Kangaroo Island Waste Resource Recovery Centre

Environmental Management Plan

Revision 2019

KANGAROO ISLAND COUNCIL

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1 INTRODUCTION

1.1 Background

The Kangaroo Island Resource Recovery Centre (KIRRC) provides the only integrated waste management facility for Kangaroo Island. The KIRRC operates under environmental authorisation (licence) 2595 issued by the South Australian Environment Protection Authority (EPA) pursuant to Section 36 of the *Environment Protection Act 1993* (EP Act) for operation of a 'Waste or recycling depot' and for 'Composting works' as defined in Schedule 1 Prescribed Activities of Environmental Significance. This Environmental Management Plan (EMP) has been prepared to document the actions and procedures to be carried out during the operation of the site and the closure and post-closure phases of the previous landfilled areas in order to manage potential adverse impacts on the environment, as practicable.

1.2 Objectives of the Environmental Management Plan

The objectives of the EMP are to:

- Produce a framework for operational procedures at the site.
- Detail post closure and closure requirements for previous landfilled areas ensuring environmental impacts are minimised, including practicable and achievable performance requirements.
- Set out processes and procedures to manage and mitigate potential adverse effects on the environment.
- Provide measures for compliance with legislation, policies, guidelines and requirements of relevant authorities.
- Detail a system for monitoring, reporting and implementing corrective action.
- Provide the community with assurance that management and closure of the landfill will be conducted in an environmentally acceptable manner.

2 ENVIRONMENT MANAGEMENT SYSTEMS

The environment management framework for the KIRRC is based on the ISO 14000 series (International Standards for Environmental Management). AS/NZS ISO 14001:2004 *Environmental management systems - Specification with guidance for use* stipulates "continuous improvement" as a major aim for environmental management, and defines it as the "process of enhancing the environmental management system to achieve improvements in overall environmental performance".

For the KIRRC, environmental management will achieve continuous improvement through a cycle of:

- **Environmental Management Planning and Establishment of key performance indicators**
  The EMP specifies environmental management measures and the required performance standards.

- **Infrastructure and Operations**
  The aspects of the infrastructure will be established and operated in accordance with the EMP. Detailed engineering design will be carried out for stormwater management, landfill capping and other infrastructure as required.

- **Monitoring and Corrective Action**
  The implementation of EMP measures will be monitored. Any inconsistencies between the EMP and its on-site implementation will be identified and addressed through corrective actions.

- **Reviews and Improvement**
  The EMP will be reviewed annually. Improvements to the EMP will be made as necessary to achieve desired environmental outcomes. The environmental management strategy is outlined in the Figure 1:

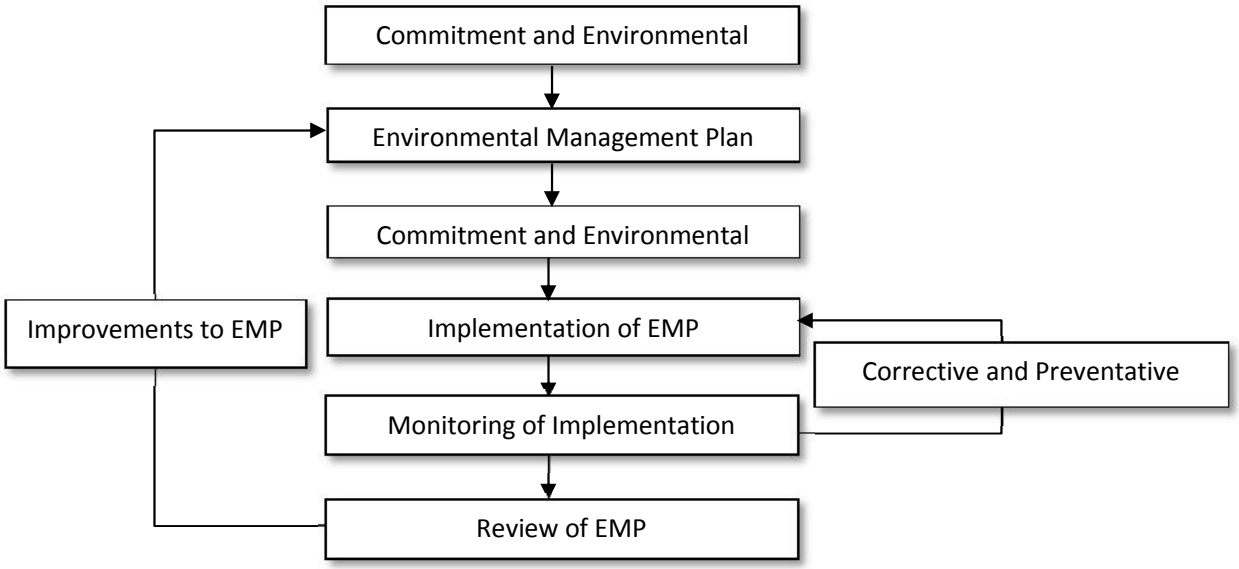


Figure 1. Outline of Environmental Management Strategy

2.1 Management Structure and Responsibilities

The following parties are involved in the operations of the KIRRC:

- Kangaroo Island Council
- Fleurieu Regional Waste Authority (FRWA)
- FRWA Member Councils
- Environmental Consultant
- Environment Protection Authority

2.1.1 Kangaroo Island Council

- Licence for site operation in accordance with the EP Act.
- Preparation of EMP.
- Detailed design of infrastructure (operational and closure related) as described in EMP.
- Monitoring performance of the EMP.
- Provide Biennial Monitoring Report (ie once every two years) to the EPA.
- Amendments to the EMP as a result of monitoring and review.
- Responsible for the closure and post closure management of the landfill operation on site.

2.1.2 Fleurieu Regional Waste Authority

- Responsible for the day to day operation of the site in accordance with the Service Level Agreement with KI Council and the EPA licence.

2.1.3 Environmental Consultant

- Preparation of detailed design specifications as required.
- EMP Monitoring.
- Preparation of Biennial Monitoring Report.

2.1.4 Environment Protection Authority (EPA)

- Issue of EPA Licence
- Review of Biennial Monitoring Report.
- Intervention in the event of a breach to the EP Act or licence conditions.
- Approval of design specifications.

2.2 Legislative Requirements

Section 36 of the EP Act, stipulates that an EPA Licence is required for the operation of activities prescribed in Schedule 1 of the EP Act, including a waste depot and composting facility and composting works. The EPA requires an EMP to be prepared by licensees as part of the licensing process.

2.3 Monitoring and Reporting Requirements

In November 2014, the EPA proposed a number of amendments to the Licence EPA 2595, including revocation / deletion of License condition regarding landfill gas monitoring and groundwater monitoring. Council however continues to exercise diligence in environmental management and monitoring in line with this EMP.

Reporting is undertaken to provide evidence of the ongoing implementation of the EMP including training activities, waste intake information, site conditions and operations, environmental monitoring data, details of non-conformances, incidents, complaints, reviews and follow up action.

Kangaroo Island Council will continue regular biennial monitoring as part of its own due diligence summarised as follows (refer to Section 6 for further details):

- Field monitoring of landfill gas from fourteen sampling points with measurement of concentrations of methane (CH_4), carbon dioxide (CO_2), carbon monoxide (CO), oxygen (O_2), hydrogen sulphide (H_2S) and volatile organic carbons (VOCs) using a field infrared gas analyser with a sampling pump and photoionisation detector (PID).
- Field monitoring of landfill gases inside site structures using an infrared gas analyser with a sampling pump is also conducted.
- Visual assessment of status of weeds and pests, odour, landscaping, erosion control, litter and stormwater management infrastructure.
- Groundwater gauging, purging and sampling from nine installed groundwater monitoring wells for analysis by laboratories accredited by the National Association of Testing Authorities (NATA) for the relevant analyses, generally comprising: chemical oxygen demand (COD), biological oxygen demand (BOD), total organic carbon (TOC), total kjeldahl nitrogen (TKN), total recoverable hydrocarbons (TRH), metals (extended suite), carbonate alkalinity, bicarbonate alkalinity, ammonia, nitrate, nitrite, total phosphate (P), sulphate (S), semi-volatile organics (SVOCs), VOCs, total dissolved solids (TDS), *E.coli*, total coliforms and total plate count.*

**This may be reduced, eg to exclude VOCs and SVOCs*

- Surface water sampling from detention basin for analysis by NATA accredited laboratory for: COD, BOD, TOC, TKN, TRH, metals (extended suite), ammonia, nitrate, nitrite and TDS.
- Preparation of performance report including groundwater data and landfill gas data and providing evaluation of any trends.

Environmental sampling and assessment will be undertaken with reference to guidance in the following publications:

- Environment Protection Authority, 2007, *EPA Guidelines, Regulatory monitoring and testing, Groundwater sampling*
- Environment Protection Authority, 2016, *Regulatory Monitoring and Testing Reporting Requirements*

- Environment Protection Authority, 2018, *Guidelines for the assessment and remediation of site contamination*
- Environment Protection Authority, 2019, *Environmental management of landfill facilities (solid waste disposal)*
- National Environment Protection Council. *National Environment Protection (Assessment of Site Contamination) Measure 1999* as amended 2013 (ASC NEPM)
- Guidelines referenced in the *Environment Water Quality Policy 2015:*
  - ANZECC/ARMCANZ *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000*
  - NHMRC *Australian Drinking Water Guidelines 2011*
  - NHMRC *Guidelines for Managing Risks in Recreational Water 2008*.

The biennial reporting process (once every two years) is summarised in the diagram below:

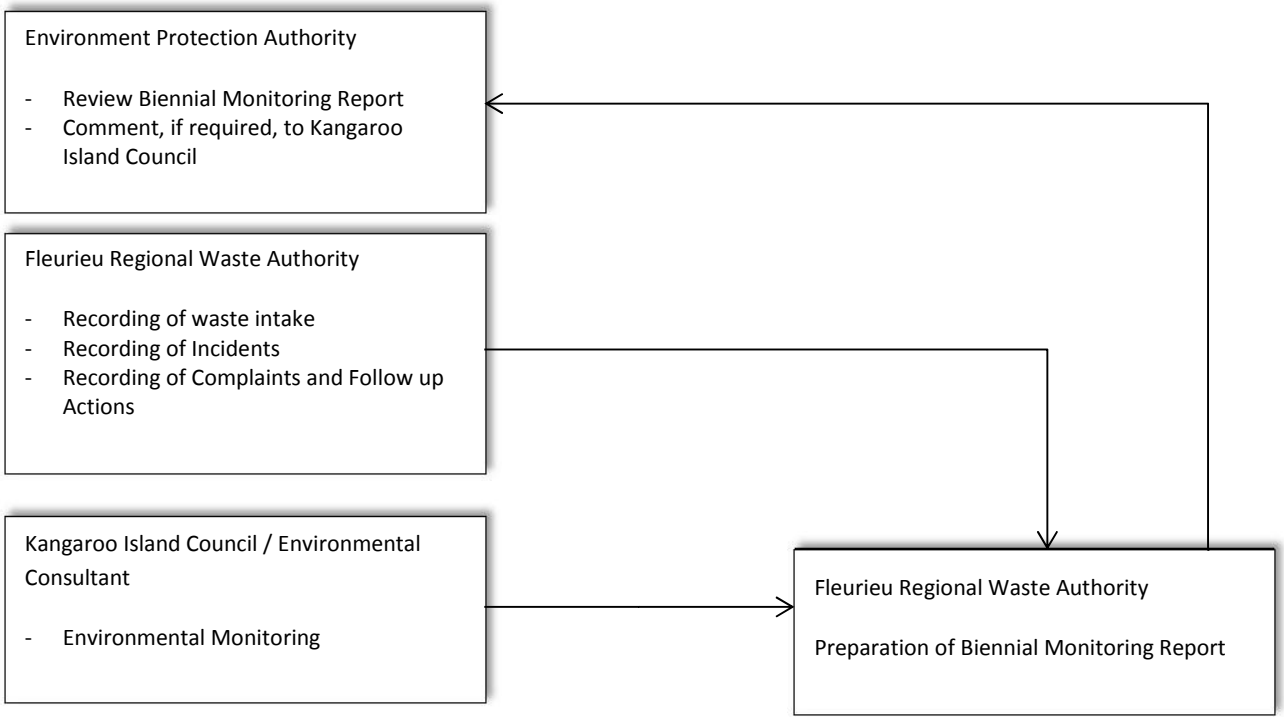


Figure 2. Biennial reporting process

Exceedances of relevant criteria and operational non-compliance are to be reported to the EPA within 24 hours by the Executive Officer or Region Manager.

2.4 Training of Staff and Contractors

Education and training will ensure that site personnel have appropriate and current knowledge of regulatory requirements, internal standards such as those identified in the EMP, and FRWA's policies and objectives.

Training shall be provided to relevant staff as detailed below:

Type of Training	Required Audience	Purpose
Induction process for new staff, regular toolbox meetings, industry specific training	FRWA staff and contractors if required	For safe work practices

2.5 Non-Conformance and Corrective Action

The findings reached as a result of the monitoring and review of the EMP will be documented, and the necessary corrective action and preventative actions identified. FRWA will ensure that corrective actions are implemented and that there is systematic follow-up to ensure their effectiveness.

3 SITE INFORMATION

3.1 General Site Information

3.1.1 Location

The site is located at 217 North Coast Road on the south-eastern corner of North Coast Road and Ten Tree Lagoon Road approximately 6 km west of Kingscote. The site location is shown on the figures contained in Appendix A.

The landfill site is located on Part Section 59, Hundred of Menzies, Pieces 4 and 5 (Certificate of Title volume 5611 folio 656, Plan/Parcel F103561Q5). Unused landfill works and infrastructure are contained on Piece 5 which has an area of approximately 31 hectares. The Certificate of Title is also provided in Appendix A.

3.1.2 Ownership of Land and Management Authority

The owner and management authority responsible for the KIRRC is:

Kangaroo Island Council
43 Dauncey Street
Kingscote SA 5223
Phone: (08) 8553 4500
Fax: (08) 8553 2885
Email: kicouncil@kicouncil.sa.gov.au

3.1.3 Site Use

The site has been used as a waste and recycling depot since 1993. The landfilling activities ceased in 2005. Green waste mulching and composting activities are also undertaken at the site.

The site is bounded by North Coast Road to the north and has patches of natural vegetation around the site boundaries. A natural drainage line runs through the site and leads to Ten Tree Lagoon south west of the site boundary.

3.1.4 Council Area and Zoning

The site is part of the Kangaroo Island Council area and according to Zone map KI/23 in the Kangaroo Island Council Development Plan (consolidated September 2015), it is zoned “Industrial”. East of the site is also zoned for “Industrial” uses and within which lies the closest dwelling around 100 m east of the site boundary. North of the site is a “Rural Living” zone. West and South of the site land is zoned as “Primary Production”.

3.1.5 Environment Protection Authority

The site is currently licenced under the EP Act for operation of a Waste or Recycling Depot and Composting Works; Licence Number 2595.

Appendix B provides a copy of the current licence.

3.2 Physical Environment

3.2.1 Topography

The site straddles the crest of a gently rolling spur between two creek lines. The spur runs approximately north north-east to south-west as it crosses the middle of the eastern boundary of the site and then runs almost north to south before exiting the southern boundary of the site. The crest of the spur is expected to be the boundary of a hydraulic divide. Approximately parallel to the crest of the spur to the east and west are creeks. The creek invert level falls from approximately 23.5m AHD in the north of the site to 15.5m AHD in the south of the site.

The filled area of the site sits upon natural ground with an elevation of approximately 28m AHD in the north to approximately 24.5m AHD in the south.

Stormwater falling on unsealed/uncapped or more permeable areas of the site is expected to infiltrate the underlying fill and sediments. Stormwater, which does not infiltrate is expected to enter the creek systems to the east and west.

Detailed contour survey of the site (associated with the Capping Plan 2014) are contained in Appendix E.

3.2.2 Groundwater

Investigations of ground water at the site show:

- The direction of regional groundwater flow was expected to be south towards Cygnet River.
- The flow diverges east and west away from the hydraulic divide (the crest of the spur) towards each of the creeks on either side of the spur.
- Groundwater depth ranges between 4m and 6m below the natural surface.

3.2.3 Geology

According to the Geological Survey of South Australia, Department of Mines, Adelaide 4 Mile Geological Sheet 1 53-16 Zone 5, the landfill is situated on the approximate border[1] of Quaternary age consolidated dune limestones (Aeolianite) and Permian age glacial tills. According to the geological sheet the boarder appears to cross between KIK1/KIK2 and KIK3/KIK4. From the drill logs generated from Maunsell's November 2003 and November 2004 groundwater and landfill gas investigations, it is not apparent whether there is a geological boundary crossing the site.

The consolidated dune limestones are described as, *"containing numerous internal unconformities and fossil soil horizons: siliceous white sands and lesser sheet (soil) travertines extend inland."*

Glacial tills are described as, *"boulder beds, chiefly clays with numerous granite, gneiss, and quartzite erratics, frequently several feet in length. Also glaciofluvial deposits: sands, gravels, clays and porcellanised clays with obscure leaf remains".*

[1] An approximate geological border is a boundary, that has not been confirmed in the field and its accuracy should not be relied upon.

3.2.4 Surface Water

Surface drainage is generally in accordance with flow paths as they existed prior to commencing landfilling activities. It is expected that surface water drains towards the east and the west of the landfill towards each of the creeks on either side of the spur. These creeks connect further down south off the site of interest and form part of the Cygnet River.

Previously landfilled areas will be capped in accordance with the approved Capping Plan (29 September 2014 approved by EPA letter dated 3 October 2014). The final landform of the capped areas links into the above flow patterns.

Surface water in the asbestos pit is collected in a trench and sump located within that pit. Under average conditions, surface water collected in the trench generally evaporates. In the event of excess water accumulation during storm events, water can be pumped from the sump to an evaporation trench. During storm events surface water can also be pumped into the onsite stormwater settlement and evaporation pond. General site runoff is diverted from non-operational areas to the pond.

3.2.5 Climate

Weather data was obtained from the Bureau of Meteorology's weather stations in Kingscote (Station 022807) and Kingscote Aerodrome (Station 022841). The Bureau's climate summary is presented in Appendix C. Pan evaporation was not measured at this station. Estimates of pan evaporation were provided by the BOM for Kingscote and are presented in the table below. The table shows monthly rainfall compared against pan evaporation. Average monthly evaporation exceeds rainfall for all months except June and July.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014 Rainfall (mm)	14.4	16.2	25.8	27.7	46.9	67.2	66.0	56.3	45.0	30.0	22.0	19.3	448.3
2014 Temp (*C)	26.6	26.6	24.5	21.6	18.6	16.1	15.4	16.1	18.0	20.1	23.0	24.8	21.0
Avg. Rainfall (mm)	15	17	18	35	58	73	77	65	47	37	23	19	485
Pan Evap (mm)	197	162	143	101	67	42	50	70	98	140	167	177	1414
Nett (mm)	-182	-145	-125	-65	-9	30	27	-5	-50	-103	-144	-158	-929

Mean annual rainfall is 485mm with an average of 118 rain days per year. The mean maximum temperature is approximately 19°C and the mean minimum temperature is approximately 12°C.
Mean annual wind speed is 16.2km/hr.

4 SITE MANAGEMENT

4.1 Hours of Operation

The site is open to the public:

- 9.30am to 4.30pm Daily
- Closed the following Public Holidays -Christmas Day, Boxing Day, New Years Day and Good Friday.

4.2 Methods for Recording and Report of Waste Types and Tonnages

Vehicles transporting waste to the site enter past the site office and weighbridge via an access road off North Coast Road. Waste is inspected by site personnel to ensure it is acceptable in line with conditions of licence. Site personnel will record details for all incoming waste loads each day including the following:

- Incoming vehicles by vehicle size.
    - Large vehicles weighed by the weighbridge.
    - Small vehicle loads and car trailers estimated using a standard classification system.
- Waste type.

Dockets recording deliveries of waste and recycling that is transported from the site to offsite locations are retained.

Appendix D provides the record sheets used at the site.

4.3 Traffic Management

The location of the internal roads was developed following the construction of the waste transfer facility. This ensures the site operates around this facility. The internal roads were constructed using the following criteria:

- Maximise space available for waste disposal.
- Encourage the public to use resource recovery opportunities.
- Ease of access for waste collection vehicles (robotic arm collection vehicles, “RACVs”).
- Avoid or minimise conflict between waste transfer vehicles and the general public.

A Traffic Management Plan is in place for this site. Signage is provided at the site to direct traffic. Signs indicate traffic flow, direct traffic to the appropriate disposal areas and identify all hazards at the site. Children are not permitted outside of vehicles.

All traffic entering the site passes the site office and is regulated by site personnel.

Internal tracks are constructed using compacted marl.

4.4 Fire Prevention and Control

The following fire protection measures are be implemented at the site:

- A 5m wide graded earth fuel break is maintained annually by KI Council around the perimeter of the site and is maintained free of all flammable vegetation and debris for the direction of each Fire Danger Season. The perimeter fuel break is constructed on the depot side of any stands of native vegetation adjoining the fence line.
- Areas between litter control fences and the infrastructure area shall be maintained free of all flammable vegetation for the duration of the Fire Danger Season.
- The grassland vegetation within the area surrounded by the perimeter boundary fuel break is reduced to a maximum height of around 10cm for the duration of each Fire Danger Season. This is achieved by slashing or burning preceding Fire Danger Season.
- Grading of depot boundary and internal fuel breaks is completed, each year, by the last week in November or earlier if required.
- Herbicide use timed so that the target area is clear of vegetation before the start of the Fire Danger Season.
- Fire vehicles have ready access to all flammable waste deposition areas, and access around the perimeter of the depot reserve at all times.
- All dead-end roads or access tracks constructed to allow large firefighting vehicles to turn safely – i.e. by providing either a turnaround area with a minimum formed road surface diameter of 25m, or a “T” or “Y” – shaped turn around area with minimum formed road surface leg lengths of 17.5m and minimum inside road radii of 8.5m.
- All vehicles and mobile plant based at the waste depot carry a fire extinguisher at all times.
- A trailer mounted water tank, with a capacity of 4,400L, fitted with a pump and hose and a person trained and able to operate the equipment shall be kept at the site during open hours.
- All buildings have portable fire extinguishers in accordance with the appropriate regulations.
- 5 x 31,700 L fire water storage tanks are maintained near the waste transfer facility with fire vehicle access and appropriate connections.
- The Stormwater Detention Basin is accessible to firefighting equipment and has a 500KL holding capacity.
- 6 x 40,950 L water tanks are also located near the Composting and Greenwaste Facility with water that can be used for firefighting in emergency situations. This facility is also connected to mains water.
- KI Council also has a CFS trained staff, usually 5 at any one time.

4.5 Site Security

Entrance to the site is restricted via a gate which is locked when the site is closed. A security fence is installed around the perimeter of the site. Entrance to the site via the gate office and weighbridge area is controlled by site personnel during operating hours.

Stands of natural vegetation provides some screening to the site and “security cameras” will be installed to monitor illegal access.

4.6 Final Landform over Completed Landfill Areas

The final landform has been designed to be consistent with the surrounding topography. The overall height of the final cap is consistent with the works at the site.

Retention of natural drainage lines to the east and west will maintain existing drainage patterns. Appendix E shows the proposed maximum final contours with capping.

Development Approvals (DA 520/0202/04 and DA 520/125/06) approved the modification the final landform over the site to 2m above the natural ground level.

4.7 Litter Management

The following measures are implemented to minimise litter:

- Landscaping will be maintained along the site boundary and will help to trap litter.
- Regular litter clean ups are conducted within the site and on immediately adjacent land if site derived litter is blown beyond the site boundaries.
- All litter control fences are kept in good order and cleared of all trapped litter at the end of each day.

4.8 Services

Electricity is connected to the Gate Keeper Office, Waste Transfer Facility, Composting and Greenwaste Facility, conveniences and workshop.

Water is connected to the site servicing the Waste Transfer Facility, Office and Conveniences, Greenwaste Facility and the standpipe.

Telephone services are connected to the Gate Keepers Office. The site also uses a mobile phone system and radio system for communications.

4.9 Types of Waste

Waste streams are received and disposed on site is in line with EPA Licence 2595.

4.10 Plant and Equipment

The plant and equipment located at the site includes an in-vessel composter and ancillary equipment, loaders, bobcats, RACVs, tipper, walking floor transfer vehicle (contractor), and general vehicles.

4.11 Signage

Signage is installed on the site providing advice of the appropriate regulations including as follows:

- Opening times
- Fees and charges
- EPA Licence
- Specific storage areas are appropriately signed for example – DrumMuster, Waste Oil, Tyres, Recyclables, Salvage etc.

4.12 Record Keeping

Records are kept and recorded at the site including:

- **EPA Licence** — Displayed on site
- **Incoming Waste** — Record stored on site
- **Outgoing Waste** — Recorded at delivery point (dockets upon delivery at offsite locations are retained by FRWA)
- **In-vessel Composting** — Automated database
- **Complaints** — Recorded on site.

4.13 Maintenance of Depot and Equipment

The KIRRC staff are responsible for the operation of the site and for ensuring all waste and recycling is deposited in the correct location and for maintaining the site in a neat and tidy condition. The Regional Manager Safety, Contracts and Operations oversees this management.

Plant and equipment will be maintained in accordance with FRWA Policy.

4.14 Supervision

A minimum of 2 FTE's are employed at the site. A staff member meets all vehicles at the gate office while other staff members assist visitors at the Waste Transfer Facility and with the disposal of their waste.

People entering the site for waste transfer operations and general maintenance are trained in the operation of the site.

4.15 Risk Management and Assurance

Work Health and Safety inspections occur at the site on a quarterly basis identifying any risks that occur. Employees also have a reporting procedure for any risks identified.

The risk of environmental harm from this facility is managed using FRWA Policies, procedures and this EMP, including a cycle of review and improvement.

4.16 Workplace Health and Safety and Education

Prior to entering the site all contractors and employees are to be inducted to the site and fully trained on the operations of the site. Hard copies of all relevant FRWA Policies, Procedures and Safe Work are located at the site and FRWA offices. FRWA staff are trained (toolbox meetings and specific courses) and contractor are inducted to site conditions and procedures relevant to their project.

FRWA's WHS documentation includes the following:

- Emergency Procedures
- Evacuation Plan

- Policies and Procedures
- Safe Work Procedures
- Training records and certifications.

The EPA site licence and relevant EPA guidelines are displayed on site.

Regular meetings occur between Waste Management staff and contractors to provide up to date relevant information on WHSE.

Work Health and Safety site inspections are undertaken quarterly in accordance with FRWA policy.

4.17 Quality Control

The gate operator is responsible for inspection of each vehicle that arrives at the site and provision of instruction to the vehicle driver where the waste is to be deposited. The gatekeeper is responsible for ensuring that the driver follows the instructions.

If an assorted load of waste arrives that is unfeasible or impractical to sort, the gate fee is increased to provide a financial disincentive for disposing of mixed loads.

4.18 Buffer Distances

Buffer distances at the site are as detailed below:

<u>North:</u>

- The previously landfilled areas are a minimum of 400m from the northern boundary of the site.
- A buffer of 250m minimum exists between the northern boundary and the infrastructure.

<u>South:</u>

- The previously landfilled areas are a minimum of 100m from the southern boundary of the site.
- A 25m buffer currently exists between the bio-solids storage ponds and the southern boundary of the site.

<u>West</u>

- The previously landfilled areas are a minimum of 200m from the western boundary of the site.

<u>East</u>

- The previously landfilled areas are a minimum of 30m from the eastern boundary of the site.

<u>Existing Waterway</u>

- The previously landfilled areas, any new landfill cells and infrastructure are sited to maintain a minimum buffer of 100m to the existing waterway that runs through the site to Ten Tree Lagoon) south west of the site).

4.19 Airport

There is no airport near the site. The closest airport is approximately 10km away.

4.20 Public Consultation

The Kangaroo Island Community is aware of the facilities at the site. An ongoing information and education program is used to advise and or consult with the community as appropriate of site initiatives KI Council and FRWA may make in relation to waste management.

5 SITE ENVIRONMENTAL MANAGEMENT

5.1 Erosion Control

Erosion of soil can occur via wind or water action. This may result in:

- increased siltation of stormwater runoff;
- generation of dust;
- the removal of valuable soil thereby hindering revegetation efforts;
- the creation of site conditions which will further accelerate the erosion process;
- the removal of protective cover soil / capping and exposure of waste thereby allowing access to pests and increasing infiltration of water as well as increasing the potential release of litter, odour and landfill gas;
- negative impact on the visual amenity of the site;
- negative impact on site infrastructure (e.g. bunds, roads).

The management measures outlined below are implemented.

Control Measures	Effect
Stabilisation of rehabilitation of all disturbed areas.	Reduce potential for erosion.
Implementation of slope stabilisation and revegetation works to follow as soon as practicable after completion of the capping earthworks.	Reduce potential for erosion.
Sediment controls and/or bunds around stockpiles.	Prevent stockpile runoff from introducing silt load to site stormwater runoff.
Locate stockpiles away from major drainage lines.	Reduce exposure to flowing water and minimise erosion potential.
Implementation of temporary erosion control during site works and revegetation programs (eg use of mulch, straw bales etc).	Prevent erosion and facilitate rapid revegetation.
Maintain erosion control works. Where soil erosion has occurred, backfill and compact the scoured areas in thin lifts and re-establish vegetation as soon as possible.	Discourage increase or re-occurrence of erosion.
Rehabilitation and maintenance of capped areas	Reduce erosion and prevent exposure of landfilled wastes

5.2 Stormwater Control

5.2.1 Strategy

Current infrastructure consists of earth bunding to prevent stormwater that has come in contact with previously landfilled and operational areas from running offsite. Stormwater infrastructure is based on the following approach:

- Capping of all previously filled areas with a surface that limits ponding and ingress of surface water into the deposited waste and promotes surface flow to open drains.
- Construction of open drains to channel the majority of surface water flows from the cap to a stormwater detention basin.
- Control of runoff from hardstand areas.
- Outlet from the stormwater basin at a controlled rate if required into the existing creek.

The surface water management system is in accordance with the Southfront designed drawing set approved and issued for construction in January 2013/01/2013. The cap and stormwater controls for landfill cap are shown in Appendix E.

5.2.2 Design of Stormwater Infrastructure

Surface water runoff from the capped landfill will drain via open surface water drains constructed around the perimeter of the capped landfill areas, flowing into the stormwater detention basin which outlets to the existing creek. These components and their design are detailed below:

Landfill Cap

The landfill cap is designed to grade evenly to its perimeter so that surface water ponding and infiltration are reduced. The landfill capping is outlined in Section 14 and conducted in line with the approved Capping Plan (2014).

Open Surface Water Drains

Open surface water drains are 3 m wide, 0.5 m deep, 'V' channels, designed to accommodate the 1 in 100-year ARI rainfall event. Some areas around the perimeter of the landfill are filled to achieve the desired grades for the drains. Biosolids deposition areas are bunded and separated from the surrounding land by a swale that diverts clean stormwater away from the biosolids.

Stormwater Detention Basin

The stormwater detention basin is sized to contain the 1 in 20-year ARI storm event. The basin has a volume of approximately 500m^3 with an embankment approximately 1.5m high, and with a low flow outlet pipe and an overflow. The outlet pipe and overflow will discharge into a rock lined open surface water drain which will discharge into the existing creek. Refer to Appendix E.

5.2.3 Dust and Mud Control

The heavy vehicle access road up to the site boundary is surfaced with bitumen. Internal roads are compacted marl. Road maintenance and dust suppression activities are undertaken to mitigate against dust generation from internal road ways when required.

During high rainfall events, areas prone to mud are avoided for safety and to reduce damage to the surface and to minimise drag out from the site.

5.3 Odour Control

Odours at the site are minimal as putrescibles waste is continually being transported off the site. Odour might be produced from the mortalities and offal received at the site is mitigated by use of the in-vessel composting process.

5.4 Noise Control

The following measures are in place to manage noise at the site:

- maintenance of buffer zones around landfill
- maintenance of vegetative screening along eastern boundary of landfill
- relatively small number of traffic movements to the site
- small amount of plant run at the site, plant run relatively infrequently
- all access to the site is restricted to opening times except in exceptional circumstances.

5.5 Control of Vermin and Vectors

Kangaroo Island is free from rabbits and foxes, so these pests are not a major management issue. Other vermin and vectors are minimised by moving putrescibles waste as quickly as possible to disposal locations. Kangaroo Island also has a feral cat management program.

5.6 Groundwater Management

Groundwater is monitored in accordance with Section 6.0 of this EMP. The management approach for groundwater is:

- Provision of a cap to landfilled areas to minimise infiltration of water thereby reducing possible groundwater contamination.
- Compacted hardstand area for management of organics
- Containment and bunding of liquid wastes (oil)
- Biennial (once every two years) monitoring of groundwater quality. If monitoring demonstrates unacceptable concentrations of chemical substances as a result of activities on site, the EPA will be consulted to determine suitable and sustainable corrective actions.

5.7 Landfill Gas Management

Landfill gas is monitored in accordance with Section 6.0 of this EMP. The management approach for landfill gas is:

- Provision of cap to landfilled areas to manage emissions of landfill gas and to reduce infiltration of water, thereby reducing landfill gas generation.
- Ventilation of all structures on site to minimise accumulation of landfill gas.
- Ongoing monitoring of landfill gas from a landfill gas monitoring well network and in site buildings.

If ongoing monitoring of landfill gas emissions demonstrates unacceptable concentrations, further mitigation methods such as extraction and flaring or venting of gas may be necessary.

5.8 Leachate Management

The landfill areas have not been constructed with an engineered base liner. The approach for managing leachate is to provide a low permeability cap over the areas that have previously been filled. This approach is aided by the climatic conditions at the site where there is significant moisture deficit (ie a deficit of mean annual precipitation relative to mean annual evaporation).

6 MONITORING PROGRAMS

6.1 Landfill Gas

Monitoring of landfill gas emissions is undertaken at the site as follows:

- sub-surface gas migration monitoring around the existing landfill
- gas accumulation monitoring.

Monitoring and analysis of results is undertaken by a suitably qualified environmental consultant.

Sub-surface monitoring wells were installed on the landfill in November 2003 and surrounding the active landfill area in September 2004. The monitoring wells were capped which allow equilibrium of the soil gas to be achieved prior to sampling. This allows an undiluted sample of soil gas to be extracted and the internal soil gas pressure to be measured. Gas wells will be extended during the construction of the landfill cap to enable use post-closure.

Field monitoring of landfill gas is conducted from fourteen sampling points with measurement of concentrations of methane (CH_4), carbon dioxide (CO_2), carbon monoxide (CO), oxygen (O_2), hydrogen sulphide (H_2S) and volatile organic carbons (VOCs) using a field infrared gas analyser with a sampling pump and photoionisation detector (PID). Gas pressure and atmospheric pressure are also recorded.

Field monitoring of landfill gases inside site structures is also conducted area using an infrared gas analyser with a sampling pump.

The field instruments are calibrated on-site before use, using a cylinder of calibration gas, according to the instrument maker's specification.

EPA guidelines *Environmental management of landfill facilities (solid waste disposal)* 2019 provides the following boundary monitoring reference levels:

- methane – 1% by volume
- carbon dioxide – 1.5% by volume

Monitoring of landfill gas and groundwater will be carried out for up to 20 years from the closure of the landfill (September 2005), or such shorter period as required and agreed to be terminated with EPA upon environmental performance monitoring evidence that stabilisation of the landfill has occurred to a satisfactory level. The bore location plan is attached in Appendix F.

6.2 Surface Water

Surface water samples from the stormwater detention basin are collected biennially and analysed for a range of parameters and, where available, compared to relevant water quality guidelines as referenced within the *Environment Protection (Water Quality) Policy 2015*. Surface water samples collected by a suitably qualified environment consultant from the detention basin are sent for analysis by a NATA accredited laboratory for analytes generally comprising the following:

Parameters*

Ammonia	Total Dissolved Solids
Biological Oxygen Demand	Total Kjeldahl Nitrogen
Chemical Oxygen Demand	Total Organic Carbon
Metals (Extended Suite)	Total Recoverable Hydrocarbons
Nitrite and Nitrate	Turbidity

Appropriate sampling and sample preservation techniques are employed in accordance with AS 5667 series. Laboratory analyses are carried out by NATA registered laboratories with NATA approved analytical methods.

6.3 Groundwater Quality

A network of nine groundwater monitoring wells are used to investigate the quality of the groundwater in the vicinity of the landfill on a biennial basis (ie once every two years). The location of the groundwater bores is shown in Appendix F. Groundwater levels are gauged and then water is purged until stabilised field parameters are recorded (temperature, dissolved oxygen, pH, conductivity, salinity, turbidity and redox potential). Requirements for stabilisation in line with EPA requirements are shown below:

Field Parameters	Acceptable range
Electrical conductivity	5%
pH	± 0.1
Temperature (°C)	0.2
Dissolved oxygen	10%
RedOx	± 10 mv

Sampling is conducted using low flow techniques with samples collected in laboratory prepared containers and transported using chain of custody documentation in secured cool boxes under low temperature conditions for analysis by laboratories accredited by the National Association of Testing Authorities (NATA) for the relevant analyses generally including the following:

Parameters*	
pH	carbonate and bicarbonate alkalinity
Conductivity	Ammonia
chemical oxygen demand (COD)	Nitrate and nitrite
biological oxygen demand (BOD)	total phosphate (P)
total organic carbon (TOC)	sulphate (SO_4)
total kjeldahl nitrogen (TKN)	semi-volatile organics (SVOCs) and VOCs
total recoverable hydrocarbons (TRH)	total dissolved solids (TDS),
metals (extended suite),	*E.coli*, total coliforms and total plate count

**This suite may be revised and updated such as to exclude VOCs and SVOCs if warranted.*

Results of sampling and analysis are compared to suitable water quality guidelines listed below as referenced in the *Environment Protection (Water Quality) Policy 2015* (and selected on a site-specific basis including

assessment of groundwater salinity, potential receptors and beneficial uses of water) and assessed with reference to Environmental Values of Water per Schedule 1 of the Policy**:**

- ANZECC/ARMCANZ *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000*
- NHMRC *Australian Drinking Water Guidelines 2011*
- NHMRC *Guidelines for Managing Risks in Recreational Water 2008*.

Appropriate sampling and sample preservation techniques are employed in accordance with AS 5667 *Water quality—Sampling*. Laboratory analysis is carried out by NATA registered laboratories.

Monitoring will be carried out for up to 20 years from the closure of the landfill which was September 2005, or may be reduced if risk assessment can demonstrate it is no longer necessary.

6.4 Weed and Pest Control

Monitoring of the success of weed control is undertaken on an ongoing basis and pest plants will be controlled at the appropriate time to ensure greatest kill and maximum value for money. Kangaroo Island is rabbit and fox free so these pest species will not be found on the site. Cat management through trapping may be used when observations indicate that it may be required. Generally, the site management techniques result in few pest animals present at the site.

6.5 Odour

Due to the site operations odour is generally not an issue; however, odour is monitored by general site observation on an ongoing basis by site staff and are managed on an as needs basis. The site has odour control chemicals which can be used at any time.

6.6 Erosion Control and Stormwater Management Infrastructure

Inspection of the Erosion Control Measures and Stormwater Management Infrastructure is undertaken as part of ongoing site operations and the regular monitoring program. Inspection by FRWA staff will be undertaken prior to and immediately after forecasted major rain events. The integrity of the capping and stormwater drainage system is inspected annually or more frequently if compliance levels are exceeded after extreme weather events. Observations and reports by staff will be forwarded to the environmental consultant to be included in their reporting.

Any serious scouring or cracking of the cap will be subject to appropriate repair and maintenance measures.

6.7 Ongoing Operational Monitoring

6.7.1 Complaints-Customer Feedback

A Complaints Register is established for the site for which the following details are recorded:

- Details of complaint/feedback
- Time and Date of complaint
- Who received the complaint
- The action taken in response to the complaint
- When the action was taken
- Any preventative action to be taken to prevent further such occurrences form taking place.
- Any other relevant information

Relevant environmental complaints are reported to the EPA within 24 hours of their lodgement.

6.7.2 Waste Intake Records

FRWA maintains records of waste entering the site, through the use of record sheets as provided in Appendix D.

6.8 Review of Monitoring Requirements

To ensure that the monitoring requirements are relevant, sufficient and carried out in accordance with the EPA Licence for the site, the EMP is reviewed annually by Council, FRWA and the environmental consultant engaged to undertake the monitoring for the site shall provide recommendations for changes to monitoring requirements as relevant.

6.9 Biennial Monitoring Report

Following the completion of the biennial monitoring (once every two years) the environmental consultant is required to prepare a comprehensive report showing:

- field inspection reports
- details of local meteorological information, including low pressure events
- the information collected on record sheets and in field books
- field monitoring data collected during the monitoring period for each of the monitoring activities
- laboratory analytical data developed
- an assessment of monitoring results and comparison to the Environment Protection (Water Quality) Policy, EPA Guidelines and against any other relevant criteria
- council observations for each of the monitoring activities
- an assessment of the monitoring results
- complaints register
- waste intake records
- recommendations for any future management actions
- recommendations for any changes to the EMP Monitoring Provisions.

The Monitoring Report is to be forwarded to Council following completion in electronic and hard format. Where the report highlights significant exceedances of the appropriate site assessment criteria particularly for

landfill gas or water quality, Kangaroo Island Council is to forward the report to the EPA within 48 hours of receipt of the report.

In conjunction with the report, the data trend analysis spreadsheet is updated for landfill gas and water quality following each monitoring event. The database is used to assess the trends to assist in determining what, if any, corrective action is required.

6.10 Monitoring and Reporting Schedule

A typical schedule for all monitoring and reporting is presented below:

Activity/Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Landfill Gas (biennially, ie once every two years))									✓			
Surface Water Quality (biennially)									✓			
Groundwater Quality (biennially)									✓			
Weed and Pest Control		✓							✓			
Erosion Control and Stormwater Management Infrastructure		✓							✓			
Complaints Recording	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Waste Intake Recording	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Review EMP										✓		
Biennial Reporting										✓		

7 WASTE TYPES, VOLUMES AND MANAGEMENT

7.1 Waste Types

The EPA Licence for the Kingscote facility permits KIRRC to receive, store, treat, transfer and dispose of wastes in accordance with the current EPA licence for the site.

7.2 Waste Burning

Burning of Timber and other substances occurs at the KIRRC to allow for appropriate management / destruction of certain waste materials and substances.

The Burning of Waste was formerly contained within the separate *Burning Timber Waste (and related substances) Environmental Management Plan (2009)*, and has been consolidated within this EMP.

Burning activities are to be conducted between 8am and 5pm and only under the supervision of a representative of the CFS.

Permitted burning of waste at KIRRC includes:

- Untreated timbers generally from building works, including pallets and off-cuts
- Greenwaste exceeding 150mm diameter (ie if unable to be processed for mulch)
- Noxious Pest weed species collected by Natural Resources Kangaroo Island (NRKI) requiring immediate destruction to avoid spread.
- Excess Green waste – in the event that quantities exceed processing capability or requirements
- Prohibited substances – under the direction and supervision of SA Police in addition to the CFS.

Following initial deposit of waste, it will be transported to a designated location in the southern portion of the site, west of internal road between the stormwater settlement and evaporation pond and the hardstand. Prescribed buffers are to be established around the periphery of the material being burned.

This area has the following containment and separation distances:

- a 100 m buffer from areas of waste receival, storage and disposal
- a 50 m buffer from the site boundary
- a 5 m firebreak surrounds the area
- a 500 mm bund around the down-gradient sides of the area to contain water used by the CFS for extinguishing burning activities.

The material prepared for burning shall be 'clean' and free from any material that is not permitted to be burnt. Particular attention will be observed to ensure the following are not prepared for burning:

- CCA (Copper Chrome Arsenic) Treated Timber
- Plastics

- Plasterboard and related materials
- Large metal objects
- Other Contaminants.

At least 7 days prior to the proposed burn of material, the CFS, neighbours within 500 m of the site and the EPA will be advised the following-

- Proposed dates for the burn
- Amount material proposed to be burnt
- Type of material proposed to be burnt.

Prior to commencing the burn operations, a full briefing will be provided to all personnel on site, including any staff member not involved in the operation. The area will be clearly signed and roped off to ensure no members of the public can access the area.

During the burn there will be a water tank (4,400 L capacity) mounted on a portable trailer for fire suppression is available for use with water supply available in water storage tanks on site. Select KI Council staff are CFS trained in order to operate this equipment in line with Emergency Response procedures and shall do so only if safe, with their own and site visitor safety as a priority.

Burning must be conducted during appropriate meteorological conditions and outside the fire danger season. If special circumstances require the burn to be conducted within the Fire Danger Season, a permit must be obtained pursuant to the Fire and Emergency Services Act.

One pile of timber will be ignited at a time, with the second pile being ignited only when the first pile is no longer a hazard and only at the direction of the CFS operations officer supervising the operation.

A trained fire crew must be in attendance and the fire supervised until fully extinguished Once the area is determined to be safe by the CFS, a debrief will be conducted, the appliance may be stood down and the fire suppression unit will remain in attendance until the fire is fully extinguished.

Residual waste will be transported to SRWRA for disposal to landfill.

Appendix H shows the location of the Waste Burning site at the KIRRC.

7.3 Waste Management at KIRRC

7.3.1 Landfill Waste

Landfill waste from the Collection Vehicles and the general public is stored in the Waste Transfer Facility. This material is loaded onto the Waste Transfer Trailer. When the trailer is full the waste is transported to the Southern Region Waste Resource Authority (SRWRA) Landfill at McLaren Vale.

7.3.2 Comingled Recyclables

Comingled Recyclables from kerbside collections and the general public are stored in the Waste Transfer Facility. This material is baled prior to transport to a mainland Material Recovery Facility in Adelaide.

7.3.3 CDL Products and Glass

Storage bins for sorted Container Deposit Legislation (CDL) compliant products and glass are provided. CDL products and glass are removed from site and provided to a local recycling depot.

7.3.4 Compostable Organics and Green Waste

Bulk dry green waste received at the site is stored and mulched by a contractor in several campaigns throughout the year. The freshly ground material is then pasteurised and once this process is completed, sold back to the community. Kerbside collected compostable organic waste is subjected to an in-vessel composting process to produce compost for sale back to the community. Some green waste is incorporated in this process, along with fish offal and small animal mortalities. Refer to Section 9.3 for further details.

7.3.5 Scrap Metal

All scrap metal is stored in a designated area in loosely compacted stockpiles, awaiting removal off site by a contractor. A hydraulic press is operated at the site as required by a Contractor to bale steel on a campaign basis and then transported to the mainland and sold to recyclers.

Non-ferrous metal is separated where possible and stored in bulk bins. The material is sent to metal recyclers when sufficient quantities are received.

7.3.6 Timber

Timber is stored in loosely compacted stockpiles at the site. A burning permit is sought from the EPA annually or as otherwise required. Burning of excess timber waste occurs in accordance with the strict conditions as set out in EPA exemption approvals as outlined in Section 7.2.

7.3.7 Inert construction and demolition material (C & D)

Construction and demolition materials including soil, clay, concrete, bricks and bitumen are stored at the site periodic/campaign-based crushing and made available for reuse.

7.3.8 Tyres

Whole tyres received at the site are stockpiled in a designated tyre storage area for periodic transfer to the Goolwa Waste and Recycling Depot for collection by a recycling contractor for offsite processing. The tyre storage area complies with SA Fire Services 'General Guidelines for the Outdoor Storage of used Tyres' as a Medium Outdoor Storage Site The tyre storage area is located at the Eastern side of the waste transfer shed. A small legacy stockpile of tyres on rims remains onsite and these are removed from site periodically as funds permit.

7.3.9 Bulk Oil

A bulk oil storage facility has been established to store cooking and engine oil prior to collection by recycling companies, consisting of two sheds. The smaller shed has a holding capacity of 2 x 1000L. The larger main shed has a holding capacity of up to 12 x 1000L containers.

Waste engine oil is stored in 1000L plastic containers. The oil is collected by an oil recycling company. Cooking oil is stored in 1000L plastic containers and is collected by local residents who convert it to biodiesel or transported off site for recycling.

Both sheds are purpose build (pre fab) and meet the following specification for floor/bund

- Concrete Floor – 150mm thick.
- Triangular bund sloping to the back of the floor with a 200mm bund wall at the back.
- Bund 100mm thick.

Once sufficient quantities have accumulated, the recycler will be contacted for collection of full containers. Loading of full containers and unloading of empty containers occurs via bobcat.

In the event of a small spill, sand is be used to soak up excess oil. Larger spills if they occur are managed by pumping spilled oil in an empty waste oil container and soaking up the residual with sand for disposal to authorised offsite facility.

7.3.10 Lead Acid Batteries

Batteries are stored undercover prior to transfer off site to a local recycler. A covered and bunded storage shed (3-sided and roofed) is provided at the site for the storage of batteries. Batteries are stored on pallets and periodically sold to the local recycler

7.3.11 Non-Friable Asbestos

Non friable asbestos waste, such as asbestos cement products received at the depot and managed in accordance with EPA licence conditions and asbestos guidelines:

- All asbestos products received at the depot are completely covered with a heavy-duty plastic film wrapping, which is held in place with suitable ties until the time of disposal.
- The wrapped asbestos waste is then buried in the asbestos burial area (See Appendix G).
- The location of the asbestos disposal is recorded.
- Earth moving plant does not come into direct contact with the asbestos waste.
- The wrapped asbestos is covered with 150mm of soil immediately following placement in the asbestos burial area.
- All asbestos waste is buried at least one metre below the final ground surface.

7.3.12 Other

7.3.12.1 Animal Waste

A small amount of animal waste (fish processing wastes, offal and small mortalities) is received at the site. Standard practice is to dispose of the animal waste in designated trenches and cover with 300mm of back-filled earth to avoid exposure. An alternative to disposal has been established at the site to instead use the animal waste as a feedstock for the in-vessel composting system established at the site in 2019.

7.3.12.2 Prohibited Substances

The site is currently permitted to burn prohibited substances seized by SA Police. Refer to Section 7.2 for further details.

7.3.12.3 Agricultural Chemical Containers

FRWA participates in the agricultural chemical industry's 'DrumMUSTER' program. Plastic containers that meet the acceptance criteria of the scheme (i.e. triple rinsed and free from liquid residue) are stored on site in the designated compound (measuring 15m x 15m x 2.4m) until removal by an authorised DrumMUSTER contractor.

All metal drums are managed as scrap metal.

7.3.12.4 Salvage Items

Salvaging is permitted on the site by the public except in the Waste Transfer Facility. Any item that staff determine as reusable is transferred to the 'Tip Shop' where it is made available to the public.

7.3.12.5 Tricky Waste

Kangaroo Island is not serviced by a hazardous waste disposal facility. Customers are advised of the Hazardous waste depot located at Dry Creek Hazar (or other facility as may be approved in future).

Limited difficult 'tricky' Domestic Wastes are received, sorted and managed into separate recyclable waste streams at KIRRC including the following:

- Batteries
- Light globes / fluorescent globes
- Waste Oil
- Empty gas bottles.

8 OTHER INFRASTRUCTURE

Appendix I shows the location of all infrastructures at the KIRRC.

8.1 Office

The site office is located in a shipping container 13m long x 24m wide x 2.7m high with disabled access.

8.2 Staff Conveniences

The staff conveniences facility consists of modified "Atco" hut which has been converted to include a disabled toilet and shower and lunch room with disabled access.

The building is connected to a 3000L septic tank and a soakage trench 15m long x 1.2m wide x 700mm with a plastic perforated arch. The arch is covered with 25-40mm aggregate and then covered with geotextile fabric and the trench then filled with sandy loam 200-300mm thick. This is in accordance with Environmental Health Guidelines

8.3 Weighbridge

The weighbridge dimensions are in accordance with the following:

Weighbridge	8m x 3m
Approaches (x2)	3m x 3m
Concrete	200mm thick
Height (total)	650mm above ground
Difference in concrete slab heights	340mm

The weighbridge is the only registered Public Weighbridge (No 300) on Kangaroo Island.

8.4 Tip Shop

The tip shop consists of a 10.6m x 30m Redpath Ultraspan Greenhouse with 100m^2 to the north of the building.

Reusable items and items which can be made reusable are brought into this facility and made available to the public.

8.5 Workshop

The workshop is co located in the same shed as the tip shop but separated by a dividing wall/ lockable door and with truck access at the Northern side of the shed.

8.6 Composting and Green Waste Facility

Refer to Section 9

8.7 Septage and Biosolids Facilities

Refer to Sections 10 and 11.

8.8 Waste Transfer Facility

Refer to Section 12.

8.9 Stormwater Settlement and Evaporation Pond

The stormwater settlement and evaporation pond was constructed at the site using a D6H bulldozer to track roll and compact clay to form a 300 mm engineered liner underlain by natural in-situ clay. It is located in the south west of the site around 50 south west from gas monitoring bore No. KIK26 and has a capacity of approximately 580m^3.

9 COMPOSTING AND GREENWASTE FACILITY MANAGEMENT PLAN

9.1 Introduction

As part of our commitment to sustainable waste management, the Kangaroo Island Council has introduced improvements to our services by further promoting the collection of food waste with our kerbside green waste collection services ('compostable organics'). In 2019, an in-vessel composting system has been established at the site in support of this initiative. This has allowed further improvements of site operation and environmental management by inclusion of materials previously disposed on site into the composting process, providing increased benefits to the environment and the community. Bulk green waste received at the site is also processed into a pasteurised mulch product for sale to the community.

The following provides a summary of the Composting and Greenwaste Facility infrastructure and processes, with management measures provided in Section 9.4 to address potential environmental risks associated with the composting and greenwaste process.

Appendix J provides site location drawings for the Composting and Greenwaste Facility.

9.2 Infrastructure and equipment

9.2.1 Hardstand

The greenwaste management facility is located on a purpose-built, lined hardstand area initially constructed following Development Approvals granted in 2004 and 2006. The hardstand initially measured around 120 m by 20 m and was constructed to a total thickness of 1.3 m using around 1 m of crushed and compacted marl as a low permeability barrier, with a 300 mm overlying protection/strength layer of crushed limestone. The area is graded at around 2% to the north and west, with those boundaries constructed with upright 200 mm concrete kerbing to direct runoff to a sump in the north west corner of the hardstand. The area was re-graded and extended in 2016/2017 to tie it in to the capping installed at the site, including building up the cap along the tie in area by around 1-2m, using compacted fine grained durable and clean gypsum/clay materials. The in-vessel composting system (refer to Section 9.3.2) is located on the hardstand area adjacent to a tank farm.

9.2.2 Stormwater Settlement and Evaporation Pond

General site runoff from non-operational (non-waste handling) areas is directed to an onsite pond via an underground pipe running under the road to a trench that discharges into the pond. The pond is lined with reworked site clay to a depth of around 300-400 mm and underlain by in situ natural clay. In the unlikely event of overflow from the pond, the water drains via a gravel lined pit through and through a geosynthetic filter, to discharge water the low-lying area beyond.

9.2.3 Water Storage

Runoff from the hardstand is directed to a sump and pumped and stored in the tank farm (6 x 40,950 L tanks) adjacent to the western boundary of the hardstand. It is collected for uses including fire-fighting and to supplement the moisture requirements required for the pasteurisation and composting processes. A second

tank farm is located near the transfer station facility comprising 5 x 31,700 L tanks which collect rainwater from the roof of the transfer station building.

- The water storages comply with the 1 in 20-year rainfall 24 hours average recurrence interval (ARI) or 3mm/hour.
- Tanks are all connected at the base to ensure maximum storage capacity is available at all times, however each tank can be isolated if required.
- If tank capacity reaches 80% Council will undertake any of the following:
  - purchase another tank;
  - pump water into septage facility through geobag;
  - Other option in consultation with EPA.
- The tank overflows are connected to the septage facility sump ensuring any overflow will be managed by the geobag.

9.2.4 Storage Shed

A 6m x 6m storage shed with concrete floor for general / miscellaneous equipment storage is located south of the hardstand area tank farm.

9.3 Organics Processing

9.3.1 Bulk Green Waste Mulching

The KIRRC accepts bulk delivered dry green waste which predominantly consists of garden waste and tree prunings. The green waste is stockpiled in line with EPA licence requirements until sufficient quantities have accumulated for campaign-based grinding and mulching by a contractor. This mainly occurs in Autumn to take advantage of rainfall as there is a water deficit on site. It is processed into a pasteurised mulch product in readiness for sale to the community. A portion of the mulch is used as a bulking agent in the in-vessel process to ensure appropriate feedstock mix is achieved, and as media for the associated biofilter.

- The material is first ground up and then water is added to achieve a moisture content of between 40% and 60%.
- The mulched material is placed in windrows for up to 12 weeks (nominally 6-8 weeks)
- Windrows are turned to ensure all material is exposed to at least 55°C for 3 consecutive days to achieve pasteurisation
- The pasteurised mulch product is made available for sale back to the community.

9.3.2 In-vessel Composting System

The automated in-vessel composting system used at the site is a HotRot 1811 manufactured and supplied by Global Composting Solutions Ltd with associated materials handling equipment. Where relevant, selected information provided by the supplier or available on its website[2] for the system including specifications, feed

[2] https://www.globalcomposting.solutions/

quality, operation and equipment maintenance has been reflected in this EMP. Further details should be referenced from manufacturer documents including 'HotRot Composting Equipment, Specifications for Use' ('use specification') and 'Operating Manual, Original Instructions HotRot 1811 In-vessel Composting Units' ('the manual').

Below is the equipment list provided by the supplier for the HotRot 1811 system and Figure 2 shows the schematic layout on site.

Equipment	Specification
HotRot 1811 composting unit	11,500 kg, 12.78m long x 2.3 m wide and 2.24 m high
Fu15 feed hopper (walking floor)	15m^3, 4000 kg, with 150L 22cc hydraulic pump
Hopper cross feed auger	550 kg 304 stainless steel trough
Inclined feed auger (left)	1,200 kg 304 stainless steel trough U300
Cross discharge auger	600 kg 304 stainless steel trough U300
Incline discharge auger	700 kg 304 stainless steel trough U300

(Source: Operating Manual, Original Instructions HotRot 1811 In-vessel Composting Units, Global Composting Solutions)

The in-vessel system is made from stainless steel with protection coatings and is fully enclosed. It is also insulated with urethane foam and fibre glass to prevent heat loss. A rotating shaft with tines runs through the composting chamber. It operates on a repeating cycle of forward shaft rotation, a static period, a reverse rotation period and a second static period to distribute moisture and heat and to maintain aerobic conditions through the composting material. A direct air injection and extraction system also supplies air to the treatment process to maintain aerobic conditions and slight negative pressures in the vessel. Air is injected and drawn through the material and then air is extracted via a variable speed fan through a condensate trap and to a biofilter. The biofilter is made from plastic support framework and mesh, filled with a moist mulch media to treat the air discharge. Excess water is released during the composting process as vapour is discharged via the exhaust air. No leachate is produced. The small amount of vapour trapped as condensate (5L to 10L per day) is discharged into the sump for storage in water tanks and reuse in the green waste mulching process.

The composting chamber is connected to automated feed and discharge systems. Compostable organic material is used as feedstock (refer to Section 9.4.1) which is loaded into a 5 m^3 hopper feed hopper for composting in the chamber. The maximum design feedstock capacity for the in-vessel system is 1.5 t or 3 m^3 per hour.

The system can process around 1.8-2.5 tonnes of material per day and the feed hopper can accept up to 2 days' processing capacity at a time. The rate of incoming feedstock is able to be fed into the system without the need for overnight storage. Should the need for temporary storage be required, contingency storage space in the concrete bays with tarpaulin cover is available.

The in-vessel composting process takes around 10-12 days from material input to discharge as composted product. The supplier estimates that for every 1.0 tonne of feedstock, between 0.5 and 0.7 tonnes of compost is produced. This is stored into a series of concrete bunkers.

A touch screen interface located on the motor control cabinet and programmable logic controller form part of the automated system to manage and monitor the process. The system includes graphical data trends,

parameter settings and fault alarms and an online connectivity option. Temperatures are continually monitored and logged using a series of temperature probes along the length of the chamber and on the variable frequency exhaust fan. There are also sampling ports to allow manual temperature monitoring if required. The concentration of exhaust CO_2 (from microbial respiration) and the pH of condensate are also monitored. The system has a series of hatches for inspection and monitoring of the components and several emergency stops. A database will be maintained by FRWA to allow for review, assessment and reporting on the system and process as necessary.

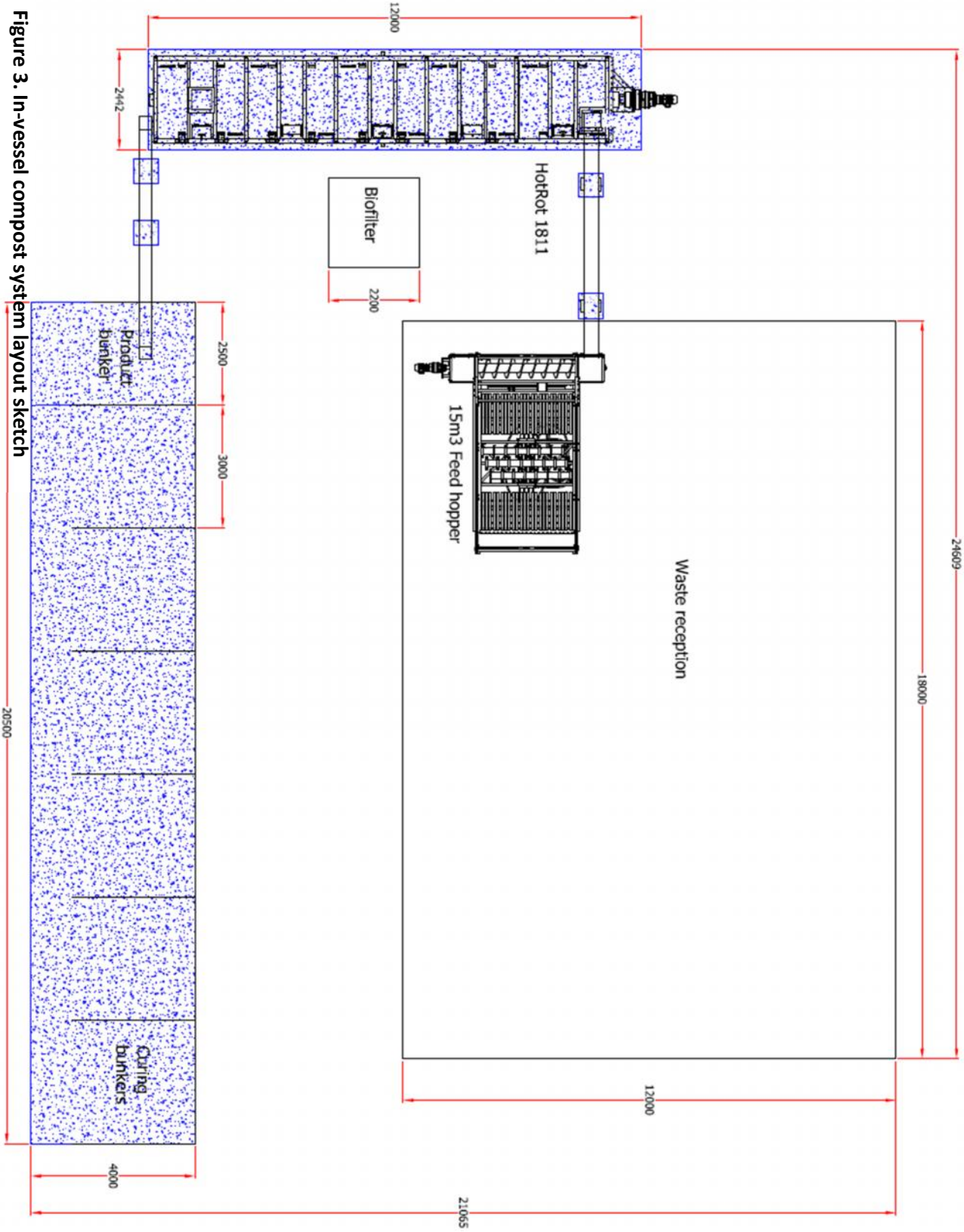


Figure 3. In-vessel compost system layout sketch

9.4 Environmental Management

The following provides an outline of potential environmental aspects, risks and management measures for the composting and green waste management facility. A summary of management measures is provided at 9.4.11. Site-wide environmental management and monitoring measures are detailed in Sections 5 and 6 of the site EMP.

9.4.1 Feedstock

A mix of green organics, food waste and other suitable compostable organic material will be processed via the in-vessel system. Sources of feedstock for the in-vessel composting are in line with those classified as Category A in the EPA *Compost guideline* (2013). Feedstock will comprise predominantly source separated green waste and food waste from the kerbside compostable organics bin collection within from the Kangaroo Island Council area. In addition, small animal mortalities and fish processing wastes will be composted using the in-vessel system. Green waste is also directly received at the site from the public and/or Kangaroo Island Council operations. Dry green waste such as tree prunings will incorporated to provide an appropriate feedstock mix and density / porosity. Other suitable feedstocks if received that may be incorporated, subject to conditions of licence, such as other commercial or industrial food and organic wastes and timber waste (no treated or painted timber) The harder woody waste and other oversize incoming feedstock is shredded prior to composting.

Target specifications set by the composting system supplier for the feedstock include the following:

- particle size:
  - Hard organics - Wood, wood chip, chipped or shredded branches and pruning's, bark and bones: >5mm and <50mm, maximum 75 mm
  - Soft organics – food waste etc: <200 mm
- organic content: > 80%
- carbon nitrogen ratio: >10:1 and <40:1
- moisture content: 45%-60%
- bulk density: 600-700kg per m^3.

Unavoidable inert inorganics such as stones, bricks or concrete pieces should be <15 mm and comprise < 5% by weight.

9.4.2 Unsuitable wastes

Contamination in the source separated compostable organic waste received at the site is very low, with bin audit data from 2014 and 2017 showing contamination rates of around 2% (KESAB, March 2018). The introduction of food waste collection with green organics could vary contamination from previous years; subsequent bin audits will help to identify if this is an issue of concern. Unacceptable materials such as plastic, glass and metal and will be avoided as far as practicable and removal of visible contamination will occur prior to composting as well as post composting, including by manual removal and sieving. Oversize organic materials will be sieved from the compost product and returned to the in-vessel process.

9.4.3 Surface water

The graded and compacted hardstand area (refer to Section 9.2.1) controls surface water runoff and reduces the risk of pooling and infiltration. Surface water runoff from the hardstand drains towards the north and west into a sump such that no head of water accumulates on the pad. Water from the sump is pumped to the adjacent water storage tanks and is reused for watering mulch. Any overflow then goes to a bio-solids tank from which overflow if any goes to tree line for watering.

Stormwater from non-operational areas is managed via drains surrounding the site that connect to the stormwater settlement and evaporation pond (refer to Section 9.2.2). In the unlikely event of overflow from the pond, the water then drains via a gravel lined pit through additional geosynthetic filter, to discharge clean water the low-lying area beyond.

9.4.4 Leachate and groundwater

The in-vessel HotRot composting process does not produce leachate, only small amounts of water vapour and condensate that is collected for reuse in the greenwaste and composting process.

The hardstand area is constructed from graded low permeability compacted material which reduces the risk of pooling and infiltration to groundwater and directs runoff to a sump and then to the adjacent water storage tanks.

Groundwater monitoring is undertaken at the site in line with Section 6 of the site EMP.

9.4.5 Air quality and Odour

Feedstock for composting includes potentially odorous wastes such as putrescible food waste and some animal waste. However, the in-vessel system is a fully enclosed controlled aerobic composting system. All process air is captured, extracted via an exhaust fan and processed through a condensate tank and a biofilter. Therefore, the risk of adverse odour impacts is low. The extraction fan has a greater capacity than the air injection system which ensures the vessel can be maintained under negative pressure. The fans also have a variable frequency drive that automatically accelerate when the main shaft rotates to manage the increased potential for vapour and odour production inside the vessel.

The composted product from the in-vessel system is highly stable and mature to a level that is stated by the manufacturer to be equivalent to open air windrow composted material after 6-9 months. The product has only the slight musty or earthy smell of compost. Following in-vessel treatment, the product is stored on the hardstand and may only require windrowing for another 2-4 weeks to allow full nitrogen fixation.

9.4.6 Noise

The in-vessel composting operation has relatively low noise output. The manufacturer specifies a noise output of 75dB measured at a distance of 1.5 m from the unit when in operation. The site is located in a rural area and the closest residence is over 300 m from the processing area.

Noise associated with use of other plant and equipment at the site such as for campaign grinding of green waste is the same as prior to the establishment of the in-vessel process. As such, the risk of noise impacts to sensitive receptors is considered to be low. Hearing protection is available for staff use onsite during any noisy operations.

9.4.7 Dust and Pathogens

The composting processes involves microorganisms such as bacteria and fungi and fine particles produced as the organic waste degrades. The risk of inhalation posed by the in-vessel composting process is low as it is a fully contained process. The composting and pasteurisation processing of green and compostable organic waste will be conducted in line with the Australian Standard 4454-2003: *Composts, soil conditioners and mulches* as well as in-vessel manufacturer instructions. This will reduce the risk of pathogens and propagules remaining in the final product.

However, precautions should be taken by site workers during product discharge, windrow turning and cleaning of the vessel. Advised measures include to wear gloves, maintain moisture contents, avoid breathing particulates including by wearing a dust mask if required, and to wash hands after handling the material and before eating or drinking. Rescheduling of works and / or dust suppression may also be used in dusty or high wind conditions.

9.4.8 Fire

The in-vessel composting process is a controlled and continuously monitored process including for temperature. The site has an emergency response procedure and fire management measures as described in Section 4.4 of the site EMP. Additional measures for the composting and greenwaste facility and are provided in Section 0 below.

9.4.9 Plant and equipment

All plant and equipment shall be maintained in effective working order and subject to routine maintenance activities. Appropriate maintenance of the in-vessel equipment in line with the manufacturer's specifications which generally comprises of periodic greasing and annual gearbox oil changes will ensure continued effective operation. Section 4.13 of the site EMP for general site equipment maintenance references the FRWA maintenance policy that is implemented at the site.

9.4.10 Records

The in-vessel system includes an automated monitoring system. Records including a database for the compost and greenwaste facility monitoring will be maintained for review and assessment as required. Records management is addressed in Section 4.12 of the site EMP.

9.4.11 Management Measures

The following is a summary of key management measures to be implemented for the Composting and Greenwaste facility.

Risk	Management Measure
Aspect: Feedstock	
Oversized materials	Oversize and hard woody feedstock will be shredded/mulched to reduce the particle size prior to in vessel composting. Following composting, a second stage of sieving will remove remaining oversize organic material which will be fed back into the in-vessel system for further treatment.
Contamination	Feedstock is predominately source segregated kerbside collected organic wastes or distinct organic waste streams such as fish processing wastes. Unsuitable non-organic wastes shall be avoided as far as practicable. The following measures will be undertaken to reduce the risk of unacceptable feedstock and final product: - Implementation of education programmes for the community. - Kerbside bin audits to monitor bin usage. - Fee structure to encourage contamination to be removed by the community prior to deposition at the site. - Observation and removal of obvious unacceptable materials from incoming feedstock as far as practicable prior to shredding and in vessel processing. - Composted materials are re-screened to remove oversize material and reduce the risk of incorporation of unacceptable materials in the final product. - Received or processed batches that are observed to have contamination with unacceptable levels of unsuitable materials that is unfeasible to remove, will be separated and managed as waste for disposal to landfill. - Monitoring and reporting including waste intake undertaken in line with Section 6.7 of the site EMP.
Aspect: Surface water	
Contamination	- Stormwater runoff diverted away from operational areas of the site to an onsite settlement and evaporation pond. In unlikely event of overflow from the onsite stormwater settlement and evaporation pond, the water is discharged to low lying areas through a filter media. - All compostable organics materials received from the kerbside collection will be processed via the fully-enclosed in-vessel system located on the hardstand. - Only final products or bulk dry green waste is stored on the hardstand. - Rainfall that falls on the hardstand is directed to a sump and pumped to adjacent water storage tanks for reuse in the mulching process. - Monitoring and reporting including surface water quality undertaken in line with Section 6 of the site EMP.
Aspect: leachate and groundwater	

Risk	Management Measure
Groundwater contamination	) No leachate is produced during the in-vessel process.) Only bulk dry green waste, mulched material and composted products are stored on the hardstand.) Hardstand and pond are lined with low permeability compacted material to reduce infiltration.) Monitoring and reporting including of groundwater quality undertaken in line with Section 6 of the site EMP.
Aspect: Odour and air quality	
Odorous compostable wastes	) The fully enclosed in-vessel system maintained and used for putrescible and odorous organics such as animal mortalities and fish offal which are deposited into vessel for composting as soon as practicable after receipt.) Kerbside collected compostable organic material received in bays to be directly loaded into the system on the day of receipt. Temporary storage in bays with tarpaulin cover is available as a contingency measure if required.) Direct air injection and mixing in-vessel to maintain aerobic conditions and minimise odour.) Negative pressure maintained) Exhaust fan treats process air via condensate trap and biofilter.) Outdoor storage only of store in-vessel composted product, mulch product and dry bulk green organics.) Monitoring and reporting including for odour and complaints undertaken in line with Section 6 of the site EMP.
Adverse biofilter function	) Maintain with uncompacted, free draining and relatively coarse organic material (such as coarse mulch).) Maintain moist (but not wet) conditions to allow active biofilm.) Check biofilter for unacceptable odours.) Appropriate exhaust fan speed to maintain aeration through biofilter.) Keep biofilter weed free.) Refresh or replace biofilter media periodically to maintain function.
Aspect: Noise	
Nuisance noise	) Use of low noise in vessel system.) Location of green waste and composting activity > 200 m from nearest dwelling.) Maintain plant and equipment in line with manufacturer recommendations and Section 4.13 of the site EMP.) Maintain complaints monitoring and response in line with Section 6.7.1. of the site EMP.
Aspect: Dust and pathogens	

Risk	Management Measure
Pathogens, dust, weeds seeds	) Pasteurisation and composting processes to meet AS4454.) Windrow turning and grinding activities may be ceased if excessive dust produced in windy conditions.) Appropriate PPE to be worn by staff and hygiene measures including washing hands before eating and drinking to be adhered to.
Aspect: Fire	
Injury and damage to people and property	) Fire prevention and control as outlined in Section 4.4 of the site EMP.) Manage stockpile heights and separation for emergency vehicle access.) Maintain aeration of stockpiles to prevent overheating.) Temperature and moisture content monitoring to maintain within recommended levels.) Prohibit smoking and hot works near combustible materials.) Empty in-vessel chamber when out of service.) Isolate electrical equipment in case of fire inside vessel.) Emergency evacuation and fire response procedure in place.) Fire-fighting equipment available and maintained onsite for use by only trained personnel in line with site emergency response procedures.
Aspect: Maintenance and inspection	
Machinery malfunction/breakdown	) Maintenance managed in line with Section 4.13 of the site EMP.) Refer to supplier / manufacturer instructions within operating manual – see manufacturer's instructions for inspection, cleaning and maintenance.) Trained operators to use system only.) Use of emergency stope when required to prevent injury and damage to equipment.) Checks include: o System alarms o Drive box, gear and load temperatures and pressure o Material, oils and condensate leaks o Noise vibration and loose fittings o Bearing and gearbox inspection and lubrication o Hydraulics checks in line with Hallco and hydraulics manuals.) Keep a log of maintenance checks, issues and resolution.

10 SEPTAGE FACILITY (operated by Council)

10.1 Specifications

- The site is surrounded by a 200mm upright kerb bund 25m x 25m.
- 150mm of 95% compacted limestone rubble covered with 100mm reinforced concrete as a base.

10.2 Septage Processing

- Contractors will dispose of the septage material in the sump on an irregular basis as they collect form the household.
- The sump is located within the 200mm kerb preventing spillage escaping from the facility.
- The septage disposal sump has the dimensions as follows:
    a. 3m x 3m x 1m chamber;
    b. 3m x 3m sloping bottom;
    c. capacity 13,500L.
- Liquid waste contractor maximum truck capacity is 8,000L for contractors on Kangaroo Island.
- Septage disposal sump is concrete with 150mm walls and floor.
- The material is pumped into the "geobag" via an automatic pump – ITT Flygt NS3085.183-along a 150mm flexible pipe.
- If rainwater enters the sump, this will also be pumped into the geobag.

10.3 Water Management

- The entire site is surrounded by a 200mm upright kerb bund.
- The water will flow into the sump over a 2% slope.
- The water is then pumped into a 44,000L poly storage tank.
- The water is pumped onto the woodlot through an inline dripper irrigation system.

10.4 Stormwater

- Stormwater drains surrounding the site are connected to the settlement and evaporation pond.

10.5 Geobag Management

- The site has the capacity for 3 geobags to be located on site.
- Two operational geobags will be located on site at all times. The third geobag will be open storing biosolids prior to inclusion into the biosolids facility.
- **The Geobags** are MacCaferri MT100 Mactube, 5m long, 5m layflat width, 1.5m high when full with 150mm sleeve.

- Geobags will be filled consecutively.
- When the first geobag is full, the second will be used – it is anticipated that a geobag will be filled every two years.
- The geobag may be opened on location, within the bunded area the contents stored / dried until required to be moved to the biosolids facility.
- A third geobag will then be placed in the biosolids area.

10.6 Disposal Sump Pump Management

- The pump is serviced in November each year by ITT Flygt in accordance with the maintenance program for the pump and in line with the CWMS Pump Station maintenance program.
- Any faults or issues arising from the annual service will be rectified.
- The pump is fitted with an emergency 'red' light which indicates if the sump is over full.

11 BIOSOLIDS DEPOT MANAGEMENT PLAN

Appendix K provides the drawings for the Biosolids depot.

11.1 Introduction

The biosolids depot was established to provide a safe, effective and inexpensive method of receiving, drying, mixing and/or processing biosolids from sources covered in these guidelines.

The Kingscote biosolids depot consists of three drying beds: one (1) for the receival of industrial / commercial biosolids and two (2) for the receival of domestic biosolids.

This depot is the first complying and approved site for the receival of biosolids on the island.

FRWA will ensure that the receival, handling and storage of biosolids at the licensed premises are carried out in accordance with the December 1996 EPA Publication *'South Australian Biosolids Guidelines – for the safe handling, refuse or disposal of Biosolids'*.

Guidelines A have been used in the formulation of this plan.

11.2 Approvals

The management of biosolids at Part Section 59 North Coast Road, Hundred of Menzies is licensed by the EPA under the Waste Depot License for Kingscote (License No.2595).

The Development Assessment Commission (DAC) granted the biosolids waste treatment depot development approval 12/11/97.

11.3 Location

Appendix K provides the location of the biosolids depot within the bounds of the KIRRC. The existing waste depot is owned by Council and managed by a private contractor. The site is considered to be ideal for this facility due to its existing use and the intensive industrial use of adjacent land. Preliminary site inspections by Officers of the EPA confirmed the site is suitable for this development.

The biosolids drying beds are approximately 350m from the nearest watercourse. There is a buffer zone of approximately 500m between the depot and the nearest dwelling.

The direction of the prevailing winds and the subsequent impact of odour and emissions on residents were considered when siting the depot. The depot is located away from low lying/flood prone areas.

The site soils are predominantly clay. The area used for drying beds was designed to prevent entry of surface stormwater. Stormwater is collected in the runoff storage area and evaporates without harming the environment.

The stockpile site is located as close as possible to the drying beds to avoid unnecessary transportation.

11.4 Design

Refer to Appendix K – the site plan of the biosolids depot and drying beds.

11.4.1 Capacity of the Biosolids Depot

Drying beds, stockpile and runoff areas are adequately sized for the population they serve. The volume is sufficient to take 80L of liquid biosolids per person per year.

11.4.1.1 Domestic Drying Beds

Effective capacity volume of each domestic drying bed:

25.2m length x 6m wide x 0.3m deep = 45.36m^3 = 45,360L

Total volume of domestic drying beds at any given time:

45,360L x 2 = 90,720L

Volume of biosolids per year from domestic population connected to Kingscote STED scheme:

80L x 1,660* people = 132,800L

Or, volume of biosolids per year from total domestic population of Kangaroo Island:

80L x 4,300* people = 344,000L

(*population figures include some industrial/commercial installations, so domestic volumes would actually be less than these estimated figures).

Hypothetically, if sludge from every domestic septic installation on Kangaroo Island was deposited in the drying beds in one year, each bed would need to be filled, dried and emptied 4 times in that year.

11.4.1.2 Industrial/Commercial Drying Beds

Effective capacity volume of the industrial/commercial drying bed:

23.6m length x 6m wide x 0.3m deep = 42.8m^3 = 42,480L

Due to the very few industrial/commercial septic tanks this bed is not expected to reach capacity depth of 0.3m.

11.4.1.3 Stockpile and Runoff Area

Dimensions of the stockpile area:

48.8m length x 10m wide = 488m^2

Dimensions of runoff area:

48.8m length x 3m wide = 146.4m^2

11.4.2 Design Features

The bases of the drying beds are level, well compacted and trafficable for the removal of dried biosolids and sealed with a clay lining as designed by a geotechnical consultant or other approved equivalent lining method to prevent seepage into groundwater.

The number of industrial and commercial septic installations is minimal on the island and it is expected the single bed will be more than sufficient. However, should trial use of the bed find it to be impractical, Council will consider constructing a bunding wall across the centre of this bed to form two. This construction would be undertaken after approval from the EPA.

The stockpiling area is a well-drained, impervious surface and prevents pooling and runoff of surface water. The area is bunded to retain stormwater runoff and prevents stormwater from outside the stockpile area entering and was constructed with a slope of 3% to the drainage sump.

The drainage sump is designed to hold at least the runoff from a 1 in 10-year return period storm event. Leachate and stormwater runoff are directed to the runoff storage sump for evaporation so that no harm is caused to the environment and there is no danger to public health. Any residue in the sump will be returned to the drying beds.

11.5 Management

Council's Technical Services Department in partnership with Council's Environmental Health Officer are the biosolids 'depot manager'.

11.5.1 Environmental Protection Policy

Kangaroo Island Council will ensure that every employee, agent or contractor responsible for carrying out any task controlled by Licence 2595 is properly advised as to the requirements of this licence and the general environmental duty under Section 25 of the Act that relate to that person's tasks and responsibilities as employee, agent or contractor.

Kangaroo Island Council will record reporting of incidents, handling public complaints or requirements for environment protection practices relating to pollution and waste.

11.5.2 Work Health and Safety

Contractors, site operators and management should abide by the Work Health and Safety Act 2012 and have policies in place to protect the health and safety of employees.

As biosolids may contain microorganisms that could be harmful to people who come into contact with the material, the following practices are suggested as minimum care:

- Wash hands and scrub nails well with soap before eating, drinking or smoking, and at the end of the working day (vehicles used for the transport of liquid biosolids should be fitted with hand washing facilities for the benefit of operators and employees).
- Do not consume food or smoke while working with biosolids.
- Wear a suitable change of clothing during work and wear footwear and gloves to protect against injury from sharps.

- Make showering facilities available to employees.
- Ensure eye protection is worn consistent with good work practice to avoid problems with dust.
- Wear masks to prevent inhalation if dust or aerosols are considered to be a problem.
- Extra care is to be taken when handling material rewetted by significant rainfall, in case of regrowth of bacteria.
- Adequate immunisation cover, especially for Hepatitis A and Tetanus, should be provided for any persons routinely in contact with biosolids.

11.5.3 Cleanout Schedule

Kangaroo Island's four yearly desludging program commenced in 1999 to ensure the ongoing efficient operation of the STED scheme.

Septic tanks and/or the septic components of aerobic wastewater treatment systems will be desludged by contractors in accordance with the SAHC Septic Tank Standard.

The Contractor must advise Kangaroo Island Council when septic tanks are desludged.

11.5.4 Management of Liquid Biosolids/Drying Beds

Liquid biosolids from septic tanks are human wastes and must be handled with care in a manner that ensures the health and safety of the community and protection of the environment.

The biosolids depot is surrounded by a chain fence and will be kept locked at all times to prevent unauthorised entry.

EPA liquid waste disposal contractors are provided with a key to the depot upon signing an agreement to be responsible for the safe keeping of the key and to provide the depot manager with a cart note detailing the appropriate information to be kept by FRWA for each load disposed of at the depot.

The biosolids depot is to remain locked at all times, except with in use.

One drying pan will be used at a time, at the direction of the depot manager. A barrier stating 'CLOSED' will be used to block the entrance to the drying bed(s) when capacity has been reached. Other directions will be provided and must be adhered to by contractors at all times.

Industrial and commercial biosolids may only be placed in the appropriately designed drying bed. Biosolids from industrial or commercial sources will be kept separate from domestic biosolids. If a vehicle is used to transport both industrial and domestic biosolids, the mixed load MUST be considered industrial waste.

When the drying bed in use has reached the effective capacity of 300mm deep, the depot manager will close it to further use to allow for drying. Once dried the biowaste will be mixed with shredded paper products and light tree prunings and removed as soon as possible to the stockpile area. A loader will be used to assist with mixing, turning and locating the product in one operation.

Samples from the surface and from within the piles are to be taken to the depot manager from the stockpiled biosolids within one month of its removal from the bed as per Section 10.5.6 of this plan. The pile will be

immediately labelled by the depot manager with a stake detailing the date of stockpiling and the contaminant grade of the biosolids pile (ie Grade A, B or C) pursuant to Part A3 of the guidelines.

11.5.5 Management of Stockpiled Biosolids

The depot manager will clearly mark the age of the stockpiles of stored biosolids to prevent removal of fresh material. Stockpiles of biosolids which have been mixed with other material will be clearly marked. Stakes used will be removable to allow for the turning process.

Stockpiles of biosolids will be maintained below 3 m in height.

Removal of the composed biosolids may only be undertaken with the approval of the depot manager and only after compliance with the requirements of Part A of the guidelines. A stabilisation grade is assigned according to the treatment the batch of biosolids has undergone to reduce pathogens, vector attraction and odours. A contaminant grade is assigned according to the concentration of a range of potentially harmful metals present in the biosolids.

Due to the potential for regrowth of organisms such as Salmonella, if, processed biosolids become wet the batch must be downgraded and dried for at least one month.

The biosolids depot manager must ensure each batch is correctly graded and classified and that the end user is given this information. Records of sampling and analyses and assignments of grades must be maintained by the manager.

11.5.6 Removal of Biosolids

The depot manager will ensure the security of the depot and loading machinery at all times to prevent unauthorised removal of biosolids. The depot manager will be accountable for control of removal of biosolids and to ensure only properly aged biosolids are removed for use.

The 'Biosolids Analysis Sheet for Producers' must be completed for each batch of biosolids (refer Appendix L).

11.5.7 Use of End Product Biosolids

Biosolids must be air dried and stockpiled at the stockpile area for a minimum of 3 years to ensure adequate pathogen reduction. Unless the product has been tested and graded Class A or B biosolid waste must not be released unless the appropriate authorisations have been granted by the EPA. The biosolids may be disposed to landfill once authority has been provided by the EPA.

11.6 Other Management Details

11.6.1 Vector/Odour/Dust Control

The depot manager is responsible for the control of odours and vectors such as birds, wildlife, rodents, dogs, cats and insects.

If necessary, a vector control program will be formulated by the depot manager to ensure there is no establishment of vector populations at the depot site. Should breeding occur, remedial action is to be undertaken as soon as possible after detection.

Liquid biosolids are to be distributed evenly in the drying beds to prevent pooling and mosquito breeding sites.

If necessary, covering of biosolids received will be undertaken that day to avoid nuisance or odour problems. Council will immediately cover the drying beds or stockpiles with sand following complaints from persons outside the depot or from occupants of nearby residences.

11.6.2 Dust Control

Access roads have been constructed and are maintained to minimise dust emission.

Dust is to be controlled by the depot manager by:

- wetting the stockpile and access roads;
- minimising drop heights to vehicles when loading;
- developing and using wind breaks;
- using organic caking agents on stockpiles.

Dust masks or respirators should be used by personnel working in the vicinity of dust from stockpiles, if they are not working in air-conditioned machines.

11.6.3 Landscaping/Wind Breaks/Buffer Zones

Trees have been planted to screen the biosolids depot to preserve the amenity of the area. Newly planted trees and shrubs will be maintained weed free and watered as required to promote efficient growth. Weed growth within all areas of the biosolids site is to be kept to a minimum. All dead and diseased trees and shrubs will be replaced to ensure an effective screen is maintained/achieved around the biosolids depot.

11.6.4 Signage of the Depot

All signs shall be maintained so they are legible from 5 m, of high quality and carrying a concise message. Signs shall include:

- EPA Licensed Depot sign
- Speed and direction signs
- No access to public sign
- Health warning/instruction, I.e. 'Warning: No public access. Contract with biosolids may risk contact with potentially harmful organisms.

11.6.5 Transport of Biosolids

Cover transported loads using industry standard dust control procedures such as tarpaulins or fibreglass covers.

Notice to contractors transporting biosolids:

- Vehicles and equipment should be maintained in sound condition to prevent spillage and leakage.
- Vehicles must be maintained in a clean condition.

- If wet biosolids, precaution must be taken so no drainage from the load escapes from the vehicle whilst in transit.
- Vehicles are to be cleaned/washed down at the biosolids depot, or other site designed to enable collection of wastewater, with any wastewater or discharge to be deposited in the drying beds.
- When transporting biosolids on a public road, cover the load to prevent loss of the fine material.
- When washing vehicles after delivery of a load of biosolids to an approved site, a location with no risk of surface runoff must be selected as the wash down site (vehicles should not be cleaned while parked on farm drives or on other compacted areas where wash down water may remain ponded on the surface).

11.6.6 Monitoring Program

11.6.6.1 Weekly Inspection of Biosolids Depot

- The biosolids depot is to be inspected by a Council EHO at a minimum of once per week. Should it be found that more inspections are required to ensure efficient operation of the depot, these will be undertaken.
- Weekly inspections will involve monitoring of the following checklist:
- lock/fence – integrity of barrier;
- signs – visible, intact;
- presence/breeding of vectors;
- dust/odour problems;
- weed growth;
- depth of biosolids in drying beds (a permanent marker will be fixed in each bed to aid visual inspection);
- biosolids distribution within drying beds;
- rate of drying of the biosolids in drying beds;
- moisture levels within the stockpiles.

11.6.6.2 Dried Biosolids

Samples from the surface and from within the pile are to be taken by the depot manager from the stockpiled biosolids within one month of its removal from the bed. The sampler will make every effort to ensure samples are representative, with a minimum of 3 samples to be taken from each batch. These samples are to be analysed to determine the contaminant grading of the pile as follows:

- Arsenic
- Cadmium
- Copper
- Lead
- Mercury

- Nickel
- Zinc.

All analyses (including sample preparation, storage and preservation) will be based upon relevant methods approved by the EPA. All analyses to be performed by a NATA registered laboratory.

The pile will be immediately labelled by the depot manager with a stake detailing the date of stockpiling and the contaminant grade of biosolids pile (i.e. grade A, B or C) pursuant to Part A3 of the guidelines.

11.6.6.3 Biosolids Stockpiled for 3 Years

When investigating end disposal options, stabilisation Grade A may be established by a sampling and analysis program which demonstrates that in 50 grams of processed biosolids there remains:

- < 1 salmonella;
- < 1 helminth ovum;
- < 1 PFU total virus;
- < 1 cyst or oocyst of Cryptosporidium and Giardia.

11.6.6.4 Environment

There will be no leaching of contaminants or leachates into groundwater or soil from the biosolids depot. The compacted clay lining of the biosolids facility is expected to prevent any leachate being generated. Should any monitoring of leachate at the waste depot site indicate that significant volumes are produced, groundwater monitoring will be implemented in accordance with the requirements of the EPA.

A monitoring program should be established to assess any impact of the facility on the environment.

11.7 Records

11.7.1 Pumpout

For each septic tank pumpout undertaken, licensed contractors are required to provide Council with a cart note. The cart notes will determine the cost to the Contractor for disposal of the biosolids. The Contractor will then be billed for their use of the facility. Note, the pumpout waste is initially processed through the septage facility, not direct to the biosolids depot.

The cart note must contain the following information:

- Name of the Contractor and driver;
- Vehicle details;
- Address of the property;
- Date of desludging;
- Date of disposal to biosolids lagoon;
- Volume of load;

- Tank size (refer table Appendix 2 for assistance);
- Any problem encountered (eg tank not uncovered, premises inaccessible);
- Comments on any failing systems;
- Type of biosolids (domestic/industrial/commercial);
- Where disposed of – ie which bed;
- Sketch of location of septic tank openings and cover, with distances from boundaries and distinguishing features clearly marked;
- Comment on stormwater discharge for the property – illegal to septic

11.7.2 Disposal to the Drying Beds

Records are to be provided to the depot manager for biosolids being deposited at the depot as follows:

- Name of licensed contractor and driver;
- Where disposed of;
- Date;
- Volume of load;
- Origin of biosolids (domestic/industrial/commercial).

11.7.3 Transport to the Stockpiling Area

Records are to be kept for dried biosolids as follows by the depot manager:

- Date of deposition on stockpile area;
- Which drying bed the biosolids came from;
- Contaminant levels of each pile.

11.7.4 Removal from the Biosolids Depot

Records are to be kept for the removal of biosolids from the depot as follows by the depot manager:

- Name of person removing;
- Location and nature of end use;
- Volume removed;
- Age of biosolids;
- Nature of treatment eg stockpiled, mixed with green wastes.

11.7.5 Monthly Summary

The depot manager will generate a monthly summary of:

- Volume of biosolids received;

- Origin of biosolids (domestic/industrial/commercial)
- Disposal site (which drying bed);
- Volume of biosolids removed from depot and destination (e.g. home garden, landscaping);
- Names of pumpout contractors.

11.8 Contractors Relationships with Environmental Health Officers

Council's EHOs are responsible for administration of the *Public Health Act* 2011, the EP Act, Council Bylaws and other regulations with respect to public health.

All contractors and persons involved with the transport of liquid or dried biosolids must provide information as required by this plan to EHOs (refer Section 10.8). Failure to do so may lead to the EPA being advised and to cancellation of the EPA license to transport waste.

Contractors involved in desludging septic tanks/use of the biosolids depot must:

- reseal septic tank access cover to prevent surface water entering the system;
- where access not to SL encourage owner to do so;
- maintain and clean vehicles regularly;
- keep domestic and industrial biosolids separate during transport and in disposal at the depot;
- have procedures in place in the event of a break down or accident;
- inform the EPA, Dept of Industrial Relations and Council upon spillage of septic tank sludge;
- have regard to Kangaroo Island Council's Biosolids Management plan and any other requirements made by Council, the EPA or the SAHC;
- be aware of their general environmental duty under Section 25 of the EP Act relating to their tasks as a contractor;
- prevent scouring the clay base of the drying bed during the disposal of biosolids.

Failing to comply with above may result in the forfeiting of use of the biosolids depot and the key will be required to be returned to Council. Applicants must then reapply for use of the depot, at Council's discretion. Legal action may be taken where necessary.

Contractors and personnel involved with the transport of dried biosolids should inform users of limitations for its use as defined by the EPA and Council's EHOs. The type of information communicated to purchasers should be agreed to with the local EHO.

11.9 Environmental Health Officers

Council's EHOs are familiar with the EPA's South Australian Biosolids Guidelines A and B and are responsible to Council for the safe handling and disposal of biosolids on Kangaroo Island.

This includes ensuring that Council employees and contractors involved in any aspect of biosolids handling are familiar with their requirements. Kangaroo Island Council will appoint an EHO as the depot manager.

Records as detailed in Section 8 'Records' will be kept and interpreted by the EHOs.

EHOs will forward records of biosolids management to the EPA in accordance with license conditions. An annual report detailing all operations within the biosolids depot will be submitted to the EPA.

11.10 Distribution and Review

Any licensed contractor given a key to the biosolids depot will be given a copy of and be expected to work to this Plan.

Senior Council Officers will be given a copy of this Plan and will be expected to ensure employees associated with any part of the operation of the biosolids depot understand the requirements.

A copy will be provided to the EPA in addition to the annual report on the management and running of the biosolids depot.

This Plan will be reviewed annually.

11.11 Decommissioning

Following commissioning of the geobag the following will occur at the existing biosolids lagoons:

- the lagoons allowed to dry;
- biosolid material allowed to dry for approximately 3 years;
- after drying the material will be placed on the old landfill area and covered with 150mm of soil and used as bulk fill to obtain final landform.

In the event the geobag management process fails, the lagoons will be used as the backup disposal option.

Biosolid material that does not meet the appropriate stabilisation or contamination level may be placed at this location for stabilisation prior to landfilling on the site.

12 WASTE TRANSFER FACILITY

Appendix M provides the design detail for the facility.

12.1 Facility Operational Plan

Waste is managed within the 'Waste Transfer Facility' as follows:

- The kerbside collection vehicle empties garbage in the facility. The waste is then 'pushed' into the transfer vehicle.
- The kerbside collection vehicle empties recyclables in the facility. The recyclables are then baled and stored awaiting transport to the processing facility in Adelaide.
- General public accessing the site, dispose of waste at the appropriate locations. The Site Attendant pushes the waste into the transfer vehicle or processes in another way.
- When the transfer vehicle is full it leaves the site and is returned after transporting waste to the landfill facility at the mainland.

As a general rule the putrescible waste will be placed in the transfer vehicle continually and at the end of each day.

The following contingencies will be in placed to ensure environmental harm does not occur:

- It is anticipated that the time between when the transfer vehicle is full until disposal will be less than 48 hours. This is subject to ferry constraints and transport contractor management.
- One transfer trailer is dedicated to this operation through FRWA's transport contractor
- Site staff will coordinate the management of all waste within the site. This includes kerbside collection vehicles, the general public, contractors and transfer vehicles.

Refer to Section 13 of the Waste Transport Contingency Plan.

12.2 Plant Flooring and Roofing

The floor of the Waste Transfer Facility will be double reinforced concrete constructed in accordance with the design specifications. A central leachate drain collects leachate in a sump located between the truck loading facility and baling operations.

12.3 Stormwater Management

Stormwater drains are located in accordance with the design layout and collected in the onsite stormwater settlement and evaporation pond.

Rainwater will be collected from the roof in a series of tanks. Overflows from these tanks will be connected to the stormwater drain system and pond. The collected water will be used to assist in the management of the Composting and Greenwaste Facility.

Appropriate drains, bunds and grading are installed around the Waste Transfer Facility to prevent stormwater entering the waste storage areas.

12.4 Leachate Management

It is anticipated that no or very little leachate will be produced for the following reasons:

- the facility is undercover;
- stormwater cannot access the facility;
- waste will be continually loaded into the transfer vehicle.

In the event of leachate generation within the Waste Transfer Facility, the floor is sloped to a drainage system. In simple terms the leachate flows to the centre of the facility, via a 2% slope, the leachate then flows to the loading end of the facility, via a ½ 150mm drain and 2% slope, into a 5m long x 0.5m wide x 0.5m deep collection sump. A 150mm pipe connects the facility floor drain with the sump. If the sump catches leachate, advice from the EPA will be sought on appropriate disposal methods.

12.5 Noise

The site is currently managed as a Waste Depot and the proposed change will only see an extra two to three trucks per week entering the site for transfer operations. This will typically occur at times when the noise impact on the surrounding area is low.

The closest dwelling is 500m from the site and the area is zoned “General Industrial”.

12.6 Odour

Odours from the Waste Transfer Facility will be managed in various ways including:

- once full, the transfer vehicle will be taken to the mainland disposal site within 24 to 48 hours where possible;
- it is anticipated putrescible waste will be located at the site less than 4 days at a time;
- the closest dwelling is around 150m from the site.

12.7 Dust

The heavy vehicle access roads to the site is surfaced with bitumen. Internal roads are constructed with compacted marl. The current site has a low dust issue and as a result these actions will produce less dust than the current operations.

The Waste Transfer Facility has a concrete floor and the likelihood of dust issues is low.

12.8 Vectors

Vector impacts in the Waste Transfer Facility will be managed in various ways including:

- the Waste Transfer Facility has a series of doors which can be opened or closed to manage this issue. All doors will be closed when the site is not attended;
- the transfer vehicle will be covered nightly and when not being filled;
- once full, the transfer vehicle will be taken to the disposal site within 24 hours where possible;
- it is anticipated putrescible waste will be located at the site less than 4 days at a time.

12.9 Fire Management

Appropriate fire extinguishers are fitted to the facility and all mobile plant. Fire water is stored on site in close proximity to the main operating area/ transfer shed. Refer to Section 4.4 for details.

13 WASTE TRANSPORT CONTINGENCY PLAN

All waste for disposal and recyclables for processing are transported off the island and taken to facilities in metropolitan Adelaide. The transport is depended on the availability of ferries and whilst booked in advance, boats might not sail due to adverse weather conditions.

In addition, Council's transport contractor may experience problems outside of their control which may delay waste transports. This may include the impacts of severe weather conditions prohibiting ferry operation, bush fires potentially restricting transport movements or technical difficulties.

For those scenarios KIRRC needs a contingency plan to store and manage waste on site.

The following Contingency Plan for the transport of waste from Kangaroo Island has been developed to ensure environmental harm does not occur as part of the Waste Transport operation as a whole:

1. Waste will be continually loaded into the transfer trailer
2. If the trailer is full or if there is no trailer available, waste will be stored in the shed for no longer than 1 week.
3. If this fails, the existing landfill cell will be used for emergency disposal.
4. If this cannot occur other options will be discussed with the EPA.

The EPA will be advised if Contingency 2, 3, or 4 are required as soon as possible or within 48 hours, whichever is the least.

Contingency 2 will only be used if an unpredictable large volume of waste was received or the ferry was unable to sail or accept the transfer trailer when required.

Contingency 4 is predicated on landfill limited (as far as practicable) to comprise domestic and commercial wastes of a putrescible nature emanating from municipal waste (kerbside collection) and *Municipal Solid Waste-Domestic Sources* and *Commercial and Industrial Waste (General)*, such that general wastes from domestic sources (other than kerbside collection) and from commercial operation (such as hotels or the like) have been specifically permitted for inclusion in contingency landfill.

Note: the current landfill cell still has sufficient capacity to function as an emergency disposal cell based on the very rare occasions of emergency disposal on site.

14 CAPPING

The capping design has been completed and the capping plan for the site has been approved by the EPA on 3 October 2014, document titled *Kingscote Landfill: Final Landfill Cap- Capping Plan and Methodology* dated 29 September 2014.

All capping works at the site were completed by the 2016.

APPENDIX A

Land Details - Certificate of Land Title CT 5611/656, Locality & Site Plans.

CERTIFICATE OF TITLE

REAL PROPERTY ACT, 1886

VOLUME 5611 FOLIO 656

Edition 3
Date Of Issue 06/01/1999
Authority TG 8538026

South Australia

I certify that the registered proprietor is the proprietor of an estate in fee simple (or such other estate or interest as is set forth) in the land within described subject to such encumbrances, liens or other interests set forth in the schedule of endorsements.

REGISTRAR-GENERAL

WARNING: BEFORE DEALING WITH THIS LAND, SEARCH THE CURRENT CERTIFICATE

REGISTERED PROPRIETOR IN FEE SIMPLE

KANGAROO ISLAND COUNCIL OF DAUNCEY STREET KINGSCOTE SA 5223

DESCRIPTION OF LAND

ALLOTMENT COMPRISING PIECES 4 AND 5 FILED PLAN 103561
IN THE AREAS NAMED KINGSCOTE AND WISANGER
HUNDRED OF MENZIES

EASEMENTS

SUBJECT TO THE EASEMENT OVER THE LAND MARKED A TO THE ETSA CORPORATION (TG 8538026)

SCHEDULE OF ENDORSEMENTS

10114275 LEASE TO AUSBULK LTD. COMMENCING ON 1.7.2003 AND EXPIRING ON 30.6.2008 OF PORTION (B IN GP 300/2004)

10977338 EXTENSION OF LEASE 10114275 EXPIRING ON 30.6.2011

End of Text.

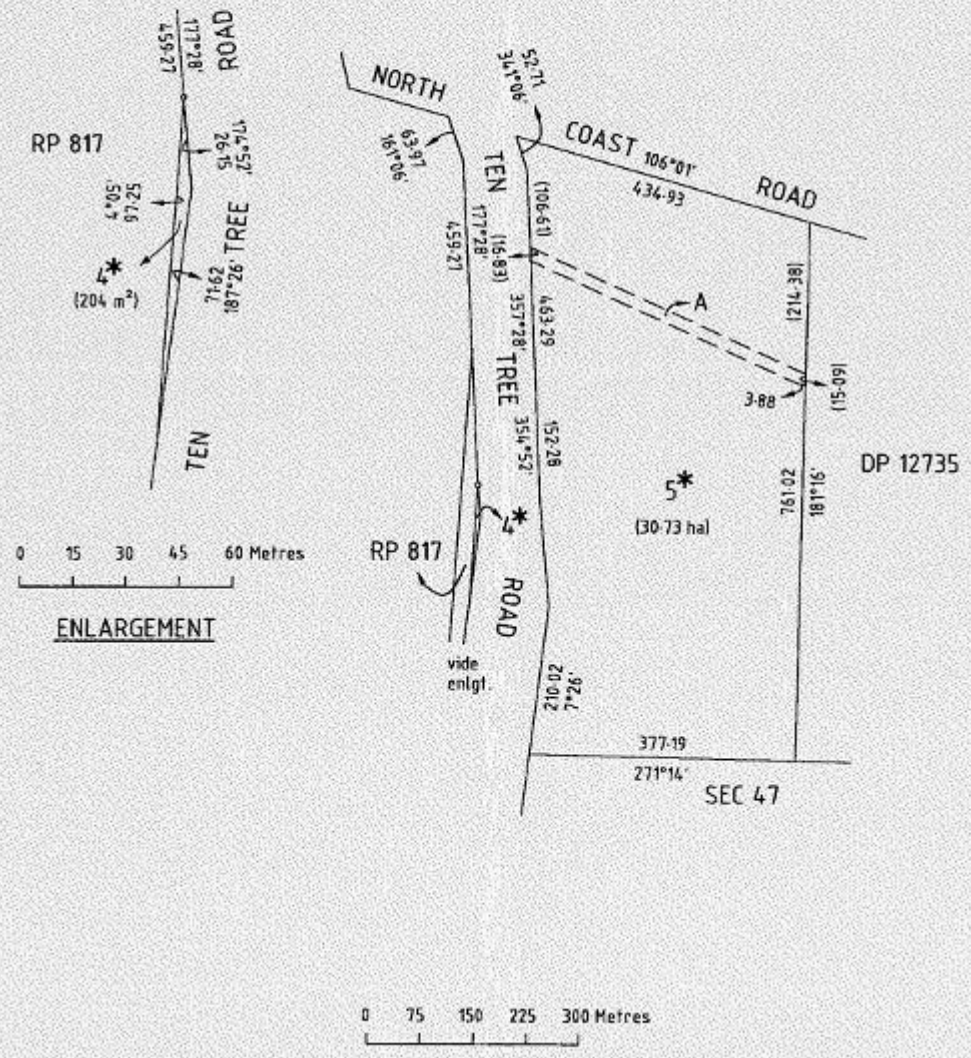
PAGE 1 OF 2

VOLUME 5611 FOLIO 656

SCHEDULE OF PIECES COMPRISED IN ONE ALLOTMENT

PIECES COMPRISED IN ONE ALLOTMENT	TOTAL AREA
4 & 5	30·75 ha

✱ Asterisk denotes PIECE identifier only.



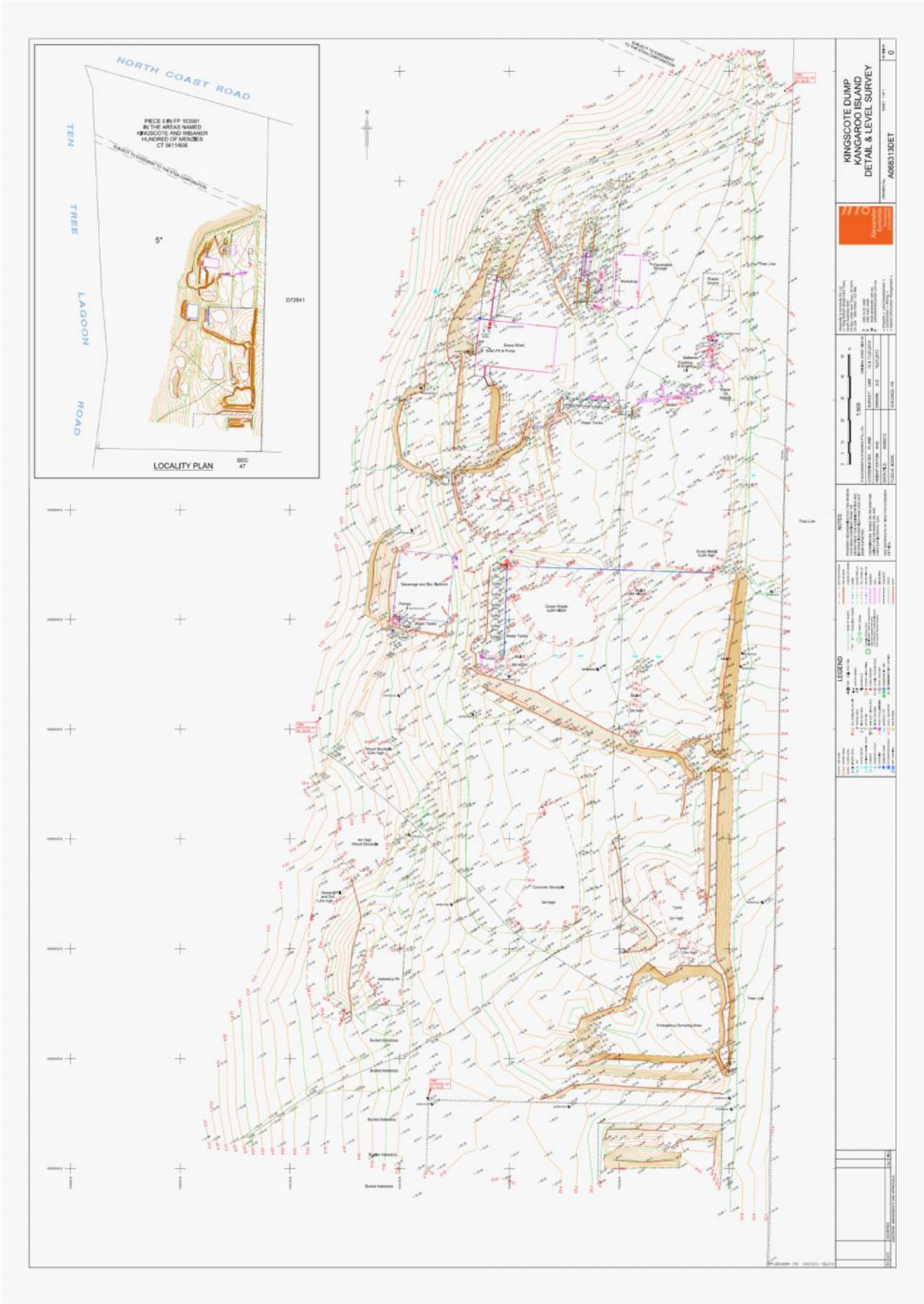
PAGE 2 OF 2

Kingscote Landfill, Kangaroo Island SA
Environmental Performance Monitoring
For
Kangaroo Island Council

Figure 1
Site Location Plan

LBW environmental projects

Job No: 140566
Drawn: S Boorman


NORTH COAST ROAD
TEN TREE LAGOON ROAD
LOCALITY PLAN
KINGSCOTE DUMP
KANGAROO ISLAND
DETAIL & LEVEL SURVEY
A06313DET
LEGEND

APPENDIX B

Licence EPA2595.

APPENDIX C

Summary of Monthly Climate – Bureau of Meteorology

Kingscote Station 022807

Australian Government
Bureau of Meteorology

Climate statistics for Australian locations

Monthly climate statistics

All years of record

Site name: KINGSCOTE **Site number:** 022807 **Commenced:** 1877 Map
Latitude: 35.66° S **Longitude:** 137.64° E **Elevation:** 18 m **Operational status:** Open

View: Main statistics All available | Period: Use all years of data | Text size: Normal Large

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Temperature															
Maximum temperature															
Mean maximum temperature (°C)	23.7	23.5	22.2	19.8	17.5	15.4	14.6	15.0	16.5	18.5	20.5	22.3	19.1	81	1914 2002
Highest temperature (°C)	40.6	41.0	35.8	31.0	24.7	22.4	22.0	23.0	27.5	37.3	39.4	38.8	41.0	38	1957 2002
Date	17 Jan 1959	08 Feb 1970	06 Mar 1985	11 Apr 1968	08 May 2002	03 Jun 1957	26 Jul 1975	29 Aug 1962	24 Sep 1967	14 Oct 1958	30 Nov 1962	10 Dec 1985	08 Feb 1970		
Lowest maximum temperature (°C)	16.1	17.2	16.0	12.8	11.3	8.4	9.7	9.5	11.5	13.3	14.0	14.4	8.4	38	1957 2002
Date	01 Jan 1970	04 Feb 1987	19 Mar 1973	20 Apr 1960	26 May 1987	22 Jun 1991	02 Jul 1984	11 Aug 1960	08 Sep 1977	02 Oct 1966	14 Nov 1970	04 Dec 1966	22 Jun 1991		
Decile 1 maximum temperature (°C)	20.6	20.5	19.3	17.2	15.4	13.8	12.9	13.3	14.1	15.8	17.3	18.8		37	1957 2002
Decile 9 maximum temperature(°C)	30.6	29.8	27.2	24.0	20.6	17.9	16.7	17.4	19.9	23.7	26.5	28.4		37	1957 2002
Mean number of days ≥ 30 °C	3.3	2.7	0.9	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.8	1.9	9.9	38	1957 2002
Mean number of days ≥ 35 °C	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	1.7	38	1957 2002
Mean number of days ≥ 40 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38	1957 2002
Minimum temperature															
Mean minimum temperature (°C)	14.9	15.4	14.3	12.5	10.6	9.3	8.4	8.3	9.1	10.3	12.0	13.6	11.8	81	1914 2002
Lowest temperature (°C)	8.3	8.9	6.1	5.6	2.8	-1.1	2.1	2.0	1.6	2.2	4.7	6.1	-1.1	38	1957 2002
Date	28 Jan 1958	24 Feb 1969	12 Mar 1958	13 Apr 1960	21 May 1962	12 Jun 1958	20 Jul 1962	19 Aug 1964	12 Sep 1961	03 Oct 1960	02 Nov 1960	01 Dec 1966	12 Jun 1958		
Highest minimum temperature (°C)	24.4	25.5	23.7	21.2	18.5	15.6	13.8	14.8	17.5	20.4	22.8	23.0	25.5	38	1957 2002
Date	03 Jan 1991	08 Feb 1983	02 Mar 2000	08 Apr 1972	12 May 2002	01 Jun 1991	08 Jul 1999	31 Aug 1989	30 Sep 2001	31 Oct 1987	23 Nov 1988	22 Dec 1976	08 Feb 1983		
Decile 1 minimum temperature (°C)	11.7	12.3	10.9	9.0	7.3	6.0	5.3	5.5	5.8	6.8	8.8	10.2		37	1957 2002
Decile 9 minimum temperature (°C)	18.8	18.5	18.0	16.1	14.4	12.6	11.4	11.5	13.0	14.4	15.7	17.1		37	1957 2002
Mean number of days ≤ 2 °C	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	38	1957 2002
Mean number of days ≤ 0 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38	1957 2002
Ground surface temperature															
Mean daily ground minimum temperature (°C)															
Lowest ground temperature (°C)															
Date															
Mean number of days ground min temp. ≤ -1 °C															

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Rainfall															
Mean rainfall (mm)	14.7	16.8	18.5	35.1	58.5	73.0	77.5	64.9	47.0	36.6	22.8	19.5	482.4	128	1877 2015
Highest rainfall (mm)	120.1	157.6	119.4	147.2	191.5	188.2	240.1	181.1	136.4	109.6	81.0	97.9	883.9	128	1877 2015
Date	1939	1946	1877	1971	1983	1955	1910	1930	1997	1962	1943	1988	1910		
Lowest rainfall (mm)	0.0	0.0	0.0	0.8	11.7	15.1	23.6	6.8	4.4	2.0	0.4	0.0	314.5	128	1877 2015
Date	1986	2015	1894	1902	1930	1944	1877	1944	1987	1981	1982	1904	1914		
Decile 1 rainfall (mm)	0.8	0.4	1.5	7.0	22.0	31.1	41.7	30.8	17.8	10.4	4.1	2.9	385.0	121	1877 2015
Decile 5 (median) rainfall (mm)	8.4	7.5	12.6	29.2	51.7	66.5	74.4	63.6	42.1	33.1	17.8	14.4	457.3	121	1877 2015
Decile 9 rainfall (mm)	34.1	43.3	41.8	68.2	98.8	119.2	113.4	99.5	79.2	67.9	47.9	40.4	619.2	121	1877 2015
Highest daily rainfall (mm)	79.2	146.3	83.3	63.8	82.8	56.4	53.0	43.9	38.0	55.9	57.0	71.4	146.3	121	1879 2015
Date	16 Jan 1939	18 Feb 1946	07 Mar 1910	03 Apr 1934	26 May 1910	07 Jun 1894	09 Jul 1894	08 Aug 1930	19 Sep 1997	19 Oct 1933	12 Nov 1979	04 Dec 1988	18 Feb 1946		
Mean number of days of rain	3.6	3.6	5.1	8.7	12.9	16.0	16.2	16.9	12.9	10.1	6.8	5.5	120.3	121	1877 2015
Mean number of days of rain ≥ 1 mm	2.0	2.0	2.8	5.1	8.2	10.7	12.3	11.3	8.5	6.3	3.9	3.2	76.3	121	1879 2015
Mean number of days of rain ≥ 10 mm	0.4	0.4	0.4	0.8	1.5	1.9	2.1	1.5	1.0	0.9	0.5	0.4	11.8	121	1879 2015
Mean number of days of rain ≥ 25 mm	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	1.6	121	1879 2015

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years
Other daily elements														
Mean daily wind run (km)														
Maximum wind gust speed (km/h)														
Date														
Mean daily sunshine (hours)														

http://www.bom.gov.au/climate/averages/tables/cw_022807_All.shtml 30/04/2015

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Mean daily solar exposure (MJ/m²)														8	2007 2015
Mean number of clear days	7.7	8.2	5.8	4.8	3.8	3.4	3.9	4.1	4.3	4.6	4.5	6.0	62.1	40	1957 2002
Mean number of cloudy days	9.3	8.7	12.5	12.7	12.8	13.2	13.2	12.9	12.7	12.3	12.2	11.5	144.0	40	1957 2002
Mean daily evaporation (mm)															

Statistics 9 am conditions	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Mean 9am temperature (°C)	19.5	19.4	18.5	16.5	14.4	12.3	11.4	11.9	13.5	15.2	16.7	18.4	15.6	76	1914 2002
Mean 9am wet-bulb temperature (°C)	16.1	16.4	15.7	14.1	12.6	10.8	9.9	10.2	11.4	12.5	13.7	15.1	13.2	70	1914 2002
Mean 9am dew-point temperature (°C)	12.9	13.4	12.8	12.3	10.8	9.6	9.0	7.9	9.4	9.5	10.7	11.9	10.8	13	1957 2002
Mean 9am relative humidity (%)	69	73	74	77	80	83	82	79	78	72	70	69	75	56	1914 2002
Mean 9am cloud cover (oktas)	4.1	4.1	4.3	4.8	4.7	4.8	4.6	4.4	4.5	4.7	4.7	4.5	4.5	84	1914 2002
Mean 9am wind speed (km/h)	16.4	15.3	13.7	12.2	11.6	13.1	13.5	14.3	15.5	17.2	16.8	16.7	14.7	38	1957 2002

Statistics 3 pm conditions	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Mean 3pm temperature (°C)	22.2	22.3	20.8	18.5	16.3	14.3	13.5	13.8	15.2	17.0	19.0	20.8	17.8	77	1914 2002
Mean 3pm wet-bulb temperature (°C)	17.3	17.7	16.8	15.1	13.5	12.0	11.1	11.3	12.3	13.4	14.8	16.3	14.3	70	1914 2002
Mean 3pm dew-point temperature (°C)	10.1	13.6	12.7	11.9	10.5	9.6	8.4	8.0	9.3	9.5	10.8	11.9	10.8	13	1957 2002
Mean 3pm relative humidity (%)	63	65	67	70	73	75	74	72	70	66	63	63	69	56	1914 2002
Mean 3pm cloud cover (oktas)	3.4	3.4	4.1	4.7	4.9	5.1	5.0	4.9	4.7	4.5	4.4	4.0	4.4	71	1927 2002
Mean 3pm wind speed (km/h)	19.0	18.1	16.7	15.4	14.4	15.8	17.4	18.2	19.0	19.4	19.7	19.6	17.7	36	1957 2002

red = highest value blue = lowest value

Product IDCJCM0034 Prepared at Thu 30 Apr 2015 00:08:11 AM EST

Monthly statistics are only included if there are more than 10 years of data. The number of years (provided in the 2nd last column of the table) may differ between elements if the observing program at the site changed. More detailed data for individual sites can be obtained by contacting the Bureau.

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- About climate averages: http://www.bom.gov.au/climate/cdo/about/about-stats.shtml
- Data file (csv): http://www.bom.gov.au/clim_data/cdio/tables/text/IDCJCM0034_022807.csv
- Climate averages home page URL: http://www.bom.gov.au/climate/data/index.shtml
- Bureau of Meteorology website: http://www.bom.gov.au

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http://www.bom.gov.au/climate/averages/tables/cw_022807_All.shtml 30/04/2015

Kingscote Aerodrome Station 022841

Australian Government
Bureau of Meteorology

Climate statistics for Australian locations

Monthly climate statistics

All years of record

Site name: KINGSCOTE AERO **Site number:** 022841 **Commenced:** 1994 Map
Latitude: 35.71° S **Longitude:** 137.52° E **Elevation:** 6 m **Operational status:** Open

View: Main statistics All available Period: 30 year period not available Text size: Normal Large

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Temperature															
Maximum temperature															
Mean maximum temperature (°C)	26.6	26.6	24.5	21.6	18.8	16.1	15.4	16.1	18.0	20.1	23.0	24.8	21.0	21	1994 2015
Highest temperature (°C)	43.8	43.8	39.9	33.9	27.1	22.4	25.0	25.0	27.8	33.8	38.8	43.0	43.8	21	1994 2015
Date	26 Jan 2009	02 Feb 2014	17 Mar 2008	09 Apr 2005	04 May 2000	08 Jun 2005	02 Jul 1997	30 Aug 1995	18 Sep 2004	21 Oct 2014	15 Nov 2000	31 Dec 2007	02 Feb 2014		
Lowest maximum temperature (°C)	17.7	17.9	16.8	14.8	12.9	11.6	10.7	10.8	12.3	12.8	12.3	15.7	10.7	21	1994 2015
Date	24 Jan 2000	01 Feb 2006	31 Mar 1999	26 Apr 1996	24 May 2006	22 Jun 2007	28 Jul 1998	10 Aug 2003	28 Sep 1994	06 Oct 1994	01 Nov 1994	03 Dec 2001	28 Jul 1998		
Decile 1 maximum temperature (°C)	21.4	21.4	20.0	17.7	15.8	14.1	13.5	13.8	14.9	16.1	17.8	19.8		21	1994 2015
Decile 9 maximum temperature(°C)	35.3	34.8	32.0	26.3	21.8	18.1	17.4	18.9	21.5	25.8	30.5	32.0		21	1994 2015
Mean number of days ≥ 30 °C	8.5	8.6	4.3	0.8	0.0	0.0	0.0	0.0	0.0	0.8	3.4	4.3	26.7	21	1994 2015
Mean number of days ≥ 35 °C	3.1	2.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.6	9.2	21	1994 2015
Mean number of days ≥ 40 °C	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.6	21	1994 2015
Minimum temperature															
Mean minimum temperature (°C)	13.2	13.6	11.1	8.7	7.9	6.8	6.0	5.7	6.5	7.1	9.6	10.9	8.9	21	1994 2015
Lowest temperature (°C)	3.1	5.3	-1.0	-0.4	-0.8	-2.4	-2.1	-1.9	-2.0	-2.0	0.4	1.0	-2.4	21	1994 2015
Date	09 Jan 2002	17 Feb 1998	12 Mar 1995	24 Apr 1996	15 May 2010	15 Jun 2008	07 Jul 2012	25 Aug 2002	05 Sep 2007	09 Oct 2007	01 Nov 2010	07 Dec 1996	15 Jun 2008		
Highest minimum temperature (°C)	24.0	26.1	21.1	19.0	18.3	14.6	14.2	14.5	15.9	17.5	23.3	22.5	26.1	21	1994 2015
Date	05 Jan 2007	18 Feb 2007	14 Mar 2008	01 Apr 2005	10 May 2013	09 Jun 1995	31 Jul 2014	03 Aug 2005	22 Sep 1994	08 Oct 1999	26 Nov 1997	02 Dec 1999	18 Feb 2007		
Decile 1 minimum temperature (°C)	8.6	8.9	6.1	4.1	2.7	2.3	1.6	1.7	1.6	2.4	4.7	5.9		21	1994 2015
Decile 9 minimum temperature (°C)	17.1	17.9	15.7	13.8	12.7	11.3	10.8	10.3	11.3	12.4	14.3	15.4		21	1994 2015
Mean number of days ≤ 2 °C	0.0	0.0	0.0	0.5	1.5	2.4	4.0	4.0	3.8	2.5	0.4	0.0	18.1	21	1994 2015
Mean number of days ≤ 0 °C	0.0	0.0	0.0	0.1	0.1	0.6	0.8	1.1	0.9	0.3	0.0	0.0	3.9	21	1994 2015
Ground surface temperature															
Mean daily ground minimum temperature (°C)															
Lowest ground temperature (°C)															
Date															
Mean number of days ground min temp. ≤ -1 °C															

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Rainfall															
Mean rainfall (mm)	14.4	16.2	25.8	27.1	46.9	67.2	68.0	56.3	45.0	30.8	22.0	19.3	436.4	22	1993 2015
Highest rainfall (mm)	48.2	80.0	101.2	80.4	92.4	128.6	137.4	104.4	113.0	82.0	62.0	51.6	705.6	22	1993 2015
Date	1995	2011	2011	2005	2003	2003	2003	2000	1997	2000	2001	2011	2000		
Lowest rainfall (mm)	0.8	0.0	0.6	1.2	7.0	8.0	16.8	11.8	6.8	0.2	1.8	1.8	290.2	22	1993 2015
Date	2012	2009	2002	1998	2005	1994	1994	2008	1994	2006	1996	1998	2008		
Decile 1 rainfall (mm)	2.0	0.5	2.6	10.6	21.2	33.4	32.2	24.3	26.5	3.8	3.8	3.8	361.6	22	1993 2015
Decile 5 (median) rainfall (mm)	9.7	10.3	15.4	23.0	45.2	60.0	58.8	59.5	38.9	26.6	20.2	18.6	426.8	22	1993 2015
Decile 9 rainfall (mm)	27.5	28.8	53.9	52.0	80.4	119.8	118.9	82.8	83.2	68.0	41.2	30.2	586.7	22	1993 2015
Highest daily rainfall (mm)	41.0	75.0	110.2	29.8	31.8	39.0	39.0	31.6	37.8	44.0	40.0	26.0	110.2	20	1993 2015
Date	14 Jan 1995	18 Feb 2011	21 Mar 2011	28 Apr 2007	03 May 1997	12 Jun 2013	25 Jul 2003	15 Aug 1993	04 Sep 2010	18 Oct 2000	26 Nov 2003	03 Dec 1999	21 Mar 2011		
Mean number of days of rain	4.1	3.7	6.4	8.9	15.0	18.2	19.4	19.0	15.5	10.1	7.9	7.2	135.4	22	1993 2015
Mean number of days of rain ≥ 1 mm	2.0	2.2	3.2	5.0	7.7	10.6	11.7	11.1	8.1	5.4	3.7	3.3	74.0	20	1993 2015
Mean number of days of rain ≥ 10 mm	0.4	0.4	0.7	0.8	1.3	2.3	2.0	1.3	1.3	0.8	0.5	0.6	12.3	20	1993 2015
Mean number of days of rain ≥ 25 mm	0.1	0.1	0.1	0.2	0.2	0.3	0.1	0.1	0.2	0.1	0.2	0.0	1.7	20	1993 2015

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Other daily elements															
Mean daily wind run (km)	396	340	319	251	230	201	273	284	292	299	345	350	308	11	2003 2015
Maximum wind gust speed (km/h)	81	76	80	83	80	87	85	94	98	80	83	85	98	11	2003 2015
Date	20 Jan 2007	05 Feb 2012	31 Mar 2013	02 Apr 2008	08 May 2008	22 Jun 2014	28 Jul 2014	30 Aug 2005	04 Sep 2012	02 Oct 2013	07 Nov 2008	19 Dec 2010	04 Sep 2012		
Mean daily sunshine (hours)															

http://www.bom.gov.au/climate/averages/tables/cw_022841_All.shtml 30/04/2015

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Mean daily solar exposure (MJ/m²)	26.3	22.9	17.5	12.7	8.8	7.3	8.3	11.3	15.3	19.4	23.5	25.4	16.8	25	1990 2015
Mean number of clear days														4	2006 2010
Mean number of cloudy days														4	2006 2010
Mean daily evaporation (mm)															

Statistics 9 am conditions	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Mean 9am temperature (°C)	19.6	19.2	18.8	16.0	13.3	11.1	10.3	11.4	13.8	15.5	17.1	18.6	15.2	16	1994 2010
Mean 9am wet-bulb temperature (°C)	15.4	15.5	14.2	13.5	11.7	10.1	9.3	9.8	11.3	12.0	13.5	14.3	12.5	14	1994 2010
Mean 9am dew-point temperature (°C)	11.9	12.6	11.9	11.2	10.4	8.7	7.9	8.2	8.7	8.5	10.0	10.5	10.0	15	1994 2010
Mean 9am relative humidity (%)	63	68	74	74	83	87	86	81	72	65	64	61	73	15	1994 2010
Mean 9am cloud cover (oktas)														4	2006 2010
Mean 9am wind speed (km/h)	19.6	17.8	13.2	12.9	11.3	11.8	11.9	13.2	17.4	19.1	18.9	19.4	15.5	16	1994 2010

Statistics 3 pm conditions	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Mean 3pm temperature (°C)	24.8	24.9	22.9	19.8	17.1	14.7	13.9	14.5	16.1	18.1	21.1	22.8	19.2	16	1994 2010
Mean 3pm wet-bulb temperature (°C)	16.7	17.2	16.1	14.3	13.2	11.9	11.0	11.2	12.0	12.9	14.7	15.5	13.9	14	1994 2010
Mean 3pm dew-point temperature (°C)	10.8	11.0	10.2	9.3	9.8	8.7	8.1	7.7	8.2	8.1	8.9	9.2	9.1	15	1994 2010
Mean 3pm relative humidity (%)	44	45	47	53	63	69	69	64	61	55	48	45	55	15	1994 2010
Mean 3pm cloud cover (oktas)														4	2006 2010
Mean 3pm wind speed (km/h)	25.4	24.9	22.8	20.9	19.0	19.9	20.2	21.2	23.0	22.9	24.0	24.2	22.3	16	1994 2010

red = highest value blue = lowest value

Product IDCJCM0034 Prepared at Thu 30 Apr 2015 00:08:16 AM EST

Monthly statistics are only included if there are more than 10 years of data. The number of years (provided in the 2nd last column of the table) may differ between elements if the observing program at the site changed. More detailed data for individual sites can be obtained by contacting the Bureau.

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APPENDIX D

Fleurieu Regional Waste Authority Record Sheets.

	Fleurieu Regional Waste Authority (FRWA) **DAILY WASTE RECORD** **KIRRC**	Form No:	FRM-Pol_0035
		Version No:	2
		Issued:	April 2014

DATE:_____

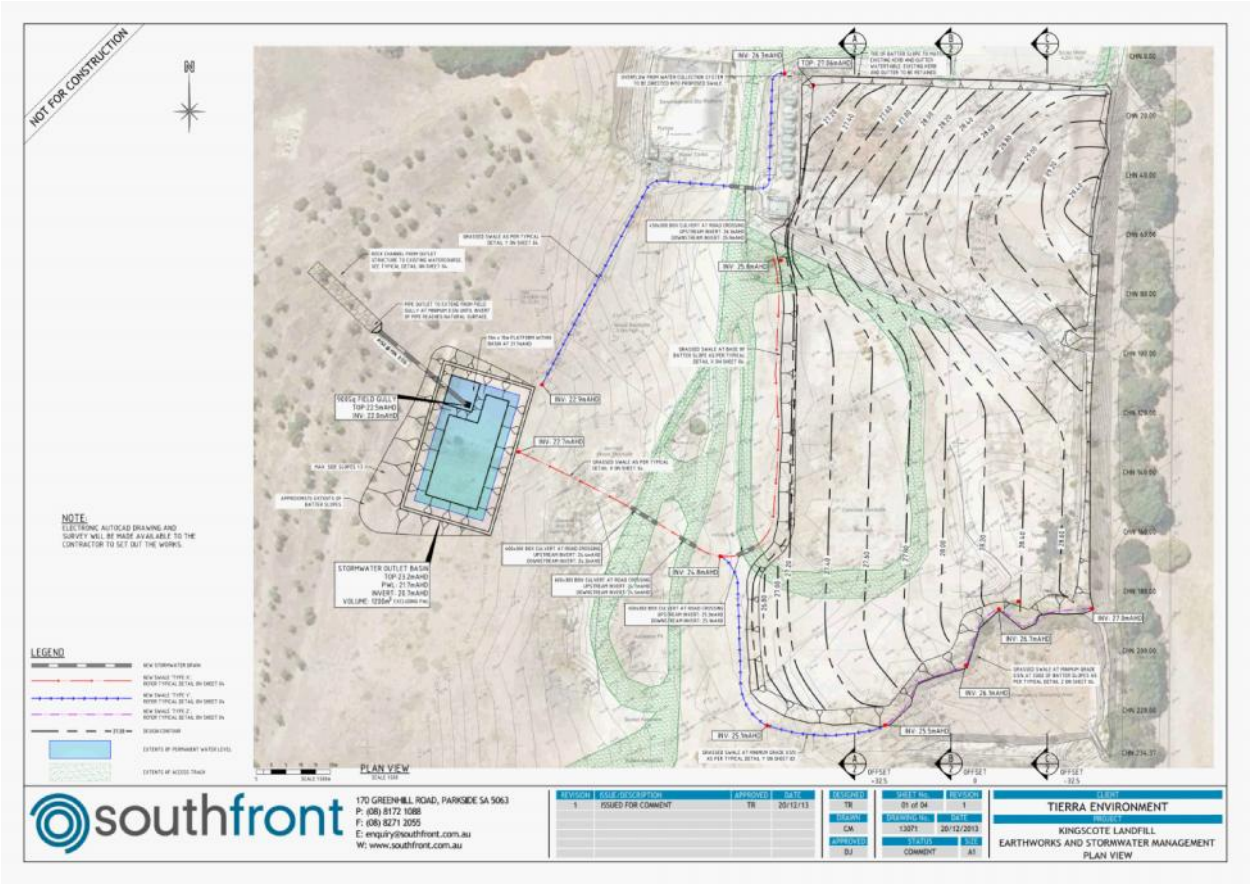
	COMMERCIAL							
	Class 1 Car and Station Wagon		**Class 2** Ute Single Axle Trailer		**Class 3** Multi Axle Trailer		**Class 4,5, and 6** Truck (T)	
Landfill Waste								
Comingled Recyclables								
Paper/Cardboard								
Baled/ Paper Cardboard								
Plastic								
Baled Plastic								
Metal								
Timber								
<150mm Green Waste								
>150mm Green Waste								
<100mm Demolition								
>100mm Demolition								
E Waste								
Mortalities								
Asbestos								
Prohibited Substance (Police Only)								
Mixed (i.e. sorted on site)								
Unsorted								
Batteries								
Oil Filter								
Oil Filter Drum								
Large Tyre								
Heavy Truck Tyre								
Tyre								
Engine Oil								
Cooking Oil								
Lubricant								
Mixed Oil Lubricant								

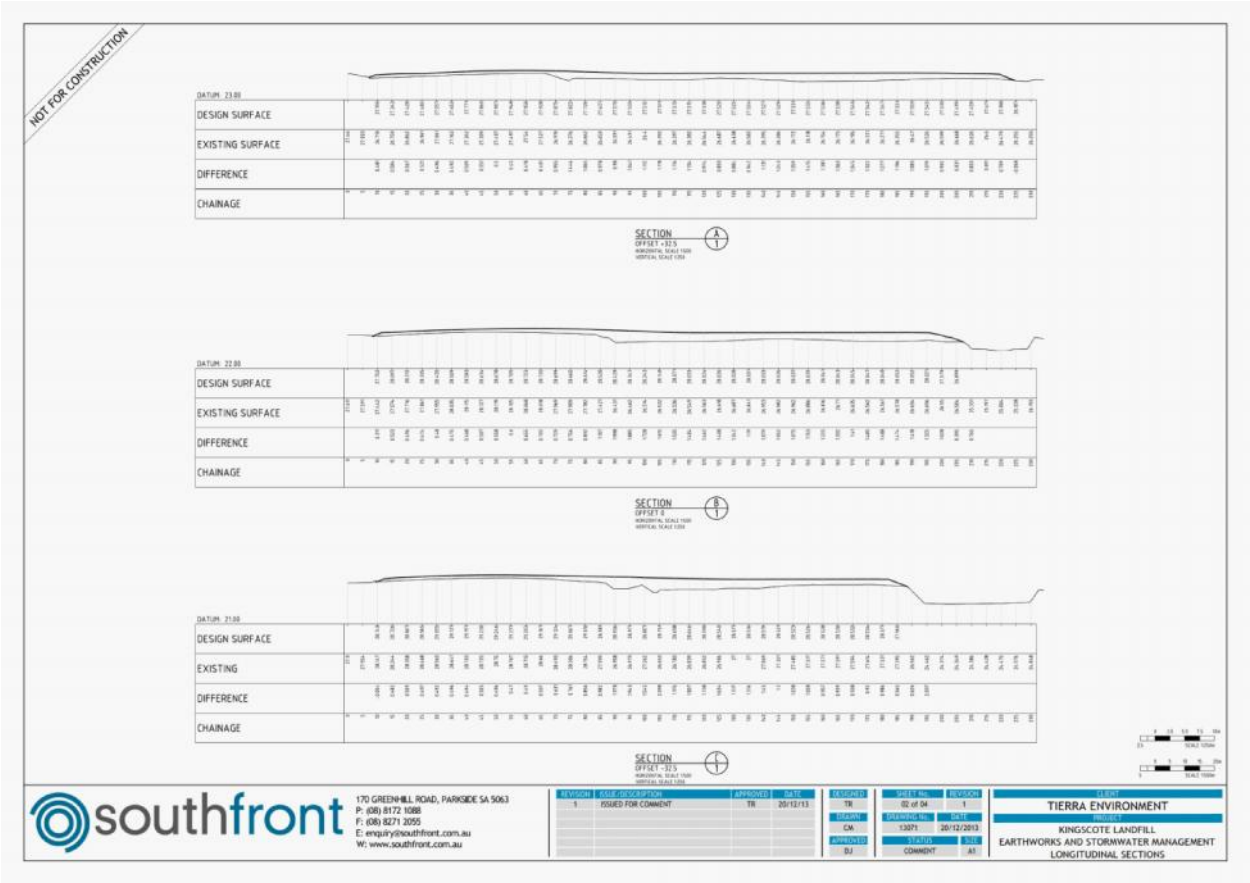
TRUCK WEIGHTS					
Owner	Rego	Gross	Tare	Net	Material

G:\New FRWA Filing System\Templates and Forms\Waste Depot Forms\Kangaroo Island\KI Daily Waste Record FRM-Pol_0035.docx

APPENDIX E

Final Contours of Capping, Stormwater Controls & Stormwater Detention Dam & Discharge.


NOT FOR CONSTRUCTION
PLAN VIEW
NOTE:
ELECTRONIC AUTOCAD DRAWING AND SURVEY WILL BE MADE AVAILABLE TO THE CONTRACTOR TO SET OUT THE WORKS.
LEGEND
STORMWATER OUTLET BASIN
southfront
170 GREENHILL ROAD, PARKSIDE SA 5063
P: (08) 8172 1088
F: (08) 8271 2055
E: enquiry@southfront.com.au
W: www.southfront.com.au
ISSUED FOR COMMENT
TIERRA ENVIRONMENT
KINGSCOTE LANDFILL
EARTHWORKS AND STORMWATER MANAGEMENT
PLAN VIEW


NOT FOR CONSTRUCTION
DESIGN SURFACE
EXISTING SURFACE
DIFFERENCE
CHAINAGE
SECTION
southfront
170 GREENHILL ROAD, PARKSIDE SA 5063
P: (08) 8172 1088
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E: enquiry@southfront.com.au
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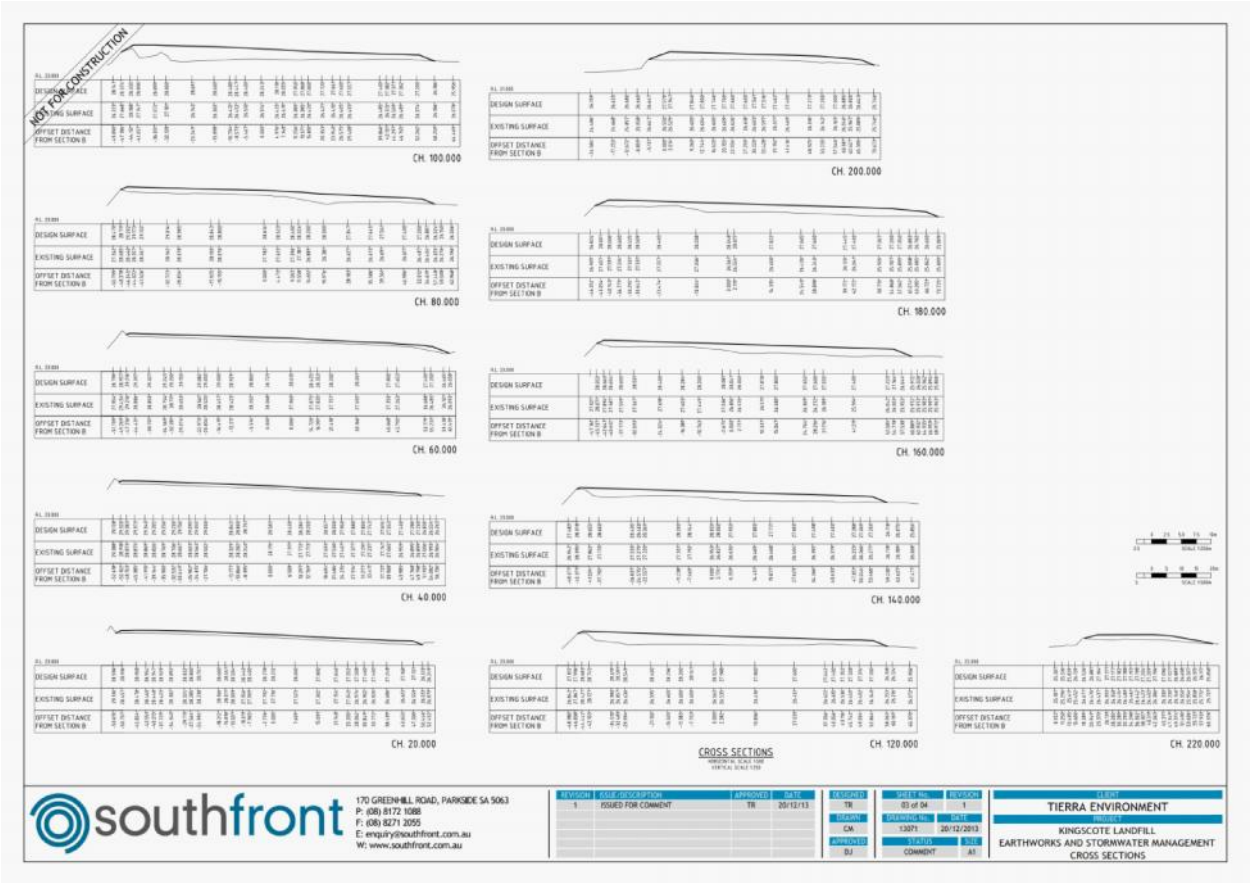
TIERRA ENVIRONMENT
KINGSCOTE LANDFILL
EARTHWORKS AND STORMWATER MANAGEMENT
LONGITUDINAL SECTIONS


NOT FOR CONSTRUCTION
CH. 100.000
CH. 200.000
CH. 80.000
CH. 180.000
CH. 60.000
CH. 160.000
CH. 40.000
CH. 140.000
CH. 20.000
CH. 120.000
CH. 220.000
CROSS SECTIONS
southfront
170 GREENHILL ROAD, PARKSIDE SA 5063
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F: (08) 8271 2055
E: enquiry@southfront.com.au
W: www.southfront.com.au
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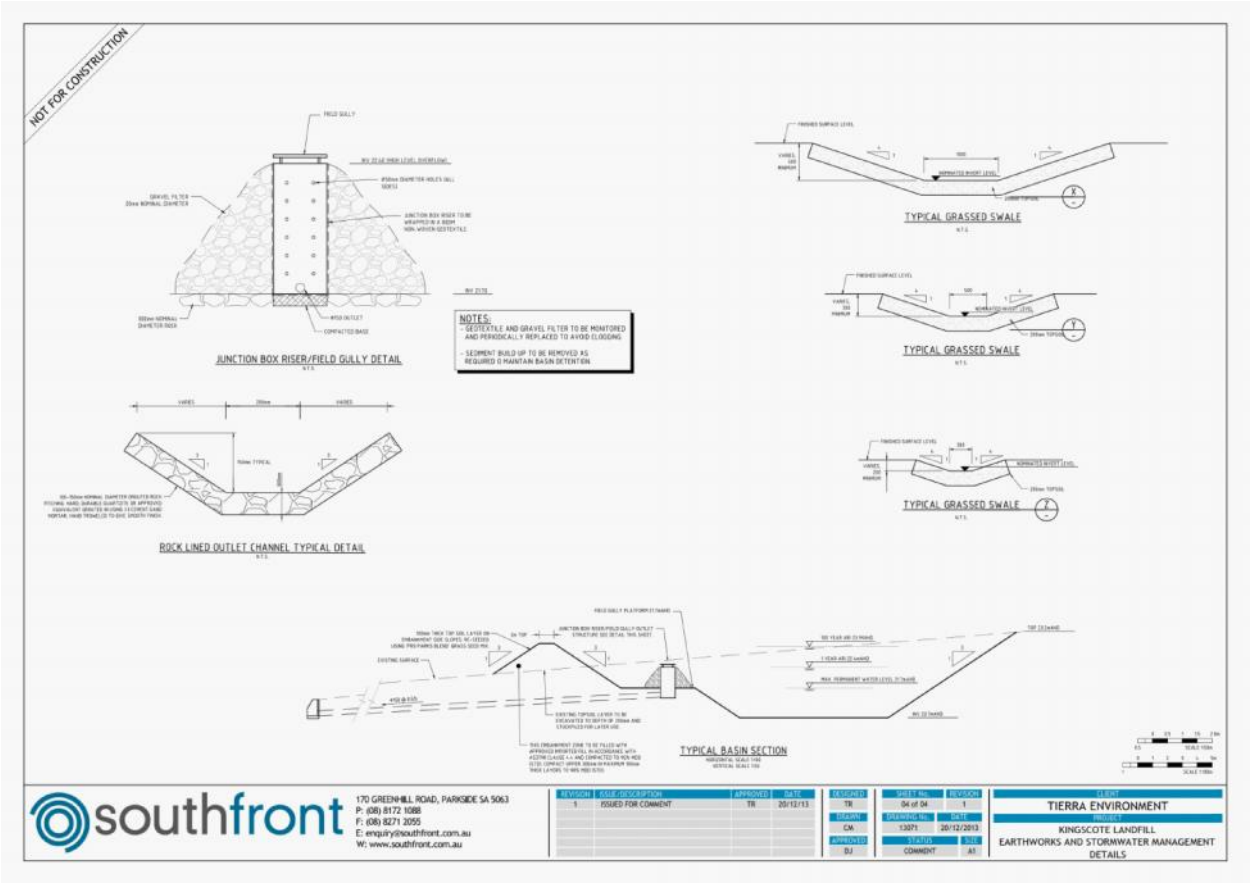
EARTHWORKS AND STORMWATER MANAGEMENT
CROSS SECTIONS


NOT FOR CONSTRUCTION
JUNCTION BOX RISER/FIELD GULLY DETAIL
NOTES:
- GEOTEXTILE AND GRAVEL FILTER TO BE MONITORED AND PERIODICALLY REPLACED TO AVOID CLOGGING
- SEDIMENT BUILD UP TO BE REMOVED AS REQUIRED O MAINTAIN BASIN DETENTION
TYPICAL GRASSED SWALE
TYPICAL GRASSED SWALE
TYPICAL GRASSED SWALE
ROCK LINED OUTLET CHANNEL TYPICAL DETAIL
TYPICAL BASIN SECTION
southfront
170 GREENHILL ROAD, PARKSIDE SA 5063
P: (08) 8172 1088
F: (08) 8271 2055
E: enquiry@southfront.com.au
W: www.southfront.com.au
ISSUED FOR COMMENT
TIERRA ENVIRONMENT
KINGSCOTE LANDFILL
EARTHWORKS AND STORMWATER MANAGEMENT
DETAILS

APPENDIX F

Location of Gas and Groundwater Monitoring Wells.

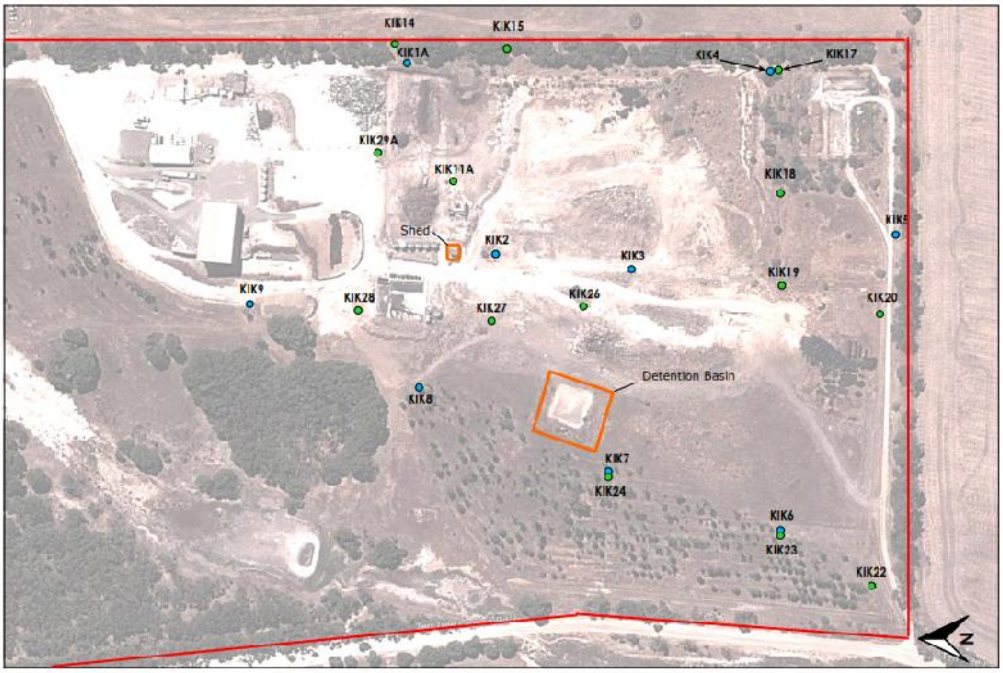


Image source: Google Maps

FIGURE 2

Site Plan and Bore Locations

Kingscote Landfill, Kangaroo Island SA

Environmental Performance Monitoring

For

Kangaroo Island Council

LEGEND

- Groundwater Monitoring Well Location
- Gas Monitoring Well Location
- Site Boundary

SCALE

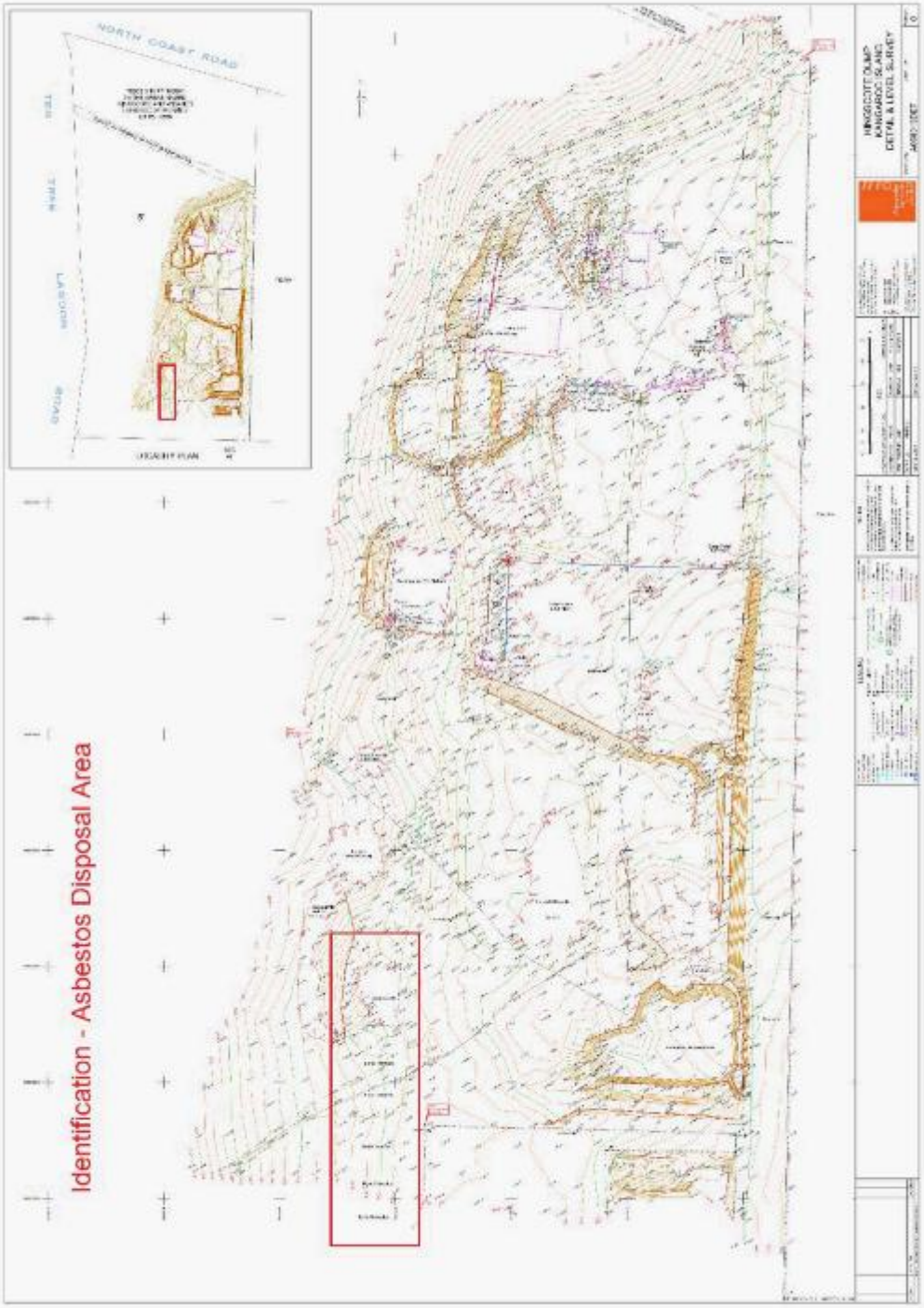
0m 50m 100m

Job No: 140366
Drawn: S Boorman
Checked: N Brewer

LBW environmental projects

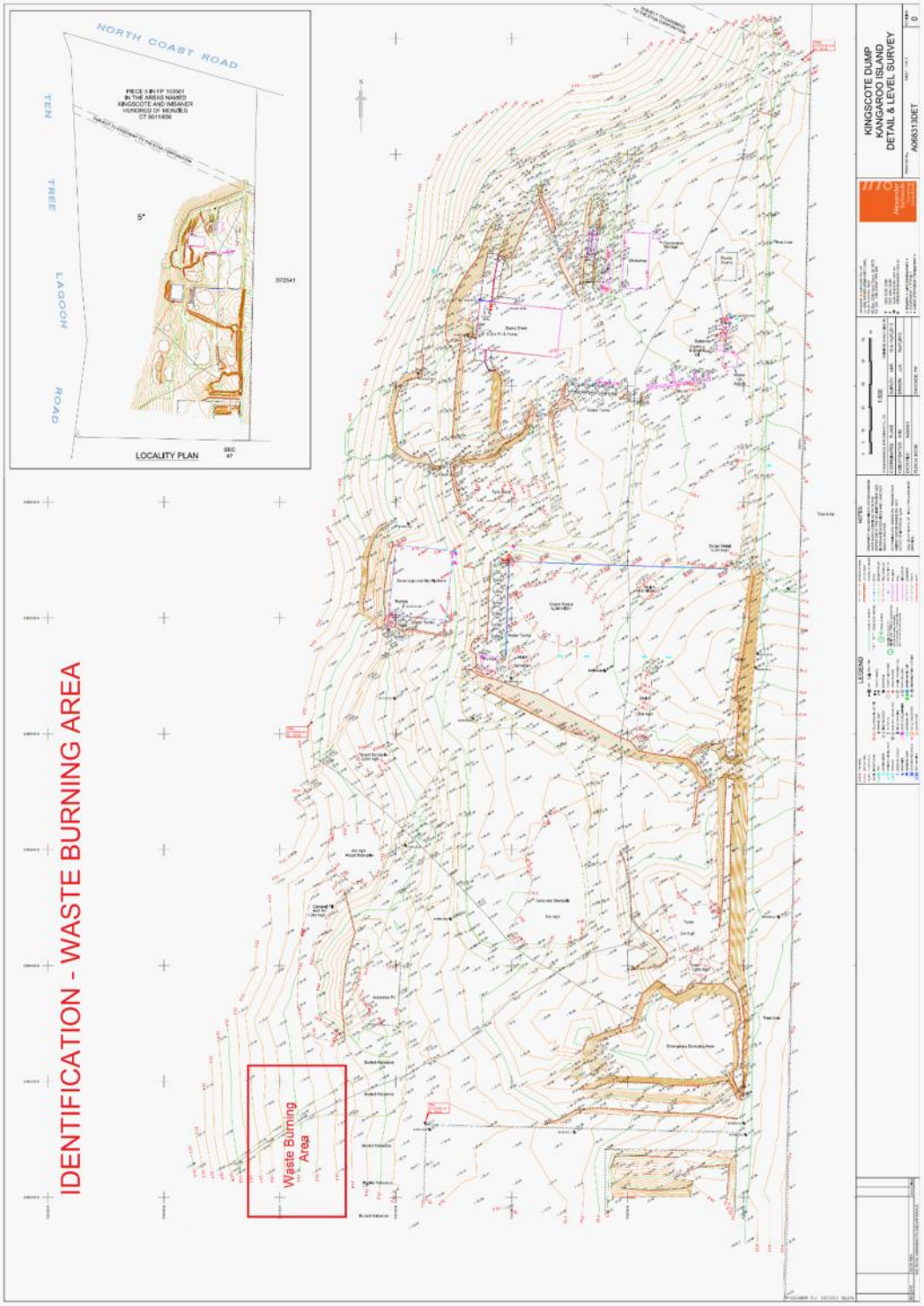
APPENDIX G

Asbestos Disposal Area.


Identification - Asbestos Disposal Area
NORTH COAST ROAD

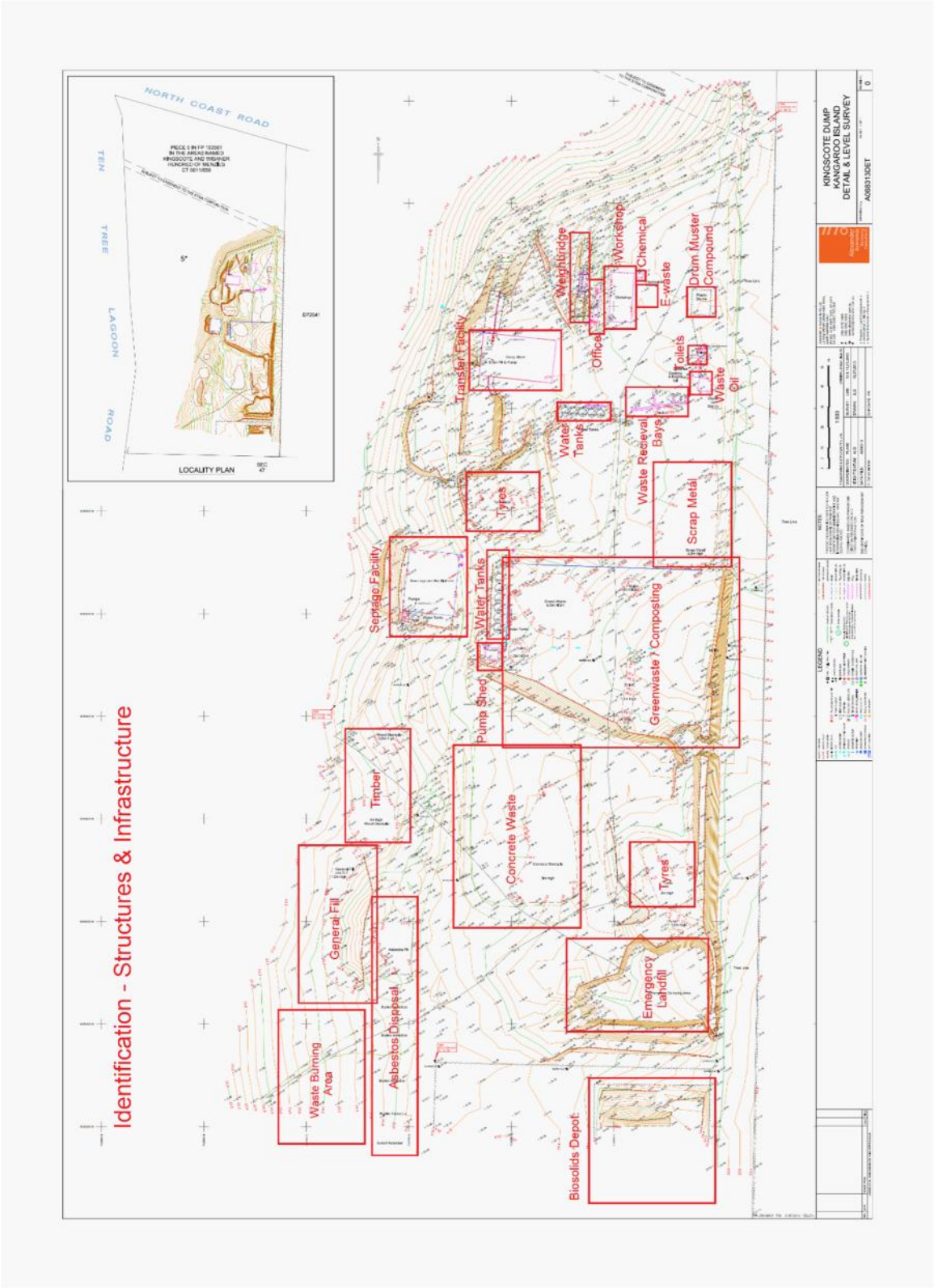
APPENDIX H

Waste Burning Area.



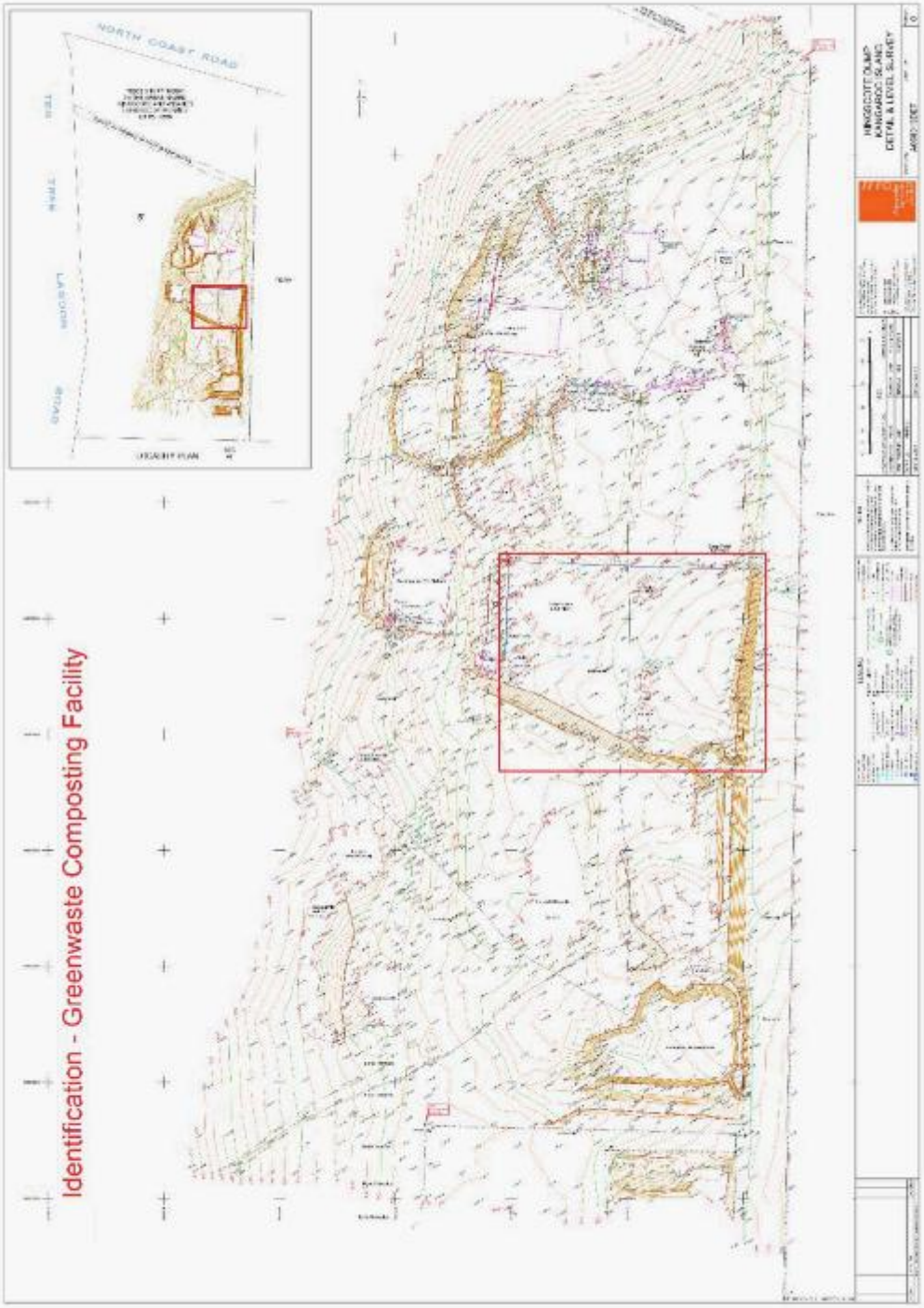
APPENDIX I

Structures and Infrastructure.



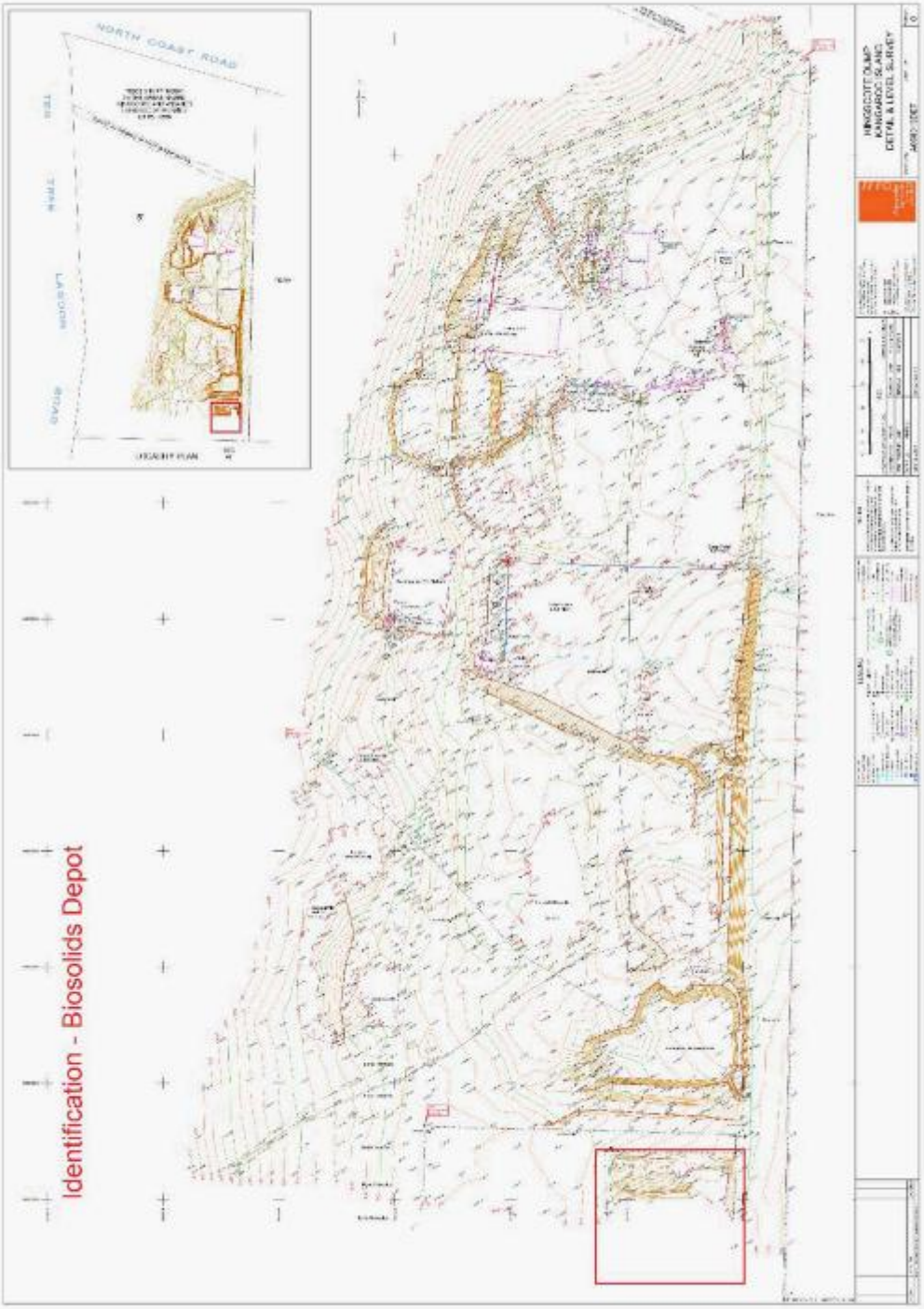
APPENDIX J

Greenwaste / Composting Facility.


Identification - Greenwaste Composting Facility
NORTH COAST ROAD

APPENDIX K

Biosolids Depot.


Identification - Biosolids Depot
NORTH COAST ROAD

APPENDIX L

Biosolids Analysis Sheets for Producers.

address 43 Dauncey Street, Kingscote
postal PO Box 121, Kingscote SA 5223
phone 08 8553 4500 | fax 08 8553 2885
email kicouncil@kicouncil.sa.gov.au
web kangarooisland.sa.gov.au
abn 93 741 277 391

Ref. No:
Cross Ref. No:
File No: 5.3.4

BIOSOLIDS ANALYSIS SHEET FOR PRODUCERS

This sheet is to be completed for all batches of biosolids before the biosolids can be re-processed or used in accordance with the *Biosolids Guidelines*. A copy must be retained by the producer and be available for random inspection by officers of the EPA or its agents. A copy should also be provided to persons receiving biosolids from that batch.

WASTEWATER TREATMENT PLAN THAT PRODUCED THE BIOSOLIDS:
Kingscote Septage Facility – Kangaroo Island Waste Resource Recovery Centre

.....

BATCH IDENTIFIER
(Unique code for each batch)

.....

BATCH SIZE

.....

DATE DEPOSITED FOR DRYING
(Latest date)

.....

DATE REMOVAL FROM DRYING BED
(Latest Date)

.....

STABILISATION GRADE (At date of completion of this form).....

RESULTS OF CONTAMINANT GRADE (mg/kg)

Contaminant	No. Samples	Mean (m)	Standard Deviation (s)	(m)+(s)
ARSENIC				
CADMIUM				
COPPER				
LEAD				
MERCURY				
NICKEL				
ZINC				

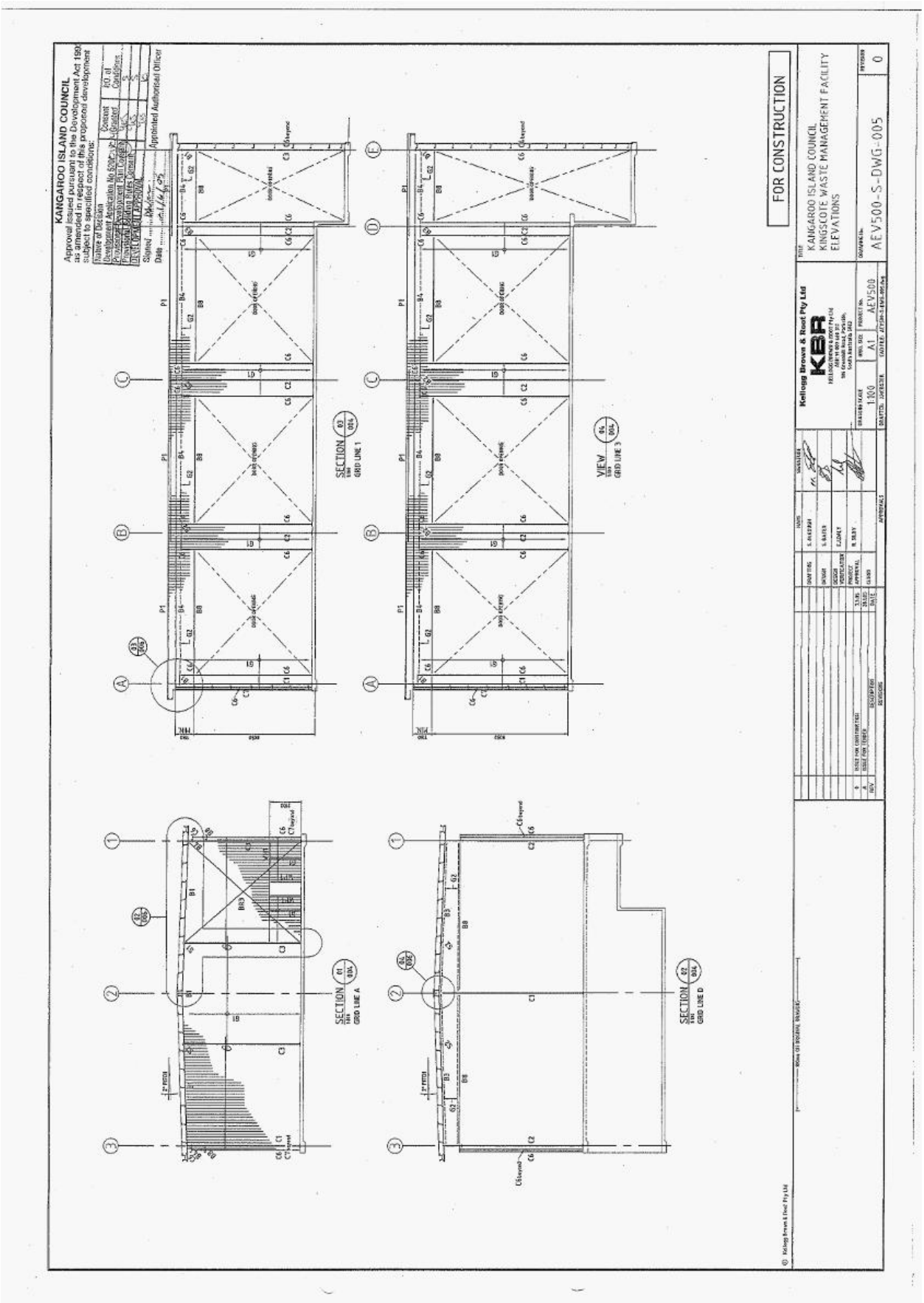
Person Supplying Information: .....

Position: ..... Date: .....

Signature: .....

APPENDIX M

Waste Transfer Facility **– Maunsell Plans.**


KANGAROO ISLAND COUNCIL
Approval issued pursuant to the Development Act 1993 as amended and in respect of this proposed development subject to specified conditions:
Nature of Decision
Development Application No 500/
Provisional Development Plan Consent
Provisional Building Rules Consent
DEVELOPMENT APPROVAL
Consent Granted
NO of Conditions
Signed
Date
Appointed Authority/ Officer
FOR CONSTRUCTION
SECTION 03 GRID LINE 1
VIEW 04 GRID LINE 3
SECTION 01 GRID LINE A
SECTION 02 GRID LINE D
Kellogg Brown & Root Pty Ltd
KBR
KANGAROO ISLAND COUNCIL
KINGSCOTE WASTE MANAGEMENT FACILITY
ELEVATIONS
1:100
A1
AEV500
AEV500-S-DWG-005
0

For further advice on any information contained within his report, please contact the following:

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Fleurieu Regional Waste Authority Office
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