FNQROC – REGIONAL WASTE MANAGEMENT PRIORITISATION & RESOURCE RECOVERY OPTIONS

Final

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EXECUTIVE SUMMARY

Far North Queensland faces a unique set of challenges in delivering cost effective and sustainable waste services, and those challenges can vary significantly from one council to the next. All councils in the region struggle with issues such as access to secondary markets and transport costs, and the increasing costs and difficulties in developing new waste infrastructure. Depending on the council, other issues may include access to affordable landfill airspace, limited infrastructure and small, dispersed population bases; these can all impact on a council’s ability to deliver and operate viable networks of resource recovery facilities and achieve strategic ambitions.

Councils working together across the region, or selected sub-regions, provides a potential solution to some of these issues, particularly with respect to overcoming efficiency and scale constraints due to the relatively small volume of material that some councils manage.

The Regional Waste Prioritisation & Resource Recovery Options Investigation (the Project) aims to assist FNQROC member councils to make informed decisions regarding the future development and improvement of the region’s waste and resource recovery sector, based on evidence of need and prioritisation of options according to the greatest benefits.

Arcadis has been engaged by FNQROC to undertake the Project on behalf of eight councils in the far north Queensland region and the Project is being delivered in two stages. The Situational Analysis Report (Stage 1) was prepared by Arcadis and accepted by the FNQROC Regional Waste Managers group (final version dated 19 July 2016). That report provides FNQROC members with a snapshot of the current conditions of the waste industry in the region including waste generation, resource recovery infrastructure, secondary markets and issues and challenges. It covers all major waste streams managed in the region including a range of materials derived from both municipal and commercial sources.

This report details the findings of Stage 2 of the project which identifies Regional Waste Management Prioritisation and Resource Recovery Options (the Options Report), which builds on the findings from the Situational Analysis to assess and prioritise options and provide a framework for the future strategic direction of waste management and resource recovery initiatives which meet the region’s waste priorities and predicted trends in waste generation. This report should be read in conjunction with the Situational Analysis report.

The overall objectives of the project are to:

- Provide FNQROC with a snapshot of the current issues, risks and opportunities as they relate to the waste industry in the region;
- Identify opportunities for regional and sub-regional collaboration which achieve cost efficiencies and improved environmental outcomes, whilst meeting community expectations around quality and levels of services;
- Provide further understanding of the region’s priority wastes and the capacity for resource recovery so as to inform FNQROC’s future strategic directions;
- Continue to develop partnerships and share resources in the Far North Queensland region to improve regional capacity and service delivery; and
- Contribute to Queensland becoming a national leader in avoiding unnecessary consumption and waste generation by adopting innovative resource recovery approaches that treat products and materials as valuable and finite resources.

In preparing the current Options Report, Arcadis has:

- Developed future projections of waste volumes in the region and resource recovery rates, both the business-as-usual case, and a number of higher recovery scenarios based on potential policy changes.
- Prioritised waste streams and issues for possible regional collaboration opportunities, based on both feedback received from councils in the first stage of the project, and a structured
assessment of each waste material against a series of weighted criteria to produce a priority score.

- Assessed the potential for regional solutions to priority issues and waste streams and proposed a series of 16 possible opportunities for FNQROC councils to work together to develop mutually beneficial solutions.
- Assessed opportunities to develop new regional waste infrastructure (arising from the regional solutions identified) and also to rationalise existing infrastructure in the interests of achieving operational savings and environmental benefits.

**Priority waste streams and issues**

It is recognised that the FNQROC group has finite resources available in terms of time, funding and staff, to implement regional collaboration projects. Hence, there is a need to prioritise opportunities and focus attention on waste streams and solutions which are likely to have the greatest impact and benefit for the region. For the current study, this prioritisation has been based on two approaches:

- Feedback received from member councils on common issues and constraints on resource recovery and particular waste streams which are challenging to manage; and
- A waste stream prioritisation assessment of a range of waste materials based on a list and assessment matrix proposed by FNQROC (with some amendments by Arcadis), using weighted criteria agreed by the Regional Waste Managers group. The criteria included aspects such as the volume of each waste stream managed in the region, existing level of recovery, environmental impacts, coverage by product stewardship arrangements and the relative ease of collecting, separating, reprocessing and marketing the materials.

The waste stream prioritisation assessment provides a simplified process which is a useful tool to narrow down opportunities, but it may not capture all of the issues that are worthy of consideration for regional collaboration opportunities. The criteria and scoring approach tends to favour the materials which are easier to recycle because they are plentiful and easy to separate, collect, reprocess and market – the ‘low hanging fruit’. While this is a logical approach to maximise the recycling impacts it may not highlight particular problem wastes or related waste system issues that are important to member councils.

If taken in isolation, there is a risk that other valuable opportunities will be overlooked. Therefore, Arcadis has also considered waste materials and systems that did not necessarily score highly in the assessment but are worthy of consideration for potential regional collaboration opportunities, based on feedback from member councils during the project. Some waste streams are also more of a priority and problem for some individual councils or sub-regional groups, rather than for the whole region, and therefore worthy of consideration for sub-regional collaboration opportunities.

A summary of the scoring of the waste streams according to the prioritisation assessment is presented in Figure 1 below and a discussion of the outcomes follows.
Figure 1: Summary of highest scoring waste streams
Generally, the waste stream prioritisation scoring shows:

- The largest waste streams generated across the region (i.e. general municipal solid waste - MSW, commercial industrial waste and organics) score highly on account of the large volumes and their potential environmental impacts if not managed well, and should be considered for regional opportunities.

- Most of the organic waste streams scored highly (including food and food processing waste, green waste, biosolids) on account of large volumes and potential environmental impacts. The only reason that food waste did not score higher, is because the existing AWT facility provides a good level of recovery of domestic food waste. However, a longer term solution is needed to address food waste for the non-AWT councils and beyond the expiry of the current AWT contract (post 2026). Similarly, recovery of green waste through mulching is well established in the region but suffers from a number of issues and constraints. There are good opportunities to improve the recovery of a range of organic wastes at a regional level, either for individual materials or as a broader stream with a common solution.

- Dry recyclables scored relatively highly, both as an overall stream (e.g. commingled recyclables) and some individual material streams (e.g. film plastics).

- Some streams scored highly on account of their potential environmental impacts but are actually already well recovered and managed in the region through existing arrangements, including lead acid batteries, biosolids, grease-trap waste, electronic waste (e-waste), mineral oil and other regulated wastes. Non-lead acid batteries will also be partially covered by a national product stewardship scheme which is currently being developed. Councils should continue to support existing arrangements, but there is little benefit in considering further regional collaboration on these particular materials.

- Construction and demolition waste (C&D) and related materials generally scored low, which is consistent with the finding that councils typically play a minimal role in recycling these materials and there is little benefit in increasing that role.

- Some materials scored relatively low on the assessment, but based on feedback given to Arcadis, they are a concern for some councils in the region and could potentially be better managed through regional or sub-regional approaches. Examples include mattresses, glass fines (within commingled recycling) and tyres.

A number of other issues were raised by councils during the project, which are likely to have an impact on resource recovery and could potentially be addressed at a regional level. The key issues that were commonly raised included:

- **Waste education** – there are some areas where waste education and messaging must be delivered at the local level to suit the differing waste and recycling systems in each council, but there are also several areas of potential common messaging. These include green waste and organics recovery, general benefits of recycling, recycling of e-waste and other problem wastes, preventing illegal dumping and generally educating the public about the challenges and costs of managing waste responsibly in the region. Another key aspect is making sure elected Councillors are educated and well informed around waste issues and challenges, so that they can make informed decisions.

- **Improving waste data management** was another critical issue that became apparent during collation and analysis of data for the first stage of the project (Situational Analysis). Arcadis found that each council had very different systems for collecting, storing and using waste data and differing levels of data quality. These differences make it challenging to compare and collate data at the regional level which could be a constraint on better collaboration. There is also a lack of data on waste composition, with the exception of Cairns and Cook Shire, which have recently undertaken waste audits. Good quality waste data is essential in planning waste services and infrastructure, and supporting options analysis and investment decisions.

- **Disaster waste management** is also an issue in the region given the prevalence of cyclones and tropical storms. Natural disasters are rarely confined to one local government
area so there is scope for councils to work together on a regional disaster waste management plan which ensures that regional waste infrastructure is shared and put to best use during a disaster, and that resource recovery opportunities are maximised to reduce landfill airspace consumption and costs during the clean-up.

- **Waste charging** systems play a significant role in waste and recycling behaviours and there are significant differences in the way that councils in the region charge for some waste and recycling services. The concern is that pricing differentials for some waste streams provide a strong incentive for cross-border movement of waste and behaviours which undermine the resource recovery efforts of each council. There may be benefits in councils working more closely to harmonise waste charging regimes and rates for domestic waste at least, for those streams of concern.

### Summary of regional collaboration opportunities

Regionalisation of waste services and infrastructure can have a number of benefits including supporting new investment in more advanced resource recovery solutions and development of more secure regional secondary markets. However, is not always the best solution – some services are best delivered at a local level and each case needs to be assessed to determine whether there are efficiencies that can be realised by working together or whether a regional approach is likely to perform better or attract new investment to the region that would not otherwise be forthcoming.

Based on the waste stream prioritisation assessment and feedback from councils, Arcadis has developed and described opportunities for councils to work together to implement regional solutions. Arcadis has focused on solutions which provide cost effective and environmentally sound outcomes for councils, but also support local economic development opportunities. The opportunities were discussed and agreed at a meeting of the Regional Waste Managers Group on 13 September 2016.

Many of the opportunities identified by Arcadis are closely related or interdependent, and should not necessarily be considered in isolation. For example, the proposals for development of a regionally consistent waste data management system and regional cooperation on waste education will ultimately contribute to the successful implementation of numerous other opportunities across recycling and organics recovery.

One of the key opportunities is the development of a regional organics recovery strategy, potentially leading to a regional processing solution. If this is pursued and successful, it will have a major impact on other proposals, such as the suggestion to develop a long-term regional MSW processing and disposal strategy. Similarly for commercial waste, where Arcadis has proposed a coordinated approach to improving recovery – this could further enhance the viability of other recycling and organics processing solutions.

In dry recycling, Arcadis has identified a number of related and overlapping opportunities including:

- The proposed container deposit scheme (CDS) in Queensland (expected to commence in 2018) could provide opportunities to expand recycling infrastructure in the region, incentivising recycling where it is currently limited and improving the viability of key infrastructure such as the Cairns MRF.

- The CDS will be a key consideration in the regional economic assessment which has been proposed on expanding recycling services for both the domestic and commercial sectors.

- Regional cooperation to develop local markets for recovered sand made from glass fines, will improve the viability of the Cairns MRF and therefore, the viability of recycling across the region.

- The proposed regional plastic film collection and reprocessing solution could potentially unlock broader recycling opportunities for a range of plastic wastes, further improving the viability of recycling.
An investigation of the potential to directly export recyclables from the Port of Townsville is proposed to overcome the high costs of transporting recyclables to South East Queensland, again improving the viability of recycling for all councils in the region. These interconnections and dependencies should be considered when deciding which of the opportunities to prioritise and pursue.

This report recommends development of a number of targeted strategies and plans for specific waste streams and issues, which should be achievable and suited to development in a staged manner. This allows FNQROC members to choose which opportunities to pursue and the preferred timing and order of implementation. However, once those targeted strategies have been developed, there would be benefits in collating those individual strategies together into a consolidated Regional Waste Strategy to provide a single, cohesive over-arching document as a guide for future collaboration on waste and resource recovery activities. By completing the smaller, separate strategies first – the development of a meaningful over-arching regional strategy will be a far less daunting task. This has been proposed as a longer term opportunity, but the timing is subject to completion of other target strategies.

One of the key constraints on improving resource recovery in the region which is common to many of the issues and opportunities identified in this report, is a lack of developed local markets for secondary resources. Secondary markets are critical for the long-term viability of resource recovery solutions but can also bring significant benefits for the local community through new employment and training opportunities, and by retaining expenditure within the region. Therefore, councils can and should be playing a leading role in supporting and developing secondary markets, rather than leaving it entirely to the private sector.

Councils and FNQROC can facilitate development of secondary markets through measures such as:

- Preparing specific regional market development strategies and action plans in collaboration with a range of stakeholders
- Supporting new industries with incentives to establish in the region
- Offering land and suitable sites for resource recovery operations within local waste precincts
- Facilitating and promoting state and federal government grants
- Providing or helping to arrange project financing
- Linking regional stakeholders and businesses together
- Aggregating feedstock / waste materials and providing surety of supply to support investment, through regional contracts
- Procuring secondary resources for council projects and encouraging contractors to do the same

FNQROC will need to consider how best to implement these opportunities and whether it is done using internal or external resources, or a combination of both. One option that was discussed by the Regional Waste Managers Group, was the potential to appoint a regional officer responsible for waste related markets and economic development projects, with a mandate to coordinate the implementation of the regional waste opportunities that are approved by the group. That officer could also coordinate regional education and communication programs.

**Prioritisation of opportunities**

The following is an overview of the 15 regional opportunities identified by Arcadis for consideration by FNQROC. Opportunities have been assigned as either short term (within 1-2 years), medium term (2-5 years) or long-term (5-10 years). The actual implementation program will be dependent on the availability of resources. Opportunities have also been categorised as
high, medium or low priority based on the prioritisation of the waste streams affected and the potential benefits for the region.

Other than the high level grouping of opportunities, the list below is not in any preferred or prioritised order – this will be determined by the FNQROC Board, informed by the Regional Waste Managers Group.

Short term priorities (within 1-2 years)

These opportunities have been identified as actions that can be implemented in the short term, within the next two years, subject to availability of resources. These include opportunities that are considered more urgent; or are relatively easy to implement, with some work already started by individual councils; or are precursors to other longer term opportunities.

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<td>Develop a regionally consistent waste data management system</td>
<td>FNQROC councils should work together to develop and agree on a standard system to collect, store and analyse waste data for all council facilities in the region. Initially, the group should review existing practices in each council to identify problem areas and any best practice templates that could be used as a basis for a shared approach. There may also be benefits in regularly collating and sharing the data between the group to monitor trends. The system should be compatible with EHP reporting requirements but provide extra levels of detail. The group should also consider the potential to commission regional waste compositional audits, to support analysis of options to improve resource recovery systems.</td>
<td>High</td>
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<tr>
<td>Develop a regional CDS strategy and collection network</td>
<td>While each council will need to make their own arrangements to prepare for the CDS, there are potential benefits in collaborating at a regional level to establish an efficient regional network or collection depots and sorting / consolidation facilities. Councils can also consider how to use the CDS to catalyse and support broader recycling programs beyond beverage containers, whilst sharing ideas and information amongst the group. The CDS is currently expected to commence in 2018.</td>
<td>High</td>
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<tr>
<td>Develop a regional organics recovery strategy</td>
<td>FNQROC members could work together to develop a regional organics recovery strategy, with a key focus on development of local markets for value-added products. Part of the strategy should be consideration of a regional organics collection and processing contract, to attract new investment in quality processing infrastructure. At a minimum, a regional organics contract could provide for reliable and regular collection of green waste from sites across the region; but could also provide a future solution for other organics such as food waste and biosolids. The strategy development should consider all aspects including feedstock sources, collection systems, processing options, market development, costs and benefits, education programs, linkages to Reef protection programs, and funding availability.</td>
<td>High</td>
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<td>Regional plastic film collection and reprocessing solution</td>
<td>Councils could work together and with industry to assess the feasibility of establish a local plastics reprocessing facility which could address the problem waste stream of film plastic (as well as existing rigid plastics) and provide a new local industry with employment opportunities. The project should include an assessment of plastic waste generation across all sectors (domestic, commercial and agricultural); review of technologies;</td>
<td>High</td>
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<td>Opportunity</td>
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<td>Regional economic assessment of recycling expansion options</td>
<td>There is good potential to expand recycling services across the region and in the process improve the efficiency and viability of the Cairns MRF. The proposed economic assessment would consider the costs and benefits of expanding recycling from a regional and local perspective and provide a sound basis for decisions. A regional approach is needed to maximise the potential of the Cairns MRF. For councils that have kerbside recycling, expansion could focus on commercial and MUD customers. For councils without kerbside recycling, the assessment would provide a robust basis for a decision about introducing a service. The assessment will consider direct costs and savings, and indirect benefits to the regional economy.</td>
<td>High</td>
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<tr>
<td>Develop a sub-regional strategy to increase recovery of commercial waste</td>
<td>Councils with significant commercial waste generation and/or high commercial waste disposal gate fees could consider working together to develop a common strategy for improving commercial waste recovery, particularly where it can provide direct financial benefits to councils though additional revenue streams or improving the efficiency of recovery infrastructure. Particular focus on commingled recyclables that can be processed in the Cairns MRF and organics that may be suitable for any regional organics processing solution. As a first step, councils should engage with industry including commercial and industrial generators, MUD building managers and commercial waste collectors.</td>
<td>High</td>
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<tr>
<td>Examine direct export options for recyclables from Port of Townsville</td>
<td>Councils could work together, led by Cairns, to explore options to export recyclables via the Port of Townsville. As the port expands and container traffic rapidly increases, it is likely that there will be more opportunities for direct export of containers to markets in Asia. As Council is not accustomed to exporting and selling materials directly, they would need support from an experienced agent. Council should also consult with other recyclers in the region and in Townsville to explore potential synergies.</td>
<td>Medium</td>
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<tr>
<td>Support development of regional markets for recovered glass sand</td>
<td>It is crucial to the long-term performance and viability of the Cairns MRF, and therefore future recycling efforts across the region, that secure and diverse markets are developed for its recovered glass sand products. FNQROC member councils can play a role in supporting this market development, by using the material for internal projects and helping to promote its broader use across the region.</td>
<td>Medium</td>
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<tr>
<td>Support the recovery of secondary aggregates</td>
<td>It is difficult for councils to improve the recovery of concrete and other inerts given that councils only manage a fraction of the C&amp;D waste in the region. With the small volumes that councils collect, it is difficult to process the material to a good quality standard and maintain a consistent supply of recovered aggregates. The majority of C&amp;D waste is managed by private operators and FNQROC councils could work with them, to support improved recovery of concrete and inerts and develop markets by:</td>
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Opportunity | Description | Priority
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| Improving quality standards and implementing a certification system, mandating use of secondary aggregates in council projects, promoting the products more broadly, and sending concrete from council facilities to quality processors. By supporting existing recyclers, councils can encourage further investment and improved standards. | | Medium

**Cooperate regionally on waste education campaigns for common issues**

FNQROC councils should work together to share and pool waste education resources (print materials, content, designs, messaging, media coverage), particularly for issues which are common across the region. This is particularly critical if the group implements some of the regional collaboration opportunities identified in this report. Coordination of messaging is also critical, so as to avoid confusion in the community, arising from different waste systems.

**Medium term priorities (within 3-5 years)**

These opportunities have been identified as actions that can be implemented in the medium term, within 3 to 5 years, subject to availability of resources. These are less urgent or less beneficial but still worthwhile opportunities, or they require other actions to be completed first.

Opportunity | Description | Priority
---|---|---
| Develop a regional disaster waste management plan to maximise resource recovery | While each council needs to have its own plans in place for natural disasters, there may be benefits in a regional planning approach with a focus on sharing regional waste infrastructure and maximising resource recovery opportunities following a disaster, to conserve landfill airspace and contain costs. In particular the plan should consider how existing and temporary facilities can be used to manage large volumes of putrescible waste and green waste in the short term, and C&D waste in the longer term. The management of asbestos waste should also be considered. | Medium

| Examine options to harmonise waste charging regimes across the region | FNQROC councils should consider whether there is potential to harmonise waste charging approaches where there is a real risk that price differentials are likely to lead to cross-border movement of waste and provide a disincentive for resource recovery. | Medium

| Regional mattress collection / processing contract | FNQROC members could consider jointly procuring a mattress collection and recycling service following a similar model to the existing regional metals contract whereby each participating council would have its own agreement with the contractor and can either arrange regular scheduled pickups or ad-hoc pickups as needed. The contract should be aimed at social enterprises which councils could support by providing a suitable site with access to some services, and access to inert landfill capacity for the residuals. Councils should also liaise with commercial generators and collectors of mattresses to explore willingness to participate in a mattress recycling underpinned by the regional contract. | Low

**Longer term priorities (within 5-10 years)**

Two opportunities have been identified as longer term, high priority actions, for implementation within the next 5-10 years.
Opportunity | Description | Priority
---|---|---
Develop a long-term regional MSW disposal / processing strategy | FNQROC councils share a number of constraints and challenges in managing putrescible domestic waste (MSW), so there are benefits in a regionally coordinated approach. While there is no short term urgency, with impending landfill closures and expiry of the existing AWT contract in 2026, planning for the future MSW solution should start early. The strategy development should consider a range of technology and collection options in the context of changing waste policies, and develop a cost-benefit analysis of various regional and sub-regional options. | High
Consolidate the targeted strategies and plans into a single Regional Waste Strategy | A number of targeted strategies and studies have been proposed above, covering specific waste streams such as organics, recyclables, MSW, commercial waste and disaster waste. Once these have been implemented, there would be benefits in collating all of these separate documents, together with the regional waste data system and market development actions, into a Regional Waste Strategy. This would provide a single, cohesive over-arching document to guide future collaboration on waste and resource recovery activities which can be reviewed on a regular basis. The exact form can be determined by group, but should result in a firm commitment from members to support its ongoing implementation. | High

Waste infrastructure opportunities

The opportunities above give rise to potential new regional infrastructure development needs, including:

- New domestic waste processing / disposal solution (long-term);
- New or adapted existing facilities to support implementation of the CDS, including collection depots and consolidation points;
- New or expanded regional organics processing facility;
- New regional solution for reprocessing plastics, particularly film plastics;
- New regional mattress recycling facility.

On the other hand, Arcadis reviewed the existing networks of landfills and transfer stations in the region, to identify any opportunities to realise operational savings and environmental benefits by rationalising unnecessary facilities. To do this, we reviewed the facility locations and compared the density of facilities (by both population and land area) with other councils in the region and other similar regional councils in Queensland. Generally, councils in the region run relatively lean waste networks, with facility densities in line with or less than similar regions. Ultimately, any decision to rationalise waste facilities is a decision that must be made locally with due consideration of operational costs and benefits, environmental risks, long term liabilities and logistics of servicing. However there are also benefits in taking a regional view.

Landfills present the greatest environmental risks and therefore the highest imperative to rationalise unnecessary facilities. The main opportunity in this respect is the two small unlined and unmanned landfills run by Mareeba Shire at Chillagoe and Almaden, which are not up to best practice standards in terms of containment and security. Given the sites are within a two hour drive of Mareeba Landfill and receiving small volumes, their conversion to transfer stations should be viable.

The environmental drivers to rationalise transfer stations are much less than for landfills, but there is scope for significant operational savings. A review of the map of transfer stations across the region reveals that there are some facilities which seem quite close to each other and could...
be reviewed for rationalisation opportunities (for example Dimbula and Mutchilba transfer stations in Mareeba, Mt Garnet and Innot Hot Springs in Tablelands). If it has not been done already, each council should review their own networks looking at each transfer station and considering the population catchment served, tonnages received, operational costs and proximity to alternative facilities.
# GLOSSARY

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>-</td>
<td>Biosolids</td>
<td>Organic sludge which is a by-product of sewage treatment processes.</td>
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<tr>
<td>-</td>
<td>Diversion</td>
<td>The act of diverting waste away from landfill disposal for another purpose such as recycling or energy recovery, thereby reducing the environmental impacts of landfill disposal.</td>
</tr>
<tr>
<td>-</td>
<td>Dry Recyclables</td>
<td>Dry recyclable material such as paper/cardboard, glass, plastics and metals.</td>
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<tr>
<td>-</td>
<td>Inert waste</td>
<td>Waste materials that are non-putrescible and generally inorganic, that will not significantly decompose or react within a landfill environment, mostly derived from construction and demolition activities including soils, concrete, bricks, tiles, plastic and glass.</td>
</tr>
<tr>
<td>-</td>
<td>Putrescible waste</td>
<td>Organic material that will decompose as a result of the actions of microbial organisms.</td>
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<tr>
<td>-</td>
<td>Residual waste</td>
<td>Waste that is collected separately from households in the residual waste bin.</td>
</tr>
<tr>
<td>AD</td>
<td>Anaerobic Digestion</td>
<td>A process in which putrescible waste is decomposed under anaerobic conditions in a controlled vessel and the resulting methane (or biogas) is captured and used as an energy source, and can be used to generate electricity.</td>
</tr>
<tr>
<td>AWT</td>
<td>Alternate waste treatment</td>
<td>A general term for advanced waste processing and recovery technologies that provide an alternate management option to landfill. Typically used to reference technologies which process mixed and/or putrescible waste streams such as MBT, EfW, Dirty MRF, AD, FOGO composting.</td>
</tr>
<tr>
<td>C&amp;D</td>
<td>Construction and demolition waste</td>
<td>Waste that is produced by demolition and building activities, including road and rail construction and excavations.</td>
</tr>
<tr>
<td>C&amp;I</td>
<td>Commercial and industrial waste</td>
<td>Waste that is produced by institutions and businesses, including industries, restaurants and offices.</td>
</tr>
<tr>
<td>EfW</td>
<td>Energy-from-Waste facility</td>
<td>A facility that converts waste into heat and/or electricity for which there is an economically viable end use. Technologies can include, but are not limited to: anaerobic digestion, combustion, pyrolysis, gasification, and plasma gasification.</td>
</tr>
<tr>
<td>FOGO</td>
<td>Food and garden organics</td>
<td>Putrescible waste material derived from plant or animal sources (either domestic or commercial), including garden waste and food waste.</td>
</tr>
<tr>
<td>IVC</td>
<td>In-vessel composting</td>
<td>A group of enclosed composting technologies where putrescible waste is composted under controlled conditions in a sealed vessel which may include concrete tunnels, rotary drums, enclosed halls, or covered windrows. Usually used to process more odorous and difficult organic wastes such as</td>
</tr>
<tr>
<td>Acronym</td>
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<tr>
<td>MBT</td>
<td>Mechanical-biological treatment plant</td>
<td>MBT plants combine mechanical sorting of mixed waste, usually MSW (such as in a Dirty MRF) with biological treatment of the organic waste fraction to process residual organic waste. This could include technology such as in-vessel composting or anaerobic digestion to stabilise the organic material and generate heat and power. The material remaining after further treatment can be refined and used as a low grade compost, or compost-like-output or used as fuel in a thermal waste-to-energy facility.</td>
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<tr>
<td>MRF</td>
<td>Materials recovery facility</td>
<td>A facility that receives and sorts either mixed waste (dirty MRF) or source separated commingled recyclables (clean MRF), usually through a combination of automated mechanical processing units. Compacts and bales, or consolidates separated materials and sends to reprocessing facilities. Residual materials are sent to landfill or for energy recovery.</td>
</tr>
<tr>
<td>MSW</td>
<td>Municipal Solid Waste</td>
<td>Waste that is produced primarily by households and similar properties, including recyclable and non-recyclable material, which is collected by, or on behalf of, councils. Also includes other waste collected by councils such as from public place bins and council operations.</td>
</tr>
<tr>
<td>RDF</td>
<td>Refuse derived fuel</td>
<td>A high calorific fuel manufactured from waste materials by processing mixed waste (MSW, C&amp;I, C&amp;D) to take out recyclables, low calorific / wet components and hazardous materials and produce a homogenised fuel material. Usually undertaken in a Dirty MRF or as part of an MBT facility.</td>
</tr>
<tr>
<td>RRC</td>
<td>Resource recovery centre</td>
<td>A facility that receives and separates reusable and recyclable materials from households and businesses that would otherwise be destined for disposal. Can be combined with a transfer station. May include a resale centre but does not undertake reprocessing activities.</td>
</tr>
<tr>
<td>TS</td>
<td>Transfer station</td>
<td>A facility allowing the drop off and consolidation of waste and a wide range of recyclable materials. Allows for consolidation of waste for bulk haulage, either to a remote disposal / processing facility, or an adjoining landfill (to keep public vehicles of the active landfill). May handle MSW, C&amp;I and C&amp;D waste. Accepts local government kerbside collected waste, private collections and householder drop-offs; can be publicly owned. Can be combined with a resource recovery reception centre and may include a resale centre; but does not undertake reprocessing activities.</td>
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**1 INTRODUCTION**

The Regional Waste Prioritisation & Resource Recovery Options Investigation (the Project) aims to assist member councils of the Far North Queensland Regional Organisation of Councils (FNQROC) to make informed decisions regarding the future development and improvement of the region’s waste and resource recovery sector, based on clear evidence of need and prioritisation of options that will deliver the greatest benefits.

Arcadis Australia Pacific Pty Ltd (Arcadis) has been engaged by FNQROC to develop this Waste Prioritisation & Resource Recovery Options Investigation for eight councils in the far north Queensland region. The Project is being delivered in two stages. The Situational Analysis Report (Stage 1) has been prepared by Arcadis and accepted by the FNQROC Regional Waste Managers group (final version dated 19 July 2016). That report provides FNQROC members with a snapshot of the current waste management conditions in the region including waste generation, resource recovery infrastructure, secondary markets and issues and challenges.

The current report details the findings of Stage 2 of the project identifying Regional Waste Management Prioritisation and Resource Recovery Options (the Options Report), which builds on the findings from the Situational Analysis to assess and prioritise options and provide a framework for the future strategic direction of waste management and resource recovery initiatives which meet the region’s waste priorities and predicted trends in waste generation.

### 1.1 Project objectives

The overall objectives of the Project are to:

- Provide FNQROC with a snapshot of the current issues, risks and opportunities as they relate to waste management in the region
- Identify opportunities for regional and sub-regional collaboration which achieve cost efficiencies and improved environmental outcomes, whilst meeting community expectations around quality and levels of services
- Provide further understanding of the region’s priority wastes and the capacity for resource recovery so as to inform FNQROC’s future strategic directions
- Continue to develop partnerships and share resources in the Far North Queensland region to improve regional capacity and service delivery
- Contribute to Queensland becoming a national leader in avoiding unnecessary consumption and waste generation by adopting innovative resource recovery approaches that treat all products and materials as valuable and finite resources.

### 1.2 Scope

FNQROC consists of ten member councils listed below and shown in Figure 2 overleaf:

- Cairns Regional Council
- Cassowary Coast Regional Council
- Cook Shire Council
- Croydon Shire Council
- Douglas Shire Council
- Hinchinbrook Shire Council
- Mareeba Shire Council
- Tablelands Shire Council
- Yarrabah Aboriginal Shire Council
- Wujal Wujal Aboriginal Shire Council

As shown in Figure 2 (overleaf) the FNQROC region covers a large portion of the broader Far North Queensland region (70% of the area and over 95% of the population) and shares boundaries with a number of other North Queensland councils, including Townsville and Charters Towers, and with councils to the far west and north such as Etheridge, Carpentaria and Lockhart River.
Of the 10 councils that make up FNQROC, eight have committed to be part of the current Project. Hinchinbrook Shire is a member of FNQROC and actively collaborates in various other fields, but for waste services it is aligned more closely with Townsville due to its geographic proximity. Croydon Shire has a very small population and is geographically isolated from the other FNQROC members, so while it should be considered in any regional collaboration initiatives it is recognised that the benefits and contribution from Croydon may be limited.

As such, this particular study is focused on the other eight member councils. Each of these councils along with private operators in the region have been consulted during the Project to develop the current regional snapshot of waste management and resource recovery (Stage 1).
Figure 2 - Far North Queensland Regional Organisation of Councils - members
1.3 Methodology

A detailed methodology was provided to FNQROC in Arcadis’ response to the RFQ, an outline of which has been included below.

Stage 1 – Situational Analysis

- Review all existing data, focusing on identifying key gaps in relation to the data required for the Project
- Undertake consultation with stakeholders to fill data gaps and gather facility details, confirm details of existing contracts, identify risks and opportunities for waste and resource recovery and understand existing and potential secondary markets
- Collate data into comprehensive baseline waste flow snapshot and infrastructure register
- Produce a Regional Situational Analysis Report.

Stage 2 – Options Report (this document)

- Develop waste projections over a 30 year timeframe using population forecasts and future potential waste generation and resource recovery trends, which will feed into the priority waste analysis
- Using the waste projection model, identify options and opportunities that should be pursued by FNQROC, which may include consolidating waste volumes and infrastructure, developing new facilities and improving secondary markets for recovered materials
- Incorporate this information into an Options Report which identifies the relative priority of opportunities.

1.4 Background

The Situational Analysis Report provides the background to this project, summarising:

- Policy and regulatory context
- Waste systems, infrastructure and contracts in each council
- Regional waste infrastructure and private sector facilities
- Baseline waste and resource flows (2014-15 data)
- Existing secondary markets
- Issues and constraints identified through consultation with each council.

This background has not been reproduced in this report, which should be read in conjunction with the Situational Analysis Report to appreciate the background and context of the findings.

1.5 Limitations

The Situational Analysis Report and this Options Report both rely on the information provided by EHP, FNQROC and participating councils and industry stakeholders. Arcadis has made every effort to ensure that the narrative and values are reflective of the current status of waste management in the region. However readers of this document should be aware that the quality of available data varies and some stakeholders may have chosen not to share sensitive commercial information, which may influence the figures in this report.

Significant data has been provided to Arcadis by EHP based on its annual surveys of waste operators. The data was collected in good faith and with undertakings by EHP to protect confidential and sensitive data. It is being used with permission from EHP for the purposes of this specific project only. Some of the data is commercially sensitive and Arcadis has made
commitments to the operators around limiting the use of the data for agreed purposes. The Situational Analysis report in particular and the data contained within it must be treated as **strictly confidential** and not shared outside of directly relevant staff of FNQROC member organisations, or used for any other purpose.

In reviewing the existing waste infrastructure and consulting with industry, Arcadis has focused on facilities and operators that potentially have an interaction with or impact on the management of waste from domestic and municipal origin. Facilities that deal with commercial waste have been considered to the extent that their activities have a flow-on effect on other waste streams. In reality however, councils have little control over the commercial and industrial waste sector. This study has not considered, for example: industrial mono-fills, mining lease landfills, small scale industrial incinerators and small regulated waste storage facilities that exist on mine sites and other industrial sites, often purely for the sole use of the site owner.
2 POTENTIAL FUTURE POLICY CHANGES

The State Government is currently considering a number of waste policy options which could impact on the way waste is managed in the region in the future, and the recovery of resources from waste. These were identified in the Situational Analysis but are discussed in more detailed below to provide some context around some of the future drivers to improve resource recovery in the region.

2.1.1 Landfill Disposal Bans

The *Waste Reduction and Recycling Act 2011* makes provision for the introduction of landfill disposal bans in Queensland and EHP recently undertook stakeholder consultation to determine the waste industry's response to any potential implementation. A preliminary cost benefit analysis has also been published which indicates that banning the following materials would be viable from a financial perspective:

- Sorted concrete
- Tyres
- Municipal green waste.

These materials were deemed feasible to ban from landfills given the access to secondary markets and/or the small quantities that are currently being disposed of to landfill. EHP is still investigating the practicalities and outcomes of implementing landfill bans on these materials, and the impact on waste management in FNQROC region is not yet clear.

Most member councils already provide for separation and recovery of green waste at transfer stations, so the volume being landfilled is likely to be small. For Cairns, Douglas and Mareeba, any green waste in the general kerbside bin would be recovered through the Bedminster facility (see below). However, if EHP bans all green waste rather than just source separated green waste, as is one of the options being considered, other councils would likely need to take additional steps to prevent green waste from entering the general waste stream.

For concrete, most councils are currently separating small volumes of clean concrete and using it on site for road construction and other uses. The external market outlets for recovered concrete are very limited and would require significant development. Also the relatively small quantities means that processing costs are high. Private sector operators are also recovering concrete, in significant quantities in some cases. There is anecdotal evidence that a lack of market outlets is leading to stockpiling of secondary concrete aggregates.

For tyres, minimal impact would be expected from a landfill ban as they are already mostly source separated and recycled.

It is difficult to know how much of these materials is being disposed to landfill currently, with only limited waste audit data available. The broader suite of waste composition data that is available on green waste and may provide indicators for FNQROC includes:

- Cook Shire kerbside MSW contains 6.4% green waste, which is low and probably characteristic of remote regions where residents have other options to manage green waste;
- Gold Coast City Council kerbside MSW is 33% green waste (2015 audit for Waste Strategy), despite kerbside green waste bins and self-haul options being available;
- Logan City Council kerbside MSW is 27% green waste (2013 Waste Reduction and Recycling Plan);
- Landfill audits at a large regional council indicated 36% green waste in MSW (2014-15) and between 10% and 41.5% green waste in C&I waste over the last four years, despite kerbside green waste bins and self-haul options being available;
In NSW, extensive domestic kerbside bin audits across the state in 2011 indicated that green waste in the domestic residual waste bin was 9.7% overall, 6.8% in the Sydney Metropolitan Region and 11.9% in regional areas;

Also in NSW, detailed disposal based audits of C&I waste across the state in 2014 indicated C&I waste is 4.74% green waste.

The private sector C&D recyclers and landfills are recovering significant quantities of concrete. However, market outlets for recovered concrete are limited and would require significant development to support an increase in concrete recovery. Also the relatively small quantities means that processing costs are high for smaller regional councils.

For concrete to landfill, there is even less waste audit data available, particularly from Queensland sources. The primary source of concrete disposed to landfill will be in C&D waste that is disposed direct to landfill without processing. Data that is available from other jurisdictions includes:

- In NSW, audits in 2004-05 of C&D waste to landfill in the Sydney region showed concrete was 16.6% of the waste stream;
- In WA, audits of C&D waste in the Perth region in 2007 found that concrete was 21% of the stream.

For tyres, the volumes currently being landfilled by local government are generally small. Most tyres are being separated and sent to recyclers, with the majority ending up with major recyclers located in South East Queensland. Arcadis is aware that a significant volume of tyres in SEQ was landfilled in 2014-15, with tyre recyclers sending 26,865 tonnes of tyres to landfill. It is not clear why such a large volume of tyres was disposed by recyclers in that year and it appears to be an anomalous event. Arcadis is aware that 2014-15 was a particularly challenging year for the tyre recycling market with significant constraints on the markets for tyre derived products and tyre derived fuel exports. It is likely that these market factors were the main driver for the high disposal rate, rather than capacity limitations at facilities to process the tyres.

In the event that tyres are banned from landfill, the recovery rate of tyres should increase to 100% and it is likely that existing recycling infrastructure could manage the additional volumes. One of the main constraints on tyre recovery in regional areas including FNQ is the high cost of transporting tyres to recycling facilities in SEQ.

### 2.1.2 Container Deposit Scheme

The Queensland Government is currently investigating options for a state-based container deposit scheme. At the time of writing, the government’s intention was to have the scheme ready to commence in 2018. An Advisory Group has been set up, of which Alan Wilson from Cook Shire Council is a member, to inform the preparation of an options paper that will provide information for preliminary cost benefit analysis and assist with public consultation. The starting point is developing a scheme that is consistent with the scheme proposed to be implemented in NSW in 2017, both for simplicity and to ensure there is no advantage to be had through cross-border arbitrage between NSW and Queensland.

In May 2016, the NSW Government announced its CDS scheme will provide a 10 cent deposit for eligible beverage containers, which therefore provides a likely model for any Queensland scheme. The details of the NSW scheme are still being finalised by a working group but a discussion paper on the proposed legislation was recently published\(^1\). Under the NSW scheme, the refund would apply to beverage containers in the size range 150 ml to 1 litre, with some

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exceptions including milk bottles, fruit juice and cordial containers, glass wine and spirits bottles and casks / sachets.

The main driver for implementing a CDS is to reduce littering of beverage containers, rather than achieving significant increases in recycling rates. A CDS could capture significant tonnages of beverage containers (plastic, glass and aluminium) but much of this would be diverted away from existing kerbside recycling systems. The greatest impact on recycling rates can be expected in regional and remote areas that do not currently have access to a kerbside recycling service, as is the case for some FNQROC councils. A CDS would likely provide an incentive for increased recycling from those residents and make it financially viable for councils to increase recycling services, for beverage containers at least.

The likely impact of a CDS on MRF infrastructure is not yet clear. In some cases, it would result in a reduction in throughput at MRFs as beverage containers are diverted from kerbside recycling to other collection depots. As such, those facilities would then be under-utilised. Alternatively, some MRFs may need to be modified to enable sorting and recovery of the beverage containers to support the CDS (as well as continued sorting of the modified commingled recyclables stream), in which case they could see their throughput increase to accommodate the additional diverted material.

The NSW discussion paper indicates that there will be a method for redeeming the refund on containers in MRFs without having to manually separate them from the recycling stream, through an auditing process or use of standard conversion factors based on typical composition. The paper also indicates that MRF operators will continue to own the materials collected, which MRF operators would be able to sell for the commodity value in addition to the refund. The NSW regulatory framework will also “encourage MRF operators to share any windfall gain with the local governments that manage kerbside services, for community benefit.”

Transfer stations and resource recovery centres will play a significant role in the collection network and significant investment may also be required into new collection depots and consolidation points, with councils and community groups expected to play a role in owning and operating this infrastructure. It is difficult to assess the infrastructure changes and investment required until the details of the scheme are better defined.

It is difficult to predict the volume of material that would be captured through a CDS in Queensland or the overall increase in recyclable material recovered. The state government is undertaking a program of waste audits to help quantify the volume of beverage container waste and current disposal routes.

In South Australia, a CDS has been operating since 1977 and while the Queensland scheme may be slightly different in its scope and operation, the performance of the SA system serves as a reasonable model at this stage. In 2015–16, around 43,165 tonnes of beverage containers were recovered through the CDS in SA from a total population of around 1.71 million. This is equivalent to 25 kg per person which if Queensland were to achieve the same per capita rate, would generate around 119,500 tonnes of beverage containers (based on 2014-15 population estimates). For the FNQROC region, this would equate to around 6,400 tonnes of containers per annum (based on 2014-15 data). It has been previously estimated in NSW that 21% of the typical kerbside recycling stream would be eligible for a CDS (based on NSW waste compositions)².

The impact of a CDS in FNQROC is likely to be positive in terms of reducing litter and improving source separation of this material, but the financial impacts on councils are not yet clear and will depend on the final scheme model adopted. A CDS could potentially divert valuable materials

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away from existing recycling systems, reducing overall MRF volumes and the recovery of valuable plastic and metal containers. However, this would be offset if MRFs then play a role in sorting and consolidating beverage containers, and even further if they are able to redeem the container deposits, as is proposed in the NSW scheme.

2.1.3 Waste Levy

With the election of a Queensland Labor Government in early 2015, there has been much speculation and discussion about whether a waste levy would be re-introduced after the previous levy was repealed in 2012, just seven months after it commenced. However, given the government’s election promise of ‘no new taxes, fees or charges’ it is unlikely that a waste levy would be applied in this term of government, but it could be considered in the future. While there is broad support across industry for a levy, the state government is currently focusing on other policy instruments to increase resource recovery.

With every other mainland state in the country having landfill levies in place, there is potential for Queensland to eventually follow suit. There are many different levy models that might be considered so it is impossible to predict exactly the impact of a potential levy. Most other states have implemented differential levy rates for metropolitan versus regional areas, which makes sense for Queensland given the vast differences in waste management systems between South East Queensland and regional areas.

While any potential levy in the future would increase the cost of landfilling in FNQROC, it would also promote the growth and development of secondary markets, improve the feasibility of resource recovery options and potentially provide funding for improved waste infrastructure.

Of all the policy instruments available, a landfill levy has the most potential to have a significant impact on landfill diversion rates in Queensland, particularly those parts of the state that have relatively cheap landfill gate fees. It would also drive business and industry to reduce waste and recycle more, and encourage investment in new resource recovery infrastructure. In other states, levy funds have been used to fund new infrastructure through grants, develop markets and undertake planning and research that supports infrastructure development.

2.1.3.1 Levy impacts in other states

This section provides an overview of levies in other states and the impact on the waste market and resource recovery infrastructure. This analysis forms the basis of a waste flow modelling scenario around the potential introduction of a waste levy in Section 3.2, but is also provided to assist councils to understand the potential impacts of a levy, if it is introduced in Queensland.

New South Wales

The landfill levy was introduced in NSW in 1971 at a rate of just $0.56/tonne but the levy in the Metropolitan Levy Area (MLA - greater Sydney, Hunter and Illawarra regions) has now increased to be the highest in the country, currently at $135.70 per tonne. In the Regional levy area, which covers most of the east coast outside of the MLA, the rate is around $78 per tonne. There is no levy in rural areas to the west of the state. Combined with a shortage of putrescible landfill capacity in greater Sydney, the levy has been a significant driver of an increase in resource recovery in the Sydney area. Outside of Sydney, it has been a strong factor in increasing resource recovery but at a slower pace.

By around the mid-2000s, the market responded to planned significant levy increases with significant investment in MBT plants and other recycling infrastructure. It remains a major driver in the current development of new recovery infrastructure, including organics processing and commercial waste recovery facilities. For MSW in particular, the rate of diversion is stabilising now that many councils have introduced, or are planning to introduce, third bin organics collections for food and/or garden organics. The MSW diversion rate across NSW is around
53% (2012-13 data), but is higher in the greater Sydney region. The diversion rate for C&I waste is 61% while for C&D waste it is 69%.

Technologies such as EfW can now compete with landfill gate fees and could produce a significant change in diversion, subject to development approvals, energy outlets and compliance with the state’s EfW policy. The production of refuse derived fuel (RDF) for export is gaining popularity as a cheaper alternative to landfill that can be established relatively quickly, subject to securing market outlets for the RDF (mostly overseas). The return of levy funds to the market in the form of grants is currently supporting a new phase of major infrastructure development which will likely result in a further jump in diversion performance.

**Victoria**

The waste levy was introduced across all Victorian landfill sites in 1996 at a modest $2 per tonne and rose steadily before a significant increase in 2010-11, when it jumped to $30 per tonne. It is currently around $60 in the Metropolitan region, while in rural regions it is $53 for C&I waste and $30 per tonne for MSW. Despite this rise, and based on the data available, the rate of change in overall landfill diversion in Victoria has been slow. Diversion of commercial and C&D waste is very high but diversion of MSW is less than 50%.

Landfill capacity in Melbourne is generally plentiful and prices relatively low, even with the levy. Melbourne is largely lacking in advanced processing infrastructure to recover putrescible waste, compared with Sydney and Perth. However, there is a process in place to plan and support new infrastructure at a regional level. The overall diversion rate in Victoria is around 70%.

**South Australia**

South Australia managed to achieve quite high diversion rates with only a modest landfill levy in place, as a result of a suite of policies to drive resource recovery. In the past, South Australia’s waste levy was relatively low, however recent increases mean that from July 2016 the metropolitan rate will be $62 per tonne and it will rise to $103 over the next four years. South Australia is also considered to have a relatively advanced recycling market which means that the response to levy increases will not be as dramatic as those states without such a developed recycling market.

**Western Australia**

In Western Australia the levy for inert material was initially $1 per cubic metre and eventually jumped to $12/m³ in 2010 which had a significant effect on increasing landfill diversion of inert waste. The levy on putrescible waste started at $3 per tonne and rose to $28 per tonne in 2010, causing a reduction in waste sent to landfill. From January 2015, the putrescible levy rate has jumped up to $55 and will rise to $70 by 2018. The inert rate is also rising rapidly and will eventually catch up with the putrescible rate at $70/t (equivalent weight basis). The WA levy only applies in the Perth metro region.

It should also be noted that the Perth region suffers from a serious lack of landfill capacity due to the natural geology of the region, which has been more of a driver than the landfill levy towards the early adoption of advanced recovery technologies. A number of MBT facilities are in operation and at least three EfW projects are currently in planning and should be cost competitive with landfill under the increased levy rates.

The diversion of MSW in the Perth metro region has remained relatively steady over the last five years (around 40%) suggesting that the impact of the recent levy rise is yet to be felt. Statewide diversion of C&I has steadily increased from 28% to 52%, while C&D diversion has increased from 31% to 42% over five years. The overall diversion rate is 42% across the state and 50% in Perth.
Summary

In general, experiences in other states suggests that:

- The diversion of C&D waste is likely to respond rapidly to a landfill levy, given that it is relatively easy to recycle C&D waste and quick to establish new C&D processing facilities. Furthermore, weight based landfill levies tend to focus attention on heavy or dense waste streams. This is also consistent with feedback from industry which suggested that a number of C&D recycling operations were set up around the time of the previous Queensland landfill levy, with some subsequently mothballed when the levy was withdrawn. An increase in C&D recovery to around 70% (excluding remote areas, from current 55%) within five years is a reasonable expectation, consistent with other states.

- The recovery of commercial waste is largely driven by price so a moderate levy rate will likely drive more waste reduction and recycling in the commercial sector. An increase in C&I recovery to 55% (from current statewide rate of 41%) within 5 years is a reasonable expectation, consistent with other states and in line with the Waste Strategy target level.

- It takes time to develop new recovery facilities (several years for major MSW infrastructure) so there is a natural lag between the introduction of a levy and any significant impact on diversion rates resulting from the commissioning of new infrastructure.

- The levy needs to be quite high before there is a step-change in the diversion of MSW, given the relative difficulty in processing wet waste and recovering valuable products. For example in Sydney where the levy is $135.70, advanced processing technologies such as energy-from-waste (EfW) and mechanical-biological treatment (MBT) are now cost competitive with landfill.

- Nevertheless a moderate levy may spur larger councils or regional groups that have significant waste volumes to consider more advanced processing solutions such as MBT or EfW.

- A levy together with other measures (such as grant funding) can encourage councils to introduce kerbside collections of food and garden organics.

- Most other states have seen their MSW diversion rates gradually increase in the order of 10-15% following significant increases in levy rates. Other factors such as landfill capacity constraints also play a role, particularly in Sydney and Perth. So an MSW diversion rate of 45% is considered achievable for regional areas (not remote) and 50% in South East Queensland within ten years.
3 WASTE FLOW MODELLING

This chapter presents the waste flow projections developed by Arcadis which forecast waste generation and disposal volumes from major sources in the region, over the next 30 years under a range of resource recovery scenarios.

3.1 Background

3.1.1 Population forecasts

Waste generation from all sources is closely linked to population growth, among other factors such as economic growth, which is discussed further below. For the purposes of modelling future waste flow projections, Arcadis has adopted the population projections released by the Queensland Government (Statisticians Office) which were updated in 2015. The updated projections account for a moderation in population growth in Queensland since the previous 2013 edition, primarily due to lower than expected overseas and interstate migration.

The projections by LGA only extend to 2036, so for the 30 year projections used in this report (to 2045), Arcadis has assumed that the annual growth rates predicted in 2036 are continued.

The population projections are presented in Figure 3 below while shows the forecast population growth rates.

The figures show that population growth in Cairns is expected to be significantly stronger than other LGAs and the main driver for growth across the region. Douglas, Mareeba, Yarrabah and Tablelands are expected to have moderate growth over this period. Cook and Cassowary Coast are forecast to have negative or zero growth in the short term, then turning positive in the medium term.

![Figure 3: Population projections FNQROC region – medium growth series, updated 2015, Qld Government Statisticians Office](image-url)
3.1.2 Historic waste flows and trends

In order to develop growth assumptions for future waste projections, Arcadis first examined the historic trends in waste generation growth over the past four years for which comparable and complete data was provided. The data is for the whole of Queensland and based on aggregated totals from EHP annual surveys so is subject to the limitations discussed in Section 1.5. Arcadis did not have access to sufficient data at an LGA level to be able to review specific trends for the FNQ region. It is noted that the quality and completeness of waste data gathered by EHP has been continually improving over recent years and it was felt that beyond the last four years of historic data, it could be difficult to directly compare waste flows.

Queensland-wide waste volumes across the three main source streams (MSW, C&I and C&D) have fluctuated significantly over the four financial years from 2011-12 to 2014-15, as shown in Figure 5 below. This coincided with turbulent economic times in the state with the end of a significant mining and resources boom, and the construction of major gas processing facilities coming to an end, which contributed to a slowing economy.
The total volume of MSW collected across Queensland increased from 2011-12 to 2012-13 but then steadily declined for the following two years. Figure 6 below also shows that MSW per capita followed a similar pattern (based on available population projections). This is generally inconsistent with long-term trends observed elsewhere in Australia but not unexpected considering the declining economy in Queensland over this period. Figure 6 also shows that the overall growth in the Queensland economy (represented by the Gross State Product, GSP) slowed significantly over this period reducing from 5.8% in 2011-12 to just 0.5% in 2014-15. In times of economic stress, people tend to consume less, particularly non-essential and luxury products, or delay the purchase of new items if they can.

The decline in waste generation is a short-term trend at this stage and it is difficult to know whether it will continue, or whether it will be reversed as the state economy improves, as is forecast. It is however, consistent with recent trends noted in other states. In Western Australia, which has also been affected by the end of the mining boom, the data for 2014-15 shows that across WA, there was a drop in waste generation of approximately 445,000 tonnes compared with 2013-14. In NSW, total waste volumes fell 2.3% between 2010-11 and 2012-13 and per capita waste generated in the greater Sydney area fell 3% over the same period.

The volume of C&I waste managed was reasonably steady from 2011-12 through to 2013-14, then dropped in 2014-15. The generation of C&I waste is typically closely linked to economic conditions and this drop could be explained by the economic decline demonstrated by the drop in GSP growth in 2014-15.

Volumes of C&D waste seemed to go against the trends of the other waste streams and the Queensland economy, with reported tonnes of C&D waste increasing significantly over the four year period. The generation of C&D waste is affected by the strength of the economy and over the longer term, C&D volumes would be expected to follow economic growth. However, year-to-year volumes can also be skewed by major infrastructure construction projects. During this period there were some significant construction projects underway in Queensland including LNG processing facilities in Gladstone and associated gas extraction and distribution infrastructure across south-western Queensland. 2014-15 also saw the start of a significant increase in residential construction in south-east Queensland.

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3 Recycling Activity in Western Australia 2014-15, Department of Environment and Regulation
4 NSW State of Environment Report 2015, NSW EPA
The only conclusion that can be drawn from this review of recent historic waste generation data is that there is no clearly identifiable trend in waste generation or it is difficult to determine whether recent short-term trends are likely to continue. As such, the recent trends are not particularly helpful as the basis for assumptions of future waste growth rates. While recent data suggests a decline in waste generation per capita for MSW and C&I, it may just be a short-term trend linked to economic uncertainty.

![Graph showing historic total waste managed per capita in Queensland by source, against annual growth in Gross State Product (GSP)](image)

**Figure 6: Historic total waste managed per capita in Queensland by source, against annual growth in Gross State Product (GSP)**

### 3.1.3 Baseline waste flows

For the each stream (MSW, C&I and C&D), Arcadis has adopted the most recently available data from the 2014-15 financial year as reviewed and agreed by each council and presented in the Situational Analysis Report, as the baseline data set for future projections. In choosing any one year’s data, there is a risk that anomalous data or events could skew the results, particularly given the fluctuations that have been observed in recent years.

### 3.2 Future waste flow projections

Generally, waste generation growth can be expected to at least match or exceed population growth. The recent historic waste volumes suggest that MSW and C&I tonnages (both total and per capita) have declined in line with a slowing in the Queensland economy. Forecast GSP growth rates for Queensland suggest that the economy will pick up, reaching 4.5% growth in 2016-17 and then dropping back to 3.25% in 2018-19.

If that happens, it can be expected that some of the recent declines in per capita waste generation will be reversed to some extent – residents will start to consume more again, and business and manufacturing activity will pick up. C&D waste generation can also be expected to grow in line with the economy and population growth, albeit with short-term fluctuations driven by major projects and construction cycles.
Projections of future waste arisings are dependent on many factors and subject to a high degree of uncertainty. Population growth and economic activity are generally accepted as the major factors. On the other hand, manufacturers and retailers are becoming more aware of packaging waste and taking measures to reduce it. Examples include light-weight packaging and re-usable shopping bags. Furthermore, anecdotal evidence within the recycling industry suggests there has been a significant drop in the generation of paper and cardboard waste. This is linked to a recent downward trend in consumption of paper products, which can mostly be attributed to a decline in sales of print media products (newspapers, magazines and marketing materials) due to substitution with electronic and online alternatives.

In the short-term, it is reasonable to assume that waste generation across all streams will be somewhat aligned to the growth of the Queensland economy (which also accounts for population growth). Longer term, Arcadis had assumed that waste generation per capita will not continue to grow indefinitely and that it will eventually plateau.

It is difficult to predict when the ‘upper limit’ of waste generation per capita might be reached or whether it has already been reached in Queensland. There is a growing awareness in the community and business of the need to minimise waste production and a number of initiatives already implemented or in planning as noted above. Arcadis anticipates that the focus on waste reduction will be a slow process, continuing over the coming decade.

### 3.2.1 Business-as-usual projections

For the purpose of modelling the business-as-usual (BAU) case, Arcadis has taken a conservative approach to waste growth assumptions and assumed a period of short-term growth followed by a plateauing in per capita waste generation. Although the Queensland Waste Strategy sets a target to reduce waste generation by 5% per capita by 2024 and recent data suggests that it has been reducing in recent years, the trend is likely a function of recent economic conditions and it is not clear whether the downward trend will continue.

As such, for the BAU baseline scenario, the future projections of waste generation growth rates across all three waste streams are based on:

- From 2016 to 2021: All streams grow in line with statewide GSP growth forecasts, noting that GSP growth projections account for population growth;
- From 2022 to 2026: transition in waste generation growth rate aligned to GSP, to growth rate aligned with population only;
- From 2026: no growth in waste generation per capita, total waste grows with population growth only.
- From 2027, the current Regional AWT contract is assumed to cease and that waste flows direct to landfill. It is possible that an alternative solution will be put in place but nothing has been determined at this stage, hence the BAU recovery profile for MSW shows a sharp increase in 2027.

These assumptions are considered to be conservatively high and it is quite possible that future waste generation rates per capita will stabilise or even further reduce. Under the business-as-usual scenario, it is assumed there is no change in the current recovery rates (other than when the AWT contract ends) so as waste generation volumes grow, the relative proportions that are disposed to landfill remain constant.

Figure 7 below summarises the projected waste flows by stream for the region.
Figure 7: Future BAU projected generation of MSW, C&I and C&D for FNQROC region

Figure 8 below presents the projected recovery rates under the BAU scenario and the tonnes of each stream to landfill.

Figure 8: Future BAU recovery rate projections – FNQROC region
### 3.2.2 Scenario 1: Achievement of Strategy Targets

This alternative scenario models the recovery rates of the major streams and waste to landfill, in the case where the Queensland Waste Strategy targets are achieved, without being specific about how the targets could be achieved. The subsequent waste flow scenarios explore the potential recovery impacts of policy reforms that may be implemented or considered in the future. They show that no single policy instrument is likely to achieve the Strategy targets and a package of complementary policies is likely to be required.

The Strategy targets are set out in Table 1 below.

**Table 1 – Queensland Waste Strategy Recycling 2024 targets**

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>Recycling target (2024)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal Solid Waste</td>
<td>Regional areas = 45%</td>
</tr>
<tr>
<td></td>
<td>Remote areas (Cook &amp; Wujal Wujal) to improve practice (no target)</td>
</tr>
<tr>
<td>Commercial and Industrial Waste</td>
<td>55%</td>
</tr>
<tr>
<td>Construction and Demolition Waste</td>
<td>80%</td>
</tr>
</tbody>
</table>

As a region overall, FNQROC councils are close to achieving the MSW recycling rate (currently around 42% overall for MSW). This is thanks largely to the AWT contract and the three participating councils are meeting or exceeding the MSW target. However, if the AWT contract is not replaced with another solution that achieves at least the same recovery of MSW, then the region’s recycling rate will drop from 2027. If that waste is sent direct to landfill, the recycling rate for the region will drop to around 30% for MSW from 2027.

The achievement of the Strategy targets for C&I and C&D waste requires a step-change in resource recovery behaviours and infrastructure. The current C&I recovery rate is estimated to be around 35%, while for C&D it is around 44%. In reality, that is going to be challenging to achieve by 2024 given the policy measures to support higher resource recovery are still being considered by the government and it takes several years to develop major new waste infrastructure. Figure 9 below presents the waste to landfill tonnages and recovery rates under this scenario.
3.2.3 Scenario 2: Introduction of a waste levy

At the time of writing this report, a landfill levy was not being considered by the state government and its inclusion as a modelling scenario should not be taken as any indication otherwise. However, there is broad support for a levy amongst the waste industry in Queensland as evidenced by feedback provided to Arcadis for the Queensland Waste Infrastructure Project. The introduction of a levy would also bring Queensland into line with other major mainland states. A discussion on levy rates and its impact on resource recovery in other states is provided in 2.1.3 above. Based on experiences and trends in other states, Arcadis has developed some assumptions around the potential impacts of a levy on the FNQROC region.

Levy Scenario Assumptions

The lack of clear policy position on a levy makes it difficult to predict what a potential levy system may look like in Queensland – in terms of the value, start date, waste type and regional coverage, and likely ramp-up profile. The previous landfill levy that was introduced in Queensland in July 2011 and subsequently repealed in early 2012, was largely criticised for being overly complex to administer as a result of exemptions for household waste. At $35 per tonne for general waste, it was also significantly lower than current rates in other states.

There are many different potential variations on levy systems that could be considered, but for the purposes of modelling this scenario to provide a demonstration of the potential scale of impacts, Arcadis has assumed the following hypothetical parameters:

- A levy is introduced in 2020 covering all waste streams disposed to landfill;
No levy applies in the Remote Queensland regions (Cook and Wujal Wujal) as other factors would still inhibit resource recovery so it is unlikely to be effective (this is consistent with NSW, WA and SA where remote areas are excluded from the levy);

By 2025, the levy ramps up to around $50-70 per tonne, which would be in the same range as current rates in Victoria, Western Australia, South Australia and regional New South Wales;

The following diversion rates are achieved within the levy area (excluding Remote region):

- MSW = 50% diversion in regional areas within ten years (2030)
- C&I = 55% diversion within 5 years (2025)
- C&D = 70% diversion within 5 years (2025)

As noted in section 2.1.3 above, C&I and C&D are expected to react quickly to a levy introduction and subsequent increases, while for MSW there will be more of a lag. Hence it is assumed that the full impact would not be evident in MSW recovery rates until 2030.

There is assumed to be no significant change in the Remote region LGAs, although it is noted that a levy could potentially fund resource recovery programs in those areas, which could have an impact (not modelled).

Figure 10 below summarises the projected recovery rates and tonnes to landfill by stream under this scenario.
### 3.2.4 Scenario 3: landfill bans

This scenario considers the impact of a landfill ban on green waste (all), concrete and tyres as current being considered by the state government. For ease of modelling, it is assumed that all self-hauled green waste is already fully recovered and the ban would mostly affect green waste that is present in domestic kerbside waste and C&I waste that goes to landfill.

Based on the limited audit that is available from various sources (see section 2.1.1), Arcadis makes the following assumptions to estimate the volume of green waste and concrete being disposed in the residual waste stream (note these are average values across the region, recognising that Cook has much less green waste in MSW).

*Table 2: Assumed average content of green waste and concrete to landfill for modelling*

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>FNQROC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green waste in domestic kerbside bins</td>
<td>35%</td>
</tr>
<tr>
<td>Green waste in C&amp;I waste to landfill</td>
<td>15%</td>
</tr>
<tr>
<td>Concrete in C&amp;D waste to landfill</td>
<td>18%</td>
</tr>
</tbody>
</table>

It is noted that the AWT facility already effectively recovers green waste from kerbside MSW, so up to 2026, there will be no change for Cairns, Douglas and Mareeba from BAU.

Figure 11 below shows the projected tonnages to landfill and recovery rates of the major streams under this scenario where green waste, concrete and tyres are banned from landfill and assumed to be fully recovered. This affects all three streams: green waste in MSW, green waste and tyres in C&I, and concrete in C&D. For the purposes of modelling, the bans are assumed to commence in 2017-18. The modelling also assumes that the policy is 100% effective in removing these materials from landfill.
3.2.5 Scenario 4: Container Deposit Scheme

This scenario looks at the future waste flows if the CDS is introduced across Queensland. Background to the likely CDS scope is provided in Section 2.1.2 above. The key assumptions in the modelling are:

- Based on the South Australian system performance, the CDS captures around 25kg per person per year which is used to estimate total capture volumes; and
- 21% of the kerbside recycling stream (where collected) would be eligible for a CDS (based on estimates using NSW recycling compositions) which is used to estimate migration from existing kerbside systems.

The potential materials that could be captured under the CDS are therefore summarised below. It shows that across the region, using 2014-15 data, approximately 6,388 tonnes of beverage containers could be captured across the region, which would be an additional 3,575 tonnes on top of existing recycling volumes. The exact split of containers between existing kerbside systems and the new CDS system is unknown.

Table 3: Breakdown of potential additional recycling through CDS (2014-15 data)

<table>
<thead>
<tr>
<th>Region</th>
<th>Domestic kerbside recycling</th>
<th>Estimated Beverage Containers (21% recycling)</th>
<th>Total potential CDS capture</th>
<th>Potential additional CDS recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cassowary Coast Regional Council</td>
<td>0</td>
<td>0</td>
<td>716</td>
<td>716</td>
</tr>
<tr>
<td>Wujal Wujal Aboriginal Shire Council</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>
Figure 12 below shows the projected tonnages and recovery rates of the major streams under this scenario. The CDS is assumed to come into force in 2017-18. For simplicity of modelling, all CDS containers are assumed to be part of the MSW stream. Not surprisingly, the overall impact on recovery rates is not significant but does result in a 3% increase in MSW recovery.
3.2.6 Summary of Scenario Outcomes

The charts below provide a summary and comparison of the recovery rates for each stream (MSW, C&I, C&D) under the scenarios described above.

Figure 13: Summary of MSW recovery rates under each model scenario

Figure 14: Summary of C&I recovery rates under each model scenario
Figure 15: Summary of C&D recovery rates under each model scenario
4 PRIORITISATION OF WASTE STREAMS & ISSUES

There are many areas across waste and resource recovery services, where FNQROC members could work together for mutual benefit. However, it is important to be realistic about what can be achieved with the resources available and within the constraints that exist. To pursue all potential opportunities will likely result in very few of them being properly and fully implemented.

In order to focus attention on solutions which are likely to have the greatest impact and benefit, it is necessary to prioritise and identify specific target materials and issues for attention. For the current study, this prioritisation is based on two sources:

- Feedback received from member councils and the Regional Waste Managers Group during the first stage of this project on common issues with existing waste systems and infrastructure, constraints on resource recovery and particular waste streams which are challenging to manage; and

- A waste stream prioritisation assessment which uses weighted criteria developed and agreed by FNQROC members to score the various waste streams and materials managed in the region in a structured assessment, to identify those which are most in need of improved management.

There is naturally some overlap in priorities identified through both approaches as discussed below.

4.1 Feedback from member councils

During the first stage of the project (Situational Analysis), Arcadis consulted with each of the member councils to identify the key issues and constraints they face, in terms of providing better waste infrastructure and recovery of resources. Not all of the issues raised can be resolved through regional collaboration – some of the issues need to be addressed at the individual council level, while other issues fall within the remit of state government or other parties.

The feedback documented in the Situational Analysis identified the following priority waste streams and areas where there may be opportunities for better regional collaboration:

- Development of local markets for secondary resources, particularly dry recyclables, recovered organics, secondary aggregates and glass fine sands.

- Enhanced organics recovery, expansion to include other organic materials (such as biosolids, food organics) and value-adding through composting or other processing options

- Collection of soft / film plastics for reprocessing, particularly from the agricultural sector

- Improvement and expansion of the Cairns MRF to improve its viability, along with increasing the collection of recyclables from other councils and from the commercial sector

- Potential for regional cooperation on future disposal and/or processing of putrescible waste to mitigate the significant lack of disposal facilities in the region

- Cooperation and aggregation of difficult wastes such as tyres, gas bottles and mattresses where improved local solutions would benefit councils

- Preparation to manage emerging problem waste streams such as lithium batteries, compact fluorescent bulbs, end-of-life solar panels, new gadgets in e-waste and new composite packaging materials

- Regional planning for the management of disaster waste including maximising resource recovery opportunities

- A regional approach to community education

- A regional approach to improving waste data

- More consistency in waste services and user charging approaches across the region
4.2 Waste Prioritisation Assessment

In order to identify which waste streams and materials should be prioritised for regional collaboration opportunities, Arcadis has undertaken a waste prioritisation assessment based on an assessment matrix and waste stream list proposed by FNQROC and modified from a tool developed under the National Waste Policy. Minor refinements have been made by Arcadis to both the assessment criteria and waste streams to better reflect the group’s requirements, based on our understanding.

The original waste material list proposed by FNQROC was based on the state wide data collection system implemented by EHP. As such, it included some materials which were not particularly relevant or significant to the FNQROC region and these materials were removed from the list including: forestry residuals; cotton gin trash; abattoir waste; vegetable oil; ash and drilling mud. Similarly, based on feedback received in the Situational Analysis stage of this project, Arcadis opted to include additional waste streams which were identified as issues for some councils, including:

- Additional of gas bottles, mattresses
- Separation of packaging plastics into rigid and soft / film plastics
- Separation of packaging glass into clean glass and glass fines / broken glass
- Consideration of broader, mixed waste streams, namely MSW and C&I general waste, commingled dry recyclables, organics and mixed C&D.

The table below summarises the waste streams and materials included in the assessment.

*Table 4: Waste materials for prioritisation assessment*

<table>
<thead>
<tr>
<th>Domestic / Commercial</th>
<th>C&amp;D</th>
<th>Organics</th>
<th>Regulated &amp; Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSW – General</td>
<td>Mixed C&amp;D</td>
<td>Overall organics</td>
<td>E-waste</td>
</tr>
<tr>
<td>C&amp;I – General</td>
<td>Concrete</td>
<td>Green waste / mulch</td>
<td>Tyres</td>
</tr>
<tr>
<td>Commingled Recyclables</td>
<td>Asphalt</td>
<td>Food processing waste</td>
<td>Other Rubber</td>
</tr>
<tr>
<td>Packaging glass</td>
<td>Brick and tiles</td>
<td>Other food waste</td>
<td>Lead acid batteries</td>
</tr>
<tr>
<td>- clean glass</td>
<td>Ferrous metals</td>
<td>Timber, wood sawdust</td>
<td>Non lead acid batteries</td>
</tr>
<tr>
<td>- glass fines</td>
<td>Nonferrous metals</td>
<td>Biosolids – DSE</td>
<td>Mineral oil</td>
</tr>
<tr>
<td>Paper &amp; Newsprint</td>
<td>Non-packaging plastics</td>
<td>Grease/grease trap waste</td>
<td>Gas bottles</td>
</tr>
<tr>
<td>Cardboard</td>
<td>Non-packaging glass</td>
<td>Manure</td>
<td>Mattresses</td>
</tr>
<tr>
<td>Packaging plastics</td>
<td></td>
<td>Agricultural residuals</td>
<td>Other regulated waste</td>
</tr>
<tr>
<td>- rigid plastics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- film plastics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steel cans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminium cans</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The criteria used in the assessment and their agreed relative weightings are summarised in Table 5 below. Each waste material or stream has been given a score from 1 to 5 against each criterion, where a higher score indicates a higher priority for focus. The individual scores are then weighted accordingly to calculate an overall priority score for each material. Further detail including scoring guidance is included in Appendix A.
## Table 5: Waste prioritisation criteria and weightings

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
<th>Scoring guidance</th>
<th>Relative Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation level (tonnes)</td>
<td>Total quantity reused, recycled and disposed to landfill (relative to total waste generation across the region)</td>
<td>High score = high volume Low score = low volume</td>
<td>20%</td>
</tr>
<tr>
<td>Existing level of reuse or recycling</td>
<td>The proportion of total generation which is already reused or recycled</td>
<td>High score = low existing recovery rate Low score = high existing recovery rate</td>
<td>15%</td>
</tr>
<tr>
<td>Potential environmental &amp; health impacts associated with end-of-life disposal</td>
<td>The potential for adverse human health and environmental impact from inappropriate disposal or management; requires particular care in handling; impacts can include air, odour, surface and ground water, soil, carbon and toxicity to humans, animals and plants</td>
<td>High score = significant potential impacts Low score = minimal potential impacts</td>
<td>30%</td>
</tr>
<tr>
<td>Existing / planned product stewardship arrangements</td>
<td>Is there an existing PS scheme in place, or a planned industry agreement with government to develop and implement recycling and reuse initiatives across industry? An existing, successful PS scheme reduces the need for additional solutions.</td>
<td>High score = no support from PS scheme Low score = already strongly supported by PS scheme</td>
<td>5%</td>
</tr>
<tr>
<td>Ease of collection / material separation</td>
<td>The ease of collecting, separating and sorting products for recycling - including whether it is physically viable and consideration of the cost of collection / processing</td>
<td>High score = easy to collect &amp; separate Low score = very difficult to collect &amp; separate</td>
<td>15%</td>
</tr>
<tr>
<td>Recyclability and market availability</td>
<td>Ease of reprocessing and the existence of commercial markets for the reprocessed products</td>
<td>High score = strong markets / reprocessing options Low score = no markets / limited reprocessing options</td>
<td>15%</td>
</tr>
</tbody>
</table>

The assessment is focused on maximising recycling and recovery of resources which is a key focus of this study but not its only purpose. The criteria above also tend to favour the materials which are easier to recycle – the ‘low hanging fruit’ – those materials which are plentiful and easy to separate, collect, reprocess and market. There is certainly logic in targeting such materials first to maximise the potential impacts within the constraint of the limited resources that are available. However, it may not highlight issues with particular problems waste such as those that have been identified by some councils above.

The assessment is a simplified exercise and it does not necessarily reflect all of the issues and aspects that need to be considered for all waste streams in the region. Nevertheless, with those constraints in mind, this waste prioritisation assessment is useful as a first cut to narrow down potential priorities.
If taken in isolation, there is a risk that other valuable opportunities will be overlooked. Therefore, Arcadis has also considered waste materials and systems that did not necessarily score highly in the assessment but should be considered for potential regional collaboration opportunities, based on feedback from member councils in Stage 1 of the project as noted above. These are discussed below. Some waste streams are also more of a priority and problem for some individual councils or sub-regional groups, rather than for the whole region, and therefore worthy of consideration for sub-regional collaboration opportunities.

Figure 16 below summarises the overall priority scores for each of the waste materials and streams assessed. Figure 17 following, presents those scores in descending order to differentiate the higher scoring wastes, and Figure 18 presents only the 12 highest scoring materials. The full assessment and scoring breakdown is presented in Appendix A.
## Summary Waste Stream Prioritisation Scores - by category

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSW - General Waste</td>
<td>3.5</td>
</tr>
<tr>
<td>C&amp;I - General Waste</td>
<td>3.75</td>
</tr>
<tr>
<td>Overall - commingled Recyclables</td>
<td>3.5</td>
</tr>
<tr>
<td>Paper &amp; Cardboard</td>
<td>3.25</td>
</tr>
<tr>
<td>Packaging glass - clean</td>
<td>3.75</td>
</tr>
<tr>
<td>Packaging glass - fines / broken</td>
<td>3.75</td>
</tr>
<tr>
<td>Packaging plastics - rigid</td>
<td>3.5</td>
</tr>
<tr>
<td>Packaging plastics - film</td>
<td>3.75</td>
</tr>
<tr>
<td>Steel cans</td>
<td>3.25</td>
</tr>
<tr>
<td>Aluminium cans</td>
<td>3.5</td>
</tr>
<tr>
<td>Overall organics</td>
<td>3.75</td>
</tr>
<tr>
<td>Green waste / mulch</td>
<td>3.5</td>
</tr>
<tr>
<td>Food waste</td>
<td>3.75</td>
</tr>
<tr>
<td>Food processing waste</td>
<td>3.75</td>
</tr>
<tr>
<td>Timber, wood sawdust</td>
<td>3.75</td>
</tr>
<tr>
<td>Biosolids – DSE</td>
<td>3.75</td>
</tr>
<tr>
<td>Grease/grease trap waste</td>
<td>3.75</td>
</tr>
<tr>
<td>Manure</td>
<td>3.25</td>
</tr>
<tr>
<td>Agricultural residuals</td>
<td>3.5</td>
</tr>
<tr>
<td>Overall C&amp;D</td>
<td>3.25</td>
</tr>
<tr>
<td>Concrete</td>
<td>3.5</td>
</tr>
<tr>
<td>Asphalt</td>
<td>3.25</td>
</tr>
<tr>
<td>Brick and tiles</td>
<td>3.25</td>
</tr>
<tr>
<td>Ferrous metals (scrap steel)</td>
<td>3.25</td>
</tr>
<tr>
<td>Nonferrous metals (scrap NF)</td>
<td>3.25</td>
</tr>
<tr>
<td>Non-packaging plastics</td>
<td>3.25</td>
</tr>
<tr>
<td>Non-packaging glass</td>
<td>3.25</td>
</tr>
<tr>
<td>E-waste</td>
<td>3.5</td>
</tr>
<tr>
<td>Tyres and rubber</td>
<td>3.5</td>
</tr>
<tr>
<td>Lead acid batteries</td>
<td>3.5</td>
</tr>
<tr>
<td>Non lead acid batteries</td>
<td>3.5</td>
</tr>
<tr>
<td>Mineral oil</td>
<td>3.5</td>
</tr>
<tr>
<td>Gas bottles</td>
<td>3.5</td>
</tr>
</tbody>
</table>

**Figure 16: Summary of waste stream prioritisation assessment overall scores by waste category**
Figure 17: Summary of waste stream prioritisation assessment overall scores in ascending order
4.2.1 MSW - general waste

MSW general waste (domestic residual waste) scored relatively high on the assessment (3.65), based on the large volume of the waste generated in the region, the high potential for environmental impact and the relatively high cost of sorting and processing the waste. Clearly the management of MSW residual waste is closely linked with the recovery and management of household recyclables and organics, which also scored highly as priorities (below).

4.2.2 C&I general waste

Commercial and industrial general waste as a stream returned one of the highest scores (4.1) on the assessment as a result of large volumes, current low recovery rates, potential environmental impacts and strong potential for better recovery performance.

Although managing commercial waste is not strictly the responsibility of local government, council landfills still received more than half (around 55%) of the 62,000 tonnes of commercial waste that was disposed in the region in 2014-15. There may be opportunities for councils to help improve the recovery of C&I waste in the region in ways that will benefit existing and future waste infrastructure by increasing waste volumes to recycling facilities and conserving landfill
airspace. Commercial waste also provides a critical source of revenue for some councils. As with MSW, the management of C&I general waste links to the recovery of commercial recyclables and organics.

4.2.3 Dry Recyclables

As an overall stream, commingled dry recyclables scored quite highly (3.5) in the assessment on account of significant volumes, current low recovery rates in some council areas, potential links to product stewardship opportunities (container deposit scheme) and strong potential to separately collect and reprocess the material.

The prioritisation assessment also considered individual recyclable material streams of which rigid and film plastics scored relatively highly (3.4 and 3.45, respectively). This was on account of strong potential for recovery, reasonable potential markets and moderate environmental impacts. Existing recovery of rigid plastics is low for those councils that do not operate kerbside recycling services. Recovery of film plastics is low across the region, other than some agricultural film plastics separated by Mareeba, with Cassowary Coast looking to start separation of agricultural plastics in the near future.

Steel and aluminium containers, paper and cardboard, and packaging glass scored slightly lower on account of their lower volumes, higher current recovery rates and/or environmental impacts. Metals recovery is generally good in the region, thanks to the high value of the material and initiatives such as the regional scrap metal collection contract. For clean glass, markets exist but are unreliable - there are domestic glass reprocessing facilities in South East Queensland, but the volume capacity of those outlets is limited and there is often an oversupply of recovered glass cullet in Queensland.

Arcadis also assessed glass fines separately from clean glass, as this is a stream that is a particular issue for some councils, with very different processing requirements and market opportunities compared to clean glass. The assessment scored glass fines moderately high (2.9) but as noted below, Arcadis is of the view that this stream should be further considered given its impact on MRF performance and potential market opportunities. Historically, large volumes of glass fines and broken glass have been disposed to landfill resulting in poor recovery rates in the region’s primary MRF (Cairns). The Cairns MRF now includes a process to convert glass and glass fines into secondary glass sand products but market options for those products are currently limited to some internal council applications, and in need of development. The development of new markets for secondary glass sand products could potentially provide a more reliable outlet for all recovered glass in the region, and reduce reliance on the limited reprocessors in SEQ.

4.2.4 Organics

As an overall stream, domestic and commercial organics scored relatively high (3.95) on account of large volumes, moderate recovery rates, high potential environmental impact and good potential for improved recovery and markets. This highlights the need for a coordinated approach organics recovery which considers a range of organic feedstocks.

Arcadis also assessed individual organic materials as detailed in Table 4 above. Green waste, food waste and biosolids are streams that are largely controlled by councils and all scored moderately high (3.4 - 3.6) on account of large volumes and potential impacts, and despite relatively good existing recovery rates. There is potential for the recovery of all streams to be improved and better markets developed.

Green waste is currently source separated by all councils, but very little is converted into higher value compost products and the market opportunities for the low grade mulch produced are limited. The AWT facility provides effective diversion of domestic food waste for the participating councils but consideration needs to be given as to how food waste will be managed beyond 2026 and whether there are opportunities for other councils to divert food waste.
Existing recovery rates of biosolids are generally high for most councils (98% overall) but with large volumes being spread on farmland, FNQROC is separately looking at opportunities to improve the management of biosolids.

There is potential for recovery solutions to be developed for the organics streams that councils can control (domestic food and garden waste and biosolids) which can then be leveraged to include other organic streams such as commercial food waste or food processing waste.

Agricultural organics also scored moderately high but in reality there is very little that councils can do to influence the recovery of those materials and the volume that is disposed to landfill is likely to be negligible. Those materials that can be reasonably recovered already are being composted, while the remainder is likely to be managed ‘on-farm’, at mills or left in fields.

### 4.2.5 C&D Waste

Construction and demolition wastes scored relatively low to moderate scores, both for mixed general C&D and for individual material streams (ranging from 2.3 to 3.0). Most of these materials are relatively inert with low environmental impacts and recovery of materials from mixed C&D would require moderate investment in new processing infrastructure.

Of the individual material streams, concrete scored moderately high (3.0), and may be worthy of consideration given the large volumes and potential for local markets supported by councils.

Most of the existing management of C&D waste is undertaken by the private sector in the region, with 87% of residual C&D waste disposed to privately run inert landfills. While there is no real benefit in councils getting more involved in C&D processing, there is potential for councils to provide market outlets for the products to support the private operators and potentially drive expansion of recovery infrastructure. This is particularly applicable to concrete, where there is a high volume of reported recovery and potential for further expansion, but anecdotal evidence that some stockpiling is taking place as a result of limited product markets.

### 4.2.6 Regulated and Difficult Wastes

Electric and electronic waste (E-waste) scored quite highly on account of high environmental impacts and good potential for recovery. There are existing product stewardship arrangements in place for some e-waste materials (namely televisions, computers, mobile phones and fluorescent lights) and potential for new schemes to cover other e-waste in the future. Recycling of e-waste is strongly linked to those product stewardship schemes and councils should continue to support and implement those schemes at a local level. As identified in Stage 1, councils should also consider how they will manage the range of emerging new e-waste streams that will start to arise from current consumer practices, such as lithium batteries of various sizes (see below) and end-of-life solar panels.

Tyres scored relatively low (2.8) on account of low tonnages and high rates of recovery. However, tyres are an issue for some councils, particularly with respect to illegal dumping and collecting tyres from remote areas, where collection and transport costs are high. There is no local recycling solution – tyres are ultimately sent to South East Queensland for recovery, either directly by councils or via local recyclers. It may still be worth exploring options for regional cooperation on this issue and better collaboration with tyre retailers in the region to determine whether there is a more cost effective way to manage this stream locally. However, this is likely to be a low priority issue.

Both lead acid and non-lead acid batteries scored relatively high (3.6) given high environmental impact and strong potential for collection and recovery. Lead acid batteries are already well managed and recovered in the region through the regional metals contract. Recycling opportunities for non-lead acid batteries are more limited and challenging. There is a product stewardship scheme currently in development for rechargeable hand-held batteries (under 5 kilograms) which is expected to be part of a broader battery stewardship scheme.
Mineral oil scored moderately (3.4) but is already well managed through established collection and recovery systems. It is unlikely that there is much scope to improve the management of this stream through a regional solution.

Gas bottles were included in the assessment by Arcadis as this stream was identified as a problem for some councils, and it scored moderately (3.4). There may be opportunities for councils to work together on improving management of this stream.

Likewise, mattresses have been included as they are an issue for some councils due to their bulk and low density, causing problems in landfills and resulting in inefficient transport. They are a particular issue for those councils with high numbers of hotels (Cairns, Douglas) where a single refurbishment project can lead to potentially hundreds of mattresses requiring disposal at one time. Mattresses scored relatively low in the assessment (2.65) on account of low volumes, low environmental impact and difficulty in separating and recovering the materials. However, as noted above and in the Situational Analysis report, there may be better opportunities for recycling if the volumes could be aggregated across the region. It is also likely that significant volumes of mattresses are being managed by commercial collectors so if a recycling solution was available, this could add to the feedstock.
5 REGIONAL RESOURCE RECOVERY AND ECONOMIC DEVELOPMENT OPPORTUNITIES

This chapter identifies and discusses the regional collaboration opportunities developed by Arcadis for the priority waste streams and issues identified in Chapter 4. The opportunities focus on areas where councils could mutually benefit and where there is potential to encourage new regional economic development.

5.1 MSW – General Waste

Councils in the region face a number of shared challenges in managing MSW which is the largest waste stream generated across the region. In 2014-15, some 81,000 tonnes of MSW was collected through kerbside services and a further 26,600 tonnes were self-hauled to transfer stations or collected in street bins and bulky waste services.

Due to environmental constraints, there is a limited and decreasing number of landfills that can receive putrescible waste and the region is becoming increasingly reliant on the main private landfill in the region, Springmount. The Situational Analysis estimated that, with Tablelands planning to close its main landfill in the next 5 years and the existing cells at Mareeba’s main landfill also due to be filled within the next decade, it is possible that only around 10% of the MSW that is currently disposed to landfill will go to council-owned landfills beyond 2026. In terms of putrescible MSW disposal, the region will be entirely reliant on Springmount Landfill.

The lack of putrescible landfill sites was a main driver for three of the councils to procure the Regional AWT contract ten years ago as a means of reducing the need for putrescible landfill. With planned landfill closures and the AWT contract expiring in 2026, there is a need for all councils to consider how best to manage MSW in the medium to long-term.

The region’s heavy reliance on Springmount Landfill is not necessarily a problem and it will continue to play a major role in the regional waste infrastructure network for many decades to come. However, the unique set of drivers in the region provide an opportunity for regional collaboration to explore alternatives to landfill that are far more beneficial to the environment and contribute to resource recovery ambitions for the state and region. Councils also need to consider how the waste policy landscape is likely to change over the coming decade. Every other mainland state in Australia has implemented strong policies to drive a shift away from landfilling of waste, including ever-increasing landfill levies. While it is not yet clear which model Queensland will choose, councils should be prepared for strong measures to support the Queensland Waste Strategy recycling targets.

FNQROC councils need to consider the long-term strategy for processing or disposing of putrescible MSW. There are benefits in doing this at regional level given the existing sub-regional arrangements and existing regional infrastructure. Arcadis recommends that councils start working now to develop a long-term regional MSW disposal / processing strategy. One potential option is to develop an advanced waste processing solution, but this can take many years to procure so the planning process should commence early to avoid limiting any options.

There are clear overlaps with other opportunities proposed below which could lead to increased recycling and recovery of domestic organics, but even if those measures are successfully implemented there will still be a large volume of residual MSW to be managed in the region. The final solution could be a single regional approach or one or more sub-regional approaches, but further analysis needs to be done to explore these options.

The regional MSW strategy could consider:

- The community priorities and council policies / drivers for domestic waste management in each LGA;
- Likely volumes requiring processing / disposal, in the context of future growth and other resource recovery initiatives that might be implemented;
The changing policy and regulatory environment and the likely drivers and constraints for waste disposal and processing, including a landfill levy and landfill bans;

Future potential changes in landfill standards and costs;

Potential processing technology solutions including energy-from-waste, AWT, dirty MRF and organics processing options, and their likely costs;

Collection system options including kerbside collection of organics;

The costs of consolidating and transporting waste to regional facilities;

Modelling the relative costs and benefits of various options and combinations of regional and sub-regional solutions;

Procurement and delivery models for the preferred solution.

Table 6: Opportunity summary – long-term MSW strategy

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Develop a long-term regional MSW disposal / processing strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>FNQROC councils share a number of constraints and challenges in managing putrescible domestic waste, so there are benefits in a regionally coordinated approach. While there is no short term urgency, now is the time to start planning the future MSW solution given impending landfill closures and expiry of the existing AWT contract in 2026. The strategy development should consider a range of technology and collection options in the context of changing waste policies, and develop a cost-benefit analysis of various regional and sub-regional options.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Joint project overseen by FNQROC, with proportional funding and resource inputs from participating councils.</td>
</tr>
<tr>
<td>Priority:</td>
<td>High</td>
</tr>
<tr>
<td>Timeframe:</td>
<td>Within 2-3 years</td>
</tr>
<tr>
<td>Proposed location:</td>
<td>To be determined depending on solution.</td>
</tr>
<tr>
<td>Social / local economy benefits:</td>
<td>Modern domestic waste management infrastructure; potential new jobs.</td>
</tr>
<tr>
<td>Environmental benefits:</td>
<td>Potential conservation of landfill airspace; recovery of valuable resources.</td>
</tr>
</tbody>
</table>
| Financial costs and benefits: | Costs – internal resources and possible external consultant support to develop strategy, capex and opex for disposal / processing solution
Benefits – reduced long-term costs for councils; reduced landfill disposal costs |

5.2 C&I – General Waste

Commercial waste is not strictly the responsibility of councils, but councils in regional areas inevitably play a significant role in managing commercial waste due to limited availability of private infrastructure. Hence commercial waste can impact on council waste management services in a number of ways:

- Council-owned landfills receive a significant proportion of commercial residual waste (55% of the 62,000 tonnes of commercial waste that was disposed in the region in 2014-15);
• Most councils collect commercial waste and for some, such as Douglas, commercial waste is a significant proportion of the waste collected;
• Managing commercial waste can be a significant source of revenue for councils, which ultimately offsets the cost of other waste services or funds projects that benefit the community;
• Where resource recovery solutions are not viable due to small volumes, commercial waste inputs can make more options viable.

There are significant social and environmental benefits to be gained by improving resource recovery in the commercial sector, including conservation of valuable landfill airspace and the opportunity for positive publicity messaging to visitors in the popular tourist destination.

For any regional resource recovery opportunities that might be contemplated, councils should consider whether there is an opportunity to allow for the inclusion of commercial waste streams to improve the cost effectiveness and viability of the solution. For example, if councils were to pursue a regional organics processing solution as discussed below, then inclusion of commercial food and garden organics could provide the additional feedstock and revenue required to make it a viable proposition.

In recycling, the Cairns MRF currently receives limited inputs from business or multi-unit dwellings (MUDs), so there is an opportunity to expand the provision of commingled recycling services to businesses and body corporates in the region in order to support the planned expansion of throughput at the MRF, which will ultimately improve its efficiency and reduce unit costs. The other major commercial MRF in Cairns is primarily recovering paper and cardboard (96% of throughput) which is most likely source separated material, so its capacity to process commingled recyclables is likely to be minimal.

If the region were to pursue organics recovery as a focus, there is an opportunity to offer this service to businesses, particularly the hospitality industry including hotels, restaurants, venues and shopping centres. The City of Gold Coast is currently undertaking a commercial food organics collection trial to test exactly that concept, focussing on restaurants, hotels, venues and multi-unit dwellings. The intention is to offer a commercial food organics collection service across the major tourist and commercial districts of the Gold Coast. There may also be other commercial and industrial sources of organics which would be suited to a processing solution.

Councils can play a leading role in establishing resource recovery solutions for commercial waste because there is not sufficient volumes or certainty for the private waste sector to invest in new recovery infrastructure just for their commercial customers. But if that infrastructure is under-pinned by municipal waste volumes, particularly at a regional scale, then it becomes a more attractive option.

The management of commercial waste is very price driven, but for many businesses and commercial waste collectors in the region there is a strong financial driver to consider resource recovery programs. As noted in the Situational Analysis, gate fees for disposal of mixed commercial waste vary significantly but are quite high in some parts of the region. In Cairns, the private transfer stations charge $120-$150 per tonne (ex GST) while prices at council waste facilities are set to discourage commercial waste other than small loads. In Cassowary Coast, Council charges as much as $175 per tonne (ex GST) for wet commercial waste. Douglas and Cook both charge around $50 per cubic metre for commercial waste which equates to $150-$200 per tonne depending on the density. On the other hand, Tablelands and Mareeba have much lower gate fees for commercial waste at $60-$63 per tonne (ex GST), although their landfills have a limited lifespan.

There are a number of initiatives that each council could implement at a local level to improve resource recovery from the commercial sector, such as offering and promoting commercial recycling collections. At a regional level, councils could work together to promote commercial resource recovery opportunities. However, in reality the impact is likely to be greatest in those councils where there is significant commercial waste generation and high gate fees for disposal of commercial waste. Hence a coordinated sub-regional approach may be appropriate in this case. For example, Cairns, Douglas and Cassowary Coast generally fit those criteria.
Collaborating at a sub-regional level for interested councils to develop a strategy for improving commercial waste recovery, recognising that the drivers are stronger for some councils than others. The strategy should identify key target customers / industries and initiatives that also benefit council resource recovery services;

Engaging with commercial and industrial generators, MUD building managers / bodies corporate and waste collectors across the region to gauge interest in enhanced recycling and/or organics recovery options;

Expanding commingled recycling services to businesses and MUDs, to provide additional feedstock for the Cairns MRF;

Promoting recycling services to the business community;

Consider providing or supporting commercial organics collections, subject to development of a regional organics processing solution (see below).

Table 7: Opportunity summary – commercial waste recovery strategy

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Develop a sub-regional strategy to increase recovery of commercial waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Councils with significant commercial waste generation and/or high commercial waste disposal gate fees could consider working together to develop a common strategy for improving commercial waste recovery, particularly where it can provide direct financial benefits to councils though additional revenue streams or improving the efficiency of recovery infrastructure. Particular focus on commingled recyclables that can be processed in the Cairns MRF and on organics that may be suitable for any regional organics processing solution. As a first step, councils should engage with industry including commercial and industrial generators, MUD building managers and commercial waste collectors.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Sub-regional, subject to interest but propose initially Cairns, Douglas and Cassowary Coast.</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Joint project overseen by FNQROC, with proportional funding and resource inputs from participating councils.</td>
</tr>
<tr>
<td>Priority:</td>
<td>High</td>
</tr>
<tr>
<td>Timeframe:</td>
<td>Within 1 year</td>
</tr>
<tr>
<td>Proposed location:</td>
<td>Utilising existing infrastructure and any new infrastructure developed under other initiatives.</td>
</tr>
<tr>
<td>Social / local economy benefits:</td>
<td>Potential savings for businesses; publicity / marketing benefits for businesses and tourism industry; more efficient and cost effective recovery infrastructure; source of additional revenue for councils; potential new jobs.</td>
</tr>
<tr>
<td>Environmental benefits:</td>
<td>Conservation of landfill airspace; recovery of valuable resources.</td>
</tr>
<tr>
<td>Financial costs and benefits:</td>
<td>Costs – minimal – development of strategy / procurement; increased operational / processing costs. Benefits – reduced costs for other council resource recovery through efficiencies; additional C&amp;I revenue through gate fees; reduced landfill disposal costs for commercial waste.</td>
</tr>
</tbody>
</table>
5.3 Dry Recyclables

5.3.1 Commingled Recycling

The Situational Analysis identified vast differences in the provision of recycling services across the region. There are significant challenges in implementing kerbside recycling programs without imposing a significant additional costs on residents. The high costs of MRF processing and transport of products to market results in a net cost burden on those councils that have kerbside recycling and a strong disincentive for other councils to increase recycling activities.

In the interest of increasing resource recovery across the region, there are potential benefits in developing a regionally coordinated approach to recycling. One of the key barriers to expanding recycling services is the perceived net cost, but to Arcadis’ knowledge there has not been an assessment of the relative costs and benefits at a regional scale. A more detailed economic assessment may find that the benefits to the local economy outweigh the costs, particularly with consideration of some of the other regional recycling opportunities discussed below. One of the key factors in reducing MRF processing costs is larger throughput, so increasing volumes should be a focus.

Arcadis proposes development of a regional economic assessment of options to expand recycling services, which could include:

- An assessment of the whole-of-life cost of landfilling at key landfill sites across the region, to understand potential savings through avoidance.
- For those councils without kerbside recycling, a review of existing kerbside collection costs and the likely additional costs to introduce kerbside recycling services.
- For those councils with kerbside recycling, an assessment of potential opportunities to expand services to more commercial and MUD customers.
- A review of options to improve the efficiency of the Cairns MRF and reduce unit processing costs, including an assessment of likely gate fees under various expansion scenarios. While the Cairns MRF is an obvious option for a regional sorting facility, other MRF options could be considered at a sub-regional level. However, for cost efficiencies to be realised in any MRF, volumes need to be maximised.
- An assessment of the cost impacts on the Cairns MRF of other opportunities identified in this report including implementation of the CDS, direct export of recyclables from Townsville, local plastic recycling solution and development of markets for glass sand.
- An assessment of indirect benefits to the regional economy of expanding kerbside recycling.
- Consideration of the impact of potential state policy changes (e.g. landfill levy) and industry trends.
- A cost-benefit analysis of options to expand recycling services across the region compared to the business-as-usual approach, both from a regional perspective and for individual councils.

Some of the earlier tasks above could be done first at an individual council level and then fed into the regional assessment.

Table 8: Opportunity summary – economic assessment of recycling options

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Regional economic assessment of recycling expansion options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>There is good potential to expand recycling services across the region and in the process improve the efficiency and viability of the Cairns MRF. The proposed economic assessment would consider the costs and benefits of expanding recycling from a regional and local perspective and provide a sound basis for decisions. A regional approach is needed to maximise the potential of the Cairns MRF. For councils that have kerbside recycling, expansion could focus on</td>
</tr>
</tbody>
</table>
Opportunity: Regional economic assessment of recycling expansion options

commercial and MUD customers. For councils without kerbside recycling, the assessment would provide a robust basis for a decision about introducing a service. The assessment will consider direct costs and savings, and indirect benefits to the regional economy.

Coverage: Regional

Governance / delivery model: Joint project overseen by FNQROC with input and resources from each council.

Priority: High

Timeframe: Within 2-3 years

Proposed location: Not Applicable

Social / local economy benefits: Potential disposal savings for councils; improved viability of recycling across the region.

Environmental benefits: Conservation of landfill airspace; recovery of valuable resources.

Financial costs and benefits: Costs – internal resources for the assessment, plus potential external consulting support, capex / opex for new recycling collections / processing.

Benefits – potential increased recycling revenues; reduced MRF gate fees; landfill disposal and transport savings.

5.3.2 Export of recyclables

As noted above, the high cost of transporting recovered dry recyclables to market is a significant constraint on the viability of expanding recycling the region. At present, most recovered recyclable materials are baled and sent to South East Queensland by road or rail where they may be further sorted and processed. Ultimately, however, many materials are exported to markets in Asia via the port in Brisbane, with the exception of glass which can be reprocessed in Brisbane. Based on consultations, it seems there are no significant savings to be gained by using rail transport over road, at least not at small scale.

Any solutions which provide a local outlet for materials or reduce the cost of transport to market will improve the viability of recycling and may open up opportunities to expand recycling services across the region. Options for developing local outlets to reprocess and/or reuse plastics and glass are discussed below, but recycling of metals and paper / cardboard is always going to rely on export markets or interstate mills, given the scale required to reprocess these materials. Hence there is a need to explore alternative, more cost effective means of transporting these recyclables to market.

One option is to export some materials directly from the port in Townsville, although to date Arcadis is not aware that this has been done to any great extent. The Port of Townsville is primarily used to export bulk resources and commodities including minerals, fertiliser, sugar and meat / livestock; and to import some cargo, mineral ore and other raw materials.

To export recyclables in a cost effective manner, industry often makes use of ‘back-loading’ on container ships that are returning to Asia. Most of the container traffic into Australia passes through ports in the capital cities rather than regional ports such as Townsville. That said, container traffic through Townsville, which was historically low at the turn of the century, has tripled over the last decade. Cargo imports are still a small fraction of the total throughput of the
port, so the opportunities for cost-effective back-loading of containers are likely to be more limited than at other ports such as Brisbane.

Nevertheless, this is an option that is worthy of further exploration and enquiry. Feasibility is probably more challenging for small, occasional shipments and therefore only viable for the Cairns MRF which has more regular outputs. The port has also been earmarked for expansion which is currently going through the environmental approvals process. It is not clear yet what impact the expansion will have on container traffic and links into Asia markets. It is also noted that under the Federal Government’s push to develop Northern Australia, with up to $5 billion in finance for new infrastructure, it is likely that the Townsville Port will become an even more significant freight link with international markets.

Directly exporting recyclables from Townsville would save transport costs but also potentially provide more revenue for councils by cutting out some of the ‘middle-men’ – the recycling consolidators in SEQ. This would ultimately lead to reduced costs for each of the councils that use the Cairns MRF and open up the possibility of others using it in the future. Ultimately, Cairns Council would likely need the assistance of a shipping and export agent to arrange the shipping and sale of the material at the destination. As a first step, Council should consult its existing buyers to determine whether they have capacity to arrange shipping from Townsville. Alternatively, a Townsville-based agent may need to be engaged. It may also be worth consulting with private sector MRF operators across North Queensland, especially in Townsville, to explore potential synergies.

Table 9: Opportunity summary - investigate direct export options from Townsville

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Examine direct export options for recyclables from Port of Townsville</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Councils could work together, led by Cairns, to explore options to export recyclables via the Port of Townsville. As the port expands and container traffic is expected to increase, it is likely that there will be more opportunities for direct export of containers to markets in Asia. As Council is not accustomed to exporting and selling materials directly, it would need support from an experienced agent. Council should also consult with other recyclers in the region and in Townsville to explore potential synergies.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Joint project overseen by FNQROC and led by Cairns.</td>
</tr>
<tr>
<td>Priority:</td>
<td>Medium</td>
</tr>
<tr>
<td>Timeframe:</td>
<td>Within 1 year</td>
</tr>
<tr>
<td>Proposed location:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Social / local economy benefits:</td>
<td>Potential savings for councils; improved viability of recycling across the region.</td>
</tr>
<tr>
<td>Environmental benefits:</td>
<td>Conservation of landfill airspace; recovery of valuable resources.</td>
</tr>
<tr>
<td>Financial costs and benefits:</td>
<td>Costs – packing and transport costs to Townsville, shipping / agent fees. Benefits – reduced transport costs; potential increased recycling revenues; reduced MRF gate fees.</td>
</tr>
</tbody>
</table>
5.3.3 Beverage Container Recycling

As noted in 2.1.2, the Queensland Government is currently considering options to introduce a container deposit scheme (CDS) which would impose a refundable deposit on beverage containers. The exact scope and specification of the scheme has not yet been determined but the strong indications from government are that it will be consistent with the planned NSW scheme, which has been confirmed but not yet fully detailed.

The primary aim of the CDS is to reduce litter hence it is targeting the beverage containers that are most commonly littered including plastic bottles, aluminium cans and glass beer bottles. Under the NSW scheme:

- For MRFs, beverage containers covered by the CDS collected through the kerbside recycling stream will be eligible for redemption of the refund. Although the mechanism is yet to be determined, the additional revenue could be significant – more than the market value of the materials in their own right. That revenue will offset any reduction in throughput at the MRF, and loss of material sales income, due to migration of containers from the kerbside bins to the CDS.
- Councils will have the chance to play a role in running collection depots and in helping to inform the community about the scheme.

If Queensland implements a CDS that follows the same model as NSW, the impact on FNQROC member councils will vary but should generally be positive:

- Councils will have the opportunity to run collection depots, with existing transfer station sites ideal for this purpose.
- The potentially higher revenues available through refunds could make it financially viable for councils that currently have very limited recycling programs to expand the range of materials they receive at transfer stations.
- For Yarrabah and Wujal Wujal, where funds are very limited and recycling options non-existent, the CDS could provide a valuable source of additional revenue to support other recycling and community projects, whilst supporting local employment.
- For councils that currently run kerbside recycling systems, there will be migration of beverage containers from the kerbside bin to the CDS system, resulting in reduced kerbside volumes.
- For Cairns and Tablelands, which run their own MRFs, there will be a decline in throughput and therefore a drop in gate fees and material sales revenue. If the MRFs will be able to claim the refunds on recycled beverage containers so that lost revenue should be offset and possibly outweighed, by the additional revenue that can be claimed through CDS redemptions on containers that in the kerbside stream. The impact on other councils that send material to the Cairns MRF will depend on the contracts in place.
- The diversion of glass bottles from kerbside recycling is also likely to improve the quality and value of paper and cardboard in the kerbside stream by reducing contamination with glass fines.
- MRFs can also potentially play a role in sorting and consolidating beverage containers collected at other depots (consolidation points) which may require some process modifications.
- Reduced rates of littering for all councils, resulting in reduced clean-up and disposal costs.

The CDS is likely to have the greatest impact on those councils that currently provide no or very limited recycling services. It could potentially make previously unviable services profitable and be used as a catalyst to implement wider recycling programs.

FNQROC members should be prepared for the CDS to maximise the benefits available through it. Arcadis recommends that, as the details of the Queensland CDS are confirmed, both

individual councils and the regional group need to assess how to make the most of it and have a coordinated strategy in place. Each council should also procure legal advice on the implications for existing MRF contracts.

Each council will need to develop its own plan and make arrangement to implement the CDS, but at a regional level, the group should cooperate to:

- Consider the most efficient way to establish a regional network of collection depots which are accessible to all residents;
- Consider how to efficiently consolidate materials for transport to recyclers, such as whether there is benefit in having one or two central consolidation facilities for the region;
- Make the best use of existing infrastructure including the Cairns and Atherton MRFs as potential sorting and consolidation points;
- Reassess the cost-benefit balance of recycling systems in the context of the revenue available under the CDS, and whether it can be used to support collecting other recyclables across the region;
- Share information and ideas on maximising CDS benefits.

Table 10: Opportunity summary – regional CDS strategy

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Develop a regional CDS strategy and collection network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>While each council will need to make their own arrangements to prepare for the CDS, there are potential benefits in collaborating at a regional level to establish an efficient regional network of collection depots and sorting / consolidation facilities. Councils can also consider how to use the CDS to catalyse and support broader recycling programs beyond beverage containers, whilst sharing ideas and information amongst the group.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Joint project overseen by FNQROC, with proportional funding and resource inputs from participating councils. Inter-council agreements will be required for supply of CDS containers to regional sorting / consolidated facilities and sharing of potential revenue.</td>
</tr>
<tr>
<td>Priority:</td>
<td>High</td>
</tr>
<tr>
<td>Timeframe:</td>
<td>Within 1 year</td>
</tr>
<tr>
<td>Proposed location:</td>
<td>Network of facilities across the region but utilising existing infrastructure where possible.</td>
</tr>
<tr>
<td>Social / local economy benefits:</td>
<td>Potential source of additional revenue for councils and community groups, potential new jobs and opportunities for social enterprises.</td>
</tr>
<tr>
<td>Environmental benefits:</td>
<td>Reduction in litter; additional recycling of beverage containers, reduction in beverage containers to landfill in residual waste loads.</td>
</tr>
<tr>
<td>Financial costs and benefits:</td>
<td>Costs – establishing new depots; loss of MRF revenue; potential contract variations. Benefits – reduced costs for litter management; additional recycling revenue; reduced landfill disposal costs.</td>
</tr>
</tbody>
</table>
5.3.4 Plastic Films

As identified in the Situational Analysis, plastic films are a particular issue for some councils given the large volume of agricultural films used in the region including bulk fertiliser bags, banana bags and trickle tape. These plastics consume significant landfill airspace but they contain materials which are potentially quite valuable. There are also suspicions that some farmers may be illegally burying the waste on their farms to avoid disposal costs. Mareeba is currently source separating some plastic films, which are collected by a contractor for sorting and ultimately sale to interstate or overseas reprocessors. Cassowary Coast is also planning to start source separating fertiliser bags. A number of farmers in the region are also providing their film plastics directly to private collectors.

Recycling of plastic film can be challenging as it can be difficult to sort and handle, is subject to high levels of contamination and there are more limited options for reprocessing compared to rigid plastics. However, there are existing facilities in South East Queensland and interstate that reprocess both rigid and film plastics into new products. Resitech and Ecopolymers are two of the main Queensland-based (Brisbane) plastics reprocessors that actually produce new products (rather than export the material), although both currently handle relatively modest volumes of recycled plastic. Interstate, Replas based in Melbourne is one of the largest recyclers of plastic film and produces a range of bollards and outdoor furniture and equipment.

Also noted in the Situational Analysis was the fact that there are at least three companies that collect and/or reprocess plastic film which are already established, or actively looking for an opportunity to establish, in the FNQ region. RDT operates a mobile baling unit to collect agricultural film plastics across North Queensland, which it sells on to reprocessors. FNQ Plastics is a Cairns-based company that currently manufactures recycled plastic products such as bollards and fence posts from recovered plastics, but it currently sources most of its feedstock from Replas (Melbourne). The company is currently seeking approvals and funding for a local reprocessing and extrusion solution for film plastics. A third company, Ritchie Plastics, is currently collecting fertiliser and banana bags from farmers in the region while its associated company, NSW-based Drums Go Round, is exploring opportunities to establish a local reprocessing solution.

Agricultural films are the largest film plastic stream by volume and it is likely that councils only manage a fraction of the total volume of waste generated. If there was a solution for reprocessing, it could also potentially receive domestic and commercial plastic films. For the Cairns MRF, like most MRFs, plastic film is an unwanted contaminant in the kerbside recycling stream. But if there were a viable market and reprocessing solution for the material, the MRF could be adapted to separate and sort plastic films for sale. The volume of domestic plastic films could potentially be significant if residents were actively encouraged to put it in their recycling bins. There are examples of other councils in Australia successfully including plastic film in kerbside recycling systems and separating it in their MRFs. For example, Lismore City Council in northern NSW runs its own MRF and has been sorting plastic film successfully for several years, which is sold on to reprocessors. There, residents are asked to wrap plastic films and bags within a plastic bag so that they can be easily separated.

There is also likely to be a significant volume of plastic film generated by local businesses and industry, such as pallet wrap, which could be source separated and kept relatively clean for collection.

Given the above, in Arcadis’ view there is a significant opportunity to develop a local plastic reprocessing facility that will provide a solution for both film and rigid plastics whilst providing local economic benefits including new employment and retention of money in the region. This is something that would need to be done at regional scale to capture enough volume of material to make it commercially viable. The technology exists and the practice is undertaken elsewhere in the state and across Australia.

A regional film plastics collection and reprocessing solution would likely involve:
Initial review and consultation with industry to determine what technologies are available, the minimum scale, constraints on commercial viability, and interest in supporting a local reprocessing solution.

An assessment of the volume of plastic film waste generated in the region and its potential for separate collection or sorting from recyclables. There is not good data available on sources such as agricultural films managed by the private sector, commercial generators or plastic film content in general waste (MSW, C&I, C&D). Councils could also consider sources outside the region, such as plastic films which are currently being collected from farms in other parts of North Queensland and sent south or overseas for reprocessing.

Consideration of the products that can be made and their likely markets, both within the region and externally.

Regional procurement of a plastic film collection and processing contract.

Establishing collection points for plastic films at transfer stations across the region, including from domestic, commercial and agricultural sources.

Reviewing the potential to adapt the Cairns MRF to sort and recover plastic films to feed into the regional reprocessing facility.

**Table 11: Opportunity summary – regional plastic film solution**

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Regional plastic film collection and reprocessing solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Councils could work together and with industry to assess the feasibility of establishing a local plastics reprocessing facility which could address the problem waste stream of film plastic (as well as existing rigid plastics) and provide a new local industry with employment opportunities. The project should include an assessment of plastic waste generation across all sectors (domestic, commercial and agricultural); review of technologies; options for collection; and potential products and associated markets. Ultimately the project could lead to procurement of a regional film plastics collection and reprocessing contract. Cairns could review options and potential to adapt its MRF to recover film plastics and each council could establish collection points at existing transfer station sites.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Joint project overseen by FNQROC, with proportional funding and resource inputs from participating councils. If it leads to a regional film plastics collection and reprocessing contract, this could follow a similar model to the existing regional metals contract whereby each participating council would have its own agreement with the contractor.</td>
</tr>
<tr>
<td>Priority:</td>
<td>High</td>
</tr>
<tr>
<td>Timeframe:</td>
<td>Within 1 year</td>
</tr>
<tr>
<td>Proposed location:</td>
<td>To be determined, collection through existing transfer stations.</td>
</tr>
<tr>
<td>Social / local economy benefits:</td>
<td>New industry for the region with employment opportunities and new products; retention of money and resources in the region; potential savings for farmers and businesses; source of additional revenue for councils.</td>
</tr>
<tr>
<td>Environmental benefits:</td>
<td>Conservation of landfill airspace; recovery of valuable resources; reduced illegal dumping or burial of plastics.</td>
</tr>
</tbody>
</table>
Opportunity  | Regional plastic film collection and reprocessing solution
--- | ---
Financial costs and benefits: | Costs – development of feasibility / option analysis; establishing collection facilities at transfer stations; adaptation of Cairns MRF; support to the contractor.
Benefits – additional revenue through plastic sales; reduced landfill disposal costs.

### 5.3.5 Glass and Glass Fines

Glass and glass fines are a particular issue at the Cairns MRF, and a major contributor to the more than 4,000 tonnes of residuals generated by the MRF (30% of inputs). This is an issue that directly affects the resource recovery performance of Cairns and Douglas, and to a lesser extent Cook and Mareeba, who all provide recyclables to the MRF. However, it is a critical issue for the long-term viability of the MRF and could also affect other councils if they were to utilise the facility in the future, including Tablelands. Hence this is an issue of regional concern.

The values and market outlets for recovered glass are limited, both locally and further afield. While some clean glass is sent to reprocessors, a significant proportion is unable to be sold and has historically been landfilled. Hence Cairns has invested in a glass crushing plant (implode) to process glass fines and unsaleable glass into a manufactured sand product which can be used as a direct replacement for virgin sand in civil applications such as pipe bedding and road construction.

Cairns has had some success in establishing internal outlets for the glass sand where it is used in council projects, particularly as pipe bedding material. This has not been an easy process however, with challenges including:

- Competition with virgin sand, which is generally cheap and readily available in the region
- Demonstrating product quality and developing an appropriate quality standard
- Education of staff to address perceived safety concerns around handling the product.

Cairns is also exploring further market opportunities outside of Council in various construction material markets. However, there is a need for more secure and diverse markets to ensure the long-term viability of this product, and therefore the MRF.

There is an opportunity for FNQROC councils to work together to support and stimulate markets for recovered glass sand for the long-term benefit of recycling in the region. As a starting point, other councils in addition to Cairns could use the product for internal civil and construction projects and promote the product to contractors in their respective regions. There are parallels and potential overlaps between this opportunity and a similar approach recommended for recovered concrete aggregates (see section 0 below). Other actions could include:

- Refinement and agreement on quality standards
- Mandating the use of recovered glass sand in council civil and road projects (both internal and contracted), where commercially viable and subject to availability of materials
- Promoting the use of recovered glass sand to the broader construction industry in the region
- Development of case studies and test projects to demonstrate viability.

If this were done at a regional level with endorsement by each council, it would help to secure the viability of the Cairns MRF into the future. It is also noted that other Queensland councils are working through similar issues – MRFs in Mackay and Rockhampton have also recently installed glass crushers to address this issue. There may be opportunities to share ideas and experiences with those councils to further support this initiative.
Table 12: Opportunity summary – glass sand market development

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Support development of regional markets for recovered glass sand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>It is crucial to the long-term performance and viability of the Cairns MRF, and therefore future recycling efforts across the region, that secure and diverse markets are developed for its recovered glass sand products. FNQROC member councils can play a role in supporting this market development by using the material for internal projects and helping to promote its broader use across the region.</td>
</tr>
<tr>
<td><strong>Coverage:</strong></td>
<td>Regional</td>
</tr>
<tr>
<td><strong>Governance / delivery model:</strong></td>
<td>Joint project overseen by FNQROC, with lead role by Cairns</td>
</tr>
<tr>
<td><strong>Priority:</strong></td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Timeframe:</strong></td>
<td>Within 1 year (noting Cairns has made good progress already)</td>
</tr>
<tr>
<td><strong>Proposed location:</strong></td>
<td>Existing Cairns MRF</td>
</tr>
<tr>
<td><strong>Social / local economy benefits:</strong></td>
<td>Potential to expand and improve recycling in the region; reduced reliance on external markets.</td>
</tr>
<tr>
<td><strong>Environmental benefits:</strong></td>
<td>Recovery of useful secondary sand products; reduction in quarrying of virgin sand; conservation of landfill airspace.</td>
</tr>
<tr>
<td><strong>Financial costs and benefits:</strong></td>
<td>Costs – purchase of product; potential additional transport costs. Benefits – reduced landfill disposal costs for MRF with on-flowing benefits to current and future MRF customers</td>
</tr>
</tbody>
</table>

5.4 Organics

It was identified in the Situational Analysis that the management of organics in the region is an area where there is scope for improvement and significant potential to produce value added products and develop new secondary markets. All councils are separating self-hauled green waste and shredding it either for use as low grade mulch or supplying it to private composters. However, markets for compost and mulch products are limited in the region and generally undeveloped, which is a constraint on expanding processing capacity and increasing the production of higher value recovered organics products.

Some councils have difficulty finding outlets for shredded green waste, particularly from more remote transfer stations. This leads to excessive stockpiling on sites which brings a significant fire risk, with fires not uncommon at some rural sites. When the stockpiling coincides with cyclone season, it presents additional safety risks at transfer station facilities.

Most councils are paying around $7-8 per cubic metre to have green waste mulched at transfer station sites on an occasional campaign basis (e.g. quarterly), which is equivalent to around $28-32 per tonne⁶. Some councils are then selling the mulch back to the public or to private composters for prices varying between $12-16 per cubic metre, but there is generally insufficient demand to sell all of the mulch. Some mulch is given away or used internally on landfill sites. Very little is generally used by other council functions such as parks and gardens maintenance.

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⁶ Based on an assumed density of 247kg/m³, from EHP survey assumptions
With the state government considering a ban on disposing green waste to landfill, all councils need to consider how to maximise recovery of green waste in a way that is sustainable and reliable for the long-term.

Arcadis is also aware that FNQROC is separately working on programs to improve the management of pest species in the region, such as weeds and invasive ant species. Under the recent Biosecurity Act 2014, councils have particular obligations to control the spread of invasive ants and green waste facilities are a significant area of risk in this regard. Composting of green waste, in a processing that achieves high temperatures to pasteurise the waste, is one way in which this risk can be managed.

Domestic food waste and other household organics are being effectively recovered through the Suez Bedminster facility for those councils that participate in the Regional AWT contract. However, consideration will need to be given as to how this recovery can be maintained beyond the end of the current AWT contract in 2026. For the other councils, there is really no recovery of household organics (other than green waste), which make up a significant proportion of the MSW stream.

Biosolids are currently recovered through a number of avenues including direct land spreading and composting by private operators, with a small volume disposed to landfill. FNQROC is currently working on a separate study on biosolids management options in an effort to address the current limitations of the land spreading option, which cannot generally be done during wet weather. Hence, improving biosolids recovery is not a focus for this project, but there is strong potential for biosolids to be co-processed with green waste and other organics and so they should be considered in any solution.

There is potential to explore a regional organics collection and processing contract to provide regular removal of green waste from sites, develop a more stable and reliable recovery outlet and to produce value-added compost products which benefit local farmers and residents. Initially the focus should be on green waste that is managed by councils and some or all of the biosolids generated by councils. In the future, depending on the processing solution, it could be expanded to include domestic and commercial food waste and other commercial organics. This would ultimately reduce the region’s reliance on Springmount Landfill to manage putrescible waste. The development of a regional collection and processing solution should be part of a broader effort by councils, together with farmers and industry, to develop local markets for compost products.

Benefits

The improved recovery of organics has a number of potential benefits:

- Providing a reliable and consistent outlet for separated green waste and biosolids;
- Reducing the volume of waste disposed to putrescible landfill, which consequently reduces the region’s reliance on Springmount Landfill and reduces the cost of transporting waste to it;
- Supporting a local industry with potential new employment opportunities and local economic benefits;
- Producing compost and soil amendment products which enhance local agricultural production and reduce or avoid the need for chemical fertilisers;
- Reducing the need to import chemical fertilisers into the region, and thereby retaining that money in the local economy;
- Reducing the impact of agriculture on the Great Barrier Reef by reducing fertiliser and sediment runoff into local waterways, through improved soil structure (with compost application), which contributes towards the state government’s high priority Reef protection program;
- Providing an opportunity to get local farmers engaged and participating in organics recovery;
- Improving the control of weeds and invasive ant species across the region, and helping councils to fulfil their obligations under the Biosecurity Act 2014.
Markets
One of the main constraints on expanding composting of organics in the region and production of higher value products is a lack of markets for those products. There is strong potential to develop the markets given the high prevalence of broad-acre agriculture in the region (particularly sugar cane) and the current efforts to reduce fertiliser use.

It was identified during the Situational Analysis that there were significant restrictions imposed on fruit farmers using compost due to food safety concerns. However, recent developments have opened the way for properly processed compost (in accordance with Australian Standards) to be used on fruit farms.

Freshcare is the main national industry code of practice for fruit and vegetable growers to ensure that produce is safe to eat, with 90% of fresh produce sold in major supermarkets grown by Freshcare members such as the Australian Banana Growers Council. Previously, the Freshcare code of practice made it very difficult for fruit growers to use composted organics on their crops, however in June 2016 an updated code was released which now allows compost use, with some caveats:

- Fertilisers and soil additives must comply with heavy metal limits specified in AS4454;
- Fertilisers and soil additives containing manures and/or food waste must be treated using an approved treatment process (e.g., compliance with AS4454 pasteurisation standards);
- Human effluent or biosolids may not be used (even when composted).

Hence, there is potential to sell composted food and garden organics to fruit growers in the region, but biosolids would need to be kept out of any compost destined for that industry, potentially requiring a separate processing stream for biosolids.

With a focus on further developing Northern Australia, including the Federal Government providing up to $5 billion in finance to encourage and complement private sector investment in new infrastructure across Northern Australia, it is likely that agriculture and horticulture will be further expanded in the region in the future.

Councils should play an active role in market development rather than putting that responsibility entirely onto a contractor. Councils can play a particular role in bringing key stakeholders together and can also be a major consumer of compost products for parks and gardens.

Other Constraints
Processing costs are a potential constraint, but may not be as high as expected. In South East Queensland, gate fees for open windrow composting facilities are typically in the order of $30-40 per tonne. They will be higher in the far north given the smaller market and scale, and reduced potential to secure commercial feedstocks, however the cost differential between on-site mulching of green waste on an occasional campaign basis versus composting at a centralised open windrow facility may not be as significant as many perceive.

The other key constraint is the cost of transporting green waste and other organics to a central location for composting. This will need to be assessed for each council and each facility where green waste is collected, but if a regional approach is adopted (i.e., with a single transport operator) there is potential for this to be optimised.

The existing AWT processing contract is a constraint on including domestic food organics in the regional organics solution for the three participating councils. The AWT contract may also be a constraint for Cairns to provide green waste for a regional organics solution. Under the AWT contract, Suez has a contractual right to receive any green waste collected by Cairns until 2026. While Suez is not currently exercising that right or expressing an interest in doing so, this issue would need to be formally resolved through a negotiated change to the contract before Cairns could commit its green waste exclusively to another contract.

Other existing contracts that councils have in place for green waste mulching and biosolids management are generally short term and should not be a constraint on a regional solution, but should be considered.

**Collection systems**

Presently, most green waste is self-hauled by residents and small businesses to council transfer stations. Cook Shire is currently assessing the benefits of introducing a kerbside organics collection service as part of a review of various options, but no other councils are currently considering this option. For the councils that participate in the Regional AWT contract, there is currently little benefit to be gained by a separate organics service, however in the future this is an option that Cairns, Mareeba and Douglas may wish to consider.

Alternatively, it may be possible to enhance the volume of green waste collected through the existing transfer station network via community education and promotion campaigns.

Some councils could also explore the potential to collect source separated organics from local businesses and industry. This is particularly relevant to Cairns and Douglas, which have a higher density of hotels and restaurants. For example, the City of Gold Coast is currently running a commercial organics collection trial targeting hotels, restaurants and high density apartment buildings. With commercial mixed waste gate fees in Cairns ranging from $120 to $150 per tonne, it may be financially attractive for some businesses to separate their organic waste, if a processing solution is available.

**Processing Technologies**

The most common and cost effective processing technology for organics is open windrow composting. It is used extensively in South East Queensland but also other regions (particularly Darling Downs, Wide Bay and Central Queensland regions) to manage a wide variety of domestic and commercial organics streams, as well as some inorganic materials. Provided the site is located away from sensitive receptors and managed properly, open windrow systems can be used to process more odour-prone materials such as food waste and manures.

Enclosed composting systems may be better suited to processing waste streams with high odour potential and other environmental impacts, but are significantly more expensive to install and operate. At this point in time, there are no real regulatory drivers for operators in Queensland to adopt the technology.

A further option is anaerobic digestion (AD) which allows biogas to be captured and used for energy production, whilst also producing soil amendment products. AD is generally an expensive process, but the production of biogas from organic waste is a key focus of the state government’s *BioFutures Roadmap* initiative so there may be funding assistance available through the Department of State Development. For feedstocks such as green waste, a dry AD system would be needed, of which there are several on the market. Arcadis’ consultation with AD technology suppliers suggests a minimum of 20,000 tonnes per annum feedstock is required to make this option viable.

**Regional Opportunities**

In Arcadis’ view there is an opportunity to improve the management of organics across the region in the long term, but this will need a regionally coordinated approach and holistic strategy that includes:

- An assessment of the costs and benefits of improved organics separation and higher order processing options, considering elements such as collection and transport costs, processing costs, product revenues, landfill disposal savings and potential future landfill levies. This should include a review of collection options such as enhancing self-haul options or offering a third kerbside bin for organics. This will need to look at each individual council, given the differences in current practices and transport costs, as well as the region as a whole.

- Consultation with the industry, composters and farmers to better understand their constraints and concerns, and potential feedstocks.
- A market development strategy for compost products developed together with farmers groups, industry groups, existing composters, EHP and other government agencies.
- A short-term focus on improving the management and processing of green waste and biosolids, with capacity to expand any solution in the future to include other organics such as domestic and commercial food organics, clean timber waste, food processing waste, other commercial and industrial organics, and agricultural organics.
- Community education and promotion.
- Leveraging and linking in with other initiatives such as the Reef 2050 Long-term Sustainability Plan and associated government programs.
- Examination of potential funding sources including funds available from both Queensland and Commonwealth governments, such as:
  - Reef Trust – a Commonwealth body with $140 million in funding available for “projects that reduce run-off of pollutants, fertiliser and sediment”. The trust has already funded various projects including $56 million allocated in April 2016 to several projects that will improve water quality by improving farming practices.
  - Clean Energy Finance Corporation, which the Coalition announced in June 2016 would be managing the $1 billion Reef Fund to invest in “projects that reduce run-off of pollutants, fertiliser and sediment”.
  - Funding available through the Queensland Government’s BioFutures Roadmap such as the $5 million Biofutures Industry Development Fund, being administered by State Development, which is particularly interested in supporting biogas projects using organic waste feedstocks.

Given the complexity of this issue, the number of different stakeholders and the long-term implications, Arcadis is of the view that a regional organics recovery strategy is required. This opportunity is described below and should include exploration of a regional organics collection and processing solution. In the short term, there are likely to be benefits in exploring and testing a regional green waste collection and processing contract with the market, to see if there is sufficient volume of material that can be aggregated to attract enough interest for industry to invest in a new or expanded processing facility. Councils in the region currently manage around 20,000 tonnes of green waste each year, with at least another 10,000 tonnes arising from commercial sources. Around 26,000 tonnes of biosolids are also managed. If most of that material can reasonably be aggregated at a central location for processing, there should be sufficient volume to establish a viable composting operation, either at a new site or through expansion of one of the existing private facilities. In the longer term, it may be possible to expand and adapt the processing solution to include other organic materials (commercial and domestic).

**Table 13: Opportunity summary – regional organics strategy**

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Develop a regional organics recovery strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>FNRQROC members could work together to develop a regional organics recovery strategy, with a key focus on development of local markets for value-added products. Part of the strategy should be consideration of a regional organics collection and processing contract, to attract new investment in quality processing infrastructure. At a minimum, a regional organics contract could provide for reliable and regular collection of green waste from sites across the region; but could also provide a future solution for other organics such as food waste and biosolids. The strategy development should consider all aspects including feedstock sources, collection systems, processing options, market development, costs and benefits, education programs, linkages to Reef protection programs, and funding availability.</td>
</tr>
</tbody>
</table>
## Opportunity

**Develop a regional organics recovery strategy**

### Coverage:
Regional, subject to viability of transporting organics and willingness to participate.

### Governance / delivery model:
Joint project overseen by FNQROC, with proportional funding and resource inputs from participating councils. A regional organics contract could follow a similar model to the existing regional metals contract whereby each participating council would have its own agreement with the contractor and can either arrange regular scheduled pickups or ad-hoc pickups as needed.

### Priority:
High

### Timeframe:
Within 2 years

### Proposed location:
Location of any new infrastructure to be informed by the strategy but could either be an existing composting facility in the region or a new site. Alternatively, councils could consider offering a site for a regional processing facility to encourage new entrants to in the procurement.

### Social / local economy benefits:
New employment opportunities; reduced spend by farmers on imported fertilisers; potential disposal savings for councils and businesses; enhanced agricultural production; better engagement with community and farmers.

### Environmental benefits:
Recovery of useful soil amendment products, reduction in chemical fertiliser use, improvement in soil quality, improvement in water quality and protection of the Reef, conservation of landfill airspace, better management of pests including weeds and invasive ants.

### Financial costs and benefits:
Costs – collection / transport, processing gate fees
Benefits – reduced putrescible landfill disposal and transport costs, savings through conservation of landfill airspace, revenues from sale of compost, savings in avoided pest damage.
5.5 C&D Recovery – Secondary Aggregates

Recovery of concrete and other inert waste by councils is limited by the small volumes delivered to transfer stations and the poor quality of crushed concrete product, which generally limits the outlets to internal use within landfill and waste sites for haul roads and fill.

Private operators are currently recovering the bulk of concrete in the region, but there is evidence that they are also being limited by a lack of suitable markets for the recovered aggregates. At least one private operator has expressed an ambition to invest in new processing infrastructure for concrete and other inert materials, but that is only likely to occur if the product markets improve.

There is limited potential or benefits in councils getting more involved in collecting and processing concrete, however there may be a role for councils to play in stimulating and underpinning the market for recovered aggregates to support the important role of the private sector in this space. It seems there should be capacity to use more secondary aggregates within council civil and construction projects, if the product quality is consistent and controlled.

The Queensland Waste Strategy sets a C&D recycling target of 80% by 2024, which would require a significant step change in recycling rates for the FNQ region (currently around 44%). While councils may not get more directly involved in C&D recycling, they could engage and work with the existing private sector C&D recyclers in the region to identify how councils can support better and more sustainable production of secondary aggregates. This could include:

- Development and agreement on quality standards
- Mandating the use of recovered aggregates in council civil and road projects (both internal and contracted), where feasible and subject to availability of materials
- Promoting the use of secondary aggregates to the broader construction industry in the region
- Development of case studies and test projects to demonstrate viability
- Ultimately, redirecting waste concrete and other inerts from council transfer stations to private sector processors to produce higher quality, value added products.

If this were done at a regional level with endorsement by each council, it would stimulate investment and growth in the C&D recycling sector across the region.

Table 14: Opportunity summary – secondary aggregates market development

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Support the recovery of secondary aggregates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>It is difficult for councils to improve the recovery of concrete and other inerts given they only manage a fraction of the C&amp;D waste in the region. With the small volumes that councils collect, it is difficult to process the material to a good quality standard and maintain a consistent supply of recovered aggregates. The majority of C&amp;D waste is managed by private operators and FNQROC councils could work with them to support improved recovery of concrete and inerts and develop markets by: improving quality standards and implementing a certification system; mandating use of secondary aggregates in council projects; promoting the products more broadly; and sending concrete from council facilities to quality processors. By supporting existing recyclers, councils can encourage further investment and improved standards.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Joint project overseen by FNQROC, with resource inputs from participating councils.</td>
</tr>
<tr>
<td>Priority:</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Opportunity | Support the recovery of secondary aggregates
---|---
Timeframe: | Within 1 year
Proposed location: | Existing inert landfill and C&D recycling facilities.
Social / local economy benefits: | Potential to expand and improve existing C&D recycling operations providing additional employment opportunities; reduced spend on virgin aggregates; potential material savings for councils and contractors.
Environmental benefits: | Recovery of useful secondary aggregate products, reduction in quarrying of virgin rock and aggregates; conservation of landfill airspace
Financial costs and benefits: | Costs – potential additional transport / processing costs to private recyclers
Benefits – reduced cost for aggregates in council projects, reduced on-site crushing costs, reduced landfill disposal costs

5.6 Difficult Wastes

5.6.1 E-waste

There is limited scope for councils to improve the recovery of e-waste at a regional level, beyond current rates. Some e-waste is already covered by product stewardship arrangements at the national level and this is likely to expand over coming years. Most councils already use the services of Endeavour to manage this stream, based in Townsville. In Arcadis’ view, national product stewardship schemes provide the most cost effective and efficient e-waste recycling pathways, and Councils should continue to actively support current and future product stewardship schemes, and promote them to the community through education programs. Councils should keep a watching brief on new and emerging e-waste streams and engage with industry to find recycling pathways for these materials.

5.6.2 Tyres

Most councils have separate arrangements in place to recycle end-of-life tyres. There may be an opportunity to collaborate and implement a regional tyre collection contract similar to the existing scrap metal contract. The potential benefits include reduced costs and improved servicing of smaller and remote sites.

In 2014-15, councils managed around 175 tonnes of tyres but it is likely that a much larger volume is managed directly by tyre retailers and collectors. This figure is unlikely to include all of the tyre waste generated by Council fleets, which could be managed separately through tyre retailers and maintenance providers.

There may be benefits in consulting with local tyre retailers and collectors / recyclers to determine whether there are opportunities for further efficiencies by combining volumes of tyres collected by councils with those collected by industry. According to Tyre Stewardship Australia (TSA) which operates the national voluntary tyre stewardship scheme, there are 13 accredited retailers and one accredited recycler in the region. TSA member organisations have all made a commitment to environmentally sound management of end-of-life tyres. The one recycler in the region, Environment Tyre Collections to the south of Cairns, primarily transfers collected tyres to SEQ (according to EHP data). There may also be an opportunity to link up with retailers and users of off-the-road (OTR) tyres such as those used in agriculture, earth moving plant and mining.

It is unlikely that there will be sufficient volume to justify investment in a typical tyre recycling facility in the region that would produce crumbed rubber products, such as those that exist in
South East Queensland. This would require a significant capital investment which is usually only viable at larger scales, and rely on establishing new markets for tyre derived products. This is an option that could be explored for the longer term, if a sufficient volume of tyres could be aggregated, in tandem with local industry collectors.

It may be viable to support investment in a tyre shredder or baler for the region which could be a mobile unit, to improve the efficiency of transporting tyre waste to SEQ. In the longer term, there may be opportunities to export baled or shredded tyres directly from the port in Townsville (see discussion in 5.3.2 below) but at present there are limited opportunities to do this cost effectively.

Alternatively, the region could consider technologies such as tyre pyrolysis. There are a number of small scale modular technologies that are being developed and commercialised to recover energy products from tyres (fuel oil, other hydrocarbon products, gas and carbon black) with varying degrees of success. There are a number of projects being planned in Queensland, again mostly in the south of the state. However, the scale of the technology means it could be viable in the far north region.

Such options should be considered with caution as many technologies have not been commercially proven and there are several examples of technology failures. The commercial and environmental risks are significant if a pyrolysis technology does fail to perform to expectations.

Arcadis initially proposed an opportunity to encourage investment in a local tyre processing or recovery facility through a regional tyre collection and processing arrangement, in consultation with local recyclers. Member councils discussed to option and decided it was a low chance of being viable and not a priority, so no opportunity has been included for this stream. FNRsdsThe FNQROC

5.6.3 Non-lead Acid Batteries

Given the current work that is being done by industry and governments to establish a national product stewardship scheme for some of these batteries (hand-held rechargeables), Arcadis recommends that councils keep a watching brief on that program and support its implementation when it is launched. The Federal Government’s annual list of products for potential consideration in 2016-17 was announced in August 2016 and includes all batteries, although it acknowledges lead acid batteries are already subject to an effective recycling process.8

No specific opportunities for regional collaboration identified.

5.6.4 Gas Bottles

Gas bottles were identified as a problem waste for some councils. Whilst the steel can be readily recycled, the main issue is around degassing the bottles safely and ensuring that this is done in a controlled and documented way to give comfort to the scrap metal contractors. There is probably limited potential for regional collaboration on this issue, other than sharing of knowledge and information amongst councils and consultation with industry.

No specific opportunities for regional collaboration identified.

5.6.5 Mattresses

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There may be scope for councils to collaborate regionally to develop a solution for mattress recycling. Generally, mattress recycling is a net cost service requiring a gate fee – although the recovered metal and foam has value, it is far outweighed by the costs (particularly labour) associated with collecting and breaking down the mattresses. However, that cost should be measured against the value of landfill airspace that each mattress consumes and the cost of transporting mattress to landfill. Those costs are generally not fully recovered by councils, if charging is based on weight alone.

Mattress recycling does not necessarily require substantial capital investment but it is generally a marginal business due to the high labour input. Larger throughput facilities can be more automated but it is unlikely that the volume of mattresses in the region would justify an automated facility. There are a number of successful social enterprises that have established mattress recycling facilities around the country and this is a model that could work in the region, with support from councils, such as provision of a site.

Depending on the recovery operation and markets for recovered materials, up to 90% of mattress components can potentially be recycled. However, market outlets for some of the materials – textiles, timber and possibly foam – are likely to be limited with the FNQROC region. Typically, steel makes up around 50% of the mattress weight. Foam typically makes up around 10% by weight, timber framing is 6-7% and textiles make up the rest\(^9\). Realistically, it will be difficult to find a use for the timber and textiles and while foam could have some value, it would need to be baled ready for transported to market. Hence a more realistic recycling rate of 50-60% should be expected, meaning that up to 40-50% of residuals will need to be disposed to inert landfill. The residuals will be easier to transport and manage or dispose in landfill than the mattresses themselves.

One of the constraints is the current lack of consistent data on mattress waste. Most councils do not currently separate or count mattresses that they receive at waste facilities, so there is a need to improve data collection in this respect. Also, there are operators within the mattress production and recycling industries that are working to establish an industry-led product stewardship scheme for mattresses. If this eventuates, it could potentially improve the viability of mattress recycling.

FNQROC councils should consider procurement of a regional mattress recycling contract to encourage establishment of a new social enterprise to dismantle mattresses.

**Table 15: Opportunity summary – regional mattress recycling**

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Regional mattress collection / processing contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>FNQROC members could jointly procure a mattress collection and recycling service following a similar model to the existing regional metals contract whereby each participating council would have its own agreement with the contractor and can either arrange regular scheduled pickups or ad-hoc pickups as needed. The contract should be aimed at social enterprises which councils could support by providing a suitable site with access to some utility services, and access to inert landfill capacity for the residuals. Councils should also liaise with commercial generators and collectors of mattresses to explore willingness to participate in a mattress recycling underpinned by the regional contract.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional, subject to viability of transporting mattresses and willingness to participate.</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>A regional mattress recycling contract could follow a similar model to the existing regional metals contract whereby each participating council would have its own agreement with the contractor and can either arrange regular scheduled pickups or ad-hoc pickups as needed.</td>
</tr>
</tbody>
</table>

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### 5.6.6 Emerging Problem Wastes

Councils should be thinking about and preparing for new and emerging problem waste streams that are likely to require management in the future such as lithium and other rechargeable batteries of all sizes, end-of-life solar panels, new gadgets in the e-waste stream and new composite and complex materials such as nano-materials and bio-plastics.

It is difficult to develop regional solutions when there are no existing recycling pathways and limited guidance. Some of these materials will likely be the target of product stewardship schemes and are included on the Federal Government potential product stewardship list for 2016-17.

Councils should keep a watching brief and share information on new waste materials that arise and any new regulations or guidance that is introduced as a result. Councils should support and implement national product stewardship schemes for these emerging waste streams as they are developed and keep abreast of recycling options in the market.

No specific opportunities for regional collaboration identified.

### 5.7 Other Regional Improvement Opportunities

A number of broader issues have been identified by the group that do not relate to a specific waste stream, as set out in section 4.1 above. Potential opportunities for regional collaboration on these issues are identified below.

#### 5.7.1 Regional Education Programs

Education and informing of the community, including residents and businesses, is critical to the smooth functioning and optimisation of any waste and resource recovery system. This has been identified as an area where councils could work together to get better value out of the investments that each council is making into educational materials, designs and content and media coverage (including television, radio, newspapers and internet ads).

It is challenging to implement shared educational programs for all aspects of the waste system as each council has such different approaches. In particular, the variation in recycling systems...
precludes the regionalisation of recycling messages. There is potential to confuse the community when messages are broadcast to the whole region but only apply to one council. Hence, there is a need for better coordination or message across the region.

There are a number of areas where the waste messaging can be relatively consistent across the region, such as:

- Promoting the separation and recovery of green waste at transfer stations
- The benefits of recycling, whether it is through a kerbside bin or at a transfer station
- If a regional organics solution is developed, promoting the benefits and opportunities to recover other organics
- Informing the public about the waste management challenges in the region – limited landfill capacity, recycling constraints, impact on the Reef
- Improving commercial waste management and providing information to businesses
- Recycling of e-waste and other hazardous wastes
- Recycling of difficult wastes such as tyres, gas bottles or mattresses
- Preventing illegal dumping and education on the impacts and costs

Arcadis recently produced a series of literature reviews on various regional waste education aspects which are publically available and could serve as a useful reference.

Any new resource recovery initiative, such as those proposed in this report, must be supported by a comprehensive education and information campaign. There would be benefits in the group working together to share resources and jointly develop educational materials, particularly if some of the regional collaboration opportunities in this report are to be implemented. The group may also wish to consider the benefits of jointly funding a Regional Waste Education Officer to coordinate these programs, which is a common approach taken by other ROCs.

Education of elected Councillors is also important and a key responsibility of waste managers and officers in each council. If Councillors are expected to support changes to waste services that might be perceived as a reduction in services or an increase in cost, it is vital that they understand the benefits and reasoning behind the changes. As such, there may be benefits in jointly developing and sharing internal information papers and presentations to support new regional initiatives.

**Table 16: Opportunity summary – regional waste education**

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Cooperate regionally on waste education campaigns for common issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>FNQROC councils should work together to share and pool waste education resources (print materials, content, designs, messaging, media coverage), particularly for issues which are common across the region. This is particularly critical if the group implements some of the regional collaboration opportunities identified in this report. The group may also consider jointly funding a Regional Waste Education Officer to coordinate and deliver regional programs. Coordination of messaging is also critical to avoid confusion in the community arising from different waste systems.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Joint project overseen by FNQROC, with resource inputs from all councils.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Cooperate regionally on waste education campaigns for common issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Priority:</strong></td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Timeframe:</strong></td>
<td>Within 1 year</td>
</tr>
<tr>
<td><strong>Proposed location:</strong></td>
<td>Not Applicable</td>
</tr>
<tr>
<td><strong>Social / local economy benefits:</strong></td>
<td>Improved understanding and education on waste and recycling issues in the community; improved performance of resource recovery systems; conservation of landfill airspace.</td>
</tr>
<tr>
<td><strong>Environmental benefits:</strong></td>
<td>Opportunities to improve and optimise resource recovery systems.</td>
</tr>
<tr>
<td><strong>Financial costs and benefits:</strong></td>
<td>Costs – internal council resources; funding of educational materials and media coverage; funding of Regional Education Officer</td>
</tr>
<tr>
<td></td>
<td>Benefits – more efficient waste systems; reduced contamination; reduced illegal dumping and incorrect disposal; reduced landfill disposal costs</td>
</tr>
</tbody>
</table>

### 5.7.2 Waste Data

In preparing the Situational Analysis Report, it became apparent to Arcadis that it was difficult to collate and compare waste data from different member councils. Good quality waste data is essential in planning waste services and infrastructure, ensuring resources are appropriately allocated, and supporting options analysis and investment decisions in new solutions.

Some of the issues encountered included:

- For sites that do not have weighbridges, the approaches to estimating tonnages may vary and it is not clear what conversion assumptions have been used.
- In some cases, councils adopt different interpretations of waste definitions / classifications.
- It can be difficult to separately identify commercial and domestic waste volumes when they are mixed (as in a transfer station) or co-collected.
- Some councils do not record waste flows at smaller sites – partly because EHP only requires reporting of overall council tonnages. However, from an infrastructure planning perspective it is useful to understand the inputs and outputs at each individual site. This would require estimates to be made, given lack of weighbridges and/or supervision at some sites. In some of those cases it will be possible to weigh the waste once it is transferred to a larger site for disposal or to obtain weights from third party customers.
- The data reported to EHP by councils often did not match the data that was separately provided by councils, which suggests councils perhaps have difficulty making their data fit into the EHP categories or are apply differing interpretations of the EHP survey questions.
- For biosolids data in particular, there seemed to be a mix of dry and wet solids data reported, when the EHP survey requests reporting by dry solids content.
- There is potential for confusion when waste is transferred across council borders or via transfer or processing facilities (such as Bedminster AWT). For example, waste which was originally collected from households (MSW) is often classified as commercial waste once it passes through a privately owned facility or is delivered by a commercial operator.
- Each council has its own unique method of collating, storing and analysing waste data. Most use some form of Excel spreadsheets but the structure and content varies, and often the data is spread across numerous spreadsheets.
There would be benefits in FNQROC councils agreeing on a standardised system to collect, store and analyse waste data. This would provide a sound basis for assessing regional collaboration opportunities whilst also improving the internal use of waste data in each council, providing an opportunity to identify best practice approaches across the region.

As previously communicated to the group, Arcadis proposes the following key actions be considered, but this is not an exhaustive list:

- If not already doing so, each council should develop a central waste flow database (Excel spreadsheet) which contains monthly data on the inputs and outputs of waste and recyclables from each site (transfer stations, landfills, MRFs, green waste processing and waste sent to private facilities).
- The database should bring together data from various sources including weighbridge data, tonnage data from third parties (e.g. green waste mulching invoices, MRF / AWT records, recycling agents, etc.) and volume based estimates where no weight data is available.
- Any assumptions that have been made in compiling the data (such as volume conversion rates) should be clearly documented in the spreadsheet.
- Waste definitions should be clearly set out and consistent, based on EHP reporting requirements where relevant. For example, in the EHP surveys, MSW includes:
  - Kerbside waste collected from households including residual waste, recycling and green waste;
  - Waste from street bins and public places (both residual and recycling);
  - Litter and illegal dumping cleaned up by councils;
  - Bulky items and hard waste collected during regular (usually annual) collections;
  - Domestic waste that is self-hauled to transfer stations, resource recovery centres and drop-off points, including residual waste, recycling, bulky / hard waste and green waste; and
  - Disaster waste collected from or delivered by residents.

All other waste is considered commercial and industrial, except for waste arising from construction and demolition activities (including road construction), which is classified as C&D.

- For biosolids, councils should be analysing the average dry matter content of biosolids. Once this is understood, the actual weight of biosolids as measured at the weighbridge (wet solids) can be easily converted to a dry solids measurement.

- Where domestic and commercial waste is mixed such as in a transfer station, councils should make their best estimate of the split based on the proportion of commercial versus domestic customers. This applies to residual waste but also scrap metal, green waste and other recyclables. This assumption should be clearly noted and verified at least annually.

Another key aspect of good quality waste data is understanding the composition of waste. The Situational Analysis also identified a lack of waste compositional data in most councils. Cairns undertakes annual audits of MSW residuals and commingled recyclables as a means to monitor the AWT facility performance and manage contamination in recyclables delivered to the MRF. Cook Shire undertook waste audits in early 2016 to inform an options analysis of kerbside collection and recycling programs. Otherwise, Arcadis is not aware that other councils have commissioned waste audits in recent years.

Waste audits are expensive – the sorting of waste into components is labour intensive, usually undertaken by trained consultants and there is a minimum sample volume and number of samples required in order for the result to be statistically robust. As such, it is generally not viable for smaller councils to undertake them regularly and there needs to be a clear purpose for the audits. However, a good understanding of the composition of waste is essential if councils are to make informed decisions about options to improve waste management and
resource recovery. For example, decisions around whether to introduce a kerbside recycling or organics collection must be based on an understanding of the quantity of materials available in the garbage stream.

At a regional level, there could be opportunities for cost efficiencies if waste audits were commissioned on a regional basis through a joint procurement, particularly as the audits are likely to be undertaken by a consultant from outside the region.

Arcadis proposes that FNQROC councils work together to develop and agree on a standard waste data collection and storage system, and consider the benefits of regional waste audits. The development of the waste data system should consider the issues identified above and existing practices at each council, including whether there are any best practice templates already in use within the group that could be shared and adapted. The group could also consider whether there are benefits in sharing and collating the data at a regional level (e.g. annually) to monitor trends and assist in planning.

**Table 17: Opportunity summary – regional waste data system**

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Develop a regionally consistent waste data management system</th>
</tr>
</thead>
</table>
| Description: | FNQROC councils should work together to develop and agree on a standard system to collect, store and analyse waste data for all council facilities in the region. Initially, the group should review existing practices in each council to identify problem areas and any best practice templates that could be used as a basis for a shared approach. There may also be benefits in regularly collating and sharing the data between the group members to monitor trends. The system should be compatible with EHP reporting requirements but provide extra levels of detail.

The group should also consider the potential to commission regional waste compositional audits, to support analysis of options to improve resource recovery systems. |
| Coverage: | Regional |
| Governance / delivery model: | Joint project overseen by FNQROC, with resource inputs from all councils. |
| Priority: | Medium |
| Timeframe: | Within 1 year |
| Proposed location: | Not Applicable |
| Social / local economy benefits: | Providing robust data to support informed decisions and planning for community services. |
| Environmental benefits: | Opportunities to improve and optimise resource recovery systems. |
| Financial costs and benefits: | Costs – internal council resources to develop system, potential input from external consultants, potential compositional audit. Benefits – more efficient data analysis; more robust investment decisions; better planning of resources and infrastructure. |

5.7.3 Disaster Waste Management
Far North Queensland is a region that is prone to natural disasters, particularly cyclones. Natural disasters typically impact across a number of neighbouring councils and can generate significant additional volumes of waste that need to be managed quickly and efficiently. Hence, it is an area where there is scope for councils to work together. The waste generated from a significant natural disaster can consume landfill airspace at a rapid rate and many councils across Australia have been left without adequate landfill space as a result of natural disasters.

Natural disasters such as cyclones generate a range of additional waste streams that need to be carefully managed, with some of the main streams being:

- Spoilt food and other putrescible waste resulting from power outages, that must be properly disposed within the first few days of the clean-up;
- Green waste from downed trees and branches, and damaged vegetation;
- General debris and waste which is wet and/or contaminated with flood waters and mud;
- Asbestos and asbestos contaminated wastes, arising from damage to older structures;
- C&D waste from demolition and reconstruction activities, which tends to extend over a much longer period (from several months up to 2-3 years).

After a natural disaster, the first instinct is often to dispose of all waste to landfill in the interest of clearing it as soon as possible. However, this can prove very expensive, particularly when the waste goes to private landfills. It can also have long-lasting implications in terms of future landfill airspace availability. Increasingly, councils are putting plans in place in advance so that resource recovery can occur, where it is practical without significantly delaying the clean-up process.

There are several examples where green waste from a natural disaster has been separately stockpiled and eventually mulched and recovered, thereby significantly reducing landfill inputs. For example, when Cyclone Marcia hit the Fitzroy region in Central Queensland in early 2015, the majority of disaster waste reported to EHP (74%) was green waste, most of which was recovered. If systems and processes are in place, it can also be possible to source separate or extract green waste and demolition materials during the clean-up process.

All councils should have their own disaster waste management plan in place, but there would also be benefits in developing a regional plan to ensure that critical facilities continue to operate efficiently and that clean-up operations are not hampered by a lack of waste management capacity. This is particularly relevant for FNQROC given the lack of landfills in some council areas and the heavy reliance of the region on a single privately owned landfill for putrescible waste disposal.

The key is prior planning and there is an opportunity for FNQROC councils to work together to prepare a regional disaster waste management plan which sets out how the councils will work together in a disaster and make the most out of the regional waste infrastructure that is available to ensure appropriate waste management and maximise resource recovery in the wake of a disaster.

A regional disaster waste plan should consider:

- The types and volumes of waste likely to be generated in different disaster scenarios, and locations of sensitive potential waste sources such as industrial facilities and shopping centres
- Identification of opportunities to source separate and recover certain materials during the clean-up process
- The key facilities that will be used to manage each waste stream
- Management and staff roles and responsibilities
- Any temporary transfer and processing facilities that might be required, suitable locations for these and any setup and operational procedures, including environmental licences
Any additional temporary plant and equipment that might be required and identification of hire providers

Forward planning to ensure there is always sufficient constructed landfill cell capacity available for disaster and normal waste (maintaining an emergency buffer in capacity)

Contractual arrangements or agreements required with each facility operator to make capacity available in a disaster

Health and safety issues, such as handling asbestos contaminated wastes or waste that may have come in contact with sewage.

Systems to record data on waste volumes and destinations.

Particular issues to be considered for FNQROC members include:

- Whether the Suez AWT facility can process a higher throughput of putrescible waste (e.g., spoilt food) on a short term basis
- Whether there are any limitations on the input of waste to Springmount Landfill and the transfer stations that feed it
- Whether private C&D recyclers in the region have capacity to stockpile and process large volumes of demolition materials, given councils currently do very little C&D recycling
- Whether storage locations and outlets for large volumes of mulched green waste could be identified, including via private composters

Table 18: Opportunity summary – regional disaster waste planning

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Develop a regional disaster waste management plan to maximise resource recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>While each council needs to have its own plans in place for natural disasters, there may be benefits in a regional planning approach with a focus on sharing regional waste infrastructure and maximising resource recovery opportunities following a disaster. In particular the plan should consider how existing and temporary facilities can be used to manage large volumes of putrescible waste and green waste in the short term, and C&amp;D waste in the longer term.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Joint project overseen by FNQROC, with proportional funding and resource inputs from participating councils.</td>
</tr>
<tr>
<td>Priority:</td>
<td>Medium</td>
</tr>
<tr>
<td>Timeframe:</td>
<td>Within 2-3 years</td>
</tr>
<tr>
<td>Proposed location:</td>
<td>Across the region - existing waste infrastructure plus sites for temporary facilities to be identified.</td>
</tr>
<tr>
<td>Social / local economy benefits:</td>
<td>Ensuring rapid and orderly clean-up and recovery after a disaster; clear plan in place to guide community.</td>
</tr>
<tr>
<td>Environmental benefits:</td>
<td>Recovery of waste materials and conservation of landfill airspace; minimising the environmental impacts of disaster clean-up.</td>
</tr>
</tbody>
</table>
| Financial costs and benefits: | Costs – internal council resources to develop plan, potential input from external consultants
Benefits – reduced landfill gate fees; revenues from sale of recovered materials |
5.7.4 Waste Charging Systems

It was identified in the Situational Analysis that each council has quite different approaches to charging for waste services. It has been shown that the charges associated with different disposal and resource recovery options have a significant influence on waste behaviours of residents and businesses. Councils across Australia are increasingly moving towards systems based on the principle of ‘user pays’ for disposal of waste, where residents are only charged for services that they use and the charges are generally linked to the volume of waste disposed and/or the frequency of use. This approach encourages waste generators, both domestic and commercial, to consider reuse and recycling alternatives when disposing of waste.

Gate fees for disposal of general domestic waste is the most common example and one where FNQROC councils differ significantly. Some FNQROC councils have opted to charge a common levy to all rateable properties which covers the cost of operating transfer stations and landfills, with no additional gate fee for disposal of domestic waste. Hence residents pay for the service regardless of whether or how much they use it. Other councils have implemented gate fees for disposal of domestic waste based on volumes and/or weights. It is recognised that, in setting the waste charging regime, councils need to consider that all residents should be able to access essential waste services and that they do not want to exacerbate illegal dumping activities.

Industry experience and best practice also shows that having a significant differential between charges for recycling versus disposal options, strongly encourages source separation and recycling. Hence many councils now offer free or low cost recycling options, whilst charging gate fees for waste disposal at cost price (or higher for commercial customers).

Ultimately, the waste charging regime that each council implements is an individual council issue. At a regional level, the main concern is that the differences in charging systems and rates for domestic waste between councils could encourage residents to move waste across council borders to the cheapest disposal option, which goes against the proximity principle and can undermine the recycling efforts of some councils. In some cases, there are legitimate reasons why councils charge more or less than their neighbouring councils, such as their ability to manage certain waste streams internally or cost effectively. However, there are some waste streams that could cause concern:

- **Self-hauled general domestic waste** — Cairns, Douglas and Cook all charge gate fees for general MSW disposal at transfer stations, while other councils allow a certain amount of free disposal and recover the costs through additional levies on all residents. Each council has measures in place to check that residents from other LGAs cannot take advantage of free disposal, but there is still an incentive for people to try to take waste across council borders for disposal.

- **Car bodies** — some councils charge a flat fee (typically around $40 per car) while others allow free disposal.

- **Green waste** — Cairns is the only council not to offer free disposal of green waste for residents (Douglas allows small loads for free and charges for larger loads) and Cairns charges the same for green waste as for self-hauled general MSW. This is a reflection of their higher cost of processing the material but provides little incentive for residents to source separate and could encourage cross-border movement of green waste.

- **Charges for tyre disposal** vary somewhat; passenger car tyres vary from $5 to $9 per unit with Tablelands and Mareeba being more expensive than other councils;

There are also significant differentials in the charges for some commercial waste streams but there is less scope for councils to consult on those charges, given the need to avoid anti-competitive behaviour which might be seen to disadvantage private operators.

There may be benefits in councils working more closely to harmonise waste charging regimes and rates across the region for domestic waste, in cases where there is currently a strong incentive for cross-border movement of waste and other behaviours that undermine the
resource recovery efforts of each council. That is not to suggest that all councils should have the same system and prices, and indeed there are clear guidelines around how councils set prices for services. Each council should also consider whether their charging regime encourages resource recovery and responsible waste behaviours.

Table 19: Opportunity summary – harmonisation of waste charging

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Examine options to harmonise waste charging regimes across the region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>FNQROC councils should consider whether there is potential to harmonise waste charging approaches where there is a real risk that price differentials are likely to lead to cross-border movement of waste and provide a disincentive for resource recovery.</td>
</tr>
<tr>
<td>Coverage:</td>
<td>Regional</td>
</tr>
<tr>
<td>Governance / delivery model:</td>
<td>Review lead by FNQROC with input from all councils.</td>
</tr>
<tr>
<td>Priority:</td>
<td>Medium</td>
</tr>
<tr>
<td>Timeframe:</td>
<td>Within 2-3 years</td>
</tr>
<tr>
<td>Proposed location:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Social / local economy benefits:</td>
<td>Equitable access to waste services across the region; encouraging user pays and proximity principles.</td>
</tr>
<tr>
<td>Environmental benefits:</td>
<td>Reduced unnecessary transport of waste; strengthening of resource recovery policies; improved resource recovery rates.</td>
</tr>
</tbody>
</table>
| Financial costs and benefits: | Costs – internal resources  
Benefits – better cost recovery |
6 WASTE INFRASTRUCTURE OPPORTUNITIES

Within the scope of the current study, Arcadis was asked to identify any opportunities to develop new waste infrastructure in the region, or rationalise existing facilities to improve operational efficiency and environment outcomes. These opportunities are discussed in this chapter.

6.1 Opportunities for new waste infrastructure

There are a number of potential opportunities to develop new regional waste infrastructure arising from the proposals identified above, subject to agreement from councils to implement. These are identified in Chapter 5 and summarised again below in Table 20.

Table 20: Summary of opportunities for new regional waste infrastructure

<table>
<thead>
<tr>
<th>Waste infrastructure development opportunity</th>
<th>Location(s)</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>New domestic waste processing / disposal solution (long-term)</td>
<td>To be determined, subject to preferred solution</td>
<td>Medium</td>
</tr>
<tr>
<td>New or adapted existing facilities to support implementation of the CDS,</td>
<td>Across the region, including existing transfer stations and MRFs</td>
<td>High</td>
</tr>
<tr>
<td>including collection depots and consolidation points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New regional solution for reprocessing plastics, particularly film plastics</td>
<td>To be determined -- close to major feedstock sources, consider Mareeba or</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Cassowary Coast</td>
<td></td>
</tr>
<tr>
<td>New or expanded regional organics processing facility</td>
<td>To be determined by contractor, new or existing facility</td>
<td>High</td>
</tr>
<tr>
<td>New regional tyre recycling or recovery facility</td>
<td>To be determined -- close to major feedstock sources</td>
<td>Low</td>
</tr>
<tr>
<td>New regional mattress recycling facility</td>
<td>Propose Mareeba for disposal of residuals but close proximity to Cairns &amp;</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Douglas</td>
<td></td>
</tr>
</tbody>
</table>

6.2 Opportunities to rationalise waste infrastructure

This section reviews the existing key council-owned infrastructure in the region, namely landfills and transfer stations, and examines whether there are opportunities to rationalise facilities to improve environmental and financial performance. Figure 19 below shows the existing network of transfer stations and landfills across the region, to inform the discussion.
Figure 19: FNQROC disposal and transfer infrastructure
6.2.1 Landfills

Landfills have the potential to cause significant environmental impacts depending on the level of engineering and containment, and how well they are operated. Hence there are likely to be benefits in reducing the number of landfills across the region, where it makes practical sense from a logistics and service perspective.

To determine whether an individual landfill should be closed requires an assessment of the site-specific environmental risks, financial costs and benefits (including future liabilities), and the logistics of providing an alternate means to dispose of the waste received. These assessments should be undertaken by each council that runs landfills and a simple review of macro-level data is not in itself sufficient to identify realistic rationalisation opportunities.

Nevertheless, Arcadis has reviewed the number of landfill sites in each LGA (excluding sites which are already scheduled to close in next 5 years, i.e. Laura landfill in Cook and Atherton landfill in Tablelands). Figure 20 below summarises the average distribution of landfills by population and land area in each LGA, including both private and council owned, putrescible and inert. While there is no accepted standard for these parameters and it is difficult to compare across regions and councils with very different demographics, some interesting findings can be drawn. Note for Cairns, there are four landfills but they are all privately owned inert landfills.

In general, councils in the region already operate with a reduced number of landfills compared to some other similar LGAs in Queensland. Cook Shire has a high density of landfills by population but very low density by land area, which reflects the demographics of the LGA. In reality there are only two council-owned landfills which are both unmanned but the Laura landfill is scheduled to be closed imminently, while Council is working to improve Coen landfill, which is extremely remote from other waste facilities so impractical to convert to a transfer station.

Mareeba Shire has the most active council-owned landfills in the region with three sites of which two are relatively remote, unlined and unmanned. In terms of number of landfills for its population, Mareeba’s rate is higher than other councils in the region and above the average figure for regional councils across Queensland. On the other hand, its density of landfills by land area is quite low compared to other councils in the region and the regional Queensland average. Nevertheless, operating unlined and unmanned landfills, even in remote areas, is not best practice. Arcadis recommends that Council consider closing the sites and converting them to transfer stations. Both sites are within two hours drive of Mareeba suggesting a transfer station conversion could be viable.

Cassowary Coast has a landfill density by land area that is higher than other similar LGAs and above the Regional Queensland average. But with only two landfills sites and a comparatively small land area, the result is a little misleading. Both landfills receive dry waste only and are well engineered, so the environmental risk is relatively low. The smaller of the two sites (Tully) still services a population of 8,500.
6.2.2 Transfer stations

Generally for transfer stations, the environmental risk and drivers to rationalise are much less than for landfills. Provided transfer stations are well run and secured, the environmental risks and future liabilities are significantly less than landfills. Hence the drivers for rationalisation are usually financial and operational, and each council needs to weigh up potential operational savings against the need to maintain adequate access to services for residents.

Figure 21 below summarises the average distribution of transfer stations by population and land area in each LGA. Again, there is no accepted standard for these parameters and it is difficult to compare across regions and councils with very different demographics. Note, Wujal Wujal has been removed from the chart as it has a very small population (around 300 people) which significantly skews the result for its one transfer station.

Cairns has a density of transfer stations that is similar to the average in South East Queensland, in terms of both the density by population and by land area. This reflects the dense population in Cairns consistent with its regional city status.

Cook Shire, with its vast land area and small population has the highest density of transfer stations by population but the lowest density by land area, which is generally consistent with the average across Remote Queensland, which includes LGAs like Cook, covering most of the western and northern part of the state.

For the other councils, the density of transfer stations varies. The density by population is generally similar across Cassowary, Tablelands, Mareeba and Douglas. It is higher than the average for Regional Queensland, which generally covers similar regional LGAs (i.e., excluding SEQ and Remote Queensland).

The data does not indicate any obvious opportunities to rationalise transfer stations. A review of the map of transfer stations across the region reveals that there are some facilities which seem quite close to each other and could be reviewed for rationalisation opportunities (for example Dimbula and Mutchilba transfer stations in Mareeba, Mt Garnet and Innot Hot Springs in Tablelands). If it has not been done already, each council should review their own networks.
looking at each transfer station and considering the population / catchment served, tonnages received, operational costs and distances to alternative facilities.

Figure 21: Distribution of transfer stations by population and land area
7 SUMMARY AND PRIORITISATION OF OPPORTUNITIES

Chapter 4 of this report has identified priority waste streams and key waste issues for the FNQROC region which could benefit from regional solutions. Chapter 5 has identified a number of potential opportunities for FNQROC councils to work together to improve resource recovery and management of those waste streams and issues. This chapter summarises the 15 opportunities identified and presents them grouped according to their priority and proposed timeframe for implementation.

Opportunities have been assigned as either short term (within 1-2 years), medium term (2-5 years) or long-term (5-10 years). These assignments were discussed and agreed by the Regional Waste Managers Group\(^{11}\). The actual implementation program will be dependent on the availability of resources. Opportunities have also been categorised as high, medium or low priority based on the prioritisation of the waste streams affected and the potential benefits for the region.

Other than the high level grouping of opportunities, the list below is not in any preferred or prioritised order – this will be determined by the FNQROC Board, informed by the Regional Waste Managers Group.

7.1 Short term priorities (within 1-2 years)

These opportunities have been identified as actions that can be implemented in the short term, with the next year. These include opportunities that are considered urgent or are relatively easy to implement, with some work already started by individual councils.

Table 21: Summary of short-term priority opportunities

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a regionally consistent waste data management system</td>
<td>FNQROC councils should work together to develop and agree on a standard system to collect, store and analyse waste data for all council facilities in the region. Initially, the group should review existing practices in each council to identify problem areas and any best practice templates that could be used as a basis for a shared approach. There may also be benefits in regularly collating and sharing the data between the group to monitor trends. The system should be compatible with EHP reporting requirements but provide extra levels of detail. The group should also consider the potential to commission regional waste compositional audits, to support analysis of options to improve resource recovery systems.</td>
<td>High</td>
</tr>
<tr>
<td>Develop a regional CDS strategy and collection network</td>
<td>While each council will need to make their own arrangements to prepare for the CDS, there are potential benefits in collaborating at a regional level to establish an efficient regional network or collection depots and sorting / consolidation facilities.Councils can also consider how to use the CDS to catalyse and support broader recycling programs beyond beverage containers, whilst sharing ideas and information amongst the group.</td>
<td>High</td>
</tr>
<tr>
<td>Develop a regional organics recovery strategy</td>
<td>FNQROC members could work together to develop a regional organics recovery strategy, with a key focus on development of local markets for value-added products. Part of the strategy should be consideration of a regional organics collection and processing contract, to attract new investment in quality processing</td>
<td>High</td>
</tr>
</tbody>
</table>

\(^{11}\) FNQROC RWM Group meeting, Cairns, 13 September 2016.
<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional plastic film collection and reprocessing solution</td>
<td>Councils could work together and with industry to assess the feasibility of establish a local plastics reprocessing facility which could address the problem waste stream of film plastic (as well as existing rigid plastics) and provide a new local industry with employment opportunities. The project should include an assessment of plastic waste generation across all sectors (domestic, commercial and agricultural); review of technologies; options for collection; and potential products and associated markets. Ultimately the project could lead to procurement of a regional film plastics collection and reprocessing contract. Cairns could review options and potential to adapt its MRF to recover film plastics and each council could establish collection points at existing transfer station sites.</td>
<td>High</td>
</tr>
<tr>
<td>Regional economic assessment of recycling expansion options</td>
<td>There is good potential to expand recycling services across the region and in the process improve the efficiency and viability of the Cairns MRF. The proposed economic assessment would consider the costs and benefits of expanding recycling from a regional and local perspective and provide a sound basis for decisions. A regional approach is needed to maximise the potential of the Cairns MRF. For councils that have kerbside recycling, expansion could focus on commercial and MUD customers. For councils without kerbside recycling, the assessment would provide a robust basis for a decision about introducing a service. The assessment will consider direct costs and savings, and indirect benefits to the regional economy.</td>
<td>High</td>
</tr>
<tr>
<td>Develop a sub-regional strategy to increase recovery of commercial waste</td>
<td>Councils with significant commercial waste generation and/or high commercial waste disposal gate fees could consider working together to develop a common strategy for improving commercial waste recovery, particularly where it can provide direct financial benefits to councils though additional revenue streams or improving the efficiency of recovery infrastructure. Particular focus on commingled recyclables that can be processed in the Cairns MRF and organics that may be suitable for any regional organics processing solution. As a first step, councils should engage with industry including commercial and industrial generators, MUD building managers and commercial waste collectors.</td>
<td>High</td>
</tr>
<tr>
<td>Examine direct export options for recyclables from Port of Townsville</td>
<td>Councils could work together, led by Cairns, to explore options to export recyclables via the Port of Townsville. As the port expands and container traffic rapidly increases, it is likely that there will be more opportunities for direct export of containers to markets in Asia. As Council is not accustomed to exporting and selling materials directly, they would need support from an experienced agent. Council should also consult with other recyclers in the region and in Townsville to explore potential synergies.</td>
<td>Medium</td>
</tr>
</tbody>
</table>
### 7.2 Medium term priorities (within 2-3 years)

These opportunities have been identified as actions that can be implemented in the short term, within 2 to 3 years. These are less urgent or less beneficial opportunities, or require other actions to be completed first.

*Table 22: Summary of medium-term priority opportunities*

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a regional disaster waste management plan to maximise resource recovery</td>
<td>While each council needs to have its own plans in place for natural disasters, there may be benefits in a regional planning approach with a focus on sharing regional waste infrastructure and maximising resource recovery opportunities following a disaster, to conserve landfill airspace and contain costs. In particular the plan should consider how existing and temporary facilities can be used to manage large volumes of putrescible waste and green waste in the short term, and C&amp;D waste in the longer term. The management of asbestos waste should also be considered.</td>
<td>Medium</td>
</tr>
<tr>
<td>Examine options to harmonise waste charging regimes across the region</td>
<td>FNQROC councils should consider whether there is potential to harmonise waste charging approaches where there is a real risk that price differentials are likely to lead to cross-border movement of waste and provide a disincentive for resource recovery.</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Regional mattress collection / processing contract

FNQROC members could jointly procure a mattress collection and recycling service following a similar model to the existing regional metals contract whereby each participating council would have its own agreement with the contractor and can either arrange regular scheduled pickups or ad-hoc pickups as needed. The contract should be aimed at social enterprises which councils could support by providing a suitable site with access to some services, and access to inert landfill capacity for the residuals. Councils should also liaise with commercial generators and collectors of mattresses to explore willingness to participate in a mattress recycling underpinned by the regional contract.

7.3 Longer term priorities (within 5-10 years)

The following two opportunities have been identified as high priority, but for implementation within 5-10 years.

Table 23: Summary of longer-term priority opportunities

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a long-term regional MSW disposal / processing strategy</td>
<td>FNQROC councils share a number of constraints and challenges in managing putrescible domestic waste, so there are benefits in a regionally coordinated approach. While there is no short term urgency, with impending landfill closures and expiry of the existing AWT contract in 2026, planning for the future MSW solution should start early. The strategy development should consider a range of technology and collection options in the context of changing waste policies, and develop a cost-benefit analysis of various regional and sub-regional options.</td>
<td>High</td>
</tr>
<tr>
<td>Consolidate the targeted strategies and plans into a single Regional Waste Strategy</td>
<td>A number of targeted strategies and studies have been proposed above, covering specific waste streams such as organics, recyclables, MSW, commercial waste and disaster waste. Once these have been implemented, there would be benefits in collating all of these separate documents, together with the regional waste data system and market development actions, into a Regional Waste Strategy. This would provide a single, cohesive over-arching document to guide future collaboration on waste and resource recovery activities which can be reviewed on a regular basis. The exact form can be determined by group, but should result in a firm commitment from members to support its ongoing implementation.</td>
<td>High</td>
</tr>
</tbody>
</table>
APPENDIX A

Waste Prioritisation Assessment Matrix

*(Attached separately)*