2019

King Island Waste Management Strategy 2019–2029

Rethinking Waste and Resource Recovery

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Acknowledgements
A.Prince Consulting would like to thank the staff and management of the King Island Council and the many community members who assisted us with research for this project.

Document Status

Rev. no.	Author	Editor	Date
Draft 1	Anne Prince	H Cooney	August 2019
Final	Anne Prince	-	August 2019

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List of acronyms used

APC	A.Prince Consulting
CCWMG	Cradle Coast Waste Management Group
CRS	Container Refund Scheme
EPA	Environment Protection Authority
EPR	Extended Producer Responsibility
ESD	Ecological Sustainable Development
IBC	Intermediate bulk container
KI	King Island
KIC	King Island Council
MRF	Material Recovery Facility
PSA	Product Stewardship Australia
STP	Sewerage Treatment Plant
TV	Television
WAC	Waste Advisory committee
WHS	Worker Health and Safety
WMC	Waste Management Centre
WMP	Waste Management Plan

EXECUTIVE SUMMARY

King Island Council currently manages three waste facilities: two active landfills – the Charles St Depot, with an inert landfill where residents can self-haul non-putrescible waste for disposal, and Parenna landfill, which receives an estimated 750 tonnes of waste collected from both residential and commercial premises by Council. A third landfill site, adjacent to the Charles St Depot, has been closed for some years but has not yet been formally capped and rehabilitated.

Bringing operations into compliance with EPA requirements is an essential first step for Council and must be given first priority.

Beyond simple compliance, the waste hierarchy mantra of reduce, reuse and recycle is equally or more valid in remote locations given the low rate base for income generation, diverse waste streams, poor economies of scale and high freight costs to export materials offshore. Other remote islands have proved that, despite these additional challenges, it is possible to transition to more sustainable practices. For example, Lord Howe Island currently diverts more than 80% of all waste from its landfill, and Kangaroo Island diverts around 75%.

On King Island, recycling is currently very limited. The local Lions Club segregate and export used lead-acid batteries, aluminium cans and scrap metals (aluminium, stainless steel, brass and copper), with the proceeds from these benefitting the community. The Swimming Association of King Island take waste oil collected at the Charles St Depot and use it to heat the pool at Grassy. And, Council coordinates the recycling of used chemical containers off-Island through the DrumMuster program.

Some materials, including garden waste, treated and un-treated timber, and tyres, are stockpiled at Charles St Depot for later burial in the inert landfill. Bulk bins were provided for residents to deposit cardboard, plastic packaging and glass, but were removed in 2018 as these materials are not currently recovered or reprocessed. Community consultation conducted in the development of this Strategy revealed a strong desire and willingness to do more to achieve greater source separation to facilitate resource recovery. Over 70% of the community were also willing to pay for improved waste-management outcomes. A significant portion of the community – 93% expressed support for the establishment of a tip shop to promote and facilitate reuse by both donation and purchase.

There are a number of actions Council can take to satisfy the community's desire for improved waste-management outcomes. In its Draft Waste Action Plan the Tasmanian government has proposed the introduction of a Container Refund Scheme (CRS) by 2021. Under this scheme, a refund would be paid to individuals on eligible beverage containers, redeemed at up to 60 collection depots around the state. It is imperative that Council lobby to ensure such a collection point is provided on King Island for the community to use.

Transitioning the Charles St Depot to a dedicated waste transfer station will reduce the volumes of waste sent to landfill and consolidate all such waste at the Parenna landfill site. To enable staff to deal efficiently with the range of used packaging materials, the installation of a mini materials recovery facility (MRF) and multi-purpose baler to aggregate recyclables for storage prior to export is highly desirable, and could be accommodated in the existing structure at Charles St Depot. A simple sorting

line installed as part of the MRF will greatly expediate sorting and processing, allowing for recyclables to be either separated at source by residents or comingled, with all recyclables delivered together and separated by staff working in the MRF.

Kerbside collection of general domestic waste is currently conducted weekly, and general commercial waste is collected by arrangement three days per week. Council should consider the introduction of variable bin sizes for domestic users with collections priced accordingly. Reducing general waste collection to a fortnightly service would enable the kerbside collection of comingled recyclables on the alternate weeks, should Council decide to process comingled recyclables rather than source separated. Ideally, Council would coincide the expansion of recycling opportunities with the introduction of the CRS. Co-locating the CRS collection depot and the MRF aligns both of these activities, as materials redeemed under the CRS will need to be consolidated for export or processed locally for reuse – all redeemed containers must be diverted away from landfill. Productivity at Charles St Depot would be greatly improved with the integration of the existing glass pulverizer into the MRF, relocating this machine outside the shed, fed by a small conveyor and loaded by a bin lifter.

A key barrier in the development of this Strategy is the lack of reliable data on both waste generation and composition. A waste audit will inform a detailed plan for what can be achieved. For example, there are opportunities to work with the Island's abattoirs in the development of a composting facility, enabling commercial food waste and community garden and cardboard waste to be diverted from landfill creating an end product for reuse by the community. Council should conduct a feasibility study into the establishment of such a facility. If it is decided that such a facility will go ahead, the currently unused tyre / cardboard shredder can be incorporated into the MRF for the processing of cardboard and paper waste as an important ingredient in any compost mix.

The end-of-life management of other materials can be addressed with new policy approaches. Inviting the community to identify quantities of cars, trucks, whitegoods and other scrap metals could inform a whole-of-Island tender for the removal of this waste by a third party using a baler and/or car crusher, subject to the amount and nature of the materials identified and the ability to use the Tasmanian Freight Equalisation Subsidy.

Other remote islands, particularly those with strong tourism markets, have shared the financial burden of waste management on their communities with visitors and tourists through the introduction of an environmental levy, a bed tax, or a departure tax. Support for this approach was demonstrated in the household survey issued as part of the community consultation, although not as strongly supported by businesses operating in the tourism sector. Whether or not to introduce such levies, and at what level, should be considered by Council as a priority.

Community engagement and support will underpin Council's ability to achieve any improvement in its waste management. It is therefore recommended that a Waste Advisory Committee be established with broad community representation to help share the load and facilitate community outreach. This group would benefit from the support of resources available through membership of the Cradle Coast Waste Management Group (CCWMG) and third-party technical assistance in guiding the implementation of this Strategy. A review of this Strategy mid-way through its life will allow for a stocktake of progress and to reprioritise the next wave of improvements.

It is recommended that King Island Council adopt the following vision for waste management:

Vision: ***'Improve waste management practices to enable greater resource recovery and circular-economy outcomes for a sustainable future.'***

Mission: To maximise resource recovery and minimise waste generation in accordance with the principles of the waste management hierarchy, the need for continuous improvement and social equity.

Key performance indicators: These reflect and complement both the State Waste Action Plan and National Waste Policy, seeking to both reduce waste generation and increase diversion from landfill:

- Increase recovery of glass, cans, plastics by 50% by 2023;
- Reduce organics waste (food/cardboard/garden/timber) to landfill by 50% by 2024;
- Increase average recovery rate from all waste streams by 50% by 2025 and 80% by 2030;
- Reduce overall waste generation by 10% by 2029.

In order to achieve these KPIs, 62 recommendations have been identified based on desktop research, scoping visits, stakeholder engagement and community consultation coupled with industry knowledge. These recommendations have been divided into five timeframes to provide a forward works program for management and staff having due respect for councils limited finances and resources.
The key actions have been grouped into five key themes:

1. **Compliance**
   - Cap and close old Charles Street Landfill
   - Convert the current Charles Street landfill to a transfer station
   - Adhere to the Environmental Management Plan and Operation Manuals for all waste sites
   - KIC seek to increase the license threshold from the EPA at Parenna landfill

2. **Charles St Resource Recovery Centre**
   - The current Charles Street Depot should be renamed the Resource Recovery Centre, with improved site layout and signage
   - Consider modifying the operating hours to meet needs of businesses and tradies
   - Establish a reuse shed or tip ship to encourage and support reuse
   - Provide new infrastructure and signage to separate, store and manage problem and household hazardous wastes including: used chemicals, paints, fluorescent bulbs, smoke detectors and e-waste (TVs, computers, printers and peripherals)
   - Provide a dedicated area for the separation and storage of scrap metal
   - Establish a program to collect and recycle plastic film, silage wrap and some hard plastics with Envorinex in Tasmania
   - Consider providing 24 hr drop facility on a trial basis when recycling options are available
   - Undertake a budget review to determine if current fees and charges are adequate to meet operating costs associated with all waste management activities and specific materials
   - Introduce differential fees to encourage source separation of waste streams at the facility
   - Ensure regular chipping of timber and garden waste is undertaken by Councils own plant or hired plant to reduce the risk of fire in the stockpile and provide a saleable commodity to the public

- The glass pulveriser should be relocated outside the building to reduce dust and noise and feed by a conveyor belt and bin lifter contingent on KIC making a commitment to use crushed glass-sand and/or to sell it to the public to use as an aggregate replacement in various applications

3. Waste collection

- Support the proposed state-based container refund scheme and increase recovery of used packaging and ensure KIC are included as a collection point with the beverage industry responsible for export of collected containers off the island
- Introduce differential service options by bin size for both commercial and residential customers, with options of 140 litres, 240 litres or 360 litres bin sizes
- Lease new collection vehicle to service multiple bin sizes ranging from 140 – 360 litres

4. Recycling and processing options and opportunities

- Conduct a waste audit to develop baseline data and to inform strategy implementation and targets setting
- Conduct a feasibility study to determine feedstock, siting, operation and technology-option assessment to determine the viability of a centralised composting plant to service the entire island in collaboration with the existing multi-species abattoir and the proposed new abattoir. Such study should include a market outputs study based on producing Australian Standard quality products. Council has access to garden waste, timber and cardboard – and almost half of the business community indicated a preparedness to separate food waste for processing. These are all vital ingredients for any compost operation to provide a carbon–nitrogen ratio
- If the above is unviable or developments do not proceed in a timely manner consider supplementing the Kelp Factory furnace with an alternative fuel which will also require further study
- Utilise the Freight Equalisation Program for shipments of specific materials to reduce costs

5. Communication, engagement and capacity building

- Any program requiring behavioural change requires extensive community engagement
- An education and outreach program should be designed, funded and delivered to bring the community on the journey to greater resource recovery
- Establish a Waste Advisory Committee (WAC) with broad community representation to help share the load and enable community outreach to guide the implementation of this strategy
- KIC should consider re-joining Cradle Coast Waste Management Group (CCWMG) to keep abreast of developments and to network with peers and colleagues facing similar challenges
- CCWMG has an extensive library of resources that KIC could assess
- KIC should seek external support for technical assistance to help guide the implementation. if and as needed

This report provides a framework for improved waste management and the extent of the implementation and the timing will depend upon the availability of capital and recurrent funding. We have prepared what we consider to be the most politically acceptable, socially responsible, economically viable and environmentally sustainable outcome for the current and future generations of residents and visitors to the Island.

1. BACKGROUND

Waste is produced by every person, every day. As a society we need to consider what we buy, how we use it and when and what we do when we discard items we no longer want or need. Councils can influence the decisions communities make about waste by providing services which are convenient, easy to use and well understood by the community. The success of any waste program requires the community to be engaged and educated, and this can be achieved through comprehensive and consistent messaging.

By reducing, reusing, recycling and re-manufacturing items, societies save raw materials, energy, water and greenhouse gas that is used to manufacture items we use on a daily basis. By composting garden and food waste we return nutrients to the soil that have been extracted in the growing of crops, pasture, food and plants. Organic materials including paper, cardboard, garden waste, food and timber break down in landfill to create methane, which is 23-times more potent a greenhouse gas than carbon dioxide. These gases are contributors to greenhouse gas associated with climate change.

King Island is located in the Bass Strait, midway between Victoria and Tasmania. The island covers more than 1,098 square kilometres, with a permanent population of approximately 1,600 residents. The island boasts an exceptionally clean and green image, primarily based around agriculture, including fish, meat and a dairy brand that is the envy of many. The island has invested in clean renewable power with both wind and solar.

King Island Council (KIC) is responsible for waste management on the island and undertook a Waste Management Review in 2014 and 2016. KIC is aware that many of the current practices on the island are not in line with best practice, and in some instances, not fully compliant with current legislation.

In 2017, Council decided to develop a Waste Management Strategy to guide the development of the island's waste management programs for the next decade (2019–2029). Council expressly requested 'on island' solutions to be explored as much as possible, given the high freight costs to the mainland and limited rate base on which to recover costs. Council is seeking a clear set of actions with priorities to move the council, and the community it serves, to improved waste management outcomes that are politically acceptable, socially responsible, economically viable and environmentally sustainable.

The following process was undertaken in preparing this waste strategy:

Stage 1	• Site visit and scoping visit
Stage 2	• Discussion Paper and presentation to council
Stage3	• Community consultation & stakeholder engagement
Stage 4	• Community consultation report & presentation to council
Stage 5	• Develop draft waste strategy
Stage 6	• Submit final Waste Strategy 2019-2029

2. GUIDING PRINCIPLES AND CURRENT POLICY APPROACHES

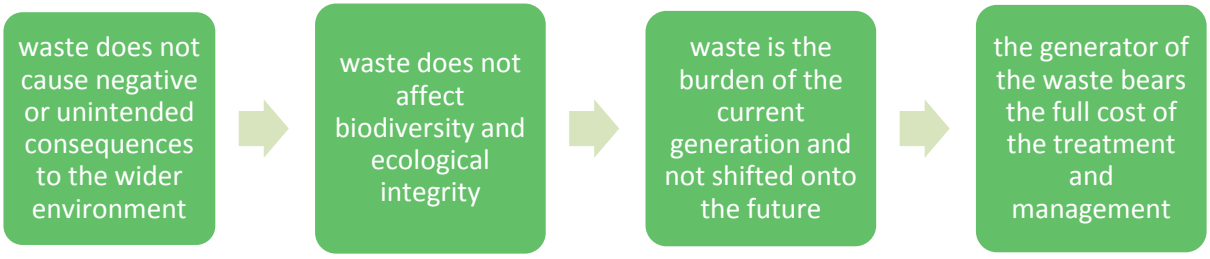
Different communities have different motivators and issues, and therefore require different waste solutions. However, the main overarching principles behind any waste strategy should be based on the Principles of Ecologically Sustainable Development (ESD) and the waste hierarchy. The international, national, state and regional context should also be considered, while recognising the need for local, fit-for-purpose solutions. These principles are summarised in the following section.

2.1 Guiding principles

In making the recommendations contained in this section, we are mindful of the following principles:

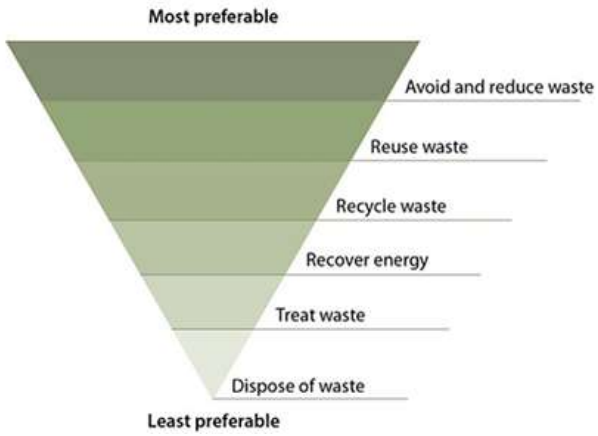
Ecologically Sustainable Development (ESD) – the effects of decisions that we make today have far-reaching impacts on future generations and the environment. Waste management decisions should be based on responsible management of materials and resources to retain and conserve their value for secondary uses. This results in the conservation of natural resources for current and future generations.

These four principles aim to govern waste management by ensuring that:



Compliance with the Waste Management Hierarchy – the waste management hierarchy is a nationally and internationally accepted philosophy for prioritising and guiding efforts to manage waste. The waste hierarchy sets out the most-to-least preferred methods for waste management globally. The hierarchy has evolved over the past four decades and now includes six steps, as depicted in the diagram below:

Figure 1 Waste Hierarchy



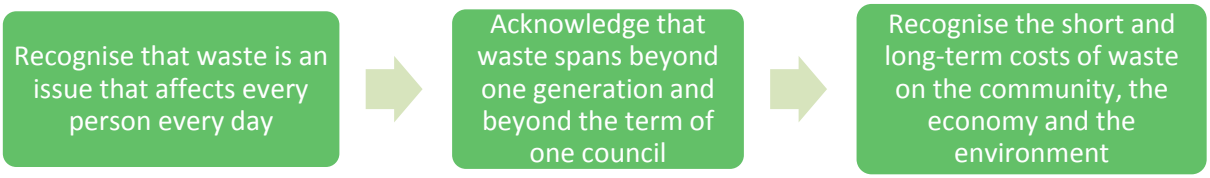
Low-risk options – government is typically risk-averse and does not operate on a commercial basis motivated by profit, but rather to provide value-for-money services to the communities they serve. Remote locations are not suitable places to pilot new and innovative practices. Proven approaches with minimal operational constraints and sophistication minimise risk.

Social equity – there are community and societal expectations for basic waste services to be delivered, irrespective of where people reside.

Best practice – significant research has been undertaken to determine methods that are appropriate and fit for purpose to achieve optimum outcomes in relation to resource recovery. Communities need to aim for continuous improvement as they move to best-practice outcomes.

Demonstrate leadership – government needs to lead the community by setting good examples and providing services and infrastructure that will enable the community to actively participate in meeting strategic outcomes.

Council and community principles -- It is expected that KIC and the community will:



2.2 Current policy directions

Any local strategy needs to consider the agenda and policy directions of other tiers of government and the international arena.

2.2.1 International

Australia has for many years relied on overseas markets, particularly China and South East Asia, to receive post-consumer used packaging materials, principally cardboard and plastics. In 2017 China announced restrictions on the import of 24 types of waste, including paper and plastics. These restrictions became effective in January 2018 and included increasing the quality standards to levels that are unachievable when using the current sorting methods available at material recycling facilities (MRFs) in most western countries. Other countries, including Thailand, Vietnam, Malaysia, Philippines, Indonesia and India, have subsequently announced bans or impending bans, or are introducing similar quality standards, effectively closing their borders to foreign recyclables.

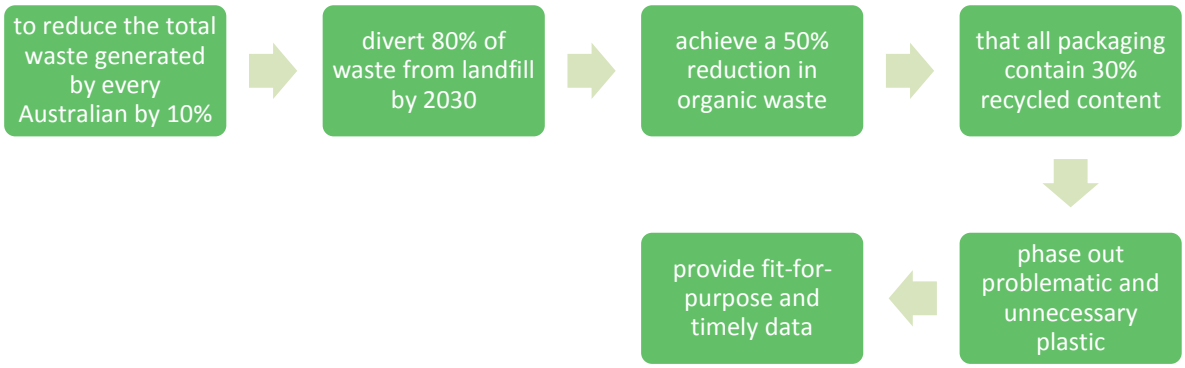
This has had a dramatic impact on the Australian recycling sector, which has not grown local end-processing capacity. Headlines reporting the redirection of recycling to landfill are a direct result of Australia's reliance on international markets over which it has limited, if any, control. Where commodities continue to be exported, there has been a substantial decrease in prices paid, further affecting recycling viability.

As a consequence of the international situation, King Island must carefully consider its needs to ensure outlets and markets are available and that quality specifications can be achieved for materials requiring export, regardless of whether this is to Tasmania, the mainland or an overseas market for reprocessing.

2.2.2 National Waste Policy

Australia produces a staggering 64 million of tonnes of waste each year, which equates to 3 tonnes per person per year. We recover 58% of our waste through recycling and the generation of energy from waste.

In late 2018, the Federal Government released an updated National Waste Policy with key aspirational targets to be achieved by 2030, including:



The Commonwealth Government also developed the *National Environment Protection Measures* (NEPMs). These set out agreed national objectives for protecting or managing aspects of the environment and are enforced through state legislation. Waste-related NEPMs currently in place address used packaging materials and the movement of hazardous waste between states and territories.

National product stewardship schemes between government and industry are in place for a number of problematic items, including e-waste (televisions and computers), end-of-life tyres, waste oil, paint, batteries and mobile phones. There are also some products that have voluntary schemes, such as mattress recycling (often supported through social enterprise or not-for-profit organisations).
At its August 2019 meeting, the communique from the Council of Australian Governments (COAG) stated that agreement had been reached [1] that Australia should establish a timetable to ban the export of waste plastic, paper, glass and tyres, while building Australia's capacity to generate high-value recycled commodities and associated demand. They tasked environment ministers to advise on a proposed timetable and response strategy following consultation with industry and other stakeholders. Leaders agreed the strategy must seek to reduce waste, especially plastics, decrease the amount of waste going to landfill and maximise the capability of our waste management and recycling sector to collect, recycle, reuse, convert and recover waste. Leaders agreed the strategy should draw on the best science, research and commercial experience, including that of agencies like the CSIRO and the work of cooperative research centres.

Leaders also agreed to establish a Regional Ministers' Forum to identify and explore opportunities to deliver better economic and social outcomes. Targeted investment, tailored to the needs of individual

[1] https://www.coag.gov.au/meeting-outcomes/coag-meeting-communique-09-august-2019

regions, and developed in collaboration across all levels of government and local communities, is key to ensuring regional Australia's ongoing success.

A consequence of this announcement is a recognition that we cannot continue to export our waste to the world. We need to build local capacity. Recycling can create new economic development opportunities and new funding programs should be available to support local and regional development around resource recovery.

2.2.3 State – Tasmania

The Environment Protection Authority (EPA) is responsible for managing waste in Tasmania through three key regulatory mechanisms which set out the framework for regulating waste and recycling facilities, tracking of controlled waste and other waste-related regulatory requirements, as follows:

- Environmental Management and Pollution Control Act 1994;
- Environmental Management and Pollution Control (Waste Management) Regs 2010;
- Environmental Management and Pollution Control (Controlled Waste Tracking) Regulations 2010).

The Local Government Association of Tasmania (LGAT) developed a *Waste and Resource Management Strategy* (2017) to inform statewide initiatives to be considered in the proposed new strategic action plan being prepared by the EPA.

During the development of this King Island Waste Strategy the previous Tasmanian Waste and Resource Management Strategy 2009 has been updated with the release, in late June 2019, of the draft Tasmanian Waste Action Plan for public consultation. The Plan is based on the principal of shared responsibility between all levels of government, the private sector and the community, and includes the following key state government commitments:

- Introduce a legislated statewide landfill levy with funds raised to be reinvested in waste and recycling infrastructure and programs;
- Introduction of a container deposit scheme. State government announced the scheme would be introduced during 2022 with 60 refund points established. The aim of the scheme is to achieve a redemption rate of 80% for eligible used beverage containers;
- Targets for waste management, litter and recycling aligned with national waste targets;
- Packaging must be reusable, recyclable or compostable by 2025;
- Reduction in overall waste generation by 5% per person by 2025 and 10% by 2030;
- Reduction in the volume of organic waste sent to landfill by 25% by 2025 and 50% by 2030;
- Achieve a 40% average recovery rate from all waste streams by 2025 and 80% by 2030;
- Work at the national level and with local government and businesses in Tasmania to phase out problematic and unnecessary plastics by 2030;
- Establish a resource-recovery management body to oversee the reforms.

The timing of the release of the Tasmanian Waste Action Plan provides clear direction to King Island Council as to the direction its own strategy must take to align with both State and Commonwealth aspirations. All written submissions on the draft Tasmanian Waste Action Plan close on **7 October 2019**.

2.2.4 Regional

Cradle Coast Waste Management Group (CCWMG) is a voluntary organisation of seven mainland councils. The group has developed the second, five-year strategy 2017–2022. The full strategy can be found at http://rethinkwaste.com.au/download/ccwmg-strategic-plan-201722/. The key performance indicators that will determine the success of this strategic plan are:

- by 2022, divert 50% of all MSW from local government landfill facilities across the region;
- by 2022, increase the proportion of recycling bins receiving a pass mark as part of recycling bin assessments to 90% across the region (based on the 2015–16 assessment pass rate of 81%);
- by 2022, reduce incidents of illegal dumping at hotspot sites by 25% across the region (after first establishing baseline data from council reports);
- by 2022, all member councils to be collecting and reporting a standardised set (for material types, units, etc.) of data in relation to waste and resource recovery activities.

Previously, KIC was part of CCWMG, who has indicated that it would welcome discussions around collaboration with KIC or working together on specific projects and initiatives of interest.

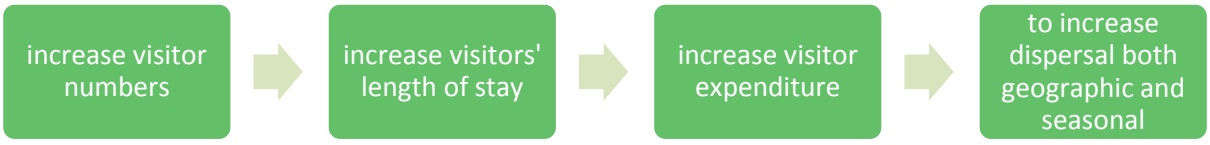
2.2.5 Local – King Island Strategic Plan 2016–2020

This overarching document provides a framework to guide KIC in delivering its services to the community. Several objectives and strategies are specifically relevant to waste management, including:

Objective 2 Infrastructure and	Strategy 2.1.2	Objective 6.3 Financial	Strategy 6.3.2
•Review and develop plans and processes with relevant stakeholders	•Revise strategies and activities for waste management including collection, recycling and landfill management	•Provide long-term financial viability planning	•Examine and review the costs associated with the provision of facilities and where necessary provide cogent information in which Council can make informed decisions about community services/service obligations

2.2.5.1 King Island Destination Plan 2016 to 2020

This plan articulates the tourism objectives as:



Tourism will play an increasing role in the economy of the island. Visitors do not, however, pay rates but use council facilities and assets. Council has limited opportunities to extract financial return from these visitors.

2.2.5.2 King Island Annual Plan 2019–2020

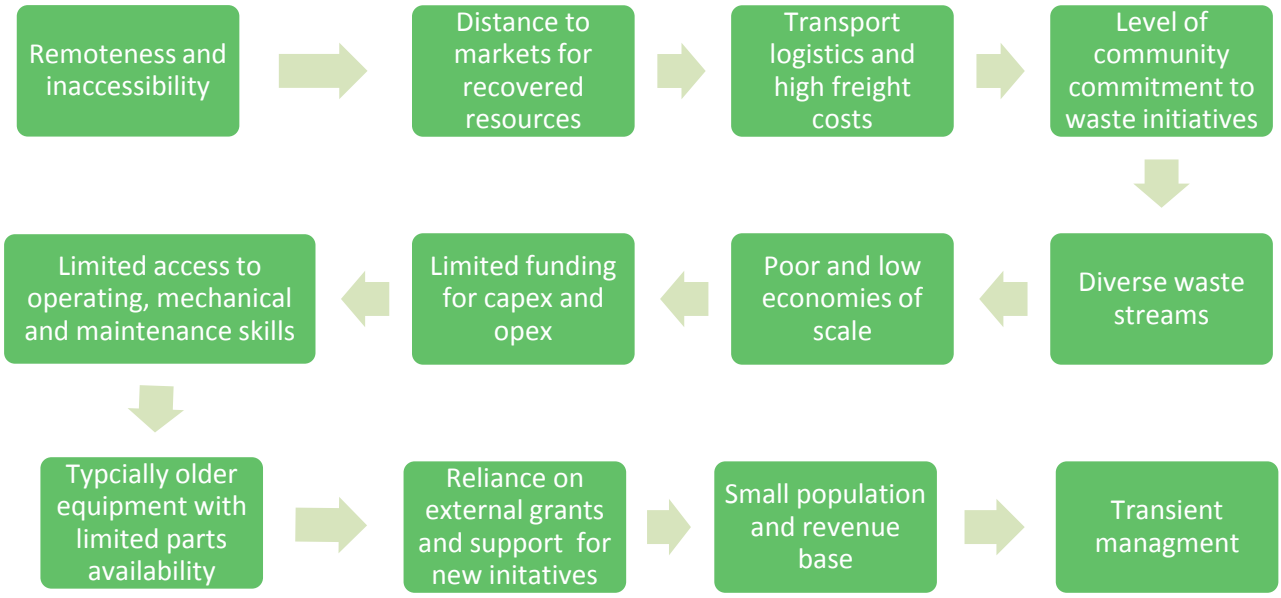
The action plan identifies the key focus areas for council activities for the next year. Waste is referred to in the following area:

Infrastructure and Facilities – Strategy: revise strategies and activities for waste management, collection, recycling and landfill management. Performance measures include:

- By June 2019 – adopt KI waste management strategy;
- By July 2019 – waste management compliance and operational review completed;
- By June 2020 – determine the waste profile, options for composting program investigated, and user experience at Charles Street waste depot to be improved.

3. WASTE MANAGEMENT ON OTHER AUSTRALIAN ISLANDS

This section provides a short summary of some key actions and achievements of other island communities to provide context to the recommendations contained in this strategy. Each island is unique, however there are many common characteristics and themes, as well as numerous barriers and constraints to overcome in order to implement improved waste management. Some that are applicable to King Island include:



APC has developed and implemented waste management and resource recovery plans and strategies on a number of iconic Australian islands with resident populations ranging from 50 to 4,000 and annual visitor numbers ranging from 200 to 500,000. All these islands have received external financial assistance from federal and/or state administration to assist in the capital works required to establish systems with the ongoing operational costs funded locally.

Kangaroo and Norfolk islands, with a predominantly agricultural base and an established tourist sector, are probably the most similar to King Island. Both have undertaken substantial transformations.

A summary of the four island waste programs is provided below:

3.1 Lord Howe Island, New South Wales

Lord Howe Island is located 550 kilometres off the NSW coast. It is home to 350 residents, welcomes more than 15,000 visitors each year and was listed as a world heritage site the same year as the Great Barrier Reef. The Island moved from a burn-and-bury mentality before the year 2000 to become a leading world-best-practice community through a comprehensive range of measures. The waste strategy set a waste diversion target of 84% reduction, which has been achieved on consecutive years after a decade of sustained effort. The only landfill ceased to operate in 2000, with all waste and recycling shipped to the mainland. The waste program was multi-faceted and included:

- A local waste management advisory group established to oversee the implementation. The group provided local advice and guidance, with APC providing technical support as external consultants.
- The cornerstone of this waste program was to target the organic fraction, which represented 55% of the island's waste stream. It established an enclosed composting system (VCU) to process shredded cardboard/paper, all food, and chipped garden waste. The matured compost was used in revegetation projects across the island. After 18 years of operation, the VCU has just been replaced with a HotRot in-vessel system.
- A source-separated waste stream was implemented for the following materials: glass, aluminium cans, steel cans, mixed plastics, EPS foam, metals, paints (water and oil-based), oils (cooking and motor), fluorescent and CFL light bulbs, toner cartridges, magazines, batteries (lead acid/nicad), textiles/clothing/bric-a-brac, e-waste/TVs and scrap metal/white goods.
- A mini MRF was established, including a glass crusher and a magnetic head to extract metals, to enable separation of materials.
- Glass is crushed and used as an aggregate in reed beds as part of the wastewater treatment strategy and as an aggregate replacement in road-making.
- All other recycling is baled and backloaded to the mainland for reprocessing.
- All remaining general waste, including nappies, tyres and builders' waste, is backloaded to the mainland for landfilling.
- A reuse centre provides an avenue for recycling of furniture, building material, bric-a-brac and books.
- A bulk food co-operative provided both visitors and residents with packaging-free options.
- An extensive community, school and visitor education, communication and engagement program was developed and implemented, including in-flight information.
- A range of policies, including motor vehicle 'one car on, one car off' policy is actively policed by the Lord Howe Island Board (LHIB). All vehicle imports and any vehicle transfers must be approved by the LHIB and as a result there are no end-of-life vehicles on the island.

3.2 Kangaroo Island, South Australia

Kangaroo Island is also similar to King Island in that it has an agricultural and tourism economic base. The island is 4,400 square kilometres with a permanent population of 4,292 and 160,000 tourists visiting annually, of which approximately one-third are international tourists. At the time of APC's involvement, the landfill had three months' capacity remaining. A transfer station was built, and an extensive education program was introduced to support a user-pays charging regime to recover costs associated with shipping all waste off the island for disposal, recycling or reprocessing on the mainland. A new kerbside recycling program was introduced, two smaller transfer stations closed, and a bulky waste service was introduced. Further, a tip shop, composting facility and a drop-off centre at the transfer station were promoted and a comprehensive separation program for timber, metals, tyres, paints, chemicals, oils, glass, plastics, and cardboard/paper introduced. As a result of these comprehensive measures, Kangaroo Island is diverting between 60 to 70% of all waste from landfill via recycling, reuse and composting initiatives.

A chronological order of waste-management developments is outlined below to provide the reader with an understanding of the transition and step changes that occurred.

December 2004

Report presented to the Special Council Meeting on 15 December 2004, where Council made the following decisions:

- All residents to receive a garbage and recyclables kerbside collection service by July 2006.
- Waste to be transported to the mainland for either landfill or recycling.
- A detailed waste management plan to be developed.
- Education of the community to occur.
- Waste service charge to be introduced on rates.

1 July 2005

- Waste service charge introduced.

22 September 2005

- Waste transfer facility completed.
- The transportation of landfill waste to mainland landfill became fully operational.

16 November 2005

- Integrated Waste Management Plan for Kangaroo Island adopted by Council.

3 July 2006

- Kingscote Landfill became the Kangaroo Island Resource Recovery Centre.
- The garbage and recyclables kerbside collection service commenced.
- Two transfer stations closed.
- Bulky waste program commenced at four island locations.

1 April 2007

- Reuse shed leased to a third party.

1 July 2007

- Sale of compost commenced.

- Construction of the bio-solids receival facility completed.
- Bulky Waste Program expanded to monthly.

1 February 2009

- Kangaroo Island Council joined the Fleurieu Regional Waste Authority.

3.3 Norfolk Island

Norfolk Island is located 1500 kilometres off the coast of Australia. It has a resident population of approximately 1,800 and its economic base is founded on international tourism. The island accommodates approximately 940 visitors at any one time and has a total annual visitation of around 25,000 per year. Tourism visitation reached a peak of 40,000 per year in 2002 and has been declining since. The Administration of Norfolk Island (ANI) was responsible for waste management on the island and many of the practices were neither compliant with Australian or international law nor acceptable to current residents.

The government undertook an extensive number of studies and consultancies to review waste management systems and to explore options for the improved management of waste. Historically, all household waste was delivered to a cliff top cage for burning prior to ocean dumping. Bulky waste was delivered to an inland pit for burning. Aluminium cans and lead-acid battery recycling occurred as a private activity and was subject to commodity price fluctuations.

In 2000, ANI started implementing a range of recommendations from the Waste Management and Audit and Options Study, including:

- Established a Waste Management Centre (WMC) in 2003
- Equipment at the WMC enabled processing
    - crushing and baling of aluminium for export and recycling;
    - crushing glass for re-use in road construction.
- Various materials are stockpiled for periodic export including:
    - asbestos;
    - aluminium cans;
    - dry-cell batteries;
    - printer cartridges;
    - smoke detectors;
    - chemicals;
    - Oils – motor mixed with fuel;
    - Paints;
    - Fire extinguishers.
- Establishment of a ‘revolve/reuse centre’ at the WMC.
- Large-scale commercial burning pits at dispersed sites around the island were closed, and together with the former ‘Top Tip’ burning pit, rehabilitated.
- Residual waste, for which there was no alternatives, was burned in the open by WMC staff, subject to prevailing wind direction.
- In 2004, waste management legislation was introduced to include levies to fund waste management.

- Installation of a dedicated high-temperature incinerator for disposal of medical and quarantine waste located next to the sewage treatment plant (STP).
- In 2008, a chemical collection clean-out and audit was undertaken.
- Investigations into installation of an air curtain incinerator was not accepted by the community.

The *Norfolk Island Act 1979* was amended to allow the Commonwealth to assume responsibility for funding and delivering national and state level services. The Australian government sought to integrate Norfolk Island into the mainland tax, social security, immigration, customs and quarantine services and the Norfolk Island Assembly transitioned to a regional council effective from 1 July 2016. A further Waste Management Strategic Plan was developed in 2015 leading to an enclosed composting operation, a mini MRF being established for separation and baling of recyclables and in 2019 the first export of baled residual waste to Australia by air began.

3.4 Overview

Considering the issues and options explored by other Australian islands, it is apparent that while much progress has been made in many areas, waste in some localities is still poorly managed. Island communities, like their mainland counterparts, have undertaken a journey to transition from poor waste practices to current improved resource-recovery outcomes in keeping with community expectations, statutory obligations and compliance requirements.

King Island Council and the community it serves are on such a journey.

4. SITUATION ANALYSIS

APC prepared two separate reports as background to the preparation of this strategy.

4.1 Paper

This report identified key issues and opportunities as a result of the scoping visit. The findings are summarised below:

Table 1 Discussion paper summary

Location	Issue	Action
Former Charles landfill	A risk assessment and rehabilitation plan are overdue, and site works to be completed are a priority. A plan and budget estimate are required.	KIC have engaged consultants to prepare
Charles Street current depot operations	Environmental Management Plan (EMP) is overdue. A review of the EMP operations and preparation of plans and costings for implementing a range of operational improvements at the Charles Street depot is a matter of urgency.	KIC have engaged consultants to prepare
	Signage regarding children remaining in vehicles at all times is difficult to read. Requires immediate replacement.	Signage replaced
Parenna landfill	Prepare and submit revised *operations manual and sub-plans* by 30 June 2019 to EPA	KIC have engaged consultants to prepare
	Apply to the EPA to increase permissible use to 2,499 tonnes per annum at Parenna landfill from current 1500 tonnes	Refer strategy
Asbestos	Apply to the EPA to construct an unlined landfill cell for asbestos disposal at the Parenna landfill	New cell dug at Charles street – to be part of site ops plan
	Undertake broad community education about correct handling and disposal methods	Refer strategy
Financial management	Undertake a full review of income/expenditure to determine if current fees/charges reflect true operating costs	Refer strategy
	Canvass tourists' willingness to pay an environmental levy for waste management	Refer Consultation report
	Canvass community willingness to pay, including how to best manage the costs of problematic waste at end of life, e.g. cars, tyres and mattresses	Refer Consultation report
Glass processing using Andela pulveriser	Determine end use for glass sand and investigate options for improving operational efficiencies	Refer strategy
	Prepare costings for installation of dust extraction and a conveyor feed	Refer strategy
Garden waste	Investigate opportunities to hire/purchase a shredder/tub grinder to chip/process green waste	Refer strategy
Commercial waste collection	Investigate servicing commercial 240 litre bins as part of kerbside run and outsource larger bulk bins to the private sector	Refer strategy
	Commercial waste services suspended until missing/damaged bin lids/wheels are replaced/repaired	Refer strategy
Waste data	Undertake a waste audit of kerbside, commercial and self-hauled loads to determine the waste profile and provide accurate data for waste planning and technology options	Refer strategy

4.2 Discussion paper opportunities

Increasing the recovery, reuse and recycling of materials on King Island will have the following benefits:

Economic benefits

- Extend landfill life, prolongs need for new landfill cell
- Reuse of materials on island reduces need to export to mainland and overseas markets, saving freight costs
- Local reuse and recycling reduces exposure to fluctuations in global commodity markets
- Localising alternative sources of fuel from waste materials

Social benefits

- Promotes the ethos of refuse, reduce, reuse, recycle, return
- Builds local capacity with new skills and training in new areas
- Opportunity for skilled jobs
- Helps to retain locals on island with new work opportunities
- Promotes new skills and updating of technical skills
- Improved waste site safety through better waste management

Environmental benefits

- Increases reuse of materials with imbedded resources, and energy
- Reduced landfill gas emissions
- Avoid use of virgin timber as fuel, protecting natural environment and habitats

APC has identified the following initial opportunities for improved recovery, reuse and recycling on the island. Each new opportunity is summarised below, in no specific order or priority.

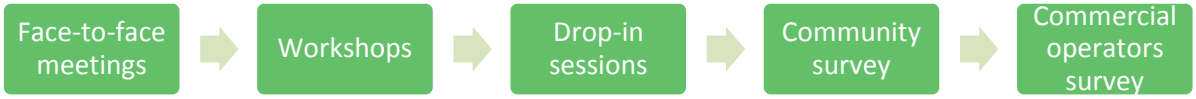
Table 2 Discussion paper opportunities

Concept	Activity	Action
Composting	Investigate options for a composting program using wood waste, garden waste and cardboard	Refer strategy
	Investigate a commercial-scale composting operation with the abattoir	Refer strategy
Fuel substitute for kelp factory	Investigate alternative fuel replacement options to reduce or replace the use of timber as the primary source of fuel	Refer strategy
Tyres	Investigate if tyre recycling is still taking place at Searoad	Apparently not
	Quantify the amount of tyres and discuss as a possible fuel source with HRL and/or burial with EPA	Refer strategy

Tip shop	Investigate the level of community support for a tip shop	Refer consultation report
	If the response is positive, engage experts to provide independent advice	Refer strategy
Plastic film	Investigate the methods and the level of support that can be provided to enable plastic shrink-wrap, film and silage wrap to be collected, aggregated and exported for recycling	Refer strategy
E-waste recovery	Seek for King Island to be a collection point under EPR program	Refer strategy
Container deposit scheme (CDS)	Continue to monitor developments in relation to the introduction of a CDS in Tasmania	Announced 2022 introduction
	Make representations to the Minister supporting such a scheme on KI, whereby industry takes responsibility for the return of used beverage containers.	Refer strategy

4.3 Community consultation

Community and stakeholder engagement and consultation was undertaken to gather views and opinions using a variety of methods in a quest to engage with as many of the island community as possible. Consultation included the following activities:



In total, 123 responses to the community survey and 31 commercial waste and visitor accommodation surveys, representing 78% of respondents and representing 77 tourist beds, were completed and analysed. In addition, 29 face-to-face interviews were conducted at the Charles Street depot by the consultants.

The key findings of the consultation activities are summarised below.

Table 3 Community consultation key findings

Satisfaction with waste collection	• Most householders (66%) and businesses (42%) are satisfied or very satisfied in relation to Council's waste collection service • Dissatisfaction by businesses related to costs and lack of recycling • Dissatisfaction by residents is related to a desire to reduce collection frequency from weekly to fortnightly for a reduced cost, and a desire for a recycling service
People want to recycle	• 48% residents want a recycling service • Strong desire across the community for more recycling options but they don't always want to pay extra for recycling • Residents and businesses are conscious of the cost of exporting recyclables
Willingness to pay for waste improvements	• 73% of respondents were willing to pay more under certain circumstances • 27% if at point of service, 47% up to $50 p.a. and 19% up to $100 p.a.
Food waste is well managed	• Residents (75%) and businesses (44%) are proactively recycling food waste through composting, chickens, pets and worm farms or a combination of these • Almost half (48%) of businesses said their business would separate food waste to facilitate Council using it in compost
Infrastructure and capacity	• People are concerned about lack of landfill capacity and increasing waste volumes • People are aware that Council's infrastructure (e.g. baler, shredder) have been unsuccessful and there is concern about litter from the Parenna site

Charles Street Depot	• 96% of residents support a tip shop, though many don't want cost increases as a result • 34% of residents want opening hours changed, with 54% seeking increased opening hours on the weekends and 22% on weekdays • 63% of businesses would like longer opening hours
Differential charging for businesses	• The majority of commercial premises (66%) support the introduction of differential charging based on different types of waste or recyclables requiring disposal
Commercial waste composition	• Based on 28 responses, waste composition comprises on average: cardboard (33%), plastic containers (14%), glass (11%), plastic film and shrink-wrap (11%), food/meat/coffee grounds (8%), timber (6%) and aluminium cans (5%) • Up to 88% of the reported waste streams could be diverted from landfill if KIC were to introduce a compost and recycling program
Domestic waste composition	• There is a willingness by households to separate and recycle if facilities were provided
Cost recovery options from visitors/tourists	• An environmental levy on air tickets and a bed tax based on occupancy were the preferred options, with a departure tax less popular

Stakeholders nominated the following as key challenges and opportunities for waste management on King Island:

Challenges	Opportunities
•Waste generation •Lack of recycling •Facilities and infrastructure •Cost •Management •Education and behaviour	• Waste reduction • More recycling • Reduce domestic waste collection frequency • Improved facilities and infrastructure • Differentiated costs and incentives

It is the aim of this strategic plan to address both the opportunities and the challenges presented to both KIC and the community it serves in order to meet the expectations and future directions of King Island toward improved outcomes for waste management and resource recovery.

4.4 Future challenges

Current and future challenges in both developing and implementing this waste strategy include:

- KIC has limited financial capacity given the diversity of issues is oversees, with a small rate base and reliance on external financial support;
- Legacy compliance issues at all three waste disposal sites with two active landfills and one requiring formal closure and remediation;
- Lack of real data on waste generation and composition to inform infrastructure, equipment, service options and targets;

- Aging waste collection vehicles and landfill traxcavator, resulting in more frequent breakdowns, increasing maintenance costs and no alternative back-up equipment as each piece performs a distinct function;
- Lack of motivation by staff due to waste management perceived to have a low priority within council operations, with lack of funds and equipment to undertake routine activities;
- At the current Charles Street waste depot, there is a lack of signage regarding both traffic flow and waste segregation;
- Diversity of waste streams with poor economies of scale;
- KI has excellent port facilities with shipping to Tasmania and Victoria, however freight costs are exorbitant. Freight equalisation applies to waste materials and only to Victoria;
- No effective management of some problematic and hazardous materials including chemicals, paints and smoke detectors;
- Lack of a plan or budget to process garden waste and timber. As a consequence, both materials are stockpiled and considered a potential fire risk;
- No separation of inert building waste and scrap metal, both of which are taking up landfill space;
- Lack of enforcement by Charles Street staff on patrons unloading materials in the wrong areas;
- Council relies on Currie Lions Club to collect, treat and consolidate used lead-acid batteries, gas cylinders and ferrous scrap metal for shipment to Melbourne;
- Council lacks data and information on the nature, volume and composition of waste collected and disposed at either of the active landfill sites;
- The island has limited local and viable end markets for recovered materials;
- Concern by the public about the costs of services;
- The state government has indicated a policy position to introduce a statewide:
    - landfill levy which will increase fees and charges as council is forced to collect and report on all waste disposal activities, and
    - container refund scheme for used beverage containers impacting on any future kerbside service;
- Division within the community in relation to the weekly or fortnightly kerbside waste collection service frequency;
- Lack of detailed understanding in relation to true operating costs and revenue recovery from waste management;
- Lack of reserve fund to pay for current and future compliance obligations in relation to waste facilities;
- Anticipating new and emerging waste streams, government policies and programs for the next decade.

4.5 Future opportunities

In addition to the opportunities identified in section 4.2, the timing of this strategy's development after the release of the draft Tasmanian Waste Action Plan provides an opportunity for alignment with the current national, state, regional and local government waste strategies.

The announcement by the Tasmanian government to introduce a container refund scheme sets a direction for future considerations as it has implications for the introduction of a kerbside service. In NSW, the introduction of a deposit scheme has seen a reduction in the amount of eligible beverage containers left in the kerbside bin as households seek to redeem containers at collection points. The details of the scheme are not fully known but it does provide a goalpost that will impact the direction and timing of council endeavours in relation to the introduction of a kerbside service and local sorting and processing facility.

4.6 Future impacts

While the resident population may have declined over recent years, the development of two world-class 18-hole golf courses has witnessed significant growth in both national and international tourism. This recent tourism spike is likely to escalate, given the recent approval of another 18-hole golf course, convention centre and 300-bed accommodation development at Cape Wickham. Experience shows that increasing affluence leads to greater consumption and waste generation. The island community and council must plan for this on King Island now.

Further, the approval of the new abattoir, set to be operational by the third quarter of 2020, brings new workers and families to the island, with an anticipated 70 to 80 staff required. New accommodation for 65 people is planned for Currie to accommodate staff and contractors during both construction and operational phases. Discussions have been held with the abattoir proponent regarding waste generation and it has detailed plans to treat and further process by-products into other saleable commodities. Producing meat and bone meal as well as a biofuel from tallow will reduce waste and increase revenue for the abattoir. The remaining waste will be composted on site to produce a compost to meet Australian Standards AS4454 for use in agricultural land applications.

With these new developments, and others that may follow – including the proposed works at the district hospital and the possible future re-opening of the Grassy Scheelite Mine site – will bring economic opportunities as well as impacts on the island's population and waste profile. These developments present both opportunity and challenge to manage the predicted increased waste volumes and often more diverse waste types both during construction, commissioning and operational phases.

The proponents of these developments will expect KIC to be responsible for the collection, treatment and disposal of many waste streams – some will be new, and others will be at increased volumes than previously experienced. Every item arriving on the island will be packaged in some way to protect it in transit. This packaging, including cardboard, plastic film, metal strapping, polystyrene, timber crates and pallets, and steel and timber offcuts from construction will require island management.

Tourism is a highly competitive market and premises frequently update and refurbish their properties resulting in additional waste materials being generated, and more frequently turned over, for example mattresses and furnishings in accommodation. More cars and modes of transport will also be required.

5. THE WAY FORWARD

There is a strong community desire for more recycling options, based on the community consultation results, with 73% of respondents willing to pay more for improved outcomes, 96% supporting a tip shop, 54% seeking extended weekend opening hours at Charles St and 48% already separating food waste. The majority (66%) of the commercial sector are willing to pay differential charges based on costs associated with managing specific waste streams. Council must now take the community on a journey to transition from the current situation to improved waste practices and greater resource recovery, particularly when such measures can deliver improved economic, social and environmental benefits for all.

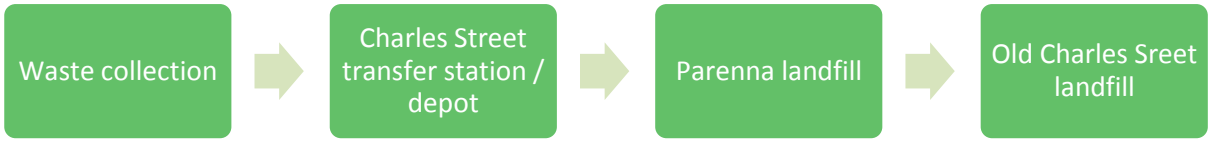
This section discusses the issues and opportunities available to KIC based on industry trends in the waste and recycling sector, community consultation and stakeholder engagement. The strategies outlined in this section assume that King Island will introduce a four-stream source-separated waste-management program based on the following key waste streams:

1. Reusable – furniture, building materials, bric-a-brac at the tip shop;
2. Compostable – food, paper/cardboard and garden waste;
3. Recyclable
   - on island – glass, used motor oil;
   - off island – lead-acid batteries, DrumMuster chemical containers, aluminium cans, brass/copper/aluminium/stainless steel, paints, fluorescent globes, chemicals, smoke detectors;
4. Disposal of residual waste
   - on island – household and commercial waste.

5.1 Current Waste Infrastructure

Local waste infrastructure plays an important role in providing the community with options to manage waste generated as a result of their activities, from bin size and service frequency, to opening hours and separation options at disposal facilities.

Infrastructure managed by KIC includes waste collection, two active and one closed landfill.



Each are discussed further below.

5.1.1 Collection

Previously, KIC provided a weekly service to all residential properties in a rear-loader compactor. As part of a cost-cutting measure, the service was reduced to fortnightly with little consultation and no new or alternative services being offered. Due to a number of issues including resident backlash about lack of bin capacity, loose material being placed alongside bins which later became litter, and worker

health and safety issues, KIC purchased a one-man operated second-hand side-loader truck and reverted to a weekly service.

All residential bins are 240 litres in size and no recycling kerbside service is provided.

The community consultation has identified that residents want more service options and a recycling service. Some households do not need a weekly service, nor do they require a 240 litre bin, as single households and those households with older residents generate less waste.

Today, many mainland councils offer variable bin sizes, with cheaper, smaller bins as reward for waste minimisation. Since a garbage truck has to travel all streets and roads regardless, an option is to offer variable bin sizes instead of offering weekly or fortnightly services. These can be collected by the same sidearm truck. The most common option is to offer a 140 or 240 litre bin, with households permitted to change bin size preference once per year.

Council currently operates two waste collection vehicles:

1. a side-loader for residential collection to empty 240 litre bins from 750 to 850 properties subject to set-out rates;
2. a rear-loader for commercial properties, servicing both 240 litre and 660 litre bin configurations from a total of 71 premises up to three times per week and servicing up to 35 premises/day.

Both vehicles were purchased second hand and are ageing. If the rear-loader breaks down, there is no alternative option to service 660 litre bins. The rear-loader has had a number of recent significant mechanical issues resulting in some clients having no service. To assist commercial clients to manage their waste in these circumstances, KIC has allowed free tipping at the Charles Street waste depot.

Possible alternatives that should be considered include:

- Council sell both vehicles and lease a new side-loader, saving labour costs and maintenance issues;
- The new side-loader should be capable of emptying both 140 litre, 240 litre and 360 litre bins;
- Council seek all commercial businesses to undertake greater source separation with a four-bin system:
    1. Food – for future composting;
    2. Paper/cardboard – for future recycling and/or composting;
    3. Recyclable containers – glass, plastics and cans for recycling;
    4. General waste – disposal.
- Council advise commercial clients that 660 litre bins will be eliminated and replaced with either multiple 240 litre or 360 litre bins (or more frequent collections);
- Commercial businesses requiring larger bins than 360 litres can enter into a commercial arrangement with the local skip hire business.

Current commercial collection fees are $11 for each 240 litre bin and $29 for each 660 litre. The majority of commercial premises (66%) support the introduction of differential charging based on different types of waste or recyclables requiring disposal. An on-call waste collection service is also provided, where KI Dairy and other enterprises are able to organise special services by arrangement.

The amount of waste collected per year from residential bins is approximately 440 tonnes and a further 316 tonnes per year from businesses. Council is collecting approximately 750 tonnes per year or 14.5 tonnes per week. The composition of the waste collected is not known.

Recommendations

1. ***Council offer the community variable bin sizes, 140 litre and 240 litre, to encourage source separation for recycling to reflect differing household needs in relation to waste generation.***
2. ***Differential fees are introduced for variable bin sizes to reward waste minimisation.***
3. ***Council offer commercial customers the choice of 240 litre or 360 litre bin options.***
4. ***Commercial premises be encouraged to separate waste into four streams – food, paper/ cardboard, recyclable containers and general waste, with differential fees based on costs to manage each waste stream.***
5. ***Council trade in or sell both current collection vehicles and investigate leasing a new collection vehicle that can service both residential and commercial premises and a range of bin sizes from 140 to 360 litres.***
6. ***Council investigate introducing a kerbside recycling service to coincide with investment in a mini sorting facility.***

5.1.2 Charles Street Depot

This site is currently open to the public from 8am–12pm Tuesday and Thursday and 10am–2pm Sunday. The community consultation indicated 34% of residents were seeking a change to the opening hours and 63% of businesses seeking longer opening hours. Specifically, 54% sought increased opening hours on the weekends and 22% on weekdays. Tradespeople sought earlier opening and closing times midweek to allow for drop-off before or after work. The opening hours should also reflect waste activities, so once the waste is delivered it can be processed each day without additional deliveries and disruptions. This is important when the recycling, sorting and composting operations are active.

In order to promote landfill diversion and resource recovery, a number of materials are accepted at Charles Street Depot free of charge and others have variable fees as shown below:

Table 4 2019–20 Charles Street Depot fees and charges

Material	Cost
Oil, batteries, cans (aluminium/steel), PET bottles, cardboard, chemical drums, glass	FREE
50 litre bag general waste	$3.00
Car/station wagon/wheelie bin	$9.00
Ute or trailer	$13.00
Kelp trailer	$21.00
Green waste	$12/m^3
Commercial waste	$35/m^3
White goods	$11

Material	Cost
Asbestos	$129/m^3
Cars	$166
Tyres – car/bike	$7
Tyres – light truck	$14
Tyres – truck	$19
Tyres – tractor	$22

The following source-separation system exists:

- DrumMuster compound – stored and exported to mainland Tasmania;
- Motor oil – placed in existing tanks for transfer to Grassy pool for heating;
- Aluminium cans – stockpiled for Lions Club;
- Lead-acid batteries – stockpiled for Lions Club;
- Scrap metal – brass, copper and stainless – stockpiled for Lions Club;
- Tyres – stockpiled and used around site or buried;
- Timber, treated – stockpiled;
- Timber, untreated – stockpiled;
- Garden and wood waste – stockpiled.

New and improved signage and storage facilities are required for all materials.

While some items are accepted free of charge to encourage source separation, currently only cans, non-ferrous metals and used lead-batteries are exported for recycling. This is done by the Lions Club, which generates in excess of $10,000 per annum to re-invest in the community. The used waste oil receptacle holds approximately 8,000 litres and is emptied approximately every two months, with waste oil reused to heat the Grassy swimming pool. A workplace injury had occurred at this area due to a faulty lid-opening device. Staff reported no remediation of the issue had occurred and the risk of another injury remains.

The DrumMuster compound is securely fenced and locked. However, a recent dispatch of containers was not triple-rinsed, resulting in the waste collection company imposing a surcharge on KIC in lieu of returning the drums to the island.

Glass and plastic containers were separated until recently, when staff removed the receptacles for these materials as they were not being recovered for recycling or reuse. Cardboard has never been recycled.

There is no pricing sign at the site. All transactions are receipted and a copy provided to the user. A copy remains in a duplicate receipt book. Transactions are summarised on a report for administration. It would appear the fees do not relate to the costs of managing these specific items nor do the fees cover the operational costs of the facility including staff, plant, equipment and contractors engaged.

The current shed provides an excellent undercover drop-off area for the public to use, with bulk bins provided at a lower level and ample workspace. However, the baler (not operational), baler wrapper, cardboard shredder and the Andela glass pulveriser (to make glass-sand) are not used. Staff have

refused to use the glass crusher due to concerns about dust and operating the equipment alone where there is a risk of serious injury in case of an accident.

When staff are operating equipment within the site shed, they have no visible contact with the public activity at the site. Children were witnessed playing in the landfill area in a high-risk area for injury. A sign stating 'children should remain in a vehicle at all times' was barely legible.

The remainder of the site has poor overall management, with improvements needed in traffic management, layout, site signage, infrastructure and day-to-day operation. At the site visit in June 2019, a new road had been constructed and the landfill cell was now being filled from the top of the hill rather than the bottom of the hillside with tyres used to define the access.

Image 1 New site access to the new disposal point at Charles Street waste depot

This landfill is inert, meaning no putrescible matter can be deposited but four key materials account for the majority of the deliveries: cardboard, concrete, garden waste and metal. All should be diverted.

Image 2 Four key materials deposited at landfill – cardboard, concrete, metal, garden waste

These materials should not be buried as they are consuming precious airspace and can be recovered for recycling. Currently there is no scrap metal diversion other than brass, copper and aluminium for the Lions Club. Almost all waste facilities across Australia divert scrap metal because its value is linked to the commodity value.

A cell has also been recently excavated for burial of wrapped and taped asbestos.
In APC's opinion, this landfill cell should be closed, and the site transformed to a resource-recovery area for separation and recovery of multiple materials. Any remaining general waste could be transferred to Parenna Landfill for disposal. Skips could be used for this and the transfer operations contracted out.

Dedicated areas should be set up with clear signage for the existing material separation, including:

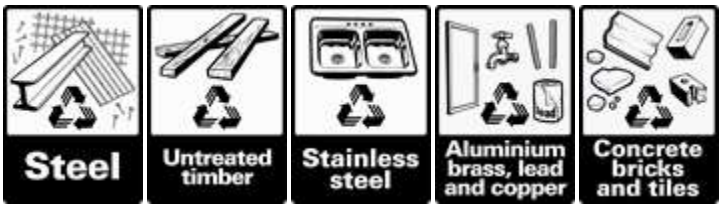
- DrumMuster compound – stored and exported to off-Island processor;
- Motor oil – placed in existing tanks for transfer to Grassy pool for heating;
- Aluminium cans – stockpiled for Lions Club;
- Lead-acid batteries – stockpiled for Lions Club;
- Scrap metal – brass, copper and stainless – stockpiled for Lions Club;
- Tyres – stockpiled and used around site or buried;
- Timber, treated – stockpiled transferred to Parenna Landfill;
- Timber, untreated – stockpiled;
- Garden and wood waste – chipped for mulch or compost;
- Glass – crushed and used locally by KIC or sold.

<u>New materials</u>

- Scrap metal – white goods/end-of-life cars – stockpiled for removal by external contractor.

Standard signage throughout the site will encourage patrons to correctly dispose of items. Images can be downloaded from http://www.epa.nsw.gov.au/wastetools/signs-posters-symbols.htm.

Figure 23: Examples of standard signage



To comply with standard environment protection and WHS regulations, all drums containing liquid and non-drained lead-acid batteries should be stored in a bunded area or on spill containment pallets. This and other relevant information will be outlined in the site-specific operational manuals recently developed for the site.

The shed at this site, measuring 31 metres by 15 metres, is under-utilised and would be ideal for the development of a mini recycling sorting plant, which is discussed in section 5.2.7.

Flinders Island is currently being supported by Hydro, which is paying to export all plastic shrink-wrap and silage wrap from the island in bulka bags. This is recycled by Envorinex in Tasmania into a range of durable products. Envorinex indicated that some hard plastics like PVC could also be processed. KIC should continue to explore if such a program can be extended to KIC for recovery of plastic, silage wrap and hard plastic. KIC should also provide an undertaking to purchase recycled content products to close the loop on recycling where products are competitive in price and quality.

Hydro was proposing to import a cardboard baler for its own use at Currie. KIC could seek to ascertain if the baler has been installed and whether it could be donated to the Charles Street depot as a community resource.

The Cradle Coast Waste Management Group (CCWMG) developed a Resource Recovery Centre and Transfer Station Best Practice Guideline that includes requirements for councils to operate resource recovery centres/transfer stations at a level that ensures environmental protection and reduces the risks to human health. It is strongly suggested that this site be upgraded and operated in accordance with this guideline.

The CWMG also undertook a review of data collection procedures and reporting from landfills and transfer stations. This led to the development of a centralised data collection portal for member councils to record waste data in a regionally consistent manner. It is suggested that KIC report its data in the same format for regional consistency and to enable future joint funding approaches.

Recommendations

1. ***Charles Street Depot be renamed the Charles Street Resource Recovery Centre;***
2. ***KIC undertake site works in accordance with the Environmental Management Plan and licence conditions;***
3. ***Opening hours be extended or modified to accommodate business, tradespeople and the public with earlier opening and/or later closing;***
4. ***A 24-hour recycling drop-off area be established along the front fence and trialled for three months to determine use for depositing key recyclables in clearly identifiable containers that are well signed (excluding general waste);***
5. ***All scavenging by the public cease to reduce liability and site risks;***
6. ***A reuse centre or tip shop be established as an avenue for reuse of furniture, building material, bric-a-brac, with the operation outsourced to a private operator or Council;***
7. ***That improved operations, including site layout and traffic management, be introduced based on the CCWMG Resource Recovery Centre and Transfer Station Best Practice Guideline;***
8. ***Improved source-separation opportunities be established for a broader range of materials, with the public encouraged to participate through both improved site layout, signage, communication and pricing mechanisms;***

9. ***Differential fees should be introduced at the waste facility to encourage source separation, relating to the destination of each product;***

10. ***A chipper should be purchased to chip all garden waste while still green and to store for resale as mulch, or stockpile as feedstock for the composting program when a definite timeframe is known;***

11. ***That KIC confirms that Envorinex in Tasmania can recycle all plastic shrink-wrap and silage wrap, and some hard plastic from the island. Seek support from Hydro to financially underpin the project, as they do on Flinders Island.***

12. ***That plans be considered to close the active landfill cell and create a transfer station facility with non-segregated waste transported to Parenna Landfill by an external provider, to help reduce current and future compliance issues;***

13. ***KIC should collect and report data in a manner consistent with CWMG for regional consistency.***

5.1.3 Parenna Landfill

This landfill is located adjacent to Sustainable Timber Tasmania land. It is fully fenced and currently comprises three filled cells and one active cell currently receiving waste. Both residential and commercial Council vehicles deliver directly to the cell. The current cell was constructed in 2017 to EPA standards, including lining to prevent any leakage to the environment, at a cost of approximately $380,000. Leachate and stormwater ponds are provided at the site, however the Tasmanian EPA reports breaches of both ponds during winter wet weather to the nearby creek. The Tasmanian EPA advised that a landfill plan and operational manual was due for submission, with an extension granted to 31 December 2019. The regulator also advised that there are currently six major non-compliances in relation to the operation of the landfill which are to be addressed.

The EPA license regulates what wastes can be deposited, including asbestos, sewerage sludge, tyres and treated timber. The site cannot accept green waste, white goods or cars. The landfill has an annual license capacity of 1,500 tonnes, with KIC waste data indicating that the current 1,500 terapascal (tPA) limit has been exceeded in the previous two years. However, based on the data gained from the public weighbridge during the development of this strategy, it would appear that around 750 tonnes are delivered to the landfill from Council waste collections.

It seems highly unlikely that with the additional deliveries the current licence condition of 1,500 tonnes is being exceeded and accordingly it appears the reporting may be inaccurate. The Tasmanian EPA have suggested that Council request a permanent increase to 2,499 tonnes (with no change to the value of Annual Permit Fees charged by the EPA) so as to ensure no risk of non-compliance. Based on the expected increased volumes of materials due to the development forecast on the island, it is suggested that KIC formally seek to increase the regulatory limit.

Recommendations

1. ***KIC seeks to apply to the EPA to increase the licence limit at Parenna Landfill from 1500 tonnes to 2499 tonnes per annum;***

2. ***KIC undertake site works at Parenna Landfill in accordance with the Operations Manual and license conditions.***

5.1.4 Former Charles Street Landfill

The Tasmanian EPA has advised that a risk assessment and rehabilitation plan for this site is overdue. The site requires temporary capping prior to formally closing to ensure all waste is encapsulated and will not leak into the surrounding environment. Given that this site still has some life expectancy it is desirable to not formally close the landfill as in the event of a disaster at the Parenna landfill this landfill site can be used for disposing of putrescible waste. A detailed plan and budget estimate have been provided to Council by another consultancy for works to be undertaken as a matter of priority to the satisfaction of the EPA.

Recommendation

1. ***KIC as a priority undertakes site works to temporarily cap the former Charles Street Landfill site to the satisfaction of the EPA.***

5.1.5 Legacy Waste

Scattered around the island are substantial amounts of scrap metal, used cars, trucks and farming equipment rusting away in paddocks. This scrap has a value for recycling and should be removed off the island.

There is also a substantial amount of garden and wood waste stockpiled at the current Charles Street Depot which, if left unattended, will present a fire risk that could threaten homes and the township of Currie. Previously, a chipper was hired annually for approximately $20,000. Given the size of the stockpile, the age of the garden waste and the diameter of some trees, the scope of works may now be beyond the chipper. Further, because no burning is allowed at the site, a tub grinder may be required to resolve this issue.

Council needs to undertake a cost-benefit analysis to determine the costs of purchasing/leasing a chipper for regular work versus hiring a chipper and operator already on the island on a regular basis. Garden waste ideally should be chipped when green. The chip can be sold as mulch product or stockpiled for use in the composting program.

Recommendations

1. ***To manage legacy scrap metal waste, KIC should seek to identify landowners with substantial amounts of scrap metal requiring removal and quantify the number of cars, trucks, white goods and amounts of metal;***

2. ***KIC prepare a tender for the removal of all scrap metal from the island as a legacy clean-up using a baler and/or car crusher subject to the amount and nature of the materials identified. Use the freight equalisation policy to assist in reducing freight costs;***

3. ***To manage legacy garden waste, KIC should seek a quotation from a local operator to process all garden waste and timber offcuts, or if the scale is too large, seek a tender for a tub grinder to process the stockpile.***

5.2 New opportunities

Data is essential to inform good decision making. Unfortunately, there is extremely limited data available in the preparation of this strategy. The only available data is from one week of public weighbridge weights, which estimates that approximately 750 tonnes of waste is collected per annum from both households and commercial premises. Typically, a detailed waste audit is conducted to determine waste generation and composition. From this, targets and recommendations about performance improvements are made, equipment selected and cost estimates determined. In this case, given the unknowns, general directions are provided to increase landfill diversion and improve resource recovery. Island-of-origin solutions are favoured where possible to reduce high freight costs.

Increasing the recovery, reuse and recycling of materials on King Island will have the following benefits:

Economic benefits

- Extend landfill life, prolongs need for new landfill cell
- Reuse of materials on island reduces need to export to mainland and overseas markets, saving freight costs
- Local reuse and recycling reduces exposure to fluctuations in global commodity markets
- Localising alternative sources of fuel from waste materials

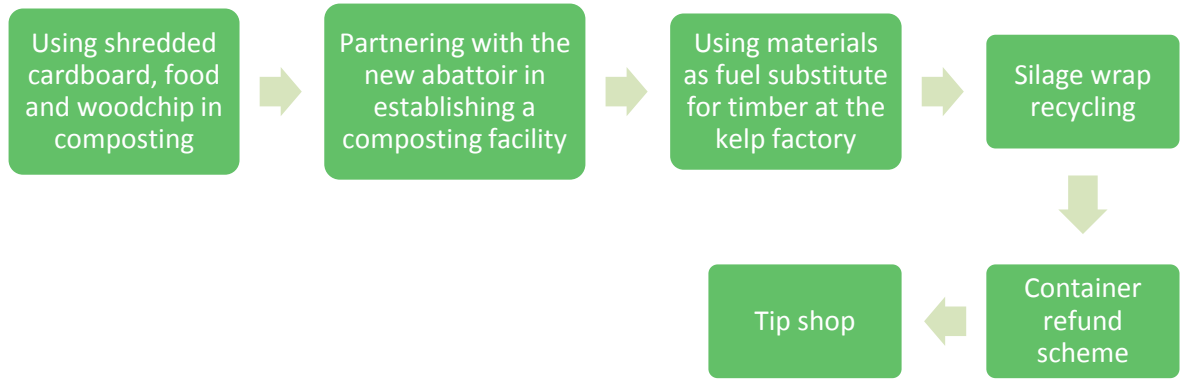
Social benefits

- Promotes the ethos of refuse, reduce, reuse, recycle, return
- Builds local capacity with new skills and training in new areas
- Opportunity for skilled jobs
- Helps to retain locals on island with new work opportunities
- Promotes new skills and updating of technical skills
- Improved waste site safety through better waste management

Environmental benefits

- Increases reuse of materials with imbedded resources, and energy
- Reduced landfill gas emissions
- Avoid use of virgin timber as fuel, protecting natural environment and habitats

APC has identified the following initial opportunities for improved recovery, reuse and recycling on the island:



Recommendation

1. ***Given the lack of any data on current waste generation and composition, it is imperative that a waste audit be undertaken on household, commercial premises and self-haul waste to Charles Street Depot to enable accurate design and development of infrastructure that is both scaled appropriately and fit for purpose.***

5.2.1 Reuse shed or tip shop

There is an ad hoc system currently in use where unwanted materials are deposited inside the drive-through door for the community to scavenge and take at will. This informal scavenging is taking place at the Charles Street landfill. However, the risks and liability presented to Council for this activity are potentially significant. These risks can be eliminated by establishing a 'reuse centre' or 'tip shop'.

Tip shops are widespread throughout mainland Australia and Tasmania and are very successful. The concept is ideally suited to island communities given the scarcity of materials and the delay and cost of bringing new or replacement items. Useable and functional goods that are no longer needed can be made available to other members of the community or used as replacement parts.

The community consultation survey revealed 96 per cent support for the concept. MD Recovery (Tas) Pty Ltd is a successful operator of numerous tip shops in Tasmania and has offered its many years of experience to the KI community on a fee-for-service basis.

These retail outlets are typically located in areas before entry to the actual waste site where patrons can off-load items that have a potential reuse value and benefit from reduced waste disposal fees as a financial incentive to support the concept. It is imperative that this area is undercover to protect and preserve items of furniture and materials, and a formal shelving or raking system be used to display items until they are removed. It also should provide parking so as to not impede the traffic flow.

These facilities have the ability to divert a considerable amount of material from disposal if adequately supported by the community, who both donate and reuse items.

Recommendation

1. ***KIC support the establishment of a tip shop and seek external assistance in relation to the key measures of success and contracting arrangements.***

5.2.2 Household Hazardous Materials

Many properties, domestic garages and sheds contain out-of-date chemicals, including unwanted and often unknown pots and bottles of herbicides, pesticides and other substances. The list can include used oils, lead-acid batteries, nicad batteries, paints, toner cartridges, smoke detectors and gas cylinders. These are termed 'household hazardous materials' and all have a potentially detrimental impact on the environment if not properly controlled and disposed of correctly**.** These waste streams present significant risk in terms of fire, public and worker safety, and have the potential to create a significant environmental incident.

Charles Street Depot is the obvious point of disposal, however there is a lack of appropriate infrastructure to receive or store materials at this time. Staff members lack the knowledge and skills

regarding the correct handling of household hazardous materials. Australian Standard AS1940/2004 recommends the correct method for storage and handling of flammable and combustible liquids.

The shed should accommodate a household hazardous drop-off area along the wall between the office and driveway for common household problems wastes including fluorescent lights, smoke detectors, paint, gas bottles, fire extinguishers and batteries, if space permits. The diagram below is one suggested layout by NSW EPA (with standard signage).

Figure 2 NSW EPA concept drawing

Figure 3 Example of standard signage

New household hazardous separation and destination recommendations are:

- Paints – decanted into drums or IBCs on bunded pallets and shipped for disposal at an appropriately licensed liquid waste treatment facility, or small quantities placed in bunded area for evaporation;
- Fluorescent and CFL light bulbs – stockpiled for export in one-way shipping containers used to reduce breakage;
- Toner cartridges – stored separately and exported for recycling and/or reuse or delivered to the post office for export;
- E-waste/TVs – stockpiled in shipping container and exported for reprocessing;
- Smoke detectors – bin provided and exported;
- Chemicals – stored in an approved cabinet to prevent unauthorised access at an appropriate distance from all ignition sources, including smoking areas;
- Gas bottles and fire extinguishers – stored and exported to mainland for recycling or reuse.

The following management methods are recommended for a range of problematic materials:

5.2.2.1 Chemicals

ChemClear is a national program for collection and disposal of unwanted rural chemicals. From APC's enquiries, it appears King Island is eligible for assistance. An inventory is required but it is not onerous to compile. The information required typically includes the details of the label or any identifiable features; the manufacturer; product name; the expiry date; the size of the container; the quantity of the chemical remaining in the container, and an assessment of the container integrity. This is then sent to ChemClear for scheduling. ChemClear contacts all waste holders to determine a date and schedule an appointment time.

Chemicals are classified in two groups:

- Group One – chemicals that are currently registered. Rural chemicals manufactured by participating members are collected free of charge.
- Group Two – chemicals that are de-registered, schedules are unknown, out-of-date chemicals or chemical products of non-participating manufacturers. These attract a fee ranging from 10 cents to 80 cents per litre subject to the nature of the material.

The WMC needs to establish a dedicated area where the community can safely dispose of selected common household problem wastes. The interface should allow for easy and convenient use to dispose of materials. A designated undercover area must be provided with correct receptacles and signage. We propose that the area to the left of the shed entry, beside the office wall, be considered as the most suitable area for a dedicated problematic wastes area.

For dangerous goods, a permanent, purpose-built, fully enclosed and ventilated secure facility should be purchased to store chemicals. It must comply with the Dangerous Goods code.

A number of training courses are offered to equip council staff with the knowledge and expertise to correctly manage dangerous goods.

5.2.2.2 Fluorescent bulbs and tubes

Mercury-containing lamps (including fluorescents, compact fluorescent lamps (CFLs), and high-intensity discharge (HID) lamps) contain small amounts of mercury and are the largest single consumer product generating mercury waste to landfill in Australia. FluoroCycle is a voluntary partnership between government and industry to increase the recycling of mercury-containing lamps. The overall aim of this scheme is to reduce the amount of mercury-containing waste being disposed through increased recycling. A small number of companies specialise in recycling these products in Australia, including Chemsal and CMA Ecocycle. There are a number of options to both store and transport used lighting in purpose-built and designed cardboard or corflute boxes, which typically hold 100 x 4-inch globes and weigh approximately 20 kilograms. The disposal rate includes a fee per box plus recycling fee.

5.2.2.3 E-waste

Television, computers and printers are products that are part of a national TV and computer recycling scheme where the industry is required to pay for the recovery of these items at the end of their useful life. Each state government has had to enact regulations to support voluntary industry extended producer responsibility (EPR) programs. The Administration needs to ensure it is part of the scheme and that suitable storage facilities are established to store these products in an environmentally responsible manner prior to export. Product Stewardship Australia (PSA), Australia and New Zealand Recycling Platform (ANZRP) and Tech Collect are licensed to operate under the scheme. KIC should seek to be a designated collection point or to conduct a one-off clean-up of legacy e-waste on the island.

5.2.2.4 Toner cartridge recycling

The Cartridges 4 Planet Ark program was established to stop printer cartridges from ending up in landfill. Almost 60% of cartridges collected are returned to the original manufacturers for reuse, while the remaining cartridges are recycled with zero waste going to landfill. Australia Post supports the program by providing a cartridge collection point. Any site can register (1800 24 24 73) to receive collection box. Once the bag inside your box is full, return the bag of cartridges through Australia Post using the reply-paid sticker affixed to the bag.

5.2.2.5 Batteries

The Australian Battery Recycling Initiative (ABRI) has set up Batteryback Australia as an initiative to collect and recycle used alkaline lithium and reusable batteries containing toxic materials that should not go to landfill nor be burned. The establishment of battery banks has now become increasingly common, whereby old discarded batteries can be placed in attractive, clear containers enabling viewing of contents and provided at the point of sale for new batteries. A number of collection points could be established within the community where batteries are sold and a larger unit at the Charles Street for aggregation.

Recommendations

1. ***KIC provide a new community interface to allow for easy and convenient drop-off of household hazardous material;***

2. ***Contact ChemClear regarding the opportunity for the island to hold a used chemical clean-up and collection, if not previously held;***

3. ***Community education be undertaken to encourage the community to clean out unwanted household and farm chemicals and hazardous items;***

4. ***That an accredited trainer from Ag Safe or ChemClear undertake staff training on the correct storage and handling of chemicals;***

5. ***The services of ChemClear should be engaged to assess, pack and remove all chemical wastes accumulated annually or at other regular intervals determined, subject to the amount of chemicals accumulated;***

6. ***That bunded pallets be purchased and used to ensure any spill or leak is wholly contained;***

7. ***Consult the sector in relation to a chemical storage cabinet and training for staff to handle chemical waste at Charles Street;***

8. ***Contact PSA, Australia and New Zealand Recycling Platform (ANZRP) or Tech Collect seeking to establish an ongoing collection point or clean-up of used e-waste on the island;***

9. ***Contact Australian Battery Recycling Initiative in relation to battery recycling;***

10. ***KIC should register as a toner cartridge collection point with Cartridges 4 Planet Ark program;***

11. ***KIC should register with FluoroCycle as a collection point.***

5.2.3 Container refund scheme for used beverage containers

The Tasmanian state government announced that a Container Refund Scheme (CRS), aimed at both reducing litter and improving resource recovery, will be in effect from 2021 and will complement schemes in SA, NT, NSW, ACT, Queensland and WA from 2020.

The scheme places a value on an eligible beverage container packaged in glass, plastic, aluminium, steel or liquid paperboard between 150 millilitres and 3 litres in volume and contain alcoholic drinks (except wine and spirits) and non-alcoholic drinks (except pure juice and milk bottles over 1 litre).

The eligible container is returned to an approved collection depot and is eligible for a 10-cent refund. A network of 60 depots will operate across the state, with the operator receiving a handling fee to administer the program locally based on each container redeemed. The handling fee varies by state, location and volume of material processed, with the beverage industry taking full responsibility for all reverse logistics.

This scheme could be managed locally by any organisation with the capacity but has synergies with the tip shop. Ideally, it could be co-located at Charles Street Depot, although a more central location with adequate storage would be preferable, if available. In some communities, a mobile redemption service is offered to outlying areas via a trailer to collect and store containers.

It is important that KIC continue to monitor development and ensure that King Island is included as an approved collection depot in the statewide network.

Recommendation

1. ***KIC to advocate to ensure that an approved collection depot is provided on KI for residents and visitors to use, with responsibility for the export of the containers falling to the beverage industry.***

5.2.4 Organic management – commercial composting

Council currently has at its disposal large quantities of green waste, timber and cardboard. In addition, 48 per cent of businesses in the community consultation survey indicated a willingness to separate food waste. These raw materials can be used to manufacture compost and substitute imported mulches. Composting requires a combination of carbon and nitrogen with aeration to create heat to breakdown material.

In addition, the proposed new abattoir will be generating by-products suitable for composting and is proposing to initiate a composting process at their site. It makes sense to rationalise a composting activity in one location on the island, supplied with materials from both sources. The current multi-species abattoir has also indicated that they will be seeking to upgrade their operation and a requirement will be to compost waste. A composting program to process all organic waste is a cornerstone to waste diversion but requires appropriate infrastructure and a system that will process all organic wastes with minimal risk of odour or leachate production.

Unfortunately, no data is available on the amount of garden waste and untreated timber delivered to Charles Street Depot. A previous study conducted by the CSIRO for the kelp factory indicated that an estimated 400 tonnes of cardboard may be available. The amount to waste from the proposed abattoir is estimated at 8 tonnes per day when fully operational. This will be in approximately three years from commissioning, which is anticipated to begin in the third quarter of 2020.

To displace artificial fertilisers, a composting system must be able to deliver quality, reliable outputs to the proposed end market of local farmers. With the addition of food, which can create odour, and given the cold, high-rainfall climate, an open windrow compost system is not considered appropriate. This is because this system typically occupies a large surface-area-to-volume ratio making it more prone to drying out in hot weather and becoming flooded during rain; both factors which can significantly affect process control (which subsequently affects product quality, odour potential, re-work and production costs).

A number of composting systems are on the market. An options assessment with a scoring matrix should be developed against which all technologies are assessed for a comparative analysis. EPA's greatest concern will be odour and leachate. Real data on feedstock is required to calculate the size of the unit. The addition of food and abattoir waste facilitates the need for in-vessel composting systems similar to those on Lord Howe Island and Norfolk Island. Both islands have HotRot systems in place.

HotRot is a fully enclosed and insulated modular system that is designed to convert a variety of organic wastes into a quality product. Waste feedstock enters one end via a bin tipper or feed hopper. A

rotating tine-bearing shaft runs the length of the unit, turning intermittently, in both forward and reverse directions, to ensure the mix is uniform and moisture and heat is evenly distributed. Air is injected along the length of the cylinder ensuring the material is maintained in an aerobic state and the composting process proceeds at an optimum rate. This occurs without the emission of nuisance odour. As the shaft rotates, it releases excess heat, moisture and carbon dioxide, which are extracted by a fan and passed through a bio-filter.

Material is automatically discharged from the HotRot unit via a combination of shaft rotation and displacement down the unit, caused by waste additions at the opposite feed end of the unit. Material takes approximately 10 to 12 days to pass down the length of the vessel. Composted product is highly stable and mature on discharge (a maturity equivalent to that of windrow-composted material after six to nine months); the product is largely odour free. At this point, the compost conforms to recognised compost standards. APC recommends however, it is temporarily windrowed for two to four weeks to allow nitrogen-fixing to complete. This also allows for sampling and quality assessment.

Figure 4 The HotRot System

Photograph source: HotRot website

Each HotRot unit is equipped with monitoring equipment that provides on-line diagnostic facilities and an auditable record demonstrating compliance with international regulatory guidelines and standards.

HotRot units can operate effectively in a range of conditions with no artificial heat or microbes added to the process. Key parameters below:

1) Odour: HotRot is the only commercial composting plant manufacturer that provides a contractual odour-free guarantee.
2) Leachate: The HotRot system does not produce leachate.
3) Grease-trap waste: HotRot do not anticipate problems with trap waste,s provided they are not in excessive proportion to the total and bulked-up appropriately.
4) Sewage sludge: Sewage sludge is an excellent addition to the HotRot feedstock. Appropriately bulked sludge heats extremely rapidly within the units and will help to offset low pH problems that can occur with food wastes. HotRot has previously treated sludge with very good results.

5) Power availability: Expected power draw is 19kW. However, this is intermittent and there may be opportunities to program the unit to more evenly spread this load if required.
6) Transport to KI: Meeting the weight restrictions of the island may be a little problematic. HotRot can certainly undertake more on-site assembly than typical, but the stripped down 1811 hull will weigh over 4 tonnes (but less than 5 tonnes). If necessary, HotRot can redesign the system to breakdown further, but would prefer to examine the need for weight reduction in more detail first.
7) Manual handling: There will be no need for manual mixing with HotRot technology as the vessel is mixed every hour or so as part of normal operation.
8) Monitoring of the system: HotRot units are generally connected to the internet to enable remote support (provided this is available on site). If support staff are needed, on-site flights to the island are probably the limiting factor as HotRot can readily get to main Australian airports from NZ.
9) Vermin control: Even in the most extreme of process failures, HotRot have not seen the product attract vermin (other than flies, which may be attracted to moisture and warm temperature). The HotRot should be entirely compatible with rodent control. Furthermore, using a feed hopper would ensure untreated food waste could be contained.
10) Ongoing costs: The major operational cost for the system is the electricity consumption. The HotRot unit may require an operator for about one or two hours per day to load waste and remove finished product.
11) Maintenance: There are grease nipples on each machine that need periodic greasing. The gearbox oil should also be replaced at least every 12 months. It is recommended that the tines and bearings be visually inspected annually. HotRot and its agents offer preventative maintenance and support contracts, however, generally maintenance can be performed by any competent operator.
12) Operator training: Operator training is provided as part of the installation and commissioning process. HotRot can also provide additional training and refresher courses as needed.

KIC should conduct a feasibility study to:

a. Determine feedstock by quantifying the current amount of:
    - food waste available from the commercial sector;
    - garden organics delivered to the Charles Street depot to feed into the plant specifications;
    - cardboard generated households and commercial.
b. Determine current and future abattoir waste streams;
c. Investigate opportunities to include biosolids from the sewage treatment plant;
d. Determine outputs based on feedstock identified above;
e. Undertake market research with island farmers regarding the use of local certified compost to determine end markets and willingness to pay to establish the business case;
f. Enter into commercial discussions with the current and proposed abattoirs about contributing financial support to a single compost operation;
g. Consider siting options;
h. Consider technology options;
i. Consider operational aspects;
j. Consider market development;
k. Consider funding options and external grants.

5.2.5 Food waste

The community survey found that 75 per cent of residents and 44 per cent of businesses are proactively recycling food waste through composting, chickens, pets and worm farms or a combination of these. However, almost half (48%) of businesses said they would separate food waste to facilitate Council using it in compost. In mainland cities, dedicated 'wet' runs to collect separated food waste is becoming more mainstream as various new technologies are commissioned. Provision of 20 litre buckets with clsowe fitting lids are often provided in commercial kitchens whereas emptied into wheelie bins for collection. .

Many households try to separate food, but the most objections are that sealed units smell, vinegar flies proliferate and the washing out of the container is unpleasant. To overcome these issues, a number of purpose-designed and manufactured kitchen tidies are now on the market aimed at assisting councils to encourage their communities to separate food scraps in the kitchen. Bio-baskets are the most common in the marketplace and are designed to allow air movement to prevent odours being generated. The bio-baskets are lined with a corn starch bag that, when full, is placed into another receptacle (i.e. 20 litre food bucket) for composting commercially or placed in a home compost or worm farm.

Figure 5 Food waste receptacles – aerated kitchen bench-top bins

It is strongly suggested that bins stickers, small poster/flyers and fridge magnets be printed to encourage correct household use. Wall posters for restaurants are also effective.

Recommendations

1. ***Undertake a feasibility assessment to determine the viability of an island composting facility to process organic waste into an Australian Standard (AS4454) compliant compost or soil conditioner for use on the island to reduce the reliance on artificial fertilisers;***

2. ***Encourage greater organic waste separation for residents by providing subsidised worm farms and/or compost bins;***

3. ***Promote organic management training in partnership with the King Island Natural Resource Management Group at the Phoenix community garden.***

5.2.6 Fuel substitute for kelp factory

The kelp factory gasifier currently operating at the King Island kelp factory is consuming approximately 1,200 square metres of timber per annum. A solution to this current operating practice is to look for alternative fuel replacement options available on King Island which could reduce or replace the use of timber as the primary source of fuel.

Management was keen to explore more sustainable alternatives. Ten years ago, it engaged the CSIRO to undertake a feasibility study on the use of cardboard as a potential fuel substitute. The research concluded that briquetting cardboard provided a viable alternative fuel source but this was not economically favourable at the time. In order to determine whether materials currently going to landfill are suitable as an alternative fuel at the kelp factory's gasification system, several steps are required, including:

Indicative costs to undertake the above (excluding item 2) would cost approximately $40,000, subject to the number of materials selected for characterisation and a time frame of eight weeks.

Recommendations

1. ***If the compost facility fails to justify the investment, conduct a feasibility study to determine appropriate alternative fuels for the kelp factory furnace and combustion characteristics of such fuels.***

5.2.7 Recycling

It is evident from the community consultation there is a strong desire by the community to recycle more. To offer the community more recycling opportunities, materials actually need to be recycled or stockpiled until sufficient quantities are generated for recycling. If the community separates materials and then finds that KIC are landfilling, community confidence is breached. Most reprocessing of materials occurs on the mainland, which requires aggregation by material type and densification to consolidate materials into the smallest amount of space possible to reduce freight costs.

Paper and cardboard, plastics and metals are eligible for the freight equalisation program, which applies to Victoria to reduce freight costs.

Most Australian councils offer a kerbside service and collect used packaging materials including steel and aluminium, plastics, glass, liquid paperboard, paper and cardboard on alternate weeks to the weekly garbage service in wheelie bins. This material is delivered to a facility for sorting into separate materials called a materials recovery facility (MRF). An MRF consists of a series of conveyors, with bunkers or bags to contain materials for later baling. All materials require some form of pre-processing for use either on the island or to be exported.

Even without the kerbside collection, there are two ways the community can deliver an expanded range of materials for recycling:

1. Depositing items in separate containers by material type;
2. Delivering all materials unsorted (termed commingled) and then KIC staff sort the materials.

There are a number of current and emerging issues which will impact on any future recycling service including:

- The state government of Tasmania announcing the establishment of a container refund scheme;
- The limited access to offshore markets as a result of China Sword. The closure of many Asian markets coupled with increased quality specifications making it virtually impossible for Australia to achieve the standard.

5.2.7.1 Container refund scheme

It is not known if King Island will be included or excluded from the scheme and whether a collection depot will be established on the island. This level of detail about the scheme is not known at this time. Five other Australian states have functioning deposit/refunds schemes in place for used beverage containers. It is assumed a Tasmanian scheme would include the same materials – water, juice, soft drink, flavoured milk and beer between 150 millilitres and 3 litre packaged in glass, plastics, aluminium, steel and liquid paperboard and excluding milk, juice larger than 1 litre, flavoured milk larger than 1 litre, wine and spirits. In different states, different levels of responsibility are accepted by the beverage

industry for the transport logistics and payment of fees to oversee the collection. What is common is that all materials recovered must be recycled and a refund is paid on deposit.

King Island could negotiate a processing fee for glass crushing on the island and bale all aluminium cans and plastics for export. A handling fee is paid by the beverage industry to the operator of the collection point.

5.2.7.2 Market access

Australia has for many years relied on overseas markets to process cardboard and plastics. In 2017, China announced restrictions on the import of 24 types of waste (effective in January 2018) and included increasing the quality standards. This has had a dramatic impact on the Australian recycling sector and on recycling viability. A consequence for King Island is that careful consideration is needed to ensure outlets and markets are available and quality specifications can be achieved for materials which require export, regardless of whether this is to Tasmania, the mainland or an overseas market for reprocessing.

As a result, securing new end markets at this time is challenging, with one of Victoria's largest processors closing down and, as a result, up to 60 councils and 400,000 tonnes of material now homeless. Given these market conditions, it is not appropriate for KIC to enter the market for materials that will require export. However, Council has invested in equipment worth $120,000 which is yet to be used,but could provide on-island solutions. These include local processing of glass and cardboard and export of plastic film to Tasmania, where a vibrant recycling plant for plastic film and some rigid plastics is operating.

5.2.7.3 Sorting recyclables

An alternative to delivering each material individually (i.e. plastics, steel cans, aluminium cans) is to combine these and deliver a commingled stream, which has become the norm in Australia and New Zealand. Sorting post-collection is then undertaken. This mixed recycling stream must then be separated by installing a single mini-sorting system for manual sorting of recyclables. Target material would be mixed plastics, steel and aluminium cans. Glass would pass through the system into a bunker for crushing.

A typical equipment package includes a loading conveyor, incline conveyor, sorting conveyor, sorting platform, installation and control system. This is very similar to the system in place at Lord Howe Island where staff undertake a positive sort of the selected material.

Figure 6 Lord Howe Island mini-sorting line and baler

Bin lifter and hopper

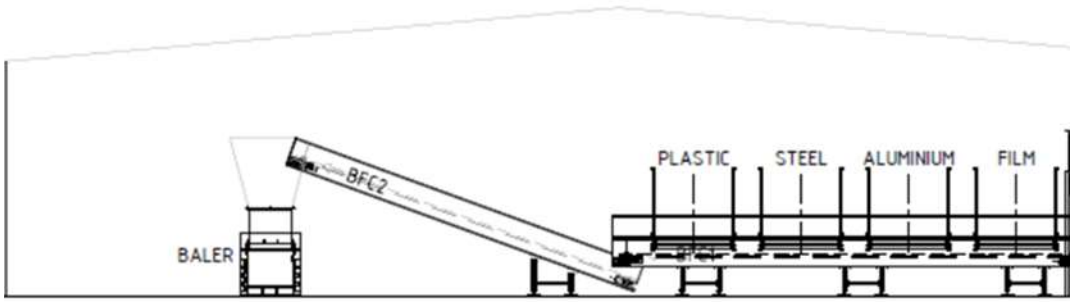
Horizontal baler at Lord Howe

Elevated conveyor belt and sort chutes

Baled mixed plastics awaiting export

The supply of a turnkey system is approximately $125,000. A new high-density baler will bale all materials to produce maximised payload weights for transport and handling-logistics efficiency.

Figure 7 Proposed MRF layout



5.2.7.4 Cardboard and tyre shredder

This unit appears to have been purchased with the intent of providing feedstock for briquettes made from cardboard as an alternative fuel source for the factory furnace to the kelp factory. The equipment has not been used but is ideal to shred cardboard for composting. This machine should be fed continuously by a conveyor belt integrated into the design (above) at a steady pace and elevated to allow discharge of the material into bulk bins.

5.2.7.5 Glass

Glass pulverisers are well suited for remote areas where recycling glass back into bottles is not economical. Glass can be crushed into gravel or sand-size pieces so that the material can be used in construction projects with no sharp edges. A variety of pulverisers and mills are available but glass is very abrasive and any machinery requires high levels of maintenance. Care should be taken when calculating wear during glass processing on a tonnage basis, as wear tends to occur on a time basis rather than a volume basis.

The Andela Glass Pulveriser purchased by KIC is specifically designed to deal with post-consumer glass products and screens out steel and plastic caps, straws and labels, producing a clean glass stream. The unit accepts all kinds of glass and pulverises it into an aggregate with the consistency of sand and fine gravel. The current unit is labour-intensive as each bottle is manually loaded.

Image 3 Manually loading the pulveriser

These units have been designed to be installed at the end of MRF conveyors, with the glass remaining on the belt and top-fed. Staff have expressed concerns about glass dust, as the unit is inside the shed when **typically they are located outside** to minimise the abrasive nature of the dust. As a result of safety concerns and no plan to use the material, staff have ceased using the machine.

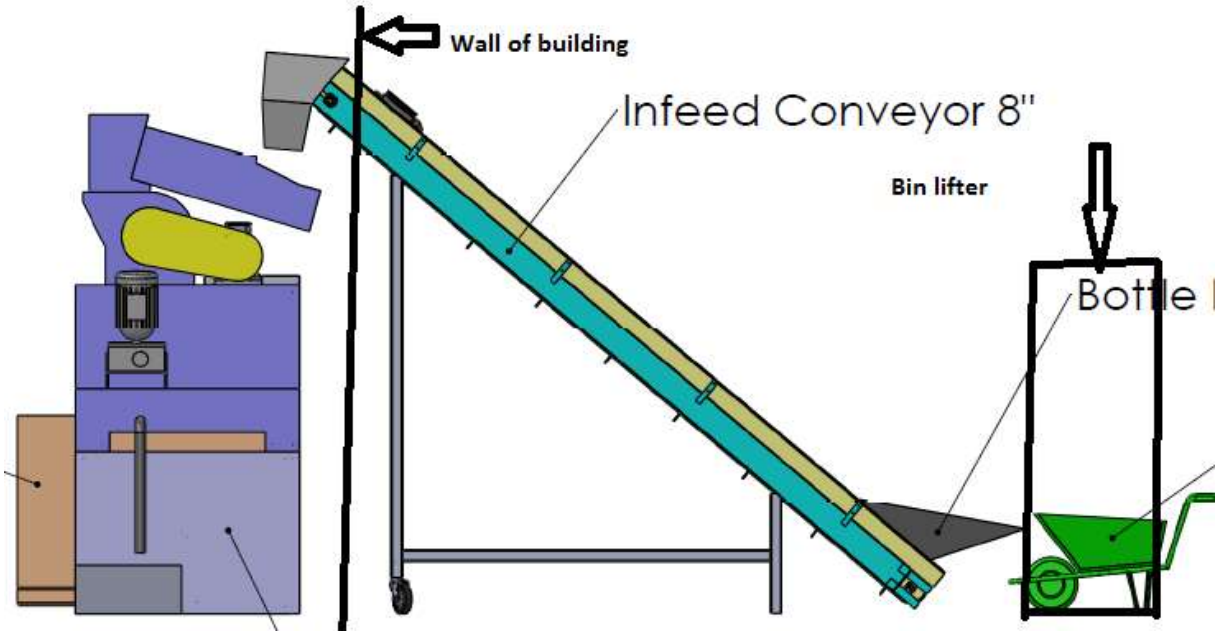
A quote has been received from Waste Initatives to install and conevor inside the shed the loda the glass onto via a 240 litre bin lifter that will convey the glass to the pulveriser which should be located outside the shed and mounted on a stand and the glass is feed from the inside of the building. Indicative costs to the Port of Melbourne are shown below.

Table 5 Costs of equipment to support glass pulveriser

Activity	Costs ext GST
Stand for the pulveriser including waste chute	$2,375.00
Bin for under pulveriser	$1,500.00
Conveyor including hopper	$20,300.00
Binlifter	$11,850.00
Installation and commissioning	3500.00
Total	**$39,525.00**

The unit when modified would look something like the below drawing which is the system is in use at Cocos Keeling Islands. (Ignore the wheelbarrow as this would be replaced with a wheelie bin).

Figure 8 Glass pulveriser relocated outside shed



It is important to feed the machine at a consistent and fast rate and to get maximum life from the wear parts. Operating costs to produce a 6 mm aggregate maximum are $12 per tonne, not including capital or site costs. Consumables and maintenance of the hammer and liners are $2,000 each and need to be replaced at every 80 tonne through-put. The projected cost of consumables is about $10 per hour, however, based on the very small quantities of glass being processed, it is likely to be substantially more as the machines work best with higher feed.

A key feature of the Andela is its capacity to process 1 tonne per hour without jamming, blocking or bridging. It is important to have an immediate use for crushed glass, as its storage in open stockpiles can cause issues with runoff. Storage of processed glass is possible in 'bulka' bags.

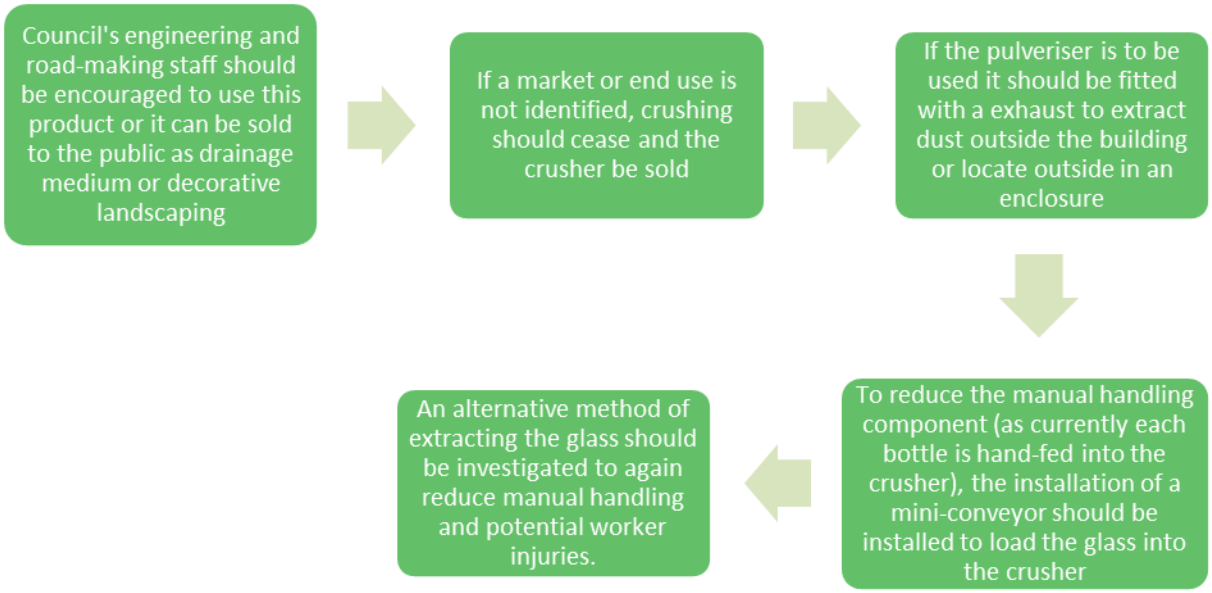
The unit is lined with replaceable liners and the product is discharged directly through a trommel at the end for size separation. Typically, the trommel screen sizes are 0–3 millimetres or 3–10 millimetres.

Image 4 Suggested glass sizes

3–10 mm

0–3 mm

The intent was to use glass sand in road-making, however this has not occurred. Given the price of aggregate and sand, crushed glass has a number of secondary uses and application for use on the island in a variety of applications, including water filtration medium and driveways. The Recycled Glass Sand Specification was developed for use by local and state authorities and others responsible for the procurement of materials, and the construction of paving and roads and provides a common standard for use in Australia. For drainage applications such as retaining wall backfill and drains, the permeability of -7 mm cullet material is about the same as that of natural sand and the permeability of the -20 mm cullet material is about the same as that of natural gravel. Therefore, fill material made of 100 per cent cullet could be used for the construction of drainage facilities and to displace virgin aggregates in these applications. Crushed glass can be used extensively by the community as an aggregate replacement for driveways and drainage – this is a common practice on Norfolk Island. Crushed glass is used extensively for reed beds as part of a waste-water treatment strategy at Lord Howe Island. We suggest the following actions should be considered:



Recommendations

1. ***As a priority a budget allocation of $40,000 be madeto relocate the glass pulveriser outside the shed and fed by a mini conveyor with the crushed glass-sand used or sold as an aggregate replacement;***

2. ***KIC awaits more details on the implementation of the CRS scheme prior to introducing new recycling initiatives;***

3. ***KIC considers locating the collection refund point at Charles Street Depot to centralise all activities;***

4. ***KIC continue to monitor market conditions for commodities and seek secure markets prior to establishing new recycling programs;***

5. ***When markets recover, a mini material recovery facility (MRF) be installed within the existing shed to enable efficient separation of materials with conveyor belts, magnetic head and baler. The existing glass crusher and paper shredder should be incorporated into the MRF design.***

5.3 Implementation

5.3.1 Waste Advisory Committee

It is recommended that a Waste Advisory Committee (WAC) be formed, drawing representation from a cross-section of the community, in order to move the implementation of this strategy forward and foster strong community ownership of waste solutions. This approach has been highly successful on a number of projects as each committee member reports back to their networks on progress. It is suggested, at a minimum, the following sectors and specific interest groups be represented:

- Council (elected and staff member);
- Tourism;
- Retail;
- Education;
- Media;
- Community representative;
- Technical adviser.

This committee should meet monthly, or as and when required, to oversee and guide the implementation. Some internal secretarial support will be required by the Waste Advisory Committee. In addition to the main committee, a number of sub-committees should be established, focusing on specific aspects including community education and engagement. These groups will report back to the main committee on specific progress.

Those communities which have achieved their strategic outcomes within a reasonable time frame, as outlined in their respective waste strategies, are those where an external provider was engaged to oversee the project implementation. All island and remote locations have limited staff, limited resources and generally lack the expertise to focus on waste programs, which are often multi-faceted and rely heavily on the engagement and support of every household, business and individual. A budget allocation should be provided for external technical support to oversee the implementation program,

given the limited resources within Council. WAC meetings should coincide with availability of the technical adviser by phone, video conference or in person. We have suggested an external technical adviser be appointed. It is suggested that two days a month be allocated for 24 months to drive the project, with fees included under project management.

Recommendations

1. ***A Waste Advisory Committee (WAC) be formed drawing representation from a cross-section of the community;***

2. ***A technical advisor be engaged to oversee and guide the implementation of the strategy, including the preparation of a detailed waste management plan, budget and timeline, subject to budget approvals and agreed priorities.***

5.3.2 Education and community engagement

Council needs to rebuild community confidence that waste is being managed in accordance with acceptable standards. Council also needs to establish an extensive community consultation and education program to clearly articulate what is happening currently and what will be undertaken in the future, including indicative timelines. Education and information are critical first steps to empowering the community to alter current behaviour and to interact with a new waste-management framework.

Every day, every household, business, and activity generates waste. Any education and community engagement program must be multi-faceted in order to reach all sections of the community. It is essential that any waste system is easy to understand – complicated systems lose participants. People incorrectly interact with waste systems due to apathy, arrogance or ignorance. The role of education and community engagement cannot be underestimated.

Implementing an education campaign produces good results initially but sustained behaviour change is required. Ongoing actions and activities are needed to maintain the focus of the community.

Contamination levels and the amount of separation of materials are a reflection of the success or failure of an education program. Any education program will be multi-pronged and ongoing, targeting residents, staff and visitors.

The formation of a formal or informal waste education working group can assist, with the branding, bin signage, bin stickers, and posters activities aimed at the all or specific segments of the community carefully considered.

A budget allocation needs to be made every year for community education and engagement. The basic tools for effective waste education include:

- Website and social media – a dedicated waste page with links to other sites;
- Brochures and information based on the principle of ‘Less is More’. Clear, simple text; generic, consistent, appropriate images; and consistency;
- Personal engagement;
- Interactive activities to build capacity and understanding.

CCWMG have excellent existing resources, website and fact sheets which KIC could assess if membership was renewed.

Once Council has made a commitment to implement this strategy, and a timeline agreed, a part-time waste education officer should be employed to engage, educate and motivate all sections of the community in the quest to improve waste management on King Island. This person should be part of the WAC.

Other islands have used 'train the trainer' workshops and programs, and a 'behind the scenes' tour of waste facilities when fully commissioned for the community and visitors. This will assist the community's understanding and appreciation of why certain actions are requested. Tours were offered on days when the depots were closed to the public due to OH&S concerns and staff availability.

Recommendations

1. ***A Waste Education Working Group be established to develop a education strategy;***

2. ***Design, develop and implement an extensive community, school and visitor education, communication and engagement program highlighting the need to reduce waste and improve resource recovery;***

3. ***Consideration be given to appointing a part-time waste education officer to engage, educate and motivate all sections of the community in the quest to improve waste management outcomes.***

5.4 Administrative support

KIC was a member of CCWMG, however membership has lapsed. Cradle Coast Waste Management Group (CCWMG) was established by its local member councils to coordinate waste management services, develop and implement waste management and recycling projects, and raise awareness of best-practice waste and recycling. The group is supported by member-council contributions and/or funds raised through a voluntary waste levy on all waste disposed to landfill in their respective councils. Current members of CCWMG are seven northwest Tasmanian Councils. They are:

- Burnie City Council
- Central Coast Council
- Circular Head Council
- Devonport City Council
- Kentish Council
- Latrobe Council
- Waratah-Wynyard Council

Dulverton Waste Management provides project management, administration, financial and communications support and manages the delivery of initiatives funded by the regional voluntary waste levy on landfill by each council.

CCWMG has indicated that they would welcome discussions around collaboration with KIC or working together on specific projects and initiatives of interest. Given the range of issues KIC are facing transitioning their waste management practices, and the lack of technical staff and resources, re-joining

CCWMG provides direct access to this group and its considerable knowledge and resources, and is therefore highly recommended. KIC would then have access to use all the education materials captured under the http://rethinkwaste.com.au website and the regional waste managers can provide a source of ongoing technical support and guidance to King Island staff.

'Should King Island wish to become a member of the CCWMG there would be a cost associated with this. Currently the CCWMG is funded by the voluntary waste levy of $5/t of waste disposed of with each council area. However, CCWMG management are willing to look at other funding options and to discuss costs based on what activities and how KIC seek to participate with the group. Given the stretched council resources joining the group and sharing initially waste education and communications resources (rethink waste website http://rethinkwaste.com.au and facebook page) could be of great resources if the messaging is aligned. Should KIC wish to participate in specific activities then specific fees can be looked at.' Mel Pearce, Project Officer, Dulverton Waste Management

Based on 750 tonnes to landfill, the annual fee would be $3,750.

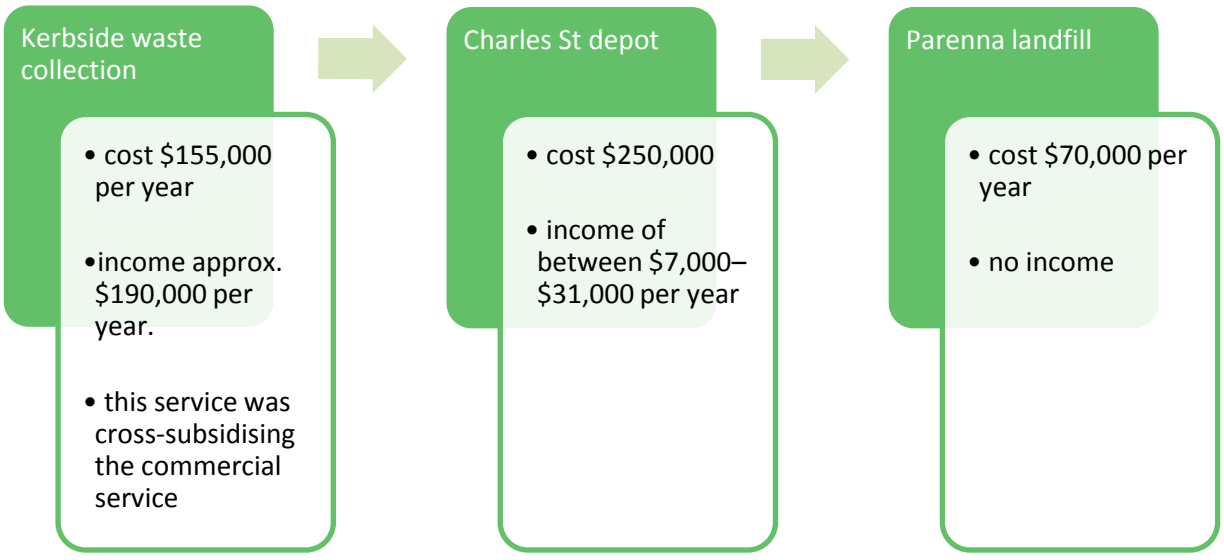
Recommendation

1. ***KIC should seek to re-join CCWMG to provide both ongoing technical support, advice, direction and networking opportunities with possible collaboration on specific projects and/or initiatives of interest.***

5.5 Financial management

Waste collection is the one service Council provides to every household and a selection of commercial premises every week. The cost of running the entire waste management program, including both Charles Street Depot and Parenna landfill, was reported as $684,000 as at 30 June 2018. The income to offset this expenditure was reported as $601,000, providing a net operating loss of $83,000.

Income is derived from rates, user fees charged to commercial customers for waste collections and tip fees recovered at Charles Street Depot. The Waste Management Review 2016 indicated that at that time the cost to run the various services and facilities was:



With compliance costs increasing and projected waste volumes likely to increase, Council must ensure waste services are operating as efficiently as possible to contain escalating costs. Operating two landfills increases Council's future costs and liability. Council also needs to ensure that the waste management budget is operating on a cash-positive basis, as reserve funds will be required to cap, close and remediate both sites at their end of life. The costs to cap, close and remediate the former Charles Street site, and undertake activities to meet compliance at both Parenna and Charles Street landfill, is estimated at $500,000.

Further, future new landfill cells will be required over time, with the current cell costing around $380,000. Future cells could be double this amount. In addition, investment in new technology to aid resource recovery as specified in this strategy will be required. These funds cannot be raised in one year alone.

While some funding for new approaches may be available as stimulus packages to aid the circular economy and greater resource recovery, these typically require matched funding. In NSW, a Domestic Waste Management Charge (DWMC) is identified on all rate notices and is a charge levied specifically for the purposes of cost recovery for waste management activities. This charge cannot be hypothecated to other activities. It can, however, be used to build a reserve fund for future capital works.

The amount charged by local councils nationally varies considerably from $280 to more than $500 per property based on the level of service provided, location and asset management. Typically, the charge includes the cost for or access to a waste management system, which in urban communities is a kerbside collection of garbage, recycling and garden organics or in rural areas is access to a transfer station or landfill to self-haul materials. Costs associated with street sweeping, litter management, street litter bins, community education, waste management centre and/or landfill operations, facility licensing, compliance and reporting to statutory authorities are also included. In addition, most councils throughout NSW and indeed Australia also incorporate a component for future funding to cap and close landfills, upgrade waste facilities and invest in new technologies that do not occur in a linear manner.

5.5.1 Variable bin sizes and differential charging

Where a kerbside service is provided and differential bin sizes are offered, councils tend to charge significantly more for bigger bins because a larger amount of waste is produced and the fee acts as a disincentive and therefore to promote waste minimisation. The table below indicates how a number of NSW councils have introduced variable bin pricing to provide a financial incentive to householders to downsize the standard waste bin and act as a disincentive to have larger bins which accommodate more waste.

Table 6 Variable bin charging examples

Council	Mosman	Wollongong	Hunters Hill	Leichhardt
Bin size	Cost/yr	Cost/yr	Cost/yr	Cost/yr
80L	$288	$283	$271	$388
120L	$469	$370	$387	$461
240L	$980	$605	$523	Not available

To establish the amount of income required, an annual operating budget for current and projected waste management activities is required, which is then divided by each occupied portion. Typically, unoccupied vacant land pays a minimal fee.

5.5.2 End-of-life vehicle management

KIC is also faced with the responsibility for the end-of-life management of all products. Other jurisdictions are faced with the same issues and have taken various approaches in respect to the disposal of motor vehicles. For more than 25 years, Lord Howe Island has implemented a strictly enforced 'one car on, one car off' policy. Car ownership limits apply and approval from the LHI Board is required for every car imported. For any car brought onto the island, the existing vehicle must be removed at the owner's expense on the same voyage. The cost of removing cars is not borne by the Council.

We see King Islands' administration has two options to manage future end of life motor vehicles:

1. Adopt the 'one car on, one car off' approach, which is strictly enforced and places responsibility for end-of-life management with the last registered owner; or
2. An advance disposal fees (ADF) on imports of problematic items including motor vehicles and farm machinery, collected at the point of importation. Such funds must be quarantined for this purpose.

Close collaboration with the freight services companies and declaration by owners/importers will be required. All vehicle imports and any vehicle transfers need to be recorded to reduce end-of-life vehicles on the island.

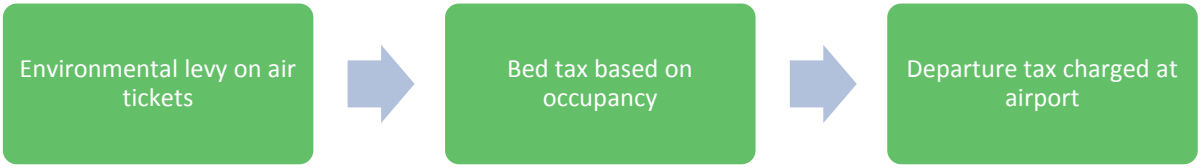
5.5.3 Tasmanian Freight Equalisation Scheme

The Tasmanian Freight Equalisation Scheme (Schedule 1) lists a range of eligible products to which the scheme applies, including a number of waste and scrap materials:

- E-waste 39960
- Metal waste and scrap 39300
- Miscellaneous textile wastes 39210
- Recycled glass 39290
- Used tyres 39260
- Waste organic solvents, such as oil 39940
- Waste, scrap paper or paperboard 39240
- Waste, scrap of plastics 39270

5.5.4 Visitor and tourists' contribution

The community consultation strategy sought to explore ways by which visitors to the island can contribute to the cost of providing effective waste services given the small rate base. The options presented were:



Having an environmental levy on air tickets gained the most first preferences, closely followed by a bed tax based on occupancy. A departure tax was less popular.

Recommendations

1. ***KIC should undertake a full review of income and expenditure to determine if current fees and charges reflect true operating costs of both disposal facilities and waste collection;***

2. ***The waste management fee should be identified on the rates notice and ring-fenced for waste-related activities only;***

3. ***All fees should relate to the actual costs of managing various waste streams. This will require greater day-to-day data collection on deliveries to confirm quantities;***

4. ***KIC needs to consider financial mechanisms to create a reserve fund to assist with end-of-life management costs of specific problematic waste streams that must be exported;***

5. ***KIC should monitor new funding opportunities from both state and federal governments to build local processing capacity for improved resource-recovery outcomes;***

6. ***Establish a reserve fund to ensure adequate funds are available to undertake routine maintenance at the landfill and to ensure ongoing compliance with the Tasmanian EPA. Funds would also need to be adequate to fund landfill licence conditions and to cap and close landfill cells and build new cells as and when required;***

7. ***KIC should utilise the Freight Equalisation Program to return appropriate materials for recycling to Victoria, including scrap metal, e-waste, glass, tyres, oil, cardboard and plastics;***

8. ***Explore the option of establishing an environmental levy on air tickets or a bed tax based on occupancy to capture a new revenue stream to assist with cost recovery of waste management from the visitor/tourism market.***

6. STRATEGIC FRAMEWORK

This strategy seeks to provide guidance on the steps and actions required to successfully make the transition to a more resourceful island community. With any small island with a limited rate base, change needs to happen over time unless external funds can be secured. This strategy provides a roadmap of what needs to happen, with priorities assigned.

Council must engage with the community to ensure sustainable waste management becomes a normal, embedded behaviour. Providing new and enhanced opportunities, equipment, resources, policies, knowledge and information for the community, Council and its staff can make informed decisions to improve waste management outcomes.

To achieve any strategy there is a need to develop measurable and achievable key performance indicators (KPIs). Currently, there is a lack of quantifiable data relating to waste management generation or composition. While targets have been set in the national, state and regional waste strategies for waste management, including litter and recycling, these are not appropriate for King Island, which is at a far lower level of activity than mainland and regional counterparts, where councils have been actively involved in resource recovery and recycling for more than two decades.

We therefore recommend the KPIs and targets be revised after the waste audit is conducted. The audit will quantify the magnitude of the opportunities available. The waste audit should seek to quantify the present baseline. In this way, targets are not subjective nor aspirational but real, relevant and quantifiable over time using the same or similar methods to measure.

Further, given the pace of change in the waste sector and implication of federal and state actions and policies, including the rapid change in societal expectations, it is appropriate to undertake a five-year review. This will allow an assessment of what has occurred, what has been achieved, what has worked and what has failed, as well as other emerging options not available at the time of writing this strategy.

King Island is significantly affected by changes in political decisions at state and federal levels. Examples of this include the announcements in June 2019 regarding the introduction of the statewide landfill levy and container deposit legislation. Further, in the next 12 months, significant new information will be known about the proposed statewide landfill levy, its applicability or not to King Island, how it will be administered, the quantum of the levy, its measurability in remote locations without weigh-bridges and where the funds raised will be directed. Likewise, details regarding the introduction of a CDS, which aims to recover 80 per cent for eligible used beverage containers at 60 refund points, will be a significant game-changer that hopefully will benefit remote and isolated councils such as KIC.

There is a number of possible options that have been considered with the overall objective to increase resource recovery and in so doing improve the current environmental performance of King Island's waste management system. Each of the options has been considered in relation to the economic, social and environmental benefits achieved by its implementation.

Research, situational analysis, community consultation and stakeholder engagement have all contributed to developing the most appropriate integrated waste-management system for King Island,

based on known facts and information at this time and having due regard to the unique characteristics of this remote locality.

It is recommended that King Island Council adopt the following vision for waste management:

Vision: ***'Improve waste management practices to enable greater resource recovery and circular-economy outcomes for a sustainable future.'***

Mission: To maximise resource recovery and minimise waste generation in accordance with the principles of the waste management hierarchy, the need for continuous improvement and social equity.

Key performance indicators: These reflect both the State Action Plan and National Waste Policy, seeking to both reduce waste generation and increase diversion, with a local focus on organic diversion:

- Increase recovery of glass, cans, plastics by 50% by 2023;
- Reduce organics waste (food, cardboard and garden waste) to landfill by 50% by 2024;
- Average recovery rate from all waste streams by 2025 and 80% by 2030;
- Reduce overall waste generation by 10% by 2029.

Key actions and timeline by priority

The following are key actions grouped by priority and time frame:

- KIC undertakes site works to temporarily cap the former Charles Street Landfill site to the satisfaction of the EPA by 2020 .
- Conduct a waste audit to develop baseline data and to inform strategy implementation and targets setting by 2020;
- Establish a reuse shed or tip ship by 2021;
- Establish a program to collect and recycle plastic film and silage wrap by 2021;
- Introduce differential service options by bin size for both commercial and residential customers, with options of 140, 240 or 360 litres by 2021;
- Lease new collection vehicles to service multiple bin sizes ranging from 140–360 litres by 2021;
- Establish source-separation programs for hazardous and problem household wastes by 2021;
- Address legacy scrap metal, garden and wood waste by 2021;
- Upgrade and close Charles Street Landfill and covert to a transfer station by 2022;
- Establish an compost facility by 2022;
- Reduce organics waste (food, cardboard and garden waste) to landfill by 50% by 2022;
- Participate in the state-based container refund scheme and increase recovery of used packaging by 50% by 2023;
- Review impact of CRS and establish new and improved recycling opportunities by 2023;
- Reduce overall waste generation by 10% by 2029;
- Review strategy progress 2024.

In order to achieve these key performance indicators and the range of opportunities, 62 recommendations have been identified**.** The following tables set out the recommendations collated from this report, grouped by priority and time frame.

The consultant has determined the following priority rankings:

- Immediate
- Urgent – within 1 year
- Very High – within 2 years
- High – within 3 years
- Medium – within 4 years

Table 7 Priority issues – immediate

No.	Recommendation
1.	All scavenging by the public cease to reduce liability and site risks
2.	Opening hours be extended or modified to accommodate business, tradespeople and the public with earlier opening and/or later closing.
3.	KIC undertake site works at Parenna Landfill in accordance with the Operations Manual and licence conditions
4.	KIC undertake site works at Charles St in accordance with the Environmental Management Plan and licence conditions.
5.	That bunded pallets be purchased and used to ensure any spill or leak is wholly contained.
6.	KIC support the establishment of a tip shop and seek external assistance in relation to the key measures of success and contracting arrangements.
7.	That KIC should seek to rejoin CCWMG to provide both ongoing technical support, advice and direction as well as networking opportunities with possible collaboration on specific projects and/or initiatives of interest
8.	KIC should utilise the Freight Equalisation Program to return appropriate materials for recycling to Victoria including scrap metal, E waste, glass, tyre, oil, cardboard and plastics
9.	That KIC confirms that Envorinex in Tasmania can recycle all plastic shrink wrap and silage wrap and some hard plastic from the island and seek support from Hydro to financially underpin the project as it does on Flinders Island
10.	KIC should undertake a full review of income and expenditure to determine if current fees and charges reflect true operating costs of both disposal facilities and waste collection.
11.	All fees should relate to the actual costs of managing various waste streams. This will require greater day-to-day data collection on deliveries to confirm quantities

Table 8 Urgent priority issues – within one year

No.	Recommendation
12.	Charles Street Depot be renamed the Charles Street Resource Recovery Centre
13.	KIC as a priority undertake site works to temporarily cap the former Charles Street landfill site to the satisfaction of the EPA
14.	Given the lack of any data on current waste generation and composition it is imperative that a waste audit be undertaken on household, commercial premises and self-haul to Charles Street Depot to enable accurate design and development of infrastructure that is both scaled appropriately and fit for purpose.
15.	A Waste Advisory Committee (WAC) be formed, drawing representation from a cross-section of the community
16.	Establish a reserve fund to ensure adequate funds are available to undertake routine maintenance at the landfill and ensure ongoing compliance with the Tasmanian EPA. Funds should be available to cover landfill licence conditions and to cap and close landfill cells and build new cells as and when required

17.	Engage a technical advisor to oversee and guide the implementation of the strategy, including the preparation of a detailed Waste Management Plan, budget and time-line subject to budget approvals and agreed priorities
18.	Council offer the community variable bin sizes – 140 litre and 240 litre – to encourage source separation for recycling to reflect differing household needs in relation to waste generation
19.	Differential fees are introduced for variable bin sizes to reward waste minimisation
20.	Council offer commercial customers the choice of 240 or 360 litre bin options
21.	Commercial premises be encouraged to separate waste into four streams – food, paper/ cardboard, recyclable containers and general waste with differential fees based on costs to manage each waste stream
22.	Council trade in or sell both current collection vehicles and investigate leasing a new collection vehicle that can service both residential and commercial premises and a range of bin sizes from 140 to 360 litres.
23.	A reuse centre or tip shop be established as an avenue for reuse of furniture, building material, bric a brac with the operation outsourced to a private operator or council
24.	That improved operations including site layout and traffic management be introduced based on the CCWMG Resource Recovery Centre and Transfer Station Best Practice Guideline
25.	Improved source-separation opportunities be established for a broader range of materials and the public encouraged to participate through both improved site layout, signage, communication and pricing mechanisms
26.	Differential fees should be introduced at the waste facility to encourage source separation that relate to destination of each product
27.	A budget allocation of $40,000 be made to relocate the glass pulveriser outside the shed and feed by a mini conveyor with the crushed glass-sand used or sold as an aggregate replacement
28.	KIC should collect and report data in a manner consistent with CWMG for regional consistency.
29.	KIC seek to apply to the EPA to increase the licence limit at Parenna landfill from 1500 tonnes to 2499 tonnes per annum
30.	Undertake a feasibility assessment to the establishment of an island composting facility to process organic waste into an Australian Standard (AS4454) compliant compost or soil conditioner and liquid fertiliser for use of the island to reduce the reliance on artificial fertilisers
31.	To manage legacy garden waste, seek quotation from a local operator to process all garden waste and timber offcuts or, if the scale is too large, seek a tender for a tub grinder to process the stockpile
32.	KIC provide a new community interface to allow for easy and convenient drop-off of household hazardous material
33.	Contact ChemClear regarding the opportunity for the island to hold a used chemical clean-up and collection if not previously held
34.	Community education be undertaken to encourage the community to clean out unwanted household and farm chemicals and hazardous items
35.	An accredited trainer from AgSafe or ChemClear undertake staff training on the correct storage and handling of chemicals
36.	The services of ChemClear should be engaged to assess, pack and remove all chemical wastes annually accumulated or at other regular intervals determined subject to the amount of chemicals accumulated
37.	Consult the sector in relation to a chemical storage cabinet and training for staff to handle chemical waste at Charles Street
38.	Contact PSA, Australia and New Zealand Recycling Platform (ANZRP) or Tech Collect seeking to establish an ongoing collection point or clean-up of used E waste on the island

39.	Contact Australian Battery Recycling Initiative in relation to battery recycling
40.	KIC should register as a toner cartridge collection point with Cartridges 4 Planet Ark program
41.	KIC should register with FluoroCycle as a collection point
42.	KIC to advocate to ensure that an approved collection depot is provided on KI for residents and visitors to use, with responsibility for the export of the containers the responsibility of the beverage industry
43.	The waste management fee should be identified on the rates notice and ring-fenced for waste-related activities only
44.	KIC need to consider financial mechanisms to create a reserve fund to assist with end-of-life management costs of specific problematic waste streams that must be exported
45.	Explore the option of establishing an environmental levy on air tickets or a bed tax based on occupancy to capture a new revenue stream to assist with cost recovery of waste management from visitor/tourism market

Table 9 Very high priority issues – within two years

No.	Recommendation
46.	A 24-hour recycling drop-off area be established along the front fence and trialled for three months to determine use for depositing key recyclables in clearly identifiable containers that are well signed excluding general waste.
47.	KIC consider locating the container collection refund point at Charles Street to centralise all activities
48.	A chipper should be purchased to chip all garden waste while green and to store for resale as mulch or stockpile as feedstock for the composting program when a definite timeframe is known
49.	Plans be considered to close the active landfill cell and create a transfer station facility with non-segregated waste transported to Parenna Landfill by external provider in a quest to reduce current and future compliance issues
50.	KIC should manage legacy scrap metal waste to identify landowners with substantial amounts of scrap metal requiring removal and quantify the number of cars, trucks, white goods and amounts of metal
51.	KIC prepare a tender for the removal of all scrap metal from the island as a legacy clean-up using a baler and/or car crusher subject to the amount and nature of the materials identified and use the freight equalisation policy to assist in reducing freight costs
52.	Establish a Waste Education Working Group to develop an education strategy
53.	Design, develop and implement an extensive community, school and visitor education, communication and engagement program highlighting the need to reduce waste and improve resource recovery
54.	Consider appointing a part-time waste education officer to engage, educate and motivate all sections of the community in the quest to improve waste management outcomes

Table 10 High-priority issues – within three years

No.	Recommendation
55.	KIC await more details on the implementation of the CRS scheme prior to introducing new recycling initiatives
56.	When markets recover, a mini material recovery facility (MRF) be installed within the existing shed to enable efficient separation of materials with conveyor belts, magnetic head and baler. The existing glass crusher and paper shredder be incorporated into the MRF design
57.	Encourage greater organic waste separation for residents by providing subsided worm farms and/or compost bins
58.	Promote organic management training in partnership with the King Island Natural Resource Management Group at the Phoenix community garden

Table 11 Medium-priority issues – within four years

No.	Recommendation
59.	Council investigate introducing a kerbside recycling service to coincide with investment in a mini sorting facility
60.	Conduct a feasibility study to determine alternative fuels and combustion characteristics

Table 12 Ongoing issues

No.	Recommendation
61.	KIC continue to monitor market conditions for commodities and seek secure markets prior to establishing new recycling programs
62.	KIC should monitor new funding opportunities from both state and federal governments to build local processing capacity for improved resource-recovery outcomes

7. IMPLEMENTATION BUDGET

While it is acknowledged that current waste management on King Island is operated on very low budgets, any improvement in standards will require a commitment for higher levels of operational and capital funding to ensure that adequate equipment, maintenance and staffing can be provided and maintained to support the new waste management regime. An implementation budget should include:

- capital expenditure
- operational costs
- implementation costs
- replacement costs

A more detailed Waste Management Plan of the preferred options is needed after the acceptance of this strategy.

7.1 Capital expenditure

This strategy provides a framework for moving forward but does not provide a full budget. There are many unknown factors that need to be considered and incorporated, including staff time and equipment costs. The following is an indicative-only, first-year budget with significant gaps due to lack of information about a range of current and future costs. A more detailed budget would be prepared in a Waste Management Plan once general agreement is reached on overall direction.

This table provides indicative costs only. More precise costs will be required when specific information and timing of the implementation is agreed. A more detailed budget will be required prior to proceeding with each component. It would appear the indicative costs for implementation are around $1.5 million. Some of these costs to facilitate upgrade and new technology may be able to be co-funded with grants from either the state or federal government.

Table 13 Capital budget

Activity	Item	Indicative Costs
Compliance	Cap, close and remediate old Charles Street Landfill	$352, 877
	Compliant activities at Parenna Landfill	$106,038
	Upgrade Charles Street Depot	$35,000
	Sub total	**$494,159**
Waste Advisory Committee	Establish local waste advisory committee	TBD
	Develop and deliver waste education and communication strategy utilise CCWMG where possible	TBD
	Sub total	**TBD**
Project management	Technical adviser – oversee project implementation up to 2 days per month for 24 months	$50,000
	Sub total	**$50,000**
Waste audit	Audit of household, commercial and landfill over 7 days	$45,000
	Sub total	**$45,000**
Revolve shed	Provide hard-stand shed with awning, shelves and racking	TBD
	Sub total	**TBD**
Green waste processing	Chipping service of stockpile per year	$25,000
	Sub total	**$25,000**

Hazardous and problematic items	Provide new interface hazardous streams – signage, IBCs, drums, bunded pallets, fluorescent globes shippers, battery containers	$8,000
	Hazardous storage cabinet	$6,000
	Provide bunded pallets	$1,500
	Chemical training course	$5,000
	Sub total	**$20,000**
Glass upgrade	Mini conveyor to pulveriser, stand and glass receival hopper	$ 40,000
	Sub total	**$40,000**
Compost	Feasibility study and options assessment	$50,000
	Site works and installation of in-vessel system	$500,000
	Sub total	**$550,000**
Recycling upgrade	Mini sorting line – commingled with magnetic head	**$**110,000
	Design and drafting detail	$10,000
	Installation and commissioning	$30,000
	Baler – subject to size and materials to be processed	TBD
	Sub total	**$150,000**

7.2 Operational budget

The preparation of a detailed budget was beyond the scope of this brief and budget.

- **Labour** – The amount of time to undertake the existing activities is not known in respect of the amount of labour and time taken for various current and future tasks. Therefore, it is not possible to predict with accuracy how long it will take and how many staff will be required to undertake the new program. It is suggested the program will be staged based on funding and approvals required. However, it is expected that the proposed program will involve more labour and higher skill levels than the current practices.

- **Freight** – No provision has been made for the freighting of materials and equipment to the island by suppliers nor for shipping any material back to the mainland given the lack of knowledge about quantities and end markets. The application of the freight equalisation to export of waste products has been determined. In addition to sea freight, local transport and wharfage fees are required.

- **Disposal or processing costs** – the disposal and processing costs for the full range of materials is unknown.

- **Training** – Staff training is required on all new practices and commissioning of any new equipment. Specific training will be provided by the various equipment suppliers in the products they provide. Specific training in the storage and handling of chemicals is imperative. Certificate-level courses in Asset Maintenance (Waste Management) are available. These can be conducted in the workplace. There are a number of avenues available to obtain funding to assist with the training.

- **Maintenance –** ongoing maintenance of all equipment is required. Manufacturers were generally not very forthcoming with costs pertaining to maintenance practices, so actual costs should be recorded.

- **Replacement costs –** Inevitably equipment will reach the end of its lifespan and will require replacement. This should be provided for by way of a sinking or reserve fund. It is considered that 15 per cent of the replacement cost should be put aside each year to provide for new equipment. In addition, new bins are likely to be needed each year due to breakages, loss or damage. It is expected that 5 to 10 per cent of the bin infrastructure equipment will need to be replaced each year. We assume that replacement bin parts are included in the fees and charges. The ownership of the residential bins is unknown.

8. CONCLUSION

Waste management on King Island has traditionally been disadvantaged by both geography, isolation and financial constraints. The community has, however, expressed a strong desire for greater recycling and a preparedness to pay.

Waste management must be considered as an essential service similar to water, power and sewerage treatment, with significant public health consequences if inadequately resourced. Adequate capital and recurrent funding must be provided for all essential services as King Island relies on this fundamental infrastructure to function.

The waste hierarchy provides an internationally recognised order to improve management practices, focusing on opportunities to reduce, reuse, reprocess (recycle/composting) before disposal. Waste segregation by the entire community is a key factor in this waste strategy, along with adequate resourcing, both financial and human, to invest in new equipment, processes, systems and policies. Waste management and resource recovery is a shared responsibility between Council and the community.

This report provides a framework for improved waste management. The implementation and timing of such will depend upon the availability of capital and recurrent funding. The information contained in this report provides a guide to those steps and suggests priorities for moving forward. However, with a lack of waste data and detailed planning, budgeting and targets are challenging to provide.

This strategy is deemed to be the most politically acceptable, socially responsible and environmentally sustainable outcome for the current and future residents and visitors to King Island, given the low base and constraints faced by KIC. However, the island community, as well as a range of external stakeholders and government agencies, will determine its appropriateness.

Many other Australian islands have transitioned from a waste disposal focus to a resource-recovery focus. The approach recommended in this strategy supports the mantra of continuous improvement and moves this community to be more in line with other Australian offshore islands.