Buckland Dry Creek Pty Ltd

DRY CREEK SALT FIELD

Integrated Program for Environment Protection and Rehabilitation and Mine Operations Plan

Part 2 of 5

Revision 4 v.1 – September 2020

PART 2 – Project Location and Description; Mine Completion Planning Framework; Site and Context Overview; Historical Operations; Stakeholder Engagement
Integrated PEPR / MOP – Holding Pattern, Residual Operations, Investigations, and Closure Operations at the Dry Creek Salt Field

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10 General Description and Location of the Project

10.1 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 and freehold land owned by BDC.

Forty-six mining leases and two 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 District Council of Mallala. The entire site is located within the 2008 gazetted boundaries of the Adelaide and Mt Lofty Ranges Natural Resource Management Board.

10.2 Previous Mining Works and Their Cessation

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).

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 salt field (Bell 2014). Earthworks 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. 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.

10.3 Adoption of the Care and Maintenance Plan

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 salt is crystallised.
- 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. This is ongoing
- draining of water from selected salinas so that these may become free draining and not require pumped water. This activity is ongoing.
- discharge 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. This activity is ongoing
- removal of the existing salt from Section 1. This activity is ongoing.

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.
At a later stage, BDC wishes to close the site to enable development and in a manner that complies with its obligations under the Mining Act, however at this point in time BDC are considering restarting commercial salt operations in 2021 or 2022 (which would be the subject of a future PEPR submission).

The activities to make these operations possible, while continuing to achieve the environmental outcomes required by this PEPR / MOP, and to enable BDC to prepare that future PEPR / MOP submission, entail:

- Rebuilding the infrastructure needed to flow brine from Section 3 into and through Section 2, and to pump brine from Section 2 into those parts of Section 1 that will be used for commercial salt production
- Pumping brine from Section 2 through a new pipeline into ML 6514 in Section 1 (See Figure 7-5 in Part 1, and Section 15.1 in Part 3 of this Revision 4 of the PEPR / MOP) and re-establish the functionality of the Section 1 infrastructure to receive and manage this brine. This pumping is necessary to re-establish the quality of brine needed for the resumption of commercial salt production in Section 1. It is noted additionally that this pumping is essential to 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).
- Once brine is being pumped into those parts of Section 1, to then make the other preparations needed for the resumption of commercial salt production
- Maintaining the following activities
  - 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, and that will also be needed for delivery of brine through to the southern end of Section 2 for pumping into Section 1.
  - draining of water from selected salinas so that these remain free draining and not require pumped water.
  - discharge of water with elevated salt concentrations as a result of evaporation in inundated ponds. The ongoing capacity to do this is necessary to prevent excessive salt concentrations in the salinas – concentrations that would be incompatible with the environmental outcomes required by this PEPR / MOP and with the quality of brine needed for pumping into Section 1
  - removal of the existing salt from those parts of Section 1 that will not be used to manage the brine received from Section 2 and crystallise new salt from it.

Until mine completion, BDC needs to operate the site in a manner that complies with its regulatory requirements including the activities set out in this PEPR.

Between February and August 2013, BDC engaged with South Australian Government agencies (Department of State Development (DSD) (now DEM), Department of Planning, Transport and Infrastructure (DPTI), SA Water, Department of Environment, Water and Natural Resources (DEWNR) (now DEW), Environment Protection Authority (EPA), Department of Primary Industries and Regions SA, (PIRSA)) on a staged conceptual mine completion plan for the site, centred around:

- Stage 1: Works to put the field into operational closure – so that:
  - no water entered Section 1 and its crystallisers from October 2013, and no further salt was manufactured by the site (however, see the end of Section 10.3 which now authorises the movement of brine from Section 2 into Section 1 for environmental purposes)
  - environmental risks were managed while site characterisation was undertaken.
Stage 2: Investigations and design during operational closure to provide the basis for a mine completion PEPR to be submitted for approval.

- BDC envisaged that, subject to environmental investigations and monitoring in this stage, water levels in ponds could be drawn down in a controlled manner; with entrainment flows at Middle Beach and Chapman Creek and outflows at Gawler River and Pumping Creek adjusted to maintain water quality in the ponds.
- BDC also envisaged that all salt field operating systems (pumps, syphons, pond connections etc.) and procedures would remain in place pending the implementation of an approved Stage 3 mine completion PEPR.

Stage 3: Implementation of works under an approved mine completion PEPR.

By May 2013, the South Australian Government agencies and Ridley (previous tenement holder) had agreed:

- that PEPRs should be submitted for each of the above stages
- on a closure strategy that would form the basis for Stages 1 and 2 work
- that the final closure strategy would be informed by the outcomes from the Stage 2 work and may evolve from that used as the basis for Stages 1 and 2 work.

In July 2013, Ridley submitted a consultation draft for a PEPR for Stage 1 only. In this PEPR, the preliminary concept was outlined for Stage 3 closure. This involved, subject to the outcomes of the investigations and design in Stage 2, staged drying of the ponds, with the maintenance of a wetlands area that BDC suggested could be handed over to Government for ongoing management.

In August 2013, Ridley was advised by DSD that there was insufficient scientific evidence to support this PEPR for Stage 1; that is, for the works to put the site into operational closure. As a consequence, Ridley was advised it was necessary to implement a care and maintenance plan for the site whilst it prepared a supported evidence-based closure approach. The resulting indicative sequence for closure is illustrated in Figure 10-1.

The care and maintenance activities are set out in Part 3 of this PEPR / MOP. These remain unchanged from the 2017 Revision 3 of this PEPR / MOP, noting that minor amendments have been made in the 2020 revision to provide clarity about care and maintenance activities. They continue to have the purposes of:

- stopping the historic salt production and implementing residual salt processing operations in Section 1
- moving brine through Section 2 and into Section 1 for the purposes outline above
- implementing a Holding Pattern for Sections 2 to 4:
  - sustaining water quality within inundated ponds (using a combination of managed entrainment and licensed pumped discharge)
  - providing opportunities to investigate, in a managed environment, the opportunities and constraints on pond drainage and drying.
- providing 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 to March 2014, both Ridley and the key South Australian Government agencies (DSD, SA Water, EPA, DEWNR, DPTI and PIRSA) worked to determine a practicable care and maintenance plan for the BDC operations.
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.

The current EPA licence is provided in Appendix 1.

Section 4 in Part 1 of this Revision 4 of this PEPR / MOP contains a chronology of the revisions and minor changes to this PEPP / MOP. Since revision 3 was approved in April 2017:

- 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.
- In September 2020 this Revised 4 of the PEPR / MOP was created to:
  - 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)

### 10.4 Environmental Management Framework for the Site

#### 10.4.1 Environment Policy

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. These have been inherited from the previous owner, Ridley Dry Creek Pty Ltd and remain unchanged.
- Implementing the DSD 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)

#### 10.4.2 Operating Procedures for Dry Creek Salt Fields

BDC maintains site-specific standard operating procedures and addresses quality, safety, legislative and environmental aspects of the operations.

A summary of the operating procedures that deal with environmental aspects of the site is provided in Table 10-1. These procedures can be made available to DSD on request.
Definition of closure operations. Some will require:
- only DSD approval of Revised PEPR / MOP
- both DSD approval of Revised PEPR / MOP and DoE approval of EPBC controlled action components

Approval of Closure Operations:
- PEPR/MOP
- EPBC controlled action components of PEPR / MOP (where relevant)

Approval of Closure Operations:
- PEPR/MOP
- EPBC controlled action components of PEPR / MOP (where relevant)

Mine completion achieved in different areas progressively and:
- Mining Leases surrendered
- Crown Leases surrendered
- Improvements / assets on Crown land transferred to Government
- Land in an environmentally safe condition allowing ongoing post closure rehabilitation and for adaptation for future land uses

SA Government and BDC agree land use and closure concepts (subject to outcomes of investigation and design)

Implement Holding Pattern in areas not under closure operations

Investigation and Design of closure operations

Preparation and approval processes for operations for:
- Mine closure and completion PEPR/MOP
- EPBC Controlled Action for Matters of National Environmental Significance

Implement closure operations

Post mine completion management of freehold land until sold

Post mine completion management of Crown Land using improvements / assets.
- If land is subject to a mine or crown lease, then the lessor would have some responsibility for this land management.

Land before mine completion is classified as a mine, regulated by DSD, supported by other State Government Agencies

Land with mine completion is no longer classified as a mine, and is regulated by other State and Local Government Agencies

Figure 10-1: Indicative closure sequence
Table 10-1: Operating procedures for Dry Creek Salt Fields

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<td>#SOP-SC-C001 EMERGENCY RESPONSE PROCEDURE</td>
</tr>
<tr>
<td></td>
<td>#SOP-SC-P010 LEVY BANK INSPECTIONS</td>
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<td></td>
<td>#80 WORKSHOP SPILL INSTRUCTIONS</td>
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<td>#81 HAZARD REGISTER INSTRUCTION</td>
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<td></td>
<td>#143 BRINE MAIN REPAIR INSTRUCTIONS</td>
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<tr>
<td></td>
<td>#150 CHEMICAL HYGIENE INSTRUCTION</td>
</tr>
<tr>
<td>Monitoring and Measurement</td>
<td>#SOP-SC-A002 MONTHLY REPORTS</td>
</tr>
<tr>
<td></td>
<td>#SOP-SC-A008 ENVIRONMENTAL MANAGEMENT PLAN</td>
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<tr>
<td></td>
<td>#SOP-SC-C005 MARINE DISCHARGE</td>
</tr>
<tr>
<td></td>
<td>#SOP-SC-P005 BIOLOGICAL MONITORING</td>
</tr>
</tbody>
</table>
10.4.3 System to Monitor, Record, Evaluate, Audit and Review Compliance

Monitoring of compliance with quality, legislative, safety and environmental requirements is managed through the implementation of BDC’s #SOP-SC-A008 ENVIRONMENTAL MANAGEMENT PLAN and #SOP-SC-C005 MARINE DISCHARGE.

10.4.4 Response to Non-compliances and Emergencies

BDC has implemented the following standard operating instructions to ensure adequate response to incidents:

- #SOP-SC-C004 SPILLS CONTINGENCY
- #SOP-SC-E001 EMERGENCY RESPONSE PROCEDURE
- #SOP-SC-P010 LEVY BANK INSPECTIONS
- #143 BRINE MAIN REPAIR INSTRUCTIONS
- #80 WORKSHOP SPILL INSTRUCTIONS
- #81 HAZARD REGISTER INSTRUCTION
- #150 CHEMICAL HYGIENE INSTRUCTION

The over-arching procedure for emergency response is in #SOP-SC-E001 EMERGENCY RESPONSE PROCEDURE. This is provided in Appendix 2.
11 Mine Completion Planning Framework

11.1 Closure Strategy

The closure strategy is described in Part 4 of this PEPR / MOP. For Section 1 of the Salt Field, the future land use is a mixed used urban development, but with parts of the land excised for the Northern Connector (about to be constructed). For Sections 2 to 4, options for land uses are under consideration and being informed by further discussions and investigations. For this reason, a base case closure strategy has been developed for Sections 2 to 4 to provide a planning framework for closure. This is further described in Part 4 of this PEPR / MOP.

As closure operations will occur in a staged manner within each section, some parts of sections will still be subject to the holding pattern or residual operations, while others will be undergoing closure activities. When it is accepted by DSD that a part of a section has achieved mine completion, it will be surrendered, and ongoing responsibility accepted by the next land user.

11.2 Organisational Framework

The South Australian Government is a key stakeholder in the closure process. 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 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.

For these reasons, the South Australian Government has established an organisational structure to oversight closure planning for the salt field, work cooperatively with BDC through the closure process and ensure all regulatory requirements are met. A number of groups have been, or are proposed to be established, as part of this structure:

- Steering Group: to provide high level oversight within Government of the Holding Pattern and Closure process.
  - Chief Executives of DPTI (Chair), DSD, EPA, DEWNR, PIRSA, SA Water and Renewal SA; a senior representative on behalf of the three Councils (Salisbury, Playford and Mallala)
- Strategy / Technical Advisory Group: to provide technical and strategic input to the closure process.
  - Senior representatives of DSD (Chair), DEWNR, DPTI, EPA, PIRSA, SA Water, Renewal SA; a representative on behalf of the three Councils (Salisbury, Playford and Mallala), and BDC.

The Strategy / Technical Advisory Group (STAG) has developed a number of principles for the design of closure of this site. These are described in Part 4 of this PEPR / MOP.

11.3 Relevant Legislation

11.3.1 Mining Act

The Mining Act 1971 and Mining Regulations 2011 provide the framework for the approval and regulation of all mining operations in South Australia and is administered by DSD. The Mining Act is the principal legislation for regulating the operations and closure of the Dry Creek Salt Field.

As noted at Section 10.1, 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 regulation 65 of the Mining Regulations and in a Ministerial Determination made under reg 65(7) of the Mining Regulations (12 July 2012 and amended 5 December 2015). The compliance of this PEPR with the Ministerial Determination is shown in Part 1.

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 DSD under s 73G of 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 73G of the Mining Act.

The current requirements of a MOP are set out in regulation 80 of the Mining Regulations. 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 Part 1. It is noted that Ridley Dry Creek Pty Ltd submitted a compliance report to DSD covering its operations under the PEPR / MOP to 31 May 2016 (Ridley 2016) and that this report was accepted by DSD. BDC effectively took over the operations and responsibility for compliance from 1 June 2016.

### 11.3.2 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 1994*

The environmental outcomes proposed in this PEPR will need to comply with these policies.

Schedule 1 of the Environment Protection Act specifies ‘Prescribed activities of environmental significance’ that require environmental authorisation from the EPA. BDC Corporation holds Licence 40942 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.

A change to this licence was approved on 12 March 2014 to allow for the Holding Pattern. Important requirements of this licence include:

- Saline water may only be discharged into coastal waters at the SA Water Bolivar Waste Water Treatment Plant Outfall Weir (Weir 2).
- The discharge must not have a salinity greater than 45 parts per thousand. Continuous in-line monitoring of salinity is required and BDC must cease discharge if the salinity criteria is exceeded.
- BDC must develop and implement a Discharge Criteria Management Plan 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 any exceedances.
- 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:
  - suspended solids: less than 80 mg / L + 80% seasonal maximum
  - pH: 6.5 – 9.2
  - salinity: hydrography of stream flow causes a permanent change in isohaline patterns of no more than 10% of background variation
  - oxygen (dissolved): discharge is subject to turbulent flow to ensure it is discharged with highest possible Oxygen saturation.
- BDC must develop and implement an inundated Pond Water Level Control Plan to address prevention of mobilisation and exposure of monosulfidic black ooze and acid sulfate soils. This must include:
  - levels of water to be maintained in each of the inundated ponds
  - measures that will be taken to ensure the water levels are maintained at the proposed levels in each inundated pond
  - method of monitoring to ensure the water levels are maintained at the proposed levels in each inundated pond.
- 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 proposed in this PEPR will need to consider the current licence requirements and any likely future requirements. While salt production has ceased on the salt field, ongoing EPA licensing is expected to be required due to the need to continue discharge to the marine environment.
11.3.3 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 not renewed, because the salinity of the water in the outfall channel, as a result of the discharge from PA5, precludes carp.

The St Kilda – Chapman Creek Aquatic Reserve is considered in this PEPR as an environmental value. There is a need for ongoing discharge to the marine environment. Consequently, environmental outcomes proposed in this PEPR will need to consider the protection of this reserve.

11.3.4 Development Act 1993

The *Development Act 1993* 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 Development 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 Development Act. The Development Plans relevant to the Dry Creek Salt Field include:

- Salisbury Council Development Plan
- Port Adelaide Enfield Council Development Plan
- Playford Council Development Plan

Post completion land uses proposed in this PEPR will need to take account of these Development Plans.

11.3.5 Natural Resources Management Act 2004

The *Natural Resources Management Act 2004* promotes the sustainable and integrated management of the State’s natural resources and provides for the protection of the State’s natural resources. The Act establishes Natural Resource Management (NRM) Regions and Boards and provides for the preparation of a State NRM Plan and Regional NRM plans to promote the objectives of the Act.

The Dry Creek Salt Field is contained within the Adelaide – Mount Lofty Ranges NRM Region. The NRM Plan regulates water affecting activities, stormwater management, management and protection of land, and control of plants and animals. Environmental outcomes and strategies proposed in this PEPR will need to take account of the Adelaide – Mount Lofty Ranges NRM Plan and the State NRM Plan. Permits may be required for certain activities included in the PEPR from the NRM Board.
11.3.6 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 DSD.

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. The Council has released *Guidelines for a native vegetation Significant Environmental Benefit policy for the clearance of native vegetation associated with the minerals and petroleum industry* (September 2005).

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

11.3.7 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*.

11.3.8 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. In making decisions under this Act, and other specified Acts and Regulations, Ministers are required to consider the operation or application of this Act and must act consistently with, and seek to further, the objects and objectives of this Act.

11.3.9 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.

11.3.10 Aboriginal Heritage Act 1988

The *Aboriginal Heritage Act 1988* provides for the protection and preservation of Aboriginal heritage.
11.3.11 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

11.3.12 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. BDC has submitted a self-assessment for the Holding Pattern and will update this at intervals during the Holding Pattern to account for new information from monitoring and the implementation of the Holding Pattern.

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.

11.4 Other Relevant Policies and Plans

11.4.1 South Australia’s Strategic Plan

South Australia’s Strategic Plan was first released by the South Australian Government in 2004 and was last updated in 2011. The plan’s targets reflect South Australia’s aspirations through to 2020. It guides government actions and priorities, and sets seven strategic priorities:

- Creating a vibrant city
- Safe communities, healthy neighbourhoods
- An affordable place to live
- Every chance for every child
- Growing advanced manufacturing
- Realising the benefits of the mining boom for all
- Premium food and wine from our clean environment.
The Strategic Plan will be considered in future land use planning for the site.

11.4.2 The 30-Year Plan for Greater Adelaide

The 30-Year Plan for Greater Adelaide was released in 2010 and outlines how the South Australian Government proposes to respond to population growth, demographic change (such as an ageing population and more single person and couple households without children) and an evolving economy.

The plan indicates that during the next three decades, Greater Adelaide could experience:

- steady population growth of 560,000 people
- construction of 258,000 additional dwellings
- creation of 282,000 new jobs
- economic growth of $128 billion.

The plan is a volume of the Planning Strategy for South Australia, which guides land-use planning throughout the State.

The plan designates Section 1 of the salt field as a future urban growth area. Parts of other Sections are also shown as investigation areas for future urban growth, dependent on a feasibility investigation study by SA Water. The plan also notes an indicative corridor for the Northern Connector as a potential primary freight road.

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

11.4.3 Adelaide International Bird Sanctuary

In 2014, the South Australian Government released a vision for an Adelaide International Bird Sanctuary along 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 11-1). The sanctuary’s focus would be 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.

Areas to be included in the proposed sanctuary will be confirmed with the State government in future land use planning for the salt field.

11.4.4 Northern Connector

The Northern Connector project is part of the 78 km North-South Corridor identified as the major transport route for north and south bound traffic (including freight vehicles) running between Gawler and Old Noarlunga. The Northern Connector is a non-stop motorway connecting the already complete Northern Expressway and South Road Superway links and provides an unimpeded 43 km journey from Gawler to Regency Park. The new 15.5 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 project is complete.

The originally proposed rail component of the Northern Connector project (31 km rail track and 4 bridges connecting with the existing rail line at Kings Road, Virginia and the Outer Harbour line at Dry Creek) has been deferred following determination that freight rail line improvements are not required in the shorter term.

The route for the Northern Connector is shown in Figure 11-2. The implications of construction of the Northern Connector for the Dry Creek Salt Fields are discussed at Chapter 11.5.
Figure 11-1: Proposed Adelaide International Bird Sanctuary (shown in green) and other protected areas

Source: DEWNR
Figure 11-2: Proposed Northern Connector route

Source: Department of Planning, Transport, and Infrastructure
11.4.5 Development Plans

Development Plans have been prepared under the Development Act 1993 for each of the four councils that include the salt field. The main zones in these development plans that apply to the salt field and surrounds are shown in Figure 11-3 and summarised below in Table 11-1. A number of policy areas also apply over and around the salt field reflecting the low-lying nature of the land and presence of acid sulfate soils.

Table 11-1: Development Plan Zones

<table>
<thead>
<tr>
<th>Development Plan</th>
<th>Zone Name</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salisbury Council</td>
<td>Coastal Conservation</td>
<td>The conservation of coastal features and scenic quality, enable appropriate public access and ensure that development is not subject to coastal hazards.</td>
</tr>
<tr>
<td></td>
<td>Coastal Settlement</td>
<td>The protection of the natural coastal environment from inappropriate development.</td>
</tr>
<tr>
<td></td>
<td>Deferred Urban</td>
<td>Accommodate a restricted range of uses that are not prejudicial to development of the land for urban purposes and maintain the appearance of the zone.</td>
</tr>
<tr>
<td></td>
<td>Mineral Extraction</td>
<td>Mining and quarrying of minerals in a sustainable manner.</td>
</tr>
<tr>
<td></td>
<td>Open Space</td>
<td>Preserve open space character to provide a visual contrast to the surrounding urban area and accommodate a range of public and private activities in an open and natural setting.</td>
</tr>
<tr>
<td>Port Adelaide Enfield</td>
<td>Metropolitan Open Space System</td>
<td>Accommodates a range of public and private activities, including passive and active recreation land uses, habitat conservation and restoration, in an open and natural setting.</td>
</tr>
<tr>
<td></td>
<td>Industry</td>
<td>Accommodate a wide range of industrial, warehouse, storage, and transport land uses.</td>
</tr>
<tr>
<td>Playford</td>
<td>Mineral Extraction</td>
<td>Mining and quarrying of minerals in a sustainable manner, including extraction of salt.</td>
</tr>
<tr>
<td></td>
<td>Metropolitan Open Space System</td>
<td>Accommodates a range of public and private activities, including passive and active recreation land uses, habitat conservation and restoration, in an open and natural setting.</td>
</tr>
<tr>
<td></td>
<td>Primary Production</td>
<td>Economically productive, efficient, and environmentally sustainable primary production.</td>
</tr>
<tr>
<td>Mallala</td>
<td>Coastal Conservation</td>
<td>Enhance and conserve the natural features of the coast, including visual amenity, landforms, fauna, and flora.</td>
</tr>
<tr>
<td></td>
<td>Conservation</td>
<td>Conservation and enhancement of the natural environment and natural ecological processes for their historic, scientific, landscape, faunal habitat, biodiversity, and cultural values.</td>
</tr>
<tr>
<td></td>
<td>Primary Production</td>
<td>Economically productive, efficient, and environmentally sustainable primary production.</td>
</tr>
</tbody>
</table>
Figure 11-3: Land use zoning
11.5 Future Land Use Context

In 2014 the prior owner of the salt field, Ridley Dry Creek Pty Ltd, and the South Australian Government initiated an expression of interest process to identify a short list of feasible future land uses and proponents for each part of the salt fields. The process entailed advertising and publicity to seek out organisations wishing to express interest and be considered.

The aims were to:

▪ help Ridley to adjust the scope and timing of its closure works to achieve mine completion in such a way that expedites mine completion, and facilitates these feasible future land uses
▪ help the South Australian Government assess the site’s residual environmental risks at mine completion in the light of these feasible future land uses
▪ help the South Australian Government and Ridley manage the land transactions needed to transition Crown and freehold land to these feasible future land uses
▪ help the South Australian Government with the economic, planning, and environmental assessments of these feasible future land uses.

That process resulted in the sale of Ridley Dry Creek Pty Ltd, and freehold land, crown leases, and its mining tenements. Ridley Dry Creek Pty Ltd has been renamed Buckland Dry Creek Pty Ltd (BDC).

BDC is now exploring the options for future land uses in the different parts of the salt field. As of the date of preparation of this PEPR Revision, the following can be stated.

11.5.1 Section 1 - South of Dry Creek

The western part of Section 1 is being taken over by DPTI for the construction of the Northern Connector. Once the construction is complete, it is understood that land that is surplus to the requirements of the Northern Connector will be transferred back to Renewal SA.

Renewal SA owned land and BDC owned land that are covered by mining tenements (and that are not required for the Northern Connector) will be the subject of mixed-use urban development. To this end Renewal SA and BDC are collaborating on the Master Planning for that development.

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 be returned to the Crown.

11.5.2 Section 2 – Dry Creek to St Kilda

North of Dry Creek to PA6 (South)

The mining tenement land associated with PA12 and between PA12 and PA11 is being taken over by DPTI for the construction of the Northern Connector.

The mining tenement land associated with PA11 is partly owned by the Crown and partly by BDC. This land does not yet have an identified future land use.

SA Water is conducting trials in Section 2 to investigate the feasibility of denitrification of effluent from its Port Adelaide treatment facility. If the trials are successful, it is understood that SA Water may want to use PA10, PA9, PA8, PA7 and the southern part of PA6 for long term denitrification operations.

Other options for future use of these ponds PA11, PA10, PA9, PA8, PA7 and the southern part of PA6 are also being explored.
Those intertidal parts of mining tenements 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 may:

- Either continue to be leased and managed by BDC from the Crown; or
- Be returned to the Crown for its management.

**PA4, PA5 and PA6 (North)**

Salisbury Council is investigating the feasibility of the concept of using PA4, PA5 and PA6 to help manage stormwater discharges from Edinburgh Park North and the land that is generally west of there. If that concept proves feasible, then these ponds may become used for stormwater detention and treatment wetlands, discharging into tidally flushed wetlands.

Other options for future uses of these ponds PA4, PA5, PA6 (North) are also being explored.

It is likely that those intertidal parts of mine tenements 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 may:

- Either continue to be leased and managed by BDC from the Crown; or
- Be returned to the Crown for its management.

**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 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.
12 Overview of Site and Context

12.1 Overview of Site and Surrounding Land Uses

12.1.1 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 configuration of land ownership in this sector is delineated in Figure 12-1.

![Figure 12-1: Land tenure – Section 1 (south of Globe Derby Park)](image-url)
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 comprising the site office and stores are constructed on Crown land. 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 Crown land has Mining Leases, however, there are generally no other occupancy rights over the Crown land.

The land is primarily within the City of Salisbury (with a small incursion into Port Adelaide–Enfield) and, under the current Development Plan, is mostly within an MFP zone, with portion being in a MOSS (Recreation) zone. The MFP zone is a redundant zone, which was intended to underpin a comprehensive and staged urban development accommodating 30,000 to 50,000 people. The zone extends into Gillman to the west. A Development Plan Amendment, rezoning the Gillman land to Industry or similar, is expected in the near term.

The 30 Year Plan for Metropolitan Adelaide defines the desired directions for future development and also provides a basis for private sector development through local government Development Plans. The future use and development of the land will be determined within the framework of this strategy. To this end, the land is referred to in the Plan as having potential for future urban development, although the nature of that development remains to be determined.

The MOSS (Recreation) zone is primarily intended as a zone in which a predominantly open space character is preserved and enhanced to provide a visual contrast to the urban area; and as a zone accommodating district and regional open space for a range of passive and active public recreational activities. The zone is to provide cycle and walking paths within an integrated system of open spaces linking adjoining land uses, development in appropriate locations of non-intrusive recreation, tourist, education and research activities, and an open and natural landscape featuring native plantings and watercourses.

12.1.2 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 evaporation and holding ponds running parallel to the salt evaporation ponds.

This land is generally within the suburb of Dry Creek. 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.

The freehold land and Crown land for this sector of the salt field operation is delineated in Figure 12-2. As shown, there is only a small area of freehold land at the southern end.
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. The ratio of both operational freehold to operational leasehold land and total freehold to total leasehold land is very low.

The land is within the City of Salisbury and, under the current Development Plan, is essentially within an Extractive Industry (Ein) zone, with small portion being in a MOSS (Recreation) zone. The primary objective of the Ein zone is for the mining and quarrying of minerals. The current use appears to accord with the intentions of the zone.

12.1.3 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, a large portion of which (to the east of the BDC land) is low-lying and marginal grazing land. A large part of the land east of the BDC land is owned by Walker Corp and is proposed for residential development in the near to medium term.

The freehold land and Crown land for this sector of the salt-field is delineated in Figure 12-3.

![Figure 12-3: Land tenure – Section 3 (St Kilda to Port Gawler)](image)

**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.

The land is essentially within the City of Playford and under the current Development Plan, is primarily within an Eln zone, with small portion being in a MOSS (Recreation) zone. The Eln zone is intended as a zone comprising both solar evaporation pans for the extraction of salt and development compatible with core horticulture activities (e.g. irrigated and greenhouse horticulture and hydroponics) within the Horticulture West Zone; and as a zone for the mining and quarrying of minerals.
12.1.4 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. 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 12-4.

![Figure 12-4: Land tenure – Section 4 (Port Gawler to Middle Beach)](image)

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.

The land is essentially within the Mallala District Council and, under the current Development Plan, is within a Coastal (Cst) zone. This zone comprises the strip of land of approximately three kilometres in width, which abuts the Gulf St Vincent coast. The zone includes the localities of Port Gawler, Middle Beach, Light Beach and Port Prime. Parts of the zone are liable to flooding from storm, tidal or river water inundation. The primary objectives of this zone are for the retention in a natural state of environmentally and ecologically significant features, particularly Samphire swamps and sand dunes; and for agricultural and aquacultural activities carried out in a manner which conserves the coastal environment and has regard to proper management practices. There is a specific restriction on extensive or intensive near coastal, recreation and camping activities.

Other objectives include continuation or extension of extractive industry operations only where the impact on the environment is minimised and of an acceptable level; protection of the scenic amenity and appearance of the coastal landscape; and land division enabling security of tenure for existing dwellings on Crown land.

12.2 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 former operating 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.

12.3 Adjoining Reserves and Sanctuaries

The proximity of the salt fields to a number of conservation reserves can be seen in Figure 11-1. This also shows the location of the salt fields relative to the proposed Adelaide International Bird Sanctuary. The reserves are described below.

12.3.1 Adelaide Dolphin Sanctuary

The Adelaide Dolphin Sanctuary 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; and the Port Gawler Conservation Park. 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.
12.3.2 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 Creek 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).

12.3.3 Port Gawler Conservation Park

The Port Gawler Conservation Park covers a range of landform features including mangrove forest, tidal flats, Samphire swamp, intermittent sand dunes, and estuarine habitats. The conservation 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.

12.3.4 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)

12.4 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 12-1.

<table>
<thead>
<tr>
<th>Table 12-1: Climate statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weather Aspect</strong></td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Av Monthly rain (56 yrs.) (mm)</td>
</tr>
<tr>
<td>Av Daily Max temp (10yrs) (°C)</td>
</tr>
</tbody>
</table>
### 12.5 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.

Despite the proximity of residential areas, there has only been one complaint received in the last three years regarding air quality impacts. This related to odour impacts from Pond XC25 following a 1 in 100-year rainfall event in February 2014 and was satisfactorily resolved. When Calsit was formerly stockpiled in the crystallising area, complaints were received from local residents about dust. In addition, the Tramway Museum had raised concerns about foam being blown onto tracks and causing corrosion.

#### 12.5.1 Applicable Legislation and Standards

The *National Environment Protection (Ambient Air Quality) Measure* (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 PM2.5. These standards are set for protecting human health and well-being.

The *Environment Protection (Air Quality) Policy 1994* 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 is 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’.

12.6 Flora and Fauna

12.6.1 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 DEWNR (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 12-5, Figure 12-6 and Figure 12-7. Further detail is provided in Appendix 5.

Intertidal Mangrove

One species of mangrove is present in South Australia; Grey Mangrove (Avicennia marina). They grow to a height of 3~ 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 3

Figure 12-5: Vegetation mapping - southern salt fields
Figure 12-6: Vegetation mapping - central salt fields
Figure 12-7: Vegetation mapping - northern salt fields
The breakdown for each vegetation community within the leasehold is as follows:

<table>
<thead>
<tr>
<th>Vegetation Community</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dryland Samphire</td>
<td>39ha</td>
</tr>
<tr>
<td>Intertidal Mangrove</td>
<td>600ha</td>
</tr>
<tr>
<td>Intertidal Saltmarsh (Samphire)</td>
<td>356ha</td>
</tr>
<tr>
<td>Intertidal Samphire / Atriplex</td>
<td>98 ha</td>
</tr>
<tr>
<td>Planted Sheoak</td>
<td>3.4ha</td>
</tr>
<tr>
<td>Samphire / Atriplex / Grassland</td>
<td>65ha</td>
</tr>
</tbody>
</table>

### 12.6.2 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 inecunda* - 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*), Calomma Daisy (*Onchosiphon 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 DEWNR land at Buckland Park and that enter the salt fields to browse in the mangrove and saltmarsh areas when green pick is scarce. Procedures for the control of feral animals are detailed in the company’s *SOP-SC-A008 Environmental Management Plan*.

**12.6.3 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

As noted at Chapter 11.3.12, 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 will be assessed on preliminary documentation. A draft charter has been created in 2015 following discussions between DoEE (Cth), DSD, DEWNR and Ridley (as the then owner and proponent). That charter describes the process for that assessment – with that process to use a future revision of this PEPR / MOP as the preliminary documentation. That revision will address the closure plan and outcomes for these inundated ponds. A copy of the draft Charter is attached in Appendix 15.

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

12.7.1 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 mined 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 12.7.2 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.

12.7.2 Acid Sulfate Soils

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 (FeS) 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 12-2 below.

Table 12-2: Acid sulfate soil materials definitions

<table>
<thead>
<tr>
<th>Material</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Acidity</td>
<td>Soil materials containing detectable sulfide minerals:</td>
</tr>
<tr>
<td></td>
<td>hypersulfidic – potential to produce acidic soils with pH of less than 4</td>
</tr>
<tr>
<td></td>
<td>hyposulfidic – soils buffering capacity maintains pH greater than 4</td>
</tr>
<tr>
<td></td>
<td>monosulfidic material (FeS) – soils / sediment contains monosulfides.</td>
</tr>
<tr>
<td></td>
<td>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 12-2).</td>
</tr>
<tr>
<td>Actual and Retained Acidity</td>
<td>Soil material that has a pH less than 4.</td>
</tr>
</tbody>
</table>

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 ($\text{FeS}_2$). A conceptual model and descriptions of ASS types and sub-types in the region is shown in see Figure 12-8.

Ponds in the Dry Creek saltfields 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.

BDC has undertaken studies to assess the presence / absence, and spatial and temporal extent / variation of the main types of ASS materials (see Table 12-2) present in a range of locations across the saltfields. The acid sulfate soil assessment reports discussed below are at Appendix 3.

**Gillman Schematic Cross Section**

![Gillman Schematic Cross Section](image)

Legend:
- **Sulfuric material** (Actual ASS)
- **Sulfidic material** (Potential ASS)
- **Tidal stream** (filled with sapric material)
- **Tidal stream** - blocked by bund wall (bottom sediment contains MBO)
- **Bund wall** (built 1985)
- **Dead mangrove**
- **Salt bush** (samphire)
- **Mangrove tree**
- **Seagrass** (Posidonia)
- **Seaweed** (Ulva)

**Figure 12-8: 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:

1. 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:
   - Engineered floors of the crystallisers and salt stacking bays
   - The floors of the final areas
   - Engineered access and haul roads
   - 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 1\(^1\), 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 12-2). 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; Appendix 4):

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

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.

\(^1\) These operations had the purpose of producing pure salt; i.e. not contaminated by algae or other organic matter.
Plate 12-1: Gypsum crust – Pond PA7 Section 2 December 2013
(Source: Acid Sulfate Soil Centre – University of Adelaide)

Plate 12-2: 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 and are permanently ponded with saline water and therefore predominately comprise subaqueous acid sulfate soils.

Each pond in Section 3 West 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.

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 saltfield 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; Appendix 3):

**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 12-9 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; Appendix 3).

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.

![Image of soil classification map](image_url)

**Figure 12-9:** Acid sulfate soil classification and acidification hazard rating - pond XF2
12.7.3 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: Environmental management of on-site remediation.

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).

12.8 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 12-10.

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.

12.8.1 Applicable Legislation and Standards

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality 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. 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. The policy aims to achieve this objective by:

- setting environmental values and water quality objectives for streams, rivers, oceans, and groundwater
- establishing obligations for industry and the community to manage and control different forms of pollution
- encouraging better use of wastewater
- promoting best practice environmental management
promoting within the community environmental responsibility and involvement in environmental issues

setting discharge limits for particular activities.

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 11.3.2, BDC has a licence that enables discharge of bitterns and saline water.

12.9 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 (Northern Adelaide and Barossa Catchment Water Management Board (NABCWMB 2000).

12.9.1 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.

12.9.2 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 (NABCWMB 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, 2, 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.

12.9.3 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 (NABCWMB 2000).
The T3 aquifer provided a flow of salt making brine into pond X83 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.

Details of all production bores in the Dry Creek Salt Fields are provided in Table 12-3 below. The locations of bores within the salt fields are shown in Figure 12-10.

### Table 12-3: Production bore details

<table>
<thead>
<tr>
<th>Cheetham Bore Number</th>
<th>Departmental Bore Number</th>
<th>Location (Datum GDA, Zone 54)</th>
<th>Aquifer</th>
<th>PWA</th>
<th>Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6628_19184</td>
<td>Middle of ‘A’ row 277797 E, 6144588 N</td>
<td>T1</td>
<td>Northern Adelaide Plains Prescribed Wells Area</td>
<td>1,177,255 kL</td>
</tr>
<tr>
<td>3</td>
<td>6628_10427</td>
<td>South end of ‘G’ row 279812 E, 6145153 N</td>
<td>T1</td>
<td>Northern Adelaide Plains Prescribed Wells Area</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6628_04356</td>
<td>North end of ‘D’ row 278658 E, 6144972 N</td>
<td>T1</td>
<td>Northern Adelaide Plains Prescribed Wells Area</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6628_13020</td>
<td>North end of ‘F’ row 278862 E, 6146789 N</td>
<td>T1</td>
<td>Northern Adelaide Plains Prescribed Wells Area</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6628_13170</td>
<td>Magazine Rd 278756 E, 6142936 N</td>
<td>T1</td>
<td>Dry Creek Prescribed Wells Area</td>
<td>850,255 kL</td>
</tr>
<tr>
<td>7</td>
<td>6628_18042</td>
<td>200m West of No6 278322 E, 6142918 N</td>
<td>T1</td>
<td>Dry Creek Prescribed Wells Area</td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>6528_2005</td>
<td>Chapmans Ck 267417 E, 6158688 N</td>
<td>T3</td>
<td>Northern Adelaide Plains Prescribed Wells Area</td>
<td>1,200,000 kL</td>
</tr>
</tbody>
</table>

#### 12.9.4 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 (NABCWMB 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.

#### 12.9.5 Applicable Legislation and Standards

The Australian and New Zealand Guidelines for Fresh and Marine Water Quality 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. 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 12-10: Surface water and bore locations
12.10 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.

The proximity of adjoining residents and other sensitive receptors is described at Chapter 12.1.

12.11 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 Kaurna 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 DEWNR keeps a database of all wrecks in the area (DEWNR 2016). Several wrecks are located within, or immediately adjacent to, the salt fields:

- Wreck 1087, the No.1 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 12-11.

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.

12.11.1 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 12-11: Location of shipwrecks
13 Description of Historical Operations

This section describes the historical salt production operations. This is to provide background context for the proposed works to put the operations and the salt field into ‘care and maintenance’ prior to rehabilitation and closure.

13.1 General Description and Summary

Dry Creek Salt Fields was a sequential concentration, series flow crystallisation solar salt operation. The operational (southern) salt field occupies approximately 4000 ha of the mineral tenements. Seawater (35g/L TDS) was pumped into the salinas at their northernmost point, near Middle Beach. The brine flowed slowly southward, gradually concentrating through evaporation. By the time brine reached Dry Creek (about 18 months after it was pumped into the northern ponds), its salinity had increased to about 300g/L TDS. The southernmost area contained the crystallising pans, where the saturated brines deposited common salt crystals onto a prepared bed for harvesting.

13.2 Product and Market

13.2.1 Geological Environment and Reserves

The salinas and crystallisers were formed on a mud base. In the salinas, where the brines were initially concentrated, this tended to be the natural surface, while the prepared crystallising pans usually had 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 sulfate 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 was ‘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 was primarily determined by the area of crystallisers and concentrating salinas, combined with the available evaporation. The total volume of salt that the mine may have produced was dependant on the longevity of the mineral leases. The concept of ore reserves is not useful in solar salt facilities fed by ocean waters, as sea salts are constantly being created on land by the weathering process on rocks and are transported to the sea via the slope and fluvial systems.

13.2.2 Market

The mine gate product was brine. The market for this product was soda ash production at the Osborne Plant. Annual production averaged 750,000 tonne per annum (tpa) which produced 640,000 tpa of usable salt. With weathering and purification losses, this resulted in sales of approximately 600,000 tpa.

Dry Creek Salt Field produced salt for this market, profitably, for over 70 years.

13.3 Historical Mining Operations

13.3.1 Sequence of Historical Operations

The salt field relied on the natural evaporative process of the sun and wind to produce salt. Seawater was pumped into shallow evaporation ponds in the northern part of the system and flowed slowly southwards, becoming concentrated in response to evaporation. Seawater was pumped into the initial
ponds during the months when the ‘effective evaporation’ was positive (the ‘making season’). In general the ‘making season’ at Dry Creek extended from September to May, as shown in Figure 13-1.

![Rainfall and evaporation at Dry Creek](image1)

**Figure 13-1: Weather statistics that define the salt-making season**

The flows through the salt field were generally managed through gravity, however, in some locations, the degree of fall required did not exist, or a watercourse intervened, and, in these cases, pumping was used to move the brines. The process flow for the salinas is shown in Figure 13-2 and the distribution drains of the crystallising pans shown in Figure 13-3.

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 precipitated in small amounts in the early salinas. Calcium sulfate (gypsum) had a long precipitation pattern starting with the dihydrate form, which started to precipitate in ponds with a specific gravity of 1.080, and ending with the anhydrate form, which precipitated in ponds that were nearly saturated for common salt. The saturation point for common salt occurs at an approximate specific gravity of 1.216. Saturated brine ready for the crystallisation of salt is known as ‘maiden brine’.

Maiden brine was held in a relatively deep ‘stock paddock’ or ‘pickle pond’ from whence it was distributed to the crystallising pans by a series of drains. At Dry Creek, there were about 390 hectares of prepared crystallising pans, located on ML389, ML390, ML 391, ML5908 and PM248. Further evaporation saw sodium chloride depositing on the floor of these pans to build a thick, hard layer of
interlaced crystals of salt. Residual brine (known as bitterns) was discarded from the last pan in each row of pans once the majority of common salt had precipitated. The initial pans were fed with fresh maiden brine throughout the making season.

The layer of salt was harvested towards the end of the making season. During harvest, the crystallisers were drained one at a time to accept the machinery. Self-propelled harvesters separated and lifted the layer of salt from the crystalliser floor and deposited the harvest onto an electric powered conveyor and stacker system. The conveyors and stacker progressed along each row of crystallisers, depositing salt into a stack parallel to the crystallisers. The stacks (camelles) were formed from a series of overlapping cones of salt.

Salt stacks ran north-south along the length of each crystalliser and reached 12 metres in height. The salt rapidly ‘crusted’ and became very hard, ensuring no entrainment of salt into breezes. Rainwater percolated through the stacks, removing any residual magnesium salts, and dissolving a portion of the common salt. This process is called ‘weathering’ and was the main purification method used to produce a saleable product.

Most salt underwent no further movement after placement into these stacks during the harvesting process, until it was dissolved for sale. A small amount of salt (approximately 18000 tonnes pa) was removed from the stacks using a front-end loader and truck, to supply the salt baskets at the brine reservoirs.

A number of factors affected the amount of salt produced. Warm sunny weather was needed to provide sufficient solar energy and large amounts of land were required. Rains diluted the brine, slowing production and also dissolved harvested salt. These factors affected the annual production, which ranged from 300,000 to 900,000 harvested tonnes per annum.
Figure 13-2: Salt field layout, process flow and salinity gradient (historical operations)
Figure 13-3: Crystalliser pans drainage
13.3.2 Modes and Hours of Historical Operations

The operating (southern) salt field operated on a continuous basis throughout the year. Pumping into and through the salinas started in early Spring each year and continued until late Autumn or early Winter. At the same time as the salinas started to operate, the crystallising pans were prepared for flooding by smoothing the pan bases to make a proper ‘bed’ for the salt. The crystallisers were flooded sequentially as each was repaired. Harvesting of the crystallisers occurred in late Autumn and Winter. Salt was harvested over about 10 weeks. During harvest, leftover crystalliser brine was assessed and either placed into deep storage ponds to overwinter or disposed to sea, if its salt content was exhausted. After harvest, the crystallising pans were rain or seawater ‘washed’ to collect any unharvested salt and this brine stored. The washed pans were then left to dry until they were ready to be prepared in Spring for a new crop.

The salt field was manned from 7:30 am to 3:45 pm Monday to Friday and 7:00 am to 3:00 pm on weekends and public holidays. The production pumps operated automatically throughout the twenty-four-hour cycle. During harvest (March – July), operations on the crystallisers (ML389, ML390, ML 391, ML5908 and PM248) were conducted for an extra hour each day.

13.3.3 Type of Equipment for Historical Operations

Equipment used in day to day operations included, but was not limited to: utilities, cars, graders, trucks, front end loaders, bulldozers and tracked vehicles.

Pan preparation utilised articulated tractors and towed agricultural-type implements. Harvesting operations included:
- 3 custom designed tracked, hydrostatically driven salt harvesters powered by Caterpillar 3208
- 9 electrically powered conveyors
- 1 stacker / generator set, generating 600 KVA
- 1 mobile lunch van
- Diesel fuel tank on trailer: 2 X 1000 litres
- Excavator: Hitachi EX220.

13.4 Processing for Historical Operations

13.4.1 Processing Plant

As the product supplied to the salt fields’ customer was crude brine (a relatively pure solution of NaCl), processing at Dry Creek included dissolving salt from the stacks, mixing it at a central reservoir and pumping it from the crude brine pumphouse into the brine main for transfer to the Penrice Osborne Plant. Dissolving was accomplished with a sprinkler system using borewater. Crude brine was transferred using portable and in-situ pumps through a common reticulation system. The operation produced no dust and no nuisance noise levels.

13.4.2 Hours of Operation

The dissolving and transport pumps operated automatically throughout the twenty-four-hour cycle. The pumps were monitored remotely to allow response to failure during ‘out of hours’ operations.

13.4.3 Type of Equipment

Dissolving equipment included:
- up to 5 mobile and permanent electric pumps (collectively 6000m³ per day capacity)
- hoses and sprinklers for use in the stacking bays
- underground power lines with outlets along each stack to operate the mobile pumps
- bore lines along each stack to provide dissolving water
- brine lines along each stack to transport brine back to the central reservoir.

Reservoir and brine pumping plant included:
- above ground reservoirs for mixing and storing crude brine
- salt baskets for ‘sweetening’ weak brines
- brine line from the dissolving points to the reservoir and crude brine pump house
- 2 electrical pumps at the crude brine pump house
- brine main (HDPE 450 mm and steel 392 mm main) from crude brine pump house to the boundary of ML390.

13.5 Wastes from Historical Operations

13.5.1 Mine Wastes

Solar salt production produced minimal wastes. Seawater is water with a small percentage of salt. It is concentrated by evaporation to produce ‘maiden brine’ that will precipitate and crystallise common salt.

The spent brine remaining after salt crystallisation is called ‘bitterns’ and contained some remnants of common salt along with magnesium sulfate, magnesium chloride and smaller amounts of other elements (Figure 13-4). This spent brine was drained from the final crystallisers of each row of pans and returned to the sea via the crystalliser drains. The Dry Creek Salt Field was, and is still, authorised by the EPA to discharge bitterns into the tidal portions of Dry Creek and North Arm Creek. The material is released in accordance with the licence conditions and as specified in the company’s SOP-SC-A008 Environmental Management Plan, SOP-SC-A012 Waste Management and SOP-SC-C005 Marine Discharge instructions. The bitterns discharge locations are shown in Figure 13-5.

Figure 13-4: Composition of seawater, maiden and bitterns
Figure 13-5: Bitterns discharge points

13.5.2 Processing Wastes

The stacks of salt produced weak brine during rain weathering, and this was discharged to sea through the drains along with the rainwater runoff. The runoff was similar in composition to estuarine water, and had a low turbidity compared to the stormwater-affected receiving waters.

During active dissolving processes little brine was wasted. The stacks of salt contained a small percentage of mud and this, along with remnant undissolved crystal salt, remained in the stackbay on completion of dissolving. This was placed into the final concentrating ponds, where the salt eventually redissolved and the fine muds gradually worked their way across the pond floor, filling any low spots and helping maintain a good seal.

Crude brine for sale to the customer was stored in the reservoirs prior to being pumped through a brine main to Osborne. This pipeline was an operation-critical element of the customer’s business and was monitored remotely to detect failure. Procedures were in place so manage spillage of crude brine through brine main failure.

13.5.3 Industrial and Domestic Wastes

Industrial waste was recycled where possible or collected by licensed contractors. The dissolvers’ laboratory had a separate sealed tank that received sink waste and was pumped out by a licensed contractor. It also generated out of date chemicals and empty chemical containers. These were collected by licensed contractors. Other waste included office wastes and wastes from the maintenance workshop. These continue to be produced.
14 Stakeholder Engagement and Consultation

Table 14-1 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 taken into account, 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.

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 a 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.

14.1 Previous Consultation and Engagement

In early 2013 Ridley initiated communications and engagement with DSD, DPTI 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 14-2). 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 DEWNR, the Adelaide Mt Lofty Region NRM Board, Department of the Environment, Coastal Protection Board, Birdlife Australia, and SA Water.
<table>
<thead>
<tr>
<th>Group</th>
<th>Role</th>
<th>Identity</th>
<th>Interests</th>
<th>STAG Meeting each month</th>
<th>Direct Meetings As required</th>
<th>Group Meetings with other stakeholders As required</th>
<th>EOI proponents Meetings as required by EOI process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner and Operator of Salt Field</td>
<td>Freehold landowner; lessee of Crown land; holder of Mining Leases</td>
<td>BDC Land Corporation</td>
<td>▪ 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.</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>State Government</td>
<td>Crown landowner / manager with economic, environmental, social interest in this land</td>
<td>DEWR</td>
<td>▪ Administers several licences to occupy that are part of salt field ▪ Responsible for Bird Conservation Park being established to west and north of the salt field which will eventually include the salt field’s bird conservation area created by closure ▪ Administers the Adelaide Dolphin Sanctuary, Port Gawler Conservation Park 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</td>
<td>Y</td>
<td>Y</td>
<td>By either party on future use of Crown land, commercial matters etc</td>
<td>On future use of Crown land</td>
</tr>
</tbody>
</table>

Table 14-1: Stakeholder roles, interests and BDC’s vehicles for consultation and engagement
<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Vehicles for Consultation and Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STAG</td>
</tr>
<tr>
<td></td>
<td>Direct Meetings As required</td>
</tr>
<tr>
<td></td>
<td>Group Meetings with other stakeholders As required</td>
</tr>
<tr>
<td></td>
<td>EOI proponents Meetings as required by EOI process</td>
</tr>
<tr>
<td>Group</td>
<td>Role</td>
</tr>
<tr>
<td>Identity</td>
<td>Interests</td>
</tr>
<tr>
<td>Renewal SA</td>
<td>▪ Oversights AMLNRM and Coast Protection Board</td>
</tr>
<tr>
<td></td>
<td>▪ Responsible for strategic planning and implementation of State sponsored urban renewal and urban development projects</td>
</tr>
<tr>
<td></td>
<td>▪ Y By either party on future use / planning for Section 1</td>
</tr>
<tr>
<td></td>
<td>▪ Y By either party on future use / planning for Section 1</td>
</tr>
<tr>
<td></td>
<td>▪ Y By either party on future use / planning for Section 1</td>
</tr>
<tr>
<td>Regulator / Planning Authority</td>
<td>DSD</td>
</tr>
<tr>
<td></td>
<td>▪ Administration of Mining Act via PEPR process until site closed under this Act and Mining leases handed back</td>
</tr>
<tr>
<td></td>
<td>▪ Coordinates STAG</td>
</tr>
<tr>
<td></td>
<td>▪ Y To advance PEPR, no less frequently than monthly. Site inspections for compliance checks each 3 months</td>
</tr>
<tr>
<td></td>
<td>▪ Y On closure of salt field</td>
</tr>
<tr>
<td></td>
<td>▪ On taking over mining leases; On clarifications re closure process</td>
</tr>
<tr>
<td>EPA</td>
<td>▪ Licensing of site operations, include discharges to external environment</td>
</tr>
<tr>
<td></td>
<td>▪ Y To address Licence matters and post closure environmental regulation. Site Inspections for compliance checks monthly</td>
</tr>
<tr>
<td></td>
<td>▪ Y On closure and post closure environmental regulation</td>
</tr>
<tr>
<td></td>
<td>▪ Y On closure and post closure environmental regulation</td>
</tr>
<tr>
<td>PIRSA</td>
<td>▪ Administration of Fisheries Management Act in respect of discharges from the site into the marine environment; and</td>
</tr>
<tr>
<td></td>
<td>▪ Y On exemption matters for</td>
</tr>
<tr>
<td></td>
<td>▪ Y On closure and post Closure</td>
</tr>
<tr>
<td></td>
<td>▪ Y On closure and post closure</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Vehicles for Consultation and Engagement</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td><strong>Group</strong></td>
<td><strong>Role</strong></td>
</tr>
<tr>
<td>DPTI</td>
<td></td>
</tr>
<tr>
<td>Adjacent landowner and prospective land purchaser / occupier</td>
<td></td>
</tr>
<tr>
<td>SA Water</td>
<td></td>
</tr>
<tr>
<td>GBE</td>
<td>Prospective land purchaser / occupier</td>
</tr>
<tr>
<td>Local Government</td>
<td>Planning, stormwater management, urban environment management</td>
</tr>
</tbody>
</table>

- **STAG** Meeting each month
- **Direct Meetings** As required
- **Group Meetings with other stakeholders** As required
- **EOI proponents Meetings as required by EOI process**
<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Vehicles for Consultation and Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
<td><strong>Role</strong></td>
</tr>
</tbody>
</table>
| Commonwealth Government | Regulator | Department of Environment and Energy | ▪ Administers the EPBC Act.  
▪ Interested in protection of migratory birds that use the site; and in other matters of national environmental significance.  
▪ In process of negotiating delegation of EPBC regulatory role to the State. | | | |
| Commonwealth, State and Local Government Politicians | Constituent and political party representatives | Susan Close Member for Port Adelaide (SA) (Fed)  
Leesa Vlahos Member for Taylor (SA)  
Zoe Bettison Member for Ramsay (SA)  
Mark Butler Member for Port Adelaide (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 | | | |
| | | | | | | | |

Mangrove Interpretive Centre built partially within the mining leases, seaweed from beach cleaning is stored temporarily on leases.

Y Each 3 months on progress and more frequently as needed on PEPR on EPBC process matters, including submissions.

Y Each 6 months on closure process and progress.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Vehicles for Consultation and Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
<td><strong>Role</strong></td>
</tr>
<tr>
<td><strong>Identity</strong></td>
<td><strong>Interests</strong></td>
</tr>
<tr>
<td><strong>STAG</strong></td>
<td><strong>Direct Meetings</strong></td>
</tr>
<tr>
<td><strong>Group Meetings</strong></td>
<td><strong>Group Meetings</strong></td>
</tr>
<tr>
<td><strong>EOI proponents</strong></td>
<td><strong>Meetings as required by EOI process</strong></td>
</tr>
<tr>
<td>Nick Champion</td>
<td>Member for Wakefield</td>
</tr>
<tr>
<td>Rural landholding neighbours</td>
<td>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</td>
</tr>
<tr>
<td>Urban and coastal township neighbours (represented by St Kilda Progress Association and St Kilda and Surrounds Development and Tourism Association)</td>
<td>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 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</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Vehicles for Consultation and Engagement</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>Group</strong></td>
<td><strong>Role</strong></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>St Kilda Tramway</td>
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<td></td>
<td></td>
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<tr>
<td>Jeffries Compositing Works</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerial farms, radars, and communication</td>
<td></td>
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<tr>
<td>towers</td>
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<td></td>
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<tr>
<td>Dublin Balefill Tip</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>South Australian Rifle Association</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>Role</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Delta, across salt field tenements</td>
<td></td>
</tr>
</tbody>
</table>

**Special Interest Groups**

<table>
<thead>
<tr>
<th>Role</th>
<th>Identity</th>
<th>Interests</th>
</tr>
</thead>
</table>
| 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 |
| BirdLife Australia | | • Interested to protect bird habitat afforded by the salt field.  
• Provides monitoring services and advice to DEWNR under Commonwealth and State funded programmes |
| Honey production | Beekeepers | • Several beekeepers lease ‘sites’ for their hives from the salt fields |

**Boards (responsible to DEWNR)**

<table>
<thead>
<tr>
<th>Role</th>
<th>Identity</th>
<th>Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible for delivering programs and projects to manage, protect and restore the region’s natural resources</td>
<td>Adelaide Mount Lofty Ranges Natural Resource Management Board</td>
<td>• Is a source of grant monies for habitat restoration purposes</td>
</tr>
<tr>
<td>Responsible for protection, restoration</td>
<td>Coast Protection Board</td>
<td>• Carries out works, acquires, and deals with coastal land.</td>
</tr>
</tbody>
</table>
### Stakeholder Vehicles for Consultation and Engagement

<table>
<thead>
<tr>
<th>Group</th>
<th>Role</th>
<th>Identity</th>
<th>Interests</th>
<th>STAG</th>
<th>Direct Meetings</th>
<th>Group Meetings with other stakeholders</th>
<th>EOI proponents</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAG</td>
<td></td>
<td></td>
<td></td>
<td>Meeting each month</td>
<td>As required</td>
<td>As required</td>
<td>Meetings as required by EOI process</td>
</tr>
<tr>
<td>Other Third Parties</td>
<td>Potential future landowners / occupiers / managers</td>
<td>Identities to be found by EoI process</td>
<td>Economic, environmental, and social value of the land</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 14-2: Key Communications and Engagement 2014 to October 2016**

<table>
<thead>
<tr>
<th>Organisation / Group</th>
<th>Activities 2014 to October 2016</th>
<th>Issue</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>Meetings and email correspondence</td>
<td>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</td>
<td>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</td>
</tr>
<tr>
<td>Councils (Mallala, Playford, Salisbury)</td>
<td>Meetings, emails, See also STAG</td>
<td>Impacts from Holding pattern on site neighbours</td>
<td>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.</td>
</tr>
<tr>
<td>Organisation / Group</td>
<td>Activities 2014 to October 2016</td>
<td>Issues Arising from Communication / Engagement</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Possible Mine Closure strategies and opportunities to use different parts of the site for urban stormwater management</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSD, DPTI, EPA, DEWNR, SA Water</td>
<td>CE Steering Committee Meetings</td>
<td>High level coordination of Government involvement and oversight of the STAG.</td>
<td>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).</td>
</tr>
</tbody>
</table>
| Ridley (to May 2016), BDC (from June 2016), DSD, DPTI, EPA, DEWNR, PIRSA plus SA Water, plus Renewal SA, plus Council representatives | Strategy and Technical Advisory Group (STAG) Meetings | 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  
- Facilitated:  
  - Permitting of Holding Pattern for Sections 2 to 4, with discharge to SA Water outfall from PAS, and trial draining of selected ponds  
  - Approval of initial PEPR 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 covering  
- Facilitated the collaborative review of the master plan for the development of Section 1 that is 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 |
| DEWNR 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; 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). |
## Organisation / Group

### Activities 2014 to October 2016

<table>
<thead>
<tr>
<th>Organisation / Group</th>
<th>Activities 2014 to October 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSD, EPA, PIRSA</td>
<td>Meetings, correspondence, reviews of documents</td>
</tr>
<tr>
<td>DSD and EPA</td>
<td>Site Inspections (monthly originally and now quarterly)</td>
</tr>
<tr>
<td>Renewal SA</td>
<td>Meetings and correspondence</td>
</tr>
</tbody>
</table>

## Issues Arising from Communication / Engagement

<table>
<thead>
<tr>
<th>Issue</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| and these goals need to be agreed by Ridley (now BDC), DEWNR / 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 **develop agreed strategic goals** 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. | 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.  

### Variations to the EPA Licence covering the Holding Pattern

- DSD’s agreement on Environmental Outcomes and Measurement Criteria to apply to the Holding Pattern  
- Approval under the FMAct for the water discharges entailed by the Holding Pattern  
- Reviews of draft submissions for minor changes and revisions to the PEPR leading to approval of submissions once finalised  
- Review of the draft PEPR compliance report leading to approval of this once finalised  
- Reviews of progress and issues arising from trials and investigations conducted under the PEPR

### Issues identified are resolved with the necessary documentation.  

#### BDC and Renewal SA are collaborating on a review of the key issues that affect the feasibility of redevelopment of Section 1 for mixed use urban development
<table>
<thead>
<tr>
<th>Organisation / Group</th>
<th>Activities 2014 to October 2016</th>
<th>Issues Arising from Communication / Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Issue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>DoEE (formerly DoE)</td>
<td>Emails and Meetings in Canberra, Site Visit by DoEE staff</td>
<td>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</td>
</tr>
<tr>
<td>BirdLife Australia</td>
<td>Meetings, emails</td>
<td>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 DEWNR for the International Bird Sanctuary Area (i.e. covering the salt field). Birdlife Australia, with AMLR NRMB advise DEWNR in discussions about potential impacts to birds from the holding pattern and from the mooted closure</td>
</tr>
<tr>
<td>SA Water</td>
<td>Meetings, emails</td>
<td>Access to SA Water land and outfall for discharge from PAS 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. The trial started in PA9 and PA10 and is being extended to PA8 and PA7a</td>
</tr>
<tr>
<td>Flinders Ports</td>
<td>Meetings, emails</td>
<td>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.</td>
</tr>
<tr>
<td>Port Adelaide Enfield Council</td>
<td>Meetings, emails</td>
<td>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</td>
</tr>
</tbody>
</table>
14.2 Proposed Consultation and Engagement

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

1. Ongoing 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 being conducted pursuant to this initial PEPR. It is anticipated that such discussions will not just involve regulatory agencies (e.g. DSD, DPTI, DEWNR, EPA, PIRSA, Councils, and Commonwealth DEE) but also extend to:
   - NGO’s, like BirdLife Australia
   - AMLR NRMB
   - 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 site neighbours and the local community will be invited to provide them with information for their consideration and to seek their feedback.