XE4	Seepage drains on north side of XE4
9	A drain cut along the southern ½ of the western side of XE4	Seepage drains on south side of XE4
10	A drain cut along the southern half of the western side of XC2 and connected to the existing drain along the western side of XC2S	Seepage drains on the south side of XC2S

Figure 12-8 Locations of discharge points for drained ponds



Figure 12-9: Location of the drain works between Smith Creek and XC3

12.2.3.5 Holding Pattern Management and Monitoring for Sections 2 to 4

The routine Holding Pattern management and monitoring tasks are shown in Table 12-1 below. The purposes of the management and monitoring tasks are to:

- control the Holding Pattern so that its environmental outcomes comply with the requirements of this PEPR / MOP
- provide the data needed to report and communicate progress with the Holding Pattern operations, and any issues arising
- investigate non-compliance matters if they arise
- provide data for compliance reporting.

Table 12-1: Routine Holding Pattern management and monitoring tasks

Holding Pattern Management Task	Where and When
1. Manage the aggregate discharge from PA5 to the outfall while: a. Keeping 6 hr average salinity from discharge into the SA Water Outfall at the EPA Licence compliance points below 45 ppt. b. Keeping salinity at PA5 consistent with that needed for salt production in Section 1	▪ Controls for PA5 pump to outfall, drawing on monitoring of SA Water Outfall flows, monitoring PA5 salinity and water levels, PA5 discharge flows, salinities at the Bridge. ▪ Monitoring of excess water levels and salinities in the Section 2 Ponds as and when these occur from extreme weather patterns
2. Monitor pond SG, water level each 2 weeks in period April to September.	▪ PA3; PA5, XA1; XA3; XA4; XA7; XB3; XB4-5; XB6; XC3; XD1, XE1-3; XE5; XE6.
3. Monitor pond SG, water level DO, pH, temp, (additional) if necessary for operational control purposes, each 1 week in period October to March.	
4. Bund and access road maintenance a. Make and collate observations of bund and access roads condition b. Keep an updated record of bund and access road maintenance conducted c. Implement bund and access road maintenance as and when their conditions require	▪ Observations made as a by-product of daily and weekly monitoring of Salt Field conditions and management of water levels, pumping and flows ▪ Maintenance when and where required
5. Twice per year environmental observations from aerial photographs (Nearmap) to produce vegetation condition change reports for drained ponds and outside the sea bunds	▪ End of winter and end of summer ▪ Reports to be contained in the annual compliance report
6. Daily environmental observations to produce land condition reports and photos for selected targeted dust prone areas in drained ponds only during windy and hot weather (when dust forecast to be likely). Purpose is to collect evidence to use in event of a complaint.	▪ XC2E opposite the capsicum greenhouses ▪ XC2 mid length of E side ▪ other locations as needed.
7. Investigate and close out odour and dust complaints.	▪ Where and when needed.
8. Monthly cleaning of sensors at Bridge;	
9. No more frequently than quarterly cleaning of flow sensor at PA5	

Holding Pattern Management Task	Where and When
10. Repairs and maintenance of sensors, cables, and telemetry systems.	▪ Where and when needed
11. Maintain the operability of the PA5 pump; the Chapman Creek pumps; the Middle Beach pumps	
12. Allow flows from Smith Creek into XC3 when water levels permit.	
13. Conduct diver inspection of syphons and remove weed / obstructions to flow, as necessary.	▪ As and where needed

12.2.3.6 Completed Investigations / Studies

Table 12-2 lists the investigations / studies / trials that have been conducted by Ridley or BDC

Table 12-2: Investigations, studies, trials in Sections 3 and 4

Issue	Investigations / studies / trials	Rationale	Timing / Status (
Topography/ bathymetry	A Joint Government and BDC funded program of investigations of: ▪ bathymetric / bottom sediment profile of inundated ponds ▪ topographic investigations and collection of Lidar data of drained ponds The objective is to form an integrated digital elevation model of the land surface levels at the site.	▪ Design drainage works so that inundated ponds are maintained at target levels and unacceptable ponding does not occur in drained ponds. ▪ Inform ASS investigation scoping for inundated ponds in Sections 3 and 4. ▪ Inform the design of the water management regime for closure for the proposed migratory bird conservation area in Section 3 (and possibly Section 4).	Complete and reported.
ASS/MBO	Joint Government and BDC funded Investigation of acid sulfate soil and MBO conditions across the Salt Fields to: ▪ form maps and cross-sections related to land surface levels ▪ develop appropriate targeted risk monitoring and management measures for the various acid sulfate soil and MBO conditions ▪ design and monitor drainage improvements to reduce ponding of water in drained ponds caused by rainfall and / or groundwater seepage – and needed to prevent /	▪ Obtain data on soil conditions and ASS/MBO properties and risks, and to address uncertainties. ▪ Quantify spatial variations of ASS subtypes. ▪ Identify hazards and impacts of ASS to underpin sustainable management options. ▪ Determine the potential, available and retained acidity to support current drying actions.	Complete and reported.

Issue	Investigations / studies / trials	Rationale	Timing / Status (
	mitigate soil acidity risks and odour risks. The field work involves soil sampling by test pit and boring; and installation and monitoring of groundwater wells.		
Migratory birds	<u>Bird Monitoring</u> ▪ Bird surveys by pond, including roosting versus foraging and the location and habitat characteristics of roosting sites ▪ Invertebrate sampling in the three broad salinity classes in ponds that support good numbers of foraging birds ▪ Bird foraging behavioural observations to infer choice of prey.	▪ Provide information to satisfy EPBC Act assessment and approval of any 'Controlled Action' within the scope of mine closure works to achieve mine completion. ▪ Identify the relationship between bird usage and pond morphology, salinity, and water levels. ▪ Investigate options for mitigating potential loss of migratory and resident bird habitat from future land uses of the presently inundated ponds.	Complete and reported. Bird surveys have been conducted for 2013 / 2014, 2014 / 2015, and 2015 / 2016 and 2016 / 2017 migration seasons. The reports from the surveys have been provided to DEM and the Commonwealth
Infrastructure management	Investigation and design of necessary infrastructure decommissioning and removal works.	All infrastructure must be removed for mine completion except for those items that are needed for future land uses or that DEM agrees can be retained.	Not yet started.
Vegetation	Vegetation mapping and targeted survey for Bead Samphire Assessment of salt marsh against EPBC listed Subtropical and Temperate Coastal Saltmarsh community. Vegetation mapping of revegetation in drained ponds.	▪ Identify ecological values that need to be considered in closure planning. ▪ Confirm relevant matters that need to be considered under the EPBC Act. ▪ Identify areas where revegetation is proceeding well, moderately well, poorly, or not all. ▪ Inform decisions about where closure works need to accommodate or address this progress.	Complete and reported. The initial mapping (2014) has been completed and reported. Aerial monitoring has been done in 2015 to provide evidence of changes since 2014. The work has been reported. A further round of this monitoring has been done (October 2016) to assess changes in revegetation and to assess the merits of annual monitoring.

Issue	Investigations / studies / trials	Rationale	Timing / Status (
Land Management	The design conduct and monitoring of trials of soil improvements and revegetation approaches. Initial preliminary trials in 2014 to early 2015 involved: - ripping, ploughing, and tilling of the surface in plots in XC2S to break up the gypsum's structure and create a suitable surface for seed germination, including using an excavator to break up gypsum blocks - ploughing and harrowing treatments in XC2 to facilitate seed retention and salt leaching - ploughing with the addition of calstilt or shell-grit in XE4 - other trials involving minor earthworks, or re-vegetation works as found necessary from time to time.	- Improve land capability in drained ponds for closure - Inform design of revegetation measures for closure.	Complete and reported.
Reconnection of Section 1 to Section 2 to Transmit Brine	This involved: - Working with DIT, Identify, design and construct the pipeline and associated works to reconnect PA12 to Section 1 - Working with DIT, identify, design and construct the reconnection of PA11 to PA12 - Reconnect electrical power for pumps at PA9 and PA12 - Re-establish pumps at PA9 and PA12 - Explore and design options for conducting brine from PA5 to PA9 - Concept designs for the works to prepare PA7, to PA11 to transmit brine	- To sequentially work through the challenge and issues involved - To prepare the information needed to seek DEM approval for this	Complete and reported
Preparation to resume discharge from PA5 to Bolivar Outfall	This involved the provision of information to DEM on: - The effect of this discharge on the salinity at PA5 over time, using a water balance model - The control of the discharge to achieve compliance with the EPA Licence	To enable DEM to be satisfied the discharge would be successful	Complete and reported

Issue	Investigations / studies / trials	Rationale	Timing / Status (
SA Water trial of denitrification of treated effluent	This trial involved inundating selected ponds in Section 2 with treated sewage effluent, and controlling the salinity and water levels, while monitoring denitrification processes	To assess the feasibility of using Section 2 ponds for this purpose	Complete and reported
DEW Trial of Tidal Inundation of XB8A	This involved constructing a tidal flow control gate in the sea bund to XB8A, disconnecting XB8A from flows to and from adjacent ponds, emptying XB8A of brine and then allowing controlled tidal inflows and outflows. The recovery of vegetation in XB8A was monitored	To obtain information to assist assess the feasibility to open selected ponds in the Salt Field to tidal flows for their progressive rehabilitation and closure	Complete and reported
Planning for resumption of salt production	Discussions with a commercial Salt Fields operator to identify the feasible approach for resuming salt production	To develop and prepare the information about resuming salt production that is in this PEPR / MOP	Complete

12.3 Pipeline to Pump Brine Bypassing Section 2 Ponds

12.3.1 Introduction

This Section describes and explains the concepts for works to once again transmit brine between Section 3 of the Salt Field to Section 1. The existing PEPR/ MOP allows this, including by pumping of brine from PA12 to Section 1 via the Section 2 ponds. However, the occurrence of mangrove dieback in mid-2020 outside some parts of the Section 2 Ponds triggered an Environmental Direction that prevents pumping brine from PA5 into PA6 to flow through the Section 2 ponds PA6 to PA11.

Therefore, brine will be pumped via a pipeline to bypass Section 2 ponds PA6 to PA12. The pipeline will connect to the existing pipeline installed to deliver brine from PA12 to Section 1.

The pipeline will use materials and methods of construction, that have been used successfully for the existing pipelines – for example the pipeline from PA5 to the Bolivar Outfall, the pipeline between PA9 and PA10, PA12 to Section 1, and other pipelines within the Salt Field.

The pipelines from PA5 to the Bolivar Outfall, and from PA12 to Section 1 were approved by DEM.

See Figure 8-3 and Appendix 7.

The key features include:

- New pump at PA5
 - Separate from pump that pumps to Bolivar outfall
- New pipeline

- PA5 to PA12 – to connect brine flow to the existing pipeline from PA12 to ML6514 in Section 1.
- New pump and sump in PA6
 - Purpose is to cap supernatant water level in PA6 at 1.5 m AHD. This supernatant water provided by the balance of rainfall, evaporation, inward seepage from groundwater from the east, and outward seepage to groundwater to the west
 - Would operate when water levels in the sump exceed 1.2 m AHD
 - Would discharge into PA5, from where the water would mix with the brine to be pumped from PA5 to Section 1
- Arrangement for provision of brine dilution water into the pump at PA5
- Monitoring and Control systems on all pumps
 - Pump on off controls
 - Flow rate monitoring
 - Upset condition alarms
 - etc
- The pipeline would be an approximately 6,300m long DN630 or DN800 poly pipeline
- The pipeline would follow the route of the existing access track that traverses the eastern side of Section 2 ponds.
- The pipeline will commence at a take-off from the existing Bolivar discharge pipeline near the St Kilda Rd pumps, and conclude at the existing pipeline crossing that runs under Little Para River.

12.3.2 Achievement of Environmental Outcomes

The pipeline will be contained entirely within the tenements of the Saltfields and therefore not open to public access.

The pipeline will operate in a similar manner to the existing Bolivar discharge pipeline, in that brine flow along the pipeline will be intermittent on an as-needs basis to fulfill Section 1 brine demand requirements.

Pipe inspection and maintenance will be similar to that performed on other poly pipe sections across the field including the Bolivar discharge pipe, stormwater drain crossings between PA9-PA10 and PA10-PA11 and Little Para River, and PA12 to Section 1.

Flushing of any crystallisation that may occur from time to time will be performed on an as-needs basis.

Loss of pressure detected by sensors installed at the St Kilda pumps and at other points along the route will allow alerting of any loss of pressure in the pipe and trigger pump and pipe shutdown processes.

With the pipeline being placed within the footprint of Section 2 ponds on the seaward side of the track, and with its invert lower than the track, in event of a pipe rupture, brine will discharge into the Section 2 ponds.

It is noted that the volume of brine in the pipe would be about 2000 m³ for DN630 pipe, and 3200 m³ for DN800 pipe. By comparison, given the pond area and floor elevation profile, the estimated approximate volume capacity of PA6 below the set maximum (and pump controlled) level of 1.5 m AHD is in the order of 20,000 m³.

The equivalent estimated approximate volume capacities of PA7, PA8 and PA9 are in the order of 25,000 m³, 20,000 m³ and 15,000 m³, respectively. The floors of PA10 and PA11 are at higher elevations, and for these it is estimated that with a maximum brine depth of about 0.5m, the approximate volume held in these ponds would be in the order of 4,000 and 7,000 m³ respectively.

These volume capacities indicate that, with pump and pipe shutdown processes triggered by pressure loss sensors:

- The entire brine volume content of the pipe can be held within any one of the ponds PA6 to PA11.
- Given the interconnected nature of PA6 to PA9, the risk of escaped brine levels causing brine levels to reach the set maximum level of 1.5 m AHD in PA6 is negligible – and in any case the pump in PA6 would control this level. In this regard the brine levels from any escaped brine would not change the peak brine level from that derived from seasonal rainfall and groundwater seepage into these ponds
- Any escaped brine held within Section 2 ponds will be available to be captured and recovered

In consequence, in event of a pipe rupture, and discharge of brine into the Section 2 ponds, there would continue to be achievement of the environmental outcomes set out in Section 14 below and relating to protection of the external environment outside the Section 2 ponds.

The pipeline construction works will occur on the edge of the existing access track and within the footprints of the Section 2 Ponds. This is within the operational area of the saltfields that has had historic approvals for its operations that predate the Native Vegetation Act by decades.

The pipeline construction operations will be compatible with processes used for saltfield operations, comply with these historic approvals and achieve the environmental outcomes set out in Section 14.

12.4 Resumed Commercial Salt Production Operations

12.4.1 General description of solar salt operations as performed in Australia

Growing and harvesting of common salt (NaCl) is a continual process that uses a renewable natural resource, rather than the extraction of a finite, distinct deposit of a more typical mining operation. Changes to the topography are minimal and while there are changes to the immediately impacted biodiversity resulting from the construction of salinas, these areas develop valuable biodiversity aspects of their own over time.

12.4.2 Salt Production

Salt waters used to extract salt (NaCl) in Australia are of two main categories. In Salt Fields constructed near the coast lagoons, sabkhas or salt marshes are dyked and salt water from the sea is concentrated. Away from the coast, Salt Fields occupy large playa salt lakes and terminal depressions that contain salt water leached from the soil and then concentrated by evaporation. Dry Creek Salt Field is located on low-lying coastal land along the eastern shores of Gulf St Vincent, between Dry Creek and Middle Beach, and uses seawater to produce solar salt. Solar salt gets its name as it uses renewable solar energy as its major energy source. This energy is used to evaporate the water to allow the concentration of salt and its ultimate extraction as is described in detail following.

It is considered that Solar Salt production has a net negative carbon footprint.

12.4.3 Land Uses

The operating Salt Field comprises a series of existing salinas (evaporation ponds, or preliminary areas) located along the shore of Gulf St Vincent between Dry Creek and Middle Beach. These salinas serially evaporate sea water as it flows southward, until the brine is sufficiently evaporated to crystallise salt in the southern crystallising pans.

The existing evaporation ponds and crystallisers were built on areas that originally supported salt marsh, sedgeland and marshes, coastal grasslands, and several estuarine areas.

The Salt Fields are an extensive operation stretching along the shore of Gulf St Vincent. Land use within the Mineral Leases and Private Mines includes:

- concentrating ponds (salinas),
- crystallising pans,
- workshops and administrative buildings,
- storage embankment maintenance materials,
- conserved intertidal land occupied mainly by samphire/mangrove, and
- undeveloped supratidal land.

These land uses are relatively constant and tend to change only in response to either process enhancements or at times in the life of the Salt Field significant changes in the scale of the operation.

Existing land use adjacent to the Salt Fields' Mineral Leases and Private Mines includes:

- areas of conservation significance
- stormwater treatment wetlands in the Cities of Salisbury of Port Adelaide-Enfield
- residential suburbs and coastal townships (Globe Derby, Mawson Lakes, St Kilda, Middle Beach)
- commercial activities (horse racing at Globe Derby, Off-Road Park at Port Gawler)
- pastoral activities
- horticultural activities, and
- other purposes (SeaGAS facility at the Dry Creek Magazines, Bolivar WWTP, the DSTO aerial facility, University of Adelaide aerial facility, the Bureau of Meteorology's Buckland Park radar facility, Jeffries Buckland Park composting facility)

12.4.4 Amenity

Dry Creek Salt Field has considerable scenic and aesthetic value. The open ponds of the salinas and crystallisers are regularly the subject of photographers hoping to obtain images of sunsets and reflections. Specialist photographers such as bird photographers and coastal wetland photographers regularly visit the Salt Field for nature photography. Over the period of its operation the Salt Field has hosted the filming of several feature productions and numerous television commercials, magazine advertising shoots and art photography.

12.4.5 Layout of Salt Field

Figures 12-10 to 12-13 show the layout of the Salt Field for resumed salt production, which salinas will be used, (and which will be out of operation and remain in the holding pattern), the planned flow of water through thee salinas and the planned salinity ranges in the salinas. Table 12-3 lists the planned water levels in the salinas

Figure 12-10: Layout of the Dry Creek Salt Field

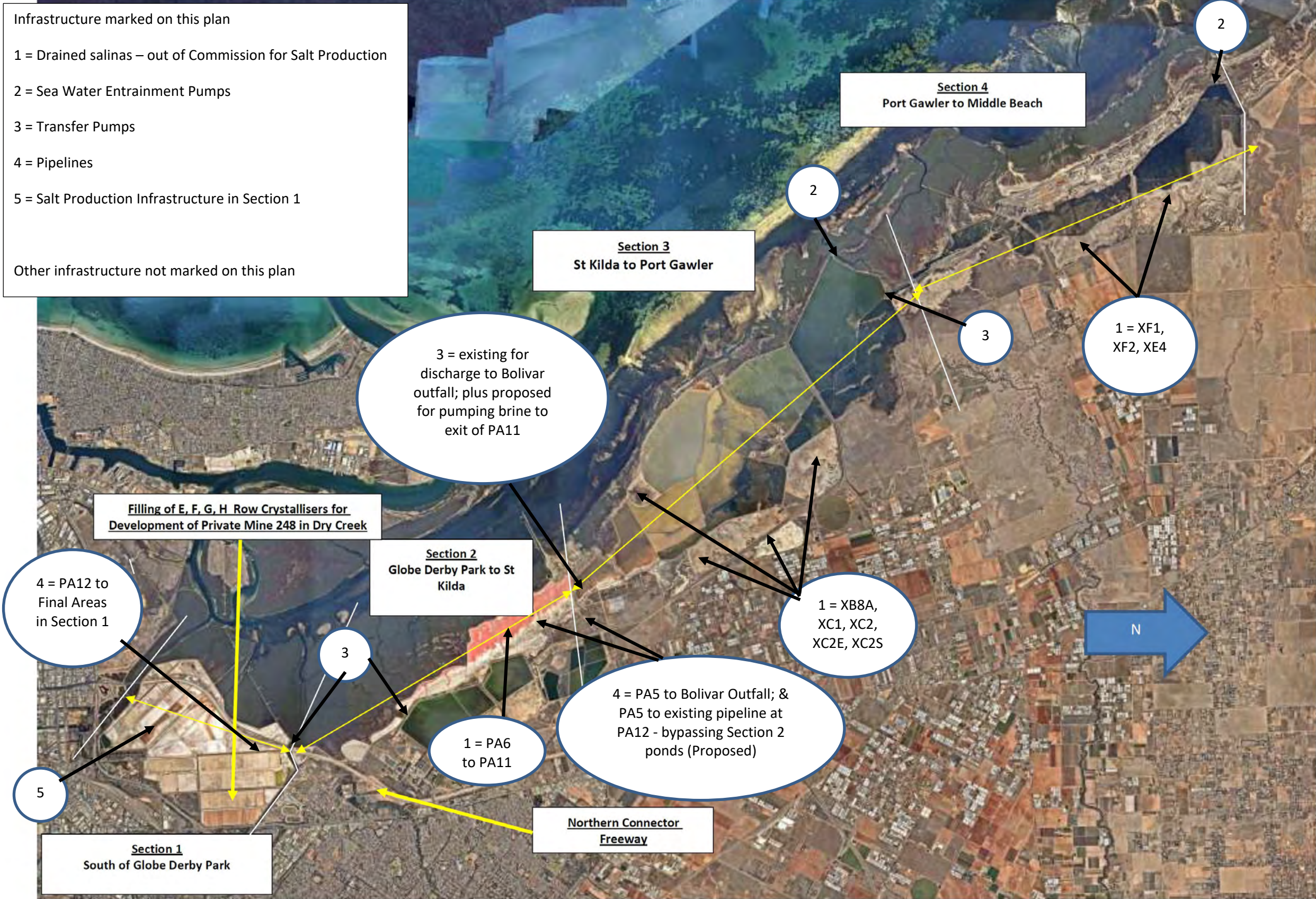


Figure 12-11 The Salinas and Crystallisers out of Commission for Salt Production

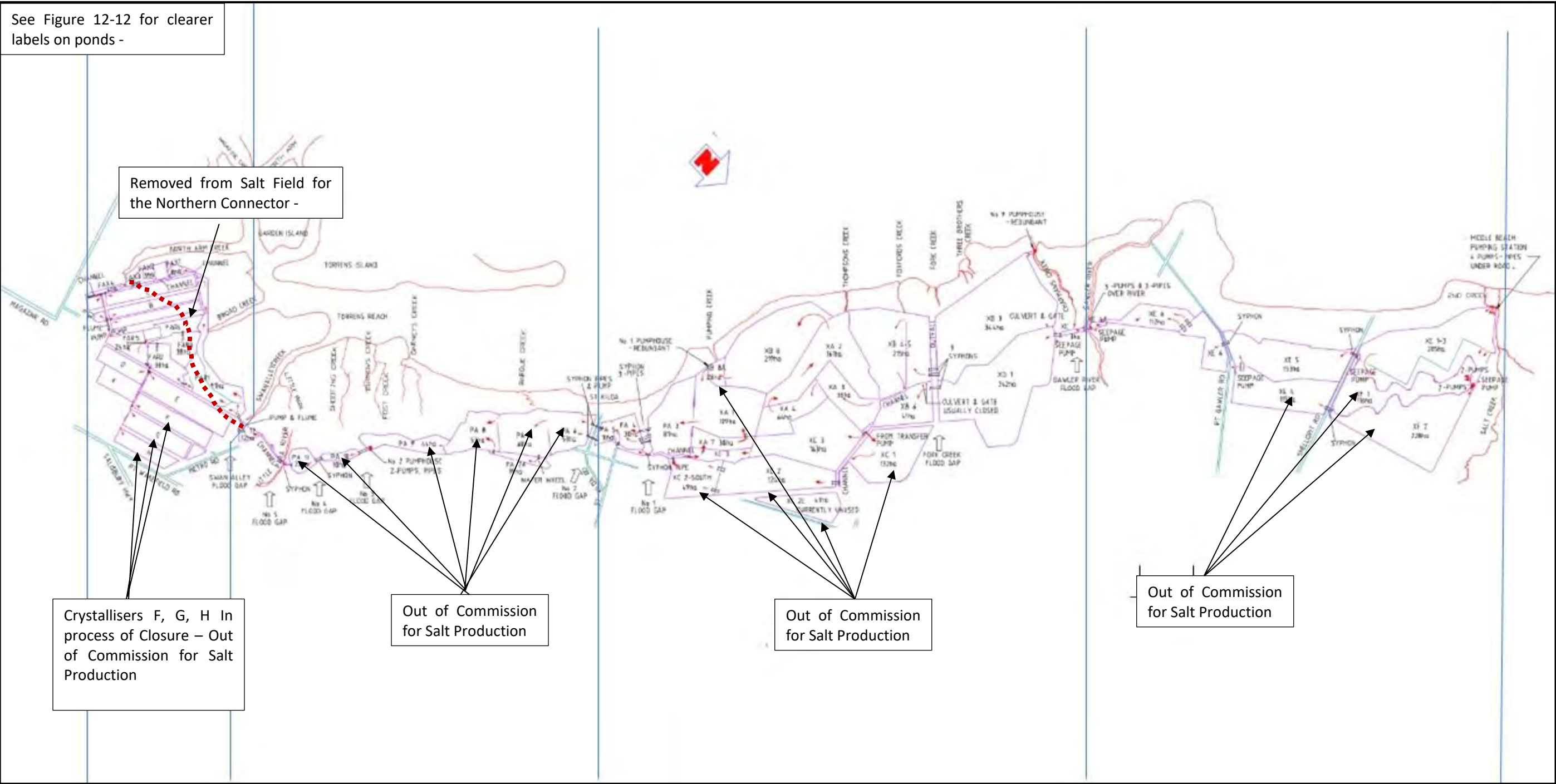


Figure 12-12 Flows through Salinas

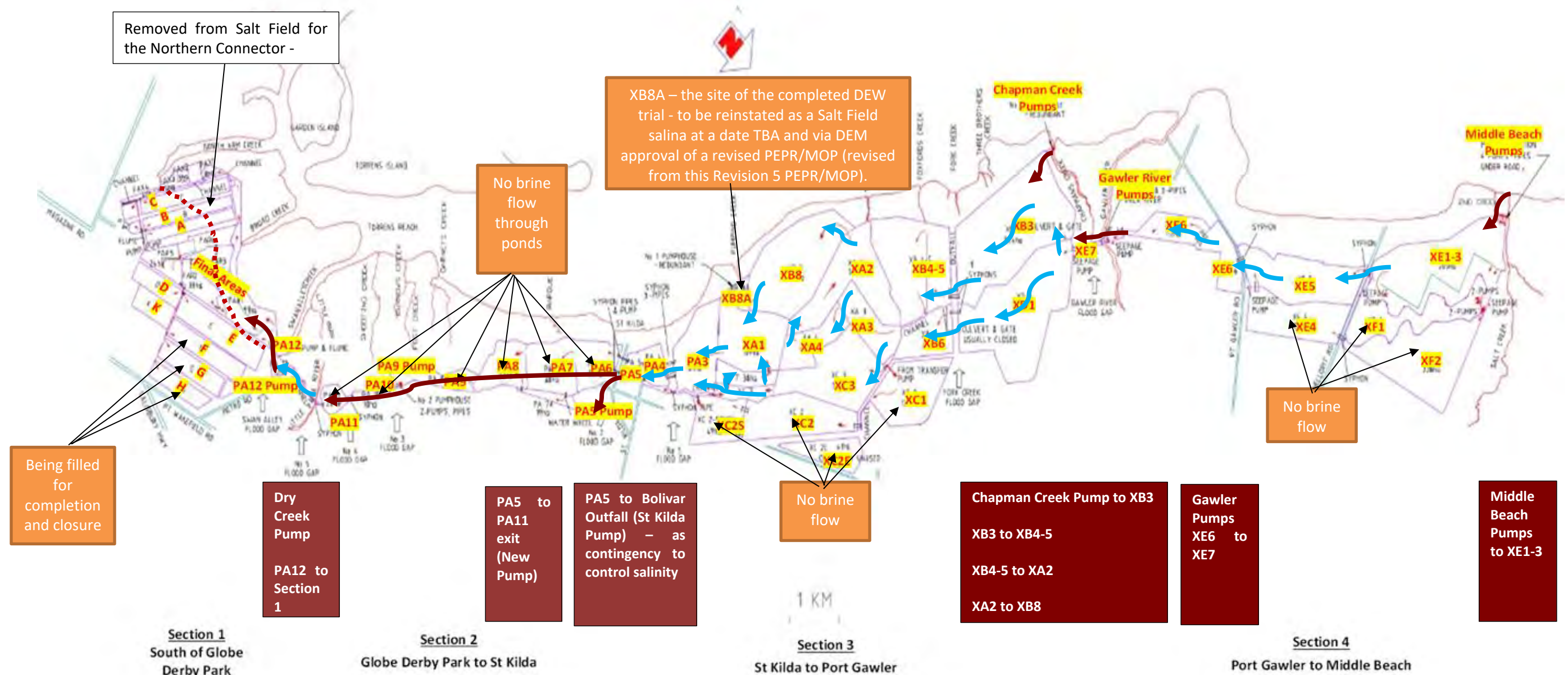


Figure 12-13 Specific Gravities in Salinas Controlled for Salt Production Will Also Preserve Environmental Values of Inundated Condenser Ponds

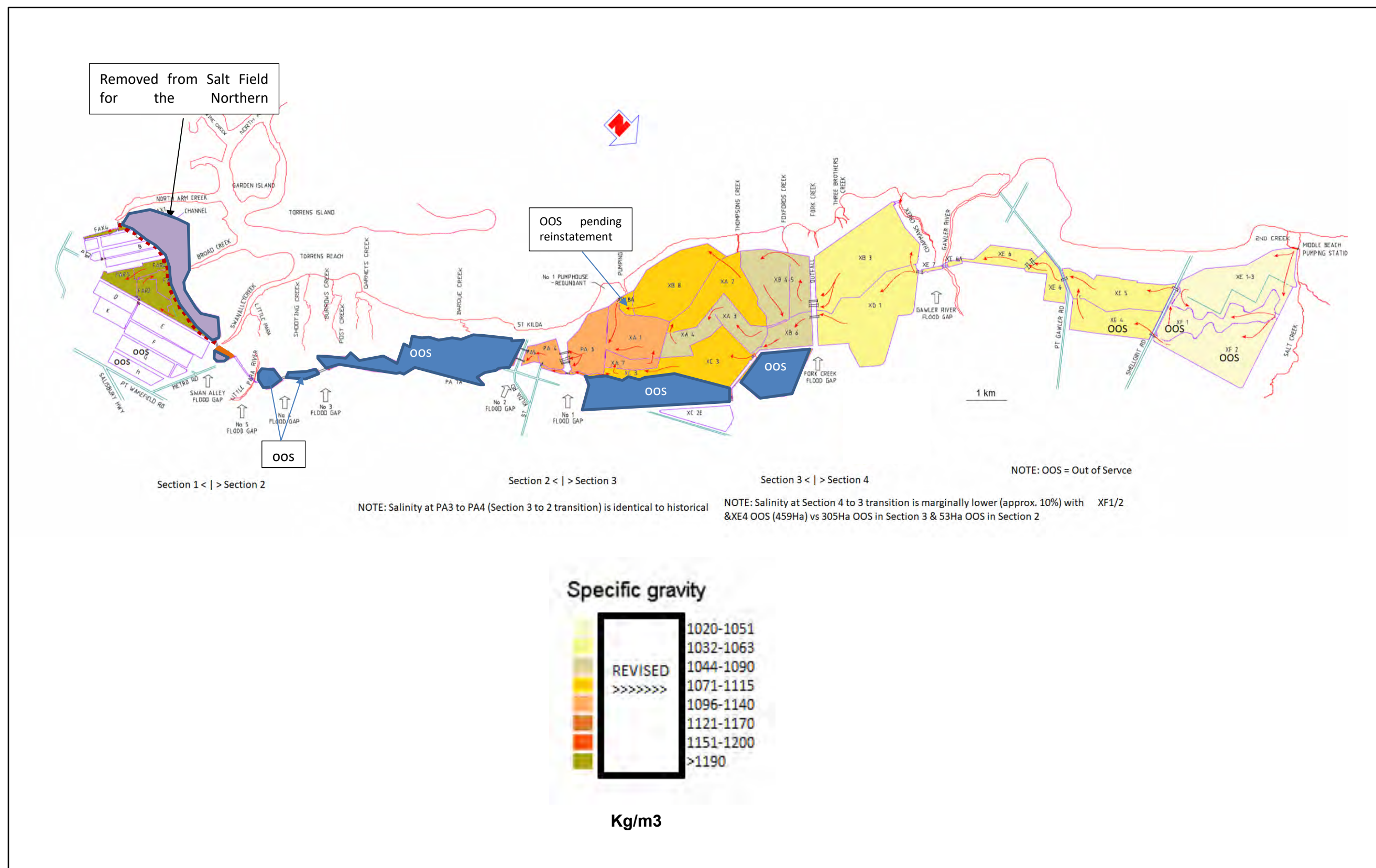


Table 12-3: Planned Water Levels in Salinas

(These planned water levels are based on the historical operational water levels from measured data, except where noted. The same levels have applied to the holding pattern)

Section	Pond	Maximum Water Level (m AHD) 2003 - 2013	Average water level (m AHD) 2003 - 2013	Minimum Water Level (m AHD) 2003 - 2013	Fluctuation in Water Level (Max – Min) (m)	Min to Max Levels = Compliance Range for Purposes of Table 14-1
Section 4	XE1-3	3.10	2.65	2.52	0.58	Yes
	XF1	3.24	3.11	2.87	0.37	No – This is a drained / dry pond
	XF2	4.08	3.96	3.77	0.31	No – This is a drained / dry pond
	XE4	3.07	2.97	2.41	0.66	No – This is a drained / dry pond
	XE5	2.68	2.59	2.06	0.62	Yes
	XE6	2.34	2.18	2.00	0.34	Yes
Section 3	XE7	Water level controlled by XD1				No
	XD1	2.90	2.82	2.59	0.31	Yes. Minimum level of 2.30 m
	XB6	2.78	2.48	2.28	0.50	Yes. Minimum level of 2.10 m
	XC1	3.35	3.23	3.10	0.25	No – This is a drained / dry pond
	XC2	3.34	3.24	3.14	0.20	No – This is a drained / dry pond
	XC2S	3.30	3.16	3.06	0.24	No – This is a drained / dry pond
	XC3	2.56	2.49	2.05	0.51	Yes. Minimum level of 1.95 m
	XB3	2.38	2.26	2.03	0.35	Yes
	XB4-5	2.21	2.10	1.97	0.24	Yes
	XA3	2.14	2.08	1.98	0.16	Yes. Minimum level of 2.00 m
	XA4	Water level controlled by XA2 or XA1				No
	XA2	2.16	2.09	2.00	0.16	Yes
	XB8	Water level controlled by XB8A				No
	XB8A	2.16	2.07	1.97	0.19	Yes
	XA7	Water level controlled by XA1 or PA3				No

Section	Pond	Maximum Water Level (m AHD) 2003 - 2013	Average water level (m AHD) 2003 - 2013	Minimum Water Level (m AHD) 2003 - 2013	Fluctuation in Water Level (Max – Min) (m)	Min to Max Levels = Compliance Range for Purposes of Table 14-1
	XA1	2.12	2.04	1.95	0.17	Yes. Min. level of 1.90 m
Section 2	PA3	2.11	2.03	1.90	0.21	Yes
	PA4	Water level controlled by PA5				No
	PA5	2.12	2.01	1.65	0.47	Yes
	PA6	Water level controlled by PA9				No – This is a drained / dry pond that may be used for contingency brine containment and evaporation
	PA7	Water level controlled by PA9				No – This is a drained / dry pond that may be used for contingency brine containment and evaporation
	PA7A	2.45	2.37	2.00	0.45	No – This is a drained / dry pond
	PA8	Water level controlled by PA9				No – This is a drained / dry pond that may be used for contingency brine containment and evaporation
	PA9	2.20	1.98	1.86	0.34	No – This is a drained / dry pond that may be used for contingency brine containment and evaporation
	PA10	Water level controlled by PA12				No – This is a drained / dry pond
	PA11	Water level controlled by PA12				No – This is a drained / dry pond
	PA12	1.99	1.57	1.30	0.69	No – This is a drained / dry pond

12.4.6 Description of Mining Processes

12.4.6.1 Salt Crystallisation

Dry Creek Salt Field is a sequential concentration, series flow crystallisation solar salt operation. The operational Salt Fields occupy approximately 3005Ha of flooded ponds within the mineral tenements. Seawater (35g/L TDS) is pumped into the salinas at their northernmost point, near Middle Beach. The brine continually flows slowly southward, gradually concentrating. By the time brine reaches Section 1 at Dry Creek (about 18 months after it was pumped into the northern ponds) its salinity has increased to about 300g/L TDS. A small final condenser area is used to 'heavy' the brine up to 330g/l where it is fed into crystallisers. The southernmost area in Section 1 contains crystallising pans, where the saturated brines deposit common salt crystals onto a prepared bed for harvesting.

The Salt Field operation is in a large part the same configuration as has been operating historically but without inclusion of some ponds that have been drained and will no longer form part of the circuit.

The total condenser area used in the operation is 2678Ha.

The condenser ponds previously part of the historical operation and no longer included in the circuit are XC1, XC2, XC2S, XC2E, XB8A, XE4, XF1, XF2 & PA6 in Sections 2, 3 & 4.

The total crystalliser area used in the operation is 294Ha, with crystallisers utilised for salt deposition and harvesting including: -

OOO, OC, C1, C2, B1, B2, A1, A2, D2, D1, K1, K2, E1, E2, E3, E4

The crystalliser ponds previously part of the historical operation and no longer included in the circuit are C3, C4, B3, B4, A3, A4, resumed as part of the DIT road development and crystallisers F, G and H in the process of rehabilitation and closure for land development.

The total area allocated to holding of bitterns, sodium chloride recovery from bitterns, production of Magnesium Chloride brine and holding bitterns for discharge through EPA licensed discharge points is 32Ha.

The truncated Salt Field operation comprises a total of 2678Ha of mostly sequential condenser ponds which allow control of the increase of salinity through the evaporation process. The input water is sea water at 35g/l, and this reaches 330g/l when it flows into crystallisers. The salinity gradient through the field is relatively fixed in a solar Salt Field operation by the size and sequence of ponds in the circuit. Salt concentration is typically measured in terms of specific gravity in Australian solar Salt Field operations.

The density profile through the field (g/l or Specific Gravity (SG)) is similar to the gradient that was in place in prior operations where the area of condenser ponds comprised some 3578Ha. The ponds removed from the circuit are in Sections 2, 3 & 4 resulting in a new operation with a smaller aggregate area of condenser ponds. The proportion of ponds now not in the circuit and the locations of those ponds result in a density profile that, while not identical to that during historical salt operations or during holding pattern operations density, preserves salinities and water levels in each active condenser pond within ranges that a) serve the purposes of resumed salt production; b) preserve and protect the current aquatic, and benthic habitats that make the Salt Field a haven for migratory and domestic shorebirds and for water birds.

It is to be noted that:

- Precipitation of gypsum in sea water salt field operations commences at an SG of 1.0897.
- Figure 12-13 indicates the intended ranges of SG in the salt field ponds, from which it can be inferred that precipitation of gypsum may occur in Section 3 in the southern parts of Ponds XB8, XC3, in Ponds XA1, XA7, PA3, PA4 and PA4, and in the Final Areas in Section 1

12.4.6.2 Seasonal Operation

Solar Salt Fields (salinas) are an extensive surface operation which rely on the natural evaporative process of the sun and wind to produce salt. Seawater is pumped into shallow evaporation ponds in the northern part of the system and flows slowly southwards, becoming concentrated in response to evaporation. Seawater is pumped continuously into the initial ponds during the months when the 'effective evaporation' is positive (the 'making season').

In general, the 'making season' at Dry Creek extends from September to May, as shown below in Figure 12-14.

The flows through the Salt Field are generally managed through gravity, however in some locations the degree of fall required does not exist, or a watercourse intervenes, and, in these cases, pumping is used to move the brines.

Every compound has a maximum solubility concentration in water at any given temperature. When that maximum point is reached the solution is said to be 'saturated' with that compound. As seawater evaporates, some compounds precipitate prior to common salt. Calcium carbonate (flos ferri) precipitates in small amounts in the early salinas and calcium sulfate (gypsum) has a long precipitation pattern starting with the dihydrate form, which starts to precipitate in ponds with a specific gravity of 1.080 and ending with the anhydrate form, which precipitates in ponds that are nearly saturated for common salt. The saturation point for common salt occurs at an approximate specific gravity of 1.218. Saturated brine ready for the crystallisation of salt is known as 'maiden brine'.

Maiden brine is held in final condenser areas from whence it is distributed to the crystallising pans by a series of drains. Brine is supplied to crystallisers from FAR5 via pump or gravity flow. Supply of maiden brine is managed through the evaporation season to ensure levels and densities are managed in crystallisers to optimise yield.

Further evaporation now sees sodium chloride depositing on the floors of these plans to build a thick, hard layer of interlaced crystals of salt. Residual brine (known as bitterns) is discarded from the last pan in each row of pans once the majority of common salt has precipitated. The initial pans are fed with fresh maiden brine throughout the making season.

The solar salt production process at Dry Creek involves the initial deposit of salt in crystallisers of around 100mm which then acts as a surface upon which additional and annual harvest salt volumes are precipitated and harvested. The initial deposit is known as a salt floor and this deposit acts to separate annual harvest salt volumes from sand, clay and mud in the crystalliser bases and also provides mechanical strength to support the operation of harvest equipment on the crystallisers.

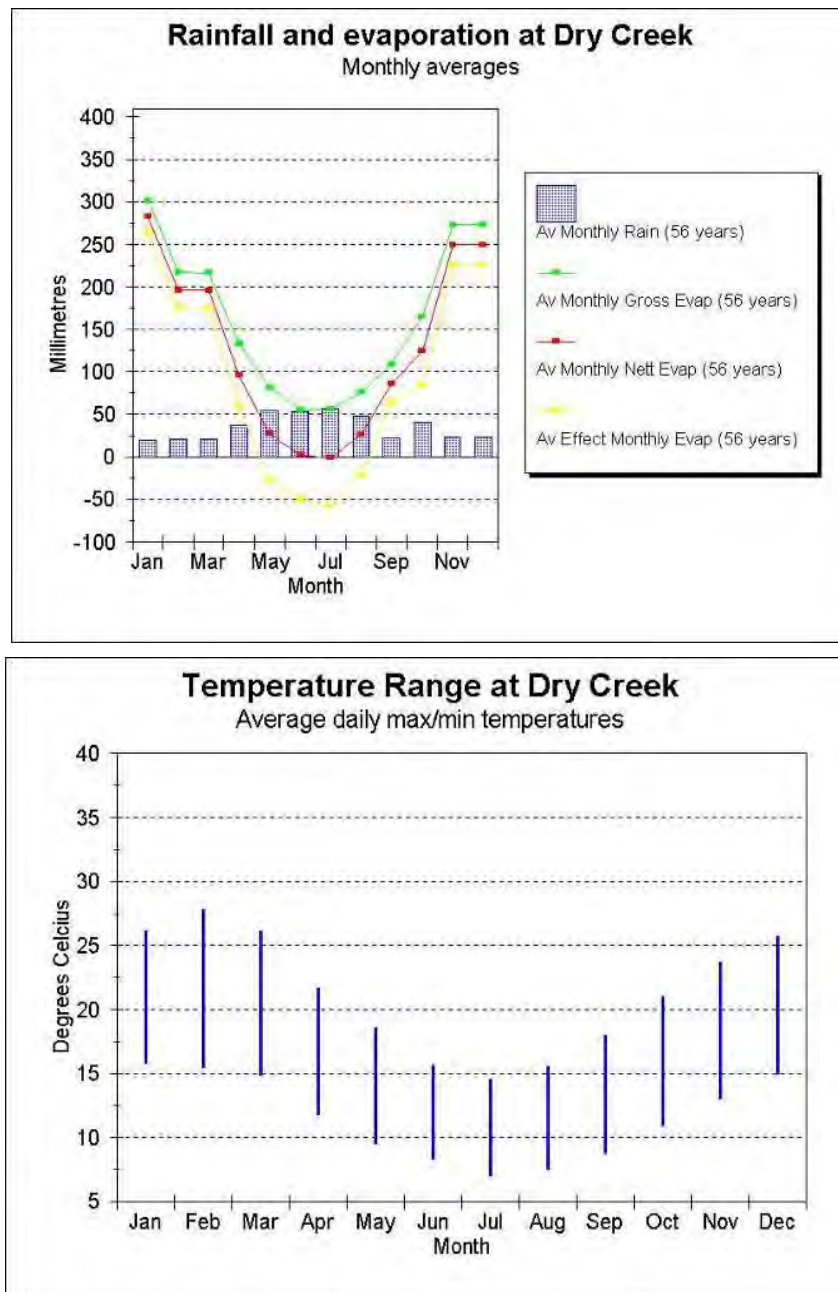


Figure 12-14- Weather statistics that define the salt-making season

The layer of salt is harvested towards the end of the making season. During harvest, the crystallisers are drained one at a time to accept the machinery. Self-propelled harvesters separate cut the layer of deposited salt from the crystalliser salt floor and deposit this loose salt on the surface of the crystallisers. Mobile equipment including excavators, front end loaders and trucks are then used to gather the harvested loose salt and load and transport that salt to the wash plant for washing.

A number of factors affect the amount of salt produced; warm sunny weather is needed to provide sufficient solar energy and large amounts of land are required. Rains dilutes the brine, slowing production and also dissolves harvested salt. These factors affect the annual production, which can range from 250,000 to 450,000 harvested tonnes per annum. Dry Creek has proven to have suitable weather and has been a reliable salt producer for almost a century.

12.4.7 The expected life of the mine

The expected life of solar salt operations is unlimited by the resource. Worldwide, solar salt operations are still operated that have been mined over three centuries

The resource being mined is Sodium Chloride or Common Salt. The salinas and crystallisers are formed on a mud base. In the salinas where the brines are initially concentrated, this tends to be the natural surface, while the prepared crystallising pans usually have a compacted and smoothed base made of imported clay.

The approximate composition of sea water is sodium chloride 2.68%, magnesium chloride 0.32%, magnesium sulphate 0.22%, potassium chloride 0.07%, calcium chloride 0.12%, other salts 0.01% and water which is 96.58%. After evaporation and crystallisation, the typical material obtained from a solar salt operation is “natural sea salt”, which is a simple compound of sodium chloride (NaCl).

As the salt is not harvested from a finite deposit the volume produced is primarily determined by the area of crystallisers and concentrating salinas, combined with the available evaporation. The average production at Dry Creek in its current form will be approximately 350,000 harvest washed tonnes per annum.

The total volume of salt that the mine may produce is dependent on the longevity of the mineral leases. The concept of finite ore reserves is not applicable to solar salt facilities fed by ocean waters, as sea water salts are constantly being created by the erosion of soils and rocks, and the transport of these eroded materials in the form of dissolved and suspended solids to the sea via fluvial systems.

12.4.8 Annual Production Rates

The solar salt production process is similar to an agricultural process where the annual production of salt is variable and based on a range of weather-related factors. The ability to produce brine to saturation in the condenser section of the Salt Field is in a large part dependant on the net evaporation. Rainfall and gross evaporation are the principle impacts however the timing of rainfall, the impact of heavy rainfall events, seepage, wind, and solar load all impacts on brine availability. The weather conditions at Dry Creek are highly suitable for solar salt production and this area has a proven history of reliable production.

In the crystalliser section of the field the rate of deposition of salt is impacted by brine availability from the condenser section of the field, rainfall and evaporation, the colour of brines, seepage, and a range of other factors.

The Salt Field is expected to yield an annual harvest tonnage of 410,000 tpa of crude unwashed salt. After washing, this yields 390,000tpa of washed harvested salt ready for sale or use in manufacturing. Salt is harvested annually prior to winter and typically during the months of April, May and June each year.

Some dissolution losses occur in stockpiles, and these are captured and returned to the brine circuit for re-precipitation. An assumed average loss through normal operations is typically around 14%. Therefore, the expected sales tonnage will be 350,000 tonnes per annum.

12.4.9 Salt Washing and Stockpiling of Washed Salt

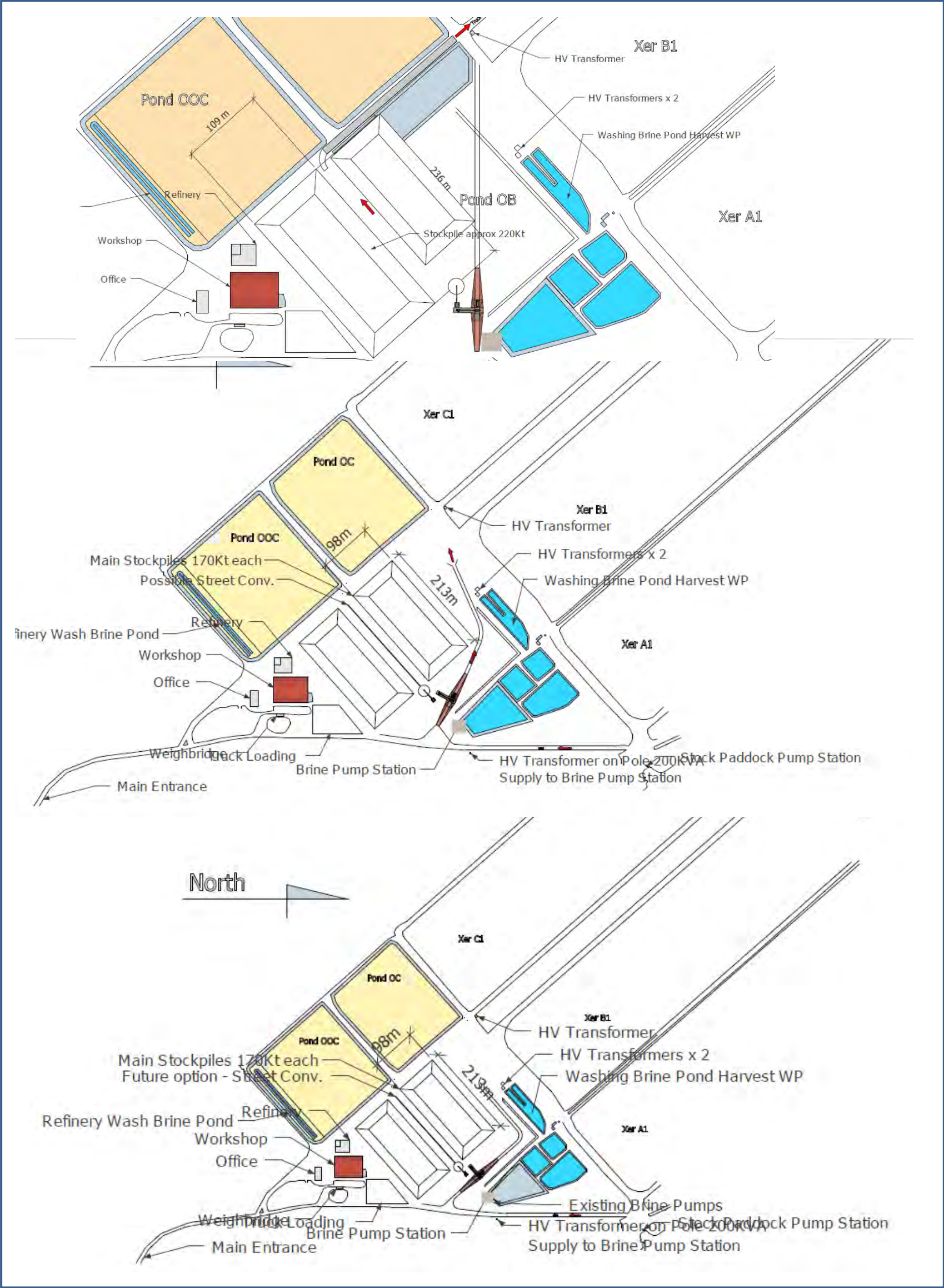
A range of wash plant and stockpile layouts are under consideration –see Figure 12-15 below. These plans will be further developed and refined following approval of this PEPR / MoP

Salt will be stockpiled post washing in a dedicated stockpile area. Allowing for safety stock of approximately 175,000 tonnes, the stockpile tonnage is expected to vary annually between 150,000 tonnes and 525,000 tonnes. The volume of salt stored is then 130,000 and 400,000 cubic metres of product. The salt stockpile will be constructed in a location within the Salt Field operation in what has been OOB. This site is conveniently located between the proposed harvest wash plant location, the refinery and warehouse location and existing constructed ponds which will form part of the wash brine circuit in the harvest wash plant. Existing OOB is 7Ha in size and salt will be stockpiled in various stacks on this area with heights up to 14m.

12.4.10 Transport of Finished Goods

All product sold from the site will leave the site by truck. Products are sold in bulk transported in bulk tippers with covered trailers or sold packaged on pallets transported on B-Double tautliners or similar. Once at full production rates a total of 350,000 tpa will be sold from the site. The typical product payload based on current and typical vehicle configurations ranges from 36 to 42 tonnes for tautliners and bulk 40 to 45 tonnes for tippers. Based on 250 weekday despatch days per annum this equates to 35 vehicle movements per day on average. Despatches will however occur at times and frequencies that meet customer needs.

Figure 12-15 Indicative Layouts for Wash Plant and Washed Salt Stockpiles



12.4.11 Market

While marketing plans are commercial in confidence suffice to say that this facility will provide salt to the global salt market. This market is approximately 350million tonnes per year, growing at the rate of approximately 3million tonnes per year. The majority of this growth is occurring in our region - Pacific and Asian neighbours and locally.

12.4.12 Production Rate and Products

Standard commodity: Salt (NaCl) & Magnesium Chloride Brine

Mine gate product: Harvest Washed Bulk Solar Salt, Refined Solar Sea Salt Packaged Products and Magnesium Chloride Brine

Mining, production & sales rates: approx. 390,000 tpa harvested and washed, to produce bulk and refined products for sales of 350,000 tpa.

Products to be marketed: Harvest Washed Bulk Solar Salt, Refined Sea Salt Packaged Products and Magnesium Chloride Brine

Intended market for the products: Domestic & International Salt Market.

12.4.13 Modes and hours of operation

The operating Salt Fields operate on a continuous basis throughout the year. Pumping into and through the salinas starts in early Spring each year and continues until late Autumn or early Winter. The crystallisers are supplied with brine continuously as it becomes available from the condenser area and as it is required to allow continued deposition of salt. Crystallisers are topped up through the salt making season to maintain operating levels and densities that optimise the production of salt. Harvesting of the crystallisers occurs in late Autumn and Winter. Salt is harvested over about 12 weeks. During harvest, crystalliser brine is moved to other crystallisers or placed into deep storage ponds to overwinter or is disposed to sea, if its salt content is exhausted. The brine when salt content is exhausted is referred to as bitters. As well as being discarded to the sea, some bitters is also further evaporated to a higher density to produce a Magnesium Chloride Brine product which is sold primarily into the dust suppression market.

The Salt Field will initially be manned from 6:00 am to 5:00 pm Monday to Friday and 7:00 am to 3:00 pm on weekends and public holidays but with commencement of salt refining activities and at full rate the site will be manned 24/7. The production pumps operate automatically throughout the twenty-four-hour cycle based on operational needs and for sea pump operation based on tides. Some pumps are monitored remotely, and some are manually inspected and operated.

The wash plant will be equipped to run around the clock during harvest as needs demand. The plant will typically operate during daylight hours.

The salt refining operation will be equipped to run around the clock during harvest as needs demand. The refinery will be capable of processing 1000 tonnes per day running 24/7 and will produce 40 tonnes per hour of high-quality refined salt products. These products will be sold into the domestic and export markets. Initially running single shift operation, the facility rate will be quickly scaled up to service growing domestic and export markets.

12.4.14 Dust, Foam and Noise Considerations

12.4.14.1 Introduction

The mineral tenements are extensive and occur in areas ranging from wilderness to localities adjacent to highways. The salina operations occur in rural areas and contribute little to no extra noise to ambient levels. The harvesting operation occurs adjacent to the Northern Connector, Port Wakefield Road, and the Port River Expressway and rarely, if ever, exceeds the ambient noise from those roads.

Ambient dust levels vary throughout the extent of the mineral tenements. The northern areas are relatively arid and contain unsealed roads that have a range of vehicular movements. Some adjacent operations (e.g., composting works, biosolids plants, horticultural field preparation) produce visible loads of dust in defined areas. Salt Field operations in these northern areas do not exceed ambient dust loads.

In the Section 1 crystallising areas much of the surroundings has been developed or is vegetated, resulting in relatively low ambient dust levels. No operations in the crystallising area (pan preparation) cause the production of dust loads except for the transit of vehicles along unsealed roadways.

Ambient air quality is also variable across the extent of the mining tenements. Odours and smoke are produced from some neighbouring industries (composting works, biosolids plant, wastewater treatment operations, feed lots), while some of the tidal flats of Barker Inlet off-gas hydrogen sulphide gas during warm weather.

No dust is produced from ponds or crystallisers during normal operations. Dust may be produced by occasional traffic along the salina embankments (once or twice a day) through the Salt Field. Road traffic will be high during harvest period and the application of Magnesium Chloride Brine dust suppressant will be used to manage road surfaces to minimise dust generation.

Foam may occasionally develop and be blown from the surface of some ponds under high wind conditions.

12.4.14.2 Crystallising area

The crystallising area of the Salt Fields in Section 1 has been subject to 'urban creep' over the 70 years of the mine's operation and is now enclosed by developed land.

The northern boundary of Private Mine 248 adjoins the Globe Derby residential subdivision, with housing starting about 105 metres from the operations. PM 248 is separated from the housing visually by two earthen embankments and by the Dry Creek Stormwater Drain. The suburb of Mawson Lakes also contains some housing in close proximity to the crystallising pans. Housing at Mawson Lakes east of Port Wakefield Road is approximately 900m away from the easternmost crystalliser row in Private Mine 248. Two houses owned by the City of Salisbury are located a short distance south of PM 248 and Mineral Lease 5908.

It is possible that the operation of harvesting equipment may be heard at residences in Globe Derby or Mawson Lakes, however the noise level is very similar to ambient levels being emitted by traffic on Port Wakefield Road.

Seasonal occurrences of dust and foam nuisance and occasional noise issues have been reported in the past by residential neighbours.

The eastern and southern boundaries of the crystallising area are occupied by stormwater treatment wetlands, historic magazines buildings, the SEAGas facility and three major highways (the Northern Connector, the Port River Expressway-Salisbury Highway and Port Wakefield Road). Part of the northern boundary of the crystallising area is occupied by the Globe Derby trotting facility. Several easements pass through the crystalliser area carrying telecommunications, the Adelaide main line sewer, electricity transmission towers and the SEAGas pipeline.

12.4.14.3 Concentrating area (salinas)

The electric pumps for input of seawater may be heard at Middle Beach under some wind conditions, although the noise levels are within normal guidelines

Immediately north of Dry Creek, pond PA12, part of Private Mine 248, adjoins the Globe Derby residential subdivision, with housing starting about 100 metres from the operations. This pond also contains easements for electricity transmission towers and the SEAGas pipeline.

The ponds between the Little Para and St Kilda Road are located west of the Bolivar WWTP. The two operations have a variable separation from each other of between 75m and 400m.

At St Kilda, Mineral Leases occupied by salinas are located as close as 50m from residential housing, and a tramway runs along St Kilda Road, within twenty metres of the ponds. The St Kilda pumping station on St Kilda Road is approximately 500m from housing.

In the past, issues with foam have been reported by the owners of the tramway, while the electrically driven brine pump can be heard at the nearest housing under certain weather conditions.

Between St Kilda Road and Port Gawler the salinas are located west of the DSTO aerial facility, rural land and the Jeffries Buckland Park composting operations. Occasional rural dwellings and buildings are located close to the operations along Brooks Road. While the houses are within 400m of the operating salinas (in some cases as close as 200m) they are separated from the ponds by several embankments, the road itself and the Bolivar sewage outfall channel.

A house on Thompson Road is within 400m of the ponds, but is separated from the operation by several embankments, Thompson and Beagle Hole Roads, Thompson Creek, and the Bolivar sewage outfall channel.

Immediately south-east of Buckland Park Lake on Allotment 6 of Filed Plan 3965 there are several huts and storage containers, just over 400m from the operating salinas. On the north-west shore of Buckland Park Lake, a shed is located on land where there is an application for a dwelling. The shed is located within the boundaries of Private Mine 199, within 65m of the operating salinas.

North of Port Gawler Road, the Port Gawler Off-Road Park operates on land including all of Private Mine 77 and parts of Private Mine 199. Just east of the operating salinas on Port Gawler Road a farmhouse is located within 100m of the ponds.

North of Port Gawler Road the salinas lie west of the University of Adelaide's Buckland Park aerial facility and the Bureau of Meteorology's Buckland Park Doppler radar installation. The buildings associated with each of these facilities are over a kilometre away from the Salt Field operations.

At Middle Beach two houses are located within 400m of the operating salinas. It is possible, under certain weather conditions, to hear the electrical sea-pumps of the Middle Beach pump station at the closest houses. In the past, there have been concerns raised by residents about the amount of water being pumped from the tidal portions of Salt Creek.

12.4.15 Type of equipment

Day to day operations:

- Indicative but not exclusive: utilities, cars, graders, trucks, front end loaders, bulldozers and tracked vehicles

Harvesting operations:

- custom designed tracked salt harvesters
- excavators
- front end loaders
- trucks

12.4.16 Ore Haulage and Stockpiles

12.4.16.1 Introduction

Salt stacks are located in a dedicated stockpile area where salt is used for sale and despatch in bulk or for use in salt refining. The salt is coarse and wet and rapidly “crusts” and becomes very hard, ensuring no entrainment of salt into breezes. Rainwater percolates through the stacks, reducing residual magnesium salts and dissolving a portion of the common salt. This process is called ‘weathering’.

Most salt undergoes no further movement after placement into these stacks during the harvesting process, until it is loaded for sale and despatch or transported to the refinery for further processing. Removal of salt from the stockpiles does not produce dust.

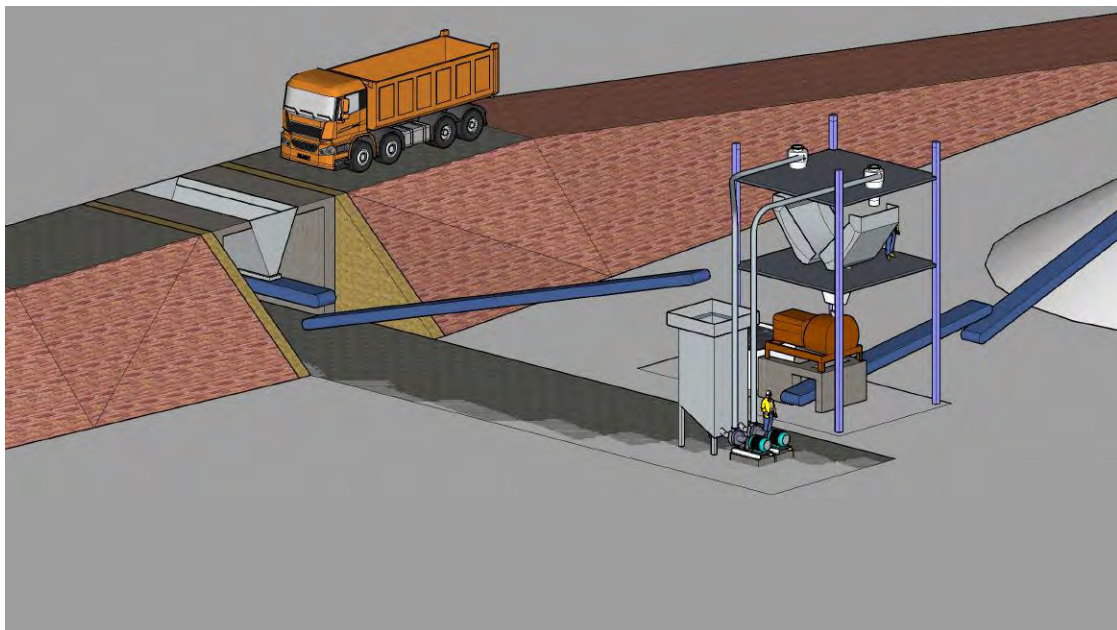


Figure 12-16 Delivery of harvested salt from crystallisers for washing.

12.4.16.2 Modes and hours of haulage

The formation of salt stockpiles occurs during harvest as salt is washed as carted. The washing and stacking process operates in conjunction with the crystalliser activity for an approximate 12-week period from April to June inclusive. Recovery of salt from these stockpiles then occurs on a regular basis through the course of the year for load out and sale or for use in the refinery operations. Stockpiles are managed using excavators, front end loaders and trucks on an as needs basis whilst product is despatched, and the refinery is operating. This activity will operate 24/7 to meet sales requirements.

12.4.16.3 Type of equipment

Salt stockpiles are formed using conveyor, excavators, front end loaders and trucks.

12.4.17 Processing plant – harvest washing

12.4.17.1 Introduction

A harvest wash plant is utilised to process harvested salt recovered from crystalliser – See Figure 12-16. The harvest wash plant is primarily a process that removes unwanted gross and fine insoluble materials that are not common salt which is the product being recovered. The washing process uses a saturated brine and physical particle separation techniques to improve the purity of salt for sale. This process uses a brine circuit where wash brine flows through adjacent ponds. Bore and town water to assist in quality upgrade of the salt. Solids and liquids generated through the washing process are recycled in the Salt Field operation where they are put to beneficial use in providing brine and solid materials for pond and bank maintenance.

12.4.17.2 Type of equipment

- Haul roads from crystallisers to the wash plant area – See Figure 12-17
- A drive over or back up tipping pit to allow discharge of harvested salt from trucks for subsequent washing.
- A harvest Wash plant consisting of conveyors and process equipment.
- An out-feed system to stack washed salt.
- Equipment to stack the harvest washed salt including excavators, front end loaders and trucks. A wash pond circuit that provides saturated brine for use in the washing process and settling and removal of insoluble materials.

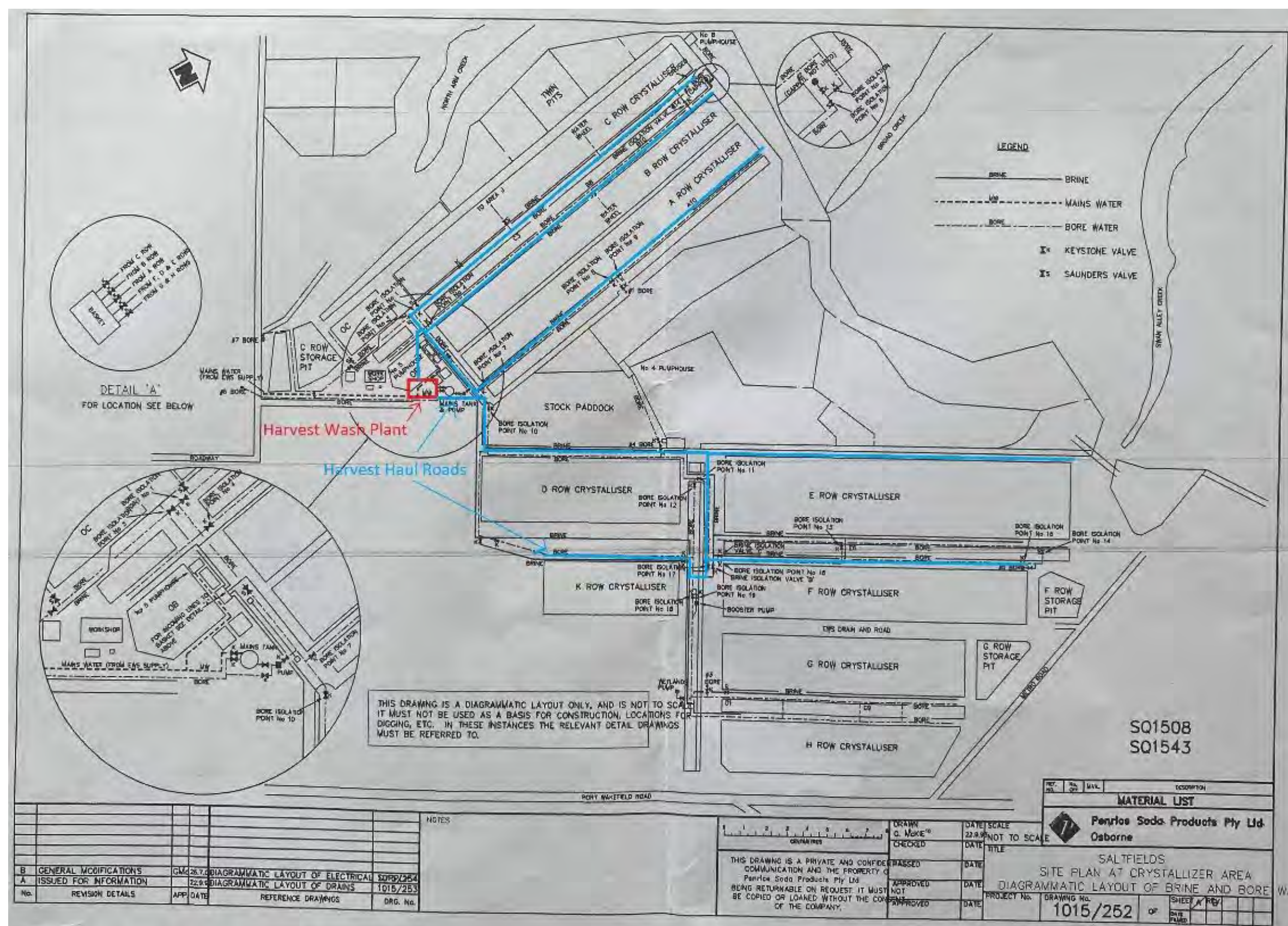


Figure 12-17 Haul Routes for delivery of harvested salt from crystallisers for washing.

12.4.18 Processing plant – Salt Refining

12.4.18.1 Introduction

A salt refinery is utilised to process harvested washed salt into a range of refined salt products with different physical and purity specifications to service the domestic and international markets.

A state-of-the-art solar salt refinery incorporating modern and innovative technologies to allow the production of high-quality solar salt.

The salt refining process involves a combination of some or all of the following unit operations: -

- Washing
- Drying
- Screening
- Sorting
- Crushing
- Packaging
- Warehousing
- Despatch

12.4.18.2 Location

The salt refinery will be constructed on land adjacent to the existing warehouse building. The factory will be well located in relation to site access points, the administration and maintenance facilities and the washed salt stockpile.

12.4.18.3 Type of equipment

- Product refinery feed system.
- Salt refinery
- Packaging Operations
- Warehousing
- Containerisation facility
- Regular use of forklifts and the use of other mobile equipment from time to time.

12.4.19 Supporting infrastructure

12.4.19.1 Access

Access to the Salt Field occurs from designated roads. Each geographical section of the Salt Field has several entries.

The crystallising area south of Dry Creek has a gate on Magazine Road and a gate adjacent to a bridge over Dry Creek from Globe Derby Drive.

Between Dry Creek and St Kilda access to the Salt Field is from Globe Derby Drive in the south, and in the north, there are two entries – one at St Kilda Road.

The large area of concentrators between St Kilda and Port Gawler has four access points. In the south there are gates at Radar Road and Whiting Street Common, in the east there is a gate leading from Beagle Hole Road and in the north, there is a gate on Port Gawler Road.

Salinas lying north of Port Gawler Road and south of Middle Beach are accessed by gates from Port Gawler Road and Shellgrit Road.

12.4.19.2 Accommodation and offices

A general office/crib room complex and maintenance workshop are located at Dry Creek on ML 390.

The current facilities in the general office/crib room complex include six fully equipped offices, a boardroom, front office, an office kitchen, a crib room (7m by 8m), a first aid room, 1 female toilet facility with a toilet & hand basin, 1 male toilet facility inside the office complex that has 2 toilets, 1 shower, 1 urinal and 1 hand basin, a male toilet/change/shower facility adjacent to the crib room complex that has 3 toilets, 2 showers, 1 urinal, 1 handbasin, a boot drying room and a change room with individual lockers.

The capacity of this complex will be expanded on an as needed basis to cater for the expanded operation

12.4.19.3 Public roads, services and utilities used by the operation

Almost all travel through the Salt Field occurs on private roads. Public roads are used to cross from gate to gate or to leave the site at Magazine Road, Globe Derby Drive, St Kilda Road, Radar Road, Beagle Hole Road, Port Gawler Road and Shellgrit Road.

12.4.20 Workforce

12.4.20.1 Introduction

The workforce at Dry Creek Salt Fields comprises:

- Management and staff
- Process operators
- Maintenance personnel

12.4.20.2 Number and workforce breakdown by job type

- Salt Field operation – 4 brine controllers (full year)
- Harvesting – 20 personnel (3 months) including permanent and contractors
- Harvest washing – 6 personnel (3 months) including permanent and contractors.
- Salt refining - 12 persons for initial single shift operation / 48 persons for full volume 24/7 operation
- Warehousing/Despatch/Container loading – 10 personnel.
- Maintenance – 6 including permanent and contractors.
- Administration – 20 personnel
- Total – 114 personnel
-
- Transport – 35 personnel (contracted)

12.4.20.3 The proportion of the workforce that would reside in the focal community and the estimated impact on local employment

The operation is adjacent to metropolitan Adelaide and will draw its labour from that region. The operation is expected to employ 114 employees plus 35 transport contract personnel plus a range of contractors delivering goods and services to the operation.

12.4.20.4 Any programs to target and assist Indigenous or local employment at the mine

The operation is adjacent to metropolitan Adelaide and will draw its labour from that region. Indigenous and local employment will be encouraged

12.4.20.5 Training to be provided to employees and potential employees

A skilled workforce is required to operate the Salt Field, salt wash plant and salt refinery. Training specific to processing equipment, operation of mobile equipment and specific skills in Salt Field operation and testing will be provided in order to build a competent workforce.

12.4.20.6 Approximate timelines for creation of the positions

The initial 114 personnel include 2 already working in the operation and will be employed in salt production for the first year.

Refinery operation is expected to commence in 2025 once adequate salt is available for operations after 2 successive harvests.

12.4.20.7 Number of full-time employee positions that would be directly created by the proposal (not to include existing positions)

The operation will employ 114 personnel in operations and administration. A large number of personnel will be involved in the construction of salt washing and salt refining facilities. The current operation utilises 2 personnel.

12.4.21 How operations on the site will be managed

Site operations will be managed from the Dry Creek site. Administration, sales & marketing and technical support will be provided by the Salt Field operator using expertise and resources based elsewhere.

12.4.22 Potential for local business participation, and procurement of local goods and services.

Goods and services will be provided predominantly by SA based businesses and mostly from the Adelaide region.

12.4.23 Resource Inputs

Table 12-4 Data Sources for Resource Input Calculations

Item	Data sources and calculations
Mains water	Salt Field records – reference operations
Bore water	Salt Field records – reference operations
Seawater	Salt Field records – Dry Creek operations
Fuel & oils	Salt Field records, converted to TJ using the diesel factor of 38.6 MJ/L
Electricity	Salt Field records, converted to TJ using a factor of 3.6 MJ/kWhr
Solar power	BoM Adelaide solar radiation records (annual MJ/m ²) applied to 5000ha of ponds
Carbon dioxide sink	3000 ha ponds treated as shallow seagrass/macroalgae communities (Garcia <i>et al</i>) accumulating 182gC/m ² /year and approx. 2500 ha unused mining leases comprising saltmarsh and mangroves (Jin Eong Ong) accumulating 1.4 tC/ha/year. Total gC/m ² /year converted and displayed as total CO ₂ tonnage per annum
Bitterns	Salt Field records – Dry Creek Operations
Water vapour	Evaporation component from Salt Field model, based on seawater input
Salt	Salt Field records – Dry Creek Operations
Carbon dioxide equivalent emissions	Sustainable Energy Authority - electricity (1MJ = 0.4075 kg CO ₂) and diesel (1 MJ = 0.0697 kg/CO ₂)
Oxygen	Carbon accumulation in ponds is due to plant matter, the carbon sink figure may be applied to the standard photosynthesis formula to calculate oxygen release: $6\text{CO}_2 + 12\text{H}_2\text{O} + \text{sunlight} \rightarrow 6\text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O}$

12.4.23.1 Water sources

Water sources used in the Salt Field include the major mined resource (seawater for salt production), hypersaline T3 aquifer water for salt production, bore water and mains water for the salt processing and administration facilities.

Each year approximately 35,000 ML of seawater from Gulf St Vincent are pumped into the evaporation ponds to make salt. Seawater is an assumed unlimited resource and the Dry Creek usage of it is infinitesimal. The hypersaline T3 aquifer is available for use and may be utilised based on operational requirements for managing the quality of brine flowing through the Salt Field. This aquifer is presently unallocated with no other known user. The extraction volume taken historically was only 1800 ML and is assumed to be insignificant in relation to the overall aquifer size.

Freshwater from the Salt Field bores in the T1 aquifer is used for salt washing and salt refining operations at Dry Creek are located in the Northern Adelaide Plains Proclaimed Wells Area

- Bores 1, 3, 4, 5 and 8 have a combined allocation of 1,177,248 kL (1,177 ML approx.) per year.
- Bores 6 & 7 have a combined allocation of 850,000 kL (850 ML approx.) per year

Aquifers T1 & T2 have a combined allocation in the Northern Adelaide Plains Prescribed Wells Area of approximately 24,000 ML. Therefore, the Dry Creek Salt Fields allocation accounts for approximately 8.4% of the total allocation of this resource.

Two bores (6 & 7) are located within the Dry Creek Prescribed Wells Area and have an allocation of 850,000 kL.

The borewater needed for harvest washing is anticipated to be about 130 to 150 ML pa. By comparison, in the 2020-2021 PEPR / MOP compliance report for the current holding pattern, the extracted volumes were 29.4 ML vs an allocation of 1177.3 ML for wells 1 to 5 and 8- and 274-ML vs an allocation of 850 ML for wells 6 & 7. All this are in the T1 aquifer. No water was extracted from the T3 aquifer.

Note that as specified in Schedule 4 Part C of the Special Mining Enterprise Agreement and Schedule 5 Annexure C of the Crown Agreement as gazetted (26 June 1997) under the Regulations of the *Water Resources Act 1997*. These two bores were historically (up to 2013) used for the dissolving operation – see section 12.9. The usage from these bores was up to 650,000 kL. As these bores are the only bores in the Dry Creek Prescribed Wells Area, they account for 100% of the water usage from this source.

The Water Resources (Penrice Exemption) Regulations 1997 provided for the take of water from the Dry Creek PWA, any T3 wells in the NAP PWA, and specific T1 and T2 wells in the NAP PWA. The maximum take of water was specified for T1 and T2 wells in the NAP PWA was 1,177 ML and was not specified for T3 wells in the NAP PWA or any wells in the Dry Creek PWA.

These regulations expired on 1st September 2011 and are no longer in force. The relevant legislation which currently applies is the Landscape SA Act 2019, which means that water cannot be taken from wells in the Dry Creek or NAP PWA without a water licence. Buckland Dry Creek holds a licence for T1 and T3 wells in the NAP PWA and another licence for T1 wells in the Dry Creek PWA. The licence numbers and their allocations are listed in Figure 10-8.

Mains water usage at Dry Creek averages is estimated to be 25 ML per annum. As SA Water supplies approximately 170,000 ML of mains water to Metropolitan Adelaide, Dry Creek's usage would account for 0.015% of that resource annually.

12.4.23.2 Indicative water uses by destination

Usage	Area
5ML pa	Dilution water for pump operation
15ML pa	Wash Plant Operation
5 ML pa	Refinery Operations and Administration
25ML pa	Total usage of freshwater from the Salt Field bores in the T1 aquifer used for salt washing and refining and ancillary operations

Actual water use depends on the tonnes of salt production

Water extraction will comply with licence limits.

All of the Brine produced from water used in the salt washing process is recycled back into the brine circuit. Whilst ultimately all this water evaporates, this directs the estimated 15ML of brine used in this process back into the Salt Field operations.

12.4.23.3 Energy sources

Energy sources used at Dry Creek include electricity from the grid, diesel, petrol and oils and solar energy. For salt production, the following is noted:

- Solar Power – 234,500 TJ pa
- Carbon Dioxide Sink – (3,000Ha ponds & 2,500 ha mangrove/salt marsh leases – remainder n/a) 38,900 tonnes pa
- CO2 equivalent from electricity, fuels, and oils [TBC To be calculated - based on elec, diesel, LPG usage – refinery will use approx. 10 litres per tonne of dried salt produced]
- The approximately 20 TJpa of electricity, fuels and oils used at Dry Creek Salt Field is equivalent to 6,500 tpa carbon dioxide equivalent.
- An estimation of resource usage and emissions from the Dry Creek Salt Fields (based on 3,000ha operational area). The figure is not a mass balance, nor is it a comprehensive carbon audit. The data used to develop the information provided in this figure do not relate to a specific year, they are representative of the range of figures to be expected at Dry Creek in a variety of years.
- Where the data are calculations based on assumptions of primary production they should be considered to be estimates only, based on any assumptions outlined. Recent studies (Gacia et al, Jin Eong Ong, and Bureau of Meteorology) have provided reasonably robust estimates for primary production in the field.
- The carbon dioxide/oxygen input/output from the biological elements of the Salt Field only reflects the carbon accumulation within the Salt Field. An additional (very large) amount of CO₂/O₂ exchange also occurs as part of the field biology's 'maintenance' budget.
- The 234,500 TJ pa of solar energy used does not create greenhouse emissions, while the ponds, salt marshes and mangroves of the mineral tenements appear, on balance, to be a net carbon dioxide sink, accumulating more CO₂ per year than they emit.
- While these data are estimates, they suggest that the Dry Creek Salt Fields has a negative carbon footprint.

12.4.24 Bitterns Management

12.4.24.1 Quantities

The spent brine remaining after salt crystallisation is called bitterns and contains some remnants of common salt along with magnesium sulfate, magnesium chloride and smaller amounts of other elements as shown in Figure 12-18.

This spent brine is drained from the final crystallisers of each row of pans and returned to the sea via the crystalliser drains. The Dry Creek Salt Field is authorised, under an Environmental Authorisation

issued by the Environment Protection Authority, to discharge bitterns into the tidal portions of Dry Creek and North Arm Creek. The material will be released in accordance with the licence conditions and as specified in the company's procedures – to be prepared following approval of this PEPR/ MOP. Plans of the bitterns discharge locations and the crystalliser drains are shown in Figures 12-19 to 12-22.

Historical operations have always involved the production of bitterns and the discharge of bitterns to the aquatic receiving environment. Discharge of bitterns has been a feature of successive operating plans and agreements and also approved in successive EPA licences. The Residual Operations and Holding Pattern also included the management of discharges via licenced EPA discharge points.

Historical operations involved discharge of 600 to 1,000 ML pa. The current planned operation involves the discharge of between 450- and 750-ML pa.

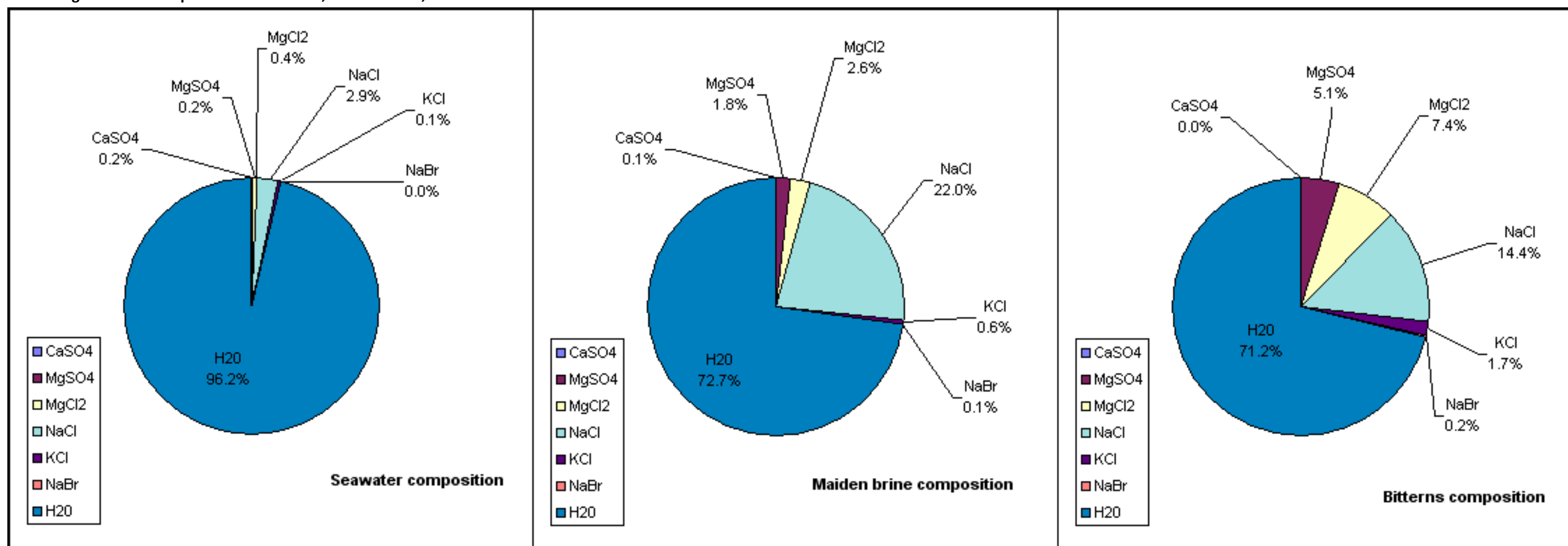
The volume of bitterns returned to the sea via licenced discharge points and the end of the process is approximately 1.6% of the total volume fed into the system.

Typical annual volumes through the process are as follows:

- Seawater average 37,500ML pa IN (range 35,000 to 40,000 ML pa)
- Salt average 350,000 tonnes pa OUT (range 250,000 to 450,000 tonnes pa)
- Bitterns average 600 ML pa OUT (range 450 to 750 ML pa).

The bitterns are sent to sea via the crystalliser drains and bitterns holding ponds.

Figure 12-18 Composition of seawater, maiden brine, and bitterns



12.4.24.2 Historical Discharge Locations

The Dry Creek Salt Field is authorised by the EPA to discharge bitterns into the tidal portions of Dry Creek and North Arm Creek. The material will be released in accordance with the licence conditions and as specified in the company's procedures covering Environmental Management, Waste Management and Marine Discharge – to be prepared following approval of this PEPR/ MOP. The historical licenced bitterns discharge locations are shown in Figure 12-19.

These historically licensed locations include:

1. Dry Creek (existing point at E Row drain flap to be retained)
2. North Arm Creek (new point to replace previous discharge point resumed in DIT road development)
3. Dry Creek (second point no longer required)

12.4.24.3 Existing and Proposed Discharge Locations

See Figure 12-20

Dry Creek

The existing discharge point known as E Row flap will continue to be utilised for discharge of bitterns into tidal sea water flows or storm water flows via drain and E row Flap (licenced point).

North Arm Creek

The existing discharge point to North Arm Creek is no longer accessible. Investigations will be made to assess the need for and the design for the relocation of the historic discharge point into North Arm Creek to accommodate the construction of the Northern Connector. Preliminary and conceptual pump and creation of infrastructure is detailed in Figures 12-22 and 12-23. Figure 12-22 provides concepts of the installation as envisaged in the existing approved PEPR / MOP. Figure 12-23 provides updated details to better suit the internal operations of Section 1.

Should these investigations conclude that there is a need for the relocation of the historic discharge point into North Arm Creek, this will be the subject of a further revision of this PEPR / MOP, and a revision to the EPA Licence. That prospective revision to this PEPR / MOP, if needed, would be prepared to include details of the proposed construction and operation of the new discharge point; and to account for discussions of these details with DEM, EPA and other relevant agencies.

Figure 12-19 Current EPA Licenced Bitterns discharge points



Figure 12-20: Location of Bitterns Discharge Points – a) the E Row Flap discharge; b) the to-be-investigated possible location for a Relocated No 8 Pump discharge (only if found to be needed)



12.4.24.4 Discharge Criteria

Operations will involve discharge of brine via existing historical licenced bitterns discharge points or alternative points to be agreed with regulators. Discharge of brine will involve be dilution then discharge into the Port River or other endorsed destinations. Whilst operations may require the ration of EPA Licence compliance points for bitterns discharge there will no change to criteria.

Location Identification	Location	Latitude/Longitude	Nature of Discharge	PARAMETER	COMPLIANCE CRITERIA
B	Pump 8 Discharge Point	Latitude -34.815615°	Bitterns Discharge	Suspended Solids	No more than 80 milligrams per litre + 80% seasonal maximum
		Longitude 138.557044°		pH	6.5 – 9.2
	E Row Drain Flap	Latitude -34.795350°		Salinity	The hydrography of stream flow causes a permanent change in isohaline patterns of no more than 10% of the background variation
		Longitude 138.578516°		Oxygen (dissolved)	The discharge is subject to turbulent flow to ensure that it is discharged with highest possible Oxygen saturation

Table 12-5: EPA Licence Parameters

12.4.24.5 Holding & Controlled Discharge of Bitterns

New bitterns holding ponds and Magnesium Chloride evaporation ponds (see Figure 12-21) will provide holding area for bitterns to allow retention of bitterns when circumstances may not allow discharge (low tidal range and low flow in estuaries). Some bitterns will be utilised to produce Magnesium Chloride Brine product.

Internal bitterns storage ponds and interconnection between systems will allow either or both to be utilised as operations require.

Historical and future control of bitterns discharge ensures dilution in receiving waters to reduce risk of impact in receiving waters. At any licenced discharge location, the bitterns flow will be managed and matched to tidal or storm water flow to ensure compliance with licence conditions

12.4.24.6 Management of Discharge of Bitterns

The impact of hypersaline brines on marine environments relates to the balance of ions, in particular the Ca/Mg ratio to Na, and to the inability of the saturated solution to hold oxygen. Both of these aspects of bitterns may lead to an impact on the marine environment.

The sodium absorption ratio (SAR) is the ratio between Na and Ca/Mg in waters. Too much Na will disrupt the osmotic balance, reducing the availability of Ca/Mg to cells within organisms. All organisms have evolved to tolerate the SAR of water they inhabit. Flora and fauna in marine environments prefer an effective SAR around 60. The SAR of bitterns varies from 50-70, falling with increased specific gravity. By comparison, maiden (crystalliser) brine that is rich in sodium chloride has an effective SAR of over 168. This suggests that the bitterns may be more easily tolerated by aquatic plant life than maiden brine would be.

Bitterns are saturated brines and are unable to contain much dissolved oxygen. The runoff process supersaturates the bitterns by running them along drains and over rocks at the discharge, however ultimately the most effective approach to increasing the brines' ability to absorb oxygen is rapid dilution. This occurs in the tidal creeks of the receiving environment.

Features of Bitterns management at Dry Creek to reduce any risk of environmental harm include:

- Dry Creek holds its bitterns longer than most Salt Fields to extract more NaCl, which reduces the sodium absorption ratio (SAR)
- Holding the bitterns longer also reduces the overall volume discharged
- Discharge occurs in 'pulse' rather than 'press' cycles of between 16 and 70 discharges per annum over a period from December to July each year, allowing tidal flushing and complete dilution to occur prior to the subsequent discharges
- All discharge locations are designed to hyperoxygenate the bitterns at discharge
- Discharge occurs where there is sufficient tidal flushing to ensure rapid dilution
- Work instructions and a monitoring program address the requirements of the Environmental Authorisation.
- The operation has a total of 32Ha of ponds allocated the holding of bitterns prior to discharge, the removal of additional sodium chloride from bitterns and the production of Magnesium Chloride Brine. This area holds at least 2 months of the total annual production of Bitterns allowing good capacity for storage in circumstances where receiving waters could limit discharge rates.

12.4.25 Wastes from Salt Processing

The harvest washed salt stacks generate brine from dissolution losses during rainfall. This brine is captured and redirected to deep storage and back to crystallisers where the salt is recovered.

During the harvest washing process brine is generated through dissolving some salt. This brine is directed from the wash ponds back to crystallisers where the salt is recovered. Solids that accumulate in the wash ponds are periodically removed. This material which is high in gypsum and salt is put to

beneficial use on surfacing roadways or lining pond batters where the salts are weathered back into solution into the ponds.

12.4.26 Industrial and domestic wastes

The Salt Field administration offices operate on a septic tank system. The laboratory has a separate sealed tank that receives sink waste and is pumped out by a licensed contractor. Office and general waste are dealt with using a licensed waste contractor.

While materials are managed to avoid spillage, any spillage of industrial and domestic wastes that does occur will be managed in accordance with company procedures – to be prepared following approval of this PEPR/ MOP.

12.4.27 Silt control and drainage

Silt retention dams or other forms of retention are not required for runoff. The majority of the site is unsealed, vegetated, tidal or ponded. Ponded areas will retain all runoff and tidal areas do not generate runoff. Unsealed and vegetated areas infiltrate a large quantity of rain as the soils are frequently sandy. Runoff that develops in the stack bays and roads of the crystallising area travels slowly down the drains to discharge into Dry Creek and North Arm Creek. This runoff is similar in composition to estuarine water, and has a low turbidity compared to the stormwater-affected receiving waters. Stormwater developed in the southernmost portions of the site settles in a stormwater pit near the front entry prior to discharge.

12.4.28 Care and Maintenance of Operational Salt Field

An operations and maintenance plan will be produced to address care and maintenance needs of all Salt Field infrastructure In Section 1 to 4 to preserve operability of the Salt Field's commercial salt production.

Solar salt production produces minimal wastes. The company's Waste Management instruction specifies methods to minimise identified waste and to ensure correct disposal

12.4.29 Visual Screening and Mine Security

The majority of the operating Salt Field site comprises low lying ponds backed with mangroves. These do not require screening, as they are consistent with the natural environment in which they occur. The crystallising area with its stacks of salt has a more mixed visual impact, depending on the point of view of the observer and this area is viewable from public roads.

The operating site is secured with heavy duty gates and padlocking at all road entry points and agricultural fencing along property boundaries that are accessible. Signage is provided along accessible fence lines at regular intervals.

12.5 Bulk Earthworks to Fill F, G and H Rows

12.5.1 Introduction

BDC is filling F, G, H Rows preparatory to seeking mine completion and closure for the filled land. F, G and H Rows are part of the Private Mine land owned by BDC (PM248). This is shown in Figure 12-21.

These earthworks have been approved in previous revisions of this PEPR / MOP following:

- Completion of a Pilot Trial the conduct of which was approved by DEM; and
- Provision of an initial Bulk Earthworks Plan and associated risk and impact assessment

The bulk filling works to date have complied with the procedure set out below, with monitoring and compliance documentation being provided to DEM or EPA as required.

12.5.2 Strategy for Bulk Earthworks and its Regulation

The bulk earthworks in F, G and H Rows in PM248 are needed for the following purposes:

- To rehabilitate this land to enable mine completion and closure.
- To prepare this land for subsequent urban (mixed uses and residential) development:
 - by raising the minimum ground levels above levels stipulated by the relevant planning authority to accommodate for factors such as high tides and storm surges, sea level rise, and floods from stormwater flows
 - by creating topography for the urban development that can accommodate stormwater runoff and drainage adequately, allowing for the effects of climate change
 - by elevating and separating the ground, on and in which the landscaping, infrastructure and foundations for the urban development will be built, from the existing salty ground of the floors of the final area ponds, crystallisers, stacking bays, and drains that formed the operational features of PM248. This elevation and separation are to prevent salt rising and adversely affecting the landscaping, infrastructure, and foundations for the urban development.

12.5.3 Management and Regulation of Bulk Earthworks

The bulk earthworks are being conducted in stages, with each stage creating a platform for an area of subsequent urban development.

Figure 12-22 illustrates the process for managing and regulating the bulk earthworks. BDC has been implementing this process and providing progress and compliance reports to DEM.

Prior to each stage, a Bulk Earthworks Plan with the following information will be submitted to DEM:

- a survey plan of existing ground levels
- a plan of intended ground levels after the bulk earthworks
- drawings showing the engineering design and specifications for the bulk earthworks i.e. materials of construction (and their sources and engineering and environmental properties),



Figure 12-21: Location of PM248

layer thicknesses and volumes, compaction requirements, quality control requirements, and construction environmental management requirements

- endorsement by a suitable qualified Geotechnical Inspection Testing Authority (GITA) that the Bulk Earthworks Plan is consistent with AS 3798-2007 and, if implemented diligently, will produce a land form that that would be geotechnically suitable for the intended land use (to be considered as “Residential” unless documented otherwise in an approved Master Plan or other suitable document).
- endorsement by an EPA Accredited Auditor that the endorsed Bulk Earthworks Plan, and associated Construction Quality Assurance Plan and Construction Environmental Monitoring and Management Plan, if properly implemented should a) generate sufficient information for an audit of the outcomes to be completed, and b) that there is a reasonable prospect that the outcomes will be environmentally suitable for the intended land use (to be considered as ‘Residential’ unless documented otherwise in an approved Master Plan or other suitable document).
- endorsement by a suitably qualified and experienced hydrological engineer that the Bulk Earthworks Plan, if implemented diligently, is likely to produce a landform that will accommodate the tidal and stream levels and flows, flood levels and flows and stormwater flows associated with the intended land use (to be considered as ‘Residential’ unless documented otherwise in an approved Master Plan or other suitable document).
- endorsement by the relevant planning authority that the Bulk Earthworks Plan, if implemented diligently, is likely to produce a land form that is consistent with future land uses (to be considered as “Residential” unless documented otherwise in an approved Master Plan or other suitable document).
- a construction environmental management plan for the bulk earthworks that articulates how the earthworks will be done, monitored, managed, and controlled so that the end result as well as the filling processes comply with the endorsed design and specifications.



Figure 12-22: Process to manage and regulate bulk earthworks

Following bulk earthworks, a completion report will be prepared which contains:

- as-built drawings and other records that demonstrate that the endorsed design and specifications have been complied with.
- endorsements, from review of these documents, supported by such independent checks as have been needed, by:
 - a. the qualified party that will be responsible for the engineering / geotechnical supervision of the bulk earthworks. This endorsement will state that the constructed bulk earthworks have complied with the design and specification and is in effect 'fit for engineering purpose' in the context of the planned urban development and anticipated or actual requirements of the relevant planning authority; the planning authority
 - b. an EPA accredited Auditor. This endorsement will state that the constructed bulk earthworks are in effect 'fit for environmental purpose' in the context of the planned urban development and the requirements of the Environment Protection Act (and other Acts with relevant environmental requirements)
 - c. a suitably qualified and experienced hydrological engineer confirming that the As Constructed landform will accommodate the tidal and stream levels and flows, flood levels and flows and stormwater flows associated with the intended land use, and; the quality of water within and discharged from the As Constructed landform will not have adverse impacts on the use of land or water within or outside the site.
- an endorsement by the responsible Planning Authority, based on its review of the above. This endorsement will state that the relevant conditions of Development Approval have been satisfied by the constructed bulk earthworks.

DEM approval of the completion report would trigger an application for the area of land containing the filled stage to be excised from the Private Mine tenement and thus from the jurisdiction of the Mining Act.

12.5.4 Design of Proposed Bulk Earthworks

The design of the bulk earthworks in each Stage will take account of:

- Further geotechnical and environmental investigations needed to support the design
- The results of geotechnical monitoring and control of prior stages of bulk earthworks)
- What these results mean for, e.g.:
 - a. minimum and maximum finished ground surface levels to accommodate planning requirements (e.g. for sea level rise, flood prevention, stormwater management etc.)
 - b. maximum finished ground surface levels
 - c. minimum and maximum finished ground slopes
- ground surface levels in areas to be filled after undesirable, surplus crystallised salt and salt muds have been removed to provide a 'stripped' ground surface ready for filling
- other constraints and opportunities – such as maximum permissible fill thicknesses over existing gas pipelines; clearance requirements under high voltage power lines etc
- the need to enable the drainage / capillary layer to discharge its water into open swales or waterways within the site

- the need to accommodate a minimum thickness of 1m of cover fill over the drainage / capillary layer. This 1m thickness is intended to assure physical separation between the drainage / capillary layer and civil works, earthworks, and infrastructure works for the subsequent land development. That is the bottom 0.5m of the cover fill is intended never to be disturbed by such works – without adequate prior planning and control to ensure that the integrity of the drainage / capillary layer is never compromised.

13 Environmental Risk Assessment and Outcomes

13.1 Context for Impact and Risk Assessment in this Revision of the Dry Creek Salt Field PEPR

This is a revision (Dry Creek Salt Field PEPR Revision 5) to an approved PEPR / MOP (Dry Creek Salt Field PEPR Revision 4). The revision is to enable the construction and operation of a pipeline in Section 2 of the Salt Field to transfer brine from pond PA5, bypassing PA6 to PA12⁶, to Section 1 via an existing pipeline constructed across Dry Creek; and the resumption of commercial salt production using this brine.

Pursuant to this revised PEPR / MOP:

- There will be no change to operations in Sections 3 and 4 of the Salt Field that are permitted by the Dry Creek Salt Field PEPR Revision 4.
- In respect of Section 2 of the Salt Field:
 - there will continue to be no pumped discharge of brine from pond PA5 into pond PA6 and thence flowing into pond PA7 to pond PA9 for pumping into pond PA10 to flow to pond PA11 and then PA12. It is noted that this movement of brine is permitted by the Dry Creek Salt Field PEPR Revision 4 but prevented by the existing Environmental Direction in force since December 2020. There is no intent in this PEPR / MOP revision to seek a change to that Environmental Direction. This means that the conditions in Section 2 ponds PA6 to PA12, established by the approved Holding Pattern from 2014 to late 2019 and then restored by the Environmental Direction would continue unchanged under this PEPR / MOP revision.
 - there will be pumping of brine from pond PA5, at the south end of Section 3 into:
 - **either** the existing pipeline that discharges into the SA Water Bolivar outfall pursuant to the existing agreement between the SA government and SA Water, and to the existing EPA licence for this discharge. This discharge is permitted by the Dry Creek Salt Field PEPR Revision 4, and this PEPR Revision 5 entails no changes to the mode or conditions for this discharge permitted by the Dry Creek Salt Field PEPR Revision 4
 - **or** the new pipeline (when this is operational). The purpose of this pipeline is to enable transfer of brine from Section 3 into Section 1 of the Salt Field. That transfer is permitted by the Dry Creek Salt Field PEPR Revision 4, but this PEPR / MOP revision is required because the mode of transfer differs from that described in or envisaged by the Dry Creek Salt Field PEPR Revision 4.
- In Section 1 the operations would comprise:
 - The filling and associated works to complete and close F, G and H row crystallisers and the F, and G row pits
 - Elsewhere, those permitted by the Dry Creek Salt Field PEPR Revision 4, plus those of resumed commercial salt production

The purpose of this Revision 5 of the PEPR / MOP is to provide a basis for DEM to approve the CHANGES in operations from those set out in Revision 4, noting that:

- Revision 4 provided for:

⁶ At this stage, PA12 will not be used as an inundated pond and will be bypassed.

- o Bulk earthworks operations in those parts of Section 1 of the Salt Field that are destined for closure
 - o Operations to prepare the Salt Field for commercial salt production operations
 - o Residual and Holding Pattern operations in parts of the Salt Field not required either for commercial salt production operations or for closure operations
- DEM conducts regular audits (quarterly or more frequent) of compliance with the required outcomes of the DEM approved successive revisions of the PEPR / MOP. If issues are raised by DEM from these audits, these are dealt with promptly and proactively
- EPA has been monitoring groundwater levels, densities, and salinities under and outside PA6 to PA8 in Section 2, and
- Annual compliance reports have been provided by BDC to DEM for the years
 - o 2014/2015
 - o 2016/2017
 - o 2017/2018
 - o 2018/2019
 - o 2019/2020
 - o 2020/2021
 - o 2021/2022
 - o 2022/2023
 - o 2023/2024
- These compliance reports have demonstrated that the environmental outcomes from the Holding Pattern and Residual Operations have, to the extent noted below, complied with the required outcomes of the DEM approved successive revisions of the PEPR / MOP:
 - o Flora and Fauna
 - Section 4: complied
 - Section 3: complied
 - Section 2: complied, noting that;
 - From mid-2013 to 2019, and since late 2020 no brine was pumped in from PA5. From early 2014 to 2019, and since early 2021, the ponds PA6 to PA9 in Section 2 fluctuated seasonally from dry to partly inundated due to the balance of rainfall, evaporation, and groundwater seepage.
 - In mid-2020 dieback of some mangroves outside parts of ponds PA6 to PA9 occurred. The cause of this has not yet been definitively established with multiple lines of supporting evidence. The succession of Nearmap images from 2013 to 2019 and from early 2021 to date indicate no impact on mangroves from the seasonally fluctuating water in the Section 2 Ponds which in these periods received no brine pumped in from pond PA5.
 - Section 1: complied
 - o Surface Water
 - Section 4: complied
 - Section 3:
 - complied in respect of EPA licence requirements for discharges to the SA Water Bolivar outfall, pursuant to the agreements allowing these discharges:
 - o 2014 to 2019 between SA Water and Ridley / BDC
 - o Mid-2021 to March 2023 between SA Water and the SA government
 - When these discharges did not occur, summer salinities in some Section 3 ponds reached levels that exceeded the ranges that

pertained during historic salt production operations and when this occurred did not comply PEPR / MOP requirements. These instances were reported to DEM in monthly operational reports and the annual compliance reports.

- Complied in respect of pond water levels
 - Section 2: complied
 - Section 1: complied
 - o Groundwater
 - Section 4: complied
 - Section 3: complied
 - Section 2: complied
 - Section 1: complied
 - o Air Quality
 - Section 4: complied
 - Section 3: complied, noting that:
 - this means that Ridley's / BDC's responses to complaints about dust or odour complied with the requirements of the PEPR / MOP
 - the protocol agreed with DEM re prevention and minimisation of calstilt dust emissions from pond XC2E has been effective
 - Section 2: complied
 - Section 1: complied
 - o Noise
 - Section 4: complied
 - Section 3: complied
 - Section 2: complied
 - Section 1: complied
 - o Soil Quality (Contamination, Salinity and Acid Sulphate)
 - Section 4: complied
 - Section 3: complied
 - Section 2: complied
 - Section 1: complied
 - o Heritage, Buildings and Structures
 - Section 4: complied
 - Section 3: complied
 - Section 2: complied
 - Section 1: complied
 - o Adjacent Land Use, Amenity, Values
 - Section 4: complied
 - Section 3: complied
 - Section 2: complied
 - Section 1: complied

This indicates a solid record of compliance and acceptably low environmental risks.

The pumping of brine into a pipeline that bypasses ponds PA6 to PA12 means that the transfer of brine from PA5 through to Section 1, as permitted by the DEM approved Revision 4 of the PEPR /MOP does NOT risk impact to groundwater or flora or fauna inside or outside these ponds.

In this context, the risk assessment presented below and in the referenced appendices, is primarily concerned with

- Assessing risks from the CHANGES in operations from those set out in Revision 4; and
- Reviewing and updating the risk assessment presented in Revision 4, to take into consideration the observations and experience from the Holding Pattern and Residual Operations from 2014 to date.

13.2 Approach to Impact and Risk Assessment and Management

The approach taken to impact and risk assessment is consistent with that prescribed in the Ministerial Determination TR005. This approach also meets the requirements in the Mining Regulations for the development of objectives in a mine operation plan. It is noted that Ministerial Determination TR005 requires proposed outcomes for each environmental component. To avoid confusion and recognising the integrated nature of the Salt Field operation, the term 'outcomes' is used in this chapter to apply to environmental objectives, identified in accordance with the Mining Regulations applying to a mine operations plan. These 'outcomes' are listed in Table 14-1.

The approach used for the impact and risk assessment is the same as that set out in previous revisions of this PEPR/ MOP approved by DEM – to make for consistency of approach.

Appendices 4 to 6 contain the detailed impact and risk assessments, which are to be read in conjunction with all the information in this Chapter 13.

A distinction is made between:

- Events that are planned to occur as part of the project design. An impact assessment considers the expected consequence of such events.
- Events that are not planned but that may occur. These are considered through a risk assessment and reflect either the uncertainties in impact assessment or the potential failure of control and management strategies.

For each of the following in turn, an Impact and risk assessment have been undertaken:

- Holding Pattern before resumed commercial salt production – See Appendix 4 for the Assessment
- Resumed commercial salt production – See Appendix 5 for the Assessment
- Filling F, G and H Rows – See Appendix 6 for the Assessment

For each, the process identified:

- The existing environment and the views of any affected parties
- Applicable legislation and standards that must be met for an environmental component
- Actual or potential environmental impact events that could occur as a consequence of the activities in this PEPR / MOP. The impact event analysis considered:
 - the source of the impact event
 - the pathway through which a receptor could be impacted
 - the key environmental receptors that could be impacted by the event (an environmental receptor was only considered if it had a recognised environmental value)
 - whether the source, pathway and receptor are all present
 - the factors that limit the impact

- o the control and management strategies that are being or will be employed by BDC to achieve the outcomes listed in Table 14-1.
 - o the significance of the impact (using the criteria in Tables 13-1 and 13-2), considering the proposed strategies.
- limitations in the impact assessment, uncertainties or unplanned events that could result in a higher impact than expected. This includes any uncertainties relating to the effectiveness of the control and management strategies
- the risk associated with a higher-than-expected impact
- the criteria proposed to be used to measure whether the outcomes listed in Table 14-1 will be met.

13.3 Rating of Impacts and Risk

Risk assessment considers the likelihood and consequence of an event.

As impact assessment for events that will or are planned to occur, it only requires an assessment of consequence.

Consequences of potential or actual impact events are rated as shown in Table 13-1.

Table 13-2 shows how likelihoods of risks are rated and risks determined.

The content of these Tables remains the same as in all earlier, DEM approved, revisions of this PEPR / MOP.

Attention is drawn to the definitions of “negligible” and “low” risk. A goal of this PEPR / MOP is by design or by control of the Salt Field operations to achieve and sustain “negligible” and “low” risks.

Table 13-1: Impact / consequence criteria

Area	Component	Consequence Descriptor				
		Negligible	Low	Moderate	High	Severe
Environment	Ecosystem function (terrestrial, aquatic, marine)	Alterations to ecosystem interactions in the localised area not detectable. No conservation or remedial measures necessary	Minor alterations to ecosystem interactions in the localised area are detectable. No conservation or remedial measures necessary	Moderate alterations to ecosystem interactions in the localised area are detectable. Effective conservation or remedial measures necessary for a period of 1 to 5 years	Major alterations to ecosystem interactions in the localised area are detectable. Effective conservation or remedial measures necessary for a period of 5 to 10 years	Major alterations to ecosystem interactions in the localised area are detectable and may not be reversible. Effective conservation or remedial measures, if feasible, necessary for a period of at least 10 years
	Flora and fauna communities and species	Loss in numbers of individuals not apparent and no reduction in localised population viability. No conservation or remedial measures necessary	Minor loss in numbers of individuals apparent but no reduction in localised or regional population viability. No conservation or remedial measures necessary.	Moderate loss in numbers of individuals and apparent and minor reduction in localised or regional population viability. Effective conservation or remedial measures necessary for a period of 1 to 5 years	Major loss in numbers of individuals and apparent and major reduction in localised or regional population viability. Effective conservation or remedial measures necessary for a period of 5 to 10 years	Extreme loss in numbers of individuals apparent and impact on localised or regional population viability may not be recoverable. Effective conservation or remedial measures, if feasible, necessary for a period of at least 10 years
	Surface water and ground water quality	Concentrations of chemicals of interest and aesthetic properties within natural variability, impacts unlikely to be detectable. No preventive or remedial measures necessary	Minor excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability may be detectable in a localised or regional area but are short term in nature and require no or minimal preventive or remedial measures that can be completed in < 1 year.	Moderate excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability are detectable in a localised or regional area and are medium term in nature and require moderate preventive or remedial measures that can be completed in 1 to 5 years.	Major excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability are detectable in a localised or regional area and are long term in nature and require extensive preventive or remedial measures that have to be sustained for 5 to 10 years.	Extreme excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability are detectable in a localised or regional area and are long term in nature and require extensive, complex, and permanent (> 10 years) preventive or remedial measures
	Air quality					
	Soil quality (contamination, salinity, and acid sulfate)					
Engineering	Weather and climate change impacts on engineered systems and structures	Temporary and localised impacts, no or minimal preventive measures or repair / restoration required to sustain functional performance	Short term impacts within localised or regional area, limited preventive measures or repair / restoration required to sustain functional performance	Medium term impacts within localised or regional area, moderate preventive measures or repair / restoration required to sustain functional performance	Long term impacts within localised or regional area, extensive preventive measures or repair / restoration required to sustain functional performance	Catastrophic impacts within localised or regional area, preventive or repair / restoration neither feasible nor practicable
	Geotechnical function (total and differential settlements of structures, stability, bearing capacity)					
Social	Physical amenity (e.g., air, noise, water, visual)	Temporary or no-detectable impacts on amenity. No preventive or remedial measures needed to restore / improve amenity	Short term and minor impacts on amenity. Minor preventive or remedial measures needed for < 1 year to restore / improve amenity	Short term impacts. Limited measures required over a short time period to restore attitudes	Long term and major impacts on amenity. Major preventive or remedial measures needed for 5 to 10 years to restore / improve amenity	Permanent and extreme impacts on amenity. extensive and complex scope and permanent (> 10 years) needed to restore / improve amenity
	Land use amenity (residential, recreational, commercial / industrial, educational, conservation)					
	Stakeholder attitudes	No measurable impact	Short term (days to weeks) limited scale impacts. Limited measures required over a short time period (days to weeks) to restore attitudes	Medium term (weeks to a month) moderate impacts. Extensive measures required over a longer time (weeks to a month) period to restore attitudes	Longer term (months) significant impacts. More extensive measures required over a longer time (months) period to restore attitudes	Permanent or very long-term impacts. Very extensive measures required over an extended period to restore attitudes, if attitudes are at all recoverable
	Heritage sites (Aboriginal, historical, maritime)	No measurable impact	Detectable impact only on sites of low significance and without significant impact on heritage values	Detectable impact only on sites of low to moderate significance and with minor and partial impact on heritage values	Detectable impact on sites of moderate to high significance and with major and partial impact on heritage values	Detectable impact on sites of high significance and with complete loss of heritage values

Table 13-2: Risk evaluation matrix with likelihood criteria

		Consequence					
		Negligible	Low	Moderate	High	Severe	Likelihood Description
Likelihood	Almost certain	Negligible	Low	High	Severe	Severe	It is very probable that the risk event could occur in any year
	Likely	Negligible	Low	Moderate	High	Severe	It is more probable than not that the risk event could occur in any year
	Probable	Negligible	Low	Moderate	High	High	It is equally probable that the risk event could or could not occur in any year
	Unlikely	Negligible	Negligible	Low	Moderate	High	It is less probable than not that the risk event could occur in any year
	Rare	Negligible	Negligible	Negligible	Low	Low	It is improbable that the risk event could occur in any year. The risk event is only theoretically possible or would require exceptional circumstances to occur.

13.4 Control and Management Strategies for Air Quality Impacts

The primary strategies for control and management of dust and odours entail:

- minimisation of the potential for dust entrainment through encouragement of revegetation of drained and dried areas of the site
- minimisation of the potential for odour generation through adaptive improvement of site drainage and of evapotranspiration from revegetation so that, where practicable, areas that are drained remain so (i.e., do not pond water for such time as to cause odour problems)
- maintenance of tidal exchange of water in XB8A.

The improvement works on a site of this scale are guided by observation and identification of problems as they arise. Detailed topographic survey data is available to inform pro-active drainage improvements, where these become warranted.

Indications of problematic areas will be provided by monitoring of the site and observations of:

- where revegetation seems slow or impeded
- where prolonged water ponding occurs following significant rainfall events
- wind-blown soil movement that could represent a potential source of dust
- odours.

Where problems are identified, contingency measures will include:

- active treatment of areas by ripping, soil treatment and / or replanting to improve revegetation
- management of water levels in ponds
- drainage works to reduce any prolonged water ponding
- subject to any DEM or other approvals needed, re-inundation of dry ponds, if necessary, to reduce dust and odour.

Approach to air quality monitoring

The scale of the site, the variability of soil and water conditions within the site (both temporally and spatially) and the variability of weather conditions precludes a fixed network of odour and dust monitoring. Such a network would not be effective and would be inordinately expensive. BDC has therefore adopted a protocol for monitoring via a tiered approach, that can be implemented if:

- a significant odour or dust event occurs, or
- there is a need to investigate a complaint or a significant dust or odour event, or
- there is a need to monitor the effectiveness of risk prevention or mitigation measures.

The purposes of the monitoring would be to:

- provide quantifiable information for investigation of causes of complaints
- track progress with correction of a problematic odour or dust event
- obtain information that can be used in communications and engagement with key stakeholders.

Wind monitoring

Wind monitoring uses data obtained retrospectively from the Bureau of Meteorology for the Edinburgh station, as a proxy for site wind data. Wind data from the Edinburgh site is expected to be sufficient to represent wind conditions across the full length of the Salt Field, with the accepted limitation that there may be some deviation in direction and speed compared to the Edinburgh site at any particular location within the Salt Field. Given the approximately consistent and even topography across the length of the Salt Field, the Edinburgh site data is considered to be appropriate for analysis of odour and dust complaint data, diary entries, dust deposition gauges, and ambient odour measurements.

Staff will continue to use the Beaufort scale for field observations of wind strength (Table 13-3).

Table 13-3: Beaufort Scale

Beaufort scale number	Descriptive term	Speed in km/h	Speed in m/s	Description on land
0	Calm	0	0-0.2	Smoke rises vertically
1	Light Air	1 - 6	0.3-1.5	Smoke drift indicates wind direction, still wind vanes
2	Light Breeze	7-11	1.6-3.3	Wind felt on face, leaves rustle, vanes begin to move
3	Gentle Breeze	12 - 19	3.4-5.4	Leaves and small twigs constantly moving, light flags extended
4	Moderate winds	20 - 29	5.5-7.9	Raises dust and loose paper; small branches are moved.
5	Fresh winds	30 - 39	8.0-10.7	Small trees in leaf begin to sway; crested wavelets form on inland waters
6	Strong winds	40 - 50	10.8-13.8	Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty.
7	Near gale	51 - 62	13.9-17.1	Whole trees in motion; inconvenience felt when walking against wind.
8	Gale	63 - 75	17.2-20.7	Twigs break off trees; progress generally impeded.
9	Strong gale	76 - 87	20.8-24.4	Slight structural damage occurs -roofing dislodged; larger branches break off.
10	Storm	88 - 102	24.5-28.4	Seldom experienced inland; trees uprooted; considerable structural damage.
11	Violent storm	103 -117	28.5-32.6	Very rarely experienced - widespread damage
12+	Hurricane	118 or more	32.7 or more	Very rarely experienced - widespread damage

Dust Monitoring

The tiered monitoring approach consists of:

- Tier 1 - establishment of dust deposition gauges if the dust emission is likely to become prolonged:
 - on site, in a location between a source area and from where a complaint has come
 - on site, located in a similar direction and distance from an area that is not a source area (to provide a basis for comparison)

- comparative data from these gauges (measured over periods of 30 days) will indicate the effectiveness of remedial measures and other dust prevention measures in areas that have been identified to be problematic.
- Tier 2 - in the event that the source area proves to be an enduring source of significant off-site dust impact that is difficult to remediate. If it is decided that it is essential to form an estimate of exposure dose experienced by offsite receptors, then an instrument such as a TES 6200 from Thomson Environmental would be deployed for a defined period of time on site. It would be located at a site between an enduring source area and the location from where the complaint has come. The results, when combined with data from a dust deposition gauge set up nearby and meteorological data from the Bureau of Meteorology, will allow a full analysis of dust occurrence as a function of site activities, wind direction and wind. This in turn will help inform assessment of possible exposure doses experienced offsite.

Odour Monitoring

The tiered monitoring approach, triggered if and where odour emissions from the site that have led to complaints could be prologued, consists of:

- A tiered set of triggers for the frequency of odour observations to be progressively increased if a complaint about a significant odour is received, and preliminary investigation indicates the source may be within the Salt Field and potentially enduring in nature. The tiers of observation frequencies are:
 - Tier 1: Observations each two days downwind of the suspect odour source
 - Tier 2: Daily observations at the suspect odour source if the odours are persistent and require mitigation.
- Use of a suitable device (e.g., a Low Range Odalog) for instrumental monitoring of H₂S concentrations. This instrument has a minimum detection limit of 0.1 ppm.

If necessary, additional monitoring will be conducted to investigate the extent of the odour plume downwind of the source. The additional records will include the following:

- approximate definition of the source area(s) of the odours
- source odour intensity, and Odalog H₂S concentration
- odour intensity, and Odalog H₂S concentration at different distances downwind of the approximate location of the strongest odour.

The triggers to increase monitoring are:

- from Tier 1 to Tier 2:
 - reason to expect deterioration in offsite impact from odours from a specific source or area; and
 - reason to expect a deterioration in odours at the source, and
 - an onsite odour intensity of 3 or more, or certain Odalog reading exceeded.

Reasons to expect a deterioration in odours could include one or more of, e.g.:

- recent heavy rainfall, sufficient to add water to pools in dry pond; or to re-wet / moisten MBO or partially decomposed organic matter for more than a few days
- deterioration in water quality (DO declining towards 1 mg/l or less; and increasing salinity; and reducing pH)
- an increasing area of soil or water becoming discoloured black
- weather conditions becoming unsuitable for dispersion of odours
- a fish kill

- an algal bloom developing
- limited options available to prevent the deterioration in odours from the above causes.

Triggers for reducing the frequency and extent of monitoring by stepping through the tiers, such as:

- from Tier 1 to no monitoring: reason to expect an improvement in odours at the source, and source odour intensity of no more than 2, and certain Odalog reading not exceeded
- from Tier 2 to Tier 1: reason to expect an improvement in odours at the source, and source odour intensity of no more than 2, and certain Odalog reading not exceeded

Reasons to expect an improvement in odours could include one or more of, e.g.:

- reduction in area of pooled water, increase in area of dry pond surface
- improvement in water quality (DO increasing above 2 mg/l; and reducing salinity; and increasing pH)
- a reduction of soil or water that is discoloured black
- weather conditions becoming more suitable for dispersion of odours
- removal or burial of organic sources of odour
- deployment of options available to prevent the deterioration in odours.

Setting thresholds for elevating the intensity of monitoring to a higher tier is challenging as odour concentration, such as that specified in EPA guidelines for odour assessment by dispersion modelling, cannot be measured directly in the field. Instead, thresholds based on direct results from monitoring methods need to be developed. For this project, these thresholds will initially be based on recorded observations by site employees and then, if it proves advantageous and practicable for environmental management and compliance purposes, defined in terms of measurements from the Odalog once sufficient information is available. Thresholds will also be reviewed and, if advisable, amended, over time once information from community diaries (see below) and complaints (if received) can be correlated with site observations.

In addition to prompting increased intensity of observational monitoring, the monitoring data will be used to inform adjustment of the measures being taken on site to prevent, mitigate and manage odour sources

Uncertainties and Limitations

Uncertainties relate to:

- The environmental conditions, other than wind, that are likely to lead to significant dust pick-up from empty pond surfaces given that the soil composition and moisture condition of the ground surfaces in ponds is highly variable both over time and spatially, even in any one pond. The soils that have a significant proportion of silt and fine sand particles, with little clay to bind them would be the most vulnerable.
- The extent to which revegetation will reduce dust impacts and the time required.
- Natural background levels of dust, given the mix of land uses adjacent to the BDC site, and the presence of other sources among them. This makes it difficult to use measures of background levels to set realistic quantitative outcome measurement criteria that would be of practical help in preventing and mitigating dust impacts, or that would provide a practicable measure against which to assess the scale of any impact attributable to the BDC site.
- The frequency, duration, and intensity of odour emissions. While the conditions that are likely to lead to odour emissions are reasonably well-known, BDC is unable to predict the scale of odour impact for houses downwind of ponds, except as hypothetical scenarios.

- The locations outside site boundary where odour impacts are most likely to occur, except in general terms. This makes it difficult to prioritise locations for monitoring.
- The scale, frequency and duration of odour events that would be considered unacceptable by regulators.

Consequently, it is not possible at this stage to set quantitative outcome measurement criteria.

The uncertainties relate to the ability to apply those measures in sufficient time at the right places to prevent impacts, not to the effectiveness of control measures. The monitoring program described above will provide improved data on odour and dust levels. Experience of the Holding pattern since 2014 to 2023 indicates that complaints arising from dusts and odours are rare.

13.5 Control and Management Strategies for Flora and Fauna

BDC has monitored bird numbers by species, water quality and the approximate areas of water of different depths (<0.15m, <0.3m, >0.3m) in the ponds since the 2013 / 14 bird season to the 2016/2017 bird season. The resulting data was compared with the statistics of comparable historical data and confirmed that draining of ponds has not significantly impacted the migratory birds. To date, bird surveys have shown there have been no significant changes in the numbers of listed migratory birds or any other waterbirds at the Salt Field attributable to the holding pattern since it was implemented (Appendix 8).

In sections 3 and 4, where the topographic depressions and trenches were revealed by the draining of the ponds, these were drained by:

- pumping using portable pumps; or
- installing drainpipes through bunds to lower ponds; or
- (where ASS conditions allow) excavation of swales.

BDC controls noxious weeds on the site and works with neighbours to control environmental weeds.

The proposed control and management strategies for the transmission of brine via a new pipeline that bypasses PA6 to PA12 have the objectives to:

- Cease discharge into this pipeline in event of an upset condition affecting the pump at PA5; or affecting the pipeline; and instead discharge from PA5 into the SA Water Bolivar outfall until the upset condition is rectified.
- Enable water at excess levels (i.e., arising from rainfall and groundwater sources – and conceptually above about 1.5 m AHD) in PA6 to be pumped into PA5. The way in which this is done will additionally comply with Attachments 1 and 2 in EPA Licence 40942 issued on 11 September 2023.
- Control the rate of supply of brine to Section 1

BDC also monitors the condition of the sea bunds – in fact of all bunds in the Salt Field – and implements preventive and responsive maintenance works. The bunds have demonstrated over decades to be intrinsically stable, with that stability sustained by the preventive and responsive maintenance works. However intense rainfall, and wind induced waves inside the inundated ponds do erode and damage the crest and uppermost parts of the internal slopes of the bunds. These are kept under observation by BDC staff in the normal course of their daily and weekly management of pond

water levels and flows, and their maintenance of other infrastructure. The external faces of the bunds are mostly vegetated and protected against tides and waves. These too are kept checked and maintained where and when needed. The restoration of commercial salt production will increase the frequency of these activities.

Seepage Discharges to the External Intertidal Environment

For inundated ponds outside Section 2, the control strategy is to a) manage salinities and water levels to be broadly consistent with those during historic salt production, and b) maintain the external bunds to inundated ponds in good condition – repairing sections where rainfall or wave action or vehicular traffic cause surficial erosion.

There will be negligible seepage of brine from PA5 into PA6 in Section 2, and so negligible seepage of that brine into the external intertidal environment.

The Section 2 ponds will not receive brine but will range from being fully drained to partly inundated due to the seasonal interplay of rainfall, evaporation, and inward and outward groundwater seepage. The lower ground levels in PA6 to PA9 are approximately coincident with or slightly above the summer low levels of the phreatic surface of groundwater seeping from east to west under these ponds and under the sea bund into the external intertidal environment. In winter this phreatic surface can rise above these lower ground levels.

The experience of the Holding Pattern between 2014 and 2019 and since 2021, indicates that this seepage – in all seasons – has not been and will not be harmful to that external environment, notwithstanding the high salinity engendered in the seeping water by its passage under / through the ponds, and arising from its contact with crystalline salts and soils that are impregnated with gypsum and other salts.

Nevertheless, it is proposed to cap the peak water level in PA6, arising from that seasonal interplay, so that the rate of seepage out is limited. This will be done by pumping excess water into PA5 – as indicated above. This means that ongoing seepage from Section 2 ponds is unlikely to cause vegetation impacts or changes in impact that can be attributed to this seepage.

Uncertainties and Limitations

Information on migratory birds is based on counts taken over many years with data available back to 1978. While numbers do fluctuate from year to year, the use of salinas by birds is reasonably well understood. However, it is not clear how changes to pond water levels will affect prey availability. A macroinvertebrate data collection program and winter bird survey have been undertaken to quantify the use of the Salt Field outside the migratory season, including the use at this time by non-migratory juvenile shorebirds.

The main uncertainty relates to cumulative impacts on shorebirds and waterbirds from changes to water levels and draining of ponds. Further changes are not planned, and it is considered that the birds' use of the Salt Field has adapted to the change brought about by the Holding pattern. The restoration of commercial salt production will not make affect the bird habitat in any detrimental way and may improve it

Appropriate management of a range of water levels in ponds that remain inundated seems to have offset any loss of habitat from draining of ponds. While cumulative impacts may have some level of uncertainty, the water depths and salinity ranges preferred by the different shorebirds and water birds in this Salt Field has been confirmed through:

- investigations at Cheetham Wetlands near Melbourne (BL&A 2014a), and

- more specifically by interpreting the following data for this site
 - areas of different water depths in each inundated pond
 - salinities of the water in each inundated pond
- counts of bird numbers and bird activities (foraging or roosting) in each pond.

As a result, relationships have been identified between bird usage and pond morphology, salinity, and water levels; and with further work, it may be possible to establish the implications of these relationships for the carrying capacities of the ponds under different water conditions (of areas of different water depth and also of water salinity). That further work is not required for the operations described in this PEPR / MOP, but may be helpful if and when further reduction in configuration of condenser ponds in the Salt Field are being contemplated.

As far as seepage from the ponds is concerned, the operations in Section 3 and 4 ponds for the holding pattern and for restoration of salt production represent no significant change in the seepage risk from those during decades of historic salt production, and so does not represent a source of uncertainty.

In Section 2, to avoid uncertainty, there will be transmission of brine via a new pipeline that bypasses PA6 to PA12; there will be no pumping of brine originating from PA5 into these Ponds.

13.6 Control and Management Strategies for Soil Quality Impacts

An adaptive risk assessment / management approach is adopted to manage ASS / MBO drawing on the outcomes of ASS studies, and to accommodate the present uncertainties.

The strategies for managing ASS / MBO during the Holding Pattern include:

- In Section 1, preserving the current soil cover over ASS and MBO
- In Section 2,
 - It is recognised that the seasonal fluctuations of water level in the lower parts of the ponds (resulting from rainfall / evaporation and from seasonal fluctuations of groundwater levels) represent a risk of progressive but slow deterioration in the gypsum cap in these ponds, and of the access of oxygen (from the air and rainwater) into the sediments (containing ASS / MBO) within and below this cap. This means that there is a potential risk of acidification within or below parts of the cap. However, the mass of gypsum available provides a very large buffering capacity and this effectively controls the risk to the external environment
- In Section 3 and Section 4:
 - preserving inundation all but the eastern higher elevation ponds
 - draining the higher elevation eastern ponds with measures to enhance surface water drainage where this is needed; and to construct limestone filters at strategic locations on the pond side of the bund and / or in the seepage drains downstream of where the drainage enters
 - Allowing revegetation of drained ponds

Under the conditions of the EPA Licence, BDC must implement a Pond Water Level Control Plan to address prevention of mobilisation and exposure of ASS / MBO. This includes:

- levels of water to be maintained in each of the inundated ponds
- the measures that will be taken to ensure the water levels are maintained at the proposed levels in each inundated pond
- the method of monitoring to ensure the water levels are maintained at the proposed levels in each inundated pond.

The resumption of salt production will strengthen these controls.

The existing measures to prevent, contain and treat spills of all types that could affect soil include:

- a spill kit is available for use in the event of vehicle accident in remote parts of the site
- fuel tanks at the workshop are contained within bunds
- a 40km/hr. speed limit is mandatory across the mine site in order to reduce the likelihood of accidents
- chemicals purchased for the dissolving tests are delivered in break-resistant containers, pre-diluted to the strength required for the analyses, to reduce the need for additional handling
- chemical spill kits are used that provide treatment for specific spilt chemicals
- work instructions have been implemented for:
 - Spills Contingency
 - Emergency Response
 - Workshop Spills
 - Chemical Hygiene

These existing measures apply to the whole Salt Field and all operations conducted by BDC and its contractors on the Salt Field. They therefore cover all works conducted under this and previous revisions of this PEPR/MOP, until, following approval of this PEPR/MOP they are reviewed and updated as required for the operations for the resumption of commercial salt production.

The following measures will be applied to any asbestos containing material (ACM):

- compile an ACM register for each Section of the site to identify the location, and nature of ACM
- design works to avoid / prevent disturbance of ACM to the extent practicable
- develop and implement an ACM management procedure for the event that ACM requires disturbance. This management procedure to include a) investigation to provide information for the design of safe work procedures b) design of safe works procedures to remove and dispose of ACM c) supervision of works and monitoring of air quality by a qualified hygienist, d) conduct of the works by suitably licensed contractors d) licensed disposal of the ACM.

- when work is completed to the satisfaction of the Hygienist, this Hygienist to 'sign off' works as being conducted in accordance with the safe work procedures and that the residual risk of ACM at the 'work site' is low to negligible.

Uncertainties and Limitations

Studies undertaken by the University of Adelaide and provided to DEM in previous revisions to this PEPR / MOP have greatly improved knowledge of ASS and MBO across the drained ponds in the Salt Field, in particular, in Sections 2 and 4.

The experience of the Holding pattern indicates ASS and MBP risks from Holding pattern operations are negligible to low in Sections 1 to 4. This situation will not be affected adversely by the resumption of salt production

It is not proposed to drain any further ponds, but should a need arise to do this, further surveys, sampling, and data acquisition may be needed as a precursor to revising this PEPR / MOP to obtain DEM permission for the ponds to be drained. These investigations would inform decisions as to whether specific management actions are required and, if so, the most appropriate actions and/or land uses to ensure an acceptable level of risk.

13.7 Control and Management Strategies for Surface Water Impacts

Water quality in discharges to surface water is managed through a program of pumping and discharge to ensure water levels are maintained at appropriate levels and salinity stays within desired criteria.

Bitterns

During historic salt production operations, bitterns were disposed to sea via Dry Creek (E Row Flap) and North Arm Creek, under EPA Licence. The existing licence retains the compliance points and compliance criteria for these discharges.

The E Row Flap discharge point and compliance criteria will be used in any resumption of salt production.

The historically used discharge point to North Arm Creek was removed for the construction of the Northern Connector. The need for and feasibility of a replacement discharge location will be investigated after salt production resumes.

Small quantities of Bitterns are used for dust control.

Operational measures to reduce any impacts include reviewing and updating the existing procedures which worked well, and sustained licence compliance during historic salt production. The update would look to adopt current technologies.

Discharge from PA5 to Bolivar Outfall

Saline water may be discharged into coastal waters from Pond PA5 via the SA Water Bolivar Waste Water Treatment Plant Outfall.

Table 13-4 extracted from the EPA Licence sets out the compliance monitoring points and compliance criteria for this discharge.

Table 13-4: Extract from EPA licence – compliance criteria and monitoring points

Location Identification	Location	Latitude/Longitude	Nature of Discharge	PARAMETER	COMPLIANCE CRITERIA
A	Immediately upstream of the SA Water Bolivar WWTP Outfall Weir called Weir 2	Latitude -34.6968°	Bolivar Channel Outfall Saline Water Discharge	Salinity	45 parts per thousand measured on a 6 hour rolling average
		Longitude 138.4821°			
B	Pump 8 Discharge Point	Latitude -34.815615°	Bitterns Discharge	Suspended Solids	80 milligrams per litre + 80% seasonal maximum
		Longitude 138.557044°		pH	6.5 – 9.2
	E Row Drain Flap	Latitude -34.795350°		Salinity	The hydrography of stream flow causes a permanent change in isohaline patterns of no more than 10% of the background variation
		Longitude 138.578516°		Oxygen (dissolved)	The discharge is subject to turbulent flow to ensure that it is discharged with highest possible Oxygen saturation
		Longitude 138.466507°			

Under the conditions of the EPA Licence:

- Continuous in-line monitoring of salinity (measured at the Bridge which is about 6 – 9 hrs flowtime above Weir 2) is done, with submission of monthly reports to the satisfaction of the EPA; and BDC ceases discharge if the salinity criteria is exceeded.
- BDC has developed, submitted and implements a Discharge Criteria Management Plan (see below) which includes:

- methodology to maintain compliance with the 45 parts per thousand salinity criteria at Location A
- proposed measures to address any exceedances of salinity criteria
- steps BDC will take to resume discharge following any exceedances.

PA5 Discharge Criteria Management Plan

BDC ensures compliance with discharge criteria for the compliance point Listed in the licence by undertaking the following monitoring

- Monitoring the salinity at the Bridge – a measure that is about 6 to 9 hours ahead of what will occur at the compliance point. This is compared with the operational warning trigger of 45 ppt and operational pump off trigger of 55 ppt for the salinity at the Bridge
- Estimating the future salinity at the Bridge - calculated from the current PA5 discharge flow rate and salinity, and the current outfall flow rate and estimated salinity

BDC regularly reviews trends in the various signals and decides whether to:

- do nothing
- reduce the discharge flow rate (by increasing return flow to PA5 and (if needed) by inserting an orifice plate in the discharge plate)
- turn the pump off as a precaution, following which there are further reviews of trends in the various signals to decide whether to:
 - leave the pump off for a while
 - turn the pump on with a reduced discharge flow rate
 - turn the pump on with no change in discharge flow rate.

Discharges from XB8A

Discharge to the marine environment from XB8A is controlled by DEW.

Pest Insects

Pest insects are managed by:

- operation of inundated ponds with water quality resembling historical levels, which have historically managed pests at the site
- active monitoring of ponds to identify emergent issues which may prompt a management intervention (e.g., changes in water quality or targeted spraying)
- managing pools of water across the site, particularly in drying ponds, where monitoring shows this is necessary to prevent pest risk.

Uncertainties and Limitations

The Holding Pattern and future resumed salt production operations build on 70 years of experience in managing the Salt Field. Consequently, there is a high degree of confidence in being able to manage water flows across the Salt Field, and the discharge of Bitterns

However, during historic salt production operations, the objective was to allow salinity to increase as water flowed towards Section 1.

The Holding Pattern seeks to control salinity given salt production has ceased.

To date, the Holding Pattern has been successful in managing this, but it has not been tested in the full range of climatic conditions. If salinity cannot be managed in the salinas, there is a risk that discharge criteria to the marine environment could not be met.

The resumption of salt production will reduce the risk from experiencing the full range of climatic conditions, because the response to increased temperatures and evaporation will be to increase flow rates and increase salt production while preserving the salinity and water levels in the Salt Field within desired tolerances.

That response is not possible, under Holding Pattern conditions, for discharges to the Bolivar Outfall. For this the response to increased temperatures and evaporation is constrained to be a reduction in discharge flow rates because in such periods flow rates down the Outfall from Bolivar decrease. That reduction in discharges forces an increase in salinity in the Salt Field which in turn reduces discharge flow rates. This sets up a negative spiral of events which brings instability to salinities and water levels in the Salt Field.

13.8 Control and Management Strategies for Groundwater

Measures are in place to ensure water extraction does not exceed sustainable levels. These include:

- monitoring of borewater usage
- use of recycled stormwater from the City of Salisbury's Greenfields Wetlands under the City of Salisbury / Cheetham Salt Storm Water Supply Agreement
- implementation of formal work instructions for resource management, bore management and wetlands water.

Uncertainties and Limitations

Given the well-established monitoring program for groundwater use, uncertainties are considered to be low.

The experience from the operation of the Salt Field over many decades – in commercial salt production and then in the Holding pattern has shown that in Sections 1, 2, 3 and 4 has caused negligible to low impacts to groundwater dependent ecosystems, with the impacts judged using the rating system in Section 13.3. The Holding Pattern does not introduce any new activities that would increase this risk. The same is the case for the resumption of commercial salt production

However, it is possible but not yet proven that in 2020 groundwater seepage from some Section 2 ponds may have been one of the several possible factors in some mangrove dieback – notwithstanding that no definitive cause has yet been established, supported by multiple lines of evidence.

The restoration since 2021 of the conditions in Section 2 ponds that pertained between 2014 and 2019 (i.e., no brine pumped from PA5 into PA6 to inundate PA6 to PA11) when water levels in these ponds fluctuated in response only to seasonal rainfall, evaporation, and any groundwater intrusion, coupled with indications of some mangrove recovery gives confidence that, if ground water seepage becomes proven to have been a risk factor in the mangrove dieback, that risk factor has been removed. The use of a pipe to transfer brine from PA5 through to Section 1, bypassing PA6 and other Section 2 ponds means that the resumption of commercial salt production preserves this situation.

Overall, the risk of adverse groundwater quality impacts from seepage are considered to be low. The low level of uncertainty around groundwater usage and impacts on the resource means the risk to other users is also low.

13.9 Control and Management Strategies for Noise Impacts

All equipment, including that used by contractors, is required to comply with relevant noise control policies and guidelines issued by the EPA. Night operation of construction equipment. BDC's operating pumps are maintained in good condition, and a complaints register for noise is maintained along with action taken.

Uncertainties and Limitations

Noise exposure from existing operations is well understood.

13.10 Control and Management Strategies for Heritage

The location and protection of the Aboriginal artefact scatter is detailed in the company's Heritage Management Instruction. Other known sites are outside any areas where disturbance occurs.

Uncertainties and Limitations³⁹⁹

A comprehensive heritage survey of the Salt Field has not been undertaken. It is possible other heritage sites exist. The heritage value of the Salt Field has also not been assessed.

13.11 Control and Management Strategies for Other Potential Impacts

13.11.1 Traffic

Traffic access to the residual operations in Section 1 is from the Salisbury Highway. This is a major arterial road and Salt Field traffic accounts for a small percentage of overall traffic on the Highway. Access to other areas of the Salt Fields is occasional and vehicle numbers are low. Consequently, the Salt Fields operations (whether for the Holding Pattern or resumed commercial salt production) will have a negligible impact on traffic movement in the area around the Salt Fields, and require no especial control or management.

13.11.2 Public Safety

The Salt Fields area is fenced, and the public excluded. The operating site is secured with heavy duty gates and padlocking at all road entry points and agricultural fencing along property boundaries that are accessible. Signage is provided along accessible fence lines at regular intervals.

While illegal access does occur, there are no significant risks on site other than vehicular traffic (e.g., there are no pit voids or other hazards normally associated with a mining operation). A vehicle speed

limit of 40 km/h is enforced across the site. Consequently, no public safety impacts are expected, and risks are considered to be negligible, and require no especial control or management.

13.11.3 Visual Amenity

Dry Creek Salt Fields has considerable scenic and aesthetic value. The open ponds of the salinas and crystallisers are regularly the subject of photographers hoping to obtain images of sunsets and reflections. Specialist photographers such as bird photographers and coastal wetland photographers regularly visit the Salt Fields for nature photography. Over the period of its operation the Salt Fields have hosted the filming of several feature productions and numerous television commercials, magazine advertising shoots and art photograph. The Salt Fields most commonly used for these purposes are those close to the coast. These are not impacted by the operations in this PEPR / MOP.

The majority of the Salt Fields comprises low lying ponds backed with mangroves. These do not require screening, as they are consistent with the natural environment in which they occur. The crystallising area with its stacks of salt has a more mixed visual impact, depending on the point of view of the observer and this area has some screening/amenity plantings where the pans are immediately adjacent to roadways.

Draining of ponds will result in a change in the landscape – such changes will only be visible to a small number of observers. Drainage of ponds is reversible during the Holding Pattern. Any changes in inundated ponds will have minimal impact on visual amenity.

The filling of F, G, H Rows will result in a change of the landscape in this part of Section 1. The change is considered to represent a low impact because the filling raises ground levels to be similar to those in adjacent / nearby commercial / industrial / residential land.

The Northern Connector provides an elevated corridor from which users can look over the adjacent parts of Section 1 and Section 2. The Northern Connector has rendered these parts of the Salt Field more visible. It is presumed this was accounted for in the planning and design of the Northern Connector as it is a matter outside the control of BDC.

The impacts of the Holding Pattern, of the works to prepare Section 2, and of the resumption of salt production on visual amenity are considered to be low. No additional risks have been identified, and require no especial control or management.

13.11.4 Conservation Areas

The mineral tenements of the Salt Fields are adjacent to, or overlain by, several conservation areas. The Adelaide International Bird Sanctuary National Park – Winaityinaityi Pangkara shares a boundary with PM77 (part), ML605 (part), ML608, ML404, ML421 (part), ML 440, ML441, ML392, ML234, ML235 and ML237. DEW also administer land at Buckland Park Lake adjacent to PM100, ML608 and ML 5210. The Adelaide Dolphin Sanctuary boundary overlays parts of the mineral tenements between North Arm Creek and Gawler River. This enables DEH staff to utilise the seawalls to access this Sanctuary. Similarly, the two Aquatic reserves (Barker Inlet Aquatic Reserve, and St Kilda-Chapman Creek Aquatic Reserve) and the two Wetlands of National Importance (Barker Inlet and St Kilda wetlands and Port Gawler and Buckland Park Lake wetlands) overlay portions of the mineral tenements.

Impacts to areas of conservation are discussed above:

- dust from exposed ground surfaces affecting adjoin areas of conservation significance – addressed in 13.4

- discharge to the marine environment impacting on habitat – addressed in 13.5
- exposure to salt / gypsum impacted soils impacts on ecological values off site – addressed in 13.6
- acidity generated from ASS / PASS impacts off land uses on site – addressed in 13.6
- discharges of water from the site impacting the marine environment – addressed in 13.5, 13.7 and 13.8.
- seepage of groundwater from the site impacting groundwater dependent ecosystems – addressed in 13.5, 13.7 and 13.8

No additional impacts or risks have been identified that require control or management.

13.11.5 Waste Management

The Salt Field administration offices operate on a septic tank system. Office and general waste are dealt with using a licensed waste contractor.

Office wastes include recyclable materials such as paper and toner cartridges, and lunch room waste. The maintenance workshop generates oily waste, tyres, and scrap metal. Infrastructure upgrades may generate asbestos, timber and building waste.

Measures to manage wastes of all types include:

- appropriate bins for recycling materials, non-toxic solids and oily wastes are provided
- scrap wood and metal are reused or sold on to recyclers
- chemical wastes are collected by licensed contractors
- tyres are disposed to a licensed dealer
- asbestos is removed and disposed by licensed operatives
- stack bay muds are returned to the final areas ponds
- work instructions specify the appropriate disposition of specific wastes, retention of waste transfer dockets and monthly reporting of waste volumes.

Given these measures, risks to the environment from management of wastes are considered to be negligible, both during the holding pattern and during resumption of salt production, and require no especial control or management.

13.11.6 Adjacent Land Use and Third-Party Property and Infrastructure

To address the requirements of the Sixth Schedule Lease Condition 2 (Adjacent Land Use and Third-Party Infrastructure Outcome), requirements related to the protection of third-party property and infrastructure have been included in the PEPR/MOP. These are most pertinent to Section 1 and in particular concern the Renewal SA land between PM248 and the Northern Connector, the Northern Connector on Section 1's western edge, a natural gas pipeline owned and operated by SEA Gas situated immediately east of the ML 6514, and the Private Mine PM248 also immediately east of ML6514 and the rest of Section 1.

Pursuant to the grant of ML6514, and the requirements of the Sixth Schedule Lease Condition 2 (Adjacent Land Use and Third-Party Infrastructure Outcome) of this ML6514, BDC has made the necessary agreements with:

- the Commissioner for Highways and DPTI, as appropriate, that establish the arrangements for the mutual protection of BDC's property and the property and infrastructure of the Northern Connector Freeway.
- SEA Gas as the owner of the SEA Gas pipeline, that establish the arrangements for the mutual protection of BDC's property and the property and infrastructure of SEA Gas
- BDC as the owner of PM248, that establish the arrangements for the mutual protection of ML6514 and the property and infrastructure of PM248

The implementation of the outcomes and measurement criteria listed in this PEPR / MOP will enable BDC's obligations under these agreements to be satisfied.

BDC has connected Section 2 to ML6514 in Section 1 via an 800mm dia HDPE at-grade pipeline allowing conveyance of concentrated brine. Agreements are in place with DPTI and other relevant parties with regard to the route of the connection between Section 2 and ML6514. Figures 13-2 to 13-4 show the set-up of ML6514 and its relationship to adjacent infrastructure.

With the resumption of salt production:

- ML6514 would form only a small portion of the overall operation in Section 1 and be used to temporarily store and convey concentrated seawater from and to other parts of Section 1
- The proposed use of Section 1 (apart from F, G and H Rows) would be almost identical to that which it had previously been during historical salt production years.

The salt ponds and crystallisers in Section 1 are designed to receive, temporarily store, and convey concentrated seawater on an ongoing basis. Any shallow groundwater at the site is intercepted by internal drains and rainfall runoff is self-contained in the site. Therefore, apart from the concentrated seawater, there is no other water produced or received that needs to be managed.

The design of the bunding around ML 6514, and indeed along the boundary of the Northern Connector in Sections 1 and 2, and the route and form of construction of the pipeline (see Figures 13-2 to 13-4) were extensively discussed with DPTI and SEA Gas to satisfy their requirements for protection of their adjacent land use and third-party property and infrastructure.

Northern Connector

DPTI and BDC have worked closely together to ensure that the pipeline does not adversely affect the integrity of the Northern Connector assets.

The new pipeline is fixed to the Northern Connector bridge over Dry Creek floodway and associated assets.

The Northern Connector is on the western edge of the site and is separated from the site by a new earthen bund (Ridley Bund). DPTI has designed and constructed the Ridley Bund having inquired of BDC's future plans regarding the land and applied the DPTI design standards for the Northern Connector. The bund is constructed to a higher elevation than surrounding levees so as to guard against overtopping of the salt pond into other Northern Connector land.

Levee to Dry Creek

The levee separating the Dry Creek floodway from the site is at an elevation of about 2.5m AHD. Therefore, any salt pond or crystalliser overtopping in Section 1 will be fully contained within the existing Salt Fields operations.

Condition of Levees, Drains and Roadways in Section 1

BDC is satisfied that the integrity of levees, drains and roadways is sound and that these assets are not in need of repair prior to filling FAR1. Periodic condition reviews of on-site levees and drains are incorporated into this PEPR / MOP.

No Public Access

There is no access to the site for the public. DPTI has provided a suitable security fence on the western edge of the site to prevent entry by Northern Connector cyclists and pedestrians. DPTI and BDC are both satisfied with the final security arrangements for the site's western perimeter.

SEA Gas Pipeline

An existing buried gas pipeline operated by SEA Gas traverses the eastern portion of the site. BDC has notified Sea Gas under the Mining Act of the Mineral Claim that led to the granting of ML6514. The SEA Gas pipeline is buried at depth and is not impacted by flooding or overtopping of FAR1. As indicated above:

- any salt pond overtopping at ML6514 will be fully contained within the existing Salt Fields operations.
- BDC is satisfied that the integrity of levees, drains and roadways is sound and that these assets are not in need of repair prior to filling FAR1. Periodic condition reviews of on-site levees and drains are incorporated into this PEPR / MOP.
- There is no access to the site for the public.

ML6514 was previously part of ML391 and as such was part of the Salt Field that has operated for decade with the SEA Gas pipeline running under it. The resumption of brine flow into ML6514 represents no change to the insignificant risk of impact represented by Salt Field operations to the SEA Gas pipeline.

Adjacent Parts of PM248

Private Mine 248 adjoins the eastern boundary of ML 6514. The western part of PM248 are the D, E and K Row Crystallisers. These are currently unused but could become reused upon resumption of salt production. F, G and H Rows in PM248 are destined for mine closure and filling for redevelopment for mixed urban uses. This is a process that will occur in stages and take many years.

It is envisaged that the D, E, and K Row Crystallisers may, variously:

- Be used to help manage the brine pumped from Section 2 into Section 1; and later
- Be returned to salt crystallisation uses
- Become used again for Mag Brine production

It is noted that in the Revision 4 PEPR / MOP, the D, E, F, G, K Row crystallisers were all slated for mine closure and filling and as such would be subject to the site contamination audit required for this. D, E and K Row Crystallisers have been withdrawn from mine closure and filling and therefore also from the site contamination audit.

14 Environmental Outcomes and Measurement Criteria

Environmental outcomes and proposed measurement criteria are shown in Table 14-1. These have been based on the assessments in Section 13 above and the risk and impact assessments provided in Appendices 4 to 6 for the following scenarios:

- Holding Pattern before or without resumed commercial salt production – See Appendix 4
- Resumed commercial salt production – See Appendix 5
- Filling F, G and H Rows – See Appendix 6

Within each of these Appendices are Tables of

- Elements of the Environment
- Impact Events
- Risk Assessment

The tables of impact events, risk assessment are organised by the following environmental aspects

- Flora and Fauna
- Surface Water
- Groundwater
- Air Quality
- Noise
- Soil Quality (Contamination, Salinity and Acid Sulphate)
- Heritage, Buildings and Structures
- Land Use, Amenity, Values

There are cross-references in Table 14-1 to each Impact Event ID listed in Appendices 3 to 6; and cross-references in Appendices 3 to 6 to each Outcome ID listed in Table 14-1

In Table 14-1 all Outcomes have associated measurement criteria to determine whether the Outcome is being met. Leading indicator criteria are required where there is a high reliance on management measures to achieve the Outcome.

Table 14-1 also provides a synopsis of the key control strategies related to each Outcome, and there is further information in Section 19 and Appendices 3 to 6 on risk management measures to achieve the Outcomes and control strategies

In Table 14-1, the measurement criteria are specified in terms of

- What will be monitored
- the location of monitoring
- the frequency of monitoring

Table 14-1 also specifies the reporting that will be provided to DEM (and other government agencies where noted). There are two main types of reporting:

- Non-compliance, which includes:
 - reporting of non-compliance with a PEPR / MOP outcome under Reg 87 of the Mining Regulations, where the occurrence of a reportable incident must be reported to DSD

within one day of BDC becoming aware of the incident. It is noted that a schedule of types of reportable incident needs to be developed and agreed between BCD and DEM

- for other incidents (such as receipt of an odour complaint) in Table 14-1, within the period specified in the Table.
- Compliance reporting under Reg 86 of the Mining Regulations, with the reporting period being quarterly for some matters, 6 monthly for others – in the context of an overall annual compliance report. This overall annual compliance report will address all the matters in Table 14-1, including reporting on:
 - any changes to operations since the previous report
 - the outcome of any studies or investigations
 - any new potential environmental risks
 - revegetation and other rehabilitation activities
 - compliance with outcomes and measurement criteria
 - rectification of any non-compliance
 - outcome of any management system audits undertaken.

BDC will also submit:

- an Annual Return to the EPA under s. 48(2)(a) of the Environment Protection Act, and
- a monthly report to DEM on the results of the continuous in-line monitoring of the PA5 discharge to the SA Water Bolivar outfall.
- progress reports on the status of closure planning, including investigations and trials, to DEM.

Table 12-3 provides, for ease of reference, the ranges of historic operational water levels in the ponds in Sections 2 to 4. These levels are relevant for OMC 1 In Table 14-1.

Table 14-1: Outcomes, Outcome Compliance Criteria, Measurement and Reporting – with Holding Pattern without Salt Production; or with Resumed Salt Production; and with Filling of F, G, H Rows

This Table 14-1 forms part of the Revision 5 of the PEPR/ MOP and is to be read in conjunction with the entirety of this document and including its Appendices.

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator Criteria	Standards / Baseline Information	Person Responsible
In Risk Assessment in Appendix 6 see Event ID's: - No SP-F1, F2, F5, F6 In Risk Assessment in Appendix 7 see Event ID's: - SP-F1 - SP-F2 In Risk Assessment in Appendix 8 see Event ID's: - PM248-F1	Flora, Fauna, and Avifauna	1. No adverse impacts on the abundance and diversity of flora, fauna and avifauna species outside the external toes of the sea bunds, as a result of operations undertaken on Salt Field	1.1 Nominated Inundated Ponds 1.1.1 Water Levels and Brine Salinities Records demonstrate that: - water levels and salinity have been managed as per the target ranges provided in Table 12-3 and Figure 12-13, respectively. - detected deviations from the target ranges of water levels and brine salinities have been rectified within 6 months or as agreed with DEM 3, recognising the impact of weather conditions on this time frame 1.1.2 Integrity of Pond Bunds Records demonstrate that: - the integrity of pond bunds has been appropriately managed; - any issues that require rectification and/or maintenance have been identified; - all such issues have been rectified within 6 months or as agreed with DEM.	1.1 Nominated Inundated Ponds Maintenance of water levels and salinity within target ranges in nominated inundated ponds and maintenance of sea bund integrity for nominated ponds are key factors for effective Salt Field operations and for no adverse impacts to the flora and fauna outside the defined buffer zone. 1.1.1 Water Levels and Brine Salinities - Water levels and salinities in nominated inundated ponds will be maintained within the operational target ranges provided in Table 12-3 and as shown in Figure 12-13 - Management and monitoring tasks provided in Section 12 - Strategies for management of inundated ponds as described in Section 13.5 1.1.2 Integrity of Sea Bunds Records of visual monitoring from routine operational access flagging if and where sea bund maintenance work is required, and	1.1 Nominated Inundated Ponds 1.1.1 Water Levels and Brine Salinities - Water levels in the nominated inundated ponds measured by reference to m AHD, using level gauges at fixed locations. - Salinities in the nominated inundated ponds will be measured as specific gravity, using a hygrometer, and converted to parts per thousand units. - Time taken to close out any identified matters (deviations of targeted pond levels and/or salinities) 1.1.2 Integrity of Sea Bunds Records of visual monitoring from routine operational access flagging if and where sea bund maintenance work is required, and 6-monthly inspections flagging if and where	1.1 Nominated Inundated Ponds 1.1.1 Water Levels and Brine Salinities - Pond water levels in the nominated inundated ponds provided in Table 12-3 - Salinity in the nominated inundated ponds provided on Figure 12-13 1.1.2 Integrity of Sea Bunds - Sea bunds for these inundated ponds: - XE1-3 - XE5 - XE6 - XD1 - XB3 - XB4-5 - XB8 - PA3 - PA4 - PA5 - PA12	1.1 Nominated Inundated Ponds 1.1.1 Water Levels and Brine Salinities - Fortnightly 1.1.2 Integrity of Sea Bunds - During routine operational access, and 6-monthly	1.1 Nominated Inundated Ponds 1.1.1 Water Levels and Brine Salinities - The operational target ranges provided in Table 12-3 and as shown in Figure 12-13 1.1.2 Integrity of Sea Bunds A potentially material reduction in the integrity of a segment of a sea bund from: - wave or water induced erosion of the internal or external slopes of the external bunds or of either slope of external bunds; or - potholing or physical damage to the crest of the bunds; or - loss of adequate freeboard above peak external tide levels (e.g., due to sea level rise) or above internal maintained water levels.	1.1 Nominated Inundated Ponds 1.1.1 Water Levels and Brine Salinities - The pattern of water levels and salinity and water levels in nominated inundated ponds required for effective salt production as informed by historical records and calculations 1.1.2 Integrity of Sea Bunds - The historical integrity of sea bunds for nominated inundated ponds, as indicated by the historical records of visual monitoring from routine operational access flagging, when, if and where sea bund maintenanc	Salt Field Operations Coordinator

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
				6-monthly inspections flagging if and where maintenance work is required - Records of Maintenance Works (Locations, Scopes, Timing, Outcomes). - Time taken to close out any identified matters (pond integrity issues). The trigger(s) for maintenance of sea bunds for nominated inundated ponds will be observations that imply a potentially material reduction in the integrity of a segment of a sea bund from: - wave or water induced erosion of the internal or external slopes of the external bunds or of either slope of external bunds; or - potholing or physical damage to the crest of the bunds; or - loss of adequate freeboard above peak external tide levels (e.g., due to sea level rise) or above internal maintained water levels.	- maintenance work is required - Records of Maintenance Works (Locations, Scopes, Timing, Outcomes). - Time taken to close out any identified matters (pond integrity issues).				e work was required	
			<u>1.2 Free Draining Ponds</u> Ponds XF1, XF2, XE4 in Section 4, and (XC1, XC2, XC2S in Section 3 receive no brine from inundated ponds. They can receive rainfall, and if groundwater levels	<u>1.2 Free Draining Ponds</u> Ensure that Ponds XF1, XF2, XE4 in Section 4, and (XC1, XC2, XC2S in Section 3 remain free draining to the extent reasonably practicable.	<u>1.2 Free Draining Ponds</u> Routine operational checks or aerial photo images, and 6-monthly inspections of: The drains in XF1, XF2, XE4 in	<u>1.2 Free Draining Ponds</u> The drains and their discharge points in XF1, XF2, XE4 in Section 4, and XC1, XC2, XC2S in Section 3	<u>1.2 Free Draining Ponds</u> - During routine operational access, and 6-monthly inspections	<u>1.2 Free Draining Ponds</u> The absence of inundation outside the drains in XF1, XF2, XE4 in Section 4, and XC1, XC2, XC2S in Section 3	<u>1.2 Free Draining Ponds</u> The absence of inundation outside the drains in XF1, XF2, XE4 in Section 4, and	

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
			become high enough, receive water from seepage. They can lose water by evaporation, by drainage into seepage drains outside the bunds where the bunds have been cut or penetrated to allow this, and if groundwater levels are low enough, by seepage to groundwater. Ponds XF1, XF2, XE4 in Section 4, and XC1, XC2, XC2S in Section 3 do not have sea bunds (i.e. exposed to external tides and storm surges) Records demonstrate that that XF1, XF2, XE4 in Section 4, and XC1, XC2, XC2S in Section 3: • Can drain reasonably freely to internal drains that discharge through one or more bunds into an adjacent pond, or / and into an external seepage drain • do not become inundated except in the internal drains • the effectiveness of pond drains bunds have been appropriately managed; • any issues that require rectification and/or maintenance have been identified; • all such issues have been rectified within 6 months or as agreed with DEM.		Section 4, and XC1, XC2, XC2S in Section 3 remain effective and can discharge freely one or more bunds into an adjacent pond, or / and into an external seepage drain • Where maintenance of these drains or discharge points is required • Records of Maintenance Works (Locations, Scopes, Timing, Outcomes). • Time taken to close out any identified matters (pond integrity issues).				XC1, XC2, XC2S in Section 3 during the historical pattern since 2014	

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator Criteria	Standards / Baseline Information	Person Responsible
			- Records of visual monitoring from routine operational, and from 6-monthly inspections flagging if and where maintenance work is required - Records of Maintenance Works (Locations, Scopes, Timing, Outcomes). - Time taken to close out any identified matters (pond integrity issues).							
			1.3 Section 2 Ponds Ponds PA 6 to PA11 in Section 2 receive no brine from inundated ponds. They can develop seasonal supernatant water from the balance of rainfall, evaporation, inward seepage from groundwater from the east, and outward seepage to groundwater to the west rainfall, and if external groundwater levels become high enough, receive water from seepage. They have intact sea bunds. <u>1.3.1 Supernatant Water Levels</u> Records confirming supernatant water in nominated dry ponds in Section 2 are managed as described in Sections 12 and 13 of the PEPR/MOP, with water level capped in Pond PA 6 at 1.5 m AHD.	1.3 Section 2 Ponds <u>1.3.1 Supernatant Water Levels</u> Supernatant water managed as detailed in Sections 12 and 13 and using: - New pump at PA5 - Separate from pump that pumps to Bolivar outfall - New pipeline - Bypassing PA6 to PA11 – to transmit brine to PA12 for pumping via the existing pipeline from PA12 to ML6514 in Section 1. - New pump and sump in PA6 to cap supernatant water level in PA6 at 1.5 m AHD. - Would operate when water levels in the sump exceed 1.2 m AHD or other operationally suitable level - Would discharge into PA5, from	1.3 Section 2 Ponds <u>1.3.1 Supernatant Water Levels</u> Pond Water levels in PA6 will be measured by reference to m AHD, in compliance with the EPA Licence Attachments 2 and 3 <u>1.3.2 Integrity of Sea Bunds</u> Records of visual monitoring from routine operational access flagging if and where sea bund maintenance work is required, and 6-monthly inspections flagging if and where maintenance work is required - Records of Maintenance Works (Locations, Scopes, Timing, Outcomes).	1.3 Section 2 Ponds <u>1.3.1 Supernatant Water Levels</u> - Measured at the location shown in the EPA Licence Attachment 2 <u>1.3.2 Integrity of Sea Bunds</u> - Sea bunds for these inundated ponds: - PA6 to PA 11	1.3 Section 2 Ponds <u>1.3.1 Supernatant Water Levels</u> Pond Water levels in PA6 will be measured monthly by reference to m AHD, Pumping/discharge on an as required basis, triggered by detected water levels in PA 6 <u>1.3.2 Integrity of Sea Bunds</u> - During routine operational access, and 6-monthly inspections	1.3 Section 2 Ponds <u>1.3.1 Supernatant Water Levels</u> - PA6 – 1.5 m AHD <u>1.1.2 Integrity of Sea Bunds</u> A potentially material reduction in the integrity of a segment of a sea bund from: - wave or water induced erosion of the internal or external slopes of the external bunds or of either slope of external bunds; or - potholing or physical damage to the crest of the bunds; or - loss of adequate freeboard above peak external tide levels (e.g., due to sea level rise) or above internal	1.3 Section 2 Ponds <u>1.3.1 Supernatant Water Levels</u> The records of levels in PA6 during the holding pattern, and when there has not been discharge of brine from PA5 into PA6 <u>1.3.2 Integrity of Sea Bunds</u> The historical integrity of sea bunds for nominated inundated ponds, as indicated by the historical records of visual monitoring from routine operational	

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
			<u>1.3.2 Integrity of Pond Bunds</u> Records demonstrate that: - the integrity of pond bunds has been appropriately managed; - any issues that require rectification and/or maintenance have been identified; - all such issues have been rectified within 6 months or as agreed with DEM.	where the water would mix with the brine to be pumped from PA5 to Section 1 - Monitoring and Control systems on all pumps with - Pump on off controls - Flow rate monitoring - Upset condition alarms <u>1.3.2 Integrity of Sea Bunds</u> Records of visual monitoring from routine operational access flagging if and where sea bund maintenance work is required, and 6-monthly inspections flagging if and where maintenance work is required - Records of Maintenance Works (Locations, Scopes, Timing, Outcomes). - Time taken to close out any identified matters (pond integrity issues). The trigger(s) for maintenance of sea bunds for nominated inundated ponds will be observations that imply a potentially material reduction in the integrity of a segment of a sea bund from: - wave or water induced erosion of the internal or external slopes of the external bunds or of	Time taken to close out any identified matters (pond integrity issues).			maintained water levels.	access flagging, when, if and where sea bund maintenance work was required	

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator Criteria	Standards / Baseline Information	Person Responsible
				either slope of external bunds; or - potholing or physical damage to the crest of the bunds; or - loss of adequate freeboard above peak external tide levels (e.g., due to sea level rise) or above internal maintained water levels						
			1.4 Changes to operations (pond status) Records demonstrate that change to pond status has been undertaken through a relevant Change Process approved in writing by DEM	1.4 Changes to operations (pond status) To be notified in advance to DEM on a case-by-case basis Proposed changes to the pond status will be assessed by DEM through its Change to Operations process and be subject to DEM endorsement/approval. Note that proposed changes to the status of inundated ponds in Section 3 and Section 4 would also require assessment under the EPBC Act and if determined by DCCEEW to be a controlled action under this Act, would require approvals by DCCEEW.	1.4 Changes to operations (pond status) As defined in applicable approvals	1.4 Changes to operations (pond status) As defined in applicable approvals	1.4 Changes to operations (pond status) As defined in applicable approvals	1.4 Changes to operations (pond status) As defined in applicable approvals	1.4 Changes to operations (pond status) As defined in applicable approvals	
			1.5 Infrastructure for Inundated Ponds and Section 2 Ponds Records of monitoring, repair and maintenance of pumps, control systems on all pumps, sensors, telemetry systems, syphons and pipelines for Inundated Ponds and Section 2 Ponds	1.5 Infrastructure for Inundated Ponds and Section 2 Ponds Monitoring, maintenance and repair of pumps, control systems on all pumps, sensors, telemetry systems, syphons and pipelines for	1.5 Infrastructure for Inundated Ponds and Section 2 Ponds All pumps, sensors, telemetry systems, syphons and pipelines for Inundated Ponds and Section 2 Ponds	1.5 Infrastructure for Inundated Ponds and Section 2 Ponds Where pumps, sensors, telemetry systems, syphons and pipelines are located for Inundated Ponds and Section 2 Ponds	1.5 Infrastructure for Inundated Ponds and Section 2 Ponds Monitoring, maintenance and repair as scheduled and as required	1.5 Infrastructure for Inundated Ponds and Section 2 Ponds Records of monitoring, repair and maintenance of pumps, control systems on all pumps, sensors, telemetry systems, syphons and	1.5 Infrastructure for Inundated Ponds and Section 2 Ponds Records of monitoring, repair and maintenance of pumps, control systems on all	

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator Criteria	Standards / Baseline Information	Person Responsible
			demonstrate they are kept in working condition	Inundated Ponds and Section 2 Ponds Records of this monitoring, repair and maintenance				pipelines for Inundated Ponds and Section 2 Ponds demonstrate they are kept in working condition	pumps, sensors, telemetry systems, syphons and pipelines for Inundated Ponds and Section 2 Ponds demonstrate they are kept in working condition.	
In Risk Assessment in Appendix 6 see Event ID's: - No SP-F7 to F9 - No SP-SW2 - No SP-SW3 - No SP-SW7 to SW11 - No SP-G2 to G5 In Risk Assessment in Appendix 7 see Event ID's: - SP-F3 to F4 - SP-SW1 to SW8 - SP-G2 to G4 In Risk Assessment in Appendix 8	Surface water	2. No adverse impacts on the environmental values of Surface Water quality and use due to EPA licenced discharge of brines and bitterns from the Salt Field or due to uncontrolled brine seepage from the Salt Field Note: Surface water include marine waters	<u>2.1 EPA Licensed Brine and bitterns discharge</u> Records of brine and bitterns discharge from discharge locations as specified in the EPA licence demonstrate that the discharge has been undertaken as per the EPA licence requirements. Any non-compliance issues reported and resolved as per the EPA requirements.	<u>2.1 EPA Licensed Brine and bitterns discharge</u> Brine and bitterns discharge controlled, and monitored as per Sections 12 and 13 and to comply with the EPA Licence.	<u>2.1 EPA Licensed Brine and bitterns discharge</u> As specified in the EPA licence: - Brine and bitterns discharge rates, salinities, timing - For Brine Discharge to the Bolivar outfall: - SA Water Bolivar outfall flow rate and salinity - PA5 salinity and pump discharge rate - For Bitterns discharge at E Row Flap - Water flow conditions past E Row Flap in Dry Creek)	<u>2.1 EPA Licensed Brine and bitterns discharge</u> Brine and bitterns monitoring locations as specified in the EPA licence	<u>2.1 EPA Licensed Brine and bitterns discharge</u> Brine and bitterns monitoring frequencies as specified in the EPA licence	<u>2.1 EPA Licensed Brine and bitterns discharge</u> For Brine Discharge to the Bolivar outfall: - SA Water Bolivar outfall flow rate and salinity - PA5 salinity and pump discharge rate For Bitterns discharge at E Row Flap - Water flow conditions past E Row Flap in Dry Creek	<u>2.1 EPA Licensed Brine and bitterns discharge</u> Historical monitoring records_	Salt Field Operations Coordinator
			<u>2.2 Brine Seepage from Section 2 Ponds</u> As outlined in Item 1.3 above	<u>2.2 Brine Seepage from Section 2 Ponds</u> As outlined in Item 1.3 above	<u>2.2 Brine Seepage from Section 2 Ponds</u> As outlined in Item 1.3 above	<u>2.2 Brine Seepage from Section 2 Ponds</u> As outlined in Item 1.3 above	<u>2.2 Brine Seepage from Section 2 Ponds</u> As outlined in Item 1.3 above	<u>2.2 Brine Seepage from Section 2 Ponds</u> As outlined in Item 1.3 above	<u>2.2 Brine Seepage from Section 2 Ponds</u> As outlined in Item 1.3 above	

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator Criteria	Standards / Baseline Information	Person Responsible
see Event ID's: • PM248-SW1 to SW3			<u>2.3 Brine Seepage from Inundated Ponds</u> As outlined in Item 1.1 above	<u>2.3 Brine Seepage from Inundated Ponds</u> As outlined in Item 1.1 above	<u>2.3 Brine Seepage from Inundated Ponds</u> As outlined in Item 1.1 above	<u>2.3 Brine Seepage from Inundated Ponds</u> As outlined in Item 1.1 above	<u>2.3 Brine Seepage from Inundated Ponds</u> As outlined in Item 1.1 above	<u>2.3 Brine Seepage from Inundated Ponds</u> As outlined in Item 1.1 above	<u>2.3 Brine Seepage from Inundated Ponds</u> As outlined in Item 1.1 above	
			<u>2.4 Surface Water Drainage from Free Draining Ponds</u> • Achievement of the outcomes specified in 1.2 above	<u>2.4 Surface Water Drainage from Drained Ponds</u> • The control strategy specified in 1.2 above • Allowing revegetation of drained ponds to develop	<u>2.4 Surface Water Drainage from Drained Ponds</u> • The measurements specified in 1.2 above	<u>2.4 Surface Water Drainage from Drained Ponds</u> • The measurement locations specified in 1.2 above	<u>2.4 Surface Water Drainage from Drained Ponds</u> • The measurement frequencies specified in 1.2 above	<u>2.4 Surface Water Drainage from Drained Ponds</u> • The criteria specified in 1.2 above	<u>2.4 Surface Water Drainage from Drained Ponds</u> • The baseline information specified in 1.2 above	
In Risk Assessment in Appendix 6 see Event ID's: • No SP-F3, F4 In Risk Assessment in Appendix 7 see Event ID's: • SP-F5	Native Vegetation	3	No loss of abundance and/or diversity of native vegetation on land outside the mine tenements, as a result of clearance due to non-routine* Salt Field operations unless significant environmental benefit has been approved in accordance with the relevant legislation. *Note that the routine operations of the saltfield have been occurring for decades and were subject of historic approvals that pre-date the	Records show: o Prior approval of clearance due to non-routine Salt Field operations in accordance with relevant legislation has been obtained; and o The clearance due to non-routine Salt Field operations complies with conditions in the approval o Implementation of the following control process: o Twice-yearly monitoring of Nearmap images (or equivalent) to identify if (and where) vegetation on land outside the external toes of sea bunds to ponds or if outside mine	• Audit (reconciliation) of land disturbance register • Measurements as required by approvals • Twice-yearly monitoring of Nearmap images (or equivalent). • Measurements as required by any investigation prompted by the twice-yearly monitoring of Nearmap images (or equivalent)	• Measurement locations as required by approvals • Twice-yearly monitoring of Nearmap images (or equivalent) of vegetation on land outside the external toes of sea bunds to ponds or if outside mine tenements, within 100 m from the external toes of sea bunds	• Measurement frequencies as required by approvals • Twice-yearly (end of winter and end of summer) monitoring of Nearmap images (or equivalent) of vegetation on land outside the external toes of sea bunds to ponds or if outside mine tenements, within 100 m from the external toes of sea bunds	• Leading indicator criteria as referenced or defined in approvals • For the purposes of the twice-yearly (end of winter and end of summer) monitoring of Nearmap images (or equivalent) of vegetation, "significant changes in the patterns and health of vegetation" means a moderate or more severe consequence rating (See Table 19-1) is evident in areas of native vegetation (Flora and fauna communities and species)	• Standards / baseline information as referenced or defined in approvals.	Salt Field Operations Coordinator

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
		Native Vegetation Act		tenements, within 100 m from the external toes of sea bunds, changes in the patterns and health of vegetation have become apparent and require further investigation to assess compliance with relevant legislation. o if the investigated vegetation changes are substantially due to non-routine Salt Field operations, this may prompt some remedial action. o If this remedial action requires the works outside the sea bund which would disturb native vegetation, a permit for this would be sought under the Native Vegetation Act 1991						
In Risk Assessment in Appendix 6 see Event ID's: • No SP-G1 In Risk Assessment in Appendix 7	Groundwater Extraction	4 No adverse impact to the quantity of groundwater available to existing users and groundwater dependent ecosystems as a	In the annual Compliance Report, records of annual groundwater extraction do not exceed the licenced annual allocation limits (copied in the table below)	Monthly monitoring of volumes extracted from wells allows the cumulative amount to be tracked against the licenced annual allocation limits. That allows adjustments to be made in extraction rates so that	Volumes extracted from groundwater bores	All licenced extraction bores specified in the licence (copied in the table below)	Monthly monitoring	The progressive cumulative volume extracted computed from the monthly monitoring	The licenced annual allocation limits	Salt Field Operations Coordinator

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement			Frequency of Measurement	Leading indicator Criteria	Standards / Baseline Information	Person Responsible	
see Event ID's: • SP-G1		result of mining operations.		licenced allocations are not exceeded									
							Bore number	Aquifer	Allocation				
							6628 -19184	T1	1,177,255 kL				
							6628-10427	T1					
							6628-04356	T1					
							6628-13020	T1					
							6628-13170	T1	850,225 kL				
							6628-18042	T1					
							6528-2005	T3	1,200,000kL				
		In Risk Assessment in Appendix 6 see Event ID's: • No SP-SQ6 to SQ8 In Risk Assessment in Appendix 7 see Event ID's: • SP-SQ1 to SQ3 In Risk Assessment in Appendix 8 see Event ID's: • PM248-G2 • PM248-SQ1 to SQ3	Soil Quality	5 No contamination of land and soils either on or off the land as a result of mining operations or mine completion and closure operations	<u>5.1 Contamination from Mining Operations</u>	<u>5.1 Contamination from Mining Operations</u>	<u>5.1 Contamination from Mining Operations</u>	<u>5.1 Contamination from Mining Operations</u>	<u>5.1 Contamination from Mining Operations</u>	<u>5.1 Contamination from Mining Operations</u>	<u>5.1 Contamination from Mining Operations</u>	<u>5.1 Contamination from Mining Operations</u>	Salt Field Operations Coordinator
Records of any spills or leaks (hydrocarbon, chemicals) and remediation actions taken for these demonstrate that spills have been managed as per the relevant EPA requirements.	Identify and remediate any spills on a case-by-case basis				As described on a case-by-case basis in records of spills and spill management /remediation actions implemented	As described on a case-by-case basis in records of spills and spill management /remediation actions implemented	As described on a case-by-case basis in records of spills and spill management /remediation actions implemented	As described on a case-by-case basis in records of spills and spill management /remediation actions implemented	Not applicable	As described in relevant EPA publications			
<u>5.2 - Bulk Filling Management</u>	<u>5.2 - Bulk Filling Management</u>				<u>5.2 - Bulk Filling Management</u>	<u>5.2 - Bulk Filling Management</u>	<u>5.2 - Bulk Filling Management</u>	<u>5.2 - Bulk Filling Management</u>	<u>5.2 - Bulk Filling Management</u>	<u>5.2 - Bulk Filling Management</u>			
As defined in: • the earthworks plan provided in Section 12, and • EPA approvals for bulk filling	As defined in: • the earthworks plan provided in Section 12 and • EPA approvals for bulk filling				As defined in: • the earthworks plan provided in Section 12, and • EPA approvals for bulk filling	As defined in: • the earthworks plan provided in Section 12, and • EPA approvals for bulk filling	As defined in: • the earthworks plan provided in Section 12, and • EPA approvals for bulk filling	As defined in: • the earthworks plan provided in Section 12, and • EPA approvals for bulk filling.	As defined in: • the earthworks plan provided in Section 12, and • EPA approvals for bulk filling	As defined in: • the earthworks plan provided in Section 12, and • EPA approvals for bulk filling			

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
In Risk Assessment in Appendix 6 see Event ID's: • No SP-SQ9 In Risk Assessment in Appendix 7 see Event ID's: • SP-SQ4	Known Asbestos Containing Material (ACM)	6 No public health impacts from known asbestos containing materials (ACM) stored on site.	Records demonstrate that known ACM risks have been managed in compliance with the relevant legislation.	Control and Management Strategies summarised in Section 13. If any asbestos containing material is identified on site as a hazard, access will be controlled, and removal undertaken by licenced operators to ensure no impact occur to human health. The work plans and safety health and environmental management plans for all works to comply, as necessary, with the relevant legislation.	As required on a case-by-case basis	As required on a case-by-case basis	As required, on a case-by-case basis	Not required	As described in SA EPA Guideline (Wastes containing asbestos – removal, transport and disposal) Chapter 8 , WHS Regulations EPA guidelines Asbestos related Codes of Practice	Salt Field Operations Coordinator
Addressed through the achievement of outcomes for Items 1 to 6 above	Adjacent land use	7 No impacts to the abundance and diversity of avifauna using the Bird Sanctuary, arising from the operations and activities undertaken within the Salt Field	Addressed through the achievement of outcomes for Items 1 to 6 above	Addressed through the Control Strategies for Items 1 to 6 above	Addressed through the Measurements for Items 1 to 6 above	Addressed through the Measurements for Items 1 to 6 above	Addressed through the Measurements for Items 1 to 6 above	Addressed through the Criteria for Items 1 to 6 above	Addressed through the Standards / Baseline Information for Items 1 to 6 above	Salt Field Operations Coordinator
In Risk Assessment in Appendix 6 see Event ID's: • No SP-SW1 • No SP-SW4 • No SP-SW5	Air Emissions (Dust, Noise, Pests Insect Species, Odour)	8 No adverse public health and or significant nuisance impacts due to air emissions, dust, pest insect species, odour, or noise Note: A significant nuisance impact is	Records demonstrate that complaints related to dust, noise, pest insects species and odour outside site boundary have been dealt as per the following: • complaint initially responded to within 48 hours; • issues underlying complaint investigated and	With respect of dust risk management for the calst in XC2E, implement the protocol agreed with DEM. In respect of other matters respond to complaints as they arise within specified timeframe.	Register of complaints received and response actions taken within reasonable timeframe.	Site-wide	On case-by-case basis, following complaint	Weather forecasts or complaints received	The information in successive PEPR / MOP compliance reports represents baseline information	Salt Field Operations Coordinator

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
- No SP-SW6 - No SP-A1 to A10 - No SP-N1 to N5 In Risk Assessment in Appendix 7 see Event ID's: - SP-A1 to A4 - SP-N1 to N3 In Risk Assessment in Appendix 8 see Event ID's: - PM248-A1 to A3 - PM248-N1		considered to be one that generates a complaint that is confirmed as attributable to the Salt Field and cannot be addressed within the timeframes specified in the measurement criteria	causes identified within 2 weeks or other time frame agreed by DEM; complaint closed out (and, if needed, corrective actions implemented) within 4 weeks (or other time frame agreed by DEM) to the satisfaction of DEM	For complaints that investigation shows have a cause from within the Salt Field, identify and implement measures that are reasonably practical that would prevent a recurrence.						
In Risk Assessment in Appendix 6 see Event ID's: - No SP-H1 to H3 In Risk Assessment in Appendix 7 see Event ID's: - SP-HBS1 & HBS2 In Risk Assessment in Appendix 8	Heritage (Aboriginal, European)	9 No damage, disturbance or interference to Aboriginal and non-Aboriginal heritage sites, objects or remains as a result of mining operations unless it is authorised under the relevant legislation	Records show that BDC is aware of and has complied with its responsibilities under the Heritage Places Act 1993, and the Aboriginal Heritage Act 1988 Records demonstrate that relevant procedures have been implemented in case of discovery of new site, object, item or remains that may be of heritage significance.	The work plans and safety health and environmental management plans for all works to comply, as necessary, with the Heritage Places Act 1993, and the Aboriginal Heritage Act 1988; known sites protected from access/damage	Relevant procedures, as per applicable legislation, implemented in case of a discovery that may be of heritage importance	As required, on a case-by - case basis	As required, on a case-by - case basis	Not required	See register-of-aboriginal-sites-and-objects at aboriginal-heritage-registers-and-the-central-archive	Salt Field Operations Coordinator

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
see Event ID's: • PM248-HBS1, & HBS2										
In Risk Assessment in Appendix 6 see Event ID's: • No SP-SQ1 to SQ5 • No SP-VALU11 & VALU2 • No SP-VALU5 to VALU7 In Risk Assessment in Appendix 7 see Event ID's: • SP-VALU11 & VALU2 • SP-VALU5 to VALU7 In Risk Assessment in Appendix 8 see Event ID's: • PM248-G1 • PM248-VALU1, & VALU2 • PM248-VALU5 to, & VALU7	AMD management	10 No impacts to adjacent land use from the operations and activities undertaken on the Site.	As specified in item 2 above.	- As specified in item 2 above - See also Management Strategies in Section 13.	As specified in item 2 above.	As specified in item 2 above.	As specified in item 2 above.	As specified in item 2 above.	As specified in item 2 above.	Salt Field Operations Coordinator

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
In Risk Assessment in Appendix 7 see Event ID's: - SP-HBS3 & HBS4 In Risk Assessment in Appendix 8 see Event ID's: - PM248-G2 - PM248-SQ1 to SQ3 In Risk Assessment in Appendix 8 see Event ID's: - PM248-HBS3	Third-Party Property and Infrastructure	11 No adverse impacts to third-party property and infrastructure on or off the Site as a result of operations and activities undertaken.	As specified in Impact ID's items 1 to 10). Records demonstrate that the site is managed as per the agreements made with third-party infrastructure owners.	As specified in Impact ID's items 1 to 10). As per the agreements made with third-party infrastructure owners.	As specified in Impact ID's items 1 to 10). As per the agreements made with third-party infrastructure owners.	As specified in Impact ID's items 1 to 10). As per the agreements made with third-party infrastructure owners.	As specified in Impact ID's items 1 to 10). As per the agreements made with third-party infrastructure owners.	As specified in Impact ID's items 1 to 10). As per the agreements made with third-party infrastructure owners.	As specified in Impact ID's items 1 to 10). As per the agreements made with third-party infrastructure owners.	Salt Field Operations Coordinator
In Risk Assessment in Appendix 6 see Event ID's: No SP-VALU3, & VALU4 In Risk Assessment in Appendix 7 see Event ID's:	Public Safety	12 Unauthorised entry to the land does not result in public injuries and or deaths that could have been reasonably prevented by BDC	Records of inspections demonstrate relevant strategies, as described in 13, including maintenance of gates at nominated locations with accompanying public safety warning signs have been maintained.	Control and Management Strategies described in Section 13.	- Periodic checks during routine operations show that gates and accompanying public safety warning signs remain intact - Records from incident register	- Gates and accompanying public safety warning signs across the Salt Field - As required for Incident investigation	- Periodic checks (during routine operations) - As required for Incident investigation	Not applicable	Not applicable	Salt Field Operations Coordinator

Impact ID	Aspect	Outcome ID	Description of how the achievement of the Outcome will be demonstrated	Control Strategy	What will be measured and how	Location of Measurement	Frequency of Measurement	Leading indicator	Standards / Baseline Information	Person Responsible
- SP-VALU3, & VALU4 In Risk Assessment in Appendix 8 see Event ID's: - PM248-VALU3, & VALU4			Records show that all incidents of public injuries and/or deaths resulting from unauthorised access to the site are recorded in the incidents system and investigated by a suitably qualified third party within 3 months, or as agreed with DEM, and the results of the investigation show that the incident could not have been reasonably prevented by the Tenement Holder							

Reporting requirements

- **Compliance reporting**
BDC will report to DEM in Annual Compliance Report or as otherwise requested by DEM (or Authorised Officer).
- Any breach of Outcomes, Outcome Measurement Criteria, Leading Indicator Criteria or any other relevant matters must be reported to DEM as per the Reportable Incident requirements in accordance with Regulation 79 of the Mining Regulations 2020 (<https://www.energymining.sa.gov.au/industry/minerals-and-mining/mining/mining-compliance/incident-reporting>).

15 Progressive Rehabilitation and Closure

This Chapter describes the proposed closure activities on the Salt Field i.e., the operations that will be conducted to prepare the site for agreed post mining land uses. Mine completion is defined by DEM as the goal of mine closure. A completed mine has been rehabilitated to an extent that the mineral leases / licences can be surrendered, and ongoing responsibility accepted by the next land user.

As progressive rehabilitation and closure operations will occur in a staged retreat process within each section of the Salt Field, some parts of sections may still be subject to resumed salt production, while, concurrently, others could be undergoing progressive rehabilitation and closure.

In this Revision 5 of the PEPR /MOP, progressive rehabilitation is only occurring currently in PM248 in Section 1.

Note that tenements in part of Section 1 and part of Section 2 have been rehabilitated and surrendered for the Northern Connector.

Refer to Table 14-1 for the environmental outcomes and measurement criteria that are and will be used for progressive rehabilitation and closure operations.

15.1 Present Status

The present status for Section 1 of the Salt Field is that:

- Parts of the mine tenement land have been excised for the Northern Connector
- The ultimate potential – post-closure future land use of the land that was not excised is a mixed used urban development. In the interim:
 - parts of PM248 are being filled to prepare them for closure and that ultimate land use and
 - the remainder is, under this PEPR / MOP, to be used for commercial salt production

The present status for Sections 2 to 4 of the Salt Field is that:

- Parts of these Sections, under this PEPR / MOP, are to be used for commercial salt production
- Options for land uses of the remaining parts are under consideration and being informed by further discussions and investigations. It is important that mine completion and closure operations are designed to facilitate those specific land use options that are realistic, practicable and achievable, and sustainable, having regard to economic, environmental, and social aspects.

15.2 Key stakeholders

The South Australian Government is a key stakeholder. The Salt Field includes significant areas of Crown land which will return to government management following mine completion. Much of this land will be an important component of the proposed Adelaide International Bird Sanctuary. Freehold land currently occupied by Section 1 of the Salt Field will contribute to *The 30 Year Plan for Greater Adelaide*. Land use planning for the Salt Field is likely to identify other government uses and / or ways in which future use will contribute to government priorities.

Renewal SA is also a key stakeholder. Section 1 of the Salt Field includes significant areas of its land (originally Crown land when the Salt Field was established in the 1930's).

For these reasons, BDC is working with the South Australian Government and consulting with Renewal SA, and on closure planning for the Salt Field. BDC will also consult with other stakeholders that would have an interest in or that would be affected by mine closure in different parts of the Salt Field.

15.3 Post-Mining Land Use

The post-mining land uses are envisaged to be a combination of:

- Environmental habitat; and
- mixed-use urban development; and
- land ready for their future uses, following consultation with the land owners.

15.4 Processes for Progressive Rehabilitation

15.4.1 Staged Retreat Processes for Salt Production Operations

These will be as agreed by BDC with all relevant Stakeholders, but conceptually, and under a revised approved PEPR/MoP for each Step:

Step 1

1. Relocate crystallisers and Salt Field operation and maintenance facilities; and adjust use of Sections 3 and 4 to deliver a smaller volume of brine to the relocated crystallisers.⁷ Then commission the changed Salt Field layout and operations to establish reliable commercial salt production at a reduced scale
2. Then decommission the balance of Section 1

Step 2

3. Repeat 1. in Step 1
4. Decommission the next further area no longer needed for salt production

Step 3 etc = Repeat Step 2

The scope and timing of each of the above steps to be subject, as necessary to commercial agreements between BDC and relevant Stakeholders

15.4.2 Decommissioning Processes After Each Stage of Retreat

This is the decommissioning of yet-to-be-defined areas that will come available - as no longer required for salt production - from a Step in the retreat process for salt production. This decommissioning would be under a revised approved PEPR/MoP. Its purpose is to make selected Inundated Ponds (e.g., Condensers, Final Area Ponds Crystallisers in each defined area) free draining, and to decommission such infrastructure as is appropriate.

⁷ This will require inclusion of Pond XB8A in the salt production operations.

The process is envisaged to be in each selected pond:

1. Define the specific mix of post closure land uses
 - the specific post mining land uses to
 - o depend on a Master Plan or other suitable document for the whole site that becomes developed & agreed by BDC with all relevant Stakeholders
 - o be subject to any required commercial agreements between BDC and relevant Stakeholders
2. Cease inflow of brine
3. Allow existing water to evaporate
4. Establish pathways for pond to become free draining (e.g. drain into adjacent lower ponds, construct swale drains where needed, cut through internal bunds where needed, cut through or install pipes in external bunds to allow outward drainage and / or tidal exchange)

15.4.3 Rehabilitation Processes After Decommissioning

The rehabilitation processes in decommissioned areas are envisaged to comprise bulk earthworks and landscaping as needed inside the free draining ponds to produce land suitable for the defined or agreed post closure land uses

The earthworks would use earthworks plans and EPA approvals similar to those used for bulk filling in Section 1, as described in Part 3, Chapter 18.

15.4.4 Outcomes and Criteria for Rehabilitated Land

These outcomes and criteria will be specified in the applicable revised approved PEPR / MoP for each defined area.

They will relate to the post-closure land uses (See Section 21.1), and conceptually are envisaged to be

1. Where land is to be redeveloped the land surface has been brought (in compliance with a revised PEPR/MoP) to suitable levels and is in a condition that satisfies an EPA approved bulk earthworks plan and other relevant Development Approval requirements
2. Where land is to become used for environmental habitat, the land surface is free draining, with tidal exchange where the pond floor levels are suitable for this, and able to revegetate naturally (but with environmental management) post closure
3. For other land uses - as defined following consultation with the land owners,

15.5 Process Approvals

For each future stage of Salt Field retreat, decommissioning and rehabilitation operations for mine completion and closure a revision to this PEPR / MoP will be submitted to DEM for approval. Each such revision to this PEPR / MoP will contain:

- A description of the decommissioning and rehabilitation operations for mine completion and closure
- An environmental risk assessment for these decommissioning and rehabilitation operations for mine completion and closure
- The environmental outcomes that will be achieved by decommissioning and rehabilitation operations for mine completion and closure. Those outcomes will be set out in a revision to

Table 14-1, so as to comply with Terms of Reference TOR05-4 requirements (as per Appendix 1 in MG2b) <https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/MRGMG2B.pdf>

This process has been followed for the environmental outcomes for the closure works of filling F, G and H Rows, which are set out in the present Table 14-1 of this PEPR / MOP.

15.6 Current Rehabilitation Activities

The current progressive rehabilitation activities are limited to bulk filling in crystalliser rows F, G and H in Section 1. Please refer to Section 12.5 (and bulk filling process outlined on Figure 12-26) and to the environmental outcomes in Table 14-1

15.7 Surrender of Tenements

Closure reports will be prepared following completion of progressive rehabilitation of tenements that come available from each Step in the Salt Field retreat process. This report will include the information needed to support surrender these tenements.⁸

15.8 Rehabilitation Liability Estimate

Tables 15-1 and 15-2 provide the Rehabilitation Liability Estimate. This is consistent with the final DEM RLE determination and recommended bond for the Dry Creek Saltfields. The assessment reflects the Mine Closure Plan for the site and includes a 5-year maintenance and monitoring period.

⁸ See https://www.energymining.sa.gov.au/__data/assets/pdf_file/0011/713774/D21044621-FINAL-DEM-Branded-Application-Information-Sheet-Surrenders-v2.pdf

Table 15-1 Rehabilitation Liability Estimate

BUCKLAND DRY CREEK REHABILITATION LIABILITY ESTIMATE

Area	Current Situation	Liabilites	RLE Calculation	Waste m3			Unit	Quantity	Rate	Alt Rate	Cost
Section 1											
Environment	Not in use and no environmental harm accruing	Nil									
PMLU	Mixed Use Urban Development										
	Significant fill required in the development - not a closure requirement	Nil									
Infrastructure	Office	Remove office - brick structure	DEM demolition rates	8		Demolition only - transport to dump below	m2	500	18		9,000
	Shed	Remove shed - steel structure	DEM demolition rates	8		Demolition only - transport to dump below	m2	3,000	18		54,000
	Stormwater flows through pipes to channels to creek line	Remove pipework		10			Item	1	10,000		10,000
PM 248											
Section E	Proposed to remain as salt production	Allow to evaporate									
		Remove sections of bunds to allow natural water flow	Estimated volume of earthworks			Minor earthworks	m3	1,000	5.00		5,000
Sections F,G,H	Currently under land development	Nil									
		Liquidator would sell land as is									
Section2											
	Currently not in use - drained saltfield tenements	Remove sections of bunds to allow natural water flow	Estimated volume of earthworks			Minor earthworks	m3	1,000	5.00		5,000
	May be used in salt production - once Section 1 closed										
	Poly pipe to be installed to support salt production in Section 1 - 7km	Remove pipeline & transport to dump		403.2	A1070	Demolition and removal of major pipelines BDC current market rates for demolition	m	7,000	5.00		35,000
	Mangroves currently under tidal movement	Nil									
Section 3 & 4											
	Combination of Mixed Use Urban Development & Environmental Habitat										
	Pumping from north to south currently to retain environmental habitat										
Option 1	Gov to keep pumping to maintain habitat ongoing	Ongoing pumping, monitoring and maintenance costs Maintenance, Labour, Fuel, Vehicle	Nil - Assume Option 2								
Option 2	Gov to retreat	Ongoing pumping, monitoring and maintenance costs Maintenance, Labour, Fuel, Vehicle									
		Drain ponds - Allow water to flow to adjacent ponds and allowed to evaporate									
		Assume pumps removed by liquidator					Item				
		Remove roads	Estimate		A1040	Scarification and ripping of Haul and Access Roads	km	20	764.80		15,296
		Remove underground cables	None significant		A1044	Removal of underground cables	m		30.55		
		Transport waste to dump plus dump fees	Assume 20km distance	429.2	A1059	Load & Remove Waste from site to external dump	m3	429.2	83.76		35,950
	Construct drainage paths created through existing bunds to align with natural drainage paths	Construction works	See Calculations Worksheet			BDC current market rates and Calcs					88,000
	Construction of swale drains to direct water to natural drainage paths	Construction works	See Calculations Worksheet			BDC current market rates and Calcs					136,060
Maintenance During Year 1 Post Closure											
	Maintenance of structures constructed during closure	Contractor earthworks and management	50% of construction costs above				%	50%	330,306		165,153
SUB-TOTAL FOR DIRECT COSTS											558,459
INDIRECT COSTS											
	Monitoring of Rehabilitation Outcomes	Proposed monitoring period based on the successful rehabilitation of XP8A Consultant costs to inspect saltfields, monitor outcomes, provide reports	5 years				Item	5	70,000		350,000
	Maintenance costs during the Monitoring period	Maintenance (including remedial earthworks, revegetation, weed and pest animal control)							10%		55,846
	Government Management Costs	Government management costs - decommissioning and closure planning process, including tendering, preparation of decommissioning and closure plan and head office management							7.5%		41,884
	Third Party Rehabilitation Project Management Costs including Overall Site Supervision during closure	Third Party Rehabilitation Project Management and Site Supervision during closure (by Government or designated party) - contractor and other stakeholder management, site inspections and auditing of outcomes							12.5%	5.0%	27,923
	Insurances	Insurances associated with the work							1%		5,585
	Contingencies	This reflects the inherent level of uncertainty in determining the detailed costs of decommissioning and rehabilitation of a mine site							30%	25%	139,615
SUB-TOTAL FOR INDIRECT COSTS											620,852
TOTAL REHABILITATION LIABILITY FOR THE OPERATION											1,179,311
BOND RECOMMENDATION											1,180,000

Table 15-2 Calculation Worksheet for Rehabilitation Liability Estimate

Calculation Worksheet

Installation of gated pipe through bund to drain ponds									
	m3	Rate \$/m3	Unit cost	Gates/pond	Cost	Ponds			
Earthworks	500	2.50		2	2,500				BDC Market rates
Pipe and gate			1,500	2	3,000				BDC Market rates
					5,500	16	88,000		
Construction of swale drains									
Total length of drains	10,000	m	BDC						
Productivity per day	200	m	BDC	Actual rate higher but assume this lower rate					
Days	50		BDC						
Excavator cost	70.00	per hr	Quantity Surveyor Rates						
Operator cost	80.46	per hr	Quantity Surveyor Rates						
Supervision/survey	121.66	per hr	Quantity Surveyor Rates						
Hours per day	10								
	136,060								
Operations during retreat									
	Operator	Hrs/week	Weeks	Cost/Year					
Labour Costs - Labour hire rates	80.46	38	52	158,989		Quantity Surveyor Rates			

List of Appendices

Appendix 1	Glossary
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Appendix 8	Impact and Risk Assessment - 3 – Filling F, G, H Rows • Elements of the Environment • Impact Events • Risk Assessment • Outcome Measurement Criteria

APPENDIX 1

Glossary

Term or Acronym	Meaning
AMLR	Adelaide and Mount Lofty Ranges
ACM	Asbestos containing material
AHD	Australian Height Datum
anaerobic	Relating to or requiring an absence of free oxygen
ASS	Acid sulfate soils
BDC	Buckland Dry Creek Pty Ltd
biodiversity	The variety of plant and animal life in the world or in a particular habitat
bitterns	A solution of bromides, magnesium and calcium salts remaining after sodium chloride is crystallised out of seawater
BOD	Biological Oxygen Demand
brine	Water saturated with or containing large amounts of salt, especially sodium chloride
calsilt	A by-product from the Penrice manufacturing plant, mostly calcium carbonate
camelles	Salt stacks formed from a series of overlapping cones of salt
CoP	Change of process
CoS	City of Salisbury
Cst	Coastal Zone under the current Development Plan
DEW	Department for Environment and Water
DEM	Department for Energy and Mining
DO	Dissolved oxygen
DCCEEW	Department of Climate Change, Energy, Environment and Water (Cth).
DIT	Department for Infrastructure and Transport
DSTO	Defence Science and Technology Organisation
EIn	Extractive Industry zone under the current Development Plan
entrainment	The upward movement of eroded particles into the water column by net turbulent drag and lift.
EoI	Expressions of Interest
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
freehold	Permanent and absolute tenure of land or property with freedom to dispose of it at will.
maiden brine	Saturated brine ready for the crystallisation of salt
MBO	Mono-sulphidic black ooze
MFP	Multifunction Polis zone
ML	Mining Lease
MOP	Mine Operations Plan

Term or Acronym	Meaning
MOSS	Metropolitan Open Space System
NABCWMB	Northern Adelaide and Barossa Catchment Water Management Board
NaCl	Chemical grade solar salt
NEPM	National Environment Protection Measure
NGO	Non-government organisation
NRM	Natural resource management
OTH	Over-the-horizon radar
PASS	Potential acid sulfate soils
PEPR	Program for Environment Protection and Rehabilitation
PEPR / MOP	A single document, such as this one, that combines a PEPR and a MOP.
piscifauna	all the fishes that live in a particular place, time, or habitat
ppt	Parts per thousand
PIRSA	Department of Primary Industries and Regions SA
Ramsar Convention	Convention on Wetlands (Ramsar, Iran, 1971)
SA	South Australian (Government)
salinas	A set of interconnected lagoons
samphire	Sparse to medium density dwarf shrubland of semi-woody plants
SAR	Sodium absorption ratio
SEB	Significant environmental benefit
SME	Special Mining Enterprise Agreement
STAG	Strategy and Technical Advisory Group
TDS	Total dissolved solids
TJpa	Terajoule per annum
tpa	tonne per annum

APPENDIX 2

References

Requirements for this PEPR/MOP:

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APPENDIX 3

EPA Licence & PIRSA Licence and Exemption



Licence No. 40942

**BUCKLAND DRY CREEK PTY
LTD**

ISSUED:

01 Apr 2021

EXPIRY:

31 Mar 2026

ACN:

114 007 153

Environmental Authorisation
under Part 6 of the
*Environment Protection
Act 1993*

**South Australian
Environment
Protection Authority**
GPO Box 2607
Adelaide SA 5001
Tel: 08 8204 2004

Environment Protection Authority

LICENCE NUMBER 40942

LICENSEE DETAILS

Licence Holder: BUCKLAND DRY CREEK PTY LTD
ACN: 114 007 153
Registered Address: 412 Hanson Road North Road, DRY CREEK SA 5094

LICENSED ACTIVITIES

The Licensee is authorised to undertake, at the location(s) shown above, the following prescribed activities of environmental significance under Schedule 1 Part A of the Act, subject to the conditions in this Licence.

1(1)	Chemical storage and warehousing facilities
1(2)(b)	Chemical works (salt production)
8(7)	Discharges to marine or inland waters

TERMS OF LICENCE

Commencement Date: 01 Apr 2021
Expiry Date: 31 Mar 2026
Amended Date: 11 Sep 2023

PREMISES ADDRESS

Saltfields, Eastern Side of Gulf St Vincent,
SA

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Licence Explanatory Notes – Do Not Form Part of the Licence

Compliance with this licence

The EPA seeks to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the quality of the environment according to the principles of ecologically sustainable development. To achieve this objective, the EPA uses a number of regulatory decision making principles and actions outlined in the 'Compliance and enforcement regulatory options and tools' document available on the EPA website.

Notification – serious or material environmental harm caused or threatened

If serious or material environmental harm from pollution is caused or threatened in the course of an activity, the licence holder must, as soon as reasonably practicable after becoming aware of the harm or threatened harm, notify the EPA (preferably on EPA emergency phone number 1800 100 833) of the harm or threatened harm, its nature, the circumstances in which it occurred and the action taken to deal with it in accordance with section 83 of the [Environment Protection Act 1993](#) (the Act). In the event that the primary emergency phone number is out of order, the licence holder should phone (08) 8204 2004.

Variations, transfers and surrender of a licence

The EPA may impose or vary the conditions of a licence by notice in writing to the licence holder in accordance with sections 45 and 46 of the Act. Public notice may be required where the variation of licence conditions results in a relaxation of the requirements imposed for the protection or restoration of the environment and results in an adverse effect on any adjoining land or its amenity.

If a licence holder wishes to vary the conditions of a licence, transfer a licence to another entity, or surrender a licence, the licence holder must submit an application to the EPA in accordance with the applicable provisions of the Act (sections 45, 49 and 56, respectively). A licence remains in effect and in its original form until such time as any proposed variation, application for surrender, or transfer has been made and approved in writing by the EPA.

Suspension or cancellation of a licence

The EPA may suspend or cancel a licence by notice in writing to the licence holder in accordance with section 55 of the Act if satisfied the licence holder has either obtained the licence improperly, contravened a requirement under the Act or if the holder is a body corporate, a director of the body corporate has been guilty of misconduct of a prescribed kind (whether in this State or elsewhere).

Responsibilities under Environment Protection legislation

In addition to the conditions of any licence, a licence holder must comply with their obligations under all State and Federal legislation (as amended from time to time) including: the [Environment Protection Act 1993](#); the [Environment Protection Regulations 2009](#); all Environment Protection Policies made under the [Environment Protection Act 1993](#); and any National Environment Protection Measures not operating as an Environment Protection Policy under the [Environment Protection Act 1993](#)

Public Register Information

The EPA maintains and makes available a Public Register of details related to its determinations and other information it considers appropriate (i.e. excluding trade processes or financial information) in accordance with section 109 of the Act. These details include, but are not limited to:

- licensing and beverage container applications and approvals
- enforcement actions
- site contamination
- serious or material environmental harm caused or threatened in the course of an activity
- environment improvement programmes and environment performance agreements
- environment assessment reports; results of testing, monitoring or evaluation required by a licence
- EPA advice or direction regarding development approvals referred to the EPA by a planning authority

Definitions

Unless the contrary intention appears, terms used in this licence that are defined in the Act (including any regulations or environment protection policies made pursuant to the Act) have the respective meanings assigned to those terms by the Act.

THE ACT: The *Environment Protection Act 1993*

PREMISES: The whole of the land comprised in Titles Register - Certificate of Title, Crown Lease and Crown Record.

CR5757/821	CT5881/409
CR5744/712	CR5744/713
CR5744/715	CR5751/448
CR5757/317	CR5760/407
CR5766/819	CR5766/820
CT5154/618	CR5744/249
CR5744/250	CT5197/309
CT5197/307	CT5197/304
CT5197/302	CT5197/300
CT5197/301	CT5197/298
CT5197/297	CT5197/294
CT5197/315	CR5766/821
CR5766/822	CR5766/824
CR5766/825	CR5766/826
CT5887/225	CR5766/827
CR5766/828	CR5766/829
CR5766/831	CR5766/832
CR5766/833	CR5766/834
CR5766/835	CR5766/836
CR5766/837	CR5766/838
CR5769/617	CR5844/945
CR5766/823	CR5757/815
CT5278/129	CR5748/918
CR5748/919	CR5748/921
CR5748/922	CR5744/714
CT5207/813	CR5779/709
CT5875/910	CR5760/408
CR5928/176	CT5885/596
CT5930/304	CT5906/440
CT5382/774	CT6161/956
CT6168/801	CT6168/802

CT6168/803	CT6168/800
CT6181/27	CT6181/30
CT6181/314	CT6181/357
CT6181/31	CT6181/28
CR6179/598	CR6199/731
CR6186/517	CT6187/447
CR6216/148	CR6212/478
CR6212/480	CR6212/479
CR6220/967	CT6224/932
CR6238/132	CT6238/131

ACID SULPHATE SOIL: means a soil or soil horizon which contains sulfides or an acid soil horizon affected by oxidation of sulfides.

AUTHORISATION FEE PAYMENT DATE: means the anniversary of the grant or renewal of this authorisation.

BITTERNS: means a solution of bromides, magnesium, and calcium salts remaining after sodium chloride is crystallised out of seawater.

ENVIRONMENTAL HARM: means the same as is defined in section 5 of the Environment Protection Act 1993.

MONOSULPHIDIC BLACK OOZE: means organic ooze enriched by iron monosulfides.

WASTE: means -

1. As defined under the Environment Protection Act 1993,

1(a) any discarded, dumped, rejected, abandoned, unwanted or surplus matter, whether or not intended for sale or for purification or resource recovery by a separate operation from that which produced the matter; or

1(b) any matter declared by regulation to be waste for the purposes of this Act (following consultation by the Minister on the regulation with prescribed bodies in accordance with the regulations); or

1(c) any matter declared by an environment protection policy to be waste for the purposes of this Act,

whether or not of value.

2. However, waste does not include—

2(a) an approved recovered resource whilst it is being dealt with in accordance with the declaration of that resource—see section 4A; or

2(b) anything declared by regulation or an environment protection policy not to be waste for the purposes of this Act,

even though the resource or the thing so declared might otherwise, but for the declaration, fall within the definition of waste in subsection (1).

Acronyms

EPA: means Environment Protection Authority

Conditions of Licence

The Licensee is authorised to conduct the prescribed activities as described in this Licence at the Premises nominated, subject to the following conditions:

1 CONTROL OF EMISSIONS

1.1 DISCHARGE LOCATIONS (U - 30)

The Licensee must only discharge to coastal waters at the locations set out in Table 1 of Attachment 1 appended to this licence.

1.2 DISCHARGES (U - 31)

The Licensee must:

- 1.2.1 ensure that any saline water discharged from Location A complies with the compliance criteria set out in Table 2 of Attachment 1 appended to this licence; and
- 1.2.2 only discharge Bitterns from Location B and ensure that the discharge complies with the compliance criteria set out in Table 2 of Attachment 1 appended to this licence.

1.3 DUST PREVENTION (S - 8)

The Licensee must take all reasonable and practicable measures, including development of an appropriate Dust Management Plan, to prevent dust from leaving the Premises.

1.4 MONITORING AND REPORTING - BOLIVAR CHANNEL DISCHARGE (U - 811)

The Licensee must:

- 1.4.1 undertake continuous in-line monitoring of salinity at Location A (as identified in Table 2 of Attachment 1 appended to this licence);

- 1.4.2 submit a report to the satisfaction of the EPA, setting out the results of the continuous in-line monitoring and analysis of the discharges, according to the following schedule:
- a for the months of January, February and March, the report must be submitted by the end of April in that year;
 - b for the months of April, May and June, the report must be submitted by the end of July in that year;
 - c for the months of July, August and September, the report must be submitted by the end of October in that year; and
 - d for the months of October, November and December, the report must be submitted by the end of January in the following year.

1.5 NOISE PREVENTION (S - 13)

The Licensee must take all reasonable and practicable measures, including development of an appropriate Noise Management Plan, to prevent noise from leaving the Premises.

1.6 ODOUR PREVENTION (S - 11)

The Licensee must take all reasonable and practicable measures, including development of an appropriate Odour Management Plan, to prevent odour from leaving the Premises.

1.7 SALINITY EXCEEDANCE - BOLIVAR CHANNEL OUTFALL (U - 728)

The Licensee must:

- 1.7.1 cease the discharge of saline water from the Bolivar Channel Outfall if the compliance criteria set out in Table 2 of Attachment 1 appended to this licence is exceeded;
- 1.7.2 notify the EPA within 24 hours of the exceedance;
- 1.7.3 provide written notification within 72 hours of the exceedance;
- 1.7.4 ensure the written notification includes a root cause analysis of why the exceedance occurred and what measures were implemented to rectify the exceedance; and
- 1.7.5 not recommence the discharge of saline water unless approved in writing by the EPA or the compliance criteria for discharge is met.

2 OPERATIONAL MANAGEMENT

2.1 COMPLAINTS REGISTER (S - 1)

The Licensee must:

- 2.1.1 prepare and maintain a register of all complaints concerning environmental issues.
- 2.1.2 ensure the register includes:
 - a the date and time that the complaint was made;
 - b details of the complaint including the likely cause of events giving rise to the complaint;
 - c the contact details of the complainant (if permitted by the complainant); and
 - d details of any action taken in response to the complaint by the Licensee.

2.2 COMPLY WITH APPROVED DOCUMENT (U - 1649)

The Licensee must implement and comply with the following approved documents:

- 2.2.1 Attachment 2 EPA Licence 40942 – BDC PA6 Monitoring Plan or any revised Monitoring Plan approved in writing by the EPA.
- 2.2.2 Attachment 3 EPA Licence – BDC Trigger Action Response Plan (TARP) or any revised Trigger Action Response Plan approved in writing by the EPA.

NOTES

This condition will terminate upon the EPA providing written notification to the Licensee that it is satisfied that a substantially equivalent obligation has been incorporated into an approved Program for Environmental Protection and Rehabilitation for the Premises under the Mining Act 1971.

2.3 DISCHARGE CRITERIA MANAGEMENT PLAN (U - 1368)

The Licensee must:

- 2.3.1 review and revise a Discharge Criteria Management Plan (DCMP) to the satisfaction of the EPA by the compliance date below;
- 2.3.2 ensure that the DCMP includes, but is not limited to the following:
 - a a methodology to ensure that the discharge of saline water does not exceed the compliance criteria for Location A set out in Table 2 of Attachment 1 appended to this licence;
 - b actions to be undertaken by the Licensee in the event that the compliance criteria for Location A set out in Table 2 of Attachment 1 are exceeded.

Compliance Date: 17-May-2021

2.4 POND WATER LEVEL CONTROL PLAN (U - 1365)

The Licensee must:

- 2.4.1 review and revise the Plan controlling pond water levels and submit to the satisfaction of the EPA by the compliance date listed below.

- 2.4.2 ensure that the Plan includes, but is not limited to:
- a actions to address exposure and mobilisation of monosulfidic black ooze and acid sulphate soils and;
 - b actions to address the creation and mobilisation of hyper-saline water; and
 - c the levels of water to be maintained in each of the ponds; and
 - d the measures that will be taken to ensure the water levels are maintained at the proposed levels in each of the ponds; and
 - e the method of monitoring to ensure the water levels are maintained at the proposed levels in each of the ponds; and
 - f the timeframe for revision of the Plan.

Compliance Date: 17-May-2021

3 MONITORING AND REPORTING

3.1 MONITORING PLAN (U - 1366)

The Licensee must, no less than 10 business days prior to undertaking discharge of saline water from location C (as identified in Attachment 1, Table 1 of this licence):

- 3.1.1 revise and submit to the EPA the Gawler Discharge Trial Plan (Monitoring Plan) dated 12 February 2015 to the satisfaction of the EPA;
- 3.1.2 ensure that the Monitoring Plan includes, but is not limited to the following:
 - a the objectives of the monitoring;
 - b methodology to measure salinity changes within the Gawler River Channel following discharge events;
 - c schedule for the monitoring of discharge events;
 - d methodology and frequency of reporting the results of monitoring to the EPA

NOTES

The EPA will assess the Monitoring Plan against the EPA Guideline 'Regulatory monitoring and testing - Monitoring plans requirements'.

4 ADMINISTRATION

4.1 ANNUAL RETURN AND PAYMENT OF ANNUAL FEES (A - 4)

For the purposes of section 48(2)(a) of the Act, the date in each year for the lodgement of the Annual Return is no later than 90 days before the anniversary of the grant or renewal of the Licence; and

- 4.1.1 For the purposes of section 48(2)(b) of the Act, the date in each year for the payment of Annual Authorisation Fee is the anniversary of the grant of the Licence.

4.2 APPROVAL OF OPERATING PROCESSES (A - 6)

The Licensee must not undertake changes to operating processes conducted pursuant to the Licence at the Premises without written approval from the EPA, where such changes:

- 4.2.1 have the potential to increase emissions or alter the nature of pollutants or waste currently generated by, or from the licensed activity; or
- 4.2.2 have the potential to increase the risk of environmental harm; or
- 4.2.3 would relocate the point of discharge of pollution or waste at the Premises.

4.3 APPROVAL OF WORKS (A - 5)

The Licensee must not construct or alter a building or structure, or install or alter any plant or equipment, for use of an activity undertaken pursuant to the Licence at the Premises without written approval from the EPA, where such changes:

- 4.3.1 have the potential to increase the emissions or alter the nature of pollutants or waste currently generated by, or from the licensed activity; or
- 4.3.2 have the potential to increase the risk of environmental harm; or
- 4.3.3 would relocate the point of discharge of pollution or waste at the Premises.

4.4 CHANGE OF LICENSEE DETAILS (A - 3)

If the Licensee's name or postal address (or both) changes, the Licensee must inform the EPA within 28 days of the change occurring.

4.5 LICENCE RENEWAL (A - 2)

For the purposes of section 43(3) of the Act, an application for Renewal of the Licence must be made no later than 90 days before the expiry date of the Licence.

4.6 OBLIGATIONS TO EMPLOYEES, AGENTS AND CONTRACTORS (A - 1)

The Licensee must ensure that every employee, agent or contractor responsible for undertaking any activity regulated by the Licence, is informed as to the conditions of the Licence.

4.7 VARIATION OF CONDITIONS OF LICENCE (U - 1402)

The EPA may:

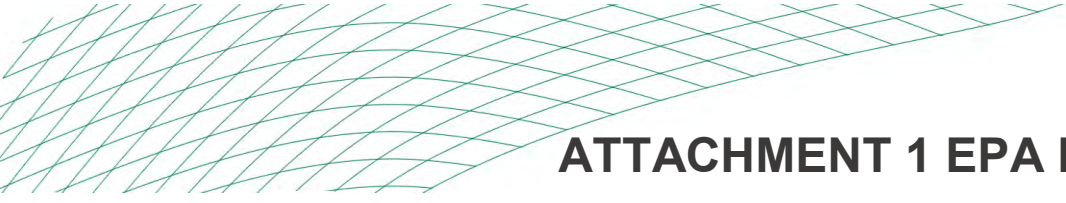
- 4.7.1 impose conditions or vary conditions of this licence at any time by notice in writing to the Licensee in the following circumstances:
- a in relation to:
 - i odour, noise and dust emissions; or
 - ii environmental pollutants (including saline discharges, bitterns, acidic discharges); or
 - iii revision and implementation of plans required by this licence; or
 - iv monitoring of conditions at the Premises and/or any area potentially impacted by activities on the Premises; or
 - b if the Licensee:
 - i recommences commercial salt production at the Premises; or
 - ii makes any other change in operations at the Premises requiring approval under Part 8B Division 7 Mining Act 1971; or
 - iii decides to cease activities undertaken pursuant to this Licence.

Attachments

ATTACHMENT1.pdf"

20230907 LICENCE ATTACHMENT 2.pdf"

20230907 LICENCE ATTACHMENT 3.pdf"



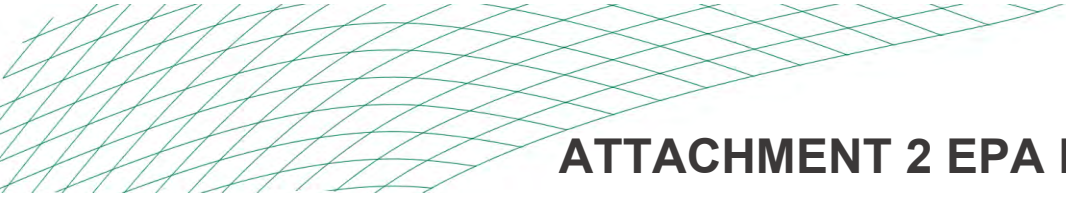
ATTACHMENT 1 EPA LICENCE 40942

Table 1: Discharge Locations

Discharge Identification	Discharge Name	Location Description	Latitude	Longitude
A	Bolivar Channel Outfall	Immediately upstream of the SA Water Bolivar WWTP Outfall Weir called Weir 2	-34.6968°	138.4821°
B	Bitterns Discharge	Pump 8 Discharge Point	-34.815615°	138.557044°
		E Row Drain Flap	-34.795350°	138.578516°
C	Gawler River Discharge	Immediately downstream of the Gawler River Weir	-34.671857°	138.466507°

Table 2: Compliance Criteria

Location Identification	Location	Latitude/Longitude	Nature of Discharge	PARAMETER	COMPLIANCE CRITERIA
A	Immediately upstream of the SA Water Bolivar WWTP Outfall Weir called Weir 2	Latitude -34.6968°	Bolivar Channel Outfall Saline Water Discharge	Salinity	45 parts per thousand measured on a 6 hour rolling average
		Longitude 138.4821°			
B	Pump 8 Discharge Point	Latitude -34.815615°	Bitterns Discharge	Suspended Solids	80 milligrams per litre + 80% seasonal maximum
		Longitude 138.557044°		pH	6.5 – 9.2
	E Row Drain Flap	Latitude -34.795350°		Salinity	The hydrography of stream flow causes a permanent change in isohaline patterns of no more than 10% of the background variation
		Longitude 138.578516°		Oxygen (dissolved)	The discharge is subject to turbulent flow to ensure that it is discharged with highest possible Oxygen saturation
		Longitude 138.466507°			



ATTACHMENT 2 EPA LICENCE 40942

BDC PA6 MONITORING PLAN

The Licensee will undertake, or engage a suitably qualified expert to undertake, the following standard monitoring and reporting to the EPA, unless otherwise directed by the EPA:

No	Action	Due Date
1.	Install a surveyed water level indicator (in meters AHD) in Pond PA6 at the location identified on the attached map.	1 October 2023
2.	Measure water level at the above mentioned Pond PA6 surveyed water level indicator	Weekly commencing 1 October 2023
3.	Monitor daily (to 9am) rainfall data (mm) at the Edinburgh Bureau of Meteorology weather station at http://www.bom.gov.au/climate/dwo/IDCJDW5015.latest.shtml	Daily
4.	Provide EPA with the following: • pond water level data • rainfall data	Monthly (on 1st business day of each month)

Note: If monitoring indicates that trigger levels identified in the TARP have been reached, the TARP may require certain actions to be taken, including additional monitoring and reporting.

ATTACHMENT 2 EPA LICENCE 40942

MAP OF SURVEYED WATER LEVEL INDICATOR



ATTACHMENT 3 EPA LICENCE 40942

BDC TRIGGER ACTION RESPONSE PLAN (TARP)

If the Licensee becomes aware that a trigger level identified in the second column has been reached, the Licensee must take the actions identified in the third and fourth columns below, unless otherwise directed by the EPA.

No	Trigger	Additional monitoring and reporting requirements	Actions to reduce environmental risk
Water level triggers			
1.	>25mm rainfall has occurred in the previous 2 days (as recorded at the Edinburgh Bureau of Meteorology weather station http://www.bom.gov.au/climate/dwo/IDCJDW5015.latest.shtml	Monitor water level in Pond PA6 at the Pond PA6 surveyed water level indicator on a daily basis for the subsequent 5 days.	No action required if water level is below 1.50mAHD.
2.	If water level at Pond PA6 surveyed water level indicator is between 1.50mAHD and 1.56mAHD	Licensee to report water level in Pond PA6 to EPA on a daily basis.	Licensee to mobilise pumping infrastructure in preparation to reduce water level in Pond PA6
3.	If water at Pond PA6 surveyed water level indicator >1.56mAHD	As per No. 2 Licensee to advise EPA, DEM and DEW within 24hrs that the trigger level has been reached and pumping is to commence. Provide EPA with daily volume of water pumped out from Pond PA6	Licensee to commence pumping and ensure that water levels in Pond PA6 as are as low as reasonably practicable, and at all times lower than 1.6mAHD when measured at the Pond PA6 surveyed water level indicator.

Note: Licensee must follow any applicable access protocols to the Bolivar Channel



Our reference: ME9903160 / MP0159

FISHERIES & AQUACULTURE

2 Hamra Avenue
West Beach SA

GPO Box 1625
Adelaide SA 5001

Tel (08) 8207 5333

www.pir.sa.gov.au

28 May 2021

Mr Matthew Size
Buckland Dry Creek Pty Ltd
PO Box 234
PORT ADELAIDE SA 5015

Email: nick.at.withers@gmail.com

Dear Mr Size

MINISTERIAL EXEMPTION AND PERMIT – ME9903160 / MP0159

I refer to your application for a Ministerial exemption for the use of net to remove carp from the Bolivar channel outfall and Ministerial permit to set the net in the St Kilda – Chapman Creek Aquatic Reserve.

I have decided to grant you a Ministerial exemption as requested. A copy of the exemption notice (ME9903160) is attached. I understand this activity is to collect any potential dead carp or other fish as a result of your high saline discharge into the SA Water's Bolivar wastewater treatment plant outfall.

It is your responsibility to ensure that you are aware of your obligations under this Ministerial exemption. The *Fisheries Management Act 2007* provides that it is an offence to breach a condition of an exemption.

I have also decided to grant you a permit issued pursuant to section 77 of the *Fisheries Management Act 2007* to undertake the activity of setting the net within the St Kilda – Chapman Creek Aquatic Reserve. A copy of the permit notice (MP0159) is also attached.

It is your responsibility to ensure that you are aware of your obligations under these conditions. The *Fisheries Management Act 2007* provides that it is an offence to breach a condition of a permit. Please note this permit may be revoked at any time.

Should you require further information, please contact Keith Rowling, Program Leader, Community Based Fisheries on telephone 0437 675 573.

Yours sincerely

Prof Gavin Begg
EXECUTIVE DIRECTOR
FISHERIES AND AQUACULTURE



Government of South Australia

Department of Primary Industries
and Regions

FISHERIES MANAGEMENT ACT 2007

Section 77

PERMIT FOR ACTIVITIES WITHIN AN AQUATIC RESERVE

Permit Number: MP0159
Permit holder: Buckland Dry Creek Pty Ltd
412 Hanson Rd
North Dry Creek SA 5094
Specified Aquatic Reserve/s: St Kilda – Chapman Creek

Pursuant to section 77 of the *Fisheries Management Act 2007*, the holder of this permit or their agents may engage in an activity limited to the disturbance of the bed by setting a net to catch dead or dying fish flushed through the SA Water Bolivar outfall channel in the aquatic reserve specified above, subject to the conditions of this permit.

Conditions:

1. The permit is valid until 27 May 2024, unless varied or revoked earlier.
2. The net may only be set within the specified aquatic reserve adjacent to the SA Water Bolivar outfall channel at 34°41'48.5"S 138°28'55.6"E (GDA94).
3. The permit holder must ensure that the net meets the specifications and conditions included in the schedules of Ministerial exemption **ME9903160** or any subsequent Ministerial exemption provided for this activity.
4. While engaging in the permitted activity, the permit holder or their agents must be in possession of a copy of this permit. It must be produced to a Department of Primary Industries and Regions (PIRSA) Fisheries Officer if requested.
5. The permit holder must not contravene or fail to comply with the *Fisheries Management Act 2007* or any regulations made under that Act, except where specifically permitted by this notice.

Date: 28 May 2021

Prof Gavin Begg

EXECUTIVE DIRECTOR

FISHERIES & AQUACULTURE

Delegate of the Minister for Primary Industries and Regional Development

FISHERIES MANAGEMENT ACT 2007: SECTION 115

EXEMPTION NO. ME9903160

TAKE NOTICE that pursuant to Section 115 of the *Fisheries Management Act 2007*, Buckland Dry Creek Pty Ltd, 412 Hanson Rd North Dray Creek 5094 (the 'exemption holder') or a person nominated as their agent are exempt from section 70 of the *Fisheries Management Act 2007*, and Regulation 5 and 10, clause 74 and 39 of Schedule 6 and Schedule 7 of the *Fisheries Management (General) Regulations 2017*, but only insofar as they may use a net to capture fish species in the waters set out in Schedule 1 using gear set out in Schedule 2 (the exempted activity), subject to the conditions set out in Schedule 3, from 28 May 2021 until 27 May 2022, unless varied or revoked earlier.

SCHEDULE 1

The waters of the St Kilda – Chapman Creek aquatic reserve adjacent to the SA Water Bolivar outfall channel at 34°41'48.5"S 138°28'55.6"E (GDA94).

SCHEDULE 2

The mesh size of any net used must not be less than 12 mm. Where a net is constructed with wire, the mesh size must exceed 50 mm.

SCHEDULE 3

1. The exemption holder or their agents must retain all fish captured under this exemption and must destroy them humanely on capture.
2. All fish retained under this exemption must be disposed of appropriately at an approved waste facility.
3. Fish taken under this exemption cannot be sold and must not be used for any commercial purpose.
4. The exemption holder or its agents must notify the Department of Primary Industries and Regions (PIRSA) in writing at least 24 hours prior to changing the configuration of the net.
5. Employees of the Department of Energy and Mining are authorised to act as agents under this exemption.
6. The exemption holder must notify PIRSA FISHWATCH on 1800 065 522 at least two hours prior to conducting the exempted activity and answer a series of questions about the exempted activity. The exemption holder must provide information about the area and time of the exempted activity, the vehicles and boats involved, the number of agents undertaking the exempted activity and other related questions.

7. While engaged in the exempted activity the exemption holder or agent must be in possession of a copy of this notice and such a notice must be produced to a PIRSA Fisheries Officer if requested.
8. The exemption holder must provide a written report to PIRSA Fisheries and Aquaculture at (GPO Box 1625, ADELAIDE SA 5001) within fourteen days of the completion of each collection made pursuant to this exemption, providing details of the numbers of fish, location, time and conditions of the collection.
9. The exemption holder must notify the Minister when the exempted activity has been finalised if the activity ceases before the end of the term of this notice.
10. The exemption holder must not contravene or fail to comply with the *Fisheries Management Act 2007* or any regulations made under that Act, except where specifically exempted by this notice.

Dated 28 May 2021



Prof Gavin Begg

EXECUTIVE DIRECTOR

FISHERIES AND AQUACULTURE

Delegate of the Minister for Primary Industries and Regional Development

APPENDIX 4

Impact and Risk Assessment – Holding Pattern – Before Commercial Salt Production

Elements of the Environment

Impact Events

Risk Assessment

**This information has also been separately provided in an Excel
Workbook:**

***Impact and Risk Assessment - No Salt Production with Holding
Pattern – 240122***

Elements of the Environment

Environmental Risk Assessment for Buckland Dry Creek Pty Limited - Dry Creek Site Holding Pattern Before Resumption of Salt Production

Elements of the Environment

Environmental element	Presence and form at site	Stakeholder issues	Applicable legislation	Environmental receptors
			and/or standards	
(a) land, air, water (including both surface and underground water and sea water), organisms, ecosystems, native fauna and other features or elements of the natural environment	All ponds in Sections, 2, 3 and 4 with the associated bunds, seepage drains and hydraulic structures	Impacts to land, air, water, organisms, ecosystems, native fauna and other features are subject to the <i>Environment Protection Act</i> .	<i>Environment Protection Act 1993</i>	the external estuarine tidal environment with its mangrove, salt bush and salt grass vegetation Groundwater
	All crystallisers, final areas and associated infrastructure in Section 1			
	There are natural watercourses passing through the landscape of the ponds in Sections 2 to 4 and extending into and through the external estuarine environment with its mangrove, salt bush and salt grass vegetation. The bunds cross these watercourses. Some drains have already been filled as part of land rehabilitation works.			
	Groundwater seeps from east to west under the ponds.			
	The western side of the salt field is bordered by the estuarine environment with its mangrove, salt bush and salt grass vegetation Section 1 and the southern part of Section 2 is bordered by the North South Motorway on an embankment To the east of Section 2 Ponds PA16 to PA10 lies the Bolivar Sewage Treatment Plant. This facility is separated from the easter bunds of the Section 2 ponds by a tidally flushed constructed drain that also transmits a) stormwater flows passing through the Bolivar facility and b) emergent groundwater seepage that from the Bolivar facility.			
(b) buildings, structures and other forms of infrastructure, and cultural artefacts	In addition to the bunds there are: a) security fences b) access roads c) Constructed brine pumping facilities at Middle Beach, Gawler River, Chapman Creek, PA5, PA9, PA12 d) Electric power supplies to these pumps e) a pipeline to transmit pumped brine from PA5 to the SA Water Bolivar Outfall f) a pipeline to transmit pumped brine from PA9 to PA10 g) a pipeline and a channel to transmit brine by gravity flow between PA11 and PA12 h) stoplog weir structures between various ponds i) concrete pipe syphon connecting PA10 and PA11. j) pipelines over the Gawler river k) groundwater pumping wells l) bridges over water courses m) SEAGas Pipeline n) HV Power lines and pylons	SA Water, DIT, Salisbury Council have all been notified of BDC's future intentions around land rehabilitation. To date there have been no significant concerns raised by any party about their assets.	Operational requirements & standards for SA Water,DIT and Salisbury Council	The North South Motorway and its users The drainage functions of the tidal creeks (Dry Creek, Between PA9 and PA10, PA10 and PA11 and PA11 and PA12) The drainage function of the constructed drain between the Bolivar STP and PA6 to PA10 The residents and visitors to St Kilda
	The township of St Kilda lies at the north west corner of PA6			
	The North South Motorway passes by PA12, and the channel connecting PA111 to PA12, and the access road between PA11 and PA12			
	There re licensed discharge points for bitters at Dry Creek and North Arm Creek			
	There are tidal watercourses also important for stormwater drainage of land to the east, between PA9 and PA10, PA10 and PA11, and PA11 and PA12			
(c) existing or permissible land use	The land is under mining tenements, salt mining is a permitted activity.	none raised	not applicable	not applicable
(d) public health, safety or amenity	There is no access to the site for the public.	BDC is satisfied with the existing security arrangements for the site's perimeters.	-	-
(e) & (f) geological heritage, aesthetic or cultural values of an area	There are no geological heritage values and no aesthetic or cultural values at the site.	none raised	not applicable	not applicable

Impact Events

Environmental Risk Assessment for Buckland Dry Creek Pty Limited - Dry Creek Site Holding Pattern Before Resumption of Salt Production
This covers Section 1 (except for the part being filled for mine completion and closure); and all Ponds in Sections 2 to 4

IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F1	Impacts on numbers / diversity of protected birds from habitat change. Water levels diminished in ponds and creation of drained areas of ground resulting in lack of suitable mix of water depths.	Changes in the depth of water in ponds	Drainage / discontinued flushing of selected ponds at the site.	Surface Water	Water Level	Shorebirds and water birds	32 listed migratory species recorded or considered likely to occur.	Yes	Previous studies have shown the relationship between water levels and usage by shorebirds and water birds.
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F2	Predation of migratory shorebirds. Land produced by draining ponds to date will provide easier access for predators and feral animals. Feral animals will be attracted by the bird life and by other fauna that colonise the drained ponds.	Changes in the depth of water in ponds	Drainage	Drained areas	Creation of drained areas of ground	Shorebirds and water birds	32 listed migratory species recorded or considered likely to occur.	Yes	
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F3	Increase in exotic and invasive plants and weeds. Eventually, without adequate control, weeds could spread over drained areas impacting on flora and fauna habitat. Conditions will tend to favour salt tolerant plants.	Drainage of ponds	Drainage / discontinued flushing of selected ponds at the site. Changes to the water / groundwater regime within the site, and associated changes to soil substrate conditions	Drained areas	Creation of drained areas of ground	biodiversity, remnant vegetation on the salt fields	Reduced potential for establishment of native plant communities.	Yes	
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F4	Increase in exotic and invasive fauna. Exotic animal species can occupy habitat niches to the exclusion of native species. They may also graze or trample flora to excess, and the physical aspects of some exotic species (e.g. sharp hoofs) may be damaging to surface roots of plants not evolved to deal with these aspects	Changes in the depth of water in ponds	Drainage / discontinued flushing of selected ponds at the site.	Drained areas	Creation of drained areas of ground	Terrestrial Ecosystems within the site, including EPBC Act listed marine or migratory bird species recorded at the site	Feeding and roosting habitat for migratory shorebirds and food.	Yes	
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F5	Impact on food sources for migratory birds from slow reduction in water quality (increasing salinity, increase in BOD, nutrients, algae). Reduction of availability of benthic organisms, fish and bottom dwelling species for food.	Decline in the quality of water in wet ponds if inadequately flushed	Poor quality of residual water in draining / drained ponds and their topographic depressions, trenches, drains, creeks or water bodies, if these cannot drain freely (via infiltration or runoff) or be refreshed frequently enough.	Surface Water	Reduction in water quality (increasing salinity, increase in BOD, nutrients, algae)	EPBC Act listed marine or migratory bird species recorded at the site	The birds rely on benthic organisms, fish and bottom dwelling species for food.	Yes	
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F6	Loss of migratory bird habitat. Drainage of more ponds may result in loss of habitat for migratory shorebirds and other species of conservation significance	Saline water discharge	Ridley has an authorisation under the Environment Protection Act to discharge saline water at a location downstream of the SA Water Bolivar Waste Water Treatment Plant Outfall Weir. The discharge must not have a salinity greater than 45 parts per thousand	Water	saline water	EPBC Act listed marine or migratory bird species recorded at the site	habitat becomes less suitable for shorebirds as salinity increases	Yes	
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F7	Impact to marine life in the adjacent parts of the gulf from export of diseases of marine life in ponds.	Discharges into the marine environment of water from the site	Discharge of water and associated marine life from ponds to the marine environment	Water	The pathway is provided by the licensed point of discharge.	Marine flora and fauna	External marine life in the Gulf St Vincent	No	Fish in Salinas are derived from native populations and do not have diseases or parasites that present a risk to native populations
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F8	Genetic changes to the external marine life in the adjacent parts of the Gulf caused by differences in the genetic make-up of the marine life in the ponds	Discharges into the marine environment of water from the site	Discharge of water and associated marine life from ponds to the marine environment	Water	The pathway is provided by the licensed point of discharge.	Marine flora and fauna	External marine life in the Gulf St Vincent	No	Fish in Salinas are derived from native populations
Flora & Fauna	No SP-Holding Pattern 2-4	No SP - F9	Impact to flora and fauna in the adjacent parts of the estuarine environment from indirect discharge of brine.	Brine Discharges from inundated ponds		Brine Discharge	The pathway is provided by seepage of brine from the ponds via the bunds and through the floors of the ponds into groundwater, and then seepage of this brine impacted groundwater to emerge in the external environment	Flora and fauna in the external estuarine environment between Section 2 and the Gulf St Vincent	Flora and fauna in the external estuarine environment between Section 2 and the Gulf St Vincent	Yes	The floors of the ponds, the natural water courses passing through the ponds and under the western bunds, and the bunds provide the seepage pathways. The difference in piezometric head between the brine (or ponded water from groundwater infiltration and rain water in the absence of this brine) inside the ponds and the groundwater levels west of the ponds provides the driving force for seepage. Data from groundwater wells have confirmed the existence of a hydraulic gradient and seepage a) of groundwater from east to west under/through the ponds; and b) of brine when present in these ponds. This is seepage is intrinsic to the nature of the salt field. This The flora and fauna in the vicinity of where this seepage reached eastwards and entered watercourses outside the bunds to the

Environmental Risk Assessment for Buckland Dry Creek Pty Limited - Dry Creek Site Holding Pattern Before Resumption of Salt Production
This covers Section 1 (except for the part being filled for mine completion and closure); and all Ponds in Sections 2 to 4

IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Surface Water	No SP-Holding Pattern 2-4	No SP - SW1	Odours as a result of deterioration of quality of residual water in draining / drained ponds and their topographic depressions, trenches, drains, creeks or water bodies.	Changes to water levels in ponds	Drainage / discontinued flushing of selected ponds at the site.	Drained areas	Reduction in water in ponds	Environmental uses	Environmental uses of waters in drains, creeks or water bodies on site	Yes	
Surface Water	No SP-Holding Pattern 2-4	No SP - SW2	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality.	Stormwater and drainage channels	Quality of stormwater entering the site from offsite	Water		Environmental uses	Environmental uses of waters in drains, creeks or water bodies on site	No	The salt fields are bunded with an external perimeter seepage drain and isolated from externally sourced runoff
Surface Water	No SP-Holding Pattern 2-4	No SP - SW3	Impacts to water quality required for aquatic life. Runoff within the site impacting waterways	Stormwater and drainage channels	Quality of stormwater runoff from the site into the drainage channels, waterways at the site	Water		Environmental uses	Environmental uses of waters in drains, creeks or water bodies on site	No	The bunds provide barriers
Surface Water	No SP-Holding Pattern 2-4	No SP - SW4	Impacts from midges and mosquitoes etc. as a result of water quality in the ponds if left un-drained or not flushed	Deterioration of water quality in the ponds, if left un-drained or not flushed		Air		Humans	Residents and occupants / workers at and outside the site	Yes	
Surface Water	No SP-Holding Pattern 2-4	No SP - SW5	Impacts from midges and mosquitoes etc. as a result of deterioration of quality of residual water in draining / drained ponds and their topographic depressions, trenches, drains, creeks or water bodies	Deterioration of quality of residual water in draining / drained ponds	Deterioration of quality of residual water in draining / drained ponds and their topographic depressions, trenches, drains, creeks or water bodies resulting in breeding of midges and mosquitoes etc	Air		Humans	Residents and occupants / workers at and outside the site	Yes	
Surface Water	No SP-Holding Pattern 2-4	No SP - SW6	Algal blooms in the water due to increased salinity, low oxygen, and availability of nutrients and organic carbon.	Deterioration of water quality in the ponds, if left un-drained or not flushed	Deterioration of water quality in the ponds, if left un-drained or not flushed, with the right temperature conditions, the water quality could deteriorate (low oxygen, increase in salinity, availability of nutrients and organic carbon) and lead to algal blooms in the water	Drained areas	Reduction in water in ponds	Human	Residents and occupants / workers at and outside the site	Yes	
Surface Water	No SP-Holding Pattern 2-4	No SP - SW7	Short term increases in salinity of tidal waters localised to the vicinity of the discharge point	Discharges into the marine environment of water from the site	Discharges into the marine environment of water from the site containing salt at concentrations higher than background sea water, and if present, other chemicals at concentrations higher than background sea water.	Water	The pathway is provided by the licensed point of discharge.	Environmental uses	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the marine environment	Yes	
Surface Water	No SP-Holding Pattern 2-4	No SP - SW8	Permanent change (in the mixing zone of the discharge) of salinity or concentrations of other chemicals	Discharges into the marine environment of water from the site	Discharges of bitterns and hypersaline water to the marine environment	Water	The pathway is provided by the licensed point of discharge.	Environmental uses	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the marine environment	Yes	
Surface Water	No SP-Holding Pattern 2-4	No SP - SW9	Prevention of formation of healthy terrestrial flora and fauna habitats as a result of acidity and metals leaching into surface water (in topographic depressions, trenches, drains, creeks)	Changes to water levels in ponds	Drainage / discontinued flushing of selected ponds at the site.	Groundwater	Acidity enters shallow groundwater and the surface water within the site. Groundwater seeps into drainage channels within the site to impact water in these channels.	Environmental uses of land within the site			Buffering of acidity available from saline water and from carbonate content of sands and calcarenite layers / lenses. Existing fill and operations at the site provide barrier to acidity

Environmental Risk Assessment for Buckland Dry Creek Pty Limited - Dry Creek Site Holding Pattern Before Resumption of Salt Production

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IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Surface Water	No SP-Holding Pattern 2-4	No SP - SW10	Change of salinity or concentrations of other chemicals in natural drainage pathways in the intertidal area adjacent to Section 2 Salinas	Prolonged discharges into the marine environment of water from the site	Prolonged Discharges of hypersaline brine to the marine environment	Groundwater	The pathway is provided if excessive rates of seepage into the external environment occur from inundated ponds containing hypersaline brine.	Environmental uses of the surface water	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the intertidal environment	Yes	
Surface Water	No SP-Holding Pattern 2-4	No SP - SW10	Change of salinity or concentrations of other chemicals in natural drainage pathways in the intertidal area adjacent to Section 3 and 4 Salinas that have sea bunds	Prolonged discharges into the marine environment of water from the site	Prolonged Discharges of hypersaline brine to the marine environment	Groundwater	The pathway is provided if excessive rates of seepage into the external environment occur from inundated ponds containing hypersaline brine.	Environmental uses of the surface water	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the intertidal environment	Yes	

Environmental Risk Assessment for Buckland Dry Creek Pty Limited - Dry Creek Site Holding Pattern Before Resumption of Salt Production
This covers Section 1 (except for the part being filled for mine completion and closure); and all Ponds in Sections 2 to 4

IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Ground water	No SP-Holding Pattern 2-4	No SP - G1	Use of groundwater impacting other users	Dissolving operation	Freshwater from the salt field bores in the T1 aquifer was used in the dissolving operation at Dry Creek.	Water		Other users of groundwater in the T1 and T3 aquifers		Yes	
Ground water	No SP-Holding Pattern 2-4	No SP - G2	Contamination, salinity, acid sulphate conditions impairing the quality of infiltration to groundwater at the site	Dissolving operation		Water		Human and environmental uses	Other users of groundwater in the T1 and T3 aquifers, and environmental	Yes	
Ground water	No SP-Holding Pattern 2-4	No SP - G3	Impaired water quality impacting on the aquatic environment. The shallow groundwater may seep into drainage channels and provide water for flora in their riparian zones. Impaired water quality could impact the aquatic environment in the drainage channels and also the riparian flora	Changes to water levels in ponds	Contamination, salinity, acid sulphate conditions impair the quality of infiltration to groundwater at the site	Groundwater	Seepage / Leaching of water to the groundwater	Environmental uses	Environmental uses of surface water within the site	Yes	
Ground water	No SP-Holding Pattern 2-4	No SP - G4	Groundwater seepage from inundated ponds without sea bunds impacting groundwater dependent ecosystems	Changes to water levels in ponds	Contamination, salinity, acid sulphate conditions impair the quality of infiltration to groundwater at the site	Groundwater	Seepage / Leaching of water to the groundwater	Environmental uses	Environmental uses of surface water within the site	Yes	
Ground water	Resumed Salt Production Operations 1-4	No SP - G5	Groundwater seepage from inundated ponds with sea bunds impacting groundwater dependent ecosystems outside the ponds	Brine in inundated ponds	Contamination, salinity conditions impair the quality of infiltration to groundwater at the site	Groundwater	Infiltration water from inundated ponds to the groundwater, then seepage of groundwater to the external environment	Environmental uses	Environmental uses of surface water outside the site	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A1	Dusts from exposed ground surfaces affecting the amenity of adjoining human receptors	Exposed ground surface	Surfaces exposed from draining of ponds	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A2	Dusts from exposed ground surfaces affecting the health of adjoining human receptors	Exposed ground surface	Surfaces exposed from draining of ponds	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A3	Dust from ASS affecting health of adjoining human or ecological receptors	Exposed acid sulphate soil	Surfaces exposed from draining of ponds	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans and ecological receptors			
Air Quality	No SP-Holding Pattern 2-4	No SP - A4	Dust from exposed ground surfaces affecting adjoining areas of conservation significance	Exposed ground surface	Surfaces exposed from draining of ponds	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A5	Dust from calslit stockpile in Pond XC2E affecting amenity of adjoining human receptors	Use of Calslit for remediation		Air/wind	Dust impacts are provided by wind moving the air offsite.	Humans	Adjoining residents	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A6	Odour from eutrophication of pooled rainfall water affecting the amenity of adjoining receptors	Pooled Rainfall	Algae blooms from Synechococcus and other species (e.g. dried ponds XE2 and XE2S)	Air/wind	Light wind conditions transporting odours from exposed acid sulphate soil surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A7	Odours from decay of organic material in anaerobic conditions affecting the amenity of adjoining receptors	Decaying organic matter	Anaerobic decay where pockets of organic matter accumulate.	Air/wind	Light wind conditions transporting odours from exposed acid sulphate soil surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A8	Odour from exposed acid sulphate soils affecting the amenity of adjoining receptors	Exposed acid sulphate soil	Surfaces exposed from draining of ponds	Air/wind	Light wind conditions transporting odours from exposed acid sulphate soil surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A9	Odour from algal blooms affecting the medium-term amenity of adjoining receptors	Deterioration of water quality in the ponds, if left un-drained or not flushed	Deterioration of water quality in the ponds, if left un-drained or not flushed, with the right temperature conditions, the water quality could deteriorate (low oxygen, increase in salinity, availability of nutrients and organic carbon) and lead to algal blooms in the water	Air/wind	Light wind conditions transporting odours from exposed acid sulphate soil surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	No SP-Holding Pattern 2-4	No SP - A10	Foam impacting on adjoining land uses	Salinas	Saline water	Air/wind	Wind transportation of foam to traffic areas.	Adjoining infrastructure and vehicles	St Kilda Tramway and vehicles on roads adjoining Salinas	Yes	

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IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ1	Acidity generated from ASS / MBO impacts on existing vegetation	Soils	ASS / MBO in Sections 2-4	Exposure to acidity in soils. Surface or ground water		Vegetation within and adjoining site		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ2	Acidity generated from ASS / MBO impacts on revegetation of drained ponds	Soils	ASS / MBO in Sections 2-4	Exposure to acidity in soils.		Revegetation within drained ponds		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ3	Acidity generated from ASS / MBO impacts on on-site or off-site infrastructure	Soils	ASS / MBO in Sections 2-4	Exposure to acidity in soils. Surface or ground water		On-site and off-site infrastructure		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ4	Acidity generated from ASS / MBO impacts on future land uses	Soils	ASS / MBO in Sections 2-4	Exposure to acidity in soils. Surface or ground water		Future land uses		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ5	Discharge of acidic water generated from ASS / MBO impacts on the marine environment	Soils	ASS / MBO in Sections 2-4	Surface water	Through licensed discharge points	Marine environment	Site workers and people living or working outside the mine development	Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ6	Contamination of soil from leaks or spills impacts on current or future land uses	Contaminants	Contamination from Stage 1 Works and contamination of soils from chemical spills / leaks and from hyper salinity from Historic Operations	Exposure to contaminants in soils. Surface or ground water	Potential for hydrocarbons and chemicals to nester groundwater and be transported. Potential movement also in stormwater.	Human uses of land within and adjoining site		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ7	Exposure to salt / gypsum impacted soils impacts on earthworks or built structures on site	Salt / Gypsum impacted soils	Exposure to Salt / Gypsum impacted soils in all sections	Drained areas / Groundwater	The pathways are direct exposure to gypsum or salt; soils impregnated with gypsum or salt; and solution of gypsum or salt in groundwater.	Earthworks and built structures on site		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ8	Exposure to salt / gypsum impacted soils impacts on ecological values on or off site	Salt / Gypsum impacted soils	Exposure to Salt / Gypsum impacted soils in all sections	Drained areas / Groundwater	The pathways are direct exposure to gypsum or salt; soils impregnated with gypsum or salt; and solution of gypsum or salt in groundwater.	Ecological values		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP-Holding Pattern 2-4	No SP - SQ9	Asbestos fibres in soil impact on human health	Asbestos material	Pipes, building materials that include Asbestos Containing Materials (ACM).	Drained areas / Groundwater	Transport of asbestos fibres by air movement to the breathing zone of people. Inhalation of air containing asbestos fibres.	Humans	Adjoining residents	Yes	
Noise	Residual Operations 1	No SP - N1	Noise from machinery used in residual operations affecting adjoining residents	Machinery	Machinery used in residual operations in Section 1	Air		Humans	Adjoining residents	Yes	
Noise	No SP-Holding Pattern 2-4	No SP - N2	Vehicle noise on site affecting adjoining residents	Vehicle movement	Vehicle movement around salt fields	Air		Humans	Adjoining residents	Yes	
Noise	No SP-Holding Pattern 2-4	No SP - N3	Noise from operating pumps affecting adjoining residents	Operating pumps	Operating pumps to move water between pumps in the salt fields	Air		Humans	Adjoining residents	Yes	
Noise	Closure Investigations	No SP - N4	Noise from machinery used in investigations and trials affecting adjoining residents	Machinery and vehicles	Vehicle and machinery movement at trial sites	Air		Humans	Adjoining residents	Yes	
Noise	Closure Investigations	No SP - N5	Noise from machinery used in investigations and trials affecting fauna	Machinery and vehicles	Vehicle and machinery movement at trial sites	Air		Fauna		Yes	
Heritage	Closure Investigations	No SP - H1	Disturbance of heritage sites by earthworks, vehicles or machinery	Earthworks, machinery and vehicle movement	Direct disturbance through earthworks. Off-road vehicle and machinery movement	Direct disturbance	Direct disturbance through contact with heritage sites, as well as vibration and movement of soil in proximity to heritage area.	Heritage	Items and areas of heritage significance	Yes	
Heritage	Closure Investigations	No SP - H2	Damage to heritage sites from fire	Operation of machinery and vehicles		Spread of uncontrolled fire		Heritage	Items and areas of heritage significance	Yes	
Heritage	No SP-Holding Pattern 2-4	No SP - H3	Drop in water levels exposes heritage sites	Water levels	Changes in water levels as a result of pond drainage.	Water	Water draining from ponds	Heritage	Items and areas of heritage significance	Uncertain	There is a possibility that unknown heritage sites could be exposed by pond drainage.

Risk Assessment

Environmental Risk Assessment for Buckland Dry Creek Pty Limited - Dry Creek Site Holding Pattern Before Resumption of Salt Production
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RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
				Very High High Medium Low Negligible	Very High High Medium Low Negligible			Very High High Medium Low Negligible	Very High High Medium Low Negligible	Very High High Medium Low Negligible		
				Very High High Medium Low Negligible	Very High High Medium Low Negligible			Very High High Medium Low Negligible	Very High High Medium Low Negligible	Very High High Medium Low Negligible		
				Very High High Medium Low Negligible	Very High High Medium Low Negligible			Very High High Medium Low Negligible	Very High High Medium Low Negligible	Very High High Medium Low Negligible		
				Very High High Medium Low Negligible	Very High High Medium Low Negligible			Very High High Medium Low Negligible	Very High High Medium Low Negligible	Very High High Medium Low Negligible		
Flora & Fauna	No SP - F1	Impacts on numbers / diversity of protected birds from habitat change. Water levels diminished in ponds and creation of drained areas of wetlands resulting in lack of suitable mix of water depths.	Minimal change to current water levels affecting numbers / diversity of protected birds	Negligible	Yes - EPBC Act: Significant Impact Guidelines 1.1 Significant impact guidelines for 36 migratory shorebird species	Adjustment of pumping and discharge rates to manage water levels and water quality in inundated ponds.	Uncertainty relates to cumulative impacts on shorebirds and waterbirds from changes to water levels and draining of ponds. Uncertainties regarding the extent to which drainage of wet ponds in Section 3 will provide shorebird habitat. Experience of Holding pattern 2014 to 2020 indicates that with the controls, the impact has been negligible (= Loss in numbers of individuals not apparent and no reduction in localised population viability. No conservation or remedial measures necessary)	Unlikely	Low	Negligible	No adverse impacts on the abundance and diversity of flora, fauna and avifauna species outside the external toes of the sea bunds, as a result of operations undertaken on Salt field	1
Flora & Fauna	No SP - F2	Predation of migratory shorebirds. Land produced by draining ponds to date will provide easier access for predators and feral animals. Feral animals will be attracted by the bird life and by other fauna that colonise the drained ponds.	No significant spread of pest plants or animals	Negligible	Yes - EPBC Act: Significant Impact Guidelines 1.1 Significant impact guidelines for 36 migratory shorebird species	Ongoing pest animal control program	Uncertainty relates to cumulative impacts on shorebirds and waterbirds from changes to water levels and draining of ponds. Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= Loss in numbers of individuals not apparent and no reduction in localised population viability. No conservation or remedial measures necessary)	Unlikely	Low	Negligible		
Flora & Fauna	No SP - F3	Increase in exotic and invasive plants and weeds. Eventually, without adequate control, weeds could spread over drained areas impacting on flora and fauna habitat. Conditions will tend to favour salt tolerant plants.	No significant spread of pest plants or animals	Negligible	No	Ongoing weed control program. Cooperation with neighbours on weed control.	Uncertainty relates to cumulative impacts on shorebirds and waterbirds from changes to water levels and draining of ponds. Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= Loss in numbers of individuals not apparent and no reduction in localised population viability. No conservation or remedial measures necessary)	Unlikely	Low	Negligible	No loss of abundance and/or diversity of native vegetation on land outside the mine tenements, as a result of clearance due to the salt field operations unless significant environmental benefits has been approved in accordance with the relevant legislation.	3
Flora & Fauna	No SP - F4	Increase in exotic and invasive fauna. Exotic animal species can occupy habitat niches to the exclusion of native species. They may also graze or trample flora to excess, and the physical aspects of some exotic species (e.g. sharp hoofs) may be damaging to surface roots of plants not evolved to deal with these aspects	No significant spread of pest plants or animals	Negligible	No	Ongoing pest animal control program. Management of grazing on site.	Uncertainty relates to cumulative impacts on shorebirds and waterbirds from changes to water levels and draining of ponds. Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= Loss in numbers of individuals not apparent and no reduction in localised population viability. No conservation or remedial measures necessary)	Unlikely	Low	Negligible		
Flora & Fauna	No SP - F5	Impact on food sources for migratory birds from slow reduction in water quality (increasing salinity, increase in BOD, nutrients, algae). Reduction of availability of benthic organisms, fish and bottom dwelling species for food.	Minimal change to current water quality. Decrease in salinity in southern ponds.	Negligible	No	Adjustment of pumping and discharge rates to manage water levels and water quality in wet ponds. Ponds containing significant habitat maintained as wet ponds. A macroinvertebrate data collection program is underway to address uncertainties.	Uncertainty relates to cumulative impacts on shorebirds and waterbirds from changes to water levels and draining of ponds. It is not clear how changes to pond water levels will affect prey availability. Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= Loss in numbers of individuals not apparent and no reduction in localised population viability. No conservation or remedial measures necessary)	Unlikely	Low	Negligible	No adverse impacts on the abundance and diversity of flora, fauna and avifauna species outside the external toes of the sea bunds, as a result of operations undertaken on Salt field	1
Flora & Fauna	No SP - F6	Loss of migratory bird habitat. Drainage of more ponds may result in loss of habitat for migratory shorebirds and other species of conservation significance	Loss of quality habitat	Low	Yes - EPBC Act: Significant Impact Guidelines 1.1 Significant impact guidelines for 36 migratory shorebird species	No further pond draining is proposed. New PEPR Revision required for any proposed pond drainage. Review of any proposed drainage against significant impact guidelines. Maintain important habitat areas as wet ponds. Drainage of more ponds could be a controlled action under the EPBC Act	Uncertainty relates to cumulative impacts on shorebirds and waterbirds from changes to water levels and draining of more ponds	Unlikely	Low	Negligible		
Flora & Fauna	No SP - F7	Impact to marine life in the adjacent parts of the gulf from export of diseases of marine life in ponds.	No measurable impact	Negligible	No	Measures to reduce numbers of fish leaving Salinas in seawater outflows	Future introduction of diseases	Unlikely	Low	Negligible		
Flora & Fauna	No SP - F8	Genetic changes to the external marine life in the adjacent parts of the Gulf caused by differences in the genetic make-up of the marine life in the ponds	No measurable impact	Negligible	No	Not required	Low	Unlikely	Low	Negligible	No adverse impacts on the environmental values of Surface Water quality and use due to EPA licenced discharge of brines and bitterns from the salt field or due to uncontrolled brine seepage from the salt field	2
Flora & Fauna	No SP-F9	Impact to flora and fauna in the adjacent parts of the estuarine environment from indirect discharge of brine.	As per event IDs "No SP-SW10 and No SP-SW11"	Low	No	As per event IDs "No SP-SW10 and No SP-SW11"	As per event IDs "No SP-SW10 and No SP-SW11"	Unlikely	Low	Negligible	Note: Surface water include marine waters	
Surface Water	No SP - SW2	Odours as a result of deterioration of quality of residual water in draining / drained ponds and their topographic depressions, trenches, drains, creeks or water bodies.	Minor short term episodic impacts may occur	Low	No	Monitoring of ponds to identify emergent issues that may prompt a management intervention.	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= "No adverse public health and no significant nuisance impacts due to air emissions, dust, pest insect species, odour, or noise)	Unlikely	Low	Negligible	No adverse public health and or significant nuisance impacts due to air emissions, dust, pest insect species, odour, or noise Note: A significant nuisance impact is considered to be one that generates a complaint that is confirmed as attributable to the salt field and cannot be addressed within the timeframes specified in the measurement criteria	8

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RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1 (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
Surface Water	No SP - SW2	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality.	Unplanned stormwater flows not expected to enter Salinas	Negligible	No	Maintain bunding on Salinas and seepage drains	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= 'No measurable adverse impacts on water quality in Salinas)	Rare	Negligible	Negligible	No adverse impacts on the environmental values of Surface Water quality and use due to EPA licenced discharge of brines and bitterns from the salt field or due to uncontrolled brine seepage from the salt field	2
Surface Water	No SP - SW3	Impacts to water quality required for aquatic life. Runoff within the site impacting waterways	Unplanned stormwater flows not expected to enter Salinas	Negligible	No	Maintain existing drains and stormwater pits	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= 'No complaints about and no observed adverse impacts on water quality in waterways from this event and pathway)	Rare	Negligible	Negligible	Note: Surface water include marine waters	
Surface Water	No SP - SW4	Impacts from midges and mosquitoes etc. as a result of water quality in the ponds if left un-drained or not flushed	Holding pattern is expected to maintain water quality	Negligible	No	Operation of inundated ponds with water quality resembling historical levels. Active monitoring of ponds to identify emergent issues which may prompt a management intervention. Managing pools of water across the site, particularly in drying ponds.	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= 'No complaints about and no observed adverse impacts from midges and mosquitoes etc. from water quality in inundated ponds)	Unlikely	Low	Negligible		
Surface Water	No SP - SW5	Impacts from midges and mosquitoes etc. as a result of deterioration of quality of residual water in draining / drained ponds and their topographic depressions, trenches, drains, creeks or water bodies	Minor short term episodic impacts may occur	Low	No	Operation of inundated ponds with water quality resembling historical levels. Active monitoring of ponds to identify emergent issues which may prompt a management intervention. Managing pools of water across the site, particularly in drying ponds.	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= 'No complaints about and no observed adverse impacts from midges and mosquitoes etc. from water quality in drained ponds)	Unlikely	Low	Negligible	No adverse public health and or significant nuisance impacts due to air emissions, dust, pest insect species, odour, or noise Note: A significant nuisance impact is considered to be one that generates a complaint that is confirmed as attributable to the salt field and cannot be addressed within the timeframes specified in the measurement criteria	8
Surface Water	No SP - SW6	Algal blooms in the water in drained ponds due to increased salinity, low oxygen, and availability of nutrients and organic carbon.	Holding pattern is expected to maintain water quality	Negligible	No	Provision of adequate numbers of suitably sited cuts through bunds / gates through bunds to discharge run off from drained / draining ponds, coupled with swales where needed to ensure the pond's ground surface is reasonably free draining, and that water cannot pond, pool for long enough to deteriorate in quality and generate significant odours. While a pond is actively in transition from being an inundated to a drained condition, active monitoring of ponds to identify emergent issues that may prompt a management intervention.	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact has been negligible (= 'No complaints about and no significant algal blooms in residual in drained ponds)	Unlikely	Low	Negligible		
Surface Water	No SP - SW7	Short term increases in salinity of tidal waters localised to the vicinity of the discharge point	No adverse impact outside mixing zone	Negligible	Yes - EPA Licence	Buckland Dry Creek ensures compliance with discharge criteria through discharge salinity monitoring.	Experience of Holding pattern 2014 to 2020 indicates that with the controls there has been compliance with licence conditions	Unlikely	Low	Negligible		
Surface Water	No SP - SW8	Long term change (in the mixing zone of the discharge) of salinity or concentrations of other chemicals	No adverse impact outside mixing zone	Negligible	Yes - EPA licence.	Buckland Dry Creek ensures compliance with discharge criteria through discharge salinity monitoring.	Experience of Holding pattern 2014 to 2020 indicates that with the controls there has been compliance with licence conditions	Unlikely	Low	Negligible		
Surface Water	No SP - SW9	Prevention of formation of healthy terrestrial flora and fauna habitats as a result of acidity and metals leaching into surface water (in topographic depressions, trenches, drains, creeks)	No adverse impact expected	Negligible	No	Use of Aerial Photography for monitoring of ponds to identify emergent issues which may prompt a management intervention. Managing pools of water across the site, particularly in drying ponds, where monitoring shows this is necessary	Experience of Holding pattern 2014 to 2020 indicates that healthy terrestrial flora is slowly revegetating the drained ponds - at rates thought to be influenced by local variations in surface soil types, surface drainage and flushing of residual salts from these soils to lower the salinity. Uncertainties remain about the potential, in some organic rich soils for acidification given the calcareous nature of its fine grained sand and silt content, and of the wind blown particles that fill the shrinkage cracks that form as this soil dries out.	Unlikely	Low	Negligible	No adverse impacts on the environmental values of Surface Water quality and use due to EPA licenced discharge of brines and bitterns from the salt field or due to uncontrolled brine seepage from the salt field	2
Surface Water	No SP - SW10	Change of salinity or concentrations of other chemicals in natural drainage pathways in the intertidal area adjacent to Section 2 Salinas	In the absence of brine from PAS entering Section 2, the only water that is in these ponds is that from seepage inflows from groundwater and tidal water and from rainfall. Low expected impact on vegetation adjacent to the sea bunds = Minor loss in numbers of individuals apparent but no reduction in localised or regional population viability. No conservation or remedial measures necessary, and minor alterations to ecosystem interactions in the localised area are detectable. No conservation or remedial measures necessary	Low	No	No input of brine from PAS into this Section unless discharge from PAS to the SA Water outfall is prevented, and this renders input of brine into Section 2 unavoidable In the absence of brine from PAS: 1) water levels in these ponds represent the balance of seepage inflows, seepage outflows and rainfall / evaporation. In summer months evaporation removes the shallow water that may have accumulated over the winter months and keeps the ponds mostly dry, except in the lowest parts; 2) limited pumping from PA9 into PA10, keeps water levels there below 1.5 m AHD approximately. This pumping also prevents water level in PA6 to PA9 rising much above about 1.6 m AHD 3) Salinity concentrations in the pond water are close to saturation levels because of dissolution of salts from the floor of the pond. The only way to reduce these concentrations would be to flow lower salinity brine from PAS through the Section 2 ponds to Section 1 and with a short enough residence time, but this would require input of brine from PAS with control of pumping rates at PAS, PA9 and PA12. In the event that discharge to the SA water outfall from PAS is not possible, and in the absence of an alternate viable source of discharge, seepage from SWF into Kaituma would be unavoidable - in these circumstances the control strategies	Assuming no input of brine from PAS into Section 2 - Low Uncertainty because of the evidence from the holding pattern from 2014 to 2019	Unlikely	Low	Negligible	Note: Surface water include marine waters	
Surface Water	No SP - SW11	Change of salinity or concentrations of other chemicals in natural drainage pathways in the intertidal area adjacent to Section 3 and 4 Salinas that have sea bunds	Low expected impact on vegetation adjacent to the sea bunds = Minor loss in numbers of individuals apparent but no reduction in localised or regional population viability. No conservation or remedial measures necessary, and minor alterations to ecosystem interactions in the localised area are detectable. No conservation or remedial measures necessary	Low	No	Maintain salinities and water levels in these Salinas within ranges required for salt production. This will preserve saturation, to oxygen condition in the soils of the floors of the ponds and the sea bunds. It will also preserve the salinity and rate of seepage at values compatible with historic values, which are associated with low impact	Low from experience of holding pattern and previous salt production operations	Unlikely	Low	Negligible		

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RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
Ground water	No SP - G1	Use of groundwater impacting other users	Usage of groundwater will not increase and is not expected to affect other users.	Low	Yes - NRM Licence	Monitoring of bore water usage, use of recycled stormwater, and implementation of formal work instructions for resource management, bore management and wetlands water.	N/A	Unlikely	Moderate	Low	No adverse impact to the quantity of groundwater available to existing users and groundwater dependent ecosystems as a result of mining operations.	4
Ground water	No SP - G2	Contamination, salinity, acid sulphate conditions impairing the quality of infiltration to groundwater at the site	No adverse impact expected.	Negligible	No	ASS investigations prior to draining any inundated pond, and management plan developed where required. SOPs in place for spills. Well-established monitoring program for groundwater use.	N/A	Unlikely	Moderate	Low		
Ground water	No SP - G3	Impaired water quality impacting on the aquatic environment. The shallow groundwater may seep into drainage channels and provide water for flora in their riparian zones. Impaired water quality from drained ponds could impact the aquatic environment in the drainage channels and also the riparian flora	No additional impact	Negligible	No	ASS investigations prior to draining any inundated pond, and management plan developed where required. SOPs in place for spills. Well-established monitoring program for groundwater use. Investigations including groundwater monitoring and risk reduction and management plan developed prior to inundating drained ponds;	Detailed ASS/MBO Investigations and groundwater investigations completed in Section 2 provide information to better understand this risk 'Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact on groundwater dependent ecosystems outside these drained ponds has been negligible (= 'Alterations to ecosystem interactions in the localised area not detectable. Loss in numbers of individuals not apparent and no reduction in localised population viability') Experience of Holding pattern 2014 to 2020 also indicates that where drained ponds become re-inundated with salt field brine and contain or develop hypersaline levels of salinity, impact on groundwater dependent ecosystems outside these drained ponds has been high. The available data does not provide conclusive evidence of cause and effect, but it is thought possible that changes in the transmissivity of preferential seepage pathways and in the sodium absorption ratio of the groundwater may be a risk factor for the observed impacts.	Probable	Low	Low	No adverse impacts on the environmental values of Surface Water quality and use due to EPA licensed discharge of brines and bitterns from the salt field or due to uncontrolled brine seepage from the salt field	2
Ground water	No SP - G4	Groundwater seepage from inundated ponds without sea bunds impacting groundwater dependent ecosystems	No additional impact	Negligible	No	ASS investigations prior to draining any inundated pond, and management plan developed where required. SOPs in place for spills. Well-established monitoring program for groundwater use. Investigations including groundwater monitoring and risk reduction and management plan developed prior to inundating drained ponds;	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact on groundwater dependent ecosystems outside these drained ponds has been negligible (= 'Alterations to ecosystem interactions in the localised area not detectable. Loss in numbers of individuals not apparent and no reduction in localised population viability') Experience of Holding pattern 2014 to 2020 also indicates that where drained ponds become re-inundated with salt field brine and contain or develop hypersaline levels of salinity, impact on groundwater dependent ecosystems outside these drained ponds has been high. The available data does not provide conclusive evidence of cause and effect, but it is thought possible that changes in the transmissivity of preferential seepage pathways and in the sodium absorption ratio of the groundwater may be a risk factor for the observed impacts.	Probable	Low	Low	Note: Surface water include marine waters	
Ground water	No SP - G5	Groundwater seepage from inundated ponds with sea bunds impacting groundwater dependent ecosystems outside the ponds	As per event IDs " No SP-SW11"	Negligible	No	As per event IDs " No SP-SW11"	As per event IDs " No SP-SW11"	As per event IDs " No SP-SW11"	As per event IDs " No SP-SW11"	As per event IDs " No SP-SW11"		
Air Quality	No SP - A1	Dusts from exposed ground surfaces affecting the amenity of adjoining human receptors	Short term episodic impacts	Low	Yes - National Environment Protection (Ambient Air Quality) Measure	Natural revegetation of exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impacts from drained ponds in Sections 2, 3 and 4 (with the exception of Pond XC2E in Section 3) have caused no complaints about adverse public health and or significant nuisance impacts due to dust. Also the controls in place for Pond XC2E have minimised complaints about adverse public health and or significant nuisance impacts due to dust and reduced the impact to "low" (= Minor excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability may be detectable in a localised or regional area but are short term in nature.)	Likely	Low	Low		
Air Quality	No SP - A2	Dusts from exposed ground surfaces affecting the health of adjoining human receptors	No measurable impact expected	Negligible	Yes - National Environment Protection (Ambient Air Quality) Measure	Natural revegetation of exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impacts from drained ponds in Sections 2, 3 and 4 (with the exception of Pond XC2E in Section 3) have caused no complaints about adverse public health and or significant nuisance impacts due to dust. Also the controls in place for Pond XC2E have minimised complaints about adverse public health and or significant nuisance impacts due to dust and reduced the impact to "low" (= Minor excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability may be detectable in a localised or regional area but are short term in nature.)	Likely	Low	Low		
Air Quality	No SP - A3	Dust from ASS affecting health of adjoining human or ecological receptors	No measurable impact expected	Negligible	Yes - National Environment Protection (Ambient Air Quality) Measure	Natural revegetation of exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impacts from drained ponds in Sections 2, 3 and 4 (with the exception of Pond XC2E in Section 3) have caused no complaints about adverse public health and or significant nuisance impacts due to dust. Also the controls in place for Pond XC2E have minimised complaints about adverse public health and or significant nuisance impacts due to dust and reduced the impact to "low" (= Minor excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability may be detectable in a localised or regional area but are short term in nature.)	Likely	Low	Low		
Air Quality	No SP - A4	Dust from exposed ground surfaces affecting adjoining areas of conservation significance	No measurable impact expected	Negligible	No	Natural revegetation of exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impacts from drained ponds in Sections 2, 3 and 4 (with the exception of Pond XC2E in Section 3) have caused no complaints about adverse public health and or significant nuisance impacts due to dust. Also the controls in place for Pond XC2E have minimised complaints about adverse public health and or significant nuisance impacts due to dust and reduced the impact to "low" (= Minor excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability may be detectable in a localised or regional area but are short term in nature.)	Likely	Low	Low		
Air quality	No SP - A5	Dust from Calcilt stockpile in Pond XC2E affecting amenity of adjoining human receptors	No measurable impact expected	Negligible	Yes - National Environment Protection (Ambient Air Quality) Measure	Implementation of dust management program	Experience of Holding pattern 2014 to 2020 indicates that with the controls the impacts from drained ponds in Sections 2, 3 and 4 (with the exception of Pond XC2E in Section 3) have caused no complaints about adverse public health and or significant nuisance impacts due to dust. Also the controls in place for Pond XC2E have minimised complaints about adverse public health and or significant nuisance impacts due to dust and reduced the impact to "low" (= Minor excursions of concentrations of chemicals of interest and aesthetic properties outside natural variability may be detectable in a localised or regional area but are short term in nature.)	Likely	Low	Low		

Environmental Risk Assessment for Buckland Dry Creek Pty Limited - Dry Creek Site Holding Pattern Before Resumption of Salt Production
This covers Section 1 (except for the part being filled for mine completion and closure); and all Ponds in Sections 2 to 4

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) <i>(If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)</i>	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
Air Quality	No SP - A6	Odour from eutrophication of pooled rainfall water affecting the amenity of adjoining receptors	Short term episodic impacts	Low	No	Odour monitoring plan. Drainage of problem areas.	Experience of Holding pattern 2014 to 2020 indicates that with the controls the odour impacts from drained ponds have been negligible and unlikely	Unlikely	Negligible	Negligible	No adverse public health and or significant nuisance impacts due to air emissions, dust, pest insect species, odour, or noise Note: A significant nuisance impact is considered to be one that generates a complaint that is confirmed as attributable to the salt field and cannot be addressed within the timeframes specified in the measurement criteria	#
Air Quality	No SP - A7	Odours from decay of organic material in anaerobic conditions affecting the amenity of adjoining receptors	Short term episodic impacts	Low	No	Odour monitoring plan. Drainage of problem areas.	Experience of Holding pattern 2014 to 2020 indicates that with the controls the odour impacts from drained ponds have been negligible and unlikely	Unlikely	Negligible	Negligible		
Air Quality	No SP - A8	Odour from exposed acid sulphate soils affecting the amenity of adjoining receptors	Short term episodic impacts	Low	No	Odour monitoring plan. Drainage of problem areas.	Experience of Holding pattern 2014 to 2020 indicates that with the controls the odour impacts from drained ponds have been negligible and unlikely	Unlikely	Negligible	Negligible		
Air Quality	No SP - A9	Odour from algal blooms affecting the medium-term amenity of adjoining receptors	Short term episodic impacts	Low	No	Odour monitoring plan. Drainage of problem areas.	Experience of Holding pattern 2014 to 2020 indicates that with the controls the odour impacts from drained ponds have been negligible and unlikely	Unlikely	Negligible	Negligible		
Air Quality	No SP - A10	Foam impacting on adjoining land uses	No measurable impact expected	Negligible	No	Erection of shade cloth where required.	Experience of Holding pattern 2014 to 2020 indicates that foam impacts from inundated ponds have been contained within the salt field . Foam impacts are not possible from drained ponds.	Unlikely	Low	Negligible		
Noise	No SP - N1	Noise from machinery used in residual operations affecting adjoining residents	Within regulatory limits and generally within background levels	Negligible	Yes - Environment Protection (Noise) Policy 2007	All equipment, including that used by contractors, is required to comply with relevant noise control policies and guidelines issued by the EPA	N/A	Likely	Negligible	Negligible		
Noise	No SP - N2	Vehicle noise on site affecting adjoining residents	Within regulatory limits and generally within background levels	Negligible	No	All equipment, including that used by contractors, is required to comply with relevant noise control policies and guidelines issued by the EPA	N/A	Unlikely	Negligible	Negligible		
Noise	No SP - N3	Noise from operating pumps affecting adjoining residents	Within regulatory limits and generally within background levels	Negligible	No	Buckland Dry Creek's operating pumps are maintained in good condition, and a complaints register for noise is maintained along with action taken.	N/A	Unlikely	Negligible	Negligible		
Noise	No SP - N4	Noise from machinery used in investigations and trials affecting adjoining residents	Potential short term impacts but within regulatory limits	Low	Yes - Environment Protection (Noise) Policy 2007	All equipment, including that used by contractors, is required to comply with relevant noise control policies and guidelines issued by the EPA	Noise uncertainties stem from the investigations and trials, as the scope of all trials and equipment to be used has not been finalised.	Likely	Low	Low		
Noise	No SP - N5	Noise from machinery used in investigations and trials affecting fauna	Minimal disturbance	Negligible	No	All equipment, including that used by contractors, is required to comply with relevant noise control policies and guidelines issued by the EPA	Response of fauna to noise. Noise uncertainties stem from the investigations and trials, as the scope of all trials and equipment to be used has not been finalised.	Unlikely	Low	Negligible		

Environmental Risk Assessment for Buckland Dry Creek Pty Limited - Dry Creek Site Holding Pattern Before Resumption of Salt Production
This covers Section 1 (except for the part being filled for mine completion and closure); and all Ponds in Sections 2 to 4

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ1	Acidity generated from ASS / MBO impacts on existing vegetation	No measurable impact expected	Negligible	No	Maintain water levels in inundated ponds. ASS/MBO investigations prior to draining of further ponds or allowing exposure of additional ground surfaces. Where appropriate for drainage from drained ponds into seepage drains that connect to the external environment, provide limestone filters for this drainage water where it exits the pond	Detailed ASS/MBO investigations completed and informed the control measures. Experience of Holding pattern 2014 to 2020 indicates that with the control measures there have not been acidity in drainage from drained ponds and so no consequential impacts on vegetation outside the drained ponds	Unlikely	Low	Negligible	No impacts to adjacent land use from the operations and activities undertaken on the Site.	10
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ2	Acidity generated from ASS / MBO impacts on revegetation of drained ponds	Minor localised impact	Low	No	Maintain water levels in ponds. ASS/MBO investigations prior to draining of further ponds or allowing additional exposure of ground surfaces. Follow-up monitoring.	Experience of Holding pattern 2014 to 2020 indicates that healthy terrestrial flora is slowly revegetating the drained ponds - at rates thought to be influenced by local variations in surface soil types, surface drainage and flushing of residual salts from these soils to lower the salinity. Uncertainties remain about the potential, in some organic rich soils for acidification given the calcareous nature of its fine grained sand and silt content, and of the wind blown particles that fill the shrinkage cracks that form as this soil dries out.	Unlikely	Low	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ3	Acidity generated from ASS / MBO impacts on on-site or off-site infrastructure	No measurable impact expected	Negligible	No	Maintain water levels in inundated ponds. ASS/MBO investigations prior to draining of further ponds or allowing exposure of additional ground surfaces. Where appropriate for drainage from drained ponds into seepage drains that connect to the external environment, provide limestone filters for this drainage water where it exits the pond	Detailed ASS/MBO investigations completed and informed the control measures. Experience of Holding pattern 2014 to 2020 indicates that with the control measures there have not been acidity in drainage from drained ponds and so no consequential impacts on internal or external infrastructure.	Unlikely	Low	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ4	Acidity generated from ASS / MBO impacts on future land uses	No measurable impact expected	Negligible	No	Maintain water levels in inundated ponds. ASS/MBO investigations prior to draining of further ponds or allowing exposure of additional ground surfaces. Where appropriate for drainage from drained ponds into seepage drains that connect to the external environment, provide limestone filters for this drainage water where it exits the pond	Detailed ASS/MBO investigations completed and informed the control measures. Experience of Holding pattern 2014 to 2020 indicates that with the control measures there have not been acidity in drainage from drained ponds and so no consequential impacts on external land uses.	Rare	Moderate	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ5	Discharge of acidic water generated from ASS / MBO impacts on the marine environment	No measurable impact expected	Negligible	EPA licence	Maintain water levels in inundated ponds. ASS/MBO investigations prior to draining of further ponds or allowing exposure of additional ground surfaces. Where appropriate for drainage from drained ponds into seepage drains that connect to the external environment, provide limestone filters for this drainage water where it exits the pond	Detailed ASS/MBO investigations completed and informed the control measures. Experience of Holding pattern 2014 to 2020 indicates that with the control measures there have not been acidity in drainage from drained ponds and so no consequential impacts on the marine environment.	Unlikely	Low	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ6	Contamination of soil from leaks or spills impacts on current or future land uses	Minor localised impact that can be readily cleaned up	Negligible	NEPM	Bunding and spill kits	Limited sources for a major spill or leak	Unlikely	Moderate	Low	No contamination of land and soils either on or off the land as a result of mining operations or mine completion and closure operations	5
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ7	Exposure to salt / gypsum impacted soils impacts on earthworks or built structures on site	Minimal impact	Negligible	No	No physical disturbance to the gypsum cap in Section 2; and natural revegetation.	Detailed ASS/MBO investigations completed in Section 2 provide information to better understand this risk. Experience of Holding pattern 2014 to 2020 indicates that earthworks and built structures on site have not had adverse impacts from exposure to salt / gypsum	Rare	Low	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ8	Exposure to salt / gypsum impacted soils impacts on ecological values on or off site	Minimal impact	Negligible	No	Avoiding discharge of brine from PAS into Section 2 Ponds, coupled with pumping to cap seasonal levels of water in Section 2 ponds from incident rainfall, and inward groundwater seepage.	Detailed ASS/MBO investigations and groundwater investigations completed in Section 2 provide information to better understand this risk Experience of Holding pattern 2014 to 2020 indicates that with the controls the impact on groundwater dependent ecosystems outside these drained ponds has been negligible (= Alterations to ecosystem interactions in the localised area not detectable. Loss in numbers of individuals not apparent and no reduction in localised population viability.) Experience of Holding pattern 2014 to 2020 also indicates that where drained ponds become re-inundated with salt field brine and contain or develop hypersaline levels of salinity, impact on groundwater dependent ecosystems outside these drained ponds has been high. The available data does not provide conclusive evidence of cause and effect, but it is thought possible that changes in the transmissivity of preferential seepage pathways and in the sodium absorption ratio of the groundwater may be a risk factor for the observed impacts.	Unlikely	Low	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	No SP - SQ9	Asbestos fibres in soil impact on human health	No measurable impact	Negligible	NEPM	Avoid / prevent disturbance of ACM to the extent practicable. ACM management procedure	Investigations will be needed when disturbance of ACM on or in soil is contemplated	Unlikely	High	Low	No public health impacts from known asbestos containing materials (ACM) stored on site.	6
Heritage	No SP - H1	Disturbance of heritage sites by earthworks, vehicles or machinery	No disturbance proposed	Negligible	No	The location and protection of the Aboriginal artefact scatter is detailed in the company's Heritage Management Instruction.	A comprehensive heritage survey of the salt field has not been undertaken. It is possible other heritage sites exist. The heritage value of the salt field has also not been assessed.	Unlikely	Moderate	Low	No damage, disturbance or interference to Aboriginal and non-Aboriginal heritage sites, objects or remains as a result of mining operations unless it is authorised under the relevant legislation	9
Heritage	No SP - H2	Damage to heritage sites from fire	Fire risk will remain low	Negligible	No	The location and protection of the Aboriginal artefact scatter is detailed in the company's Heritage Management Instruction.	A comprehensive heritage survey of the salt field has not been undertaken. It is possible other heritage sites exist. The heritage value of the salt field has also not been assessed.	Rare	Moderate	Negligible		
Heritage	No SP - H3	Drop in water levels exposes heritage sites	Not expected to affect heritage sites or compromise any heritage value of the salt field	Low	No	The location and protection of the Aboriginal artefact scatter is detailed in the company's Heritage Management Instruction. Surface water quality is managed through a program of pumping and discharge to ensure water levels are maintained at appropriate levels.	A comprehensive heritage survey of the salt field has not been undertaken. It is possible other heritage sites exist. The heritage value of the salt field has also not been assessed.	Unlikely	Moderate	Low		
Values, Aesthetics, Land Use,	No SP-VALU1	Movement of water through the site and associated activities impact on geological feature	No expected impact	Negligible	No	NA	Low uncertainty The site is an existing salt mine and no geological features are present.	Rare	Negligible	Negligible	No impacts to adjacent land use from the operations and activities undertaken on the Site.	10
Land Use, Aesthetics, Values	No SP-VALU2	An unknown aesthetic or cultural value is affected by future salt operations	No expected impact	Negligible	No	NA	Low uncertainty There are no aesthetic or cultural values at the site that differ from the surrounding Saltfield land.	Rare	Negligible	Negligible		
Land Use, Aesthetics, Values	No SP-VALU3	A user of public roads accesses the site on foot and suffers adverse health or injury.	No expected impact	Negligible	No	The site is fenced along public road boundaries to prevent road corridor users including cyclists and pedestrians from entering the site. Dry Creek floodway is a natural barrier to people from Globe Derby Park accessing the site and such people would have to cross other Saltfield land to reach the site.	Low Uncertainty	Rare	Negligible	Negligible	Unauthorised entry to the land does not result in public injuries and or deaths that could have been reasonably prevented by BDC	12
Land Use, Aesthetics, Values	No SP-VALU4	An accident on the Northern Connector results in out-of-control vehicle(s) coming to rest in a Section 1 or Section 2 salt pond	No expected impact	Negligible	No	Where a vehicle collision results in an out-of-control vehicle entering a salt pond, State emergency services provide first response and follow-up notification and investigations. There is no pre-emptive action for BDC in this respect	Low Uncertainty	Rare	Negligible	Negligible		
Land Use, Aesthetics, Values	No SP-VALU5	Views from publicly accessible viewpoints are degraded by site operations.	No expected impact	Negligible	No	NA	Low uncertainty Views from public roads other than the Northern Connector will not be changed by the resumption of salt production. DPTI has established landscaping on the Northern Connector verges to achieve the desired level of screening of the Saltfield.	Rare	Negligible	Negligible	No impacts to adjacent land use from the operations and activities undertaken on the Site.	10
Land Use, Aesthetics, Values	No SP-VALU6	Re-establishment of salt operations prevents other land uses for the Crown land that is under mineral lease.	No expected impact	Negligible	No	NA	Low uncertainty The site already is configured as a salt mine. Government agencies have confirmed to BDC that they have no alternative use for the crown land that is under mineral lease.	Rare	Negligible	Negligible		
Land Use, Aesthetics, Values	No SP-VALU7	The site degrades as a result of salt production / holding pattern .	No expected impact	Negligible	No	NA	Low uncertainty The existing site arrangement with levees and drains is effective in managing water. Salt production requires the site and its infrastructure to be maintained in a good operational condition	Rare	Negligible	Negligible		

APPENDIX 5

Impact and Risk Assessment – Resumed Commercial Salt Production

Elements of the Environment

Impact Events

Risk Assessment

**This information has also been separately provided in an Excel
Workbook:**

Impact and Risk Assessment - Resume Salt – 240122

Elements of the Environment

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations

For Those Parts of the Salt Field Involved in Resumed Salt Production (i.e., excluding those parts remaining in holding pattern or in completion and closure)

Elements of the Environment

Environmental element	Presence and form at site	Stakeholder issues	Applicable legislation and/or standards	Environmental receptors
(a) land, air, water (including both surface and underground water and sea water), organisms, ecosystems, native fauna and other features or elements of the natural environment	All ponds in Sections, 2, 3 and 4 with the associated bunds, seepage drains and hydraulic structures All crystallisers, final areas and associated infrastructure in Section 1 There are natural watercourses passing through the landscape of the ponds in Sections 2 to 4 and extending into and through the external estuarine environment with its mangrove, salt bush and salt grass vegetation. The bunds cross these watercourses. Some drains have already been filled as part of land rehabilitation works. Groundwater seeps from east to west under the ponds. The western side of the salt field is bordered by the estuarine environment with its mangrove, salt bush and salt grass vegetation Section 1 and the southern part of Section 2 is bordered by the North South Motorway on an embankment To the east of Section 2 Ponds PA16 to PA10 lies the Bolivar Sewage Treatment Plant. This facility is separated from the easter bunds of the Section 2 ponds by a tidally flushed constructed drain that also transmits a) stormwater flows passing through the Bolivar facility and b) emergent groundwater seepage that from the Bolivar facility.	Impacts to land, air, water, organisms, ecosystems, native fauna and other features are subject to the <i>Environment Protection Act</i>.	<i>Environment Protection Act 1993</i>	the external estuarine tidal environment with its mangrove, salt bush and salt grass vegetation Groundwater
(b) buildings, structures and other forms of infrastructure, and cultural artefacts	In addition to the bunds there are: a) security fences b) access roads c) Constructed brine pumping facilities at Middle Beach, gawler River, Chapman Creek, PA5, PA9, PA12 d) Electric power supplies to these pumps e) a pipeline to transmit pumped brine from PA5 to the SA Water Bolivar Outfall f) a pipeline to transmit pumped brine from PA9 to PA10 g) a pipeline and a channel to transmit brine by gravity flow between PA11 and PA12 h) stoplog weir structures between various ponds i) concrete pipe syphon connecting PA10 and PA11. j) pipelines over the Gawler river k) groundwater pumping wells l) bridges over water courses m) SEAGas Pipeline n) HV Power lines and pylons The township of St Kilda lies at the north west corner of PA6 The North South Motorway passes by PA12, and the channel connecting PA111 to PA12, and the access road between PA11 and PA12 There re licensed discharge points for biterns at Dry Creek and North Arm Creek There are tidal watercourses also important for stormwater drainage of land to the east, between PA9 and PA10, PA10 and PA11, and PA11 and PA12	SA Water, DIT, Salisbury Council have all been notified of BDC's future intentions around land rehabilitation. To date there have been no significant concerns raised by any party about their assets.	Operational requirements & standards for SA Water,DIT and Salisbury Council	The North South Motorway and its users The drange functions of the tidal creeks (Dry Creek, Between PA9 and PA10, PA10 and PA11 and PA11 and PA12) The drainage function fo the constructed drain between the Bolvr STP and PA6 to PA10 The residents and visitors to St Kilda
(c) existing or permissible land use	The land is under mining tenements, salt mining is a permitted activity.	none raised	not applicable	not applicable
(d) public health, safety or amenity	There is no access to the site for the public.	BDC is satisfied with the existing security arrangements for the site's perimeters.	-	-
(e) & (f) geological heritage, aesthetic or cultural values of an area	There are no geological heritage values and no aesthetic or cultural values at the site.	none raised	not applicable	not applicable

Impact Events

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations
For Those Parts of the Salt Field Involved in Resumed Salt Production (i.e., excluding those parts remaining in holding pattern or in completion and closure)

IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Flora & Fauna	Resumed Salt Production Operations 2-4	SP-F1	Impacts on numbers / diversity of protected birds from habitat change. Water levels and salinities in inundated ponds managed within target ranges resulting in reliable and suitable mix of water depths and salinities.	Operational changes in the depth and salinity of water in inundated ponds	Operational changes in the depth and salinity of water in inundated ponds	Surface Water	Areas of different water depth and salinity affect availability of food in foraging areas for different species	Shorebirds and water birds	32 listed migratory species recorded or considered likely to occur.	Yes	Previous studies have shown the relationship between water levels, salinities and usage by shorebirds and water birds.
Flora & Fauna	Resumed Salt Production Operations 2-4	SP-F2	Predation of migratory shorebirds. Land produced by drained ponds in the holding pattern will provide easier access for predators and feral animals. Feral animals will be attracted by the bird life using the inundated ponds and by other fauna that colonise the drained ponds.	Changes in the depth of water in ponds	Drainage of ponds in holding pattern that are adjacent to inundated ponds used by shorebirds and waterbirds	Drained areas	Creation of drained areas of ground	Shorebirds and water birds	32 listed migratory species recorded or considered likely to occur.	Yes	
Flora & Fauna	Resumed Salt Production Operations 2-4	SP-F3	Impact to marine life in the adjacent parts of the gulf from export of diseases of marine life in ponds.	Discharges from inundated ponds into the marine environment of water from the site	Discharge of water and associated marine life from inundated ponds to the marine environment	Brine Discharge	The pathway is provided by the licensed points of discharge from inundated ponds.	External marine life in the Gulf St Vincent	External marine life in the Gulf St Vincent	No	Fish in salinas are derived from native populations and do not have diseases or parasites that present a risk to native populations
Flora & Fauna	Resumed Salt Production Operations 2-4	SP-F4	Genetic changes to the external marine life in the adjacent parts of the Gulf caused by differences in the genetic make-up of the marine life in the ponds	Discharges from inundated ponds into the marine environment of water from the site	Discharge of water and associated marine life from inundated ponds to the marine environment	Brine Discharge	The pathway is provided by the licensed points of discharge from inundated ponds.	External marine life in the Gulf St Vincent	External marine life in the Gulf St Vincent	No	Fish in salinas are derived from native populations
Flora & Fauna	Resumed Salt Production Operations 2-4	SP-F5	Impact to flora and fauna in the adjacent parts of the estuarine environment from indirect discharge of brine.	Brine Discharges from inundated ponds		Brine Discharge	The pathway is provided by seepage of brine from the ponds via the bunds and through the floors of the ponds into groundwater, and then seepage of this brine impacted groundwater to emerge in the external environment	Flora and fauna in the external estuarine environment between Section 2 and the Gulf St Vincent	Flora and fauna in the external estuarine environment between Section 2 and the Gulf St Vincent	Yes	The floors of the ponds, the natural water courses passing through the ponds and under the western bunds, and the bunds provide the seepage pathways. The difference in piezometric head between the brine (or ponded water from groundwater infiltration and rain water in the absence of this brine) inside the ponds and the groundwater levels west of the ponds provides the driving force for seepage. Data from groundwater wells have confirmed the existence of a hydraulic gradient and seepage a) of groundwater from east to west under /through the ponds; and b) of brine when present in these ponds. This seepage is intrinsic to the nature of the salt field. This The flora and fauna in the vicinity of where this seepage reached root zones and entered watercourse outside the bunds to the ponds have adapted to the baseline environmental conditions created by "normal" rates and salinities of this seepage and how these are moderated by tidal exchange processes..
Surface Water	Resumed Salt Production Operations 2-4	SP-SW1	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality within the site.	Stormwater and drainage channels	Quality of stormwater entering the site from offsite	Water		Environmental uses of the surface water	Environmental uses of waters in drains, creeks or water bodies on site	No	Sections 2 to 4 of the salt fields are bunded and isolated from external sea water and externally sourced runoff. On the landward side there are seepage drains to intercept and divert both externally and internally sourced seepage
Surface Water	Resumed Salt Production Operations Section 1	SP-SW2	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality within the site.	Stormwater and drainage channels	Quality of stormwater entering the site from offsite	Water	The E Row Drain in Section 1 receives stormwater drainage from outside the site and from the internal drains that connect to it. The balance of Section 1 is bunded and isolated from externally sourced runoff	Environmental uses of the surface water	Environmental uses of waters in drains, creeks or water bodies on site	Yes	
Surface Water	Resumed Salt Production Operations Section 1	SP-SW3	Impacts to water quality required for aquatic life. Runoff within the site impacting waterways	Stormwater and drainage channels	Quality of stormwater runoff from the site into the drainage channels, waterways outside inundated ponds, and crystallisers at the site	Water	Surface water runoff within Section 1 that enters drains not connected to E Row Drain is conducted to a detention pond within Section 1. E Row Drain receives and transmits stormwater from wetlands outside the site and for this reason discharges to Dry Creek via a flap which opens when water levels in Dry Creek are low enough. Runoff entering the drains connected to E Row Drain also discharges via the E Row flap	Environmental uses of the surface water	Environmental uses of waters in drains, creeks or water bodies on site	Yes	Surface water runoff within Section 1 that enters drains not connected to E Row Drain is conducted to a detention pond within Section 1. E Row Drain receives and transmits stormwater from wetlands outside the site and for this reason discharges to Dry Creek via a flap which opens when water levels in Dry Creek are low enough. Runoff entering the drains connected to E Row Drain also discharges via the E Row flap
Surface Water	Resumed Salt Production Operations 1-4	SP-SW4	Short term increases in salinity of tidal waters localised to the vicinity of the licenced discharge points	Short term discharges into the marine environment of water from the site	Short term discharges into the marine environment of water from the site containing salt at concentrations higher than background sea water, and if present, other chemicals at concentrations higher than background sea water.	Water	The pathway is provided by the licensed point of discharge.	Environmental uses of the surface water	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the intertidal environment	Yes	
Surface Water	Resumed Salt Production Operations 2-4	SP-SW5	Change of salinity or concentrations of other chemicals in natural drainage pathways in the intertidal area adjacent to Section 2 salinas	Prolonged discharges into the marine environment of water from the site	Prolonged Discharges of hypersaline brine to the marine environment	Groundwater	The pathway is provided if excessive rates of seepage into the external environment occur from inundated ponds containing hypersaline brine.	Environmental uses of the surface water	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the intertidal environment	Yes	

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations
For Those Parts of the Salt Field Involved in Resumed Salt Production (i.e., excluding those parts remaining in holding pattern or in completion and closure)

IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Surface Water	Resumed Salt Production Operations 2-4	SP-SW6	Change of salinity or concentrations of other chemicals in natural drainage pathways in the intertidal area adjacent to Section 3 and 4 salinas that have sea bunds	Prolongued discharges into the marine environment of water from the site	Prolongued Discharges of hypersaline brine to the marine environment	Groundwater	The pathway is provided if excessive rates of seepage into the external environment occur from inundated ponds containing hypersaline brine.	Environmental uses of the surface water	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the intertidal environment	Yes	
Surface Water	Resumed Salt Production Operations 1-4	SP-SW7	Long term change (in the mixing zone of the discharge) of salinity or concentrations of other chemicals	Prolongued discharges into the marine environment of water from the site	Prolongued discharges of bitterns or hypersaline water to the marine environment	Water	The pathway is provided by the licensed points of discharge.	Environmental uses of the surface water	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the intertidal environment	Yes	
Surface Water	Resumed Salt Production Operations 1-4	SP-SW8	Overtopping of inundated pond affects surface water elsewhere.	Discharges of hypersaline pond water into the intertidal and marine environment of water from the site	Discharges of hypersaline pond water into the intertidal and marine environment of hypersaline water from the site	Water	The pathway would be provided by overtopping of bunds	Environmental uses of the surface water	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the intertidal environment	No	Buckland Dry Creek actively controls water levels within limits in inundated ponds. These limits prevent overtopping. The eternal bunds and bunds between ponds are maintained. Overtopping internally would see water captured by internal drains or adjacent ponds. External bunds have crest levels that protect against overtopping from external tides and storm surges. These crest levels provide ample safety margin against overtopping from internal water levels.
Ground water	Resumed Salt Production Operations Section 1	SP-G1	Licensed use of groundwater impacting other users	Salt washing and refining operation	Freshwater from the salt field bores in the T1 aquifer is used in the Salt washing and refining operation at Dry Creek.	Water	Draw down of groundwater	Other users of groundwater in the T1 and T3 aquifers		Yes	
Ground water	Resumed Salt Production Operations 1-4	SP-G2	Contamination, salinity impairing the quality of infiltration to groundwater at the site	Brine in inundated ponds		Water		Human and environmental uses	Other users of groundwater in the T1 and T3 aquifers, and environmental uses of	Yes	
Ground water	Resumed Salt Production Operations 1-4	SP-G3	External regional groundwater and tidal water with a piezometric head higher than that in drainage channels and inundated ponds may seep into these. Impaired water quality could impact the aquatic environment in the drainage channels or the ponds	External Groundwater and Surface Water	The environmental quality of external Groundwater and Surface Water	Groundwater	Seepage of the groundwater from the eternal environment into Sections 1 to 4	Environmental uses	Environmental uses of surface water within the site	Yes	
Ground water	Resumed Salt Production Operations 1-4	SP-G4	Groundwater seepage from inundated ponds impacting groundwater dependent ecosystems outside the ponds	Brine in inundated ponds	Contamination, salinity conditions impair the quality of infiltration to groundwater at the site	Groundwater	Infiltration water from inundated ponds to the groundwater, then seepage of groundwater to the external environment	Environmental uses	Environmental uses of surface water outside the site	Yes	

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations
For Those Parts of the Salt Field Involved in Resumed Salt Production (i.e., excluding those parts remaining in holding pattern or in completion and closure)

Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	IMPACT EVENTS			Linkage Confirmed	Evidence of the Linkage/Non-Linkage
							Pathway Description	Receptor(s)	Receptor Description		
Air Quality	Holding Pattern 2-4	SP-A1	Dusts from exposed ground surfaces affecting the amenity of adjoining human receptors	Exposed ground surface	Surfaces of internal roads, bunds and edges of inundated ponds. Saltfields vehicles moving around the site	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	Holding Pattern 2-4	SP-A2	Dusts from exposed ground surfaces affecting the health of adjoining human receptors	Exposed ground surface	Surfaces of internal roads, bunds and edges of inundated ponds. Saltfields vehicles moving around the site	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	Holding Pattern 2-4	SP-A3	Dust from exposed ground surfaces affecting adjoining areas of conservation significance	Exposed ground surface	Surfaces of internal roads, bunds and edges of inundated ponds. Saltfields vehicles moving around the site	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans	Adjoining residents	Yes	
Air Quality	Holding Pattern 2-4	SP-A4	Foam impacting on adjoining land uses	Salinas	Saline water	Air/wind	Wind transportation of foam to traffic areas.	Adjoining infrastructure and vehicles	St Kilda Tramway and vehicles on roads adjoining salinas	Yes	
Noise	Resumed Salt Production Operations 1-4	SP-N1	Noise from machinery used in residual operations affecting adjoining residents	Machinery	Machinery used in residual operations in Section 1	Air		Humans	Adjoining residents	Yes	
Noise	Resumed Salt Production Operations 1-4	SP-N2	Vehicle noise on site affecting adjoining residents	Vehicle movement	Vehicle movement around salt fields	Air		Humans	Adjoining residents	Yes	
Noise	Resumed Salt Production Operations 1-4	SP-N3	Noise from operating pumps affecting adjoining residents	Operating pumps	Operating pumps to move water between pumps in the salt fields	Air		Humans	Adjoining residents	Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	Resumed Salt Production Operations 1-4	SP-SQ1	Contamination of soil from leaks or spills impacts on current or future land uses	Contaminants	Contamination from Stage 1 Works and contamination of soils from chemical spills / leaks and from hyper salinity from Historic Operations	Exposure to contaminants in soils. Surface or ground water	Potential for hydrocarbons and chemicals to enter groundwater and be transported. Potential movement also in stormwater.	Human uses of land within and adjoining site		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	Resumed Salt Production Operations 1-4	SP-SQ2	Exposure to salt / gypsum impacted soils impacts on earthworks or built structures on site	Salt / Gypsum impacted soils	Exposure to Salt / Gypsum impacted soils in all sections	Drained areas / Groundwater	The pathways are direct exposure to gypsum or salt; soils impregnated with gypsum or salt; and solution of gypsum or salt in groundwater.	Earthworks and built structures on site		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	Resumed Salt Production Operations 1-4	SP-SQ3	Exposure to salt / gypsum impacted soils impacts on ecological values on or off site	Salt / Gypsum impacted soils	Exposure to Salt / Gypsum impacted soils in all sections	Drained areas / Groundwater	The pathways are direct exposure to gypsum or salt; soils impregnated with gypsum or salt; and solution of gypsum or salt in groundwater.	Ecological values		Yes	
Soil Quality (Contamination, Salinity and Acid Sulphate)	Resumed Salt Production Operations 1-4	SP-SQ4	Asbestos fibres in soil impact on human health	Asbestos material	Pipes, building materials that include Asbestos Containing Materials (ACM).	Drained areas / Groundwater	Transport of asbestos fibres by air movement to the breathing zone of people. Inhalation of air containing asbestos fibres.	Humans	Adjoining residents	Yes	
Heritage, Buildings and Structures	Resumed Salt Production Operations 1-4	SP-HBS1	Disturbance of heritage sites by earthworks, vehicles or machinery	Earthworks, machinery and vehicle movement	Direct disturbance through earthworks. Off-road vehicle and machinery movement. Movement of water through site or associated activities	Direct disturbance.. Movement of water via the existing landform	Direct disturbance through contact with heritage sites, as well as vibration and movement of soil in proximity to heritage area. Movement of water through site or associated activities	Heritage	Items and areas of heritage significance. An unknown cultural artefact	Yes	
Heritage, Buildings and Structures	Resumed Salt Production Operations 1-4	SP-HBS2	Damage to heritage sites from fire	Operation of machinery and vehicles		Spread of uncontrolled fire		Heritage	Items and areas of heritage significance	Yes	

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations
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IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Heritage, Buildings and Structures	Resumed Salt Production Operations 1-4	SP-HBS3	Flooding and/or overtopping of ponds in Section 1 affects the Northern Connector and/or Sea Gas pipeline.	Water in Ponds I Section 1		Overtopping	Flooding and/or overtopping of ponds in Section 1 affects the Northern Connector and/or Sea Gas pipeline.	Buildings, structures	The Northern Connector and/or Sea Gas pipeline.	Yes	
Heritage, Buildings and Structures	Resumed Salt Production Operations 1-4	SP-HBS4	The new pipeline connecting PA11 to FAR1 affects DPTI Northern Connector assets.	The new pipeline connecting PA11 to FAR1	A leak from the pipeline	Flooding	Flooding affects the Northern Connector	Buildings, structures	The Northern Connector	Yes	
Values, Amenity, Land Use,	Resumed Salt Production Operations 1-4	SP-VALU1	Movement of water through the site and associated activities impact on geological feature	Movement of water		Disturbance to geology		Geological features		No	There are no identified aesthetic or cultural values at or adjacent to the site.
Land Use, Amenity, Values	Resumed Salt Production Operations 1-4	SP_VALU2	An unknown aesthetic or cultural value is affected by future salt operations	Movement of water through site or associated activities		Existing landform		Aesthetic and cultural values		No	There are no identified aesthetic or cultural values at or adjacent to the site.
Land Use, Amenity, Values	Resumed Salt Production Operations 1-4	SP_VALU3	A user of public roads accesses the site on foot and suffers adverse health or injury.	Existing landform and associated operations		Broken or no fencing or other security/safety barriers		Members of the public		Yes	The verges on public roads appropriately manage safety and security risks for road corridor users.
Land Use, Amenity, Values	Resumed Salt Production Operations 1-4	SP_VALU4	An accident on the Northern Connector results in out-of-control vehicle(s) coming to rest in a Section 1 or Section 2 salt pond	The Public road and the existing landform and associated operations		Out-of-control vehicle(s)		Members of the public		Yes	DPTI has constructed Northern Connector verges in a way that appropriately manages safety and security risks for road corridor users.
Land Use, Amenity, Values	Resumed Salt Production Operations 1-4	SP_VALU5	Vistas from publicly accessible viewpoints are degraded by site operations.	Movement of water		Vistas from Public Roads adjacent to the saltfields		Users of Public Roads adjacent to the saltfields		Yes	Amenity from adjacent public roads will be similar to that experienced in the past by road users passing other nearby Saltfields land as the site's landform already features salt ponds. Resumption of salt production will preserve / improve this amenity by eliminating views of crusted salt and minerals.
Land Use, Amenity, Values	Resumed Salt Production Operations 1-4	SP_VALU6	Re-establishment of salt operations prevents other land uses for the Crown land that is under mineral lease.	Re-establishment of salt operations		Existing landform		The Crown		No	The site has no obvious alternative use to that of a salt mine. If or when other Saltfields land in private mine tenements to the east of the crown land under mineral lease becomes rehabilitated for other use in coming years ,alternative uses for the crown land may emerge to merit consideration.
Land Use, Amenity, Values	Resumed Salt Production Operations 1-4	SP_VALU7	The site degrades as a result of salt production.	Movement of water and associated activities		Disturbance of land		Land		No	The site has operated as a salt mine for decades and is eminently able to withstand future salt production activities.

Risk Assessment

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations
For Those Parts of the Salt Field Involved in Resumed Salt Production (i.e., excluding those parts remaining in holding pattern or in completion and closure)

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) <i>(If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)</i>	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
Flora & Fauna	SP-F1	Impacts on numbers / diversity of protected birds from habitat change. Water levels and salinities in inundated ponds managed within target ranges resulting in viable and suitable mix of water depths and salinities.	Minimal change to current water levels affecting numbers / diversity of protected birds	Negligible	Yes - EPBC Act Significant Impact Guidelines 1.1 Significant impact guidelines for 36 migratory shorebird species	Adjustment of pumping and discharge rates to manage water levels and water quality in inundated ponds.	Low	Unlikely	Low	Negligible		
Flora & Fauna	SP-F2	Predation of migratory shorebirds. Land produced by drained ponds in the holding pattern will provide easier access for predators and feral animals. Feral animals will be attracted by the food life living the inundated ponds and by other fauna that colonise the drained ponds.	No significant spread of pest plants or animals	Negligible	Yes - EPBC Act Significant Impact Guidelines 1.1 Significant impact guidelines for 36 migratory shorebird species	Ongoing pest animal control program	Low	Unlikely	Low	Negligible	No adverse impacts on the abundance and diversity of flora, fauna and <i>au faune</i> species outside the external box of the sea bunds, as a result of operations undertaken on salt field	1
Flora & Fauna	SP-F3	Impact to marine life in the adjacent parts of the gulf from export of diseases of marine life in ponds.	No measurable impact	Negligible	No	Not required	Low	Unlikely	Low	Negligible	No adverse impacts on the environmental values of Surface Water quality and use due to EPA licensed discharge of brines and bitterns from the salt field or due to uncontrolled brine seepage from the salt field	2
Flora & Fauna	SP-F4	Genetic changes to the external marine life in the adjacent parts of the Gulf caused by differences in the genetic make-up of the marine life in the ponds.	No measurable impact	Negligible	No	Not required	Low	Unlikely	Low	Negligible	Note Surface water include marine waters	
Flora & Fauna	SP-F5	Impact to flora and fauna in the adjacent parts of the aburine environment from indirect discharge of brine.	As per event IDs "SP-SWS and SP-SWS"	As per event IDs "SP-SWS and SP-SWS"	As per event IDs "SP-SWS and SP-SWS"	As per event IDs "SP-SWS and SP-SWS"	As per event IDs "SP-SWS and SP-SWS"	As per event IDs "SP-SWS and SP-SWS"	As per event IDs "SP-SWS and SP-SWS"	As per event IDs "SP-SWS and SP-SWS"	No loss of abundance and/or diversity of native vegetation on land outside the mine tenements, as a result of clearance due to the salt field operations unless significant environmental benefit has been approved in accordance with the relevant legislation	3
Surface Water	SP-SW1	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality within the site.	Unplanned stormwater flows not expected to enter Salinas	Negligible	No	Maintain bunding on Salinas and seepage drains	Low	Unlikely	Low	Negligible		2
Surface Water	SP-SW2	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality within the site.	Offsite stormwater enters E Row Drain only, and discharge from there to Dry Creek via E Row Flap. Impacts would be short term and confined to E Row Drain	Negligible	No	Maintain E Row Flap and E Row Drain	Low	Rare	Low	Negligible		
Surface Water	SP-SW3	Impacts to water quality required for aquatic life. Runoff within the site impacting waterways	Unplanned stormwater flows not expected to enter parts of Section 1	Negligible	No	Maintain existing drains and stormwater pits	Low	Unlikely	Low	Negligible		
Surface Water	SP-SW4	Short term increases in salinity of tidal waters localised to the vicinity of the licensed discharge points	No adverse impact outside mixing zone	Negligible	Yes - EPA licence	Buckland Dry Creek ensures compliance with discharge criteria through discharge salinity monitoring.	Low from experience of holding pattern and previous salt production operations	Unlikely	Low	Negligible	No adverse impacts on the environmental values of Surface Water quality and use due to EPA licensed discharge of brines and bitterns from the salt field or due to uncontrolled brine seepage from the salt field	
Surface Water	SP-SW5	Change of salinity or concentrations of other chemicals in natural drainage pathways in the intertidal area adjacent to Section 2 Salinas	In the absence of brine from PAS entering Section 2, the only water that is in these ponds is that from seepage inflow from groundwater and tidal water and from rainfall. Low expected impact on vegetation adjacent to the sea bunds = Minor loss in numbers of individuals apparent but no reduction in localised or regional population viability. No conservation or remedial measures necessary, and minor alterations to ecosystem interactions in the localised area are detectable. No conservation or remedial measures necessary	Moderate	No	No input of brine from PAS into this Section because of the pipeline diverting brine to the system and drain heading to PAS. Pumping of super-saturated water from incident rainfall and groundwater seepage to join brine in this pipeline. Contingency ability for discharge to SA Water before Outfall In the absence of brine from PAS: 1) water levels in these ponds represent the balance of seepage inflow, seepage outflow and rainfall / evaporation. In summer months evaporation removes the shallow water that may have accumulated over the winter months and keeps the ponds mostly dry, except in the lowest parts; 2) limited pumping from PAS into PAS, keeps water levels there below 1.5 m AHD approximately. This pumping also prevents water level in PAS to PAS rising much above about 1.6 m AHD; 3) salinity concentrations in the pond water are close to saturation levels because of dissolution of salts from the floor of the pond. The only way to reduce these concentrations would be to flow lower salinity brine from PAS through the Section 2 ponds to Section 1 and with a short enough residence time, but this would require input of brine from PAS with control of pumping rates at PAS, PAS and P12. In the event that discharge to the SA water outfall from PAS is not possible, and in the absence of an alternate viable licensed discharge,	Low	Unlikely	Low	Negligible	Note Surface water include marine waters	
Surface Water	SP-SW6	Change of salinity or concentrations of other chemicals in natural drainage pathways in the intertidal area adjacent to Section 3 and 4 Salinas that have sea bunds	Low expected impact on vegetation adjacent to the sea bunds = Minor loss in numbers of individuals apparent but no reduction in localised or regional population viability. No conservation or remedial measures necessary, and minor alterations to ecosystem interactions in the localised area are detectable. No conservation or remedial measures necessary	Low	No	Maintain salinities and water levels in these Salinas within ranges required for salt production. This will preserve saturation, to oxygen condition in the soils of the floors of the ponds and the sea bunds. It will also preserve the salinity and rate of seepage at values compatible with historic values, which are associated with low impact	Low from experience of holding pattern and previous salt production operations	Unlikely	Low	Negligible		

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations
For Those Parts of the Salt Field Involved in Resumed Salt Production (i.e., excluding those parts remaining in holding pattern or in completion and closure)

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
Surface Water	SP-SW7	Long term change (in the mixing zone of the discharge of salinity or concentrations of other chemicals	No adverse impact outside mixing zone	Negligible	Yes - EPA licence.	Buckland Dry Creek ensures compliance with discharge criteria through control of pumped discharge and salinity monitoring.	Low from experience of holding pattern and previous salt production operations	Unlikely	Low	Negligible		
Surface Water	SP-SW8	Overtopping of inundated pond affects surface water discharge.	Erosion Damage to crest of external or internal bunds for the pond, necessitating bund repair Overtopping external bunds impacts salinity of water in external drains, creeks	Low	No	Buckland Dry Creek actively controls water levels within limits in inundated ponds. These limits prevent overtopping. The external bunds and bunds between ponds are maintained. Overtopping internally would see water captured by internal drains or adjacent ponds. External bunds have crest levels that protect against overtopping from external tides and storm surges. These crest levels provide ample safety margin against overtopping from internal water levels.	Experience of holding pattern and previous salt production operations demonstrates that the existing site arrangement, and controls is effective in managing pond overtopping risks	Unlikely	Low	Negligible		
Groundwater	SP-G1	licensed use of groundwater impacting other users	Usage of groundwater will not increase and is not expected to affect other users.	Low	Yes - NMM Licence	Monitoring of bore water usage, use of recycled stormwater, and implementation of formal work instructions for resource management, bore management and wetlands water	N/A	Unlikely	Moderate	Low	No adverse impact to the quantity of groundwater available to existing users and groundwater dependent ecosystems as a result of mining operations.	4
Groundwater	SP-G2	Contamination, salinity impairing the quality of infiltration to groundwater at the site	No adverse impact expected.	Negligible	No	Experience shows that impacts to groundwater from historic salt production caused negligible to low adverse environmental impact outside the salt flat. SOPs in place for spills. Well-established monitoring program for groundwater use.	The shallow Quaternary groundwater table is known to be regionally hypersaline, very low yielding and without beneficial use.	Unlikely	Low	Negligible		
Groundwater	SP-G3	External regional groundwater and tidal water with a piezometric head higher than that in drainage channels and inundated ponds may seep into these. Impaired water quality could impact the aquatic environment in the drainage channels or the ponds	No additional impact	Negligible	No	Maintain seepage drains where these exist on the landward side of the salt field Maintain integrity and functionality of sea bunds and other bunds around the inundated ponds and around Section 1		Unlikely	Low	Negligible	No adverse impacts on the environmental values of Surface Water quality and use due to EPA licensed discharge of brines and bitterns from the salt field or due to uncontrolled brine seepage from the salt field Note: Surface water include marine waters	2
Groundwater	SP-G4	As per event ID's "SP-SW5 and SP-SW6"	As per event ID's "SP-SW5 and SP-SW6"	Moderate	No	As per event ID "SP-SW5 "	As per event ID "SP-SW5 "	As per event ID "SP-SW5 "	As per event ID "SP-SW5 "	As per event ID "SP-SW5 "		
Air Quality	SP-A1	Dusts from exposed ground surfaces affecting the amenity of adjoining human receptors. •Odour & pest insects- when the salt ponds are dry, odour from organic deposits can emerge and pest insects can occupy associated areas	Short term episodic impacts	Low	Yes - National Environment Protection (Ambient Air Quality) Measure	Vegetation or other dust prevention for exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Experience from historic salt production demonstrates impacts on air quality were rare and of negligible consequence The Saltfield has a long history of operating with minimal impacts to air quality relating to dust, odour insects and noise. Occasions where those issues become apparent are when poor weather conditions prevail and regional air quality challenges are prevalent, significantly overshadowing any impacts from Saltfield. Regarding odour and pest insects, BDC commitments under the PEPP means that the pond would be filled with water for the vast majority of time, only being dried during certain maintenance activities.	Unlikely	Negligible	Negligible		
Air Quality	SP-A2	Dusts from exposed ground surfaces affecting the health of adjoining human receptors. •Odour & pest insects- when the salt ponds are dry, odour from organic deposits can emerge and pest insects can occupy associated areas	No measurable impact expected	Negligible	Yes - National Environment Protection (Ambient Air Quality) Measure	Vegetation or other dust prevention for exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Experience from historic salt production demonstrates impacts on air quality were rare and of negligible consequence The Saltfield has a long history of operating with minimal impacts to air quality relating to dust, odour insects and noise. Occasions where those issues become apparent are when poor weather conditions prevail and regional air quality challenges are prevalent, significantly overshadowing any impacts from Saltfield. Regarding odour and pest insects, BDC commitments under the PEPP means that the pond would be filled with water for the vast majority of time, only being dried during certain maintenance activities.	Unlikely	Negligible	Negligible		
Air Quality	SP-A3	Dust from exposed ground surfaces affecting adjoining areas of conservation significance. Odour & pest insects- when the salt ponds are dry, odour from organic deposits can emerge and pest insects can occupy associated areas	No measurable impact expected	Negligible	No	Vegetation or other dust prevention for exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Experience from historic salt production demonstrates impacts on air quality were rare and of negligible consequence. The Saltfield has a long history of operating with minimal impacts to air quality relating to dust, odour insects and noise. Occasions where those issues become apparent are when poor weather conditions prevail and regional air quality challenges are prevalent, significantly overshadowing any impacts from Saltfield. Regarding odour and pest insects, BDC commitments under the PEPP means that the pond would be filled with water for the vast majority of time, only being dried during certain maintenance activities.	Unlikely	Negligible	Negligible		
Air Quality	SP-A4	Foam impacting on adjoining land uses	Temporary or no- detectable impacts on amenity or engineered systems or structures. Temporary or no detectable environmental impacts	Negligible	No	Erection of shade cloth where required		Unlikely	Low	Negligible	No adverse public health and or significant nuisance impacts due to air emissions, dust, pest insect species, odour, or noise Note: A significant nuisance impact is considered to be one that generates a complaint that is confirmed as attributable to the salt field and cannot be addressed within the timeframe specified in the measurement criteria	8
Noise	SP-N1	Noise from machinery used in residual operations affecting adjoining residents	Within regulatory limits and generally within background levels	Negligible	Yes - Environment Protection (Noise) Policy 2007	All equipment, including that used by contractors, is required to comply with relevant noise control policies and guidelines issued by the EPA	Regarding noise, the Saltfield are an inherently noise-free operation, with only minor amounts of noise during salt harvesting (away from the site) and from occasional vehicle movements which will produce far less noise than the noise produced by the adjacent Northern Connector.	Unlikely	Negligible	Negligible		

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations
For Those Parts of the Salt Field Involved in Resumed Salt Production (i.e., excluding those parts remaining in holding pattern or in completion and closure)

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
Noise	SP-N2	Vehicle noise on site affecting adjoining residents	Within regulatory limits and generally within background levels	Negligible	No	All equipment, including that used by contractors, is required to comply with relevant noise control policies and guidelines issued by the EPA	Regarding noise, the Saltfield are an inherently noise-free operation, with only minor amounts of noise during salt harvesting (away from the site) and from occasional vehicle movements which will produce far less noise than the noise produced by the adjacent Northern Connector.	Unlikely	Negligible	Negligible		
Noise	SP-N3	Noise from operating pumps affecting adjoining residents	Within regulatory limits and generally within background levels	Negligible	No	BDC's operating pumps are maintained in good condition, and a complaints register for noise is maintained along with action taken.	Regarding noise, the Saltfield are an inherently noise-free operation, with only minor amounts of noise during salt harvesting (away from the site) and from occasional vehicle movements which will produce far less noise than the noise produced by the adjacent Northern Connector.	Unlikely	Negligible	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	SP-S01	Contamination of soil from leaks or spills impacts on current or future land uses	Minor localised impact that can be readily cleaned up	Negligible	NFPM and SAOPA	Bunding and spill kits. If Acid Sulphate Soils are to be disturbed or excavated prepare and implement a task specific acid sulphate risk management plan that complies with NFPM and SAOPA guidance	Limited sources for a major spill or leak	Unlikely	Moderate	Low	No contamination of land and soils either on or off the land as a result of mining operations or mine completion and closure operations	5
Soil Quality (Contamination, Salinity and Acid Sulphate)	SP-S02	Exposure to salt / gypsum impacted soils impacts on earthworks or built structures on site	Minimal impact	Negligible	NFPM and SAOPA	Bunding and spill kits. If Acid Sulphate Soils are to be disturbed or excavated prepare and implement a task specific acid sulphate risk management plan that complies with NFPM and SAOPA guidance	Limited sources for a major spill or leak	Rare	Low	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	SP-S03	Exposure to salt / gypsum impacted soils impacts on ecological values on or off site	Minimal impact	Negligible	NFPM and SAOPA	See SP-G2 and SP-SW5	See SP-G2 and SP-SW5	Unlikely	Low	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	SP-S04	Asbestos fibres in soil impact on human health	No measurable impact	Negligible	NFPM	Avoid / prevent disturbance of ACM to the extent practicable. ACM management procedure		Unlikely	High	Low	No public health impacts from known asbestos containing materials (ACM) stored on site.	6
Heritage, Buildings and Structures	SP-HB51	Disturbance of heritage sites by earthworks, vehicle or machinery	No disturbance proposed	Negligible	No	The location and protection of the Aboriginal artefact scatter is detailed in the company's SOP-SC-AD13 Heritage Management Instruction.	A comprehensive heritage survey of the salt field has not been undertaken. It is possible other heritage sites exist. The heritage value of the salt field has also not been assessed. The land is already heavily modified being an existing mine site.	Unlikely	Moderate	Low	No damage, disturbance or interference to Aboriginal and non-Aboriginal heritage sites, objects or remains as a result of mining operations unless it is authorised under the relevant legislation	9
Heritage, Buildings and Structures	SP-HB52	Damage to heritage sites from fire	Fire risk will remain low	Negligible	No	The location and protection of the Aboriginal artefact scatter is detailed in the company's SOP-SC-AD13 Heritage Management Instruction.	A comprehensive heritage survey of the salt field has not been undertaken. It is possible other heritage sites exist. The heritage value of the salt field has also not been assessed. The land is already heavily modified being an existing mine site.	Rare	Moderate	Negligible		
Heritage, Buildings and Structures	SP-HB53	Flooding and/or overtopping of ponds in Section 1 affects the Northern Connector and/or Sea Gas pipeline	No expected impact	Negligible	No	The Rulley Bund protects the NC corridor from overtopping of the Section 1 pond levees as it is constructed to a higher elevation than other Section 1 pond levees. Periodic condition reviews on on-site levees and drains.	Low uncertainty DPTI constructed the Rulley Bund to their satisfaction having regard to BDC's future plans. The Sea Gas pipeline is buried at depth and is not impacted by flooding or overtopping of Section 1 ponds. BDC is satisfied that the integrity of levees, drains and roadways is sound and they are not in need of repair.	Rare	Negligible	Negligible	No adverse impacts to third-party property and infrastructure on or off the Site as a result of operations and activities undertaken.	11
Heritage, Buildings and Structures	SP-HB54	The new pipeline connecting PA11 to FA12 affects DPTI Northern Connector assets.	No expected impact	Negligible	No	DPTI and BDC have worked closely together to ensure that the pipeline does not affect the integrity of the Northern Connector assets.	DPTI has agreed with BDC for them to be responsible for establishment of the pipeline.	Rare	Negligible	Negligible		
Values, Aesthetics, Land Use, Accessity, Values	SP-VALU11	Movement of water through the site and associated activities impact on geological feature	No expected impact	Negligible	No	NA	Low uncertainty The site is an existing salt mine and no geological features are present.	Rare	Negligible	Negligible	No impacts to adjacent land use from the operations and activities undertaken on the site.	10
Land Use, Accessity, Values	SP-VALU12	An unknown aesthetic or cultural value is affected by future salt operations	No expected impact	Negligible	No	NA	Low uncertainty There are no aesthetic or cultural values at the site that differ from the surrounding Saltfield land.	Rare	Negligible	Negligible		
Land Use, Accessity, Values	SP-VALU13	A user of public roads accesses the site on foot and suffers adverse health or injury.	No expected impact	Negligible	No	The site is fenced along public road boundaries to prevent road corridor users including cyclists and pedestrians from entering the site. Dry Creek Roadway is a natural barrier to people from Globe Derby Park accessing the site and such people would have to cross other Saltfield land to reach the site.	Low Uncertainty	Rare	Negligible	Negligible	Unauthorised entry to the land does not result in public injuries and or deaths that could have been reasonably prevented by BDC	12
Land Use, Accessity, Values	SP-VALU14	An accident on the Northern Connector results in out-of-control vehicle(s) coming to rest in a Section 1 or Section 2 salt pond	No expected impact	Negligible	No	Where a vehicle collision results in an out-of-control vehicle entering a salt pond, State emergency services provide first response and follow-up notification and investigations. There is no pre-emptive action for BDC in this respect	Low Uncertainty	Rare	Negligible	Negligible		
Land Use, Accessity, Values	SP-VALU15	Views from publicly accessible viewpoints are degraded by site operations.	No expected impact	Negligible	No	NA	Low uncertainty Views from public roads other than the Northern Connector will not be changed by the resumption of salt production. DPTI has established landscaping on the Northern Connector verges to achieve the desired level of screening of the Saltfield.	Rare	Negligible	Negligible	No impacts to adjacent land use from the operations and activities undertaken on the site.	10
Land Use, Accessity, Values	SP-VALU16	Re-establishment of salt operations prevents other land uses for the Crown land that is under mineral lease.	No expected impact	Negligible	No	NA	Low uncertainty The site already is configured as a salt mine. Government agencies have confirmed to BDC that they have no alternative use for the crown land that is under mineral lease.	Rare	Negligible	Negligible		

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Resumed Salt Production Operations
For Those Parts of the Salt Field Involved in Resumed Salt Production (i.e., excluding those parts remaining in holding pattern or in completion and closure)

Environmental Aspect	RISK ASSESSMENT											
	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) <i>(If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)</i>	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome ID in Table 20-1
Sand, Silt, Arsenic, Volatiles	SP-VAL17	The site degrades as a result of salt production.	No expected impact	Negligible	No	NA	Low uncertainty. The existing site arrangement with levees and drains is effective in managing water. Salt production requires the site and its infrastructure to be maintained in a good operational condition.	Rare	Negligible	Negligible		

APPENDIX 6

Impact and Risk Assessment – Filling F, G, H Rows

Elements of the Environment

Impact Events

Risk Assessment

**This information has also been separately provided in an Excel
Workbook:**

Impact and Risk Assessment - PM248 Filling – 240122

Elements of the Environment

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

Elements of the Environment

Environmental element	Presence and form at site	Stakeholder issues	Applicable legislation and/or standards	Environmental receptors
(a) land, air, water (including both surface and underground water and sea water), organisms, ecosystems, native fauna and other features or elements of the natural environment	The five crystallisers named F row to H row are already in a form suitable for filling. Minor locations contain crusted salt which is removed prior to filling commencing. Two open pits named as F Row Pit and G Row Pit are situated adjacent to Dry Creek. The water in F Row pit is hydraulically linked to local groundwater and to Dry Creek. There are no natural watercourses on the site, although a network of bittens and stormwater drains exist associated with past Saltfields activities. Some drains have already been filled as part of land rehabilitation works. Minor portions of un-utilised land are situated around the fringes of the site and contain varying types of vegetation such as grasses, shrubs and trees, none of which is considered to have conservation value. Groundwater is situated about 0.5m below the original crystalliser bed level and is highly saline, low yielding and has no beneficial use. Groundwater is likely to be linked hydraulically to Dry Creek to the north and to groundwater beneath other Saltfields land west of D row and E row.	Impacts to land, air, water, organisms, ecosystems, native fauna and other features are subject to the <i>Environment Protection Act</i>.	<i>Environment Protection Act 1993</i>	Dry Creek floodway Adjacent groundwater
(b) buildings, structures and other forms of infrastructure, and cultural artefacts	There are no fixed buildings or other built form structures at the site. Some aboveground and underground pipelines, pump sets, open channel gates and associated water control structures remain and will be removed rather than mothballed. Various public utility assets (water main, sewer mains, high pressure gas pipeline operated by Epic Energy) exist within Lot 21 which is a 30m strip of land situated between F row and G row and owned by SA Water. Additionally, a further high pressure gas line operated by Sea Gas is situated on the western boundary of E row.	SA Water, Epic Energy and Sea Gas have all been notified of BDC's future intentions around land rehabilitation. To date there have been no significant concerns raised by any party about their assets.	Operational requirements & standards for SA Water, Epic Energy and Sea Gas	Users of the Northern Connector Sea Gas pipeline
(c) existing or permissible land use	The land is owned by Buckland Dry Creek Pty Ltd and under PM248, salt mining is a permitted activity. Rehabilitation of the land commenced in 2018 under the Holding Pattern PEPR.	none raised	not applicable	not applicable
(d) public health, safety or amenity	There is no access to the site for the public.	BDC is satisfied with the existing security arrangements for the site's perimeters.	-	-
(e) & (f) geological heritage, aesthetic or cultural values of an area	There are no geological heritage values and no aesthetic or cultural values at the site.	none raised	not applicable	not applicable

Impact Events

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Flora & Fauna	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-F1	Impacts on numbers / diversity of protected birds from habitat change.	Filling of F, G, H Row in PM248		Surface Water	Areas of different water depth and salinity affect availability of food in foraging areas for different species	Shorebirds and water birds	32 listed migratory species recorded or considered likely to occur in the salt field.	No	There is a long history of Saltfields activity and associated knowledge of bird movements in the region. Previous studies have shown no significant usage of F, G, H Rows by shorebirds and water birds. The site is already highly modified with no remnant vegetation and no protected bird habitat present
Surface Water	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-SW1	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality within the site.	Stormwater and drainage channels	Quality of stormwater entering the site from offsite	Water	The E Row Drain in Section 1 receives stormwater drainage from outside the site and from the internal drains that connect to it. The balance of Section 1 is bunded and isolated from externally sourced runoff	Environmental uses of the surface water	Environmental uses of waters in drains, creeks or water bodies on site	Yes	Discharge of stormwater in this manner has occurred under EPA licence for decades
Surface Water	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-SW2	Impacts to water quality required for aquatic life. Runoff from Filling within the site impacting waterways	Stormwater and drainage channels	Quality of stormwater runoff from the filled parts of F, G, H row crystallisers in PM248 into the drainage channels and then to waterways and the estuarine & marine environment outside PM248	Water	Surface water runoff within filling in PM248 that enters E Row drain or other drains that discharge from PM248	Environmental uses of the surface water	Environmental uses of waters in drains, creeks or water bodies on site	Yes	Discharge of stormwater in this manner has occurred under EPA licence for decades E Row Drain receives and transmits stormwater from wetlands outside the site and for this reason discharges to Dry Creek via a flap which opens when water levels in Dry Creek are low enough. Runoff entering the drains connected to E Row Drain also discharges via the E Row flap
Surface Water	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-SW3	Short term increases in salinity of tidal waters localised to the vicinity of the licenced discharge points	Short term discharges into the marine environment of water from unfilled parts of F, G, H row crystallisers in PM248	Quality of stormwater runoff from the unfilled filled parts of F, G, H row crystallisers in PM248 into the drainage channels and then to waterways and the estuarine & marine environment outside PM248	Water	The pathway is provided by the licensed point of discharge.	Environmental uses of the surface water	Environmental uses of water in the parts of Gulf St Vincent adjacent to the site. Flora and fauna in the intertidal environment	Yes	
Ground water	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-G1	Filling affects ground water levels and hydraulic gradients, changing groundwater seepage patterns under PM248	Infiltration through fill placed in F, G, H row		Infiltration to shallow groundwater, then groundwater seepage	Mounding of groundwater under filled parts of F, G, H row generates changes in seepage patterns of shallow groundwater under PM248	Environmental uses of shallow groundwater	Environmental uses of water in the Gulf St Vincent and the groundwater dependent ecosystems outside PM248.	Yes	The shallow Quaternary groundwater table is known to be regionally hypersaline, very low yielding and without beneficial use. AN extensive network of groundwater monitoring wells has identified contamination in groundwater that pre-dates rehabilitation activities, and that may be unrelated to historic salt production activities
Ground water	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-G2	Importation and placement of fill materials containing chemical contamination may allow contamination to migrate to groundwater table affecting its quality.	Infiltration of contamination through fill placed in F, G, H row		Infiltration to shallow groundwater, then groundwater seepage	Mounding of groundwater with contamination under filled parts of F, G, H row generates seepage that causes contamination to migrate in shallow groundwater under PM248	Environmental uses of shallow groundwater	Environmental uses of water in the Gulf St Vincent and the groundwater dependent ecosystems outside PM248.	Yes	The shallow Quaternary groundwater table is known to be regionally hypersaline, very low yielding and without beneficial use. AN extensive network of groundwater monitoring wells has identified contamination in groundwater that pre-dates rehabilitation activities, and that may be unrelated to historic salt production activities
Air Quality	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-A1	Dusts from exposed ground surfaces in filled and unfilled parts of F, G, H row in PM248	Exposed ground surface	Dust—ground being worked and unsealed roadways being traversed by vehicles and machinery can generate dust which can travel off-site during wind events	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans, adjacent flora	Residents of Globe Derby Park and Mawson Lakes Users of Port Wakefield Rd, North-South Motorway, Salisbury Hwy and associated bike and pedestrian paths. Vegetation external to and adjacent to PM248	Yes	Existing rehabilitation works underway since 2018 have been effective in managing dust. Occasions where dust becomes apparent are often when poor weather conditions prevail and regional air quality challenges are prevalent, significantly overshadowing any impacts from Saltfields.
Air Quality	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-A2	Odours from exposed ground surfaces in filled and unfilled parts of F, G, H row in PM248	Exposed ground surface	Odour & pest insects—odour from drying/rotting vegetation in and around open drains and associated pest insects	Air/wind	Light wind, and suitable temperature conditions transporting odours from exposed ground surfaces within the site	Humans	Residents of Globe Derby Park and Mawson Lakes Users of Port Wakefield Rd, North-South Motorway, Salisbury Hwy and associated bike and pedestrian paths.	Yes	There is insufficient fluctuation of water levels and physical properties in open drains to initiate an odour event arising from widespread dying and rotting of adjacent vegetation.
Air Quality	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-A3	Contamination in dust from exposed ground surfaces affecting adjoining areas of conservation significance	Exposed ground surface	Contaminants in dust—ground being worked and unsealed roadways being traversed by vehicles and machinery can generate dust which can travel off-site during wind events	Air/wind	Hot, windy conditions creating and transporting dusts from exposed ground surfaces within the site	Humans, adjacent flora	Residents of Globe Derby Park and Mawson Lakes Users of Port Wakefield Rd, North-South Motorway, Salisbury Hwy and associated bike and pedestrian paths. Vegetation external to and	Yes	Existing rehabilitation works underway since 2018 have been effective in managing contamination levels in soils imported for filling within acceptable limits. They have also been effective in managing dust. Occasions where dust becomes apparent are often when poor weather conditions prevail and regional air quality challenges are prevalent, significantly overshadowing any impacts from Saltfields.

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	IMPACT EVENTS		Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
						Pathway	Pathway Description				
Soil Quality (Contamination, Salinity and Acid Sulphate)	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM-SQ1	Contamination of soil from leaks or spills	Contaminants	Contamination from chemical spills / leaks from equipment and machinery in F, G, H Rows in PM248	Exposure to contaminants in soils. Surface or ground water	Direct exposure to contaminated soil; Potential for hydrocarbons and chemicals to nestle groundwater and be transported. Potential movement also in stormwater.	Humans involved in construction activities and uses of the filled land		Yes	The environmental controls on the rehabilitation works in H row and progressing well at G row have been effective, with engineering and environmental performance data indicating no impacts from contamination
Soil Quality (Contamination, Salinity and Acid Sulphate)	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-SQ2	Unsuitable imported fill contaminates the filled parts of F, G, H Rows in PM248	Contaminants and waste in imported fill	Contamination and waste in fill imported to in F, G, H Rows in PM248	Exposure to contaminants in soils. Surface or ground water	Direct exposure to contaminated soil; Potential for hydrocarbons and chemicals to nestle groundwater and be transported. Potential movement also in stormwater.	Humans involved in construction activities and uses of the filled land		Yes	The environmental controls on the rehabilitation works in H row and progressing well at G row have been effective, with engineering and environmental performance data indicating no impacts from contamination
Soil Quality (Contamination, Salinity and Acid Sulphate)	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-SQ3	Exposure to salt / gypsum impacted soils from unfilled parts of F, G, H Row in PM248 impacts on ecological values on or off site	Salt / Gypsum impacted soils	Exposure to Salt / Gypsum impacted soils	Drained areas / Groundwater	The pathways are direct exposure to gypsum or salt; soils impregnated with gypsum or salt; and solution of gypsum or salt in groundwater.	Ecological values		Yes	
Noise	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-N1	Noise from machinery, vehicles used in filling operations affecting nearby residents	Machinery	Noise from machinery, vehicles, equipment used in filling operations	Air		Humans	Residents of Globe Derby Park and Mawson Lakes Users of Port Wakefield Rd, North-South Motorway	Yes	Vehicle and machinery movements within PM248 produce far less noise at site boundaries than the noise produced by vehicles on adjacent arterial roads.
Heritage, Buildings and Structures	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-HB51	Disturbance of heritage sites by earthworks, vehicles or machinery	Earthworks, machinery and vehicle movement	Direct disturbance through earthworks. Off-road vehicle and machinery movement. Movement of water through site or associated activities	Direct disturbance, Movement of water via the existing landform	Direct disturbance through contact with heritage sites, as well as vibration and movement of soil in proximity to heritage area. Movement of water through site or associated activities	Heritage	Items and areas of heritage significance. An unknown cultural artefact	Yes	The site has operated as a salt mine for decades and no artefacts have been identified in this location. An artefact site does exist several hundred metres away in undisturbed Saltfields land which is outside the rehabilitation area.
Heritage, Buildings and Structures	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-HB52	Damage to heritage sites from fire	Earthworks, machinery and vehicle movement		Spread of uncontrolled fire		Heritage	Items and areas of heritage significance	Yes	The site has operated as a salt mine for decades and no artefacts have been identified in this location. An artefact site does exist several hundred metres away in undisturbed Saltfields land which is outside the rehabilitation area.
Heritage, Buildings and Structures	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-HB53	Earthmoving activities affects adjacent SA Water pipelines, high pressure gas pipeline assets and the BDC brine pipeline connecting PA12 to FAR1	Earthworks, machinery and vehicle movement		Direct disturbance, Movement of water via the existing landform	Direct disturbances, as well as vibration and movement of soil in proximity the structure. Movement of water through site or associated activities	Buildings, structures	SA Water pipelines, high pressure gas pipeline assets and the BDC brine pipeline connecting PA12 to FAR1...	Yes	The SA Water assets and Epic Energy gas pipeline are contained in a services corridor owned by SA Water. The Sea Gas pipeline is buried at depth and is outside any proposed filling area. The brine pipeline is located outside PM248 and so is unaffected by rehabilitation activities. BDC is satisfied that depth of cover at existing ground-level crossings of those assets is sufficient to protect the assets from vibration or compressive loads.
Values, Amenity, Land Use	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-VALU1	Drainage and runoff from filled parts of F, G, H Rows in PM248 impact on geological feature	Movement of water		Disturbance to geology		Geological features		No	There are no identified aesthetic or cultural values at or adjacent to the site. The land is already heavily modified being an existing mine site.
Land Use, Amenity, Values	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-VALU2	An unknown aesthetic or cultural value is affected by filling F, G, H Rows in PM248	Direct disturbance from filling or movement of water from filling or associated activities		Filling impacts on existing landform		Aesthetic and cultural values		No	There are no identified aesthetic or cultural values at or adjacent to the site. The land is already heavily modified being an existing mine site.
Land Use, Amenity, Values	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-VALU3	A user of public roads accesses F, G, H Rows in PM248 on foot and suffers adverse health or injury.	Existing landform and associated operations		Broken or no fencing or other security/safety barriers		Members of the public		Yes	There is no easy access to the site for the public. Dry Creek floodway prevents access to the site from Globe Derby Park. The Northern Connector includes a fence on the western edge of the site to prevent road corridor users including cyclists and pedestrians from entering the site. Port Wakefield Road has a combination of mature Sheoak trees and wire rope barriers to prevent vehicles and inhibit pedestrians from venturing onto the site.
Land Use, Amenity, Values	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-VALU4	An accident on the Northern Connector results in out-of-control vehicle(s) coming to rest in a Section 1 or Section 2 salt pond	The Public road and the existing landform and associated operations		Out-of-control vehicle(s)		Members of the public		Yes	Verges on the Port Wakefield Road frontage appropriately manage safety and security risks for road corridor users.

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

IMPACT EVENTS											
Environmental Aspect	Mine Life Phase	Event ID	Potential Impact Event	Source	Source Description	Pathway	Pathway Description	Receptor(s)	Receptor Description	Linkage Confirmed	Evidence of the Linkage/Non-Linkage
Land Use, Amenity, Values	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-VALU5	Vistas from publicly accessible viewpoints are degraded by filling F, G, H Rows in PM248	Filling disturbs vistas		Vistas from Public Roads adjacent to the saltfields		Users of Public Roads adjacent to the saltfields		Yes	Amenity change visible from arterial roads will be in the form of conversion of salt ponds to urban land. The site is not visible or accessible from Globe Derby Drive.
Land Use, Amenity, Values	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-VALU6	Filling of F, G, H Rows in PM248 impacts on operations in the balance of Section 1	Filling operations or drainage from filled land disturbs operations in the balance of Section 1		Interference with operations in balance of Section 1		The Crown		No	It is possible for D Row and E row to be used for future salt crystallisation for some time while rehabilitation of remaining rows (F/G/H) progresses.
Land Use, Amenity, Values	Fill F, G, H Rows in PM248, preparatory to completion and closure	PM248-VALU7	Filled land is not fit for future land use	Potential Deficiencies in filling		Interference with future land development, and use		Future land users, occupiers and owners		Yes	The potential deficiencies might be associated with geotechnical, drainage, contamination or other issues

Risk Assessment

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome Measurement Criteria (see next sheet)
Flora & Fauna	PM248-F1	Impacts on numbers / diversity of protected birds from habitat change.	There is a long history of Saltfield activity and associated knowledge of bird movements in the region. Previous studies have shown no significant usage of F, G, H Rows by shorebirds and water birds. The site is already highly modified with no remnant vegetation and no protected bird habitat present	Negligible	Yes - EPBC Act: Significant Impact Guidelines 1.1 Significant impact guidelines for 36 migratory shorebird species	Not required	Low uncertainty. There is a long history of Saltfield activity and associated knowledge of bird movements in the region. Previous studies have shown no significant usage of F, G, H Rows by shorebirds and water birds. The site is already highly modified with no remnant vegetation and no protected bird habitat present	Rare	Negligible	Negligible	No adverse impacts on the abundance and diversity of flora, fauna and avifauna species outside the external toes of the sea bunds, as a result of operations undertaken on Salt field	1
Surface Water	PM248 -SW1	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality within the site.	Impacts to water quality required for aquatic life. Offsite stormwater impacting water quality within the site.	Negligible	No	Maintain bunding on PM248 crystallisers and drains. Maintain existing drains and stormwater pits. An audit by a suitably qualified professional demonstrates that the PM248 site was rehabilitated as per the endorsed site rehabilitation plan.	Low	Unlikely	Low	Negligible	No adverse impacts on the environmental values of Surface Water quality and use due to EPA licenced discharge of brines and bitters from the salt field or due to uncontrolled brine seepage from the salt field Note: Surface water include marine waters	2
Surface Water	PM248 -SW2	Impacts to water quality required for aquatic life. Runoff from Filling within the site impacting waterways	Impacts to water quality required for aquatic life. Runoff from Filling within the site impacting waterways	Negligible	No	Maintain bunding on PM248 crystallisers and drains. Maintain existing drains and stormwater pits. Detain runoff and employ sediment control measures as necessary and as per good practice construction environmental management. An audit by a suitably qualified professional demonstrates that the PM248 site was rehabilitated as per the endorsed site rehabilitation plan.	Low	Unlikely	Low	Negligible		
Surface Water	PM248 -SW3	Short term increases in salinity of tidal waters localised to the vicinity of the licenced discharge points	No adverse impact outside mixing zone	Negligible	Yes - EPA Licence	Buckland Dry Creek ensures compliance with discharge criteria through discharge salinity monitoring.	Low from experience of holding pattern and previous salt production operations	Unlikely	Low	Negligible		
Ground water	PM248-G1	Filling affects ground water levels and hydraulic gradients, changing groundwater seepage patterns under PM248	No adverse impact expected.	Negligible	Yes SA EPA Guidelines	No importation of unsuitable fill material that might affect future use of the site. Regular groundwater monitoring of existing and any new monitoring wells, with oversight of groundwater data by a Site Contamination Auditor. Comply with requirements set out in existing approved documents: •Bulk Earthworks plans •Interim Audit Advice (Incorporating a Site Management Plan) An audit by a suitably qualified professional demonstrates that the site was rehabilitated as per the endorsed site rehabilitation plan.	It is known that existing groundwater contamination pre-dates rehabilitation activities at the site and it is not feasible for rehabilitation activities to reverse any existing groundwater impacts.	Unlikely	Low	Negligible	No impacts to adjacent land use from the operations and activities undertaken on the Site.	10
Ground water	PM248-G2	Importation and placement of fill materials containing chemical contamination may allow contamination to migrate to groundwater table affecting its quality.	No adverse impact expected.	Negligible	Yes SA EPA Guidelines	No importation of unsuitable fill material that might affect future use of the site. Regular groundwater monitoring of existing and any new monitoring wells, with oversight of groundwater data by a Site Contamination Auditor. Comply with requirements set out in existing approved documents: •Bulk Earthworks plans An audit by a suitably qualified professional demonstrates that the site was rehabilitated as per the endorsed site rehabilitation plan. •Interim Audit Advice (Incorporating a Site Management Plan)	It is known that existing groundwater contamination pre-dates rehabilitation activities at the site and it is not feasible for rehabilitation activities to reverse any existing groundwater impacts.	Unlikely	Low	Negligible	No contamination of land and soils either on or off the land as a result of mining operations or mine completion and closure operations	5

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome Measurement Criteria (see next sheet)
Air Quality	PM248-A1	Dusts from exposed ground surfaces in filled and unfilled parts of F, G, H row in PM248	Short term episodic impacts	Negligible	Yes - National Environment Protection (Ambient Air Quality) Measure	No importation of unsuitable fill material that might affect future use of the site. Regular groundwater monitoring of existing and any new monitoring wells, with oversight of groundwater data by a Site Contamination Auditor. Comply with requirements set out in existing approved documents: •Bulk Earthworks plans •Interim Audit Advice (incorporating a Site Management Plan) Vegetation or other dust prevention for exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Low uncertainty. Experience from filling of G and H rows to date demonstrates impacts on air quality were rare and of negligible consequence. Occasions where those issues become apparent are when poor weather conditions prevail and regional air quality challenges are prevalent, significantly overshadowing any impacts from Saltfield.	Unlikely	Negligible	Negligible	No adverse public health and or significant nuisance impacts due to air emissions, dust, pest insect species, odour, or noise Note: A significant nuisance impact is considered to be one that generates a complaint that is confirmed as attributable to the salt field and cannot be addressed within the timeframes specified in the measurement criteria	8
Air Quality	PM248-A2	Odours from exposed ground surfaces in filled and unfilled parts of F, G, H row in PM248	Short term episodic impacts	Negligible	Yes - National Environment Protection (Ambient Air Quality) Measure	No importation of unsuitable fill material that might affect future use of the site. Regular groundwater monitoring of existing and any new monitoring wells, with oversight of groundwater data by a Site Contamination Auditor. Comply with requirements set out in existing approved documents: •Bulk Earthworks plans •Interim Audit Advice (incorporating a Site Management Plan) Prevention of odour sources - such as stagnant water Implementation of air quality monitoring plan and remedial measures where needed	Low uncertainty. Experience from filling of G and H rows to date demonstrates impacts on air quality were rare and of negligible consequence. Occasions where those issues become apparent are when poor weather conditions prevail and regional air quality challenges are prevalent, significantly overshadowing any impacts from Saltfield.	Unlikely	Negligible	Negligible		
Air Quality	PM248-A3	Contamination in dust from exposed ground surfaces affecting adjoining areas of conservation significance	No measurable impact expected	Negligible	Yes - National Environment Protection (Ambient Air Quality) Measure	Vegetation or other dust prevention for exposed areas. Implementation of air quality monitoring plan and remedial measures where needed	Low uncertainty. Experience from filling of G and H rows to date demonstrates impacts on air quality were rare and of negligible consequence. Occasions where those issues become apparent are when poor weather conditions prevail and regional air quality challenges are prevalent, significantly overshadowing any impacts from Saltfield.	Unlikely	Negligible	Negligible		
Noise	PM248-N1	Noise from machinery, vehicles used in filling operations affecting nearby residents	Within regulatory limits and generally within background levels	Negligible	Yes - Environment Protection (Noise) Policy 2007	All equipment, including that used by contractors, is required to comply with relevant noise control policies and guidelines issued by the EPA	Low uncertainty. Vehicle and machinery movements within PM248 produce far less noise at site boundaries than the noise produced by vehicles on adjacent arterial roads.	Unlikely	Negligible	Negligible		

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome Measurement Criteria (see next sheet)
Soil Quality (Contamination, Salinity and Acid Sulphate)	PM-SQ1	Contamination of soil from leaks or spills	Minor localised impact that can be readily cleaned up	Negligible	NEPM and SAEPA	Bunding and spill kits. If Acid Sulphate Soils are to be disturbed or excavated prepare and implement a task specific acid sulphate risk management plan that complies with NEPM and SAEPA guidance An audit by a suitably qualified professional demonstrates that the site was rehabilitated as per the endorsed site rehabilitation plan.	Limited sources for a major spill or leak	Unlikely	Moderate	Low	No contamination of land and soils either on or off the land as a result of mining operations or mine completion and closure operations	5
Soil Quality (Contamination, Salinity and Acid Sulphate)	PM248-SQ2	Unsuitable imported fill contaminates the filled parts of F, g, H Rows in PM248	Minimal impact	Negligible	NEPM and SAEPA	No importation of unsuitable fill material that might affect future use of the site. An audit by a suitably qualified professional demonstrates that the site was rehabilitated as per the endorsed site rehabilitation plan.	Low Uncertainty. Controls on filling to date in G and H Row have ensured imported fill is suitable.	Rare	Low	Negligible		
Soil Quality (Contamination, Salinity and Acid Sulphate)	PM248-SQ3	Exposure to salt / gypsum impacted soils from unfilled parts of F, G, H Row in PM248 impacts on ecological values on or off site	Minimal impact	Negligible	NEPM and SAEPA	Salt and gypsum exposures, controlled by the operational procedures for Section 1. If Acid Sulphate Soils are to be disturbed or excavated prepare and implement a task specific acid sulphate risk management plan that complies with NEPM and SAEPA guidance. An audit by a suitably qualified professional demonstrates that the site was rehabilitated as per the endorsed site rehabilitation plan.	Low Uncertainty. Operational experience over many years shows the effectiveness of controls to protect ecological values off site from PM 248. Internally, PM 248 is a highly modified ecosystem from the decades of salt production activities	Unlikely	Low	Negligible		
Heritage, Buildings and Structures	PM248-HBS1	Disturbance of heritage sites by earthworks, vehicles or machinery	No disturbance proposed	Negligible	No	The location and protection of the Aboriginal artefact scatter is detailed in the company's SOP-SC- A013 Heritage Management Instruction.	Low uncertainty. The site has operated as a salt mine for decades and no artefacts have been identified in this location. An artefact site does exist several hundred metres away in undisturbed Saltfield land which is outside the rehabilitation area.	Unlikely	Moderate	Low	No damage, disturbance or interference to Aboriginal and non-Aboriginal heritage sites, objects or remains as a result of mining operations unless it is authorised under the relevant legislation	9
Heritage, Buildings and Structures	PM248-HBS2	Damage to heritage sites from fire	Fire risk will remain low	Negligible	No	The location and protection of the Aboriginal artefact scatter is detailed in the company's SOP-SC- A013 Heritage Management Instruction.	Low uncertainty. The site has operated as a salt mine for decades and no artefacts have been identified in this location. An artefact site does exist several hundred metres away in undisturbed Saltfield land which is outside the rehabilitation area.	Rare	Moderate	Negligible		
Heritage, Buildings and Structures	PM248-HBS3	Earthmoving activities affects adjacent SA Water pipelines, high pressure gas pipeline assets and the BDC brine pipeline connecting PA12 to FAR1	No expected impact	Negligible	No	An audit by a suitably qualified professional demonstrates that the site was rehabilitated as per the endorsed site rehabilitation plan.	Low uncertainty. The SA Water assets and Epic Energy gas pipeline are contained in a services corridor owned by SA Water. The Sea Gas pipeline is buried at depth and is outside any proposed filling area. The brine pipeline is located outside PM248 and so is unaffected by rehabilitation activities. BDC is satisfied that depth of cover at existing ground-level crossings of those assets is sufficient to protect the assets from vibration or compressive loads.	Rare	Negligible	Negligible	No adverse impacts to third-party property and infrastructure on or off the Site as a result of operations and activities undertaken	11

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) (If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome Measurement Criteria (see next sheet)
Values, Amenity, Land Use,	PM248-VALU1	Drainage and runoff from filled parts of F, G, H Rows in PM248 impact on geological feature	No expected impact	Negligible	No	An audit by a suitably qualified professional demonstrates that the site was rehabilitated as per the endorsed site rehabilitation plan.	Low uncertainty. There are no identified aesthetic or cultural values at or adjacent to the site. The land is already heavily modified being an existing mine site.	Rare	Negligible	Negligible	No impacts to adjacent land use from the operations and activities undertaken on the Site.	10
Land Use, Amenity, Values	PM248-VALU2	An unknown aesthetic or cultural value is affected by filling F, G, H Rows in PM248	No expected impact	Negligible	No	NA	There are no identified aesthetic or cultural values at or adjacent to the site. The land is already heavily modified being an existing mine site.	Rare	Negligible	Negligible		
Land Use, Amenity, Values	PM248-VALU3	A user of public roads accesses F, G, H Rows in PM248 on foot and suffers adverse health or injury.	No expected impact	Negligible	No	The site is fenced along public road boundaries to prevent road corridor users including cyclists and pedestrians from entering the site. Dry Creek floodway is a natural barrier to people from Globe Derby Park accessing the site and such people would have to cross other Saltfield land to reach the site.	Low uncertainty. There is no easy access to the site for the public. Dry Creek floodway prevents access to the site from Globe Derby Park. The Northern Connector includes a fence on the western edge of the site to prevent road corridor users including cyclists and pedestrians from entering the site. Port Wakefield Road has a combination of mature Sheoak trees and wire rope barriers to prevent vehicles and inhibit pedestrians from venturing onto the site.	Rare	Negligible	Negligible	Unauthorised entry to the land does not result in public injuries and or deaths that could have been reasonably prevented by BDC	12
Land Use, Amenity, Values	PM248-VALU4	An accident on the Northern Connector results in out-of-control vehicle(s) coming to rest in a Section 1 or Section 2 salt pond	No expected impact	Negligible	No	Where a vehicle collision results in an out-of-control vehicle entering a salt pond, State emergency services provide first response and follow-up notification and investigations. There is no pre-emptive action for BDC in this respect	Low uncertainty. 'Verges on the Port Wakefield Road frontage appropriately manage safety and security risks for road corridor users.	Rare	Negligible	Negligible		
Land Use, Amenity, Values	PM248-VALU5	Vistas from publicly accessible viewpoints are degraded by filling F, G, H Rows in PM248	No expected impact	Negligible	No	Not required	Low uncertainty. 'Amenity change visible from arterial roads will be in the form of conversion of salt ponds to urban land. The site is not visible or accessible from Globe Derby Drive.	Rare	Negligible	Negligible	No impacts to adjacent land use from the operations and activities undertaken on the Site.	10
Land Use, Amenity, Values	PM248-VALU6	Filling of F, G, H Rows in PM248 impacts on operations in the balance of Section 1	No expected impact	Negligible	No	Not required	Low uncertainty. 'It is possible for D and E rows to be used for future salt crystallisation for some time while rehabilitation of remaining rows (F/G/H) progresses.	Rare	Negligible	Negligible		
Land Use, Amenity, Values	PM248-VALU7	Filled land is not fit for future land use	No expected impact	Negligible	Yes, Australian Standards, EPA guidelines, Engineering guidelines, Planning controls	An audit by a suitably qualified professional demonstrates that the site was rehabilitated as per the endorsed site rehabilitation plan and is in a condition fit for mine completion, and closure and then redevelopment for planned and permitted land uses.	Low uncertainty. 'The potential deficiencies might be associated with geotechnical, drainage, contamination or other issues. These are being controlled by supervision and monitoring and verification	Unlikely	Negligible	Negligible		

Environmental Risk Assessment for Buckland Dry Creek Pty Ltd - Filling in F, G, H Rows Preparatory to Mine Completion and Closure in Parts of PM248

RISK ASSESSMENT												
Environmental Aspect	Event ID	Potential Impact Event	Description of Impact / Expected Impact	Significance of Impact	Applicable Regulatory Standard	Risk Management (To achieve the control strategies, outcomes and measurement criteria in Table 20-1) <i>(If there are any inconsistencies between what is written below and in Table 20-1, the content of Table 20-1 prevails)</i>	Uncertainties	Likelihood of greater impact than expected	Possible level of impact (Consequence)	Risk Rating	Outcome	Outcome Measurement Criteria (see next sheet)

APPENDIX 7

Plans for Section 2 Pipeline

Dry Creek Saltfields

Section 2 Infrastructure – Proposed pipeline

Report by:	Buckland Dry Creek Pty Ltd
Report Author:	David Kingston, BDC Engineering Manager
Report date:	5 June 2025

Introduction

BDC proposes to connect Section 3 ponds with Section 1 via a 6,300m DN630 poly pipeline, with the pipeline to follow the route of the existing access track that traverses the eastern side of Section 2 ponds. The pipeline will commence at a take-off from the existing Bolivar discharge pipeline near the St Kilda Rd pumps, and conclude at the existing pipeline crossing that runs under Little Para River.

The Bolivar discharge pipe is a DN630 pipe with the following technical details:

- Code - POHO4630M (12m lengths)
- Brand - POLIplex 100S1
- Nom. Diameter - DN630
- Material – POH PE100 (black polyethylene)
- Pressure rating - PN4
- Standard dimensional ratio - SDR41
- extruded 22 Jan 2014 to AS/NZS4130

It is proposed that the new pipe will be the same or similar product, although there is the option of the pipeline being a DN800 which allows more brine capacity and lower head losses. A decision on which diameter pipe to select will be made in coming months in consultation with hydraulic engineers.

The existing unsealed access track that runs along the eastern side of Section 2 ponds will become the alignment for the pipeline, with it being placed on the seaward side of the track and therefore within the footprint of Section 2 ponds. This reduces the risk of any brine from a pipe rupture exiting the Section 2 field into adjacent Council stormwater drains. Brine will discharge in that case into the Section 2 ponds where it can be captured and recovered at a later date.

Detailed Design

The work of detailed design will follow DEM approval of this PEPR/MOP.

Construction and commissioning

The pipe bed formation will be established adjacent to the existing Section 2 access track and depending on local conditions, will require importation of a construction aggregate of suitable compaction properties (e.g. PM2/20) and establishment of a formation surface of around 1.0m. In other parts, grading of the land adjacent to the access track will be sufficient to allow establishment of a pipe bed formation. The pipeline will be secured in place by star droppers installed each side at regular spacings. All pipe sections will be butt welded in-situ, with bolted flange butt connections limited to areas where a change in direction is required or where butt welding is not practical. Temporary construction laydown areas and a works compound will be established at several locations in Section 2 where trucks can satisfactorily perform turn-arounds.

There will be no impact on any remnant saltmarsh vegetation, either along the pipeline corridor or for any of the temporary works areas. Some clearing of re-growth vegetation will occur alongside the access track to make way

for the bed formation, however this regrowth is within the footprint of the Section 2 ponds, and emerged after the drying of the Section 2 ponds in the last 10 years and is not of significant ecological value.

It is anticipated that the construction program will last several months, with lead times in place for supply of pipe sections from interstate sources. Other building materials such as PM2/20 aggregate will be sourced locally. Specialist local pipe installers will be used to string the pipe sections and place them onto the formation.

The pipe will be commissioned by BDC's pipe installer in conjunction with BDC field crews. A commissioning program will be established that sets out initial flow rates, brine collection in PA12 and other relevant factors.

Operation

The pipeline will operate in a similar manner to the existing Bolivar discharge pipeline, in that brine flow along the pipeline will be intermittent on an as-needs basis to fulfill Section 1 brine demand requirements. Brine will be pumped from the existing pump-set at the Bolivar offtake adjacent to St Kilda Road. To the PA12 "Peter's Peak" pumpstation. Sensors installed at the St Kilda pumps and at other points along the route will allow alerting of any loss of pressure in the pipe and enable pipe shutdown processes to occur.

Existing bore water supply from Section 1 bores will be used, if needed, to manage the saturation of brine in the pipeline.

The management of the pipeline will be in line with the existing management of all infrastructure across the saltfield.

Maintenance and security

Pipe inspection and maintenance will be similar to that performed on other poly pipe sections across the field including the Bolivar discharge pipe, stormwater drain crossings between PA9-PA10 and PA10-PA11 and Little Para River. The pipe is extremely durable and not susceptible to rupture, buckling, kinking or any other deformities. Flushing of any crystallisation that may occur from time to time will be performed on an as-needs basis.

The pipeline will be contained entirely within the tenements of the Saltfields and therefore not open to public access.

Attachments

- 1: Figures
- 2: Photos

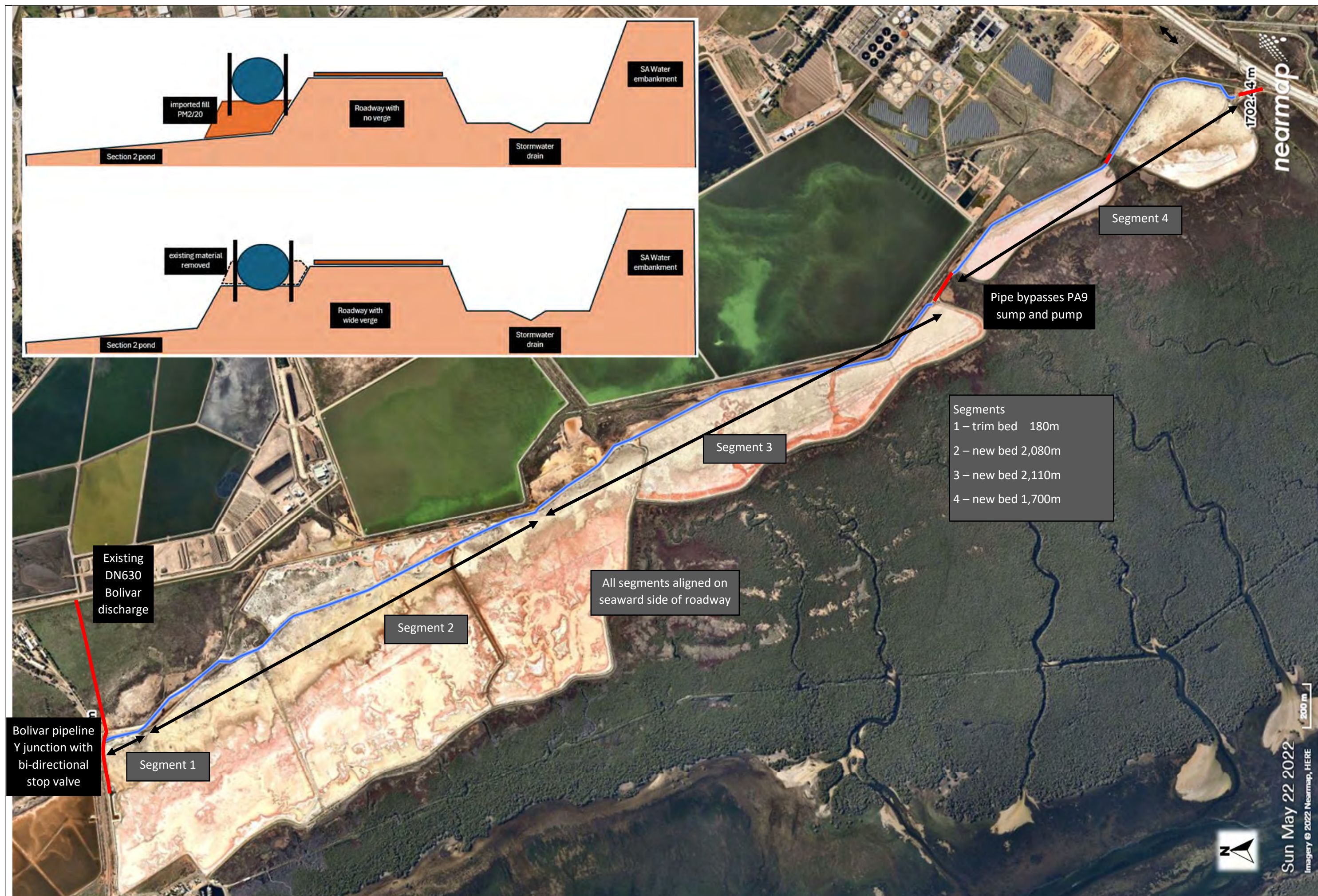


Figure 1: Overall concept

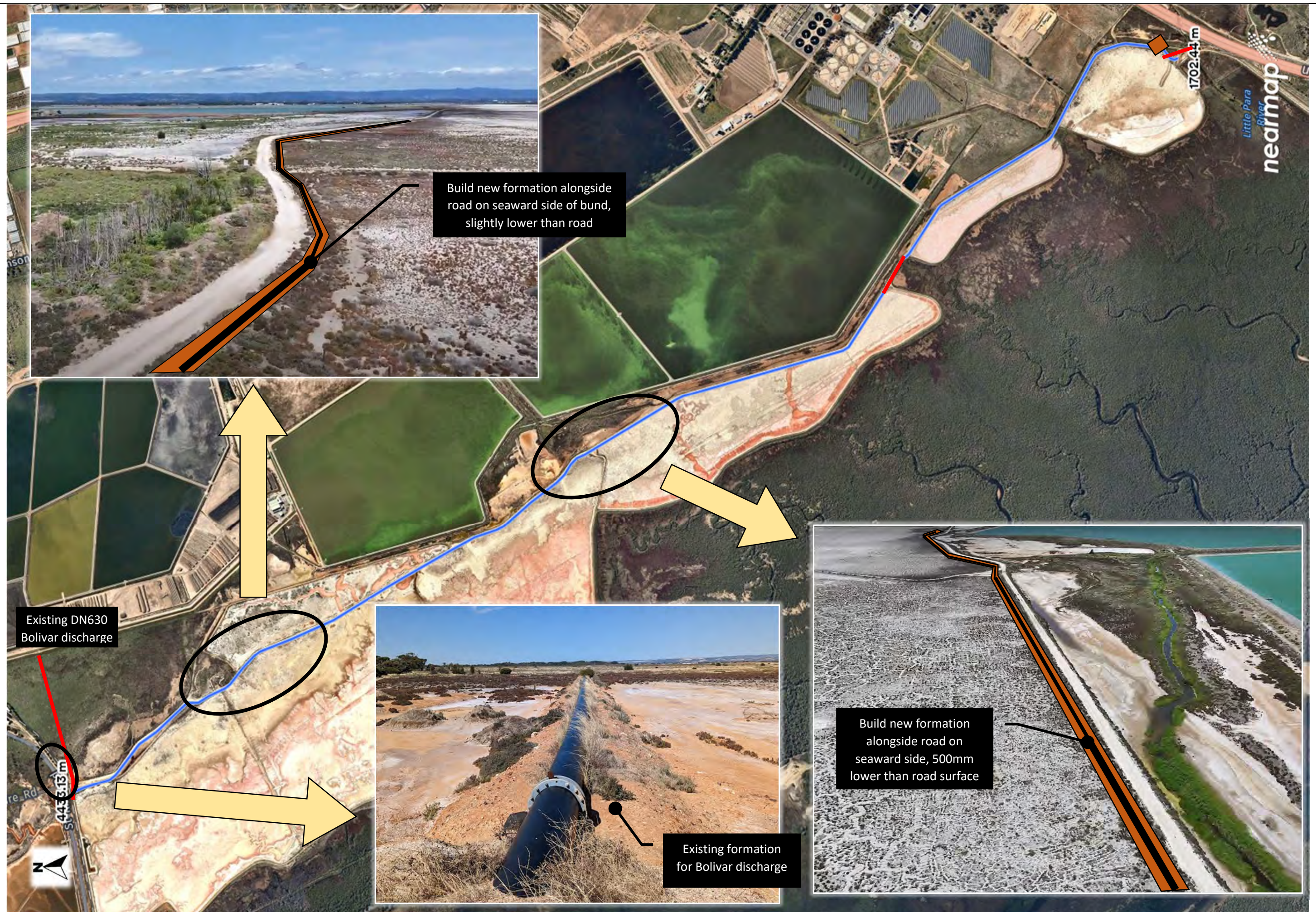


Figure 2: Examples of pipeline bed formation



Figure 3: PA9 pump and Helps Road Drain crossing

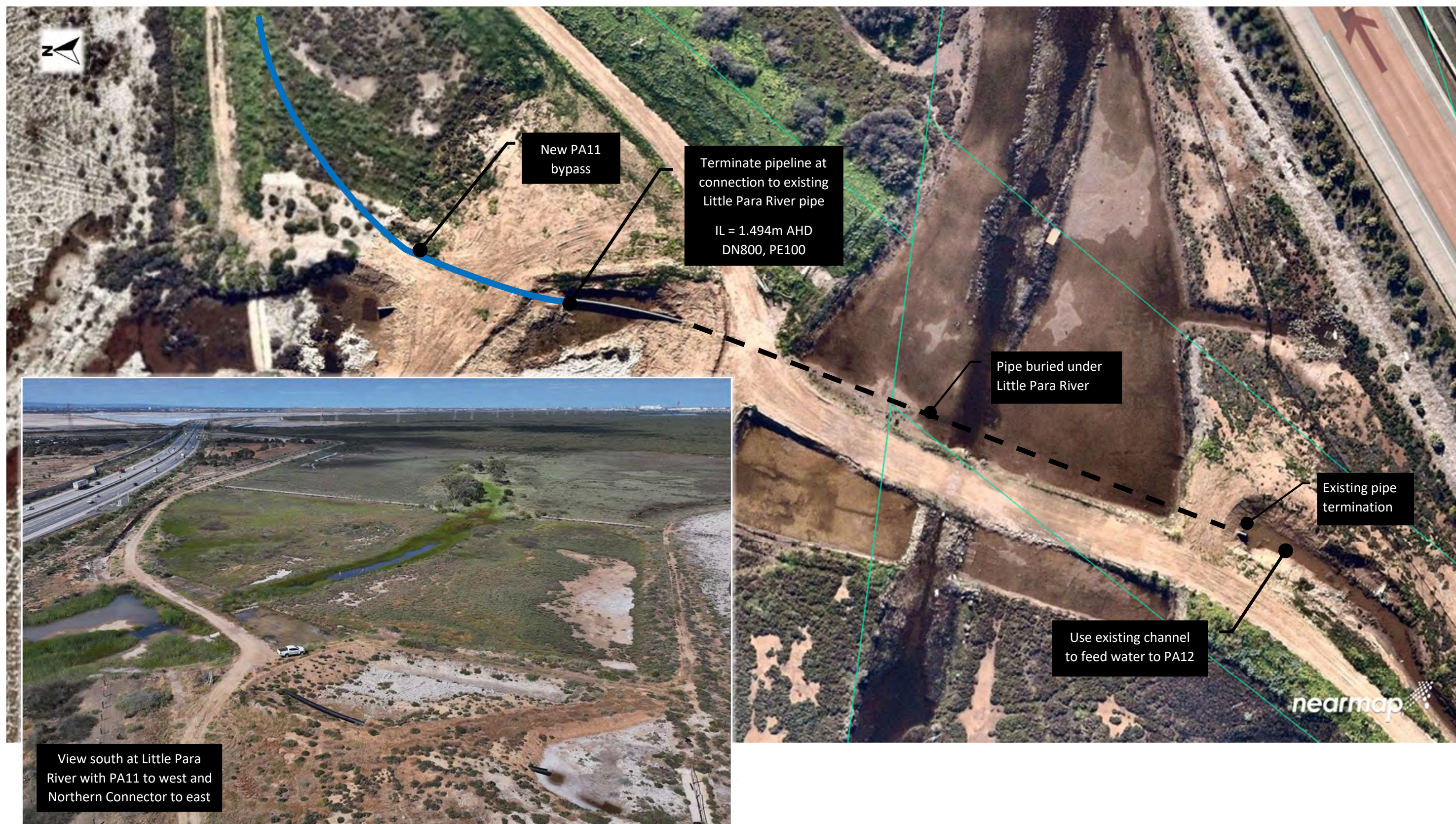


Figure 4: Little Para River crossing



Photo 1: View east at Bolivar discharge adjacent to St Kilda Road



Photo 2: View south at midpoint of PA6



Photo 3: View south at PA7 & PA8



Photo 4: View south at PA8 & PA9



Photo 5: View north at PA9 and PA8



Photo 6: View north at PA9 with Council drain to right



Photo 7: View north at PA10 and PA9 with 1st Council drain crossover



Photo 8: View north at southern end of PA10 with 2nd Council drain crossover



Photo 9: View south at PA11



Photo 10: View south at Little Para River crossing and channel to PA12



Photo 11: View south at open channel extension from Little Para R.



Photo 12: View north at existing open channel near PA12, Council drain to right



Photo 13: View south at channel outfall to PA12



Photo 14: View south at PA12 and Peter's Peak pumpstation

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