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This report has been completed with the generous assistance of many people who gave of their time, wisdom and experience. These people are noted in the Consultation section of this report.

Particular thanks go to:

- Environment Canterbury
- WasteMINZ
- Agrecovery
- Plasback
- EnviroNZ
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1. EXECUTIVE SUMMARY

The New Zealand Rural Waste Minimisation Project (NZRWMP) is being undertaken to better understand the nature of waste on farms and to begin to identify alternatives to burning, burial and bulk storage of waste. The NZRWMP has the following objectives:

1. To determine the impacts on and risks to New Zealand’s natural resources (land, water and air), economy, and social and cultural wellbeing from current rural waste burning, burying and stockpiling practices.
2. To identify new waste minimisation options for rural waste management and assess the technical and economic feasibility of these.
3. To develop implementation plans with service providers for feasible waste minimisation options.

The focus of the work undertaken in this report has been on the second objective: identifying and assessing the economic and technical feasibility of new waste minimisation options. This work also requires development of a strategy which identifies where and how best to focus waste minimisation efforts.

Barriers and Drivers Relating to Alternative Rural Waste Management Options

Prior to considering options, consideration was given to understanding the barriers to new rural waste minimisation options and the drivers that could potentially support these options.

The key barriers are seen as:

- **Costs**: with the most commonly used methods of disposing of waste costing nothing or very little in terms of direct financial outlay, for alternatives to succeed they must be provided at minimum cost.
- **Inconvenience**: currently used practices for rural waste disposal on farms are relatively convenient, a key driver in their popularity. For alternatives to succeed they must be minimally inconvenient – or ideally more convenient – for farmers.
- **Lack of Incentives**: while the farmer survey demonstrated that farmers are internally motivated to change rural waste management behaviour, there are currently few external motivators for farmers to do so. For alternatives to succeed they will ideally tap into intrinsic farmer motivations or align with existing extrinsic motivators such as farmer assurance programmes.
- **Lack of Awareness**: it is apparent that a number of services that provide alternative rural waste management options are not well known. For alternatives to succeed they must include a coherent strategy to ensure high levels of farmer awareness to encourage participation.
- **Lack of Economic Viability**: many services that aimed to provide alternative rural waste management options have struggled or failed because of unpredictable market conditions or inadequacy of planning and business execution. For alternatives to succeed they must ensure that their business model is robust and well thought out to ensure economic feasibility.

The lack of regulation around the current prevalent behaviours relating to rural waste, combined with substantial barriers to cost-effective services thriving in the market, helps explain the amount of waste that is currently being burned, buried and bulk stored on New Zealand farms.
To address this issue, a number of organisations offer farm assurance or certification programmes for their suppliers, including:

- Synlait Milk
- Miraka
- Horticulture New Zealand
- New Zealand Winegrowers

These programmes appear to work well in the sectors in which they operate, but not all require waste to be addressed, and the collective number of farmers covered by such programmes is still a small minority.

Farmers themselves seem to be motivated to pursue alternative means of rural waste disposal, but alternatives’ cost and convenience continue to operate as key barriers to universal behaviour change. Successful alternatives have to address at least one, if not both, of these factors.

**Alternative Domestic Options for Rural Waste Minimisation**

Existing and potential services in New Zealand for reducing, reusing, recycling, recovery and disposal of rural waste have been considered, including both collection and processing models.

The specific rural waste collection options addressed further in this report are:

**On-Farm Collection Options**

- Council/TA Collection:
  - Territorial Authorities (Multiple Waste Streams)
- Waste Contractor Collection:
  - Waste Management New Zealand Limited (Multiple Waste Streams)
  - EnviroWaste Services Limited (Multiple Waste Streams)
  - Smart Environmental (Multiple Waste Streams)
  - Wastebusters Canterbury (Multiple Waste Streams)
  - XtremeZeroWaste (Multiple Waste Streams)
  - Plasback (Agricultural Plastics)
  - EnviroWaste Services Limited (Agricultural Plastics)
  - JBL Environmental (Hazardous Wastes)
  - Multiple Providers (Scrap Metal)
  - Multiple Providers (Tyres)
- Distributor Back Haulage:
  - NZ Post (Sharps)
Local Drop-off Collection Options

- Council/TA Waste Hubs:
  - Territorial Authorities (Multiple Waste Streams)
- Permanent Collection Hubs:
  - Agrecovery (Agricultural Plastics) – Also One-Off Collection Rounds
- Retail Store Drop-off:
  - Rural Stores (Multiple Waste Streams)
  - Recovering Oil Saves the Environment (ROSE) (Waste Oil)
  - PaintWise / Dulux Paint Take-Back Scheme (Paint)
  - Fonterra (Sharps)

The specific Rural Waste Processing Options addressed further in this report are:

Reduction, Reuse and Recycling Options

- Reduction of Waste:
  - Multiple Providers (Biodegradable Plastics)
- Reuse and Recycling of Waste:
  - Local Community Groups (Multiple Waste Streams)
- Recycling of Waste:
  - EnviroWaste Services (Agricultural Plastics)
  - Astron Plastics (Agricultural Plastics)

Energy Recovery from Waste Options

- Waste Transformation Limited (Multiple Waste Streams)
- Multiple Providers (Plastics to Energy)

Disposal of Waste Options

- ChemWaste (Hazardous Wastes)
- Waste Management Technical Services (Hazardous Wastes)

It is apparent from analysing how rural waste is, and could potentially be, managed that the challenge is less in how waste is processed than it is in how waste is collected. There are recycling or processing options available for most rural waste streams, but many of these are being burnt, buried or stored currently because the economics of collection are unsatisfactory or transporting waste to a location for processing is inconvenient for farmers.
International Options for Rural Waste Minimisation

The regulatory frameworks and contextual factors for the UK and Europe, the United States, Canada and Australia were considered to understand how these countries differ from New Zealand in terms of rural waste management. Overall, legislation limiting particularly burning of waste was tighter and landfill costs in most areas were increased by substantial waste levies or taxes.

No specific international options were carried forward for option assessment, but rather the international section provides examples of options and methodologies that can be applied to a New Zealand context, and suggests how existing service types can be refined and improved to be more successful.

Preliminary Options Assessment

Based on the option preliminary economic and technical feasibility assessments undertaken, the options below are recommended. The strategy determined for the next milestones of the project is to pursue the proposed follow-up strategies (detailed in Section 8) for these options to further explore and develop them, and to determine whether they will work successfully.

<table>
<thead>
<tr>
<th>Option Description</th>
<th>Assessed Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>EnviroWaste Plastics Collection and Recycling:</td>
<td>Very High</td>
</tr>
<tr>
<td>EnviroWaste commences processing of polypropylene fertiliser bags, of which it currently has a stockpile and is continuing to collect via a series of hubs in conjunction with key partners. As the service grows, EnviroWaste begins collection of fertiliser bags from farms using back-haulage arrangements with fertiliser delivery contractors. EnviroWaste then extends service to include other forms of plastic from farms. In time, the service may extend to other waste streams.</td>
<td></td>
</tr>
<tr>
<td>Agrecovery Agrichemical and Plastics Collection:</td>
<td>Very High</td>
</tr>
<tr>
<td>Agrecovery collects agrichemicals from farms, and accepts agrichemical containers at its nationwide network of collection hubs. Support is given to Agrecovery to consider how collection rates might be further improved.</td>
<td></td>
</tr>
<tr>
<td>Vehicle Battery Nationwide Collection:</td>
<td>Very High</td>
</tr>
<tr>
<td>A regular (likely annual) nationwide vehicle battery collection is organised to recycle batteries from farms. Local charities such as the Lion's Club are engaged to organise local hubs and manage collections. These charities receive the proceeds from collections. The local collections are promoted as ‘community events’. Local councils and other industry organisations assist with marketing and awareness.</td>
<td></td>
</tr>
<tr>
<td>Plasback Plastics Collection:</td>
<td>High</td>
</tr>
<tr>
<td>Plasback provides agricultural soft plastic on-farm collections to farmers through its network of local contractors. Support is given to Plasback to consider ways in which collection requests and pick-ups can be more effectively planned and monitored to ensure customer satisfaction and increase collection rates.</td>
<td></td>
</tr>
<tr>
<td>Plasback Expanded Waste Stream Collection:</td>
<td>High</td>
</tr>
<tr>
<td>Plasback provides agricultural soft plastic on-farm collections to farmers through its network of local contractors. Plasback contractors pick up additional waste streams from farmers while collecting plastics.</td>
<td></td>
</tr>
<tr>
<td>Agrecovery Expanded Waste Stream Collection:</td>
<td>High</td>
</tr>
<tr>
<td>Agrecovery collects agrichemicals from farms, and accepts agrichemical containers at its nationwide network of collection hubs. As part of the on-farm hazardous waste collection, additional non-bulky, hazardous wastes are collected by contractors. As part of the container collection, additional non-hazardous recyclable wastes are collected at collection hubs.</td>
<td></td>
</tr>
<tr>
<td>Option Description</td>
<td>Assessed Feasibility</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td><strong>Scrap Metal Nationwide Collection:</strong> A regular (likely annual) nationwide scrap metal collection is organised to recycle metal waste from farms. Local hubs are utilised for easily transportable metal waste, whereas on-farm pick-ups can be organised for larger items such as used machinery or vehicles. Scrap Metal Recyclers Association of New Zealand assists with coordination (and perhaps host the booking system) and local members are engaged to manage the process and recycle waste. Farmers are given receipts when items are collected and paid once items have been weighed. Local councils and other industry organisations assist with marketing and awareness.</td>
<td>High</td>
</tr>
<tr>
<td><strong>Expanded ROSE Oil Recycling Scheme Drop-Off Hubs:</strong> Additional sites are established for the collection of oil containers and oil filters at convenient locations for farmers, such as rural stores.</td>
<td>High</td>
</tr>
<tr>
<td><strong>Fonterra Sharps Collection:</strong> Fonterra is currently undertaking a pilot to provide sharps collection containers to farmers. This pilot will be completed in June, 2017. Farmers fill the containers and drop them off at local participating vet clinics from which they are sent for disposal.</td>
<td>High</td>
</tr>
<tr>
<td><strong>Inclusion of New Services into Farm Assurance Programmes:</strong> As new options for farm waste minimisation become established, companies providing farm assurance or certification programmes are encouraged to include these services specifically in the programmes.</td>
<td>High</td>
</tr>
<tr>
<td><strong>Community Organisation On-Farm Collection:</strong> Community organisations, such as Wastebusters Canterbury, roll out multi-bin on-farm waste collection services based on a farmer-owned bin swap arrangement, as Wastebusters Canterbury currently provides. Organisations pursue both recycling and reuse opportunities.</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Expanded Territorial Authority Recycling Drop-Off Hubs:</strong> Territorial Authorities with a substantial rural population provide recycling hubs in locations convenient to farmers. Both existing and new rural hubs expand waste streams to include some recyclable commercial rural waste streams, such as soft plastics, which would be collected from the hub by recyclers.</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Expanded Paint Recycling Scheme Drop-Off Hubs:</strong> Additional sites are established for the collection of waste paint at convenient locations for farmers, such as rural stores. It is probable that wastes would need to be within the free categories of existing schemes to avoid payment requirements.</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Territorial Authority On-Farm Collection:</strong> Territorial Authorities that provide an on-farm domestic waste collection extend this to include recyclable agricultural plastics. A separate bin would be provided for these wastes, and the volume collected would be sent to either Plasback or EnviroWaste for recycling.</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Commercial On-Farm Collection:</strong> National and regional waste collection service providers develop and/or refine on-farm waste collection services for farmers. Service providers provide a range of bins sizes (including larger wheelie bins) and also allow farmers to purchase their own bins to use in a bin swap system. Both domestic and commercial waste streams are accepted, including both non-hazardous general waste and recyclables. Soft plastics collected would be sent to Plasback or EnviroWaste for recycling.</td>
<td>Low</td>
</tr>
</tbody>
</table>
2. INTRODUCTION

2.1. PROJECT OVERVIEW AND OBJECTIVES

In 2013 Environment Canterbury commissioned a study which sought to understand the non-natural waste streams and volumes of waste being generated on farms in the Canterbury region (GHD, 2013). This work found that, on average, farms were producing nearly 10 tonnes of non-natural rural waste each year in addition to domestic waste and animal remains. The report also confirmed that burning, burial and bulk storage of waste on farms are the prevalent methods being deployed to manage waste. Investigative work undertaken in the Waikato and Bay of Plenty regions in 2014 yielded similar results.

Based on the concerns this work raised, Environment Canterbury sought and received funding from the Ministry for the Environment’s (MfE) Waste Minimisation Fund (WMF) to undertake a project to better understand the nature of waste on farms and to begin to identify alternatives to burning, burial and bulk storage of waste. This project is called the New Zealand Rural Waste Minimisation Project (NZRWMP).

In addition to funding from the Waste Minimisation Fund for the NZRWMP, Environment Canterbury has part-funded the work and additional funding has been received from:

- Waikato Regional Council
- Bay of Plenty Regional Council
- Canterbury Waste Joint Committee
- WasteMINZ Strategic Investment Fund
- Synlait Milk
- Agrecovery Foundation
- 3R Group Limited

The project is overseen by a Governance Group that is chaired by Environment Canterbury and includes representatives from:

- Waikato Regional Council (as a regional council representative)
- Ashburton District Council (as a local council representative)
- Synlait Milk
- WasteMINZ
- Fonterra
- DairyNZ

The NZRWMP has the following objectives:

1. To determine the impacts on and risks to New Zealand's natural resources (land, water and air), economy, and social and cultural wellbeing from current rural waste burning, burying and stockpiling practices.
2. To identify new waste minimisation options for rural waste management and assess the technical and economic feasibility of these.
3. To develop implementation plans with service providers for feasible waste minimisation options.
The NZRWMP comprises six milestones across three project phases, as follows:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Milestone</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 - Risk assessment</td>
<td>• Undertake risk assessment of rural waste disposed on-farm and prioritise high risk waste streams for further work.</td>
<td>Complete</td>
</tr>
</tbody>
</table>

**Project stage-gate: MfE and ECAN agreement required to proceed past this point.**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Milestone</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 - Situational analysis and options for minimising rural waste</td>
<td>• National and international review of options for increasing rural waste reduction, reuse, recycling, recovery and disposal, and a preliminary feasibility assessment of each.</td>
<td>This report</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase</th>
<th>Milestone</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3 - Explore potential waste minimisation options</td>
<td>• Informed by the strategy developed in Milestone 2, explore options for rural waste minimisation identified as feasible in Milestone 2 in more detail including financial implications, potential risks and barriers, and benefits.</td>
<td>Due 21/10/2016</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phase</th>
<th>Milestone</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4 - Detailed business cases</td>
<td>• Prepare complete and detailed business cases for each preferred option.</td>
<td>Due 3/3/2017</td>
</tr>
</tbody>
</table>

**Project stage-gate: MfE and ECAN agreement required to proceed past this point.**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Milestone</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5 - Implementation of preferred options &amp; communications strategy</td>
<td>• Select and refine preferred options for implementation and create implementation plans. • Develop communications strategy and work plan to promote improved rural waste management and minimisation. • Develop work plan, identifying selected mechanisms and tools that will be used.</td>
<td>Due 9/6/2017 (To Be Confirmed)</td>
</tr>
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<table>
<thead>
<tr>
<th>Phase</th>
<th>Milestone</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6 - Option pilot trials &amp; communications roll-out</td>
<td>• Undertake preferred option pilot trials and prepare a final report detailing pilot processes and outcomes. • Implement communications strategy and work plan. • Publish and distribute materials and tools.</td>
<td>Due 10/11/2017 (To Be Confirmed)</td>
</tr>
</tbody>
</table>

This report represents the deliverable for Phase 2, Milestone 2: Situational analysis and options for minimising rural waste, which seeks to undertake a national and international review of options for increasing rural waste reduction, reuse, recycling, recovery and disposal, and a preliminary feasibility assessment of each. This milestone has the following objectives:
• Identify key stakeholders including waste generators, transporters, processors and end users.
• Analyse existing industry and mechanisms for reducing, reusing, recycling, recovery and disposal of rural waste.
• Undertake interviews with key stakeholders to build understanding of industry activities, issues and relationships.
• Identify and explore key barriers, issues and limitations to rural waste minimisation.
• Identify and explore potential interventions and end uses for rural waste.
• Undertake preliminary technical and economic feasibility assessments.
• Develop a strategy which identifies where and how best to focus waste minimisation efforts and how to achieve this.

2.2. PHASE 1 SUMMARY

Phase 1 of the NZRWMP focused on undertaking a risk assessment of rural waste disposed of on-farm and prioritising high risk waste streams for further consideration in subsequent phases of the project. This work was undertaken by SLR Consulting and completed in September 2015.

The report for Milestone 1 of the project considered the environmental, social/health and safety, cultural and economic risks that each of the waste streams analysed presented based on how these wastes may be managed. Overall, it was concluded that burning of waste presented the highest risk, followed by burial and then bulk storage (SLR Consulting, 2015).

Specifically, the primary risks in terms of rural waste were considered to be:

• Bioaccumulation of contaminants in the ecosystem (people, animals, habitats).
• Leaching of soil accumulated contaminants into surrounding waterways (e.g. surface water runoff from burial of waste types).
• Additive effects if contaminants combine.
• Production of large volumes of waste in crop farming activities and production of large quantities of chemical waste in dairy and horticulture farming activities.
• Release of toxic gases from burning.

Based on assessed risks, the analysed non-natural rural waste streams were then ordered in terms of priority as follows (top 30 shown only):

<table>
<thead>
<tr>
<th>1.</th>
<th>Paints, solvents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Oil containers</td>
</tr>
<tr>
<td>3.</td>
<td>Used oil</td>
</tr>
<tr>
<td>4.</td>
<td>Aerosols</td>
</tr>
<tr>
<td>5.</td>
<td>Vehicle batteries</td>
</tr>
<tr>
<td>6.</td>
<td>Waste oil filters</td>
</tr>
<tr>
<td>7.</td>
<td>Agricultural sprays</td>
</tr>
<tr>
<td>8.</td>
<td>Drench/dip</td>
</tr>
<tr>
<td>9.</td>
<td>Sharps</td>
</tr>
<tr>
<td>10.</td>
<td>Netting</td>
</tr>
<tr>
<td>11.</td>
<td>Animal feed bags</td>
</tr>
<tr>
<td>12.</td>
<td>Baleage wrap</td>
</tr>
<tr>
<td>13.</td>
<td>Mulch film and crop cover</td>
</tr>
<tr>
<td>14.</td>
<td>Silage wrap</td>
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<tr>
<td>15.</td>
<td>Fertiliser bags</td>
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<tr>
<td>16.</td>
<td>Animal health plastic</td>
</tr>
<tr>
<td>17.</td>
<td>Seed bags</td>
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<tr>
<td>18.</td>
<td>Plastic (pallet wrap)</td>
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<tr>
<td>19.</td>
<td>Containers</td>
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<td>20.</td>
<td>Drums</td>
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<td>21.</td>
<td>Glass</td>
</tr>
<tr>
<td>22.</td>
<td>Greenhouse plastic sheeting</td>
</tr>
<tr>
<td>23.</td>
<td>Plastic bags</td>
</tr>
<tr>
<td>24.</td>
<td>Household batteries</td>
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<tr>
<td>25.</td>
<td>CCA treated timber</td>
</tr>
<tr>
<td>26.</td>
<td>PVC</td>
</tr>
<tr>
<td>27.</td>
<td>Untreated timber offcuts</td>
</tr>
<tr>
<td>28.</td>
<td>Plastic</td>
</tr>
<tr>
<td>29.</td>
<td>Wood-chip animal bedding</td>
</tr>
<tr>
<td>30.</td>
<td>Metal (roofing, metal, wire)</td>
</tr>
</tbody>
</table>
This prioritised list of waste was carried forward into Phase 2 of the NZRWMP to help focus and guide endeavours to minimise rural waste, although opportunities are sought which address waste streams beyond this list.

2.3. PHASE 2 INTRODUCTION AND METHODOLOGY

The overall focus for Phase 2 of the NZRWMP is to identify and/or create sustainable, feasible options that will contribute to greater levels of rural waste minimisation in New Zealand and stand as enduring alternatives to the burning, burial and bulk storage of these wastes. The scope of the project is focused on non-natural rural waste streams.

It is the absolute intention of this phase of the project to focus energy on those waste streams that present the greatest risk to the environment, as well as to the economic, cultural and social wellbeing of New Zealand. In doing so, a number of underlying emphases drive how this phase of the project will be carried out:

- The work undertaken in this phase needs to be closely connected to the ‘realities’ of farming in New Zealand. While behaviour change is sought in terms of how rural waste is currently being managed on the majority of farms in New Zealand, options that minimise cost and farmer inconvenience are preferred.
- The approach to considering alternatives to burning, burial and bulk storage of waste focuses on sustainable business models. The analysis being undertaken seeks to identify services that are economically sustainable (able to establish themselves independently and operate profitably) and technically reliable (based on systems and technologies that are proven and perform consistently).
- Particular attention is paid to existing options that can be expanded or refined in this phase, with the application of learnings from international research. It is important that existing options that contribute to rural waste minimisation are not undermined based on the work done in this phase.
- An emphasis is placed on relationships in this project, and opportunities are sought to encourage industry players to work collaboratively to improve rural waste minimisation outcomes.
- The waste hierarchy informs the environmental desirability of options: reduction of waste, reuse of waste, recycling of waste, energy recovery from waste, disposal of waste (in descending order of desirability).

Given the time and resource limitations inherent in any project of this kind, not every domestic or international service that interacts with rural waste has been identified or profiled in this report. The aim, instead, is to understand those that are preeminent in providing waste services, as well as services that present an alternative business model or a difference in some key aspect of service delivery. In some cases, one organisation or service is profiled and acts as a functional ‘stand-in’ for others of a similar type or business model. In such cases, other services of a similar nature may feature as part of the pursuit of an option with potential to contribute to improved rural waste minimisation outcomes.

Likewise, not every waste stream on the priority list detailed in Section 2.2 has been individually considered and matched with a strategy for alternative waste management. Instead, consideration of waste streams has typically fallen into the following categories:
• Hazardous wastes (wastes ranked 1 to 4 and 7 to 9 on the priority list)
• Soft plastics (wastes ranked 10 to 18, 22, 23 and 28 on the priority list)
• Hard plastics (wastes ranked 19, 20 and 26 on the priority list)
• Metal (wastes ranked 5, 6 and 30 on the priority list)
• Other wastes (wastes 21, 24, 25, 27 and 29 on the priority list)

Wastes categories are considered in this report in terms of how they can be feasibly collected and processed in accordance with the following model:

As wastes and options have been considered, this report has been structured as follows:

• **Section 3: Rural Waste Management in New Zealand.** This section provides an overview of farming in New Zealand and describes the context in which current rural waste management behaviours occur. Included in this section are:
  - Consideration of the types and extent of farming in New Zealand and the particular challenges being faced currently in the rural sector.
  - The practices currently being utilised to manage rural waste in New Zealand.
  - The barriers and challenges to pursuing alternative strategies for managing rural waste.
- The intrinsic drivers (internal motivations, such as a desire to improve the environment) and extrinsic drivers (external motivations, such as compliance requirements) for pursuing alternative strategies to manage rural waste.

- **Section 4: Alternative Domestic Options for Rural Waste Minimisation.** This section looks at the current and emerging options for rural waste collection and processing in New Zealand, as well as key contextual factors for existing options such as local regulation. The options are organised in the following categories:
  - Waste collection: On-farm collection – waste collection options where the waste is picked up by a third party directly from the farm.
  - Waste collection: Local drop-off – waste collection options where the waste is taken by the farmer to another location for disposal or recycling.
  - Waste processing: Reduction, recycling and reuse – waste processing options where waste is recycled.
  - Waste processing: Energy recovery from waste – waste processing options where waste is processed to produce fuel or some other form of energy.
  - Waste processing: Disposal of waste – waste processing options where waste is treated and disposed of or sent directly to landfill.

- **Section 5: International Options for Rural Waste Minimisation.** This section looks at key options for collection and processing of rural waste internationally and considers whether these options could work in New Zealand. This section also looks at key contextual factors – particularly the level of legislation around disposal of rural waste – that impact current options. The options are organised in the following categories:
  - Waste collection options – models in place internationally to collect rural waste.
  - Waste processing options – models in place internationally to process rural waste streams.

- **Section 6: Options for Consideration.** This section organises the information from the previous sections to present complete options for consideration as alternatives to current rural waste management practices.

- **Section 7: Preliminary Option Assessment: Technical and Economic Feasibility.** This section presents and applies the methodology for determining whether the options considered are feasible and desirable from an economic and technical perspective.

- **Section 8: Strategy and Recommendations.** This section provides conclusions as to which options should be carried forward for further analysis and how this will work.
3. RURAL WASTE MANAGEMENT IN NEW ZEALAND

3.1. FARMING AND GROWING IN NEW ZEALAND

Since its inception as a country, farming and agriculture have been synonymous with both New Zealand’s economy and the New Zealand way of life. While New Zealand has eagerly pursued technology-based industries and other ways to add value to our exports, farming has continued to dominate international exports. In the 12 months to April, 2016, agriculture and related industries represented in excess of $31 billion, or approximately 64% of New Zealand’s total exports by value (Statistics New Zealand, 2016).

Farms cover approximately 14.4 million hectares of New Zealand’s 26.8 million hectares of land (54%). The key farming sectors in terms of land use are (Statistics New Zealand, 2012):

- Dairy farming (2.4 million ha)
- Sheep and beef farming (9.3 million ha)
- Horticulture and forestry (2.3 million ha)

This section considers some of the key statistics of these three primary farming types, particularly around land use and economic value, and also provides an overview of the key non-natural waste streams each farming type typically produces.

**Dairy Farming**

The 2012 census records that New Zealand has 12,150 dairy farms, with three quarters being in the North Island and the remainder in the South Island. The greatest number of farms in terms of regional locations are in (Statistics New Zealand, 2012):

- Northland (966 farms)
- Waikato (4,149)
- Taranaki (1,677)
- Manawatu-Wanganui (915)
- Canterbury (1,155)
- Southland (939)

For the twelve months to April, 2016 New Zealand exports of milk powder, butter and cheese totalled $11.22B, representing nearly 23% of exported products by value and the most valuable product export, with the next largest attracting 40% less export revenue. This total figure is, however, down nearly 12% on the previous year (Statistics New Zealand, 2016).

One of the most well-known and challenging aspects of dairy farming in recent times has been the decline in global dairy prices in the last two years. While volumes have been relatively stable, prices have dropped dramatically, resulting in a $1.5 billion (37%) drop in the value of exported dairy products between Quarter 4, 2013 and Quarter 1, 2016 (MacPherson, 2016).
Fonterra, the seller of the majority of New Zealand’s dairy exports, has recently forecast a ‘farm-gate milk price’ for the 2016/17 dairy season at $4.25. The peak price, in the 2013/14 season, was almost twice this level at $8.40. It is estimated that, for the average New Zealand dairy farm to break even, the price needs to be $5.25 (MacPherson, 2016).

One of the clear impacts from the downturn in dairying is the reduction in the number of dairy cows. Since 2005 the number of dairy cows in New Zealand had grown steadily to a peak of a little over 6.7 million in 2014. In 2015, for the first time since 2005, the number of dairy cattle fell, to 6.5 million (MacPherson, 2016). Two-thirds of dairy farms in New Zealand are less than 200 hectares in size and only 10% are greater than 400 hectares in size. The average dairy farm is just under 200 hectares. (Statistics New Zealand, 2012).

The rural waste surveys conducted in Canterbury and the Waikato in 2013 and 2014 concluded that the key non-natural waste streams for dairy farming were:

- Plastic wrap
- Packaging
- Animal health products
- Twine
- CCA treated timber
- Tyres
- Hazardous substances
- Animal feed bags
- Fertiliser and seed bags
- Wood chips
- Filter socks (paper like filter funnels that are used in milking sheds)

**Sheep and Beef Farming**

For the year ended April, 2016 the export of meat was New Zealand’s second largest export earner, with a value of $6.6B. The majority of this revenue is earned from the sale of sheep and beef meat. Unlike a number of other farming sectors, 2015/2016 revenue is up on the previous year with a nearly 7% increase (Statistics New Zealand, 2016).
As of 2012, New Zealand had over 25,000 farms focused on sheep and/or beef farming. Of these farms 62% are in the North Island, whereas 38% are located in the South Island. Key sheep and beef farming regions include (Statistics New Zealand, 2012):

- Northland (2,229 farms)
- Waikato (3,501)
- Manawatu-Wanganui (3,171)
- Canterbury (4,131)
- Otago (2,016)
- Southland (2,022)

Half of New Zealand’s sheep and beef farms are less than 60 hectares whereas 10% are over 800 hectares (Statistics New Zealand, 2012). Between 2014 and 2015 the number of sheep being farmed in New Zealand was down 2% to 29.1M, while the number of beef cattle being farmed was down 4% to 3.5 million (MacPherson, 2016).

The rural waste surveys conducted in Canterbury and the Waikato in 2013 and 2014 concluded that the key non-natural waste streams for sheep and beef farming were:

- Plastic wrap
- Packaging
- Animal health products
- Twine
- CCA treated timber
- Tyres
- Hazardous substances
- Animal feed bags
- Fertiliser and seed bags
- Sheep dip chemical containers
- Wood chips

**Horticulture**

In the year ended April, 2016, exports of horticultural products (including forestry) earned New Zealand more than $8 billion with the key contributors being (Statistics New Zealand, 2016):

- Forestry ($3.7B, up 5% on 2015 revenue)
- Fruit ($2.4B, up 33%)
- Wine ($1.6B, up 12%)
- Vegetables ($0.4B, up 11%)

New Zealand has (based on 2012 data) a very large number of farms dedicated to horticulture spread throughout the country, with the largest number of farms in Canterbury and the Bay of Plenty. Based on the number of farms, the key sectors are (Statistics New Zealand, 2012):
• Fruit growing - excluding grapes (5,073 farms)
• Forestry (4,461)
• Grape growing (1,506)
• Vegetable growing (1,161)

The rural waste surveys conducted in Canterbury and the Waikato in 2013 and 2014 concluded that the key non-natural waste streams for horticulture were:

• Untreated timber offcuts
• Seed bags
• Pesticides and herbicides
• CCA treated timber
• Vehicle batteries
• Hazardous substances
• Building waste
• Metal
3.2. RURAL WASTE REGULATORY FRAMEWORK OVERVIEW

There are a number of key statutes and regulations that determine how rural waste must be handled in New Zealand. Some of these are centrally determined, whereas others are devolved to give authority to local councils.

Included in the regulatory framework for waste is the New Zealand Waste Strategy which was released in 2010 and has the dual goals of (Ministry for the Environment, 2010):

- Reducing the harmful effects of waste
- Improving the efficiency of resource use

The Waste Strategy is implemented through a range of legislation including:

- Waste Minimisation Act 2008
- Hazardous Substances and New Organisms Act 1996

These Acts, as well as a number of other legislative instruments that impact rural waste, are considered in the following section.

Waste Minimisation Act 2008

The purpose of the Waste Minimisation Act 2008 (WMA) was to “encourage waste minimisation and a decrease in waste disposal in order to:

- protect the environment from harm; and
- provide environmental, social, economic, and cultural benefits.”

The WMA has two main provisions that interface with rural waste: the waste levy and product stewardship.

The intention behind the waste levy was both to “reflect the extraneous costs disposal imposes on the environment, society, and the economy” and “to raise revenue for promoting and achieving waste minimisation” (Hinchey, 2013). Half of this fund goes to councils to pursue waste minimisation and the other half goes to the Ministry for the Environment’s Waste Minimisation Fund, from which this project has been part-funded.

The levy, which is currently $10 + GST per tonne, is levied on all “disposal facilities” and is paid by the facility to the government. About $25 million is raised each year. The levy is reviewed every three years, with the last review being undertaken in 2014. At this review it was noted that:

“The levy has increased the cost of waste disposal to disposal facilities. However, as much as 70 per cent of waste being disposed of to land is estimated to be at facilities that fall outside of the definition of disposal facility, and are not subject to levy obligations. Therefore, the cost of disposal has likely not increased for the majority of waste, and many waste generators are receiving no direct incentive from the levy to minimise waste” (Ministry for the Environment, 2014).
The review recommended that the Ministry for the Environment look to make more disposal sites subject to the waste levy, but did not raise the levy amount. The next review will take place in 2017.

The WMA also created provision for product stewardship schemes in New Zealand. The purpose of this element of the WMA is “to encourage (and, in certain circumstances, require) the people and organisations involved in the life of a product to share responsibility for:

- ensuring there is effective reduction, reuse, recycling, or recovery of the product; and
- managing any environmental harm arising from the product when it becomes waste.”

The WMA includes the ability for the Environment Minister to declare priority products that must come under a compulsory product stewardship scheme, but there are, as yet, no such mandatory schemes. The current accredited voluntary product stewardship schemes are (Ministry for the Environment, 2016):

- Agrecovery rural recycling programme (*agrichemicals and containers*)
- Plasback (*agricultural plastics*)
- Recovering of oil saves the environment (ROSE NZ) (*waste oil*)
- Resene PaintWise (*waste point*)
- Envirocon product stewardship (*concrete*)
- Fonterra milk for schools recycling programme (*milk containers*)
- Fuji Xerox zero landfill scheme (*Fuji Xerox equipment and consumables*)
- Interface ReEntry programme (*carpet tiles*)
- Kimberly Clark NZ’s envirocomp product stewardship scheme for sanitary hygiene products
- Public place recycling scheme (*plastic, paper, aluminium and glass containers*)
- Refrigerant recovery scheme
- RE:MOBILE (*mobile phones and accessories*)
- The glass packaging forum (*glass containers*)

While the WMA does not directly influence farmer behaviour in terms of waste management, it does impact both the cost of disposing of waste at a landfill and, potentially, the nature of services that recycle rural waste. The WMA also guides territorial authority activity, which may influence how rural waste is managed, specifically:

- Councils must have a Waste Management and Minimisation Plan (WMMP) which determines how waste is to be managed in the district, including “collection, recovery, recycling, treatment, and disposal services”.
- Councils may make waste bylaws consistent with their WMMPs.

In the recent territorial authority survey undertaken as part of this project, many of the councils that participated noted that their WMMPs were the primary strategy to address rural waste in their communities.
Regional Council Regulation

New Zealand regional councils have the responsibility for “managing the effects of using freshwater, land, air and coastal waters, by developing regional policy statements and the issuing of consents” (localcouncils.govt.nz, 2016). Practically this means that these councils have the power to determine what can be burned, buried or bulk stored (based on the potential for leachate) in each region.

Each of New Zealand’s 16 regional councils allows the burning of vegetation on one’s own property in rural areas. Likewise, each of these councils prohibit the burning of tyres, treated timber and hazardous wastes.

Beyond this, regional variations apply to rural properties:

- All regions except Auckland allow paper, cardboard and untreated timber to be burned.
- Waikato, Manawatu-Wanganui, Wellington and West Coast regions allow the burning of ‘halogen-free plastics’ including HDPE (netting and chemical drums), LDPE (silage wrap and silage covers) and PP (fertiliser bags). Other regions do not allow any plastics to be burned.

Although substantial fines are typically attached to the breaching of rules relating to burning waste, anecdotal evidence suggests that these rules are difficult to monitor and enforce in practice. The often isolated locations of rural properties make such enforcement a very difficult challenge for regional councils and it is probable – based on the degree to which alternative methods of disposing waste are utilised - that many farmers are breaching these rules.

Farm pits are also widely regulated, with rules typically requiring that such pits are a certain distance from water sources and property boundaries. Most regions also prohibit the use of farm pits for hazardous wastes such as agrichemicals, batteries, used oil, or treated timber.


The Hazardous Substances and New Organisms Act 1996 (HSNOA) “manages the risks that hazardous substances and new organisms pose to the health and safety of people and communities and the New Zealand environment...and pulls together the management of hazardous substances and new organisms into one comprehensive Act” (Ministry for the Environment, 2001).

The HSNOA applies broadly to manufacturers, importers, handlers and users of hazardous substances, a term which encompasses any substance that has one or more of the following characteristics (Ministry for the Environment, 2001):

- Explosiveness
- Flammability
- The ability to oxidise (accelerate a fire)
- Human toxicity (acute or chronic)
- Corrosiveness (to human tissue or metal)
- Ecotoxicity (with or without bioaccumulation)
- The capacity, on contact with air or water, to develop one or more of these characteristics.
The prioritised waste streams determined in Phase 1 of this project include the following that would be considered hazardous under this criteria:

- Paints and solvents
- Oil containers
- Used oil
- Aerosols
- Vehicle batteries
- Waste oil filters
- Agricultural sprays
- Drench/dip
- Sharps

The HSNOA requires that hazardous substances must be approved by the Environmental Protection Authority, which will then place controls on the use of those substances relating to such aspects as packaging, labelling, handling, identification, tracking and disposal.

In terms of disposal, the HSNOA requires that most hazardous substances must be processed through one of the following three outlets (Environmental Protection Authority, 2012):

- “Treating the substance so that it is no longer a hazardous substance, including depositing the substance in a landfill, incinerator or sewage facility if that facility will render the substance non-hazardous”.
- “Discharging the substance to the environment provided that, after reasonable mixing, the concentration of the substance in any part of the environment outside the mixing zone does not exceed any [safe environmental limit]”.
- “Exporting the substance from New Zealand as a hazardous waste”.

The Land Transport Rule: Dangerous Goods 2005 sets requirements for the safe transportation, on land, of dangerous goods in New Zealand and impacts importers, manufacturers and all those that are involved in transportation (NZ Transport Agency, 2005). The rule includes requirements for dangerous goods relating to:

- Packing, identification and documentation.
- Separation of incompatible items.
- Transportation – including training and responsibilities for those involved in transportation.

The combined impact of the HSNOA and the Dangerous Goods Rule is that the requirements for managing the top nine priority rural waste streams under this project are very stringent, impacting both the degree of care required and the costs involved.

**Health and Safety at Work Act 2015**

The Health and Safety at Work Act 2015 (HSWA), which came into force in April, 2016, introduces the goal of “reducing New Zealand’s workplace injury and death toll by 25 percent by 2020”.

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Building on New Zealand’s existing health and safety legislation by broadening the scope of responsibilities in terms of health and safety in the workplace, the HSWA introduced the following key changes (Ministry of Business, Innovation and Employment, 2016):

- “It reinforces proportionality – what a business needs to do depends on its level of risk and what it can control
- It shifts from hazard spotting to managing critical risks – actions that reduce workplace harm rather than trivial hazards
- It introduces the “reasonably practicable” concept – focusing attention on what’s reasonable for a business to do
- It changes the focus from the physical workplace to the conduct of work – what the business actually does and so what it can control”

While the HSWA does not fundamentally change the nature of health and safety requirements in the workplace, employers must now undertake all steps that are deemed “reasonably practicable” to prevent harm. Liability in the case of an accident now may spread far more widely, including to companies’ directors and officers who have a new due diligence obligation. This is enforced by stronger penalties for non-compliance, including (New Zealand Law Society, 2014):

- For “Reckless Conduct” (where someone has a duty and exposes any person to whom the duty is owed to risk of death or serious injury/illness and is reckless as to that risk) – fines up to $3 million (or $600,000 and/or up to five years’ imprisonment for individuals).
- For “Failure to comply with a Duty” (with exposure to risk of death or serious injury/illness) – fines up to $1.5 million (or $300,000 for individuals).
- For “Failure to comply with a Duty” (no exposure to death or serious injury/illness) – fines up to $500,000 (or $100,000 for individuals).

The impact of this legislation is that smaller organisations may struggle to come to terms with their obligations under the HSWA, and would potentially be unable to survive a prosecution. The HSWA may also discourage existing and potential service providers from dealing with certain rural wastes, particularly hazardous substances.
3.3. BARRIERS TO ALTERNATIVE RURAL WASTE MANAGEMENT METHODS

In Milestone 1 of this project it was concluded, with support from earlier survey data, that burning, burial and bulk storage of waste were the prevailing methods of disposal used by farmers in New Zealand in relation to commercial, non-natural rural waste streams.

In April, 2016 a survey was prepared for farmers to gauge their current practices and openness to change in terms of rural waste, to further validate the conclusions drawn in Milestone 1. The survey link was issued through key farming-focused organisations and 645 responses were collected. A copy of the survey questions is contained in Appendix 1 and the survey results are discussed in more detail in Section 3.4.1.

Relevant here is the question addressed to farmers that asked: “what methods do you use to dispose of waste on your farm”? 80% of farmers answered that they utilised “burning, burying and/or storage on-farm”.

While a substantial number of farmers indicated using some form of alternative disposal method also, it is clear that traditional practices are still dominant on New Zealand farms. The survey indicated that there is a high desire to pursue recycling (see Section 3.4.1), and considerable activity in this space, but it is clear from the survey results that there are still a number of barriers to farmers fully embracing alternative means of waste disposal on their farms.

It is not necessarily straightforward to determine what these barriers are, however, and it is likely that there are a number that are working in parallel to reinforce existing waste management behaviours on rural properties.

A 2001 UK Environment Agency report aimed at formulating a strategy to address rural waste also worked to understand the barriers to alternative disposal methods. This research found four key barriers (Okuniewski, 2001):

1. **Low farmer awareness and motivation**: raising farmer awareness was considered to be a particularly challenging task, but one that is essential to overcome for alternatives to achieve any momentum. Negative downturns in the agricultural sector are viewed as making this particularly difficult.

2. **Limited cost-effective techniques for on-farm waste recovery**: few technologies exist that can productively utilise rural waste without incurring transportation costs.

3. **High logistics costs for off-farm recovery/disposal**: the distances between farms and high volume to weight ratio of many rural waste streams, combined with the propensity for these waste streams to be contaminated, are seen as key factors in transportation costs being often unacceptably high.

4. **Poor markets, high reprocessing costs, and limited facilities**: the lack of reprocessing facilities, the volatility of recyclables markets and the costs often associated with contaminated waste streams tend to diminish the viability of alternatives to current farm waste practices.

Likewise a 2003 Cornell University report on recycling agricultural plastics found the primary barriers to doing so to be (Levitan & Barros, 2003):

- **Unstable markets**: buyers for and suppliers of products for recycling tend to be uneven in terms of supply and demand, and products for recycling are often of poor quality and in small quantities.
• **Dispersed sources**: sources of agricultural wastes for recycling tend to be spread over a wide geographical area.

• **Dirty materials**: contamination of waste tends to be high, negatively impacting the economics of recycling.

• **Lack of incentives**: the costs for recycling or reusing waste tend to be much higher than the costs of burning or burying waste and there has historically been low or no regulation or subsidies to encourage farmers to consider other alternatives.

In November, 2015 the Far North District Council issued a draft solid waste bylaw which included provisions that suggested farmers would be unable to burn or bury domestic or farm waste on their properties. While it now appears that these provisions may be removed from the final bylaw, the public submissions made give a sense of how some farmers feel about having to rely on alternative means for disposing of waste.

Feedback from submissions included the following (Miller, 2016):

• Several submitters commented that there weren’t any solutions put forward as alternatives, and no options exist for materials such as silage wrap (even though Plasback is available in the region). A number of submitters noted that the creation of more recycling options should be the council’s focus.

• Rural advocacy group Farmers of New Zealand said that, given the economic conditions faced by farmers, increased costs should not be incurred by farmers or ratepayers for “uncalculated or ideological benefit” and the council should instead focus on non-regulatory strategies to pursue waste minimisation.

• Federated Farmers submitted that “rural residents face disproportionate costs and barriers to disposing of solid waste and recycling and believe that it is impractical and inequitable to impose stricter solid waste rules on [them]”. Like Farmers of New Zealand, Federated Farmers advocated for the development of alternative services and a non-regulatory approach, rather than a new bylaw.

• Several submitters noted the cost and time involved in having to move waste off farms.

• Several submitters said that education rather than compliance should be the council’s focus in terms of rural waste.

• One submitter asked that the council allow waste to be accumulated on farms to be burned “at the right times of year”.

• One submitter suggested rural stores be lobbied to receive rural waste.

These submissions indicate that farmers are resistant to limitations on burning or burial of waste based on the lack of alternative services, and the costs and distances involved in utilising alternative services. It is also apparent that, while farmers profess to support waste minimisation, their preferred approach to addressing this on farms is through more cost effective service development and education, rather than through regulation.

Based on the information collated in this project to date, it is apparent that there are several key barriers to the successful and sustainable operation of alternative models for disposing of rural waste:
Costs

The cost of recycling or removing waste from a farm is, in almost all instances, going to be higher in direct terms than burning, burying or storing waste. Lighting a fire, digging a pit or finding room for waste in a shed have become the incumbent options for rural waste disposal, at least in part, because they do not involve any direct cash outlay.

Whatever alternative is pursued will involve costs to a farmer that they would not have otherwise incurred. The farmer survey clearly demonstrates that cost is a barrier for farmers and that, where an alternative waste disposal strategy is considered the amount that a farmer is willing to pay is well below the costs of available services.

Alternative services tend to be more expensive than equivalent services available in metropolitan areas because the distances that must be travelled to collect the waste are often substantial and the number of properties that can be visited on a single run is often low. This factor – route density – is a key concept that acts as barrier to cost-effective service delivery.

The participant comments given in the farmer survey demonstrated clearly that many farmers consider that, as ratepayers, their waste should be collected or at least managed by the local council without additional costs being incurred. This perception – which contrasts with that expressed by a number of councils that non-domestic farm waste is ‘commercial’ and outside the council’s remit – obviously makes farmers reluctant to pay ‘additional’ costs for waste disposal.

Comments made by farmers in the farmer survey also illustrate the harsh economic realities that many farmers are currently facing in New Zealand. As noted in Section 3.1, the Fonterra ‘farm-gate milk price’ forecast for the 2016/17 dairy season is $4.25 whereas the likely break-even price for dairy farmers is around $5.25. Pricing volatility also greatly impacts other farming sectors.

In such uncertain times farmers will act to limit expenditure, and a number of the service providers interviewed for this project see a direct correlation between dairy price slumps and reduced patronage of their services. In such times, burning, burying and bulk storage of waste are evidently seen as ‘cost-free’ fall-back positions for managing waste on farms.

Inconvenience

While lighting a fire, digging a pit or carrying waste to a storage shed do require effort, they will often be far more convenient than sorting waste for pick-up or transporting waste to a secondary location to drop-off.

The farmer survey showed, unsurprisingly, a preference for services that involve the collection of waste from farms as opposed to services that involve the farmer taking waste to another location themselves. Because of the costs involved in an on-farm collection, most alternative services have tended to focus on recyclables being taken somewhere by the farmer. This requirement clearly acts as a barrier to the uptake of the service.
Lack of Incentives

The barriers around cost and convenience come into sharper relief when the lack of legislative drivers or other incentives are considered. While farmer use of the ‘3Bs’ is somewhat restricted by New Zealand’s waste legislation framework, these activities are not disallowed in most of New Zealand, and there are suggestions that burning still takes place in locations and with waste streams that are unlawful, because of a low perceived risk of prosecution.

Section 3.4 considers the extrinsic and intrinsic drivers that are in place for farmers to consider alternative methods of waste disposal but these are, for the most part, drivers that are optional or voluntary in nature and there is little to compel farmers to manage waste in new ways.

When pursuing new methods for waste disposal means inconvenience and/or additional cost, the lack of some force to compel farmers to act is a key barrier to uptake of these methods.

Lack of Awareness

A number of the comments made in the farmer survey, and in other public forums related to rural waste, clearly demonstrate that the level of awareness of the full offering of alternative rural waste services is low. While some services such as Plasback and Agrecovery have a reasonable level of market recognition, few services beyond these two are widely known.

The level of uptake of ‘second-tier’ rural waste services is particularly low. When asked if they had used the following recycling services:

- Only 1.8% of farmers had used the PaintWise paint recycling service
- Only 1.4% had used the Dulux Paint Take-back service
- Only 0.8% has used the ROSE Oil recycling service

While there are likely other factors that impact this level of uptake, notably service location and convenience, it is apparent that most recycling services for rural waste are not well known.

Lack of Economic Viability

There are a number of factors that challenge the economic viability of services that aim to divert waste from farm pits, farm bonfires and farm storage sheds, including:

- **Supply chain participants:** for a business model to work there must be willing, motivated and committed participants at all stages of the supply chain, including those ‘fronting the service’ and those providing transportation logistics and processing technologies.
- **Customer demand:** entities that aim to service rural communities – particularly those that involve an on-farm collection – require a critical mass of customers in a given locale to cover costs and ensure the service is profitable. Where demand is weak or unpredictable it is very difficult for services to establish themselves and meet the expectations of customers they have engaged.
• **Waste contamination levels**: the nature of rural waste lends it to being contaminated with organic matter or other waste streams. This then requires that whatever process the waste is to be put through can effectively manage the levels of contamination. Processes that would otherwise work reliably and cost-effectively can be rendered non-viable because of contamination, whether avoidable or unavoidable.

• **Inconsistency and unreliability of volume**: when a waste processing service enters the market it must typically do so on the basis that it has secured domestic or international markets for whatever it will output the waste as. Should the volumes that the service can attract from farmers not prove adequate, or should supply be seasonally inconsistent, the service can lose their output market customers and end up with waste that they have no economic use for.

• **Unreliability of novel technologies**: a number of innovative technologies that have been seen as potential ‘silver bullets’ for processing difficult waste streams have failed at some point in the process of commercialisation. These technologies often work successfully at ‘bench’ or prototype scale, but cannot deliver reliably when faced with large volumes of waste, especially when these waste streams are not uniform.

• **Increasing compliance requirements**: larger corporates that provide waste services typically have the resources to implement a full suite of policies, procedures and monitoring to ensure compliance with all relevant regulation. Smaller, community-based organisations that seek to provide alternative rural waste services may struggle to do all that is asked of them from a compliance perspective or may simply be unable to operate lawfully because of these requirements.

• **Inadequate business model or lack of capital**: as with any business venture, a lack of capital or a poorly conceived business model can sink the most noble of commercial endeavours. The level of uncertainty in providing waste services to rural communities and finding markets for processed or recycled waste only heightens the importance of these factors.

• **Volatility of output markets for processed waste**: finding reliable and sustainable markets for waste recycling outputs is key for any service that operates in this space. Finding consistent domestic markets that are able to take large volumes of recyclables is very challenging, so many waste recyclers look to international markets for their products. Foreign exchange fluctuations and changes in commodity prices can negatively impact these services with great speed and little advance warning.

A particular barrier in terms of output market volatility in recent years has been the restrictions placed on the export of recyclable waste by the Chinese ‘Green Fence’ policy.

In 2011 the Chinese government passed regulations that stated: “in the process of importing solid waste, measures shall be taken to prevent [imports] from spread[ing] seepage and leakage or other measures to prevent pollution of [the] environment.” (Flower, 2016). The regulations were implemented in early 2013 as a way of reducing the level of contaminated waste and recycling being imported into China.

Once the policy took effect, as many as 70% of incoming containers were inspected to ensure that waste materials had less than 1.5% contamination. Prior to the policy, typical contamination rates were between 3% and 10% (Rooney, 2014). While 22,000 containers were rejected in the first year of the policy, this actually only represented 0.04% of incoming shipments, as waste exporters around the world understood China was very serious about the policy (Flower, 2016).
The Chinese policy had been implemented as recyclables had become one of the largest imports in China, but the level of contamination had steadily increased to the point that, when the policy was implemented, China had evidently grown tired of dealing with poor quality recyclables.

The almost immediate impacts of the policy were (Flexman, 2013):

- There were major holdups at Chinese ports as inspection regimes were ramped up.
- Many shipments were stopped at Chinese borders and containers were instructed to be returned.
- China became a riskier destination for traders and sellers.
- Chinese import volumes dropped, and so did prices, as supply exceeded demand.
- The quality of imported recyclables improved.
- For New Zealand exporters, sale of plastics in particular became more difficult.

Immediately after the policy took effect, Far North District Council informed local residents that they could no longer recycle a range of plastics that had previously been exported to China. This policy equated to a one-third reduction of the council’s plastic recycling volume (Far North District Council, 2013). A number of councils around the country made similar moves.

Since the implementation of the policy it is apparent that most New Zealand waste recyclers exporting to China have adjusted their systems to accommodate the contamination limits. It is probable, however, that these contamination restrictions limit the condition of waste that can be received. The changes have also, in all likelihood, added costs as a result of more contaminated waste being sent to landfill or additional steps being added to processes to manage contamination before exporting.

These issues are clearly not insurmountable, but the need to avoid contamination, particularly in soft agricultural plastics, simply makes recycling a little more difficult and makes burning or burial of these wastes a little more attractive to farmers.

The barriers considered in this section are carried forward to form part of the assessment methodology for potential options for alternative rural waste management. Options need to be able to overcome these barriers in order to be successful and sustainable.
3.4. DRIVERS FOR ALTERNATIVE RURAL WASTE MANAGEMENT METHODS

While the previous section considered the barriers to the take-up of alternative rural waste management methods, this section looks at the drivers that act on farmers to encourage the pursuit of alternatives to burning, burying and bulk storage of waste. Understanding these drivers is a key step in determining what services might work successfully as alternatives.

Two key types of driver are considered:

- **Intrinsic drivers**: Intrinsic drivers are those internal motivations that encourage farmers to pursue alternatives, such as a desire to protect the environment.

- **Extrinsic drivers**: Extrinsic drivers are those external forces that encourage farmers to pursue alternatives, such as farming assurance programmes.

Both of these types of drivers are profiled in the following sections.

3.4.1. Intrinsic Drivers

While it is impossible to determine what all farmers think and feel, the farmer survey undertaken earlier this year as part of this project has sought to better understand what is ‘going on in farmer’s heads’ that might encourage them to reconsider burning, burial and bulk storage as the dominant methods of managing rural waste.

The survey garnered responses from most rural areas around New Zealand and from a reasonable spread of farm types as illustrated below:

![Figure 3: Farmer Survey Results - What type of farm do you operate?](image)

The ‘other’ category, which was indicated on nearly 15% of responses (more than one farm type was often indicated) included farm types such as beekeeping, dairy goats, horse farming, pork and forestry.
Farmers were asked about the methods currently employed to dispose of farm waste. The key responses were:

- Burning, burying or bulk storage of waste (80% of respondents).
- Recycling delivered to a recycling facility/transfer station (65%).
- Recycling collected on farm (36%).
- Waste delivered to local tip/dropped off (36%).
- Waste collected on farm (32%).

These results are surprising in that such a large proportion of respondents are pursuing alternative methods of managing farm waste. 1 in 3 respondents have an on-farm collection for waste and/or recycling, while 2 out of 3 drop recycling off in town and 1 in 3 drop off general waste. This indicates that farmers are concerned about the impact their waste is having and are willing to act on this concern. Despite this, it is clear that burning, burial and bulk storage of waste are still predominant waste management strategies, and certainly a ‘fall-back’ position when alternatives are not present or do not work as expected, in line with earlier research undertaken in this project.

Farmers were asked which recycling services they currently use. The key responses were:

- Council transfer station / recycling drop off (64% of respondents).
- Agrecovery (43%).
- Plasback (20%).
- None of the services listed (17%).

The comments fields associated with the question frequently mentioned the absence of collection available to the farmer based on location. A number of respondents raised concern as to the reliability of collection for Agrecovery and Plasback.

Focusing on intrinsic drivers, farmers were asked what motivates them to recycle farm waste. The responses from this question were particularly surprising:

![Figure 4: Farmer Survey Results - What motivates you to recycle farm waste?](image)
A clear majority of respondents are ‘somewhat motivated’ or ‘highly motivated’ to recycle, with a surprisingly low number reporting they are unmotivated to pursue recycling. Based on weighted averages the responses are very evenly distributed across these motivation factors, with ‘to avoid spoiling my land’ slightly higher than the others.

Farmers were asked how likely is was that they would use a range of waste services. The responses were as follows:

It is clear from these results that respondents had a preference for on-farm collection of waste or return of waste streams to the place of purchase, whereas the services used currently tend to be drop-off of waste at local facilities.

It is interesting to note that, where on-farm waste collection is considered, the preference is for multiple bins – requiring on-site separation of waste – rather than for a single bin to receive all waste. This is likely to connect to a motivation to see waste being recycled rather than simply landfilled off-site. Despite the positive response to this question, farmers make it clear in associated comments that their likelihood to use any such services is very much dependant on cost.
Farmers were asked how much they would be prepared to pay for the waste services from the previous question. The responses were as follows:

While it is clear that the willingness among farmers to pay for most proposed services is low, the survey has shown that for on-farm waste collection approximately two-thirds of respondents indicated they would be willing to pay up to $500 for waste collection, with roughly one-quarter indicating a willingness to pay more than $500 a year. It is also apparent that there is little willingness to pay for recycling.

Comparing these results against the previous question it is apparent – and somewhat expected – that farmers will incur some inconvenience (in transporting waste themselves) or cost (in paying for a waste collection) but not both.

Overall, it appears that the level of motivation among farmers to pursue options for rural waste beyond burning, burial and bulk storage is high, but tempered by the cost of alternatives. There is much anecdotal evidence that suggests farmers are increasingly concerned about the impact of these waste disposal methods on their farms and the wider environment, and the survey results confirm this. However, there is a clear reluctance to pay commercial rates for waste collection.

A significant number of farmers are prepared to pay up to $500 for annual on-farm waste collection, with larger farms prepared to pay up to $1000 and a small proportion over $1000. This may indicate a need for a differential service which allows small waste producers to have waste collected occasionally, while larger farms are serviced more frequently.

It is obvious that cost is a major factor for farmers and it may be that the recent downturn in dairy prices, given that more than 50% of respondents have an involvement in dairy farming, is a significant factor in this. But there is also an apparent belief among many farmers that the rates they pay to their local council should cover waste collection. While this question was not asked specifically, 50 out of 124 comments left in relation to paying for services (40%) expressed that these services are or should be covered by rates already paid.

**Figure 6: Farmer Survey Results - How much would you be prepared to pay annually to use the following services?**
3.4.2. Extrinsic Drivers

This section includes profiles of a number of organisations and programmes that interface with farmers and provide some level of external incentive to consider how waste is managed on farms, as well as a general comment on how market forces may produce an increase in the presence of such programmes in the future.

Each of the organisations profiled in this section was provided with the opportunity to check and correct any inaccuracies in the information shown below.

Dairy New Zealand

DairyNZ is the New Zealand dairy farmers’ industry association and exists to “support on-farm change, create on-farm opportunities, build capability and mitigate risk to achieve the industry’s strategic objectives through research and development, engagement and leadership” (DairyNZ, 2015). DairyNZ represents all 7,812 dairy farm owner-operator farmers, who collectively produce 1.8 billion kg of milk solids.

Among the objectives in its ‘Strategy for Sustainable Dairy Farming 2013 – 2020’ DairyNZ has two relating to environmental factors (DairyNZ, 2015):

- The dairy industry fulfils all commitments listed in the Sustainable Dairying: Water Accord (currently 6 out of 10 targets achieved).
- 80% of New Zealanders agree dairy farmers are good stewards of the environment by 2020 (currently 36%).

DairyNZ Senior Developer for Sustainability Matt Highway says that currently the extent of DairyNZ’s focus on farm waste is minimal. Funding has been received from the Ministry for Primary Industries to prepare a number of resources including an advisory document for farmers on waste management, but that this document is “fairly rudimentary”.

DairyNZ Senior Developer for Sustainability Matt Highway says that DairyNZ has recently developed resources that promote good waste management practices. Highway says:

“At this stage it is recognised that while waste minimisation is an important issue, due to regional differences and the current lack of national solutions and processes in place for farmers the waste management guide is generic to be relevant to farmers from across New Zealand”.

DairyNZ also provides voluntary Sustainable Milk Plans on a regional basis to assist dairy farmers to adopt environmentally sustainable farming practices. These plans touch on waste management and recommend both recycling waste where possible, and removing waste from farms where feasible (DairyNZ, 2016). Highway says “several hundreds” of farmers have progressed through this programme.

Another mechanism to influence farmer behaviour in place through DairyNZ is the Sustainable Dairying: Water Accord (SDWA). The overall purpose of the SDWA is to “enhance the overall performance of dairy farming as it affects freshwater by committing to good management practices expected of all dairy farmers in New Zealand; and recording pledges by the dairy sector, with the support of others, to assist and
encourage dairy farmers to adopt those good management practices and to monitor and report progress” (DairyNZ, 2016).

The SDWA has a range of commitments and targets for farm management and has been committed to by a range of organisations including:

- Fonterra
- Open Country
- Miraka
- Synlait
- Tatura
- Oceania Dairy

The SDWA is also supported by a range of fertiliser companies, regional councils and government departments. While the SDWA is a voluntary agreement, the dairy industry evidently takes these commitments seriously. The SDWA is, therefore, potentially a powerful mechanism.

Currently, says Highway, the SDWA does not include any requirements on waste. There is a review period every five years undertaken by the Dairy Environment Leadership Group (DELG). While the current focus is on fresh water, there may be a potential for other environmental aspects to be added by DELG.

The contents of the SDWA are currently being reviewed and will be updated as required in June, 2017, and this may present an opportunity to consider whether waste requirements could be included. The challenge in this is that the nature of the requirements is universal in that all those who come under the SDWA need to follow its contents as instructed. This fact would mean that any waste requirements – such as utilising a particular service or practice – can be implemented throughout the country and on all farms. Careful wording could potentially overcome any difficulties, but it is likely any waste requirements suggested as additions to the SDWA would need to be very carefully considered and crafted to avoid strong opposition from SDWA partners.

**Fonterra**

Fonterra is the world’s largest exporter of dairy products with a 2013/2014 revenue of $22.3 billion and volume of nearly 4 million tonnes (Fonterra, 2014). Fonterra is owned by 10,500 farmer-shareholders (Fonterra, 2016).

Fonterra operates a farm assurance programme but it does not include any requirements on waste. Waste does appear to be of concern to Fonterra, but the focus for environmental concern appears to be on water quality.

Fonterra is, however, a trustee of AgRecovery and promotes this service, as well as Plasback, internally. Fonterra has also expressed a willingness to assist this project by asking their supplier’s questions relating to waste management as part of their annual ‘On Farm Change’ programme. Fonterra has recently launched a pilot project (see Section 6.14) to encourage farmers to safely collect sharps.
Synlait Milk

Canterbury-based Synlait was founded in 2000, has been operating as a dairy processing company since 2008 and listed on the New Zealand stock exchange in 2013. Synlait currently has 201 suppliers for its range of products, which include milk powders and infant formulas.

Synlait recently announced their expectation that 2015/2016 sales volume will be approximately 122,500 tonnes, up on 2014/2015’s 97,800 tonnes (Walraven, 2015).

As part of its commitment to sustainability, Synlait launched a best practice dairy farming certification programme titled ‘Lead With Pride™’ in early 2014. All Synlait farmers meet the Gold level of Lead With Pride™ certification as a condition of milk supply, but suppliers may elect to certify as Gold Plus or Gold Elite by auditing against higher standards across the four pillars of:

- Environment
- Animal health and welfare
- Milk quality
- Social responsibility

Gold Plus certification is achieved by meeting a set of requirements in line with the four pillars of the programme. Once this status has been maintained for a period of twelve months suppliers may elect to progress to Gold Elite status by certifying against a more stringent set of requirements. At each stage an independent audit is undertaken by contracted auditors AsureQuality, at no cost to the farmer. This takes about a day and is conducted by two auditors (Synlait, 2016).

In terms of waste, the Gold Plus standard requires that “any farm pit and waste disposal systems must meet requirements, including the use of recycling for silage wrap…” (Synlait, 2016). There are also strict requirements in place for handling and disposal of chemicals. No additional waste requirements are added to the Gold Elite status specification.

It should be noted, however, that while the programme has these requirements, non-conformances are awarded penalty points which are deducted from a possible 100 points for each of the four pillars. Provided suppliers do not end up with less than 70 points for each pillar, they can achieve or retain certification. In most instances a substantial failure in waste management would be considered a ‘major’ non-conformance and would receive 10 penalty points (Synlait, 2016).

Synlait Lead With Pride™ Manager Mark Wren says that, in practice, suppliers need to show that they are doing all they reasonably can to recycle waste when a service is available, particularly around silage wrap and chemicals. A farm pit is not prohibited, but it must be managed properly and not used to dispose of waste that can be practically recycled. Burning silage wrap, says Wren, would be considered a critical non-conformance and attract a 20-point penalty.

As new recycling services become available, the programme can adapt and include these in the more detailed Standard Operating Procedures available to suppliers to guide practice. Synlait and supplier representatives meet twice a year to review the programme and ensure it stays up to date in this way. Wren says Synlait is definitely open to asking more of farmers in terms of waste management if affordable and reliable waste recycling services are available.
The direct benefit to suppliers of achieving the higher levels of certification are financial: Gold Plus members can achieve up to an additional $0.06 per kg of milk solids above the final milk price, and Gold Elite can achieve up to $0.12 per kg of milk solids above the final milk price. This could potentially be a significant - and welcome - financial boost for farmers, particularly when dairy prices are relatively low.

As of 7 June, 2016 Synlait’s forecast milk price for the 2015/2016 season $3.90 per kg of milk solids (Synlait, 2016).

An average dairy farm in New Zealand, as at 2014, produces 1,063kg of milk solids per hectare and is 144 hectares in size (DairyNZ, 2014). This gives an average milk solids total of slightly over 153,000kg per farm. However, Wren notes that Canterbury farms tend to be larger and Synlait’s supplier average is more like 300,000kg of milk solids per farm per year.

Under Synlait’s Lead With Pride™ scheme, suppliers could expect the following pay-out based on this average estimate:

- Gold $1,260,000
- Gold Plus $1,278,000 ($18,000 more than Gold)
- Gold Elite $1,296,000 ($36,000 more than Gold, $18,000 more than Gold Plus)

Currently, says Wren, 26 out of Synlait’s 201 suppliers (13%) are certified under Lead With Pride™, and about another 30 (15%) are actively working towards certification. Synlait aims to have a total of 50 suppliers (25%) certified by the end of 2016.

Wren says that while there is an almost universal interest in achieving this certification among Synlait’s suppliers “it tends to be set aside when other priorities appear on the farm”. Wren says it is time, rather than the cost of meeting the certification, that is a barrier to suppliers.

Ideally, says Wren, Synlait wants – and tends to get – suppliers that value the kind of high-quality farming practice that Lead With Pride™ aims to encourage. In this way the programme is acting more to recognise those farming well, rather than forcing compliance on those that simply want a higher pay-out.

**Miraka**

Miraka is a small, 80% iwi-owned milk processor based in Taupo. It has 105 farmer-suppliers, all of whom are based within 85km of its milk processing facility. Miraka prides itself on being driven by its values, one of which is kaitiakitanga or sustainability, meaning “we will nurture our natural resources and people for a prosperous future” (Miraka, 2016)

General Manager Milk Supply Grant Jackson explains that a key expression of this value is the new Farm Excellence Programme that Miraka has developed. This programme is based on five ‘pillars’, one of which is the environment. In terms of waste, the standard for Miraka suppliers is to recycle at least 50% of agricultural plastics through a sanctioned recycling programme such as Plasback or Agrecovery. Other programmes may be acceptable, but must be reviewed by Miraka in advance.

Farmers must prove to an independent auditor that they have met the required standard by providing documentary evidence, such as programme receipts. If they do so they receive an additional 1c per kg of
milk solids for the current season. Jackson says that the average farmer within their supply group produces about 240,000kg of milk solids annually, so this payment is worth approximately $2,400 to them each year. The level of this incentive – at 1c per kg – is the same as about 70% of the other incentives within the programme, indicating that a focus on rural waste is a genuine priority for Miraka. Some other incentives operate at the 2c per kg level, but others are only 0.5c/kg.

For Miraka’s farmer-suppliers the waste element of the Farm Excellence Programme is not mandatory, but rather incentivised, so compliance with this standard will not be known until sometime after the programme commences on June 1, 2016. Jackson believes that their farmers will definitely aim to meet the standard as the benefit greatly outweighs the costs of doing so.

Jackson says that the focus on waste management is not customer driven, as no customers have requested action on rural waste. Rather, he says, it is simply a reflection of the sustainability value and land stewardship perspective of Miraka’s primarily Maori owners.

**Silver Fern Farms**

Silver Fern Farms is a processor and marketer of lamb, mutton, beef, venison and associated products to more than 60 countries. It is a farmer-controlled co-operative with more than 6,200 Ordinary Shareholders and over 16,000 farmer partners. In 2014 it reported revenue of $2.3B. (Silver Fern Farms, 2014).

Daryn Jemmett, Group Environmental Manager for Silver Fern Farms, says the ability of red meat processors to influence suppliers’ actions on their farms is much lower than the ability milk processors have in the dairy sector because of the ease with which suppliers can move from one meat processor to another. This, combined with Silver Fern Farms’ need for volume to meet customer orders and ensure efficient plant operating costs, means they only recommend – rather than require – that farmers meet specific conditions in their businesses which demonstrate they act in a sustainable manner.

Silver Fern Farms encourages their farmers to use services such as Agrecovery but, in general, sustainability requirements are ultimately driven by customer requirements and regulatory obligations. Jemmett says Silver Fern Farms is frequently visited by international meat buyers who want to inspect farms, but the focus of these buyers is on the overall management of the farm, and on issues such as animal welfare and water management, rather than anything that touches on waste. Jemmett says that even customers that are highly focused on sustainability and are prepared to pay a premium for sustainable products do not express any requirements or standards in terms of rural waste management.

Silver Fern Farms finds that sustainability does not in itself attract a premium price – other than in a few, isolated cases – but the pursuit of sustainability, particularly in terms of animal welfare and environmental management, does improve product brand reputation and quality. It is this quality aspect, says Jemmett, that buyers are generally focused on.
New Zealand GAP

New Zealand GAP (Good Agricultural Practice) is an audited quality assurance programme for crop growers, particularly fruit and vegetable suppliers. The programme was first launched in 1999 by Vegfed (the NZ Vegetable and Potato Growers Federation) and is now owned by Horticulture New Zealand (New Zealand GAP, 2016).

As a quality assurance programme, NZ GAP’s advantage is that it is benchmarked to the international quality assurance programme Global GAP which is a requirement for many export buyers. In fact, says Matthew Dolan, Business Manager for NZ Gap under Horticulture New Zealand, while there are some countries that one could conceivably export produce to that wouldn’t require certification, “doing so would be quite difficult”. Likewise, all the major local buyers such as Foodstuffs, Countdown and Turners and Growers also require NZ Gap certification.

Dolan says that NZ Gap has 1,500 growers certified, while Zespri has a similar scheme under Global Gap that has about 1,400 growers and 400 – 500 have direct certification to Global Gap. All of these programmes have similar requirements for waste management.

The combined impact of these participation rates, says Dolan, is that New Zealand has one of the highest certification rates in the world with about 85% of farms being covered and about 90% of overall volume.

The NZ GAP programme has the following requirements in terms of waste management:

- The Agrecovery container recovery programme must be used to dispose of waste or unwanted plastic agrichemical containers belonging to participating manufacturer’s brands. This must be verified by receipts from Agrecovery. NZ GAP participants must explain how containers are disposed of for brands outside the programme.

- Participants must dispose of chemicals in accordance with approved methods.

- Waste must be clearly labelled and participants are asked to explain how this is removed from the site.

Dolan says that while these directions are not ‘critical requirements’ under the programme, in that non-compliance does not produce immediate suspension, they are more than just recommendations, and failure to comply will result in a ‘major non-compliance’ notice. Farmers then have a set time to remedy non-compliance or suspension results.

In practice, the requirements effectively mean that certified farmers cannot use farm pits. Burning does occur but this tends to be pruning offcuts, a waste stream that is best incinerated so as to kill any diseases present. Dolan acknowledges that some other wastes are likely to be thrown on fires when offcuts are being burned. Despite this, the expectation would be that most farmers would have a commercial waste collection, made somewhat easier, says Dolan, by the fact that growers of fruit and vegetables tend to be closer to main centres than other farm types.

Dolan says that there is a growing concern among some in the horticultural sector over the increasing intensification of fruit and vegetable growing, and particularly the increasing use of crop covers. This is a waste stream, he believes, for which no real waste management solution yet exists and volumes are rapidly increasing.
**New Zealand Winegrowers**

New Zealand Winegrowers (NZW) is the industry association for New Zealand wineries and vineyards. Currently membership consists of about 850 growers and 700 wineries (NZ Wine, 2016).

In 1997, NZW introduced a programme to pursue and certify sustainable best practice in the wine industry in New Zealand. This programme - ‘Sustainable Winegrowing New Zealand’ (SWNZ) - aimed to (NZ Wine, 2016):

- “Provide a 'best practice' model of environmental practices in the vineyard and winery.
- Guarantee better quality assurance from the vineyard through to the bottle.
- Address consumer concerns regarding products which are made taking care to respect the environment”.

Justine Tate, Business Manager Sustainable Winegrowing NZ for NZW, says that the programme was “way ahead of its time” when created. While at this time customer demand was not a key factor for launching the programme, Tate says that for a number of key markets for New Zealand wine, particularly the UK, sustainability standards have become very important and in order to continue to succeed in these markets, this kind of certification is necessary.

The certification under SWNZ, which is held by about 96% of vineyards in New Zealand, requires that growers fill out a scorecard every year that asks a number of questions relating to sustainability issues including (NZ Wine, 2016):

- Biodiversity
- Soil, water and air
- Energy
- Chemicals
- By-products
- People
- Business practices

Some of the questions asked are mandatory, whereas others are voluntary and aimed at gathering honest answers and data to inform and guide the industry. Tate says that, typically, new issues start out as voluntary questions so that NZW can understand the current situation. Where something is happening that requires action, growers are typically given 12 months’ notice, then a question becomes mandatory.

When growers fill out the scorecard they must achieve a ‘pass/fail’ standard to remain certified and must also address any non-compliance with corrective actions, which are likely to have a specific timeframe attached to them. Growers are independently audited every three years, or more often if corrective actions have been required.

Tate says the main question on waste – which is mandatory – is “is there a recycling or waste recovery programme?” This question is only a ‘yes/no’ requirement, but it is supported by other questions that look specifically at the details of this programme and whether services such as Agrecovery are used.
These questions are, currently, only voluntary but a recent industry advisory group review has determined that more emphasis should be placed on waste issues, so there is a chance such questions may become mandatory in time.

The issue in doing so, says Tate, is that utilising recycling services can only be compelled if the services are actually available. The lack of services across the country for key winegrowing waste streams, such as treated timber and bird netting, limits what winegrowers can be asked to do.

**Global Consumer Trends**

There is increasing evidence to suggest that, globally, consumers of New Zealand’s primary produce are paying increasing attention to performance around sustainability and land management. A number of the organisations overseeing the programmes profiled above were asked about this growing trend, but the majority are not yet seeing it reflected in the feedback from their customers.

Maximising Export Returns (MER), is a three-year project being undertaken at the Agribusiness and Economics Research Unit (AERU) at Lincoln University to "help New Zealand’s biological industries maximise their export returns". The project commenced in 2014 (Lincoln University, 2016).

The project has so far concluded that:

> “Consumers are increasingly making food choices based not only on experience quality attributes, such as taste, texture, and appearance, but also on credence attributes, such as animal welfare, fair trade, provenance and environmental stewardship” (Lees & Saunders, 2015).

Research undertaken suggests that the fact that produce comes from New Zealand, which has a strong brand in terms of sustainability, is of considerable importance to international consumers. It notes, however, that apart from “kiwifruit, apples and wine” most New Zealand produce is not consistently identified as being from New Zealand (Lees & Saunders, 2015). This is, potentially, a lost opportunity that will be addressed in time and give rise to new and more robust farm assurance programmes.

The research does not focus on issues around waste and it is apparent that this is not at the forefront of consumers’ minds when considering whether or not to buy New Zealand produce. In fact, the researchers noted that consumers commented that issues around sustainability “tended to be less of a priority for most consumers unless they were related to food safety” (Lees & Saunders, 2015).

Despite this, the research noted that issues around environmental sustainability become more important when manufacturers seek to market their products based on the land on which they are produced. Once again, if this research proves to be accurate, more farm assurance programmes may seek to consider waste as an important aspect of their overall ‘brand story’.
3.5. SUMMARY AND CONCLUSIONS

The barriers to successful and sustainable services that operate as an alternative to burning, burying and bulk storage of waste are numerous, but are broadly understood here to be:

- **Costs**: with the most commonly used methods of disposing of waste costing nothing or very little in terms of direct financial outlay, for alternatives to succeed they must be provided at minimum cost.

- **Inconvenience**: currently used practices for rural waste disposal on farms are relatively convenient, a key driver in their popularity. For alternatives to succeed they must be minimally inconvenient – or ideally more convenient – for farmers.

- **Lack of Incentives**: while the farmer survey demonstrated that farmers are internally motivated to change rural waste management behaviour, there are currently few external motivators for farmers to do so. For alternatives to succeed they will ideally tap into intrinsic farmer motivations or align with existing extrinsic motivators such as farmer assurance programmes.

- **Lack of Awareness**: it is apparent that a number of services that provide alternative rural waste management options are not well known. For alternatives to succeed they must include a coherent strategy to ensure high levels of farmer awareness to encourage participation.

- **Lack of Economic Viability**: many services that aimed to provide alternative rural waste management options have struggled or failed because of unpredictable market conditions or inadequacy of planning and business execution. For alternatives to succeed they must ensure that their business model is robust and well thought out to ensure economic feasibility.

The lack of regulation around the current prevalent behaviours relating to rural waste, combined with substantial barriers to cost-effective services thriving in the market, helps explain the amount of waste that is currently being burned, buried and bulk stored on New Zealand farms.

To address this issue, a number of organisations offer farm assurance or certification programmes for their suppliers, including:

- Synlait Milk
- Miraka
- Horticulture New Zealand
- New Zealand Winegrowers

These programmes appear to work well in the sectors in which they operate, but not all require waste to be addressed, and the collective number of farmers covered by such programmes is still a small minority.

Farmers themselves seem to be motivated to pursue alternative means of rural waste disposal, but alternatives’ cost and convenience continue to operate as key barriers to universal behaviour change. Successful alternatives will have to address at least one, if not both, of these factors.
4. ALTERNATIVE DOMESTIC OPTIONS FOR RURAL WASTE MINIMISATION

4.1. RURAL WASTE COLLECTION OPTIONS

This section considers the current options available to farmers to have their waste picked up from their farm, or to drop their waste off at a separate site for processing or disposal. The options shown are not meant to be exhaustive, but rather representative of the primary alternative options available to farmers.

Each of the organisations profiled in this section were provided with the opportunity to check and correct any inaccuracies in the information shown below.

4.1.1. On-Farm Collection Options

This section profiles those rural waste services that primarily involve waste being collected directly from the property where the waste is being produced.

**Council/TA Collection: Territorial Authorities (Multiple Waste Streams)**

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<tr>
<th>Waste Categories:</th>
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New Zealand has 67 territorial authorities comprising 12 city councils, 53 district councils, Auckland Council and Chatham Islands Council (Statistics New Zealand, 2016). These are delineated as shown below:

Figure 7: New Zealand Council Maps (Source: Local Government New Zealand)
Of the 67 territorial authorities, 26 are considered ‘rural sector’ (populations below 20,000 such as Hauraki District and Mackenzie District) and a further 27 are considered ‘provincial sector’ (populations between 20,000 and 90,000 such as Taupo District and Ashburton District), giving a total of 53 out of 67 that would not be considered metropolitan (Local Government New Zealand, 2016).

In April, 2016, in conjunction with WasteMINZ, a survey was sent to all territorial authorities to understand current involvement in addressing rural waste as well as potential involvement and strategies that may be considered. A copy of the survey questions is included in Appendix 2.

Responses were received from 52 out of 67 territorial authorities. Key results from the survey included:

- 37% of respondents consider rural waste a high or very high priority. The predominant stated reason for rural waste being a low priority in other cities and districts was the lack of rural properties.
- The key strategies deployed to consider rural waste tended to focus on waste management and minimisation plans and liaison with regional councils. Several respondents mentioned council support for Agrecovery and/or Plasback services. Several councils provide rural recycling parks. A number of councils provide domestic waste collection to rural properties close to main routes.
- 31% of respondents are already collecting waste for landfill and 41% of respondents are already collecting recyclables, although many indicate this is only for domestic comingled recyclables. 18% of respondents would consider or are prepared to offer such services for landfill waste, while 25% of respondents feel similarly about recyclables. A number of councils that would not consider such services noted that they believe these services should be ‘user pays’. A number of others felt that locations to drop off waste was a preferable solution.
- 57% of respondents are already providing collection services to a proportion of rural properties for landfill waste and 55% of respondents are already doing so for recyclables. 11% of respondents would consider or are prepared to offer such services for landfill waste, while 15% of respondents feel similarly about recyclables. Councils that expressed an unwillingness to consider such services tended to have a lack of rural properties or felt that such a service would be cost-prohibitive given route density.
- 51% of respondents are already providing drop-off points for landfill waste and 60% of respondents are already doing so for recyclables. 19% of respondents would consider or are prepared to offer drop-off points for landfill waste, while 53% of respondents feel similarly about recyclables. A number of councils that considered they provided drop-off points did not take into account the distances farmers would have to travel to utilise them. Councils that expressed an unwillingness to consider such services tended to be concerned about abuse of these locations, particularly if unmanned.

Councils were provided with the top ten list of priority waste streams determined under Phase 1 of this project and asked to rank them in terms of concern within their regions.

Their responses were as follows:
Councils were also asked how best they felt they could contribute to the issues around finding alternatives to burning, burying and bulk-storage of rural waste. The key responses were that they could:

- Promote and raise awareness of existing solutions.
- Stimulate or support product stewardship programmes.
- Work more closely with regional councils.
- Support waste collection initiatives.
- Pursue increased regulation around burning rural waste.
- Provide drop-off facilities.

There are a number of conclusions that can be drawn from the survey:

- In line with the rural waste priorities drawn in this project, hazardous waste is a key concern for territorial authorities.
- Rural waste is of growing concern to territorial authorities that have a substantial rural population.
- A substantial number of councils are providing services to pick up or receive domestic waste from farms, but not commercial waste. They are happy to publicise existing services in this space, but most appear to see the collection of commercial waste as an activity that is not within councils’ remit.
- As such a substantial proportion of councils (over 50%) are providing collection services to some rural properties, there may be an opportunity to ‘piggyback’ a commercial, user-pays waste collection service onto this (through the contracted operator) that may be less expensive than ‘starting from scratch’.

It is worth noting that the reluctance expressed here in terms of council collection of commercial waste from rural properties suggests a disconnect with the significant number of farmers that consider waste services should be covered by the rates they pay.
While this latter view may be focused primarily on domestic waste, it is likely that a proportion of farmers would make no distinction between these waste streams and would expect councils to provide services for both. In any case, many councils appear to offer no waste collection services of any kind for rural properties.

Overall, it is apparent that while a number of councils provide waste collection services to rural properties, the intention is clearly that this is focused on domestic waste streams, rather than commercial ones.

**Waste Contractor Collection: Waste Management New Zealand Limited (Multiple Waste Streams)**

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Waste Management New Zealand (WMNZ), owned by Chinese-based Beijing Capital, is New Zealand’s largest waste management company. Waste Management Sales Manager - National Accounts Tracy Cousins says Waste Management:

- Services more than 30 million bins per year.
- Operates over 800 vehicles.
- Collects more than 1 million tonnes of general waste per year.
- Collects more than 150,000 tonnes of recyclables per year.
- Works with 17 city or regional councils.
- Works with nearly 300,000 commercial and domestic customers.
- Processes over 50,000 tonnes of hazardous and liquid waste per year.
- Produces 600,000 tonnes of compost every year from collected organic waste.
- Recycles 10,000 tonnes of glass.

WMNZ currently provides very limited services to rural properties for the collection of commercial farm waste. Karen Boyes, Regional Sales Manager – Lower North Island for WMNZ, says the main waste service being provided to farmers between the Bombay Hills and Wellington is a steel general waste bin with a 3m³ or 4.5m³ volume. Within that territory there are three major areas that are currently accessing services: Taranaki, Waikato and Rotorua.

Shane Robbertsen, Operations Manager for WMNZ for Taranaki, Wanganui and the Manawatu says that WMNZ provides waste bins to between 600 and 700 farms in Taranaki. WMNZ estimates that about 70% of local farmers use some form of commercial collection service for waste disposal.

Of those that receive a service about 60% have a 1.5m³ bin, 30% have a 3m³ bin and the remaining 10% have a 4.5m³ bin. While Robbertsen says most of the waste in these bins is domestic in nature, there is some commercial farm waste, notably silage wrap, that cannot be recycled because of high levels of organic contamination. Farmers usually pay $100 - $150 per month for on-farm collection services. Typically, waste collection services will involve a minimum of monthly pick-ups, driven by the need to generate reasonable revenue off the waste bin asset.

Robbertsen believes that there are two key reasons for the level of uptake of on-farm waste collection in Taranaki. The first apparent cause is the proactivity of Taranaki Regional Council in ensuring waste is not burnt on farms and discouraging farmers from using farm pits. The second reason is that many farms in
Taranaki have been handed down to a “younger generation” that is more focused on environmental issues than previous generations of farmers have been.

Robbertsen believes that the best way to increase farmers using waste collection services is for groups of farms to coordinate waste disposal and have recycling bins on the farm that is closest to a main route. Farmers could share costs to utilise a locked recyclables bin - or perhaps one bin for plastics and another for paper and cardboard – while still retaining the convenience of a very localised drop-off point. Such a service would, however, be confined to household recyclables only – hazardous wastes and commercial plastics would not be suitable for such a programme.

Regional Sales Manager – Lower North Island Karen Boyes also believes that farmers who participate in the service tend to do so because of land stewardship, as well as for reasons of convenience. Boyes says that while WMNZ has actively pursued service provision in the rural sector there has been a definite slowing in growth due to the fall in dairy prices, and farmers have responded by minimising expenses.

WMNZ is prepared to provide services anywhere, but lower route density will result in higher prices. There are no ‘set prices’ for rural pick-ups simply because transportation represents about 50% of the total service costs and this is dictated by travelling distances between properties. Likewise, the remaining 50% is dictated by landfill costs, which also vary greatly from region to region.

Despite these challenges, WMNZ is very interested in waste streams that have value, and that they can source in reasonable volumes. Boyes indicates that, as a guide, a waste stream needs to be of a sufficient volume to be baled and fill a container to sell into the international market. Waste streams that are of particular interest include:

- Cardboard
- Shrink wrap
- Recyclable plastics – PET and PE-HD, as well as most other types dependent on location
- Hard plastics (such as tubing) and polypropylene bags
- Scrap metal

A key challenge in any recycling effort, says Boyes, is contamination of waste streams, either because the waste is dirty or because other waste streams are mixed in. Off-site sorting is considered to be “rarely practical”.

Andrew Shipley, Boyes’ South Island equivalent echoes the comments made by Boyes and Robbertsen and believes that there is no standard response or service for farms from WMNZ. Service levels and costs always depend on distances and volumes of waste. Shipley admits that WMNZ are still really only beginning to understand rural waste streams, but that the company wants to develop their knowledge of this market before investing too heavily into it.

Despite this, Shipley says that there are rural collections happening in the South Island, particularly in South Canterbury and Southland. Ultimately, Shipley says, the viability of service delivery for any farm is primarily based on its distance from the local WMNZ depot.
**Waste Contractor Collection: EnviroWaste Services Limited (Multiple Waste Streams)**

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EnviroWaste Services (EWS), part of the EnviroNZ group, was founded in 1995 when the waste disposal businesses of Northern Disposal Systems and the South Island waste collection operations of Fulton Hogan merged. In 2013 EnviroWaste was purchased by Hong Kong based Cheung Kong Infrastructure Holdings Limited (EnviroWaste, 2016). EWS has 19 local branches throughout the country (including most rural regions) and operates seven transfer stations in the North Island.

EWS Christchurch Branch Manager Mike Aberhart says there is no overall and cohesive rural strategy for EWS but that each region operates to the needs of local commercial operations. Service provision to rural properties tends to be in the form of one or more 4.5m³ frontload bins that are picked up no less than monthly, based on the required return on the bin asset value and the need to control waste odour. All of this waste is sent to landfill and no recyclables are currently removed.

There are some exceptions that EWS is developing, however, including the provision of cardboard recycling bins to some Ngai Tahu owned farms. EWS is also working with Ashburton District Council to service satellite sites for rural waste, including free drop-off of bottles, cans and cardboard and potentially agricultural plastics.

Aberhart says that any successful service for rural waste needs to ensure general waste and recyclables are kept separate to avoid recyclable materials, such as silage wrap, being disposed of in a general waste bin. Aberhart believes the right approach is to collect general waste from farms, and have farmers drop off recyclables – ideally at no cost – at a local hub. Aberhart believes that the weight-based cost for the general waste bin should be enough to dissuade farmers from including recyclables, particularly if they can be disposed of off-site for free. Local landfill costs are also an influencing factor in how well waste separation is done generally, with Aberhart noting that in some regions landfills cost $450 per tonne resulting in “very good separation out of recyclables”.

Low volumes and low returns on asset value practically rule out a multiple bin solution for most farms, according to Aberhart. Having separate general waste and recyclables bins on farms would mean that each would take too long to fill, providing EWS with an unacceptably low return on the value of the bins used. The infrequency of pick-ups would also diminish the ability of EWS to rationalise pick-ups and would result in unacceptably high collection costs. Ultimately, Aberhart believes that either councils or rural stores need to provide drop-off facilities for recyclables, while waste collection service providers should just focus on picking up general waste from farms. The desire from EWS to focus on general waste is likely influenced by their view that many of the valuable, recyclable waste streams are already reasonably well serviced by incumbent industry players.

Overall, the current level of waste collection service provision to rural communities around the country by EWS is considered to be “modest” and, says Aberhart, any substantial expansion is unlikely to occur before 2018. Despite this, Aberhart says farmers can probably access a rural waste collection service if they have sufficient volumes of waste and are prepared to pay the transportation costs. The feasibility of any such service is going to primarily depend on the distance the collection truck has to travel.

Specific data on rural properties receiving a waste collection is not available, as properties are not tracked in this manner, but General Manager - Business Development & Sales for EnviroWaste Dave Elder says that...
— anecdotally — most of the waste that is collected tends to be domestic rather than commercial. The
commercial waste, Elder believes, just ends up “in the farm pit or on the bonfire”. He does note, however,
that Taranaki is the one region that is known for having a more substantial number of rural waste
collections.

**Waste Contractor Collection: Smart Environmental (Multiple Waste Streams)**

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Smart Environmental (SE) describe themselves as “the third largest waste and recycling company in New
Zealand” and “the largest New Zealand owned waste and recycling company” (Smart Environmental, 2016).

Chief Operating Office Blair Griffiths describes the company as “very regional” with a focus outside of main
centres. They operate large Materials Recovery Facilities in Queenstown and Kopu in Eastern Waikato, with
three smaller facilities in Manawatu, Buller and Tasman.

Griffiths says that SE does provide some waste services to farms, mainly in Hauraki, Waipa, Matamata-
Piako and the Manawatu. These tend to be based on 4.5m³ skip bins, with some smaller wheelie bins also
being deployed. SE offers both general and recycling waste bins for use on farms. Those that access these
services are, according to Griffiths, typically those that are particularly environmentally conscious and have
farms that are not too distant from town centres. If this is not the case the transportation costs become
prohibitive. Griffiths says that even among those that have used the service – and numbers are quite low
– a substantial proportion have cancelled the service since the dairy downturn began and it is very difficult
to get farmers to consider on-farm waste collection in the current economic environment.

The cost of the service SE provides is based more on transportation distance than waste disposal costs,
with a truck costing about $3/km to send out to pick up waste. To minimise this cost, larger bins are used
so that more waste can be collected per trip. But, as noted by other waste companies, a certain frequency
of pick-ups is required in order to provide a return on the bin asset.

Griffiths says that he has noticed a marked increase in environmental consciousness among farmers in
recent years, but that this tends to motivate them to bring recyclable waste into towns, rather than incur
the substantial costs involved in an on-farm pick-up. For this reason, SE has not made on-farm pick-ups a
strategic priority. The low route density, matched with poor returns from marketing efforts aimed at
increasing it in the past, makes on-farm collections relatively unattractive from a commercial perspective.
Despite this, Griffiths says that SE is very open to exploring opportunities in this area, and would gladly
respond to any demand for such services.

**Waste Contractor Collection: Wastebusters Canterbury (Multiple Waste Streams)**

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Wastebusters Canterbury (WC), based in Ashburton, is a charitable trust focused on moving towards the goal of zero waste in their local community. The trust was founded in 1994 and has a strong emphasis on waste education. WC previously had a contract with Ashburton District Council to run the Ashburton Resource Recovery Park (ARRP), but lost this contract to another commercial enterprise in 2010.

Despite this setback, WC continues to operate their own resource recovery park and, according to WC Manager Sharon Breakwell, they have very strong community support. Currently their resource recovery park will take “virtually all waste streams except general waste”. In addition to this, and in response to perceived community need, WC decided to trial waste collection services to rural properties several years ago.

Under WC’s service delivery model farmers purchase their own wooden bins that are marked with their personal details. 1.7m$^3$ recycling ‘cubes’ are available for $160 + GST, while 2.6m$^3$ rubbish bins are $310 + GST and 2.6m$^3$ bale wrap bins are $150 + GST (Wastebusters Canterbury, 2016).

When bins are ready to be collected, WC is notified and the bins swapped out with empties. Breakwell says WC will pick up most waste streams but they insist on them being carefully separated. They maintain a close relationship with farmers and will both communicate quickly if contamination becomes an issue and bill farmers for it – a fee of $120 + GST per bin (Wastebusters Canterbury, 2016).

WC are also keen to promote the services of other like-minded waste collectors such as Agrecovery, metal recyclers and oil recyclers. Breakwell says they did not initially collect plastic and silage wrap, but due to perceived customer demand for an alternative to Plasback, WC found a buyer for plastics and began including this waste stream in their collection.

WC found that early adopters for the service were younger farmers that had been exposed to environmental education in schools and understood the risks around burning and burying waste. Breakwell also believes the Environment Canterbury’s ban on burning of waste and the Synlait ‘Lead With Pride’ programme have prompted many local farmers to seek alternatives to burning and burial of waste.

Breakwell says the key to their approach has been to focus on strong engagement with farmers and their workers. The first step in engaging farmers with service provision is for one of WC’s team to visit the farmer and discuss initial options for waste collection. Their strategy is to begin with just a few waste streams and “make the whole thing as easy as possible, rather than too complicated up front”. As momentum grows, more waste streams tend to be added through the purchase of additional wooden boxes. Commercial farm waste tends to be the initial focus, with domestic farm waste streams coming later. Most of their current farmer customers have four or more boxes on site. Another key aspect of engagement with the farmer is to meet with all of those working on the farm to explain how the system works and the importance of sorting waste carefully. Breakwell considers this kind of relationship development to be absolutely critical in an effective process.

WC is constantly looking for new outlets for waste streams so that they can take as much waste as possible off a farm. Currently they accept glass, paper, plastic, cardboard, baling twine, polypropylene sacks, steel
and aluminium cans, silage covers and bulk bags. These recyclables are accepted for free, with just a $40 + GST collection fee (in nearby rural areas). WC also accepts general waste for pick-up at $150 + GST for the first bin and $100 + GST for additional bins in a single pick-up (Wastebusters Canterbury, 2016).

Breakwell says that WC has never actively marketed the service because of capacity fears, but are now in a position where they would like to scale up the service. Despite the lack of marketing – with growth being purely from word of mouth referrals - WC are currently adding 1 – 2 farms a day to their route and currently have 80 farms participating. WC has identified transportation logistics as, unsurprisingly, their biggest challenge to growth. They do not have their own truck and instead subcontract this to a local transportation company, but this does increase pick-up costs. WC will travel a considerable distance to pick up waste but, says Breakwell, this hurts the economics of what they’re doing.

Picking up from Rakaia (30kms from Ashburton) increases the pick-up cost to $50 + GST, while the Mt Somers area (40km away) is $80 + GST and further afield may be $100 + GST or more. To address these challenges WC has invested recently in systems to rationalise pick-ups and predict timing for runs to ensure collection costs are minimised.

As an alternative to on-farm collection, farmers can drop recyclables at WC ‘s Ashburton depot free of charge, although they do not accept general waste. WC has considered providing unmanned drop-off points for waste in rural areas but rejected this idea as they believe the volumes of waste from farms would overwhelm these locations and cause friction in these communities.

Breakwell says that essentially WC collection charges cover the cost of providing the collection services, and that any profit comes from finding markets for recyclable waste streams. This model has a degree of vulnerability to it, but Breakwell is adamant that the model is sustainable and could be easily adopted in other areas.

Dorte Wray, Executive Officer for the Community Recycling Network (CRN) of which WC is a member, says that most of the community-based recyclers around New Zealand do not currently operate a commercial operation of this kind, and would need to assess the community support and economic viability of such a model before launching into this area.

CRN is a charitable trust that works on behalf of these types of organisations and aims to support their efforts in community-based resource recovery. It has 40 full members (all of whom are non-profit organisations) and about 11 of these are rural or semi-rural based. Wray says that while community engagement and education are strengths of these groups, generally CRN members are not currently set up for this kind of commercial recycling activity.

With these limitations in mind, Wray considers there are some CRN members that have the potential to offer commercial collection services in rural communities, namely:

- XtremeZeroWaste in Raglan
- Wanaka Wastebusters
- Central Otago Wastebusters
- Seagull Centre in Thames
- Waiuku Zero Waste in Auckland
- Helensville Resource Recovery Trust in Auckland
- Waitaki Resource Recovery Trust in Oamaru
- CrEW in Whakatane
Whereas most of these organisations have not yet been engaged in this project, the services of XtremeZeroWaste are considered in the following section.

**Waste Contractor Collection: XtremeZeroWaste (Multiple Waste Streams)**

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XtremeZeroWaste (XZW) is a Raglan-based and locally owned community enterprise that aims to transform waste into a community resource. XZW achieves an approximate 75% diversion of waste from landfill (Xtreme Zero Waste, 2016).

Currently, in terms of rural waste, XZW has focused on the provision of drop-off bins at rural schools for both domestic and commercial farm waste. In addition to glass, cans and other domestic recyclables, XZW also receives silage wrap, spray containers and reusable items such as fence standards. Where possible, says XZW Relationship Manager Rick Thorpe, items are reused in some way.

XZW have a relationship with Agrecovery and allow farmers to drop off chemical containers at no charge. Silage wrap is also received and sent to recycling company Reclaim in Auckland at a cost to farmers of $10 per m³. Thorpe says they do not work with Plasback due to issues with service performance.

Thorpe believes that the key to successful engagement with farmers is relationship, and the stronger this is, the more effectively waste is sorted and the lower the levels of contamination. XZW consider this level of community engagement key to their success in achieving high levels of diversion from landfill.

While XZW has focused on drop-off services to date, their desire is to begin to move towards on-farm collections. Thorpe says that XZW is currently in discussions with Fonterra to trial a service that would involve a mobile compactor picking up silage wrap from farms on a ‘loop’. The intention is that this will run on a monthly cycle in winter when silage is being unwrapped.

They are also considering providing a similar run for waste metal and wood as low market prices are currently encouraging farmers to store these waste streams rather than make the effort to transport them for recycling. Again, as far as is possible, XZW would aim to reuse rather than recycle these wastes.

Thorpe says collection services would need to be charged for, but XZW are confident there is a demand for on-farm collection and he believes people in the Raglan community are prepared to pay to have waste collected. The reason for this willingness, says Thorpe, is that XZW have been working for many years to raise awareness around waste issues and this investment is now “starting to pay real dividends in terms of changing farmer behaviour”.

**Waste Contractor Collection: Plasback (Agricultural Plastics)**

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Plasback is a division of Agpac, which is itself part of the Australian-owned Tapex Group. Agpac imports agricultural plastics, particularly silage wrap. As noted on the Plasback website:

“Plasback is the trans-Tasman name for the Tapex Group’s Product Stewardship programmes in both Australia and New Zealand. Plasback operates Agpac’s Product Stewardship scheme to recover used farm plastics for recycling.” (Plasback, 2016)

Plasback, as a product stewardship programme, is accredited by the Ministry for the Environment and has operated in New Zealand since 2006.

Plasback collects six ‘streams’ of agricultural plastics (Plasback, 2016):

- **Stream 1** - Bale Wrap, silage pit covers, small low density polyethylene (LDPE) feed bags, shrink wrap and pallet covers. These are collected on-farm using a bin and liner system. Some contamination is allowed for with silage wrap, but farmers are instructed to minimise this by placing wrap into containers as soon as possible. A $40 (plus GST) collection charge is applicable per liner.

- **Stream 2** - Polypropylene feed, seed and fertiliser bags. Bags must be collected inside a Plasback liner. A $40 (plus GST) collection charge is applicable per liner.

- **Stream 3** - High density polyethylene (HDPE) containers – from 1L to 60L. This stream is collected in the North Island only and containers must be carefully triple-rinsed, squashed and placed into a liner for collection. A $40 (plus GST) collection charge is applicable per liner.

- **Stream 4** - High density polyethylene (HDPE) drums - 100 and 200L. This applies only to drums from Ecolab and Agpro. Drums must be triple rinsed and in good condition. Collection is free.

- **Stream 5** - Vineyard nets, HDPS monofilament nets. A liner is not required. Variable collection charges apply.

- **Stream 6** – Polypropylene twine from farms and orchards. Twine must be placed within a Plasback liner. A $40 (plus GST) collection charge is applicable per liner.

Despite these different streams, Plasback focuses mainly on the collection of silage wrap products produced by its parent company Agpac. To provide this service, in addition to the collection charges noted, Plasback charges $51 (plus GST) for a three-pack of liners, each of which holds approximately 150 standard bale wraps. A $560 (plus GST) Plasback bin is also a recommended, but optional, purchase (Plasback, 2016). Plasback notes that the prices for collection have remained unchanged since its inception in 2006.

Plastic that is collected by Plasback is baled locally and sent primarily to Malaysia, Vietnam and Hong Kong for recycling into plastic rubbish bags, building film and crop covers. Plasback has recently added two new purpose-built balers to its existing two to cope with increased volume (Hartshorne, 2015). Hartshorne says that Plasback are also looking to trial the processing of silage film and HDPE vine nets with locally-based Astron Plastics late in 2016 and this may provide an alternative to exporting of plastics for recycling.
As of June, 2015 Plasback had collected 5,446 tonnes of plastic from New Zealand farms and its annual collection in the 2014/2015 year had increased by 42% to 1,743 tonnes. Growth has been strong each year and Plasback confirms that they have not faced issues with international demand for its products and no plastic stockpiles are maintained.

In the 2014/2015 year 89% of plastic collected was LDPE (silage wrap), 5% was HDPE (plastic containers) and 4% polypropylene (bags and twine). A new stream and notable increase was in MDPE plastic (irrigation pipe) from wine growers (Hartshorne, 2015).

Plasback has an almost nationwide presence (with the exception of the East Cape), utilising a small team of agricultural contractors to collect the liners from farms. The contractors work independently and are instructed by Plasback when to make collections. Plasback and its contractors have balers available to prepare the plastics for export in:

- Ruawai, north of Auckland
- Matamata, in the Waikato
- Kaponga, in Taranaki
- Palmerston North
- Richmond, near Nelson
- Tai Tapu, south of Christchurch
- Oamaru
- Mataura, in Southland

Plasback General Manager Chris Hartshorne says that Plasback does not have a centralised booking and monitoring system to ensure that requests for collections are followed up promptly, but believes that the contractors are very focused on ensuring as short a turnaround time as possible for collecting plastic.

The current system is based on a centralised phone number that directs callers to the local contractor. Plasback also allows farmers to book collections on their website, and Hartshorne advises that this is becoming increasingly popular. Local contractors run independently created systems that track each booking request and the date of booking. Hartshorne says that many of the collectors have systems that “flag old and outstanding collection requests so that they can keep in touch with the farmer”.

Two of the organisations interviewed for this project reported concerns about responsiveness for Plasback pick-ups. A substantial number of comments made by farmers in the farmer survey recently undertaken for this project also raised similar concerns.

Hartshorne says that any such concerns are “a hangover” from the collection service previously run by Agrecovery. Even though it has been several years since Agrecovery withdrew from silage wrap collections, Plasback is still “dealing with the legacy of their bags being on properties awaiting collection”.

Hartshorne believes that some of the farmers that are upset at waiting for plastics to be collected are actually holding Agrecovery bags and are mistakenly believing they are Plasback bags.

Hartshorne does acknowledge, however, that farmers may call for collection of bags at any time, whereas many of the collectors are “silage contractors and so have to prioritise their main work during the summer months”. This may impact responsiveness at different times of the year.
While Plasback has an almost national coverage, activity tends to be focused on a few key agricultural regions. 75% of 2014/2015 volume was made up of collections from Taranaki, Southland, Canterbury and Waikato, with the latter three regions representing two-thirds of overall volume (Hartshorne, 2015). Regional volumes are as follows:

![Figure 11 - 2014/2015 Plasback Volumes by Region (Tonnes) (Hartshorne, 2015)](image)

According to Hartshorne, there are still strong prospects for growth within Plasback and they have, in fact, recently purchased an additional two balers, based on increasing volumes. Plasback estimates they are collecting silage wrap from only 15 – 20% of dairy farms in New Zealand, suggesting there is still considerably more volume to be captured. The recent farmer survey undertaken as part of this project found that 123 respondents (20%) had utilised the Plasback service.

Part of the challenge to growth may be the nature of Plasback's business model and ownership. Agpac, as an importer of silage wrap, effectively underwrites Plasback's operation. Hartshorne estimates that Plasback operates “basically at breakeven” so support from the parent company, as part of its voluntary approach to product stewardship, is required.

There are currently fourteen other manufacturers of silage wrap that do not support Plasback, presumably because of its ownership by a major industry player. This produces something of a stalemate situation: Agpac is reluctant to let other manufacturers ‘free-ride’ on its considerable effort and investment in building Plasback, while other manufacturers like Donaghys and Integrated Packaging are likely wary of Agpac’s control over Plasback and will not contribute financially to the programme. Despite this, Plasback does not limit collection to Agpac wraps, and will collect plastics from other manufacturers.

Hartshorne also believes Plasback will not see the big jump in volume this year as was seen in the 2014/2015 year. Sales of recycling bins and liners is down slightly, and this is largely attributed to the downturn in dairy prices in New Zealand. Hartshorne believes that lower dairy prices are forcing dairy farmers to carefully review all purchases, and thinks it likely that silage wrap is being stored for collection at some later date once the financial situation for dairy farmers improves.
In more recent years Plasback has explored new ways of providing services and collecting waste. Discussions are in place with a number of territorial authorities to subsidise Plasback liner collections from farms. Plasback is also very amenable to its network of collection contractors considering the collection of other waste streams.

Wayne Maskill, a Plasback contractor who services the Palmerston North area, notes that most of those providing the collection service are barely covering their costs in doing so because of low route density. Maskill says he has worked very hard to increase demand by word of mouth, but that building demand takes a long time.

Maskill says that, as far as he is aware, all of the contractors would be more than willing to consider augmenting their businesses by picking up other waste streams but there is a very real issue of managing demand and capacity. In order to look at new waste streams contractors would need to set up the relationships and equipment required to collect and process other waste. They would also need to ensure a minimum frequency of collection in order to maintain credibility with farmers. However, during this time it is likely that demand would be low and potentially contractors could be making substantial losses in providing collections for low volumes with very low route density. Ultimately, Maskill and Hartshorne agree, the challenge with considering other waste streams is determining who will pay for collection, and disposal or recycling, of the waste stream.

**Waste Contractor Collection: EnviroWaste Services Limited (Agricultural Plastics)**

| Waste Categories: | Hazardous Wastes | Soft Plastics | Hard Plastics | Metal | Other Wastes |

In addition to its general waste collection services, EnviroWaste Services Limited (EWS) is planning the imminent launch of a service aimed at collecting and recycling agricultural plastics.

This service has its genesis in 2015 with a trial undertaken in conjunction with fertiliser companies Ravensdown and Ballance. This trial aimed to test the feasibility of collecting and processing the companies’ polypropylene fertiliser bags from farmers throughout the country. Ravensdown customers were required to take fertiliser bags to one of 12 drop-off points, while Ballance customers had bags picked up and ‘backhauled’ by transport companies delivering new fertiliser products. In preparation for the pilot EWS worked with the two companies to refine their bag design to better prepare for recycling.

General Manager Business Development & Sales for EnviroNZ (the parent group for EWS), and the developer of the new service, Dave Elder reports that 200 tonnes of bags were collected in the first two months of the pilot and a further 150 tonnes collected each month for the duration of the pilot. The plastic collected is being stored at EWS’ new Plastics Recycling Plant in Christchurch which is due to begin operations later in 2016 (see section 4.2.1).

The pilot has been considered by EWS and the fertiliser companies to be a remarkable success and they have now created a working group with their partners to determine how best to roll out a wider service. As part of the expansion plan EWS has partnered with Environment Waikato to put balers at rural transfer stations for use by farmers. Partnering with regional councils in this way is a key aspect of EWS’ growth strategy.
The 12 collection points initiated by Ravensdown are now permanent and will form the backbone of the plastics collection strategy. The second phase of the strategy is to build on successful transportation ‘back-haulage’ trials to see Ballance and Ravensdown products and, according to Elder, “potentially other products” collected by companies that are visiting farms already. As part of this strategy EWS has encouraged groups of three to four farms to work together to rationalise plastic collection. EWS are then able to pick the waste up without charging the farmers.

Elder says it is EWS’ intention, in due course, to also provide individual farm pick-ups, but that some coordination or rationalisation makes the process more economically sustainable. To support this intention EWS are looking to provide compacting bins that will enable farmers to store plastics efficiently and safely for a longer period of time to ensure pick-ups are only as frequent as is absolutely necessary. EWS has already purchased 200 of these bins and they are being trialled at different locations around the country.

Elder says the grand strategy for EWS is to build its capability to collect waste – their core business – off farms, but then to add in recyclables as they gain momentum. They are also interested in tyres and plan to add other waste streams once their logistics are in place. Elder says it is likely that farmers may have to pay some cost for additional waste streams but that this will be ‘minimal’ as the transportation elements will already be covered by the core waste stream operations.

**Waste Contractor Collection: JBL Environmental (Hazardous Wastes)**

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Blenheim-based JBL Environmental (JBL) specialises in the collection and transportation of hazardous wastes, including agrichemicals. One of JBL’s key activities is acting as the contracted collection provider for agrichemicals for the Agrecovery programme in the South Island (see section 4.1.2). This has involved on-farm agrichemical collections in Marlborough, Otago, Southland, West Coast, Canterbury and the Nelson and Tasman Districts (JBL Environmental, 2016). JBL conducted four pick-up runs in 2015 and has undertaken two so far in 2016. Typically, major regions receive a pick-up run annually.

JBL also manages hazardous waste collected at Marlborough transfer stations for Marlborough District Council.

JBL Industrial Chemist Chloe Abernethy says JBL is focused on the efficient collection and identification of agrichemicals, which are then sent to Chemwaste and Waste Management Technical Services for processing. For many chemicals this involves transportation to Australia or Europe for appropriate destruction.

Abernethy says that almost all of JBL’s interaction with rural waste is managing agrichemicals for Agrecovery, and any additional work they considered as part of their Agrecovery-funded collection round would need to have their approval. But, should Agrecovery be willing to allow JBL to collect additional waste streams when they are visiting farms to collect agrichemicals, JBL would definitely be interested in considering this.

Because JBL has the ability to handle hazardous waste streams and often has additional capacity on its run, there is potential for collecting less bulky waste streams such as sharps, waste oil or oil filters. These waste
streams, which are - or could be - stored year on year, do not require frequent collection and Abernethy believes that, dependent on farm and drop-off location, there may be low marginal costs to collect these.

Abernethy believes JBL would “need to plan ahead for picking up such items, but...would definitely be interested in doing it as it makes a lot of sense to streamline all hazardous waste (paints, cleaners, gas tanks, oil, fuels etc.) into one collection”.

**Waste Contractor Collection: Multiple Providers (Scrap Metal)**

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It was estimated in the first milestone of this project that in excess of 40,000 tonnes of scrap metal lies on farms throughout New Zealand. Unlike many other waste streams, metal is almost always recyclable and has considerable market value.

Korina Kirk, President of the Scrap Metal Recycling Association of New Zealand (SMRANZ) says that metal recyclers in New Zealand are very keen to access this volume. SMRANZ represents scrap metal recyclers and works to promote the interests of the industry and look for opportunities to increase effective recycling of scrap metals. One of the greatest challenges to the industry has been the dramatic and sustained reduction in global scrap metals prices over recent years.

Currently the prices offered for scrap metal by MetalCorp, of which Kirk is a director, range from $10 per tonne for tin, to $30 a tonne for car bodies, to $150 a tonne for heavy steel, all excluding transportation costs. Metals such as copper can attract prices of up to $5 per kg (Metalcorp, 2016).

According to Kirk, prices were twice the current level 18 months ago. The driving force behind these price decreases is the Chinese market which, as a result of lower activity overall, has caused global commodity prices to fall sharply in the last two years. There is no indication that this trend is going to be reversed anytime soon and Kirk believes such low prices are likely to be “the new normal”.

The result of this downward price trend is, perhaps surprisingly, that scrap metal recyclers want more and more volume. The reaction of many holders of scrap metal when the market price is down is to retain it in the hope that the market will rebound. Conversely, scrap metal recyclers need more volume in order to generate sufficient revenue for their businesses. Thus, scrap metal recyclers are motivated to access the large volumes being stored on rural properties.

![Figure 12: Global Scrap Metal Price Trend - USD per ton (Market Realist, 2015)](image-url)
Kirk says that an approach was made to Federated Farmers in 2015 to look at a ‘collection drive’ for scrap metal, but that this idea did not get traction at the time. This is still, however, a concept that SMRANZ favours. Such a drive would involve farmers registering the kinds of scrap metal they have and a coordinated, regional collection undertaken in much the same way as Agrecovery undertakes regional chemical collections. Pursuing this kind of rationalised approach would minimise transport costs and allow farmers time to locate and prepare scrap metal ready for collection.

Almost any metal could be collected in this way, provided it is not heavily contaminated with other materials. Some items – such as computers – which contain metal but also large volumes of other waste – such as plastic – would likely be excluded. Kirk believes car bodies are certainly of interest to scrap metals recyclers but it is likely a separate collection would be required for these and some elements, such as tyres, would need to be removed in advance.

It is likely that, even though multiple farms would be visited on a collection run, some effort would need to be made to identify each farm’s contribution in terms of volume. Farmers would receive a temporary receipt when scrap was collected, but payment would only be made once it had been weighed.

Kirk says that SMRANZ would very much like to work with appropriate partners to organise a collection like this and then, subject to its success and an analysis of the type of metals collected, look at making this a regular event; perhaps every six or twelve months. Ultimately, maintains Kirk, metal should not be considered a waste as it can virtually always be recycled. It is simply a matter of efficiently accessing and collecting it.

One of the specific priority waste streams under this project – and a source of scrap metal - is vehicle batteries. As these batteries contain lead, they have a value to many scrap metal recyclers. Currently Metalcorp offers 83c/kg for batteries (Metalcorp, 2016).

Christchurch-based Dominion Trading Co Ltd (DTC), trading as ‘Happy Scrappy’ operates a nationwide network for collecting and recycling commercial quantities of vehicle batteries.

DTC Trade and Export Executive Mee Clarke says that their trucks cover most of the country, but they have not yet sought to provide a coordinated service directly to farmers.

Clarke says that Lions’ Clubs in some rural communities have organised vehicle battery collections as fundraisers, and they are happy to pick up batteries from most areas of New Zealand once a pallet load is amassed – about 60 batteries. DTC currently pays 70 – 80c/kg for vehicle batteries, but Clarke says this rate is very much subject to price fluctuations and freight costs.

Clarke says that DTC would be very interested in a nationally coordinated ‘milk run’ for vehicle batteries that would collect vehicle batteries from rural communities in a coordinated and well publicised manner. This could be undertaken as often as is required to ensure the batteries on farms are safely recycled. DTC would pay for the batteries as noted above, and could supply a weighbridge docket after the collection to prove overall weights. Household batteries, aerosols and oil filters could not be included in this type of collection.
**Waste Contractor Collection: Multiple Providers (Tyres)**

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Tyres have not traditionally been considered a hazardous material and were therefore ranked relatively low in the risk identification process under Milestone 1. However, the risks associated with this waste stream are now becoming more apparent.

Tyres are often used in silage pits on farms, although this is apparently changing with the shift towards broader use of silage wrap. Where tyres are no longer required, or in storage for future use, they are often aggregated in unproductive areas of the farm. This may be near property boundaries, in gullies or waterways.

Unfortunately, the consistent view that tyres are largely an inert material has largely been disproven. It is now apparent that tyres can leach chemical components, particularly when exposed to water and sunlight. The effect of this can be a release of heavy metals and other toxic chemicals into the environment. Tyres also pose a significant fire risk. When ignited, tyres produce a black smoke and diesel-like liquid runoff. Both of these discharges are particularly toxic and tyres are therefore banned from being burnt in most regions. When they are burned, they are also very difficult to extinguish and pose a material risk to productive farmland, nearby structures and vehicles.

There is a broad collection network in New Zealand for the collection of used tyres, generally charging between $3-10 per unit for collection and disposal. However, there is anecdotal evidence that some collectors may be involved in stockpiling and/or illegal dumping of collected tyres and it would behove users to confirm an appropriate disposal methodology is in place.

The main tyre disposal methodologies currently in use in New Zealand are landfilling of chipped/quartered tyres or export for use as a fuel source. Both methods are costly and, unfortunately, this cost leads to significant numbers of tyres being stockpiled around the country. There is a significant amount of work being done to find a viable long term solution concurrent to this project, so tyres are therefore not a key focus of this report.

**Distributor Back Haulage: NZ Post (Sharps)**

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State-owned NZ Post has seen letter volumes fall by approximately 60 million items a year, negatively impacting revenue and increasing a desire to find different ways to provide services (Stuff, 2016). Acting GM of National Processing Stu Kane says NZ Post is very open to looking at ways its network of ‘posties’ could be involved in collecting rural waste.

Kane says the network is not uniform across the country and delivery frequency varies in different regions, but that 90% of the network still receives deliveries 6 days a week. In rural areas NZ Post staff are not going to every farm gate - instead they are often delivering to banks of letterboxes - but that proximity to most farms is close, and the potential to collect items as well as make deliveries is definitely present.
The challenge, says Kane, is one of physical capacity. Most of the delivery vehicles are small vans, utes or cars and could not handle anything bulky. In addition, most staff are already being stretched in terms of coverage and would have limited time to handle waste. Kane also rules out hazardous waste. Consideration was given to the carriage of sharps, but further investigation has confirmed that sharps are considered hazardous substances under the Hazardous Substances and New Organisms Act 1996.

While discussions are ongoing with NZ Post, consulting the list of prioritised wastes formulated under Milestone 1 of this project and removing those that are bulky or hazardous does not leave many waste stream options for consideration.
4.1.2. Local Drop-off Collection Options

This section profiles those waste services that primarily involve waste being dropped off at a location secondary to the property where waste is being produced.

**Council/TA Waste Hubs: Territorial Authorities (Multiple Waste Streams)**

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The recent farmer survey undertaken as part of this project found that 402 respondents (64%) utilised local council transfer stations or recycling drop-off points. An additional 206 (32%) said they were ‘somewhat likely’ or ‘very likely’ to utilise such a service for general waste, while 205 (32%) gave the same responses for recyclable waste.

The territorial authority survey found that the councils of 27 out of 53 respondents (51%) were already providing rural drop-off points for general waste, while a further 10 (19%) would consider or are prepared to do this.

The councils of 31 out of 52 respondents (60%) were already providing rural drop-off points for recyclables, while a further 12 (23%) would consider or are prepared to do this.

The following sections look at a number of ways in which territorial authorities have provided or are seeking to provide waste drop-off services to rural communities:

**Hastings District Council**

Hastings District Council (HDC) Waste Minimisation Planner Angela Atkins says that HDC decided several years ago that their focus on urban waste collection was too narrow, and so began a process of trialling different options and consulting with rural communities to capture domestic rural waste streams.

Wheelie bins were used at two sites to collect recyclables over a two-year period and it quickly became obvious to HDC that the rural communities in which the trials took place were more than willing to utilise these services. One site collected about 20 tonnes of recycling each year, whereas the other collected about 80 tonnes each year.

As a result of community feedback HDC created custom ‘Green Bins’: converted 20-foot shipping containers with up to six compartments for different recyclable waste streams including plastic and cans, paper and cardboard, and colour-sorted glass.

The section dividers in the Green Bins can be shifted to accommodate uneven waste stream volumes, and the slot openings have been specifically designed to avoid contamination from larger items, such as rubbish bags. In fact, says Atkins, the engagement of local community champions to oversee the bin sites has meant that there has been very little illegal dumping thus far.
The bins cost about $30,000 for a six cell unit, and about $24,000 for a single cell unit. To date these costs have been funded by HDC’s accrued waste disposal levy funds and grants from the Glass Packaging Forum, the Public Place Recycling Scheme and the Keep New Zealand Beautiful Beverage Recycling Fund (Atkins, 2015). In addition to the container costs, a concrete pad and guide rails must also be constructed, as well as the steps and platform shown in the image above. When the bins are full they are simply picked up and swapped with an empty container. Servicing costs are estimated at between $99 and $238 depending on contents, which is funded by a $7 rural property rate (Atkins, 2015).

HDC has so far set-up four sites across the district for its 17,000 rural residents, but Atkins says they have three more Green Bins they would like to identify sites for as soon as possible. The popularity of the sites has spread “virally” and HDC is keen to build on this by considering other waste streams, such as providing drop-off facilities for the waste streams collected by Agrecovery and Plasback.

Atkins believes that the hub model used by HDC could work in any region, and that there is nothing unique about Hastings District that gives rise to this success. HDC aim to capture farms in a 5 to 10km radius of hubs and are planning additional locations on this basis. Atkins acknowledges that this won’t catch all rural properties, but believes it will reach a substantial proportion, and the current popularity of these services show that farmers are willing to transport waste – albeit only domestic waste to date – to a hub location.

Ultimately HDC believes that the best solution for rural waste is to capture as many recyclable waste streams as possible – without charge – at a hub, and pursue on-farm collections for general waste provided the farm is reasonably close to a transportation route.

**Marlborough District Council**

In 2015, as part of the Marlborough District Plan review, Marlborough District Council (MDC) realised that it had little data on the use of farm pits on rural properties. It was understood that some farms have pits that are well over a hundred years old and that these pose a potential environmental risk.

This discussion stimulated a desire to understand the degree to which waste management services were available to rural properties and where the gaps lie. This piece of work was undertaken in the second half of 2015.
In addition, MDC undertook community consultation with rural communities that did not have convenient access to a transfer station. Current transfer stations were mapped based on travel time and rural gaps identified and, from this analysis, the Rural Community Recycling (RCR) project was born.

MDC Solid Waste Manager Alec McNeil says the first step in addressing rural waste was to minimise travel for farmers to recycle waste. Six new sites were added, mostly at rural schools, with new ‘bank bins’ that are split into 4 to 5 compartments for different recyclable waste streams.

The RCR sites are unmanned and 24/7 and users are able to leave recycling at no charge. To ensure waste is not dumped illegally, community ‘wardens’ are paid to watch over the sites.

In the months that these sites have been operating, the RCR project has taken in 300 tonnes of recycling with no equivalent downturn in volumes at the Blenheim-based Resource Recovery Centre. The conclusion from this, says McNeil, is that waste is being recovered that would have otherwise gone into landfill or farm pits. This result, in conjunction with very low contamination rates, has given a sense of optimism to the project as a strategy for domestic rural waste. MDC are now considering whether this solution may be useful in other rural areas.

In parallel with the RCR project, MDC has also begun construction of a $3 million ‘Commercial Industrial Sorting Facility’ (CIF). The CIF, which is currently under construction and due for completion in November, 2016, aims to capture commercial waste including farm waste such as vineyard posts and irrigation pipe. Where an existing service provider such as Agrecovery can already handle waste farmers will be directed to use these services instead. Subject to this restriction, McNeil says the MDC is focused on getting as much volume as possible through the CIF and would happily take mixed waste bins from farms.

All waste will go over a part-manual, part-automatic sort line and recyclables will be removed. Users will pay $110+GST per tonne regardless of the type of waste being disposed of, and MDC is aiming for 60% waste diversion from landfill by 2017.

McNeil says some waste outlets have been found, but they are continuing to find new ones and will not have all of these locked down until the waste composition is known once the CIF is up and running. One potential outlet is for waste wood to be used to build or repair Department of Conservation huts. Certainly, “creative local outlets” are being sought, although MDC are not averse to exporting recyclable waste if this is the best option. One aspect of waste processing the CIF will be focusing on is cleanliness of waste outputs to provide uniformity of supply to users. This will aid in both securing and retaining output markets.

It is acknowledged that, while the CIF provides a useful destination for farm waste, this does not solve the problem of transportation. McNeil says that most farmers will not have the volume of waste to justify a skip bin on site and, even if they did, the transportation costs would be prohibitive. Farmers that seek to dispose of waste off the farm will, in all likelihood, use their own trailers to bring waste into the CIF. The cost of doing so, combined with the gate fee, is likely to cause some issues.
McNeil recognises that many farmers believe that, as they are required to pay rates, they should be able to dispose of waste for free, but that this view has to be balanced with the fact that farming is a commercial activity and commercial enterprises have to pay for a commercial waste collection. Ultimately it is recognised that farm waste is something of a ‘special category’ and McNeil says MDC may consider allowing commercial, recyclable waste to be dropped off at the local hubs as a way of “meeting farmers part-way”.

Ashburton District Council

Craig Goodwin, Waste Recovery Manager at Ashburton District Council (ADC), says that the council’s focus on rural waste came from an analysis of waste data undertaken several years ago. The data suggested that the waste going to landfill per capita in Ashburton District was extremely low, which was taken as indicating that a lot of waste in rural communities was being disposed of in farm pits. As a result, in 2011, rural waste became a priority in the council’s Waste Minimisation and Management Plan.

ADC’s focus in terms of rural waste has been on behaviour change. The council is keen to promote better rural waste management across all aspects of farming, but is focused on domestic rural waste based on the view that by engaging farmers at this level initially, broader efforts that will encompass commercial rural waste streams will follow.

ADC has provided rural recycling drop-off points for some time, but Goodwin believes these did not operate to their potential for a number of reasons. Locations were not always desirable and many farmers would have to travel considerable distances to dispose of waste. The drop-off points also operated by using a number of potato boxes to collect waste, which meant farmers would need to spend considerable time sorting waste into the appropriate bin. Transportation costs were also high as contractors would need to use a rear load truck to pick up the boxes separately, and ensure they stayed separate, until properly disposed of.

The new strategy is based on a number of significant changes. Firstly, sites have been selected that are already on a key transportation route. Goodwin says that ADC has the longest roading network of any district council in the country (2,700km) and must carefully consider where to put these depots. 10 rural sites have been set up at places where farmers are already going, and as many as 9 additional sites will follow. Intersections on main roads where children are being dropped off in the morning for school bus pick-ups are key locations as “parents are going there anyway”. By selecting such sites, ADC is aiming to reduce transportation costs and movements, and ensure the locations are as convenient for farmers as possible.

The other key change ADC is implementing is the use of co-mingled recycling front-load bins which do not require farmers to separate recycling and are easier, quicker and cheaper for contractors to collect. The waste is taken to Timaru where it is sorted by a waste contractor into different waste streams for recycling.

As a result of the different approach, which was launched in February 2016, far more waste is being collected off farms. In Methven, the amount of waste collected doubled in a single month. Goodwin acknowledges that the system does not currently address commercial farm waste streams but says that the intention is to offer space for commercial operators such as Plasback or Agrecovery to place collection bins at the satellite sites for the convenience of farmers. Such space would be offered at a “peppercorn rental”.
ADC is very keen to explore other such partnerships and find ways to capitalise on the level of awareness they have achieved. They are very keen to see this awareness grow and prompt the recycling of commercial farm waste streams.

Kaikoura District Council / Innovative Waste Kaikoura

Innovative Waste Kaikoura Limited (IWK) began in 2000 as a partnership between a local community group and Kaikoura District Council. It was subsequently purchased outright by Kaikoura District Council.

IWK is primarily focused on recycling of domestic rural waste and has established drop-off hubs at a number of local schools for domestic waste from rural families. IWK Manager Rob Roche says that farmers have treated these hubs very well and separated waste effectively because they understand “if they abuse it they will lose it”.

The hubs only handle recyclables such as plastics, cardboard and bottles which can be dropped off at no charge. No general waste is allowed. Roche says farmers are more than willing to bring waste into town rather than to have to pay for it.

More recently, IWK has begun to consider more commercial forms of rural waste. Roche says they are very supportive of Plasback’s service and have begun to allow farmers to bring agricultural plastics into their facility in Kaikoura. Farmers are able to do this without paying a disposal cost, but plastics must be in a Plasback bag which costs $15 + GST. Once sufficient volumes have been collected IWK transports this to Plasback’s recycling facility in Christchurch.

Roche says IWK is very open to expanding their activities to consider other waste streams, and to supporting other waste programmes such as Agrecovery, but they have not yet actively pursued these opportunities.
Permanent Collection Hubs: Agrecovery (Agricultural Plastics) – Also One-off Collection Rounds

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The Agrecovery Foundation was established in 2005 to “address persistent on-farm waste issues” by collecting unwanted agrichemicals and containers for which a collection levy has been paid. Agrecovery is a non-profit charitable trust and its collection services for small containers and agrichemicals are accredited Product Stewardship Schemes under the Waste Minimisation Act 2008.

Agrecovery programmes are governed by the Agrecovery Foundation, a board that comprises representatives from AGCARM (the New Zealand Association for Animal and Crop Protection), DairyNZ, Federated Farmers of New Zealand, Horticulture New Zealand, Rural Contractors New Zealand, Waikato Regional Council (on behalf of Local Government New Zealand) and an elected representative from among agrichemical distribution companies (Agrecovery, 2016). The contracted programme managers are Hastings-based 3R Group.

Agrecovery provides a mix of fixed and flexible container collection sites. There are currently 44 fixed collection sites for smaller containers (less than 60L) in the North Island and 28 in the South Island (see Figure 11). 62 companies participate in Agrecovery and charge a 12c per litre levy on their products, which is passed to the Agrecovery Foundation. These participating companies represent over 3,000 common agrichemical, animal health, hygiene and nutrient products for which collection and recycling of plastic is fully funded. Any of these participating brands’ waste agrichemicals that fall within a limit of being less than two years past expiry are also able to be collected and safely disposed of.

![Image](image.jpg)

**Figure 18: Agrecovery Container Collection Network (Source: Agrecovery)**

Drop off of containers less than 60L at collection sites or at regional events is free when from a participating brand. For other brands a fee is charged of $2 + GST per 10L container capacity (i.e. $10 + GST for a 50L container). User pays fees are currently $18.50 + GST for a drum or $70 + GST for the larger Intermediate Bulk Containers (IBCs) up to 1,000L. Such transactions are directly with 3R Group and not part of the Agrecovery programme itself.
Farmers participate in the agrichemical collection programme by registering the chemicals held and waiting for a local collection, which occurs every 12 – 18 months. During that time funding for the collection is applied which can be a mix of Agrecovery Levy, Council Funding or user pays fees.

Farmers participate in the container programme by either arranging for an on-farm collection, participating in a local collection event, or by dropping off containers at one of Agrecovery’s nationwide network of container drop-off depots. Quantities of at least four larger drums, IBC containers, or large volumes of smaller containers are directly collected from the farm. When farmers first interact with the programme they are issued with a membership number against which all of their activity is recorded. Recycling reports are then available for the purposes of on-farm audits.

Agrecovery advises that user-pays activity for containers (less than 60L) from brands that sit outside the programme, is only 5% of overall volume. In 2014/2015 approximately 75% of containers were received at collection centres, 18% via on-farm collection and 7% via one-off events. The recent farmer survey undertaken as part of this project found that 269 respondents (43%) had utilised Agrecovery services.

All containers must be empty and triple-rinsed, still possess the original label (to qualify for free collection), and have any lids or handles removed. Containers are inspected before being accepted for recycling. Currently Agrecovery states that they collect about 60% of containers in the horticultural sector and about 15 – 20% of containers in the pastoral sector.

It is understood that, over time, more and more agrichemical containers are coming onto the market. While some products are now going to rural contractors in larger containers – meaning more reuse and less waste – there is a general trend in agrichemicals towards removal of water and more concentrated chemicals, resulting in smaller and potentially larger numbers of containers.

Opportunities to redesign such containers are likely to be limited as only one chemical manufacturer is New Zealand based, while the rest are imported into New Zealand. It is also unlikely that manufacturers will be focused on the recycling of packaging, outside of the involvement of most in Agrecovery, but will instead be focused on product packaging-related safety issues. Changing packaging may present an increased user risk and is unlikely to be considered by chemical companies in the absence of a legislative imperative.

Containers collected by Agrecovery are processed and granulated either on site or at one of three depots, and the plastic blown into 1 tonne bags for ease of transport. Agrecovery states that it delivers the plastic to Astron Plastics where it is generally made into underground utility cable cover, and that this is an audited pathway for chemically contaminated plastic. The revenue from sale of plastic helps offset the costs of the programme.

Over its operational lifetime Agrecovery states that it has collected over 75 tonnes of unwanted or expired agrichemicals and 1,000 tonnes of container and drum plastic (AgRec, 2015). This volume is split approximately evenly between North and South Island operations. In the last three years the number of farmers utilising Agrecovery services has gone from 9,108 to 12,100, an increase of 33%.

According to its 2014/2015 annual report, Agrecovery generated a surplus of $191,403 on revenue of $1,626,988 in 2014/2015, compared to a surplus of $261,685 on revenue of $1,585,586 in 2013/2014.
In 2014/2015 93% of revenue came from brand owner levy funding and less than 5% from the sale of plastic. 3R Group’s expenses of $1,307,513 for 2014/2015 represented 91% of operating expenditure (Agrecovery, 2015).

![Figure 19: Agrecovery Plastic and Chemical Volumes (Source: Agrecovery)](image1)

The historical collection rates and costs of the programme can be seen in the following chart:

![Figure 20: Agrecovery Costs and Collection Rates (Source: Agrecovery)](image2)
Simon Andrew, who is a Business Manager for Federated Farmers but provides administration and financial management support to the Agrecovery Foundation as part of Federated Farmers’ involvement in the programme, acknowledges that Agrecovery achieves low collection rates and is expensive in comparison to similar schemes operating internationally.

Andrew considers that this is a result both of the absence of legislation to compel participation in the programme and of the “long and thin” geography of New Zealand which complicates transportation logistics. Even allowing for the absence of supporting legislation though, Andrew points out that comparable international schemes achieve 60% collection rates – indicating the proportion of calculated target waste streams collected – whereas Agrecovery only achieves a little over half of this overall.

Andrew also notes that international programmes provide services at a “considerably cheaper” rate per kg of waste recovered than the costs incurred to operate Agrecovery. Andrew says the average cost for collection globally is less than US$1.00 per kg, with the average for comparable programmes in Canada and Australia being around US$1.25 per kg. New Zealand’s cost exceeds US$4.00 per kg.

In order to address these internal concerns Agrecovery is reviewing its operations and considering how costs can be managed. Part of this process will be a competitive tender process for the contracts that make up service delivery in late 2016.

Duncan Scotland of 3R Group, who are the contracted service delivery party for Agrecovery, also notes that take-up rates for the recycling of containers are much lower than would be expected for what is typically a free service. He suspects that convenience is a major issue, but believes that even if containers were to be collected from farms, many farmers may not want trucks on their properties. 3R Group states that their customer research has confirmed that farmers would rather drop off containers than have them collected. The opposite is the case for the agrichemical collections where demand exceeds the available funding for collection.

Outside of this issue Scotland notes that, while a large number of companies participate in the programme, there are five major agrichemical companies that do not. Adding these in, he believes, “would double collection volumes in two years” by avoiding on-farm confusion as to what containers are free for collection.

The primary reason for non-participation, Scotland believes, is cost: a large agrichemical company may have to pay $100,000 a year to be involved. The detriment in such non-participation is that Agrecovery will only accept containers without cost from participating companies and farmers must determine whether the containers they are dropping off at collection centres are from the right brand. Clearly this is not an ideal situation for farmers and is likely to lead to frustration. Cost is also apparently an issue for farmers, and Scotland says that in situations where farmers have to contribute financially to waste collection or recycling, take-up is extremely low.

As it considers its future, Simon Andrew confirms that Agrecovery is open to considering other waste streams, providing these are essentially “self-funding”. Agrecovery recognises that it has invested significantly in creating a national network of collection sites and, to a lesser degree, on-farm collection logistics and would like to evaluate the merits of receiving agricultural plastics such as silage wrap.

Part of the concern in considering expansion, however, would be the reaction of those agrichemical companies that currently charge and contribute levy funding to the operation of Agrecovery. It is likely that they would perceive such expansion as them effectively cross-subsidising the collection of other waste streams.
Andrew says, in relation to considering other waste streams:

“The Agrecovery Foundation is currently undertaking a procurement process for the operational delivery of the Foundation’s three current waste streams; containers, drums and agrichemicals. Concurrently, the Foundation is also looking to investigate how the scheme will be managed at a programme management level. The Foundation is currently funded to operate three waste streams; containers, drums and agrichemicals. However, the Foundation also sees potential in operating as a vehicle in which to generate greater outcomes for rural waste minimisation by providing solutions for additional waste streams. This supports the Foundation’s mission which is to act as a respected and credible leader for agricultural waste reduction. Operating further waste streams would be subject to attracting further funding and ensuring no cross-subsidisation for current programme funders. Overall, Agrecovery is keen to be the vehicle that enhances on-farm waste reduction and recycling through horizontal integration.”

Scotland says 3R Group is not interested in considering involvement with collection of silage wrap and similar plastics as they previously had an unsuccessful involvement with these waste streams. The key reason for this was, according to Scotland, that the scheme they operated was mainly user-pays with only limited brand owner funding and farmers treated it as a “rubbish collection service as opposed to a recyclable resource”. Scotland believes that such a model can work, but only with very high user take-up, recognition of the resource value and economies of scale.

Despite this experience Scotland is confident that Agrecovery could add in a number of waste streams including oil and oil containers, sharps and dairy rubber wear. The advantage of Agrecovery doing so, according to Scotland, is that “farmers want one provider to do everything” rather than dealing with a different entity for each waste stream. He considers that providing farmers a consistent customer experience for all waste streams is a critical component in a sustainable alternative to burning or burying farm waste. Scotland says that some of the waste streams such as waste oil containers, which must be kerosene rinsed before recycling, would be difficult to create a compelling business case for.

Scotland believes that bringing together brand owners around particular waste streams in the form of product stewardship is the only sustainable way to address rural waste issues nationally. He also believes Agrecovery is in a strong position to build on its existing model and infrastructure to partner with brand owners in reducing the amount of farm waste being burned and buried.

Overall, Agrecovery Foundation’s Simon Andrew believes that Agrecovery is doing particularly well in the following ways:

- The scheme works well in the horticulture and arable sectors, largely due to Sustainable Winegrowing NZ, Global GAP and NZ GAP certification requirements.
- The brand is recognisable and trusted.
- Governance is strong with representation from all stakeholders.
- Good relationships with levy payers.

Andrew believes the main areas for growth for the programme are:

- The programme is currently expensive when compared to schemes overseas.
- Current roles and responsibilities need further refinement.
Opportunities exist for improvement in service provision.

Reducing costs and improving service provision may increase commitment from the pastoral sector.

Retail Store Drop-off: Rural Stores (Multiple Waste Streams)

Waste Categories:

| Hazardous Wastes | Soft Plastics | Hard Plastics | Metal | Other Wastes |

The recent farmer survey undertaken as part of this project found that 363 respondents (56%) were ‘somewhat likely’ or ‘very likely’ to return recyclable materials (such as plastic containers) back to the place of purchase.

The following sections explore the opportunities to initiate such arrangements with leading rural stores in New Zealand:

PGG Wrightson

PGG Wrightson is a publically traded company that was formed in 2005 as a merger of Pyne Gould Guinness and Wrightson, both of which have long histories in the agricultural sector (PGG Wrightson, 2016). PGG Wrightson has 96 stores throughout New Zealand (from Kaitaia to Invercargill) and has a particular focus on the sheep and beef, and horticultural sectors. In addition, PGG Wrightson is understood to sell a significant proportion of the agrichemicals sold in New Zealand.

PGG Wrightson has been a supporter of Agrecovery since its inception, being one of the brand owners that participates in both the chemical and container aspects of the programme. PGG Wrightson also provides container collection points at 13 of its stores for receipt of triple-washed containers ready for Agrecovery to process.

There are currently no known plans in place to pursue additional involvement in rural waste, but PGG Wrightson is understood to be very open to exploring opportunities in this space.

Farmlands Cooperative

Farmlands Co-operative Society Limited is owned by 63,000 farmer-shareholders throughout New Zealand and has a network of 83 rural stores (Farmlands Cooperative, 2016). In the 2014/2015 financial year Farmlands had a total turnover of $2.5 billion (Farmlands Cooperative, 2015).

Farmlands Director Strategy and Communication Colm Hamrogue says the strength of Farmlands is that it services all rural sectors including dairy, beef and lamb, and horticulture. As part of this service Farmlands employs 150 Technical Field Officers that provide on-farm advice to their shareholders and can potentially be conduits for information on waste services.
Farmlands is eager to take a leadership role in addressing farm waste from “the farmer’s perspective” and this features as a current strategic priority for them. An outline for achieving this has already been initiated, with 14 Farmlands sites nationwide currently hosting an Agrecovery collection site and another two hosting “collection events”.

Farmlands wants to build on this by continuing to support a rationalisation of services for the collection of different rural waste streams. Hamrogue believes coordinated services would be more convenient for farmers and would form part of Farmlands’ focus on “taking cost out” of the process so good waste management practices are cheaper for farmers.

As yet, Farmlands does not have a defined strategy for addressing farm waste, but Hamrogue says that they are very open to partnerships around rural waste, provided services “are not brand specific, which tends to annoy farmers”.

**Retail Store Drop-off: Recovering Oil Saves the Environment (ROSE) (Waste Oil)**

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<tr>
<th>Waste Categories:</th>
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<th>Hard Plastics</th>
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The Recovering Oil Saves the Environment (ROSE) scheme began in 2010 and was approved as a recognised product stewardship scheme under the Waste Minimisation Act in 2011. ROSE has a number of major partners that participate in the scheme including BP, Mobil, Mazda, Total Lubricants and Chevron. The scheme is delivered by Salters Cartage (upper North Island), Petroleum Services (lower North Island) and Fulton Hogan (South Island).

The recent farmer survey undertaken as part of this project found that only 5 respondents (0.8%) had utilised the ROSE scheme.

Salters Cartage (SC) provides free oil and oil filter collection and recycling services from Cape Reinga to Turangi under the ROSE scheme. This occurs primarily through the provision of 1,000L oil collection tanks (pictured at right) which are collected on an agreed regular round as required. Given the size, these tanks tend to be supplied to commercial businesses, such as service stations and workshops, in cities and towns in Auckland, Northland, Bay of Plenty and Waikato.

Oil filter collection is serviced through the provision of a 240L drum that is filled with waste filters. When full the drum is collected and the filters “squashed, drained, washed and scrapped in a contained compound that meets strict environmental guidelines” (Salters Cartage Ltd, 2016). SC does not typically pick up waste oil or filters from individuals or small enterprises because of transportation costs but say they are always willing to consider a proposal that is commercially viable.
Fulton Hogan (FH) handles oil recycling for the ROSE scheme in the South Island. This is done both through bins at Supercheap Auto stores (which are urban-based) and through collections directly from farmers.

Reuben Harrison, Department Manager Refuelling and Used Oils for Fulton Hogan, says that FH will typically pick up used oil from a rural property at no charge if the volume exceeds 200L. This places the collection outside of the norm for most farms and tends to be focused on rural contractors, logging operations or particularly large commercial farms. Overall, FH picks up used oil from very few farms.

The oil that FH collects, either from retail stores or directly from farms, is used as a low grade burner fuel in FH’s asphalt production process. Harrison says that FH is able to extract good value from this used oil in the South Island - and hence does not need to charge for collection - but this is not the case in the North Island where the use of inexpensive natural gas in burners means that used oil has less appeal. Beyond this, says Harrison, farmers will usually need to take waste oil to transfer stations, some of which will have low maximum limits on what can be accepted.

FH currently passes any oil filters they receive on to Christchurch-based Filter Crusher NZ (FCNZ), owned and operated by Merv Ferguson. FCNZ operates between the Waimakariri and Rakaia rivers, covering Selwyn and Ashburton districts, and focuses primarily on the collection of filters from commercial workshops. When filters are collected, the oil is drained and recycled and the metal crushed and recycled separately. Ferguson says that the average farm will only go through 5 or 6 filters a year so any kind of individual service delivery would be uneconomic. Instead, he believes that having a drum for oil filters and a tank for oil at rural stores would be an easy and cost-free way to capture this waste. FH’s Reuben Harrison agrees.

FCNZ and FH are open to conducting a trial of collection points at one or more rural stores in FCNZ’s operational area to see if the concept has merit. They would pick these up at no cost and ensure they were recycled, and could do so regularly based on current transportation routes. Harrison says that there are some compliance requirements around handling and storing these materials, largely around being able to track who deposits materials, but says these are relatively easy to meet.

The challenge in potentially placing ROSE collection containers at rural stores around New Zealand would be ensuring that farmers understand that other chemicals, such as antifreeze, cannot be mixed with the oil, as this causes significant issues to the recycling process. This challenge is no different than that presented by having ROSE collection bins at Supercheap Auto stores however, and these bins are understood to work well. Any expansion of the ROSE programme would, in addition, depend on volumes being sufficient to justify the effort involved.

### Retail Store Drop-off: PaintWise / Dulux Paint Take-Back Scheme (Paint)

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<th>Waste Categories</th>
<th>Hazardous Wastes</th>
<th>Soft Plastics</th>
<th>Hard Plastics</th>
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Resene PaintWise is an accredited voluntary product stewardship scheme under the Waste Minimisation Act 2008 and is managed by Hastings-based 3R Group Ltd. Paints can be dropped off at Resene ColourShops throughout the country, of which there are currently 44 in the North Island and 17 in the South Island. Almost all of these are in main centres.

In terms of the end use for paint received, Resene sends “good quality Resene paint to community groups for reuse, recycle[s] packaging materials that are recyclable, send[s] solvent-borne paints to solvent recovery, find[s] alternative uses for waterborne paints, such as graffiti abatement, and dispose[s] of the rest...” (Resene, 2016).

PaintWise is funded by a levy of 15c per litre on Resene paints. The levy is received by Resene and paid to the non-profit Resene Foundation. Resene says the service is not profitable and that it directly contributes to the operation of PaintWise to fund its deficit and avoid the requirement for a higher levy. Non-Resene products can be received, but a cost of $1.00 for up to a 4L container, or $2.50 for a 10L or larger container, must be paid. All paint must be in original and correctly labelled containers and well-sealed. No other chemicals or aerosol cans can be disposed of through the programme (Resene, 2016).

In 2014, after ten years’ operation, PaintWise had (3R Group, 2016):

- Sent 500,000 litres of paint for solvent recovery.
- Donated over 190,000 litres of paint for social projects or to cover graffiti.
- Recycled over 400 tonnes of steel and 200 tonnes of plastic.

Conversely, Dulux’s Paint Take-Back Service is not an accredited product stewardship scheme, but is endorsed by the Sustainable Business Council and the New Zealand Green Building Council. Paints are disposed of or recycled by Dulux in much the same manner as Resene. Dulux allows its own brand paint to be dropped off at no charge, while other brands attract a fee of 25c per litre. Where larger quantities of paint are to be recycled (more than 20 units) Dulux will collect these, regardless of brand, for a fee of $100 plus 25c per litre. As with PaintWise, paints must be labelled and in original containers, and aerosols are not accepted (Dulux, 2016).

All of Dulux’s 17 trade centres, at which any paint must be dropped off, are in main centres, with half being in Auckland and only three in the South Island. This is likely to prove quite inconvenient for any farmers wishing to participate.

The recent farmer survey undertaken for this project shows that neither Resene’s nor Dulux’s take-back programmes are well utilised by farmers. PaintWise had been utilised by 11 respondents (1.8%) while Dulux’s Paint Take-back Service had been utilised by 9 respondents (1.4%).

**Retail Store Drop-off: Fonterra (Sharps)**

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<th>Waste Categories:</th>
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<th>Soft Plastics</th>
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One of the priority waste streams under this project is sharps – particularly needles from animal treatments. A number of New Zealand service providers including Interwaste, Fumacare and Waste
Management Technical Services offer sharps disposal bins which farmers could use but, to date, there has not been a service focused specifically on waste sharps from farms.

In response to a perceived need around disposal of sharps, Fonterra – in conjunction with the Waikato Regional Council - have recently launched a pilot project with 30 of their supplier dairy farmers. The farmers are being supplied a 1.4L wall-mounted sharps container with built-in features to ensure the safety of users. The plan is for farmers to utilise the containers for twelve months and then to drop them at a participating local veterinary clinic. The veterinary clinic will then ensure the needles are safely disposed of following usual practices.

Fonterra advises that the estimated cost for the container and disposal is about $10, and they will conduct a survey after the pilot to determine whether farmers would be prepared to pay for such a service. The pilot will run from June, 2016 to June, 2017.
4.2. RURAL WASTE PROCESSING OPTIONS

This section considers the current options available for rural waste processing or disposal. The options shown are not meant to be exhaustive, but rather representative of the primary options available to farmers. It should be noted here that options have not been sought for wastes that have well established and well known and accepted avenues for recycling or reuse, such as glass, and wood-chip animal bedding that can be readily composted. Likewise, untreated timber offcuts are not a focus as they can be safely used as a heating source for farm houses.

Each of the organisations profiled in this section were provided with the opportunity to check and correct any inaccuracies in the information shown below.

4.2.1. Reduction, Reuse and Recycling Options

This section profiles those waste processing options that primarily involve waste being recycled (converted into useful materials) or reused (for the same or a different function).

Reduction of Waste: Multiple Providers (Biodegradable Plastics)

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In 2014 New Zealand-based students Sam Reynolds and Rebecca Elmslie sought a James Dyson Foundation award for edible silage wrap. The experimental wrap, made from flax and hessian, is designed to be laid onto pasture to allow it to ferment and be eaten by livestock. The concepts for the wrap also included adding supplemental nutrients to the product, such as salt to replace the currently used salt licks (James Dyson Foundation, 2016).

The benefits of the wrap were postulated as being not only environmental, but also economic as the farmer saves not only the cost of recycling silage wrap, but also the costs associated with supplementary feeding to animals. At the stage of seeking the award the edible wrap was still very much in development and, having not won the award, no further information could be found as to the development of the concept.

Earlier in 2016, though, a group of British PhD students entered Imperial College London’s Venture Catalyst Challenge competition with a similar edible silage wrap concept that provides nutritional content for livestock (Imperial College London, 2016). The technology uses an edible biopolymer and the students plan to add in nutrients or probiotics to increase the wrap’s value. They believe the wrap will be being tested on farms over the next two years with plans to launch the product somewhere between 2019 and 2021 (Farmers Weekly, 2016).

This concept has apparently been considered for some time. A 2001 article mentions the new development of a ‘corn zein’ based edible bale wrap being produced in the US, although there is no subsequent record of it being commercialised (Farm and Dairy, 2001).

Despite the absence of information as to whether these concepts for biodegradable silage wraps have proved successful there are apparently a number of such products available for purchase from China. Closer
inspection, however, reveals that the wraps are made from traditional plastics and the claims of biodegradability appear spurious.

**Reuse and Recycling of Waste: Local Community Groups (Multiple Waste Streams)**

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Community organisations such as Canterbury Wastebusters and XtremeZeroWaste are particularly adept at, and motivated to, find reuse or recycling avenues for rural waste streams. Both of these organisations, and others like them, endeavour to find reuse opportunities for non-hazardous waste streams such as untreated wood offcuts, which can be used for construction. XtremeZeroWaste looks to repair and add value to waste where possible, and sell this to provide revenue for the organisation.

Ultimately, the options for reuse are somewhat limited by the nature of most rural waste streams, and recycling is a more frequent pathway for these wastes. Most of the priority waste streams being recycled by community organisations tend to be managed in similar ways to other options profiled in this report.


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In 2014 EnviroWaste Services (EWS) acquired Mastagard and, with it, a plastics recycling plant which had not yet operated successfully. Over the last year EWS has worked on securing feedstock for plastics recycling, confirming the plant works to expectation, and ensuring sustainable and profitable output markets for recycled plastics are in place. General Manager Market Development and Sales for EWS’ parent group EnviroNZ Dave Elder says all of these elements are now in place, and the plant is “just about to begin operations”.

EWS has assembled a full end-to-end production line for recycling polypropylene (PP) and polyethylene (PE) plastics and turning them into a raw material for use in the manufacturing of new plastic products. The source material is currently used PP fertiliser bags, supplied through EWS’ partnership with fertiliser companies Ravensdown and Ballance, although EWS are also planning to capture other PE plastic waste streams, particularly silage wrap.

In the last eleven months, since collection began, EWS has amassed 1,200 tonnes of PP fertiliser bags. These are baled and stored at several EWS locations, including the storage yard at the Christchurch facility where the recycling plant operates.

![Figure 23: Polypropylene fertiliser Bags awaiting recycling at EnviroWaste's Christchurch facility](image)
Through its relationship with Ravensdown and Ballance EWS has secured a reliable supply of these bags and is receiving approximately 150 tonnes of bags per month. The relationship with these companies arose as both independently changed their fertiliser bags from multiple use to single use (for health and safety reasons) and were motivated to find a way to recycle them. These new relationships provided the sustainable feedstock source for the plastics recycling plant that EWS required to ensure economic viability.

The fertiliser bags are initially placed into a shredder on EWS’ new line at a rate of 1 – 2 bales an hour. They then proceed through a multistage washing line to remove any contaminants. The process is able to handle a fairly high degree of contamination in the feedstock.

The plastic is then rinsed and ‘squeezed’ to remove excess water. It is then sent to the manufacturing stage of the process to be converted into pellets.

During this phase the plastic proceeds through another sophisticated filter that removes any remaining contaminants or other plastic types to ensure an extremely consistent end product. Other additives such as colour dyes or UV stabilisers can be introduced at this stage, if required, depending on the end use of the plastic output.

The plastic is then ‘pelletised’ and sent to a baling machine ready for transportation. The output of the process is approximately 500kg per hour, with an approximately 1m$^3$ bale taking about an hour and a half to fill.

EWS says the output product will be primarily used in the production of irrigation pipe for the agricultural market in New Zealand. There is an additional agricultural use that has been “locked in” and they are in negotiations with one other customer that is also interested in purchasing the recycled plastic. Elder says there is “absolutely no doubt” that they have sustainable and committed markets for the plastic.

Part of the attraction of this product to purchasers is the fact that recycled PP typically costs a third less than virgin plastic, which currently costs between $1,500 and $1,800 per tonne. Elder also says that, as EWS moves into processing silage wrap and other PE plastics, they will be supplanting virgin PE that costs even more, at $1,800 to $2,100 per tonne. EWS has recently received the results of quality testing on the plastic, and it is now “tested and approved to international standards”.

Figure 24: The washing stage of EnviroWaste’s Plastics Recycling Plant

Figure 25: Manufacturing stage of EnviroWaste’s Plastics Recycling Plant

Figure 26: Output plastic pellets from EnviroWaste’s Plastic recycling Plant
Integral to EWS’ plans for the plant is the fact that it can handle both PP and PE plastics with relative ease. The capacity of the plant is approximately 4,000 tonnes per year, based on a three shift, 24-hour operation. EWS has calculated that breakeven operation occurs at ‘one shift’ level, or 8 hours a day, giving a minimum target throughput of 968 tonnes per annum. Currently they are receiving PP bags to an annual level of approximately 1,800 tonnes per annum, leaving excess capacity of about 1,200 tonnes per annum. This is capacity, says Elder, that silage wrap and other PE plastics will fill to ensure the plant is used to its potential. Should additional capacity be needed EWS are very willing to invest in an additional plant.

EWS are currently working with several partners, including Ravensdown and Ballance, to ensure they can secure a reliable supply of PE before adding this into their operation. This is considered a higher value product than PP, and Elder says there are strong markets for recycled PE, but EWS want to ensure the plant is operating successfully with PP before diversifying.

Elder reports that the plant has been tested successfully and is now being independently evaluated from a health and safety perspective before commencing operation in earnest in October, pending final board sign-off and the arrival of a final piece of equipment being sourced internationally. EWS’ owners have made significant investment in the success of this technology.


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Astron Plastics, which has plastics recycling facilities in Melbourne, Sydney, Brisbane, Auckland and Christchurch, collects plastic scrap and recycles it into underground cable covers accredited to international standards (Astron Plastics, 2016).

Astron is currently the recipient of plastics from Agrecovery and is planning to trial processing of silage film and HDPE vine nets from Plasback. Astron’s ability to begin processing these waste streams is enabled due to its 2015 Ministry for the Environment Waste Minimisation Fund grant for a new dry-cleaning facility. This $510,000 grant to Astron enables it to process up to 2,000 tonnes of soft plastics each year in Auckland (Stuff, 2015).

Astron Business Manager Steve Mead says that waste rural plastics are a core market for them and they are motivated to recycle both hard and soft plastics through their relationships with Agrecovery and Plasback. Mead says the new dry-cleaning facility is being commissioned in the next few months and should be operating late in 2016.

This plant can reportedly handle a significant degree of contamination from farming activities. The technology has been trialled internationally with contaminated plastics and has performed well. While it has yet to be trialled with contaminated soft plastics in New Zealand, Mead says Astron are confident it will perform well.

The intention with soft plastics, if the trial with Plasback is successful, is for these to be recycled into both cable cover and also potentially into films such as builder’s wrap or back into silage wrap. Currently cable cover is the destination for hard plastics from Agrecovery because of the slight possibility that trace quantities of agrichemicals may be present. Cable cover is a safe use of such recycled plastics. Soft plastics
such as silage wrap do not present such a safety issue and so the potential output products may be different.

Mead says Astron’s current strategy is to work with others such as Agrecovery and Plasback that have collection logistics already in place; however, Astron is open to all opportunities in the rural sector.
4.2.2. Energy Recovery from Waste Options

This section profiles those alternative waste processing options available in New Zealand that primarily involve waste being transformed into a form of energy whether stored or used immediately.


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<th>Waste Categories:</th>
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<th>Soft Plastics</th>
<th>Hard Plastics</th>
<th>Metal</th>
<th>Other Wastes</th>
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Waste Transformation Limited (WTL) is a privately owned New Zealand company that brings together a number of organisations with extensive experience in utilising pyrolysis technology. Pyrolysis converts wood into charcoal by applying heat (at a relatively low temperature) to wood in the absence of air. WTL’s process is ‘batch pyrolysis’ which focuses on the production of charcoal-like biochar, as opposed to slower processes which focus on oil production. Originally created to handle waste tyres, WTL’s units are now focused on a range of waste streams including green wastes and treated timber and are, in theory, capable of handling any organic waste streams.

**Figure 27: WTL Plant at Redruth Landfill in Timaru. One chamber has been removed for waste loading.**

WTL was identified and evaluated as part of Environment Canterbury’s 2013 Treated Timber Waste Minimisation Process. WTL was considered to have a very strong business model, high managerial capability and a strong understanding of the processes required to turn waste into energy (Scott, Treated Timber Waste Minimisation Project - Milestone 3.1 Potential Scenarios, 2013).

In 2014 WTL formed a relationship with Timaru District Council (TDC) and located one of its portable pyrolysis units

**Figure 28 - Biochar produced by WTL at Timaru plant**
at the Redruth Landfill. This unit, built into a 20 foot container, consists of four pyrolysis chambers and is focused on processing TDC’s timber waste, which has been estimated at 18% of total waste handled through the landfill (Jarvis, 2014). The plant is operated by a single person and requires only a small digger to load the chambers with waste. The timber does not need to be chipped prior to loading in the chambers, but must be able to fit into the chambers efficiently. WTL advises that they do in fact chip the timber in Timaru as this aids handling and increases the chamber capacity.

WTL have treated this plant as a pilot operation with a view to locating other plants at transfer stations or near landfills throughout New Zealand. Their next focus after Timaru, according to WTL CEO Mike Henare, is likely to be the earthquake demolition and rebuild waste in Christchurch, provided a suitable site can be established.

The Timaru plant has provided WTL with an opportunity to refine their design and focus on ensuring that emissions are carefully managed. They have also worked closely with TDC to secure a resource consent for discharge to air and monitor emissions closely. Henare advises that there have been no complaints around odour at Redruth and they are very confident they have made the design improvements necessary to control air discharge.

Currently the plant is processing 2t of timber waste each day, but has a daily capacity of between 5t and 6t, or twice this in a 24-hour operation. WTL have recently expanded their focus to include green waste from the landfill. A second unit that WTL say is currently processing tyres will be moved to Timaru shortly to process tyres and generate power for the local Materials Recovery Facility. Henare says the primary unit is capable of processing anything organic (carbon-based) without issue, but acknowledges that processing of diverse waste streams could raise issues and may require further research and development. Chlorinated plastics and liquids could not be processed. The latter may prove a significant challenge as waste streams become more diverse.

While the specific financial details of WTL’s current operation are commercially sensitive, Henare advises that whatever model is in place, the final processing price per tonne will be dictated by volumes of waste to be processed. The Environment Canterbury treated timber project that analysed WTL in 2013 found that the process would likely require about $200/t to breakeven, although this was prior to the establishment of the plant in Timaru (Scott, 2013).

Longer term plans are for a significant proportion of this to be generated from the sale of carbon-based outputs including charcoal as a boiler fuel (which could attract $200 per tonne) and more refined and valuable outputs like carbon black and activated charcoal, but that these revenue streams are not yet in operation.

It is probable that WTL will be able to sell its biochar products as a fuel source soon, with several potential customers in development, but for now the required revenue must be generated by a gate fee. In some locations the cost of landfilling is still low enough to make WTL’s model hard to justify. Henare says the move by some councils to limit landfills to commercial users only makes transfer stations more attractive, particularly as substantial levels of sorting is already taking place. WTL’s current model outsources the operation of a weighbridge and administration (which is handled in Timaru by TDC) so a completely ‘in-house’ business model would require additional revenue to cover these overheads.

Business model challenges notwithstanding, WTL feel confident that, given time, their units would be ideal for processing farm waste and, furthermore, that the biochar would have numerous farm uses including use in runoff trenches. Processing of farm waste could take place at local hubs or, in time, a small on-farm model may be possible.
WTL have indicated that the throughput of the plant at Timaru is really too low to be economically viable for them and that, while a single chamber unit is possible, the cost of operation requires a fully utilised four-chamber unit (as shown in Figure 27) with a catchment area larger than that achieved in Timaru. This volume requirement – which is largely prohibitive in terms of rural waste – may be substantially reduced once WTL achieves their goal of full automation but, according to Henare, this is likely to be some way off.

Ultimately, for WTL to work as a processing solution for rural waste, either waste would need to be collected from a wide area and rationalised and processed in a major centre, or WTL needs to pursue several development pathways to create a unit that will work economically at lower volumes.

Unfortunately, WTL have advised that they do not currently have the manpower or capital to look at actively pursuing application of their technology to rural waste and that it will be at least six to twelve months before they are able to do so. This is still within the timeframe scope of the project however, so progress will be monitored closely.

**Energy Recovery from Waste: Multiple Providers (Plastics to Energy)**

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<thead>
<tr>
<th>Waste Categories:</th>
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<th>Soft Plastics</th>
<th>Hard Plasctics</th>
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In 2011 Plastics New Zealand, the trade association for the plastics manufacturing industry in New Zealand, commissioned a report to consider opportunities for using waste plastics as an energy source in New Zealand.

Among its findings this report concluded (Wilkinson, 2011):

- Waste plastics have real potential as an energy source, with a calorific value in some cases higher than coal.
- Pyrolysis of waste plastics into fuel offers potentially strong returns and short capital payback periods.
- Attracting the volumes of waste plastics required consistently would be a major barrier to a plant operating in New Zealand.
- Life cycle assessments shows converting plastics to energy has environmental benefits over landfilling.
- Many international waste to energy plants are co-located with large manufacturing facilities to utilise the heat produced.
- Air emissions are likely to be a major concern for any waste to energy plant, and consenting would be the “largest non-fiscal barrier to a waste-to-energy plant in New Zealand”.
- Waste to energy plants typically operate at a minimum annual volume of 100,000 tonnes of waste. At this level the cost to construct is about $100M.

At this stage there are no known plastics to energy plants operating in New Zealand commercially and sustainably.
4.2.3. Disposal of Waste Options

This section profiles those waste processing options available in New Zealand that primarily involve waste being chemically treated and/or landfilled.

It is worth noting here that the landfill gate fees across New Zealand vary hugely, from under $100/t + GST in the Far North District to over $300/t + GST in the Mackenzie District. The average cost is about $150/t + GST.

Disposal of Waste: ChemWaste (Hazardous Wastes)

<table>
<thead>
<tr>
<th>Waste Categories</th>
<th>Hazardous Wastes</th>
<th>Soft Plastics</th>
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</table>

ChemWaste, a division of EnviroNZ alongside EnviroWaste Services, focuses on liquid and solid waste collection, treatment and disposal, with a particular specialty in hazardous and chemical wastes. ChemWaste operates facilities in both Auckland and Christchurch.

Christchurch Branch Manager Rupinder Brar says that ChemWaste receives agrichemicals, from a range of customers around Canterbury, but mainly through JBL Environmental which runs a collection service in the South Island through Agrecovery.

JBL identify as many of the chemicals as possible and provide ChemWaste with a detailed inventory. Any persistent organic pollutants, such as DDT, or chemicals which cannot be identified are sent to Europe for incineration at a cost of between $28 and $35 per kg. These chemicals are very carefully packaged and inventoried based on international standards.

Chemicals that can be identified go through a range of different processes to neutralise and render them safe. This may involve caustic or acidic hydrolysis based on the chemical group. Brar says the most common agrichemicals they see are broad leaf sprays and other weed-killers, as well as an increasing volume of alkaline and acidic washes used at dairy facilities.

Brar considers that the work done by organisations such as Agrecovery has greatly improved the way in which chemicals are handled on farms. Whereas historically many of these would have been disposed of in farm dumps – at considerable environmental risk – Brar now believes this is becoming an uncommon practice based on the availability of collection services.
Dispensation of Waste: Waste Management Technical Services (Hazardous Wastes)

Waste Categories:

| Hazardous Wastes | Soft Plastics | Hard Plastics | Metal | Other Wastes |

Waste Management Technical Services (WMTS) is the division of Waste Management that focuses on the collection, processing, treatment and recycling of liquid and hazardous wastes. Through their processing bases in Auckland, Wellington and Christchurch WMTS receive a wide range of hazardous waste streams, including agrichemicals. WMTS also has smaller branches in Tauranga, Whakatane, Rotorua and Palmerston North.

Christchurch-based Key Account Manager Dean McGregor says that the only real rural waste stream WMTS receives is agrichemical waste from Agrecovery, although they also receive veterinary sharps. Once received, WMTS sorts this waste into ‘intractables’, or persistent organic pollutants, and those that can be neutralised. Intractables are sent to France for incineration, while the others are processed and sent to a Class A landfill such as Kate Valley north of Christchurch or Redvale in Albany north of Auckland.

McGregor says that Waste Management, which manages a number of landfills around New Zealand, prefers to refer to these facilities as ‘recovery parks’ to express the emphasis on resource recovery that is inherent in their design and management.

Class A landfills are tightly regulated and have to meet a lengthy list of requirements under the Ministry for the Environment’s Landfill Classification system. These requirements include stipulations that operators must (Ministry for the Environment, 2016):

- Ensure effective containment of waste, leachate and landfill gas.
- Minimise the potential for failure of the leachate collection system.
- Avoid contamination of adjacent surface water bodies with leachate.
- Protect the coastal marine area from adverse environmental impacts associated with the landfill.
- Avoid contamination of a viable groundwater supply.
- Minimise the risks associated with inappropriate waste disposal.

These requirements and the design of landfills mean, says McGregor, that no leachate reaches the ground. Multiple layers of protection ensure that anything hazardous that is disposed of in the landfill is effectively trapped and any leachate collected in storage tanks for treatment. In addition, modern landfills include methane lines to capture gas produced by the breakdown of waste, and this is typically used for power generation. McGregor says that Redvale landfill produces enough electricity to power 15,000 homes.

While it is acknowledged that recycling is certainly preferable to landfulling, McGregor believes that the volumes generated in New Zealand will always make recycling a challenge. For instance, WMTS has a battery recycling programme that currently takes two years to accumulate sufficient volume for batteries to reach a level where they can be economically exported for recycling.
4.3. SUMMARY AND CONCLUSIONS

In considering alternative rural waste management options to burning, burial and bulk storage, extensive efforts have been made to identify existing and potential services in New Zealand for the collection and processing of these wastes.

The following Rural Waste Collection Options were identified:

On-Farm Collection Options

- Council/TA Collection:
  - Territorial Authorities (Multiple Waste Streams)
- Waste Contractor Collection:
  - Waste Management New Zealand Limited (Multiple Waste Streams)
  - EnviroWaste Services Limited (Multiple Waste Streams)
  - Smart Environmental (Multiple Waste Streams)
  - Wastebusters Canterbury (Multiple Waste Streams)
  - XtremeZeroWaste (Multiple Waste Streams)
  - Plasback (Agricultural Plastics)
  - EnviroWaste Services Limited (Agricultural Plastics)
  - JBL Environmental (Hazardous Wastes)
  - Multiple Providers (Scrap Metal)
  - Multiple Providers (Tyres)
- Distributor Back Haulage:
  - NZ Post (Sharps)

Local Drop-off Collection Options

- Council/TA Waste Hubs:
  - Territorial Authorities (Multiple Waste Streams)
- Permanent Collection Hubs:
  - Agrecovery (Agricultural Plastics)
- Retail Store Drop-off:
  - Rural Stores (Multiple Waste Streams)
  - Recovering Oil Saves the Environment (ROSE) (Waste Oil)
  - PaintWise / Dulux Paint Take-Back Scheme (Paint)
  - Fonterra (Sharps)
The following Rural Waste Processing Options were identified:

**Reduction, Reuse and Recycling Options**

- **Reduction of Waste:**
  - Multiple Providers (Biodegradable Plastics)

- **Reuse and Recycling of Waste:**
  - Local Community Groups (Multiple Waste Streams)

- **Recycling of Waste:**
  - EnviroWaste Services (Agricultural Plastics)
  - Astron Plastics (Agricultural Plastics)

**Energy Recovery from Waste Options**

- Waste Transformation Limited (Multiple Waste Streams)
- Multiple Providers (Plastics to Energy)

**Disposal of Waste Options**

- ChemWaste (Hazardous Wastes)
- Waste Management Technical Services (Hazardous Wastes)

It is apparent from analysing how rural waste is, and could potentially be, managed that the challenge is less in how waste is processed than it is in how waste is collected. There are recycling or processing options available for most rural waste streams, but many of these are being burnt, buried or stored currently because the economics of collection are unsatisfactory or transporting waste to a location for processing is inconvenient for farmers. Identifying options that effectively encourage farmers to transport waste off farms or participate in on-farm collection services will be key in a sustainable and successful business model.
5. INTERNATIONAL OPTIONS FOR RURAL WASTE MINIMISATION

This section considers the options being deployed in key international farming regions and the regulation and contexts in which these options operate. The options shown are not meant to be exhaustive, but rather representative of the primary options available to farmers in these regions.

5.1. REGULATORY FRAMEWORKS AND CONTEXTUAL FACTORS

This section focuses on the key contextual information that influences options for the management of rural waste beyond burning, burial and bulk storage. This information includes legislation that determines how rural waste must be managed, as well as cost factors such as waste levies and landfill gate fees that determine how compelling alternative options are likely to be for farmers.

5.1.1 UK and Europe

As of January, 2016 the European Union (including the UK) had a population of over 506 million including a rural population of nearly 113M. The amount of ‘predominantly rural’ land in the EU is approximately 2.3 million km², or about 52% of the total land mass of the EU. Agricultural exports for the EU were approximately 122 billion EUR in 2014 (European Commission, 2016).

The majority of farms in Europe are small, with few livestock, and operated by older farmers. Crops represent about 52% of agricultural activity, with livestock-related farming constituting the remainder. (European Commission, 2016).

The 2008 EU Waste Framework Directive (WFD) is the key source of regulation determining how farmers in Europe and the UK must handle waste. The WFD dictates that farmers in member countries must “take the necessary measures to ensure waste is recovered or disposed of without endangering human health or causing harm to the environment and includes permitting, registration and inspection requirements” (gov.uk, 2014). The WFD also requires that measures are taken to minimise waste production and harmfulness, and that efforts are made to recycle, reuse or derive energy from any waste produced.

In the UK the 2006 Waste Management (England and Wales) Regulations work in conjunction with the WFD by deeming agricultural waste with the same regulatory controls as commercial or industrial waste (Department for Environment, Food and Rural Affairs, 2006). This means that farms must dispose of or recycle waste in a manner that protects the environment and human health by either (Farmers Weekly, 2004):

- Sending or taking waste for disposal off-farm at licensed sites; or
- Obtaining a (free) exemption to recycle waste on-farm; or
- Apply for a permit to continue on-farm disposal. This option is apparently very expensive and not economic for most farms.

In practice the WFD makes it unlawful to use a farm pit, which become classed as landfills and must be regulated as such if active. Likewise burning of any waste other than small quantities of wood or plant material are likely to be considered harmful to the environment and/or human health.
In the UK, prior to the introduction of the WFD and the Waste Management Regulations, it was found that:

“90% of farmers are disposing of some wastes using practices that may not be possible once the legal controls are implemented. For example: 83% are burning waste in the open, 32% are using farm tips or burying waste, 77% are putting waste in the household dustbin, over 70% are storing some wastes with no plans for disposal – mainly scrap metal, machinery, tyres and asbestos roof sheets” (Farmers Weekly, 2004).

It is reported generally that the WFD is well enforced and monitored.

In addition to strong legislation controlling how rural waste must be managed, it should also be noted that UK and a number of countries in Europe have very high landfill costs, bolstered by high landfill taxes.

In Denmark a landfill tax of DKK40 (NZ$8.58) was introduced in 1987 and this has now risen to DKK475 (NZ$101.88), ten times the value of the waste levy, New Zealand’s equivalent, and one of the highest landfill taxes in Europe.

During this time waste to landfill had decreased from 3.5Mt to 0.8Mt per year, as opposed to overall waste production which has increased from 9Mt to 15.6Mt (Fischer, Lehner, & McKinnon, 2012). The implication of this is that the cost of landfilling has prompted a far higher level of recycling.

In the UK, a landfill tax was introduced in 1996 with a particular focus on changing behaviour away from landfilling waste. The landfill tax level has risen quickly in the last ten years and is, as of 1 April 2016, GBP84.40 (NZ$170.57) (HM Revenue and Customs, 2016). Since the introduction of the tax recycling and other forms of recovery have increased sharply and the proportion of waste being sent to landfill has roughly halved (Ministry for the Environment, 2014).

Figure 32: Typical Landfilling Costs for UK and Europe in 2013 (Source: European Environment Agency)
Overall, it is important to note when considering options from Europe and the UK that use of farm pits and burning of waste are largely prohibited. This, when combined with high landfill costs and taxes, means that alternative means of disposal have a strong foundation for economic feasibility in comparison to New Zealand.

5.1.2 United States

As of 2007, the United States had approximately 2.2 million farms over 373 million hectares, with an average farm size of about 169 hectares, compared to about 230 hectares in New Zealand. Agriculture contributed approximately US$297 billion to the economy, with 48% coming from crops and the remainder from animal-related agriculture (United States Department of Agriculture, 2009).

The US Clean Air Act establishes standards for air quality and acts to limit levels of certain pollutants. Under this Act, each state must develop plans to identify sources of air pollution – such as from agricultural waste burning – and act to ensure air quality standards are met (US Environmental Protection Agency, 2016). As a result, most states in the US have laws prohibiting the burning of agricultural plastics and many other agricultural waste (Barth, 2015).

The state of Tennessee, for example, specifically bans ‘open burning’ of virtually all rural waste streams with the exception of vegetation from the property and untreated wood (Hawkins, 2010). Prosecutions for breaking this law are apparently not uncommon, with fines imposed of up to US$25,000 (NZ$35,854) per incident.

Likewise, the state of Texas bans most forms of outdoor burning, but has an exception for “on-site burning of waste plant growth”. Burning of “business waste” is specifically prohibited (Texas Commission on Environmental Quality, 2008).

Landfill gate fees vary from state to state in the US, but are estimated to be US$42/t on average (The Wasters Blog, 2013).

5.1.3 Canada

In 2001 the value of agriculture in Canada increased over 11% to CA$49.4 billion after two years of successive decline. Livestock outputs, which make up about 54% of the agricultural economy, were particularly strong performers for Canada (Statistics Canada, 2015).

In 2011 the average Canadian farm size was 315 hectares, compared to about 230 hectares in New Zealand. At this time grain farms made up about 30% of farm holdings, while beef farms represented about 18%. On the whole, farms are getting larger and the number of farms is reducing (Statistics Canada, 2012).

In Canada, regulation on permissible methods for disposing of rural waste is largely devolved to state and local agencies.
In British Columbia the Open Burning Smoke Control Regulation allows for the burning of leaves and weeds, but specifically prohibits the burning of a number of wastes including (British Columbia Air Quality, 2016):

- Plastics
- Tyres
- Treated timber
- Paint and paint products
- Most hazardous wastes

In Ontario, the Environmental Protection Act contains a provision which prohibits the discharge of a contaminant into the environment. Investigations and prosecutions do occur, but are seen as rare (Sonnenberg, 2009).

In practice, a 2010 survey of farmers in Ontario found that (Sonnevera International Corp, 2011):

- Approximately half of seed bags, used twine and net wrap were burnt on farms.
- Approximately one quarter of farmers burn plastic wrap, empty feed bags, and silage wrap on-site.
- 20% of farmers stated that they “strongly disagree” with the statement “I am uncomfortable burning or putting certain products in my own or other landfills, but don’t see any alternative” while 27% “strongly agreed”.

Other studies undertaken in Ontario also note that, in the ‘western provinces’ (British Colombia and Alberta) open burning of agricultural plastics is very common (Sonnevera International Corp, 2011).

The only Canadian states that utilise a waste levy are Manitoba and Quebec. Manitoba’s levy is currently CA$10/t (NZ$11.09/t) while Quebec’s is CA$21.10/t (NZ$23.41/t).

In addition, for the most part, landfilling fees in Canada are considered low (Giroux, 2014). The city of London, Ontario has maximum gate fees of CA$75.00/t (NZ$83.20/t) for commercial waste (London Canada, 2016). The city of Calgary, Alberta has gate fees for most waste of CA$113/t (NZ$125.36/t) (Calgary, 2016).

5.1.4 Australia

As of 2012, there are approximately 134,000 farms in Australia, almost all of which are family owned and operated. 32% of farms are in New South Wales, 25% in Victoria, 21% in Queensland and 10% in South Australia. About 400 million hectares (52%) of Australian land is used for agriculture (National Farmers’ Federation, 2012).

In 2009/10 the value of agriculture in Australia was AU$48.7B, with about AU$33 billion of this being exported. The major agriculture exports for Australia, by value, were wheat (17%), beef and veal (13%), wool (7%), wine (6%) and dairy (5%) (National Farmers’ Federation, 2012).

While there are a number of federal statutes that impact management of rural waste, notably those that govern product stewardship schemes, most regulation has been devolved to state and territory authorities.
Typically burning of waste is tightly regulated, whereas little is specifically said in reference to the use of farm pits or the storage of rural waste.

In New South Wales agricultural burning of most kinds of plant material is allowed without any kind of environmental approval. Burning of tyres, paint and solvent containers and residues, and treated timber is expressly prohibited (Fire and Rescue NSW, 2016).

In Victoria, the Environment Protection (Industrial Waste Resource) Regulations 2009 govern waste management for commercial activities including agriculture. These regulations make it “an offence to cause land, air, water or noise pollution – including through the inappropriate disposal of farm wastes” (Agriculture Victoria, 2016). While burning of some farm waste “such as sticks and branches” is permitted, the burning of any commercial waste is not allowed (Environment Protection Agency Victoria, 2012).

A number of Australian states have sought to reduce waste to landfill with the use of waste levies. In New South Wales a levy of AU$135.70/t (NZ$141.90/t) applies in metropolitan areas, while a levy of AU$78.20/t (NZ$81.77/t) applies in regional areas. This levy rises each year based on the rate of inflation (NSW EPA, 2016). This levy caused the level of recycling in New South Wales to double between 2002/03 and 2010/11 (Ministry for the Environment, 2014).

In South Australia a waste levy of AU$57.00/t (NZ$59.60/t) applies in metropolitan areas, while a levy of AU$28.50/t (NZ$29.80/t) applies outside of main centres (Zero Waste SA, 2016).

In Western Australia the landfill levy is AU$55.00/t (NZ$57.51), but will rise by AU$5 (NZ$5.23) on 1 July, 2016 and do so again in 2017 and 2018 (WA Department of Environmental Regulation, 2014).

In Victoria the landfill levy is AU$58.50 (NZ$61.17) in metropolitan areas, AU$29.30 (NZ$30.64) for rural domestic waste and AU$51.30 (NZ$53.64) for rural commercial waste (Environment Protection Authority Victoria, 2015).

Landfill gate fees vary greatly from state to state with Queensland (which has no landfill tax) offering landfill costs as low as AU$10/t – 30/t (NZ$10 – 31/t) while Sydney has total landfill costs, including waste levy, in excess of AU$300/t (NZ$314/t) (Ritchie, 2014).
5.2. WASTE COLLECTION AND PROCESSING OPTIONS

This section considers the noteworthy options being utilised for the collection and/or processing of rural waste in key international farming regions. The options shown are not meant to be exhaustive, but rather representative of key options and trends in rural waste management internationally.

5.2.1 UK and Europe

Collection Options

In 2001 a report was prepared by the UK Environment Agency to consider a strategy for sustainable agricultural waste management in the UK, in order to prepare for a planned extension of the EC Framework Directive on waste to encompass agricultural waste (Okuniewski, 2001). Like the current project, this work focused on non-natural rural waste.

Overall waste streams and recommended options are shown below:

![Diagram showing waste management options in the UK](https://example.com/diagram.png)

Figure 33: Recommended Options for Agricultural Waste in the UK (Source: Okuniewski, 2003)

As with the current project, consideration was given both to collection of waste off farms and drop-off of waste at local collection points. The ‘short-list’ of options considered was as follows:
As options were assessed, the key criteria used for evaluation were:

- Financial costs (to farmers).
- Likely farmer uptake.
- Level of commercial incentive for waste collectors.
- Geographical availability.
- Technical constraints (such as issues around hazardous waste).
- Environmental impact.
- Health and safety risk.
- Legal compliance requirements.
- Bio-security (risk of disease transfer)

Key conclusions from the project included:

- On-farm collection for many waste streams will not be feasible due to high transport costs and low incentives for farmers to participate. One-off collections for some waste – including scrap metal – may work.
- Where waste can be collected by those working on a farm (such as sharps used by vets) this is a cost-effective option to pursue.
- Supplier take-back is a key aspect of any strategy to address rural waste.
- A ‘milk round’ collection of agricultural plastics and packaging is most likely the best option, supported by local drop-off sites.
- Where local authorities already collect domestic waste from farms, expanding collection to commercial waste streams is potentially cost effective.

In general, off-farm drop-off points were not considered desirable because:

<table>
<thead>
<tr>
<th>Category</th>
<th>Options</th>
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<tbody>
<tr>
<td>Collection from farm</td>
<td>1. Collection from individual farms by waste contractors (the Baseline Option)</td>
</tr>
<tr>
<td></td>
<td>2. ‘Milk round’ collection by waste contractors (1)</td>
</tr>
<tr>
<td></td>
<td>3. Collection by service providers (take-back) (2)</td>
</tr>
<tr>
<td></td>
<td>4. Collection by distributors (take-back) (3)</td>
</tr>
<tr>
<td></td>
<td>5. Collection by Waste Collection Authorities</td>
</tr>
<tr>
<td>Transfer by farmers to waste collection points</td>
<td>6. Transfer by farmers to existing household waste collection sites</td>
</tr>
<tr>
<td></td>
<td>7. Transfer by farmers to existing waste transfer stations (operated by waste management companies)</td>
</tr>
<tr>
<td></td>
<td>8. Transfer by farmers to new waste transfer stations on selected farms</td>
</tr>
<tr>
<td></td>
<td>9. Transfer by farmers to new waste transfer stations on merchants’ premises</td>
</tr>
<tr>
<td></td>
<td>10. Transfer by farmers to new waste transfer stations on livestock markets.</td>
</tr>
</tbody>
</table>

Figure 34: Short-list of Options for Assessment  (Source: Options for Agricultural Waste Collection, 2003)
• Few facilities will accept agricultural waste and be convenient for farmers.
• Adding new drop-off points is expensive and legally challenging.
• Farmers lack incentives to transport waste to drop-off points.
• When farmers do transport waste this presents increased environmental and health and safety risks.

A novel approach to collection of silage wrap was undertaken in Leicestershire in the UK in 2015. An agricultural contractor organised a ‘bale wrap amnesty’ to encourage farmers to pull out stored wrap and make it available for collection. The programme encouraged farmers to collaborate and elect one farm as a collection point for the area to minimise transportation logistics. The contractor then committed to collecting full loads only (18 – 20 tonnes per load) at a rate of £25 (NZ$53) per farm regardless of volume. The registration fees collected were substantially below typical rates and the contractor also committed to giving 20% of the money collected to a charity for struggling farmers (Farmers Weekly, 2015).

This same company, Harby Agriculture, offers a range of on-farm pick-up services for recyclable rural waste, including:

• Triple-rinsed chemical containers
• Fertiliser and seed sacks
• Cardboard
• Silage wrap
• String
• Netting

To minimise collection costs, which are dependent on distance from Harby’s base, a Solway bin and liner system is used which allows plastic waste to be compacted and stored as required. Harby will then collect a minimum of three liners at a cost of £30 (NZ$64) per liner (Harby Agriculture, 2016). The bins hold about 400kg of waste or about 1800L and retail for £282 (NZ$597), while liners are about £6 (NZ$13) each.

In Germany the PAMIRA (German acronym for packaging recovery agriculture system) programme operates to collect empty pesticide containers from farms. Farmers are able to take empty and rinsed containers once a year to one of over 300 collection points around Germany. Plastics are shredded and either used in waste to energy processes, or recycled into other plastic products. The voluntary programme began in 1996 and is financed by the pesticide manufacturers. Only products that are part of the programme are accepted (PAMIRA, 2016).

In 2015 PAMIRA collected 2,900 tonnes of plastic containers from 339 collection points, mainly at rural stores. Staff at these stores check the containers prior to acceptance (RIGK GmbH, 2015). Over the past five years PAMIRA has averaged about 2,800 tonnes of waste collected per year, with a recycling rate of 88% in 2015 and an overall return rate (percentage of containers captured for recycling) of over 70% (PAMIRA, 2016).

In France, Adivalor operates as a voluntary collection and recovery scheme for agrichemical containers, fertiliser bags, and plastic films and silage wrap. 1,200 distributors receive waste from approximately 285,000 farmers across France (Adivalor, 2016). As with most schemes of this type, wastes are dropped off...
at local depots for no charge, unless the products sit outside the brands participating in the programme, in which case a financial contribution is sought. Adivalor is primarily financed by 360 manufacturers paying an ‘eco-fee’ that is collected via a range of professional organisations (Adivalor, 2015).

Adivalor collected 7,000 tonnes of plastics in 2014 and achieved a 93% recycling rate by processing these plastics into tubing, insulation and rubbish bags. 83% of containers in the market are collected each year. Adivalor has also collected over 10,000 tonnes of waste agrichemicals since 2001 (Lepineau, Adivalor, 2015).

Adivalor recently noted that its strategic priorities included (Lepineau, Reduce Costs or Improve Operating Efficiencies?, 2015):

- Improving the on-farm rinsing processes for containers.
- Increasing collection and recycling rates.
- Decreasing operational costs and improving service efficiency.
- Bringing ‘free riders’ into the scheme.
- Consideration of other agricultural waste streams.

**Processing Options**

In 2012 the International Solid Waste Association produced a study collating the latest information on waste to energy plants throughout the world (International Solid Waste Association, 2012). The report highlighted those countries with the most waste to energy plants in the world, being France, Germany and the United States:

![Figure 36: Number of Waste to Energy Plants by Country (International Solid Waste Association, 2012)](image-url)

One of the most well-known and advanced of these plants – featuring on the cover of the ISWA report – is the Sysav plant in Malmö, Sweden. The plant can handle most waste streams, with a range of advanced flue gas scrubbers and filters, and has the ability to process 630,000 tonnes of waste annually; about equal
to the waste from 70,000 homes. As part of its process the plant produces both heat and electricity which are sold into neighbouring communities (Sysav, 2016).

In 2013 the author undertook a project for Environment Canterbury considering options for waste treated timber. As part of this project international trends in the processing of treated timber waste were analysed (Scott, Treated Timber Waste Minimisation Project - Milestone 2: International Industry Trends, 2013).

The project found that treated timber is rarely recycled in the UK and Europe because of its classification as a hazardous waste. Various waste to energy plants were looked at and, in addition to operating at a scale that was too large for most areas of New Zealand, the report found that many waste to energy plants suffered from two key challenges in operation:

1. Unpredictability and diversity in waste streams made air emission targets very difficult to meet.
2. Opposition from locals and environmental groups to waste to energy plants is often very strong based on air emission concerns.

The report found that, while waste to energy plants need to be large in order to benefit from economies of scale, the larger they became the more difficult it became to find reliable customers for the heat output of these plants. Access to reliable and consistent sources of waste also proved to be an ongoing difficulty for these plants.

London-based Cynar Technology has developed a patented process which converts waste plastics into high quality, synthetic liquid fuels (including diesel) using a combination of pyrolysis (which breaks down organic matter at high temperatures in the absence of oxygen) and oil refinery technology (Cynar Plc, 2016). The process is described as follows:

“It essentially returns plastic to its original state: oil. First, the plastic must be cleaned, shredded, and heated in the absence of oxygen. Instead of burning, it melts to the consistency of chewing gum, and then vaporizes into a hydrocarbon cloud. When the cloud cools, the vapour condenses into a liquid that can be refined to diesel, kerosene, or light oil and used with any car or generator” (Ostashevsky, 2015).

Cynar’s technology can handle a wide range of plastic feedstock, including most of those found in agricultural products, and can apparently handle a reasonable degree of contamination. The output from the process per tonne of input waste plastic is (Murray, 2011):

- 700 litres of diesel
- 200 litres of gasoline
- 100 litres of kerosene
- 60kgs of synthetic gas (which is used to power the process)
- 50kg of residual biochar

Cynar state that their diesel costs roughly half as much to produce as traditional diesel at the pump (Murray, 2011).
Cynar has two plants operating, one in Almeria in southern Spain, and another in Seville 400km to the west. The Almeria factory, which opened in 2014, processes about 900kg of plastic waste per hour, which produces nearly 14,000 litres of fuel per day enough to fill “230 midsize cars” (Ostashevsky, 2015).

Cynar’s founder says that he has invested over “$20 million” getting the technology to where it is, but that Cynar has now got it to the point where the technology is “scalable, affordable, and profitable” (Ostashevsky, 2015). Despite this, it is acknowledged that lower fuel prices are negatively impacting profitability.

With an optimum capacity of 20 tonnes of waste per day, Cynar’s technology clearly needs a substantial scale to operate profitably. It is reported that Cynar has signed contracts to license their technology to plants in Florida in the US, as well as into Central and South America (Trager, 2014).

5.2.2 United States

Collection Options

A 2003 study conducted at Cornell University in New York to consider alternatives to burning of agricultural plastics on New York farms found that almost all the plastics then in use were burned or buried. No legislation limited burning or burial of plastics on farms at this time, and the report identified “altruism” as the only real farmer incentive to look at alternatives (Levitan & Barros, 2003). The report looked closely at the initiatives in place in Pennsylvania and New Jersey states:

- In Pennsylvania, the state government has run the voluntary Plastic Pesticide Container Recycling (PPCR) to manage plastic pesticide containers from farms for over 20 years. In 2013 the programme collected over 11t of containers (Gilbert, 2014). Containers must be triple-rinsed and dropped off to one of 66 locations around the state. These sites are a mix of state-run sites and private sites operated by rural stores. The plastic collected from the programme is primarily used to make drain pipes, fence posts, speed bumps and marine pilings. The programme is supported by landfill fees, pesticide product registration fees, fines, and business license fees. Research into the programme concluded that permanent, static sites as deployed here are more efficient and effective than occasional “recycling days” (Levitan & Barros, 2003).

- The equivalent programme in neighbouring New Jersey uses this type of “recycling day” approach to collect large volumes of containers at once. The costs of this programme are relatively low as a result. Research undertaken into the New Jersey recyclable plastics programme has shown that farmers will travel up to 45 minutes to a depot to drop off plastics as well as paying a disposal fee of US$10 – 20 (NZ$15 – 29) per tonne. The likely reason for this willingness is the cost saving against a US$60 per tonne landfill fee in a state where burning waste is illegal. In Pennsylvania, where waste burning is legal, similar research found that farmers would travel a maximum of 20 minutes to a recycling facility (Levitan & Barros, 2003).

Among the conclusions of the report were the following comments (Levitan & Barros, 2003):
• The volatility of recycling markets and the degree of contamination of plastics tends to make recycling unappealing.

• A full system for recycling plastics must be in place, including certainty of supply and output markets, before it will work efficiently.

• “Experience has shown that successful recycling programs require a state or local agency or organization to “champion” the cause, i.e., to motivate participation, make local arrangements for collection, and broker arrangements with re-processors”.

• “Farmers are more likely to participate in recycling if they are constrained from using cheaper and easier on-farm disposal options, or are provided technical assistance and/or economic incentives to recycle”.

• The cost of recycling equipment was seen as an incentive to pursue wide-area recycling programmes to catch as much volume as possible.

• The best identified options for recycling contaminated plastics were producing plastic lumber from silage bags and producing plastic ‘nuggets’ to mix with coal for energy recovery.

It is apparent that the predominant model in the US for plastic container disposal is a hybrid of depot drop-offs with occasional – and widely publicised – pick-up rounds. Oregon-based Agri-Plas is an example of this. The company accepts a range of agricultural plastics at its Oregon processing site, then undertakes an occasional collection run into neighbouring states including Idaho, Utah and Washington. No fee is paid for this service in most cases, and Agri-Plas process the recovered plastic into synthetic oil which is sent to a Washington-based oil refinery (Agri-Plas, 2016).

Agri-Plas is part of a US-wide network of agricultural plastics recyclers called the AG Container Recycling Council (ACRC). With the exception of several states in New England, all of the continental US and Hawaii are covered by a small number of recyclers that undertake scheduled collections across multiple states (ACRC, 2016). In most cases these collection services are provided free of charge, apparently based on the value of the plastic collected in terms of recycling, and the relatively low cost of logistics based on the infrequency of pick-ups.

Another member of this group, Texas-based USAg Recycling, collects agricultural plastics on-farm across 17 states. The company makes use of a mobile granulation plant mounted on the truck trailer unit. States receive collection rounds either every 30 - 45 days, every 90 days or between one and three times a year. Predictably, the frequency of collection is based on the intensity of agriculture within the state (USAg, 2016).

Processing Options

A presentation by an Agricultural Plastic consultant in 2014 noted that there are basically two core outlets for used agricultural plastics: plastics to fuel and recycling into new plastics (Springman R., 2014). In both cases it was considered that there are two fundamental issues with recycling:
1. Contamination of plastics with foreign matter, limiting value for recycling.
2. Collection of economically sustainable volumes, based on a lack of infrastructure, farming seasonality and transportation distances.

It was also noted that:

- Plastics recycling start-ups often struggle to pay for plastic until revenue begins to flow reliably.
- There are as many failures as successes in the industry, which is far from mature.
- Take-back schemes are a good idea, but very rare.
- Recycled agricultural plastics compete with virgin plastics which are usually more expensive, but much cleaner.
- Contamination adds more cost to the process than is often appreciated in advance.
- Most successful agricultural recycling schemes are receiving clean and well sorted plastic.
- Lower oil prices have hurt plastics to oil programmes.

Another presentation by the same consultant on plastics recycling solutions noted that (Springman R. E., 2014):

- Technology in this space is often oversold and not well understood.
- There are substantial technical challenges and costs in going from a demonstration scale plant to full commercial operation.
- Seeking consents and permits for these types of operations is a difficult and unpredictable process.
- Variable feedstock can require ongoing process adjustments.
- Long-term agreements for purchasing of outputs are essential.
- Smaller systems that require less start-up capital are increasingly popular.
- Fuel technologies need high and predictable volumes, whereas agricultural plastics collections are usually unpredictable, low volume and dependant on third party collection mechanisms.

A 2008 report undertaken for the state of California sought to understand the volumes and end of life options of plastics used for agriculture in the state (Hurley, 2008). The report found that about 36% of agricultural plastics producers were involved in a recycling programme, and about 34% of farmers recycled some of the plastic they used.

Survey questions focused on what would encourage farmers to recycle found that an on-farm collection service was the preferred choice, while a substantial number expected some kind of financial incentive for recycling.
On the supplier side, plastics producers were asked about the difficulties they experienced in recycling agricultural plastics. As is frequently found in New Zealand, transportation logistics features heavily as a challenge to recycling programmes. The survey results also indicated that it is larger farms utilising larger volumes of plastics that tend to participate in recycling programmes.

Recycling of plastics to oil is not uncommon in the US, with New York-based Plastic2Oil being a significant operator in this sector. Plastic2Oil’s technology can process a number of different types of plastic including HDPE (grocery bags, oil containers etc.), LDPE (silage wrap) and PP (fertiliser bags), and does not require these to be sorted or washed. The process handles about 1.8 tonnes of waste per hour, with the gases generated being used to fuel the processing units and the liquid fuel output being used for boiler and furnace fuel (Plastic2Oil, 2016). With an annual throughput of 10,000 – 15,000 of plastic waste, clearly the Plastic2Oil process is not a small-scale operation, and would struggle to attract sufficient volumes in New Zealand.

5.2.3 Canada

Collection Options

A 2013 report considering opportunities for agricultural waste management in Ontario, Canada noted:

“Currently, there are limited opportunities in Ontario to collect, recycle and safely dispose of agricultural wastes generated by farmers. There are, however, some permanent programs for rinsed pesticide containers, obsolete pesticide stocks, used oil, filters and containers, and used on-road and off-road tires” (CleanFARMS Inc., 2013).

This report, aiming to identify alternatives to burning and burying agricultural waste, focused on a range of waste streams very similar to the priority waste streams under this project, including agricultural plastics, pesticides, oil and sharps. As in New Zealand, most of this waste is currently burned or buried. It is estimated that Ontario produces about 7,300 tonnes of agricultural plastic each year. this is about 25% of the New Zealand volume estimated in Milestone 1 of this project.

The report focused on four alternatives for alternative rural waste disposal (CleanFARMS Inc., 2013):

1. Event based: the use of temporary collection points for waste based on a predetermined schedule. This was seen as advantageous based on the ability to collect multiple waste streams and to alter the frequency of events based on farmer need. It was recommended that hazardous and contaminated wastes be collected in this way, ideally at agricultural product retailer sites. It was recommended that this occur approximately every three years. Materials should be stored in UN-approved containers and sent to appropriate processors for destruction.
2. **Depot based**: the use of permanent collection points for waste based at convenient locations, typically catering to both agricultural and non-agricultural waste streams, as at a council transfer station. This was seen as advantageous based on a low cost of operations (given its mixed use), the ability to collect large volumes of waste and the ability to combine multiple waste stream collections at one convenient point. It was recommended that most plastics be collected in this way. Municipal authorities in Ontario did note they were reluctant to utilise their facilities for commercial waste in this manner, but that they “view the diversion of highly recyclable materials as a direct benefit to preserving their own scarce landfill resources and are not averse to assisting with this for the agricultural community”. Recommended sites were chosen based on their proximity to intensive cattle-raising areas. A travel expectation of 15km was used where possible, but 25km was adopted in less populated rural areas. The report recommended using multi-compartment bins similar to those in use by several territorial authorities in New Zealand. Recycling options were available for most plastics waste streams, with silage wrap being diverted for washing, processing and pelletising by a local processor for recycling.

3. **Permanent Back to Retail**: the use of retail sites as collection points for specific waste streams. This was seen as advantageous in that product users are encouraged to think about recycling right from the time of purchase and the locations tend to be those farmers are already visiting frequently.

4. **Private Contractor**: on-farm collection of waste by waste companies. This was seen as advantageous in that the services are convenient, but this is offset by the costs to the farmer.

The Ontario report considered different product stewardship options for waste streams not under any existing mandatory scheme. Mandatory product stewardship was considered to have the highest likelihood of success, based on its ability to make funds available to meet the programme costs, but that success was greatly enhanced by other policy instruments such as compulsory “eco-labelling” and bans on other disposal methods such as burning. Should a scheme be voluntary, these policies become even more important to support participation. Bans on undesirable options were only considered effective if public support could be secured and the bans properly enforced. (CleanFARMS Inc., 2013).

### 5.2.4 Australia

#### Collection Options

The Victorian Environmental Protection Agency (VEPA) provides advice to farmers to ensure they meet their obligations under the Environment Protection (Industrial Waste Resource) Regulations 2009. VEPA provides the following information to farmers as to their options for managing key waste streams (Victoria Environmental Protection Agency, 2009):

- **Empty chemical drums and used containers**: utilise the drumMUSTER programme for eligible containers.
• **Unwanted or excess chemicals**: utilise the ChemClear programme for eligible chemicals.

• **Oil and oil filters**: oil can be recycled through local contractors, although minimum quantities may apply. Oil filters must be recycled and are prohibited from landfill.

• **Tyres**: can be used for legitimate purposes on farms, but not brought on farms for disposal.

• **Silage wrap and twine**: silage wrap can be recycled in most regions through local programmes. Twine can be recycled in some regions.

• **Treated timber**: should be reused, stored for reuse, or sent to landfill.

In 1998 the National Farmers Federation, Avcare Limited, the Veterinary Manufacturers and Distributors Association and the Australian Local Government Association entered into an agreement to form the Industry Waste Reduction Scheme (IWRS). Both ChemClear and drumMUSTER – as referred to by the VEPA above – are components of the IWRS.

drumMUSTER is a national programme for the collection and recycling of agrichemical containers. It receives funding from the purchase of non-returnable containers over 1kg or 1L in size at a rate of AU$0.04 (NZ$0.04) per kg or L. The programme is run by Agsafe Ltd. and has two key goals (Australia and New Zealand Environment and Conservation Council, 2000):

1. To reduce the number of waste containers by encouraging manufacturers to use alternative packaging containers.

2. To ensure containers have a route for disposal that is socially, economically and environmentally acceptable.

There are currently in excess of 800 sites across Australia where containers can be taken for recycling, providing they are appropriately clean and bear the drumMUSTER logo (drumMUSTER, 2016). It is apparent that the drumMUSTER programme operates very similarly to the Agrecovery service for agrichemical containers. drumMUSTER state that, to date, they have recycled 27,594,834 containers (drumMUSTER, 2016).

A 2000 review of the programme concluded the following (Australia and New Zealand Environment and Conservation Council, 2000):

- The volume of containers entering the distribution had dropped markedly as manufacturers had introduced more reusable and refillable containers and focused on increasing the concentration of chemicals in smaller containers.

- There was a high level of community support for the programme.

- Among councils, who partner in the delivery of the programme, satisfaction was typically high. Where satisfaction was low (8%) this was largely due to low collection rates or the proportion of containers that had not been washed correctly.

- Farmers were also largely satisfied with the programme. Where satisfaction was low (12%) this was typically a result of distances to depots or timing of collections.

ChemClear is also part of the IWRS and is an Australia-wide programme for the collection of agrichemicals from farms. It is funded via the same mechanism as drumMUSTER. So far ChemClear has collected “350 tonnes of obsolete, inherited and unknown” agrichemicals (ChemClear, 2016). As with Agrecovery,
ChemClear requires farmers to register chemicals online and then plans collection times based on local demand. The collections are at a central hub however, and not on an on-farm basis.

Most chemicals that are in their original, labelled container and are manufactured by a participating brand are accepted free of charge. Other brands and unknown or unlabelled chemicals are charged a fee that is confirmed to the farmer following registration (ChemClear, 2016).

Processing Options

Sydney-based Integrated Green Energy Limited (IGE) has recently commenced operations at its new plastics to fuel plant in Berkeley Vale, about 100km north of Sydney. This plant, capable of processing both plastics and tyres, processes approximately 100 tonnes of waste per day (Integrated Green Energy, 2016). The manufacturer of the plant reports that it is “the first commercial scale plant in Australia that can convert plastic scrap to fuel” (Renewable Energy from Waste, 2015).

The plant, built for a relatively modest AU$4 million (NZ$4.3 million), uses a proprietary “catalytic restructuring” process – apparently a type of pyrolysis - that heats plastic in the absence of oxygen until the plastic breaks down into gases and liquids. The liquids – gasoline, kerosene and diesel – are said to be “road-ready” for use in transportation, and IGE plans to be producing 65 million litres of fuels per annum by mid-2017 (Environment News Service, 2015).

IGE has also secured a 10-year supply contract to ensure it can obtain a consistent supply of inwards plastic waste for its process. The price that IGE will pay for plastic waste will be approximately AU$160 (NZ$171) per tonne (Palmer, 2015).

IGE have recently announced that they have been commissioned to design and build a 1,500 tonne per day plastics to fuel plant in Texas, with rights to construct a further four plants in the US (Dooley, 2015).
5.3. SUMMARY AND CONCLUSIONS

Comparing the rural waste management mechanisms in other countries to those in New Zealand is always a difficult exercise that must take into account variation in the contexts of different regions. In understanding the differences in context between New Zealand and other countries it is important to note:

- New Zealand has a relatively low population compared to many other agricultural countries, and a relatively low volume of waste output. This impacts the feasibility of large scale waste collection and processing options.
- As in New Zealand, farm holdings in many parts of the world are becoming fewer and larger.
- The UK and Europe have tight legislation effectively banning burning and burial of most rural waste and this is apparently well enforced. The UK and much of Europe also has high landfill costs and high waste levies to make landfilling relatively expensive.
- The US has state by state rules for burning of waste but the trend is evidently that burial is permitted while burning of most rural waste streams is not allowed. Landfill costs are generally low.
- Canadian provinces appear to mostly prohibit burning of farm waste, but this appears poorly enforced, perhaps based on the remoteness of many farms. Landfill costs are generally low.
- In Australia, most states appear to ban the burning of most rural waste. High waste levies and landfill fees are present in most of the key agricultural states except Queensland.

Key conclusions from considering agricultural waste in the UK and Europe include:

- On-farm processing options (such as waste to energy) are not particularly easy to make feasible.
- The feasibility of off-farm options depends heavily on transportation costs and availability of processing options.
- One-off collection rounds for stockpiled waste streams is an effective method of recovering these wastes.
- Supplier take-back of waste is a key strategy to pursue.
- Where councils already collected domestic waste from farms, collection of commercial waste may be cost-effective.
- Drop-off points are likely to be expensive to set up and inconvenient for farmers.
- Waste to energy plants require very large volumes of waste to work well and emission issues with inconsistent waste streams are likely to be problematic.
- Plastics collection programmes run in a manner very similar to those in New Zealand, but tend to maintain higher collection rates, likely due to the legislative framework in place.

Key conclusions from considering agricultural waste in the US include:

- In areas where burning is illegal and landfill fees are high, farmers are willing to travel to drop-off waste for recycling.
- Output market volatility, lack of reliable volumes and contamination are major barriers in waste recycling.
• Technology used for waste recycling is often far more difficult than first thought, particularly around scalability and dealing with inconsistent waste streams.

• For contaminated plastics, use in composite lumber and plastics to fuel technologies are key potential options.

• Plastic container collection tends to be on-farm, based on a regular pick-up round.

• Supplier take-back schemes work well but are relatively uncommon.

Key conclusions from considering agricultural waste in Canada include:

• Hazardous and contaminated wastes are best collected using ‘event-based’ collections using hubs, ideally based at rural stores.

• Agricultural plastics should be collected at permanent hubs using multi-compartment bins, with less than a 25km travel distance for farmers.

• Retailer take-back schemes should be used wherever possible.

• On-farm commercial waste collections are very convenient for farmers, but typically too expensive.

Key conclusions from considering agricultural waste in Australia include:

• Plastic container and agrichemical collections work similarly to Agrecovery in New Zealand, but chemical collections are hub-based rather than on-farm.

• Plastics to fuel technology offers a potential option for New Zealand in the future, but still operates at high waste volume requirements.

Overall, there are no specific, novel options being utilised overseas that will be considered as new options for alternative rural waste management in New Zealand for the purposes of this report. The information discovered in considering these options does, however, both aid in recommending refinements to existing New Zealand options and provides a focus for suggesting new options for New Zealand in Section 6.
6. OPTIONS FOR CONSIDERATION

The options that are being considered in this section take into account the existing and potential on-farm and drop-off options profiled in Section 0, learnings from the analysis of international options in Section 5 and the application of an understanding of barriers to – and drivers for – alternative rural waste management solutions in Section 3.

Where options are already operational, suggested pathways for expansion or refinement have been included to advance the objectives of this project. Options are profiled below and assessed for preliminary economic and technical feasibility in Section 7. Options are not in order of preference but rather loosely follow the order of:

- On-farm collection options
- Drop-off collection options
- Processing options

6.1. OPTION 1 – TERRITORIAL AUTHORITY ON-FARM COLLECTION

<table>
<thead>
<tr>
<th>Description:</th>
<th>Territorial Authorities that provide an on-farm domestic waste collection extend this to include recyclable agricultural plastics. A separate bin would be provided for these wastes, and the volume collected would be sent to either Plasback or EnviroWaste for recycling.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type:</td>
<td>Council/TA Collection</td>
</tr>
<tr>
<td>Key Players:</td>
<td>• Territorial Authorities&lt;br&gt;• Waste collection service providers&lt;br&gt;• Plasback and/or EnviroWaste</td>
</tr>
<tr>
<td>Waste Streams:</td>
<td>It is unlikely that Territorial Authorities will be open to accepting commercial general waste, so such a collection would need to focus on recyclables that have some recovery value, with an existing avenue for processing and sale. In addition, waste streams would need to be manageable in terms of bulkiness and hazardous (or potentially hazardous) waste would need to be avoided because of the specialist handling requirements. Based on the priority waste list the waste streams that could readily be collected in this manner are limited to agricultural soft plastics, namely:</td>
</tr>
<tr>
<td></td>
<td>• Netting&lt;br&gt;• Animal feed bags&lt;br&gt;• Baleage wrap&lt;br&gt;• Mulch film and crop cover&lt;br&gt;• Silage wrap&lt;br&gt;• Fertiliser bags&lt;br&gt;• Seed bags&lt;br&gt;• Plastic (pallet wrap)&lt;br&gt;• Greenhouse plastic sheeting</td>
</tr>
</tbody>
</table>
### Rationale:

- 22 out of 54 respondents to the Territorial Authority survey said they were already **providing** a collection service to rural properties for recyclables. 21 out of 52 respondents said they were already **subsidising** some level of recyclables collection to rural communities.

- An additional 8 out of 52 said they would consider or are prepared to provide a collection service for recyclables. 13 out of 52 said they would consider or are prepared to subsidise such a collection.

- 37% of Territorial Authority survey respondents consider rural waste a high or very high priority.

- Approximately 66% of respondents to the farmer survey said they would use an on-farm collection service that included recyclables.

- If a truck is travelling to or near a farm to collect waste, marginal costs of adding on additional waste streams may be lower.

- A council-provided service that is widely available would be more cost-effective on a per-user basis than a niche or bespoke service.

- If provided without cost to farmers, uptake would likely be high and councils may be able to at least partly cover costs through the sale of plastics collected to a processor.

### Challenges:

- Territorial Authorities may be reluctant to have any involvement with commercial waste and to be exposed to recycling market vulnerabilities.

- Costs – which will vary based on region – may be prohibitive.

- Plasback, the incumbent service provider for agricultural soft plastics would be negatively impacted in regions where such a service was provided, unless they were the service provider.

- It is likely that a separate run would be required to collect plastics, negating the benefits of adding on to an existing service.

### 6.2. OPTION 2 – COMMERCIAL ON-FARM COLLECTION

**Description:**

National and regional waste collection service providers develop and/or refine on-farm waste collection services for farmers.

Service providers provide a range of bin sizes (including larger wheelie bins) and also allow farmers to purchase their own bins to use in a bin swap system.

Both domestic and commercial waste streams are accepted, including both non-hazardous general waste and recyclables.

Soft plastics collected would be sent to Plasback or EnviroWaste for recycling.

| Type: | Waste Contractor Collection | Recycling/Disposal of Waste |
### Key Players:
- Waste Management
- EnviroWaste
- Smart Environmental
- Other regional waste collection service providers

### Waste Streams:
Hazardous waste could not be included in this collection due to specialist handling requirements.

Domestic waste streams – both general and recyclable – would be a key part of this, even though they are not within the scope of this project.

Priority waste streams would include:
- Netting
- Animal feed bags
- Baleage wrap
- Mulch film and crop cover
- Silage wrap
- Fertiliser bags
- Seed bags
- Plastic (pallet wrap)
- Glass
- Greenhouse plastic sheeting
- Plastic bags
- CCA treated timber
- PVC
- Plastic
- Metal

### Rationale:
- Approximately 55% of respondents to the farmer survey said they would use a single bin on-farm collection service. 76% of respondents indicated they would pay for such a service.

- Approximately 66% of respondents to the farmer survey said they would use an on-farm collection service that included both general waste and recyclables bins. 75% of respondents indicated they would pay for such a service.

- Most of the waste streams to be collected are recyclable and would have value to the collector.

- Most existing service providers are already well set up to provide collection services and manage the targeted waste streams.

- As services became more well-known and popular, and route density increased, costs for farmers would go down.

- Allowing the use of smaller bins would enable farmers to fill these in the four-week pick-up rotation that service providers typically require. Allowing farmer-owned bins would may allow farmers to have less frequent pick-ups.

- Including both domestic and commercial waste streams increases volumes and may reduce costs. 41% of farmers surveyed said they already access
some kind of on-farm waste collection service but this is most likely to be domestic only.

| Challenges: | Farmers may not sort effectively and recyclable waste streams may end up in a general waste bin. |
|            | Existing services, such as Plasback, may be undermined. |
|            | Most farmers surveyed indicated they would pay less than $500 annually for a waste collection service, which is a very low revenue figure for a service provider. |
|            | Farmers experiencing lower than usual returns may be reluctant to pay additional costs. |
|            | The requirement to sort recyclable waste streams may make the service uneconomic for providers. |
|            | If commercial waste streams are added to existing service runs farmers may inadvertently or deliberately dispose of hazardous waste, causing a potential health and safety issue for service providers. |
|            | If farmers own their own bins or smaller bins are used, infrequency and unpredictability of pick-up requirements may negatively impact rationalisation of transportation logistics and increase costs. |

6.3. OPTION 3 – COMMUNITY ORGANISATION ON-FARM COLLECTION

| Description: | Community organisations, such as Wastebusters Canterbury, roll out multi-bin on-farm waste collection services based on a farmer-owned bin swap arrangement, as Wastebusters Canterbury currently provides. Organisations pursue both recycling and reuse opportunities. |
| Type: | Waste Contractor Collection | Recycling/Reuse of Waste |
| Key Players: | • Wastebusters Canterbury. |
|            | • Other community organisations with similar capabilities. |
| Waste Streams: | All non-hazardous waste. |
| Rationale: | • Approximately 66% of respondents to the farmer survey said they would use an on-farm collection service that included both general waste and recyclables bins. 75% of respondents indicated they would pay for such a service. |
|            | • Most of the waste streams to be collected are recyclable and would have value to the collector. |
|            | • Wastebusters Canterbury are already providing this service successfully. |
• There are a number of similar community organisations around the country that potentially have the capability to provide this service but are not doing so currently.

• Waste streams would be sorted by the farmer on-site minimising waste handling costs.

• Farmers own their own bins so can utilise services as and when suits them.

• Community organisations are typically strong in terms of farmer education and engagement, so will likely get better yields and sorting of waste than purely commercial operations.

### Challenges:

• Most farmers surveyed indicated they would pay less than $500 annually for a waste collection service, which is a very low revenue figure for a service provider.

• Farmers experiencing lower than usual returns may be reluctant to pay additional costs, especially bearing in mind the need to purchase bins.

• Because the service responds to farmer demands in terms of pick-ups, infrequency and unpredictability of pick-up requirements may negatively impact rationalisation of transportation logistics and increase costs.

• The service may work well for farmers close to main centres, but the costs of transportation may become prohibitive for more remote locations.

• Community organisations may struggle to meet compliance requirements and access capital to operate a strong and commercially savvy service.

• Based on Wastebusters Canterbury, the business model is apparently vulnerable to commodity pricing for recyclables.

### 6.4. OPTION 4 – PLASBACK PLASTICS COLLECTION

| Description: | Plasback provides agricultural soft plastic on-farm collections to farmers through its network of local contractors. Support is given to Plasback to consider ways in which collection requests and pick-ups can be more effectively planned and monitored to ensure customer satisfaction and increase collection rates. |
| Type: | Waste Contractor Collection | Recycling of Waste |
| Key Players: | Plasback | Plasback collection contractors |
| Waste Streams: | Agricultural soft plastics | Some containers and drums |
Rationale:  
- 20% of farmers surveyed indicated they were already using Plasback and Plasback has grown year on year for some time.
- Plasback is a Ministry for the Environment accredited product stewardship scheme that recycles the plastics collected.
- Plasback’s rates are relatively inexpensive for an on-farm collection and transportation costs have remained stable for 10 years.
- Approximately 66% of respondents to the farmer survey said they would use an on-farm collection service that included recyclables.
- The service is provided on an as-needed basis, rather than to a set timeframe or schedule.
- Plasback has a variety of – and stable – markets for recycled plastics.
- Plasback’s process can handle a reasonable degree of contamination.
- Plasback provides a virtually nationwide service.

Challenges:  
- Most farmers surveyed indicated they would pay less than $500 annually for waste collection services.
- Farmers experiencing lower than usual returns may be reluctant to pay additional costs.
- A number of farmers and service providers have expressed concern over Plasback’s service responsiveness.
- Other potential entrants to the market for recycling soft plastics may negatively impact Plasback.

6.5. OPTION 5 – PLASBACK EXPANDED WASTE STREAM COLLECTION

Description:  
Plasback provides agricultural soft plastic on-farm collections to farmers through its network of local contractors. Plasback contractors pick up additional waste streams from farmers while collecting plastics.

Type:  
Waste Contractor Collection | Recycling of Waste

Key Players:  
- Plasback
- Plasback collection contractors
### Waste Streams:
In addition to Plasback’s focus on plastic waste streams, contractors could potentially collect other non-hazardous, recyclable waste streams that are not too bulky. This may include:

- Glass
- Plastic bags
- Household batteries
- PVC
- Cardboard
- Alkathene pipe offcuts
- Plastics packaging
- Paper
- Irrigation trickle tape

### Rationale:
- Plasback has an almost nationwide network of contractors that are already travelling to farms to pick up waste. It is probable that many of these contractors will have spare capacity to pick up additional waste streams, and would be keen on additional income from waste collection.
- Contractors collecting waste for recycling would, in all likelihood, not need a significantly larger number of transportation movements to ensure waste gets to recycling services.
- Approximately 66% of respondents to the farmer survey said they would use an on-farm collection service that included recyclables.
- The marginal costs of collection would probably be quite low.

### Challenges:
- Suitable waste streams are limited.
- Convenient outlets would need to be found for all waste streams.
- Either the farmer would need to pay for waste to be collected, or the waste streams would need to be of sufficient value for outlets to pay collectors. Most of the target waste streams do not meet the latter requirement.
- Agpac, which underwrites Plasback, may feel that it is cross-subsidising the collection of other waste streams.
- There is some market confusion and/or dissatisfaction about Plasback’s service levels.
- Plasback’s booking system and process would need to be substantially modified to deal with additional waste streams.
### 6.6. OPTION 6 – ENVIROWASTE PLASTICS COLLECTION AND RECYCLING

<table>
<thead>
<tr>
<th>Description:</th>
<th>Once fully operational and launched, EnviroWaste commences processing of polypropylene fertiliser bags, of which it currently has a stockpile and is continuing to collect via a series of hubs in conjunction with key partners. As the service grows, EnviroWaste begins collection of fertiliser bags from farms using back-haulage arrangements with fertiliser delivery contractors. EnviroWaste then extends service to include other forms of plastic from farms. In time, the service may extend to other waste streams.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type:</strong></td>
<td>Waste Contractor Collection</td>
</tr>
</tbody>
</table>
| **Key Players:** | • EnviroWaste  
• Fertiliser companies including Ballance and Ravensdown  
• Transportation contractors |
| **Waste Streams:** | Initially fertiliser bags.  
Then, potentially, all recyclable agricultural plastics.  
Other waste streams may follow. |
| **Rationale:** | • The collection logistics aspect of this model has already been successfully trialled.  
• Currently some bags are being picked up at no charge due to the use of back-haulage. This is the medium-term model and is obviously appealing to farmers from both a cost and convenience perspective.  
• 38% of farmers surveyed said they currently use a local drop-off for some recyclables. An additional 35% said they were somewhat likely or very likely to utilise such a service.  
• Approximately 66% of respondents to the farmer survey said they would use an on-farm collection service that included recyclables.  
• Plastics recycling plant is apparently close to being commissioned and launching.  
• Plastic will be recycled in New Zealand back into agricultural plastics. A back-up market for plastic output has also been secured.  
• The process allows for a reasonable degree of contamination.  
• The process can handle a wide range of agricultural plastics. |
| **Challenges:** | • The processing plant is not yet fully operational and has experienced some delays in becoming operational.  
• The option may undermine existing services such as Plasback.  
• Drop-off of plastic at local hubs is likely to be less popular than on-farm pick-up.  
• Scaling up recycling operations is often fraught with technical difficulties, particularly in terms of dealing with contamination. |
6.7. OPTION 7 – AGRECOVERY AGRICHEMICAL AND PLASTICS COLLECTION

**Description:** Agrecovery collects agrichemicals from farms, and accepts agrichemical containers at its nationwide network of collection hubs.

Support is given to Agrecovery to consider how collection rates might be further improved.

**Type:**
- Permanent Collection Hubs & Waste Contractor Collection
- Recycling of Waste & Disposal of Waste

**Key Players:**
- Agrecovery
- Agrecovery service provider (currently 3R Group)
- Agrecovery collection service providers (including JBL Environmental)

**Waste Streams:**
- Plastic agrichemical containers
- Agrichemicals (including agricultural sprays and drench/dips)

**Rationale:**
- 43% of farmers surveyed indicated that they utilised the services of Agrecovery.
- Agrecovery is probably the most well-known and successful service provider for agricultural waste.
- Agrecovery’s container and agrichemical collections are accredited product stewardship schemes.
- Agrecovery already collects in excess of 30% of targeted agrichemical containers in New Zealand.

**Challenges:**
- Agrecovery has relatively low collection rates compared to some similar programmes operating internationally.
- Agrecovery is a relatively expensive programme compared to some similar programmes operating internationally.
- Agrecovery’s growth in terms of percentages and volumes of plastic collected appears to have slowed or peaked.
- There is potential uncertainty as to the operational future of Agrecovery as the service delivery component is being openly tendered later in 2016.
- Agrecovery does not cover all brands of agrichemical and imposes strict restrictions on products and containers that can be recycled.

6.8. OPTION 8 – AGRECOVERY EXPANDED WASTE STREAM COLLECTION

**Description:** Agrecovery collects agrichemicals from farms, and accepts agrichemical containers at its nationwide network of collection hubs.

As part of the on-farm hazardous waste collection, additional non-bulky, hazardous wastes are collected by contractors.
As part of the container collection, additional non-hazardous recyclable wastes are collected at collection hubs.

<table>
<thead>
<tr>
<th>Type: Permanent Collection Hubs &amp; Waste Contractor Collection</th>
<th>Recycling of Waste &amp; Disposal of Waste</th>
</tr>
</thead>
</table>

**Key Players:**
- Agrecovery
- Agrecovery service provider (currently 3R Group)
- Agrecovery collection service providers (including JBL Environmental)

**Waste Streams:**

<table>
<thead>
<tr>
<th>Existing Agrecovery waste streams:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic agrichemical containers</td>
</tr>
<tr>
<td>Agrichemicals (including agricultural sprays and drench/dips)</td>
</tr>
</tbody>
</table>

**Potential new hazardous waste streams:**
- Paints, solvents
- Oil containers
- Used oil
- Aerosols
- Vehicle batteries
- Waste oil filters
- Sharps
- Household batteries

**Potential new non-hazardous waste streams:**
- Agricultural soft plastics
- Paper and cardboard

**Rationale:**
- 43% of farmers surveyed indicated that they utilised the services of Agrecovery.
- Agrecovery is probably the most well-known and successful service provider for agricultural waste.
- Agrecovery’s transportation contractors are currently the only known hazardous waste collection providers regularly travelling to rural properties. They are already used to the challenges of dealing with hazardous farm waste. To use this route to collect additional hazardous waste would likely add low marginal costs.
- JBL Environmental, that collects agrichemicals for Agrecovery in the South Island, has already confirmed a willingness to consider collection of additional waste streams.
- Farmers are already taking chemical containers to Agrecovery sites. To take other waste at the same time would likely be minimally inconvenient.

**Challenges:**
- Outlets for hazardous waste and recyclables would need to be confirmed and logistics to move waste to the appropriate outlet considered.
• Consideration would need to be given to revenue streams for new waste. It is likely that farmers would need to pay for at least some of these waste streams, which is not Agrecovery’s core business model.

• The brand owners that participate with Agrecovery’s product stewardship schemes may see the collection of additional waste as an activity they would be cross-subsiding and would likely need to approve the addition of any new waste streams.

• Agrecovery has relatively low collection rates compared to some similar programmes operating internationally.

• Agrecovery is a relatively expensive programme compared to some similar programmes operating internationally.

• Agrecovery’s growth in terms of percentages and volumes of plastic collected appears to have slowed or peaked.

• There is potential uncertainty as to the operational future of Agrecovery as the service delivery component is being openly tendered later in 2016.

6.9. OPTION 9 – SCRAP METAL NATIONWIDE COLLECTION

| Description: | A regular (likely annual) nationwide scrap metal collection is organised to recycle metal waste from farms. Local hubs are utilised for easily transportable metal waste, whereas on-farm pick-ups can be organised for larger items such as used machinery or vehicles. SMRANZ assist with coordination (and perhaps host the booking system) and local members are engaged to manage the process and recycle waste. Farmers are given receipts when items are collected and paid once items have been weighed. Local councils and other industry organisations assist with marketing and awareness. |
| Type: | One-off Collection Hubs & One-off Collection Round Recycling of Waste |
| Key Players: | • SMRANZ. • Scrap metal recyclers. • Local transportation contractors. • Local councils and other industry organisations. |
| Waste Streams: | • Scrap metal • Vehicle batteries (potentially) • Used machinery/vehicles |
Rationale:

- A regular collection service would be relatively inexpensive to run and would source desired additional volumes for scrap metal recyclers.
- An industry association that could potentially coordinate such a run – and has expressed a willingness to do so – exists.
- A hybrid model that allows farmers to take some waste to a collection hub, while larger items are collected on-farm is likely to be well-received.
- 38% of farmers surveyed said they currently use a local drop-off for some recyclables. An additional 35% said they were somewhat likely or very likely to utilise such a service.
- Approximately 66% of respondents to the farmer survey said they would use an on-farm collection service that included recyclables.
- Farmers would receive some payment for scrap metal collected.

Challenges:

- Farmers have apparently held on to scrap metal waste recently because of low commodity prices. They may continue to do so.
- A potentially expensive online or phone-cased booking system would need to be designed and implemented.
- The logistics of collecting and weighing waste and providing receipts and payment to farmers may prove unwieldy.

6.10. OPTION 10 – VEHICLE BATTERY NATIONWIDE COLLECTION

Description: A regular (likely annual) nationwide vehicle battery collection is organised to recycle batteries from farms. Local charities such as the Lion’s Club are engaged to organise local hubs and manage collections. These charities receive the proceeds from collections. The local collections are promoted as ‘community events’. Local councils and other industry organisations assist with marketing and awareness. This option could overlap or be replaced by Option 9.

Type: One-off Collection Hubs

Key Players:

- Christchurch-based Dominion Trading has expressed a willingness to consider undertaking such a collection, although other providers may also be keen to be involved.
- Local community organisations such as the Lion’s Club.
- Local councils and other industry organisations.

Waste Streams: Vehicle batteries only
Rationale:

- A regular collection service would be relatively inexpensive to run and would source desired additional volumes for scrap metal recyclers.
- An organisation that could potentially coordinate such a run – and has expressed a willingness to do so – exists.
- A community-based event that supports a local charity is likely to secure public support.
- Directing all proceeds to a charity removes the need to individually weigh waste and account for contributors.
- No booking system would be required – the collection would be organised to simply happen on a certain day.
- 38% of farmers surveyed said they currently use a local drop-off for some recyclables. An additional 35% said they were somewhat likely or very likely to utilise such a service.

Challenges:

- As only one waste stream is being targeted, volumes may be uneconomical.
- A considerable amount of overall coordination would be required to ensure all local logistics were undertaken satisfactorily. The scrap metal recycler may find the effort required is not justified by the financial return, particularly given the number of local sites that would be required to make the service convenient for farmers.

6.11. OPTION 11 – EXPANDED TERRITORIAL AUTHORITY RECYCLING DROP-OFF HUBS

Description:
Territorial Authorities with a substantial rural population provide recycling hubs in locations convenient to farmers.

Both existing and new rural hubs expand waste streams to include some recyclable commercial rural waste streams, such as soft plastics, which would be collected from the hub by recyclers.

Type: Council/TA Waste Hubs Recycling of Waste

Key Players:
- Territorial Authorities

Waste Streams:
- Agricultural soft plastics
- Metal
- Paper and cardboard
- Glass

Rationale:
- 60% of surveyed Territorial Authorities indicated they already provided a local hub for recyclables from rural communities, although this would almost certainly only be for domestic waste streams. An additional 23% of Territorial Authorities indicated a willingness to consider providing such hubs.
- 39% of surveyed farmers said they already used such services, while an additional 34% said it was very likely or somewhat likely they would do so.
A number of councils have launched successful initiatives to capture waste from rural areas and have positive feedback from locals. Some have indicated a willingness to add in commercial waste streams such as soft plastics, and some have already done so.

Anecdotally, farmers have treated these hubs well, with little contamination or illegal dumping, and a willingness to travel to utilise such sites provided they are well-located.

Recyclable wastes can typically be dropped off at no charge to the farmer. Certain waste streams may be a revenue stream for councils.

Challenges:

- In order to be convenient, a substantial number of sites must be established, at a potential cost to ratepayers.
- Outlets and collection logistics for new waste streams would need to be established and must also be reliable, even if commodity prices fall.
- Contamination or dumping of unacceptable waste may become an issue.
- The inclusion of metal may lead to concerns over site security and theft given its value.
- The process for approving and implementing such sites may be difficult or lengthy for some Territorial Authorities.

**6.12. OPTION 12 – EXPANDED ROSE OIL RECYCLING SCHEME DROP-OFF HUBS**

**Description:**
Additional sites are established for the collection of oil containers and oil filters at convenient locations for farmers, such as rural stores.

<table>
<thead>
<tr>
<th>Type:</th>
<th>Retail Store Drop-off</th>
<th>Recycling of Waste</th>
</tr>
</thead>
</table>

**Key Players:**
- ROSE
- ROSE providers – Fulton Hogan, Salters Cartage and Petroleum Services
- Rural stores

**Waste Streams:**
- Oil containers and used oil
- Waste oil filters

**Rationale:**
- 38% of farmers surveyed said they currently use a local drop-off for some recyclables. An additional 35% said they were somewhat likely or very likely to utilise such a service.
- Farmers are already visiting rural stores and could drop off these wastes at no charge as they have value to recyclers, but volume is too low to consider an on-farm collection.
- ROSE has confirmed they are willing to consider such a service extension.
- Both PGG Wrightson and Farmlands have confirmed they are willing to consider providing facilities for such collections.
- Fulton Hogan and Filter Crusher NZ have confirmed a willingness in principle to pilot such a service based on the collection of oil filters and containers from rural stores.

**Challenges:**
- Less than 1% of surveyed farmers have used the ROSE scheme.
- As hazardous waste, these waste streams would require the sites to meet certain requirements to ensure safety. Sites would need to ensure contamination is avoided.
- Farmers travelling into main centres may be reluctant to handle ‘dirty’ waste streams on these trips.

### 6.13 OPTION 13 – EXPANDED PAINT RECYCLING SCHEME DROP-OFF HUBS

**Description:**
Additional sites are established for the collection of waste paint at convenient locations for farmers, such as rural stores. It is probable that waste would need to be within the free categories of existing schemes to avoid payment requirements.

**Type:**
| Retail Store Drop-off | Recycling/Disposal of Waste |

**Key Players:**
- Resene / PaintWise
- Dulux
- Rural stores

**Waste Streams:**
- Paint

**Rationale:**
- 38% of farmers surveyed said they currently use a local drop-off for some recyclables. An additional 35% said they were somewhat likely or very likely to utilise such a service.
- Farmers are already visiting rural stores and could drop off these wastes at no charge as they have value to recyclers, but volume is too low to consider an on-farm collection.
- Paint is the top-rated priority waste stream.

**Challenges:**
- Neither Dulux nor Resene has yet expressed a willingness to consider such an expansion.
- Less than 2% of surveyed farmers have used the PaintWise scheme and less than 2% of farmers surveyed have used the Dulux Paint Take-back service.
- As paint is a hazardous waste, sites would be required to meet certain requirements to ensure safety. Sites would need to ensure contamination is avoided.
- Farmers travelling into main centres may be reluctant to handle ‘dirty’ waste streams on these trips.
Transportation logistics to collect paint and transport it for processing need to be considered and may prove uneconomic.

These schemes cover only two brands of paint and impose strict restrictions on products and containers that can be recycled.

6.14. OPTION 14 – FONterra sharps collection

**Description:** Fonterra is currently undertaking a pilot to provide sharps collection containers to farmers. This pilot will be completed in June, 2017.

Farmers fill the containers and drop them off at local participating vet clinics from which they are sent for disposal.

**Type:** Retail Store Drop-Off

**Key Players:**
- Fonterra
- Local veterinary clinics
- Specialised waste collection service providers

**Waste Streams:**
- Sharps

**Rationale:**
- The solution being tested by Fonterra is low-cost, relatively convenient and effectively deals with a priority waste stream using existing disposal mechanisms.
- Fonterra is testing the model to ensure effectiveness and acceptability to farmers.

**Challenges:**
- It is likely Fonterra would focus on its own suppliers for the rollout of any wider scheme, so arrangements may need to be made to allow the service to be utilised by other farmers.
- The model requires local vet clinic participation, which will need to be secured in all rural communities.

6.15. OPTION 15 – Waste transformation limited waste pyrolysis

**Description:** Waste Transformation Limited (WTL) receives applicable waste streams initially at its Timaru base, then subsequently at other sites as its rollout continues.

WTL pyrolyses waste into biochar and other carbon products.

**Type:** Council/TA Waste Hubs

**Key Players:**
- Waste Transformation Limited
- Local council/transfer station partners
### Waste Streams:
- Agricultural soft plastics
- CCA treated timber
- Untreated timber offcuts
- Used tyres
- Old fence posts
- Pallets – untreated wood

### Rationale:
- WTL can process a wide variety of waste streams.
- WTL has a consent in Timaru which allows for a proportion of CCA treated timber to be processed. This is one of only two known ‘non-landfill’ outlets for CCA treated timber in New Zealand.
- WTL’s plant is relatively stable and proven in terms of its technology and has operated successfully in Timaru for several years.
- WTL intends to pursue a strategy that will see small containerised units that may be able to be moved around the country to process waste as required.

### Challenges:
- WTL’s technology has not been extensively tested with a wide variety of waste streams and overseas experience suggests this may cause emission issues.
- WTL currently requires substantial and reliable volumes to be economically viable. In terms of rural waste, this would require the waste to be collected from a large area and taken to a centralised processing facility, which may prove uneconomic.
- WTL currently only operates in Timaru.
- WTL is not planning to focus on rural waste in at least the next year.

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### 6.16. OPTION 16 – INCLUSION OF NEW SERVICES INTO FARM ASSURANCE PROGRAMMES

**Description:** As new options for farm waste minimisation become established, companies providing farm assurance or certification programmes are encouraged to include these services specifically in the programmes.

**Key Players:**
- DairyNZ – Sustainable Dairy Water Accord (SDWA)
- Synlait – Lead With Pride
- Miraka
- NZ Winegrowers – Sustainable Winegrowing NZ

**Waste Streams:** The waste streams included will be dependent on what new services are included.
**Rationale:**

- A number of farm assurance and certification programmes are operating successfully and already have specific services such as Agrecovery as requirements or recommendations for participating farmers.
- A substantial number of farmers already come under one of these programmes, particularly in the horticulture and arable sectors.
- Agrecovery has noted that its inclusion as a recommendation or requirement on a number of these programmes has made a substantial positive impact on its participation rates.
- Becoming part of the programmes raises farmer awareness of services and is likely to boost the take-up of such services.

**Challenges:**

- The services vary in terms of the strength of the requirement or recommendation. Some allow the recommendation to be ignored.
- Services, in many cases, must be nationwide in order to be included in the programmes. Services must also be performing reliably to be considered and must be acceptable to farmers.
- While the inclusion of a new service in most programmes is unlikely to be prohibitively difficult, inclusion of a service in the SDWA which currently do not have any waste requirement, but do have a very wide uptake, may be very challenging given the focus on water.
- It will take considerable time for services to become reliable and established to the point where programmes may consider participation becoming a requirement.
7. PRELIMINARY OPTION ASSESSMENT: TECHNICAL AND ECONOMIC FEASIBILITY

Fully assessing the overall technical and economic feasibility of an option for alternative rural waste management requires both that the option details and structure are determined and that all the required information on the option has been provided. At this stage, neither of these factors is complete. Instead this preliminary technical and economic feasibility looks to determine whether there is a ‘base case’ feasibility to options based on initial plans for delivery.

Economic feasibility looks to assess the proposed business model to determine whether it makes financial sense to proceed with its development. This assessment considers whether the business model – the overall design for the option, taking into account costs and revenue streams – could potentially work.

Technical feasibility looks both to the technological elements of an option and to resource flows. It considers whether the required inputs (waste) can be sourced, whether the process is reliable and proven, and whether the required outputs will be produced.

7.1. ASSESSMENT METHODOLOGY

In Section 3.3 the barriers to alternative rural waste management methods were considered. The key barriers were identified as:

- Costs
- Inconvenience
- Lack of Incentives
- Lack of Awareness
- Lack of Economic Viability

In order to achieve economic viability as outlined in Section 3.3, the following factors were identified:

- Supply chain participants: services must have willing, motivated and committed participants at all stages of the supply chain.
- Customer demand: services need to be able to secure and sustain a reasonable level of customer demand at a service price that allows for profitability.
- Waste contamination levels: services need to be able to deal with reasonable levels of waste contamination.
- Inconsistency and unreliability of volume: services need to secure consistent volumes or be able to deal with inconsistent volumes of incoming waste.
- Unreliability of novel technologies: services need any technology they rely on to be proven, scalable and reliable.
- Increasing compliance requirements: services need to have the capability, resources, systems and processes in place to comply with all relevant government regulation.
- **Inadequate business model or lack of capital**: services need to have a robust and sustainable business model, be adequately capitalised for the proposed model, and have the capability to execute it.

- **Volatility of output markets for processed waste**: services need to have secure access to output markets or the financial means to be able to cope with uncertainty in this regard.

In addition to overcoming barriers to the success of alternative service provision options, solutions need also to deliver on the focus of this project, which is to avoid as much waste from as many of the focus rural waste streams as possible. The top priority rural waste streams are as follows:

1. Paints, solvents
2. Oil containers
3. Used oil
4. Aerosols
5. Vehicle batteries
6. Waste oil filters
7. Agricultural sprays
8. Drench/dip
9. Sharps
10. Netting
11. Animal feed bags
12. Baleage wrap
13. Mulch film and crop cover
14. Silage wrap
15. Fertiliser bags
16. Animal health plastic
17. Seed bags
18. Plastic (pallet wrap)
19. Containers
20. Drums
21. Glass
22. Greenhouse plastic sheeting
23. Plastic bags
24. Household batteries
25. CCA treated timber
26. PVC
27. Untreated timber offcuts
28. Plastic
29. Wood-chip animal bedding
30. Metal (roofing, metal, wire)
31. Used machinery/vehicles
32. Used tyres
33. Cardboard
34. Alkathene pipe offcuts
35. Misc. plastics packaging
36. Paper (filter socks)
37. Old fence posts
38. Building waste/concrete
39. Twine
40. Pallets – untreated wood
41. Irrigation trickle tape

Considering all of the factors that contribute to a successful and sustainable business model for proposed rural waste management options, the following list of assessment factors will be used for evaluation:

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
</tr>
<tr>
<td>All participants in supply chain in place are readily able to be secured.</td>
<td>High</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

The assessment of options has been undertaken based on these criteria, weighted based on the stated importance. Both the level of importance and the assessments made are, of course, subjective, but based on best available information to date.
7.2. OPTIONS ASSESSMENT

This section provides a preliminary assessment of technical and economic feasibility of identified options for alternative rural waste minimisation. The assessment factors are as indicated in Section 7.1 and each option is rated as to how well it meets each assessment factor based on a scale of Low, Moderate, High or Very High. Comments are provided to explain ratings given. Options are then given an overall rating which indicates the determined level of overall economic and technical feasibility for the option.

### 7.2.1. Option 1 – Territorial Authority On-Farm Collection

Territorial Authorities that provide an on-farm domestic waste collection extend this to include recyclable agricultural plastics. A separate bin would be provided for these wastes, and the volume collected would be sent to either Plasback or EnviroWaste for recycling.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Very High</td>
<td>Under this option services would be provided to farmers without a direct cost.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Low</td>
<td>The option would likely need to be at least part-funded by councils.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>Very High</td>
<td>Farmers are very likely to dispose of waste if collected from their property.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Both proposed service providers can deal with a degree of waste, but the lack of direct relationship with farmers may result in higher levels of contamination.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>Very High</td>
<td>High volumes are likely, and are supplementary to services’ existing volumes.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>Councils would be providing services through existing providers.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Revenue streams and council cost requirements are not yet fully understood.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>High</td>
<td>Connects with established service providers.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Low</td>
<td>The processes required for council to access funding for this model are unknown, but may prove politically difficult.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Low</td>
<td>Councils appear reluctant to be directly involved in commercial waste streams.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Low</td>
<td>Service providers can handle large volumes of waste, but the logistics of collection may prove difficult, including bin sizes.</td>
</tr>
</tbody>
</table>
### Assessment Factor

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>High</td>
<td>Plastics would be recycled.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Farmers would have waste collected from their properties.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>High</td>
<td>Agricultural soft plastics feature in a number of assurance programmes. The option would provide a convenient and free alternative to burning or burying plastics.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>The option would collect a range of soft plastics, but no other waste streams.</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Where council waste collections are offered to rural properties they appear well supported. Many farmers also support the idea of an on-farm recyclables collection. Specific option not yet in existence.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>Low</td>
<td>It is likely this option would take considerable time to develop and implement.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>Low</td>
<td>It is likely that, even if such a service were launched, it could not be offered to very remote properties. Option is specific to each area in which it is launched.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Providers are well established.</td>
</tr>
</tbody>
</table>

**Overall comment:**

While this option would likely prove popular with farmers, it is unlikely to gain support from many councils because of its focus on commercial waste streams and its potential cost to implement. It is likely that if implemented it would need – from a political standpoint – to be available to all rural ratepayers. In many regions this would be prohibitively expensive.

**Overall assessment:**

The overall rating for this option is Low.

This option is not considered to offer a preliminary economic and technical feasibility. Despite this, it may be worth communicating the idea to councils to see if there were any that would be interested in piloting such a service. A successful pilot may require a reconsideration of feasibility.

### 7.2.2. Option 2 – Commercial On-Farm Collection

National and regional waste collection service providers develop and/or refine on-farm waste collection services for farmers. Service providers provide a range of bin sizes (including larger wheelie bins) and also allow farmers to purchase their own bins to use in a bin swap system. Both domestic and commercial waste
streams are accepted, including both non-hazardous general waste and recyclables. Soft plastics collected would be sent to Plasback or EnviroWaste for recycling.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Low</td>
<td>Such collections are typically expensive.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Low</td>
<td>Low route density is likely to make such services minimally profitable and unsustainable. If farmers cancel services, this will impact the feasibility of providing services to other farmers on the same run.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>Low</td>
<td>Except in a few regions, this is a niche service. Take-up is currently low because of volume requirements and cost.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Waste streams can be sorted after collection but this may make the service uneconomic. Contaminated waste streams are likely to result in farmers being charged fees.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Waste volumes are likely seasonal and overall volumes may be marginal. Service providers are likely to send waste on to third party processors so may be able to cope well with this.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>Existing service providers are well established and well-resourced to meet compliance requirements.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Low</td>
<td>The business model is likely marginal in most regions due to low take-up.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>High</td>
<td>Most target waste streams have reliable output markets.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Very High</td>
<td>Most commercial waste collection service providers are very well capitalised.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Moderate</td>
<td>Service providers engaged for this project are open to considering service expansion but concerned about its difficulties.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Option works best with higher volumes of waste and more participants.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>High</td>
<td>Waste streams would be recycled through existing providers.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Farmers have waste collected from the farm, but may need to sort waste into different streams.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Option does get waste off farms, but its cost is likely to be a barrier to inclusion in assurance programmes.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
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<td>------------</td>
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<td>----------</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>High</td>
<td>Option would collect most recyclable waste streams.</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Farmers may be aware of the availability of such services but are not generally supportive based on cost.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Delays here would be in ensuring markets for products, arranging bins and marketing the service. Delays are unlikely to be lengthy if service providers are willing to participate.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>High</td>
<td>Service providers cover most of New Zealand, but costs will always have a component of travel in them and will likely make the service uneconomic to provide to remote properties.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Very High</td>
<td>All current service providers are well established.</td>
</tr>
</tbody>
</table>

**Overall comment:**

This option will likely continue to work as it has in some regions, and the addition of on-farm recycling bins is worthy of consideration by service providers. Despite this, the cost of providing on-farm waste collection as part of a commercial venture is hard to justify on a nationwide basis and is unlikely to be a key strategy as an alternative to burning, burying and bulk storage of waste. Were a service to be offered at an annual price-point of around $500, it is likely this option would be considerably more feasible.

**Overall assessment:**

The overall rating for this option is Low.

This option is not considered to offer a preliminary economic and technical feasibility. It is recommended that service providers be contacted to see if any is prepared to trial recycling as described in this option in a key region such as Taranaki. Beyond this, it is recommended this option not be further considered and developed under this project.

### 7.2.3. Option 3 – Community Organisation On-Farm Collection

Community organisations, such as Wastebusters Canterbury, roll out multi-bin on-farm waste collection services based on a farmer-owned bin swap arrangement, as Wastebusters Canterbury currently provides. Organisations pursue both recycling and reuse opportunities.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Costs to farmers are dependent on location, but likely to be well below commercial rates.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Moderate</td>
<td>The business model is minimally profitable, but driven by lower expectations of profitability based on organisational objectives.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Wastebusters Canterbury is seeing strong farmer uptake, but the service is likely to be of most interest to those reasonably close to a main centre.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>High</td>
<td>A key aspect of this option is high farmer engagement aimed at ensuring contamination is minimal.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>High</td>
<td>In most cases service providers will send waste to third party processors.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Non-profit organisations may struggle to maintain a complete and current compliance system.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>High</td>
<td>As the model for this option Wastebusters Canterbury appears to have a well-conceived business model based substantially on strong customer engagement.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Providers will be dependent on the markets of processors, and may have little influence over variability in volumes processors will take.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Low</td>
<td>Non-profit organisations will likely need to fundraise to set up services.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Moderate</td>
<td>Aside from those organisations currently offering services, this option has not been specifically discussed with potential providers.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Moderate</td>
<td>Scalability and volumes will be limited by access to capital for expansion, which will be very limited.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>Very High</td>
<td>Community organisations are likely to pursue as many options for reuse and recycling as possible.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Farmers do have to sort waste but direct support would be given by the service provider for any behaviour change requirement.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>High</td>
<td>The community nature of the option is likely to appeal strongly to intrinsic drivers. Alignment with assurance programmes is possible once services are well established.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>------------</td>
<td>--------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>Very High</td>
<td>All recyclable waste streams for which a market can be found would be included.</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Awareness of this type of programme appears to operate based on word of mouth. Community support is likely to be high based on the type of organisation providing services.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Although community organisations, being typically small and able to move fairly quickly, would likely embrace the idea rapidly, the process of securing funding to establish services would be potentially lengthy.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Community organisations with the capability to provide such services are only present in some regions. The cost of providing services to very remote properties is likely to be prohibitive.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Low</td>
<td>Other than Wastebusters Canterbury, such service provision would be a new venture for community organisations.</td>
</tr>
</tbody>
</table>

**Overall comment:**

This option has good potential in regions where capable community organisations are present. It would not be easy to launch and operate such a service sustainably, but Wastebusters Canterbury is showing it can be done, and they are seeing growth. If other organisations are willing to replicate this model, it is definitely worth assisting them to do so, subject to a strong business case. This will not be a model that works nationwide, but may make a significant difference in some communities.

**Overall assessment:**

**The overall rating for this option is Moderate.**

This option is considered to offer a moderate preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

### 7.2.4. Option 4 – Plasback Plastics Collection

Plasback provides agricultural soft plastic on-farm collections to farmers through its network of local contractors. Support is given to Plasback to consider ways in which collection requests and pick-ups can be more effectively planned and monitored to ensure customer satisfaction and increase collection rates.
<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Farmers have to pay for collections and this is clearly a barrier. Costs are not exorbitant however, and have remained largely stable for some time.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Plasback advises that Agpac do subsidise the service, but are highly committed to ensuring it remains.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Plasback has grown but costs are clearly a barrier to many farmers.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>High</td>
<td>Plasback successfully deals with contamination currently, although this does present challenges.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Plasback apparently struggles with service timeliness due to seasonality of volumes.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>Plasback operates successfully in this regard based on information to hand.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Plasback has grown and is operating successfully but it appears to be struggling to grow and cover the costs inherent in on-farm collections.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>Very High</td>
<td>Plasback has stable output markets and has begun to develop additional new markets.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Very High</td>
<td>Plasback has recently grown its infrastructure through public funding and also has a large corporate underwriting service provision.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Very High</td>
<td>Plasback is already operating successfully throughout New Zealand.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Plasback has already successfully scaled its operation and is aiming to increase volumes.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>Very High</td>
<td>Plastic is recycled internationally.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Waste is collected on-farm, but the option requires farmers to place waste in a special liner.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>Very High</td>
<td>A number of programmes already note Plasback as a recommended option.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Plasback handles a range of soft plastics as well as some containers and other plastics.</td>
</tr>
</tbody>
</table>
Assessment Factor | Importance | Rating | Comments |
--- | --- | --- | --- |
Farmers are aware of option or strong community support is present. | Moderate | Moderate | Plasback is relatively well known, but has attracted some criticism based on service timeliness. New systems would aim to improve this. |
Development requirements and timeframes are minimal. | Moderate | Very High | Plasback is already operational nationwide. Development of new systems may take some time. |
Waste can be managed from a wide geographical area. | Moderate | Very High | Plasback operates nationwide except for East Cape. |
Provider has a strong track record. | Moderate | High | Plasback has attracted some criticism from farmers but has operated successfully for some years. |

**Overall comment:**

Plasback is already a successful and growing service with relatively high farmer uptake and relatively low costs to farmers. If Plasback has a weakness it is potentially that service delivery could be better planned and monitored. Working with Plasback on this regard has the potential to improve its reputation and increase collection rates.

**Overall assessment:**

The overall rating for this option is High.

This option is considered to offer a high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

### 7.2.5. Option 5 – Plasback Expanded Waste Stream Collection

Plasback provides agricultural soft plastic on-farm collections to farmers through its network of local contractors. Plasback contractors pick up additional waste streams from farmers while collecting plastics.

Comments from the assessment of Plasback in Option 4 are replicated here. *Additional comments relevant to the addition of other waste streams are in noted in italics.*

Assessment Factor | Importance | Rating | Comments |
--- | --- | --- | --- |
Costs to farmers are minimal. | Very High | Moderate | Farmers have to pay for collections and this is clearly a barrier. Costs are not exorbitant however, and have remained largely stable for some time. *Marginal costs for additional waste streams may be quite low.*
<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>High</td>
<td>Plasback advises that Agpac subsidise the service, but are highly committed to ensuring it remains. The addition of other waste streams without considerable additional collection costs may boost profitability, particularly for local contractors.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>High</td>
<td>Plasback has grown but costs are clearly a barrier to many farmers. Uptake may be increased as more waste streams are included.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Low</td>
<td>Plasback successfully deals with contamination currently, although this does present challenges. The addition of other waste streams is likely to lead to increased contamination issues.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>High</td>
<td>Plasback apparently struggles with service timeliness due to seasonality of volumes. The addition of new waste streams will provide greater volumes to justify more regular collections.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>Plasback operates successfully in this regard based on information to hand.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>High</td>
<td>Plasback has grown and is operating successfully but it appears to be struggling to grow and cover the costs inherent in on-farm collections. Additional waste streams may generate more revenue for local contractors and strengthen the business model.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>High</td>
<td>Plasback has stable output markets and has begun to develop additional new markets. The addition of new waste streams will require new markets to be found, increasing service vulnerability.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Very High</td>
<td>Plasback has recently grown its infrastructure through public funding and also has a large corporate underwriting service provision.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>High</td>
<td>Plasback is already operating successfully throughout New Zealand. Local contractors are likely to be interested in collecting other waste streams provided these are profitable. Agpac may be reluctant to participate if collection of other waste streams is seen as cross-subsidisation.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Plasback has already successfully scaled its operation and is aiming to increase volumes.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>Very High</td>
<td>Plastic is recycled internationally. This option focuses on other waste streams that can be recycled.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Waste is collected on-farm, but the option requires farmers to place waste in a special liner. Additional waste stream collections will require separation of wastes, but will mean more waste can be dealt with at once.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>Very High</td>
<td>A number of programmes already note Plasback as a recommended option. This will only strengthen with the addition of more waste streams.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>High</td>
<td>Plasback handles a range of soft plastics as well as some containers and other plastics. Considerably more waste streams would be added under this option.</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Plasback is relatively well known, but has attracted some criticism based on service timeliness. New systems would aim to improve this.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Plasback is already operational nationwide. Development of new systems may take some time. The addition of new waste streams would require development time in order to consider transportation logistics and output markets.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Plasback operates nationwide except for East Cape.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>High</td>
<td>Plasback has attracted some criticism from farmers but has operated successfully for some years.</td>
</tr>
</tbody>
</table>

**Overall comment:**

There is a strong case to be made for the addition of new waste streams to Plasback’s model. This would leverage the benefit from the fact that collection costs are already being covered and would add additional revenue streams for local contractors, provided farmers are willing to pay for waste to be collected, or the waste has enough inherent value to provide revenue. Feasibility is ultimately dependent on Agpac’s agreement for additional waste streams to be added. They may be persuaded if revenue from other waste streams helps to defray plastic collection costs.

**Overall assessment:**

The overall rating for this option is High.

This option is considered to offer a high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.
7.2.6. Option 6 – EnviroWaste Plastics Collection and Recycling

Once fully operational and launched, EnviroWaste commences processing of polypropylene fertiliser bags, of which it currently has a stockpile and is continuing to collect via a series of hubs in conjunction with key partners. As the service grows, EnviroWaste begins collection of fertiliser bags from farms using back-haulage arrangements with fertiliser delivery contractors. EnviroWaste then extends service to include other forms of plastic from farms. In time, the service may extend to other waste streams.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Very High</td>
<td>EnviroWaste intends to collect initial focus waste streams for no charge. Additional waste streams may attract a modest charge.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Very High</td>
<td>The breakeven throughput for EnviroWaste’s system is relatively low compared to its capacity. End to end control of the process assists in this regard as EnviroWaste is able to extract margin at all stages of the process.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>High</td>
<td>Initial uptake where farmers are taking plastics to a hub may be moderate, but should on-farm collection become the norm, farmer uptake is likely to be very high.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>High</td>
<td>EnviroWaste’s process has extensive washing capabilities designed to deal with contamination from farms.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>Very High</td>
<td>EnviroWaste has secured reliable volumes as required for base profitability. The process can handle other waste streams to utilise remaining capacity.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>EnviroWaste is a large organisation with a very detailed compliance system.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Very High</td>
<td>EnviroWaste’s process has a relatively low breakeven throughput volume and is well insulated from market forces due to securing several domestic markets for outputs.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>Very High</td>
<td>EnviroWaste has reportedly secured more than one reliable output market for recycled plastic.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Very High</td>
<td>EnviroWaste is a large corporate that has already invested substantially in the operation and has access to additional required capital.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Moderate</td>
<td>EnviroWaste has control of most of the supply chain, but its process is not yet operating fully.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>The existing process has substantial capacity and EnviroWaste has expressed a willingness to invest in a second line if required.</td>
</tr>
</tbody>
</table>
Assessment Factor | Importance | Rating | Comments |
---|---|---|---|
Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.) | High | High | EnviroWaste is recycling plastic into new plastic to replace the need for virgin material. |
Inconvenience and behaviour change requirement for farmers is minimal. | Moderate | Moderate | The current model is for farmers to take waste to local hubs, which may be a barrier to wide uptake. The medium term model involves pick-up from farms. |
Potential alignment with extrinsic or intrinsic drivers is strong. | Moderate | High | Once service is established it is likely to align well with existing assurance programmes. |
Multiple focus waste streams are handled. | Moderate | Moderate | Service initially focuses on PP bags. Other plastics may be added in due course. |
Farmers are aware of option or strong community support is present. | Moderate | Moderate | Option pilots have been well received, but option has not yet been fully launched. |
Development requirements and timeframes are minimal. | Moderate | Moderate | The process is not yet fully operational and there have been some delays in the process being launched. |
Waste can be managed from a wide geographical area. | Moderate | High | EnviroWaste intends to collect waste nationwide. |
Provider has a strong track record. | Moderate | High | EnviroWaste has a strong reputation, but has not provided extensive service to rural communities. |

**Overall comment:**

EnviroWaste’s proposed service and process is well-conceived and has a very strong business model. While the service initially is likely to be of moderate interest to farmers, once waste is collected from farms and the target waste streams are broadened it is likely that the service will be dominant in the rural sector.

**Overall assessment:**

The overall rating for this option is Very High.

This option is considered to offer a very high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

### 7.2.7. Option 7 – Agrecovery Agrichemical and Plastics Collection

Agrecovery collects agrichemicals from farms, and accepts agrichemical containers at its nationwide network of collection hubs. Support is given to Agrecovery to consider how collection rates might be further improved.

| Assessment Factor | Importance | Rating | Comments |
---|---|---|---|
Costs to farmers are minimal. | Very High | Very High | Most containers and chemicals can be disposed of without cost. |
<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>High</td>
<td>Agrecovery runs at a modest surplus.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>High</td>
<td>Farmer uptake is substantial but relatively low compared to international services of the same type. This option would look to improve collection rates.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Containers must be triple-rinsed and meet strict criteria for collection.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>High</td>
<td>Waste volumes appear reasonably strong for containers and both container and chemical models are well designed to cope with typical volumes.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>Agrecovery handles hazardous waste as part of service delivery and ensures all compliance requirements are met.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Agrecovery’s service provision is understood to be undertaken on a fixed fee basis, rather than on the basis of volumes collected. This may not be optimal in encouraging greater collection rates.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>Very High</td>
<td>Agrecovery has sustainable and stable output markets for plastics.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>High</td>
<td>Agrecovery has reasonable reserves and has successfully funded business delivery to date.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Very High</td>
<td>Agrecovery is currently operating successfully.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Agrecovery is already handling very large volumes of waste nationwide.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>High</td>
<td>Plastics are recycled. Chemicals are disposed of based on the only options available for waste of these types.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Farmers have to triple-rinse containers and take them to a collection hub. Agrichemicals are picked up on-farm.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Agrecovery is the service most often specifically noted in farm assurance programmes.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>High</td>
<td>Agrecovery handles only containers and agrichemicals, but these cover a significant number of priority waste streams.</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>High</td>
<td>Agrecovery is well known and supported in rural communities, but collection rates are not as high as comparable international programmes.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Agrecovery is already operating nationwide.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Agrecovery is already operating nationwide.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Agrecovery has been operating for a number of years throughout the country.</td>
</tr>
</tbody>
</table>

**Overall comment:**

Agrecovery is the leading rural waste service in New Zealand in terms of farmer uptake and farmer awareness. Agrecovery has, itself, expressed concern over the costs required to provide the service and the collection rates being achieved and there is evidently room for improvement in these areas.

**Overall assessment:**

The overall rating for this option is Very High.

This option is considered to offer a very high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

7.2.8. Option 8 – Agrecovery Expanded Waste Stream Collection

Agrecovery collects agrichemicals from farms, and accepts agrichemical containers at its nationwide network of collection hubs. As part of the on-farm hazardous waste collection, additional non-bulky, hazardous wastes are collected by contractors. As part of the container collection, additional non-hazardous recyclable wastes are collected at collection hubs.

Comments from the assessment of Agrecovery in Option 7 are replicated here. Additional comments relevant to the addition of other waste streams are in noted in italics.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>High</td>
<td>Most containers and chemicals can be disposed of without cost. Additional waste may require payment by farmers.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>High</td>
<td>Agrecovery runs at a modest surplus. Additional waste could potentially improve profitability.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>High</td>
<td>Farmer uptake is substantial but relatively low compared to international services of the same type. This option would look to improve collection rates. The collection of additional waste may improve uptake as the service becomes more useful for farmers.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Containers must be triple-rinsed and meet strict criteria for collection. The collection of additional waste may increase contamination issues.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>Very High</td>
<td>Waste volumes appear reasonably strong for containers and both container and chemical models are well designed to cope with typical volumes. The collection of additional waste would increase volumes and may allow for more frequent on-farm collections.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>Agrecovery handles hazardous waste as part of service delivery and ensures all compliance requirements are met.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Agrecovery’s service provision is understood to be undertaken on a fixed fee basis, rather than on the basis of volumes collected. This may not be optimal in encouraging greater collection rates. The collection of additional waste may provide stronger revenue streams for collection contractors and potentially for Agrecovery.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>High</td>
<td>Agrecovery has sustainable and stable output markets for plastics. Additional waste streams will require the sourcing of new output markets.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>High</td>
<td>Agrecovery has reasonable reserves and has successfully funded business delivery to date.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Moderate</td>
<td>Agrecovery is currently operating successfully. It is probable that 3R Group as the current service provider would be resistant to the addition of agricultural soft plastics to the model. JBL Environmental has confirmed an interest in collecting additional hazardous waste. Agrecovery brand owners may see the addition of other waste streams as cross-subsidisation and would likely need to approve these being added.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Agrecovery is already handling very large volumes of waste nationwide.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>High</td>
<td>Plastics are recycled. Chemicals are disposed of based on the only options available for wastes of these types.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Farmers have to triple-rinse containers and take them to a collection hub. Agrichemicals are picked up on-farm. Adding additional waste streams is likely to be more convenient for farmers.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Agrecovery is the service most often specifically noted in farm assurance programmes. <em>Additional waste streams would likely be included in these programmes if managed through Agrecovery.</em></td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Agrecovery handles only containers and agrichemicals, but these cover a significant number of priority waste streams. <em>The collection of additional waste would enhance Agrecovery’s impact in this regard.</em></td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>High</td>
<td>Agrecovery is well known and supported in rural communities, but collection rates are not as high as comparable international programmes.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Agrecovery is already operating nationwide. <em>Detailed business cases would need to be developed and consultation undertaken before adding any new waste streams.</em></td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Agrecovery is already operating nationwide.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Agrecovery has been operating for a number of years throughout the country.</td>
</tr>
</tbody>
</table>

**Overall comment:**

Much about this option is very favourable, but a number of stakeholders would need to be aligned to make it work. The brand owners currently supporting the scheme, the Agrecovery Foundation, the service manager and the contractors operating sites and collection services would all need to be on board with the addition of new waste streams. This would be highly desirable in many respects, but may prove challenging to achieve agreement on.

**Overall assessment:**

The overall rating for this option is High.

This option is considered to offer a high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

### 7.2.9. Option 9 – Scrap Metal Nationwide Collection

A regular (likely annual) nationwide scrap metal collection is organised to recycle metal waste from farms. Local hubs are utilised for easily transportable metal waste, whereas on-farm pick-ups can be organised for larger items such as used machinery or vehicles. SMRANZ assist with coordination (and perhaps host the booking system) and local members are engaged to manage the process and recycle waste. Farmers are given receipts when items are collected and paid once items have been weighed. Local councils and other industry organisations assist with marketing and awareness.
<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Very High</td>
<td>Farmers would earn a return on waste.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>High</td>
<td>The business model appears robust, but would require a detailed business case based on current metal price, location of service providers and location of pick-up hubs.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>High</td>
<td>An infrequent event that provides modest revenue for farmers is likely to get a reasonable level of support. Combining the use of hubs with an on-farm pick-up for larger items is likely to encourage farmers to take the opportunity to recycle metal waste.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Wastes would need to be relatively free of contamination.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>High</td>
<td>Metal recyclers are very keen for any additional volumes they can access. Volumes are currently relatively low.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>High</td>
<td>Most metal recyclers will be well aware of compliance issues, particularly around health and safety. On-farm collection may present additional requirements.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>High</td>
<td>The business model appears robust, but would require a detailed business case based on current metal price, location of service providers and location of pick-up hubs.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>High</td>
<td>Existing output markets are in place, but scrap metal prices are particularly low currently.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>High</td>
<td>No additional capital requirements are foreseen for this option other than the development of a booking system, which may involve considerable expense. Participating providers will have the infrastructure they require already.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>High</td>
<td>This concept has been discussed with SMRANZ, but not with individual scrap metal recyclers. It is understood that additional volumes are keenly sought however, so this is not expected to be a barrier. SMRANZ or some other organisation would need to agree to be the ‘lead’ on the service to coordinate bookings and planning.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Scrap metal recyclers can handle large volumes and are currently seeking additional volumes.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>High</td>
<td>Scrap metal is exported for recycling.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Farmers will need to take scrap to a local hub for recycling, but larger items will be collected on-farm.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>Low</td>
<td>Metal is not seen as a hazardous waste and it is unlikely to align well with farm assurance programmes or farmers’ own internal motivations.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>Low</td>
<td>Only scrap metal is collected, although vehicle batteries may be included.</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Service does not currently exist, but farmer support is expected.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Organising a nationally coordinated pick-up would require substantial planning and communication. A booking system would also likely be required and the development of this may take some time.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Service is intended to be nationwide.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>High</td>
<td>Targeted service providers will be well regarded, but will not likely have undertaken a service of this kind.</td>
</tr>
</tbody>
</table>

**Overall comment:**

It is likely that a national ‘milk run’ for scrap metal would work well, although more work needs to be done in terms of a detailed business case to ensure the event would run profitably for participating service providers. The need for a centralised booking and planning function may make this service somewhat more difficult to develop, but SMRANZ is a strong potential candidate to fulfil this role.

**Overall assessment:**

The overall rating for this option is High.

This option is considered to offer a high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

### 7.2.10. Option 10 – Vehicle Battery Nationwide Collection

A regular (likely annual) nationwide vehicle battery collection is organised to recycle batteries from farms. Local charities such as the Lion’s Club are engaged to organise local hubs and manage collections. These charities receive the proceeds from collections. The local collections are promoted as ‘community events’. Local councils and other industry organisations assist with marketing and awareness. This option could overlap or be replaced by Option 9.
<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Very High</td>
<td>Farmers would not be charged for dropping off waste, but would not receive revenue from waste either.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>High</td>
<td>The business model appears robust, but would require a detailed business case based on current metal price, location of service providers and location of pick-up hubs.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>Very High</td>
<td>An infrequent event that provides modest revenue for farmers is likely to get a reasonable level of support, particularly where this has a strong community focus.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>High</td>
<td>Waste would need to be relatively free of contamination, but contamination would not be expected with vehicle batteries.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>High</td>
<td>Metal recyclers are very keen for any additional volumes they can access. Volumes are currently relatively low.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>Most metal recyclers will be well aware of compliance issues, particularly around health and safety.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>High</td>
<td>The business model appears robust, but would require a detailed business case based on current metal price, location of service providers and location of pick-up hubs.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>High</td>
<td>Existing output markets are in place, but scrap metal prices are particularly low currently.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>High</td>
<td>No additional capital requirements are foreseen for this option. Participating providers will have the infrastructure they require already.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>High</td>
<td>This concept has been mooted with one nationwide service provider that has expressed an interest in participating.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Scrap metal recyclers can handle large volumes and are currently seeking additional volumes.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.).</td>
<td>High</td>
<td>High</td>
<td>Scrap metal is exported for recycling. Plastics are also recycled.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Farmers will need to take batteries to a local hub for recycling.</td>
</tr>
</tbody>
</table>
### Assessment Factor | Importance | Rating | Comments
--- | --- | --- | ---
Potential alignment with extrinsic or intrinsic drivers is strong. | Moderate | High | Metal is not seen as a hazardous waste and it is unlikely to align well with farm assurance programmes, but the community fundraising aspect of this option is likely to appeal to farmers’ own internal motivations.

Multiple focus waste streams are handled. | Moderate | Low | Only vehicle batteries are included.

Farmers are aware of option or strong community support is present. | Moderate | High | Service does not currently exist, but strong farmer support is expected.

Development requirements and timeframes are minimal. | Moderate | High | Organising a nationally coordinated pick-up would require substantial planning and communication, but if a single provider was selected, this would be made somewhat easier.

Waste can be managed from a wide geographical area. | Moderate | Very High | Service is intended to be nationwide.

Provider has a strong track record. | Moderate | High | Targeted service providers will be well regarded, but will not likely have undertaken a service of this kind.

**Overall comment:**

The community aspect of this option is likely to appeal to farmers and simplifies the process of managing revenue from the collector. A potential provider has indicated a willingness in principle to provide such a service and it may prove to be a relatively easy way to collect a high priority waste stream in a convenient manner for farmers.

**Overall assessment:**

The overall rating for this option is Very High.

This option is considered to offer a very high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

#### 7.2.11. Option 11 – Expanded Territorial Authority Recycling Drop-Off Hubs

Territorial Authorities with a substantial rural population provide recycling hubs in locations convenient to farmers. Both existing and new rural hubs expand waste streams to include some recyclable commercial rural waste streams, such as soft plastics, which would be collected from the hub by recyclers.

| Assessment Factor | Importance | Rating | Comments
--- | --- | --- | ---
Costs to farmers are minimal. | Very High | Very High | Under this option drop-off of recyclables would be free.
<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Moderate</td>
<td>The business model would need to be developed in detail, but ratepayers may need to contribute to service provision.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>High</td>
<td>Existing rural waste drop-off points are reasonably well patronised. How well these work will depend on convenience of locations.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Waste contamination would cause significant issues at most hubs. Experience with existing hubs suggests farmers will not cause significant contamination issues.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>Very High</td>
<td>High volumes are likely, and are supplementary to services’ existing volumes.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Very High</td>
<td>Councils would be providing services through existing providers.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Revenue streams and council cost requirements are not yet fully understood.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>High</td>
<td>Connects with established service providers.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Moderate</td>
<td>The processes required for council to access funding for this model are unknown, but may prove politically difficult. A number of existing councils have already successfully pursued such services.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Moderate</td>
<td>Councils appear reluctant to be directly involved in commercial waste streams, but may be more willing to provide space for other service providers such as Plasback to provide collection receptacles.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Moderate</td>
<td>Large volumes of commercial rural waste may overwhelm collection hubs.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>High</td>
<td>Waste streams would be recycled.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Farmers would need to take recycling to the hubs and ensure it was carefully sorted.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>High</td>
<td>Services will vary regionally, so are unlikely to be recommended by farm assurance programmes. Alignment with intrinsic drivers is far more likely.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>High</td>
<td>The option would include a range of recyclable waste.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Where councils offer these services they appear to be well supported by farmers. This will vary region by region and particularly based on the location of hubs. Option is not yet in existence in most regions.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>Low</td>
<td>It is likely this option would take considerable time to develop and implement in most regions.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>This will depend on the number and location of hubs, but is likely to collect waste from a reasonable geographical area.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Providers are well established.</td>
</tr>
</tbody>
</table>

**Overall comment:**

It is clear this option is working well in a number of regions, though mostly for domestic rather than commercial waste. Widespread adoption of this model will be challenging to achieve, but the potential to capture large volumes of recyclables if this strategy is well executed is very high.

**Overall assessment:**

The overall rating for this option is Moderate.

This option is considered to offer a moderate preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

### 7.2.12. Option 12 – Expanded ROSE Oil Recycling Scheme Drop-Off Hubs

Additional sites are established for the collection of oil containers and oil filters at convenient locations for farmers, such as rural stores.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Very High</td>
<td>Drop off of oil containers and filters would be free of charge.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Very High</td>
<td>Fulton Hogan and FCNZ have confirmed that the model would be profitable and desirable in principle from their perspective.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Farmers already visit rural stores and would be reasonably likely to drop off oil containers and filters. Currently ROSE has very little farmer uptake however.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Contamination would be very problematic, but should be managed effectively as currently happens at existing collection sites.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>High</td>
<td>Variable volumes are tolerable, but a reasonable volume would be required to justify collection from stores.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>High</td>
<td>Rural stores staff would need some training to ensure effective management of collection sites, but this works acceptably elsewhere.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Very High</td>
<td>Business model already works well for pick-up from other locations.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>Very High</td>
<td>Output markets are already well established and consistent.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Very High</td>
<td>All participants are significant companies and minimal additional capital is required to pursue this option.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>High</td>
<td>ROSE, Fulton Hogan and FCNZ have expressed a willingness to consider such an option, as have two key rural store chains. North Island based collection service providers have not yet been engaged.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Option is unlikely to be limited by volumes.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>High</td>
<td>Oil is recycled, as is metal from oil filters.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Collection sites would be based most likely at rural stores, where farmers already visit.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>High</td>
<td>A nationwide programme with sites at rural stores could well be included in farm assurance programmes.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>Low</td>
<td>Oil filters and containers of waste oil only would be collected.</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Farmers appear to have relatively low awareness of this service.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>It is not expected that the rollout of this service would take a long time.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>High</td>
<td>Service coverage would only be limited by the location of rural stores for selected service partner.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Very High</td>
<td>ROSE and potential rural store partners are well established and well regarded.</td>
</tr>
</tbody>
</table>

**Overall comment:**
The potential success of collecting oil and filters from rural stores hinges on whether farmers would be willing to take these wastes into a rural store on an occasional basis, and this notion would need to be validated with farmers specifically. Provided there are no handling safety issues, this model presents a potentially easy roll-out to capture two high priority waste streams.

**Overall assessment:**

*The overall rating for this option is High.*

This option is considered to offer a high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

### 7.2.13. Option 13 – Expanded Paint Recycling Scheme Drop-Off Hubs

Additional sites are established for the collection of waste paint at convenient locations for farmers, such as rural stores. It is probable that waste would need to be within the free categories of existing schemes to avoid payment requirements.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Very High</td>
<td>Drop off of Dulux and/or Resene paints would be free of charge.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Moderate</td>
<td>The details of existing business models are not known, but it is likely that collecting paint at rural stores would not negatively impact these models and would probably increase volumes. Increased transportation costs would be incurred to pick up paint from stores.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Farmers already visit rural stores and would be reasonably likely to drop off paint containers. Currently both paint schemes have very little farmer uptake however.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Contamination could be problematic, but should be managed effectively as currently happens at existing collection sites.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>High</td>
<td>Variable volumes are tolerable, but a reasonable volume would be required to justify collection from stores.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>High</td>
<td>Rural stores staff would need some training to ensure effective management of collection sites.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>High</td>
<td>Business model already works well for pick-up from other locations, but the addition of rural stores may prove expensive.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>------------</td>
<td>--------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>Very High</td>
<td>Output markets are already well established and consistent.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Very High</td>
<td>All participants are significant companies and minimal additional capital is required to pursue this option.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Moderate</td>
<td>Two rural store chains have expressed a willingness to consider such an option. Neither Dulux nor Resene have yet been engaged.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Option is unlikely to be limited by volumes.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>High</td>
<td>Paint is typically reused or recycled, but may be disposed of.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Collection sites would be based most likely at rural stores, where farmers already visit.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>High</td>
<td>A nationwide programme with sites at rural stores could well be included in farm assurance programmes.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>Low</td>
<td>Paint only would be collected.</td>
</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Farmers appear to have relatively low awareness of these services.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>It is not expected that the rollout of this service would take a long time.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>High</td>
<td>Service coverage would only be limited by the location of rural stores for selected service partner.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Very High</td>
<td>Dulux and Resene’s schemes and potential rural store partners are well established.</td>
</tr>
</tbody>
</table>

**Overall comment:**

As the highest priority waste, paint could potentially be collected fairly easily utilising this option. As yet Resene and Dulux have not been engaged so the feasibility of the scheme ultimately depends on their agreement to participate. It is likely that some additional costs may be involved, but additional volumes collected may be substantial.

**Overall assessment:**

The overall rating for this option is Moderate.

This option is considered to offer a moderate preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.
7.2.14. Option 14 – Fonterra Sharps Collection

Fonterra is currently undertaking a pilot to provide sharps collection containers to farmers. This pilot will be completed in June, 2017. Farmers fill the containers and drop them off at local participating vet clinics from which they are sent for disposal.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Very High</td>
<td>At an estimated $10 per container, farmer costs are very low.</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>High</td>
<td>It is likely Fonterra have designed the business model to cover costs rather than be profitable.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>High</td>
<td>As a low cost and relatively easy option, any farmer generating reasonable quantities of sharps is likely to be interested.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>High</td>
<td>Contamination is unlikely to be an issue, but as waste is disposed of as hazardous anyway, minor contamination is unlikely to cause issues.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>Very High</td>
<td>As waste is being sent for disposal with existing mechanisms, the business model does not require any particular volumes to be successful.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Moderate</td>
<td>Transportation of sharps requires compliance with a number of regulations. It is not yet known if Fonterra’s programme complies with this given farmers must transport containers themselves.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>Very High</td>
<td>Business model is very simple and likely to work.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>Very High</td>
<td>Waste is disposed of, so no output markets are required.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>Very High</td>
<td>No additional capital is required for this option.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Moderate</td>
<td>Processor is in place but a nationwide network of vet clinics will need to be willing to participate.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>Very High</td>
<td>Option is unlikely to be limited by volume.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>Low</td>
<td>Waste is disposed of, as the only current and safe option for sharps.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>High</td>
<td>Farmers need to take sharps containers to vet clinics, but this is not likely to prove onerous.</td>
</tr>
</tbody>
</table>
### Potential alignment with extrinsic or intrinsic drivers is strong.

**Importance**: Moderate  
**Rating**: High  
**Comments**: A nationwide programme could potentially be included in farm assurance programmes.

### Multiple focus waste streams are handled.

**Importance**: Moderate  
**Rating**: Low  
**Comments**: Sharps only are included.

### Farmers are aware of option or strong community support is present.

**Importance**: Moderate  
**Rating**: Moderate  
**Comments**: Option is currently being piloted but is considered likely to be supported by farmers.

### Development requirements and timeframes are minimal.

**Importance**: Moderate  
**Rating**: High  
**Comments**: Pilot will not be completed until June, 2017, but rollout after this time if the pilot is successful should be relatively quick.

### Waste can be managed from a wide geographical area.

**Importance**: Moderate  
**Rating**: High  
**Comments**: Currently the service is being focused on Fonterra suppliers, which are widely geographically spread, but could be rolled out to include other farmers around the country if successful.

### Provider has a strong track record.

**Importance**: Moderate  
**Rating**: Very High  
**Comments**: All parties involved are well established and well regarded.

---

**Overall comment:**

While this option is currently focused on Fonterra suppliers it is likely that it can be extended to include other farmers also and provide a simple, cheap and easy system for collecting sharps. The only obvious potential issue here is whether farmers can legally transport sharps containers. There is some suggestion that this may breach transportation regulations. Also, for the scheme to work nationwide, vet clinics in all rural areas would need to agree to participate, potentially for no gain other than providing an additional community service.

**Overall assessment:**

The overall rating for this option is High.

This option is considered to offer a high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.

### 7.2.15. **Option 15 – Waste Transformation Limited Waste Pyrolysis**

Waste Transformation Limited (WTL) receives applicable waste streams initially at its Timaru base, then subsequently at other sites as its rollout continues. WTL pyrolyses waste into biochar and other carbon products.

<table>
<thead>
<tr>
<th>Assessment Factor</th>
<th>Importance</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs to farmers are minimal.</td>
<td>Very High</td>
<td>Low</td>
<td>The current business model would require farmers to be charged collection costs and gate fees for waste to be processed by WTL.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>------------</td>
<td>--------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Business model ensures profitability and sustainability.</td>
<td>Very High</td>
<td>Moderate</td>
<td>The current business model is profitable if a suitable gate fee can be charged. Potential business models include the sale of higher value carbon products which may remove the need for a high gate fee.</td>
</tr>
<tr>
<td>High farmer uptake is likely.</td>
<td>Very High</td>
<td>Low</td>
<td>Waste would need to be transported to WTL and a gate fee paid. This is unlikely to have strong appeal to farmers.</td>
</tr>
<tr>
<td>Any waste contamination can be dealt with easily.</td>
<td>Very High</td>
<td>High</td>
<td>Any organic contamination is unlikely to cause issue to a pyrolysis process, but moisture content may be problematic.</td>
</tr>
<tr>
<td>Waste volumes are assured or business model can cope with inconsistent volumes.</td>
<td>Very High</td>
<td>High</td>
<td>As the business model would need to be based around municipal waste, it is likely able to deal with variable waste volumes from farms.</td>
</tr>
<tr>
<td>All compliance requirements can be met.</td>
<td>Very High</td>
<td>Moderate</td>
<td>WTL currently has a consent that enables processing of treated timber but inconsistent feedstock is likely to cause emission issues.</td>
</tr>
<tr>
<td>Business model is robust and well-conceived.</td>
<td>Very High</td>
<td>High</td>
<td>WTL currently functions successfully provided large volumes of municipal waste can be accessed.</td>
</tr>
<tr>
<td>Output markets are assured or business model can cope with inconsistent output markets.</td>
<td>Very High</td>
<td>High</td>
<td>WTL is currently focused on selling biochar as a coal replacement but has a number of higher volume carbon products it can feasibly produce.</td>
</tr>
<tr>
<td>Access to required capital is likely.</td>
<td>High</td>
<td>High</td>
<td>WTL is well capitalised, but expansion into other areas may prove very expensive.</td>
</tr>
<tr>
<td>All participants in supply chain in place or readily able to be secured.</td>
<td>High</td>
<td>Low</td>
<td>WTL does not currently have any active service delivery partners other than Timaru District Council. WTL has said they cannot strategically focus on rural waste in the short to medium term.</td>
</tr>
<tr>
<td>Large volumes of waste can be handled, or option is scalable.</td>
<td>High</td>
<td>High</td>
<td>WTL’s units are modular and can be relatively easily scaled.</td>
</tr>
<tr>
<td>Waste is managed using higher levels of waste hierarchy (Reuse, recycling etc.)</td>
<td>High</td>
<td>Moderate</td>
<td>WTL currently converts waste into biochar to be used as fuel.</td>
</tr>
<tr>
<td>Inconvenience and behaviour change requirement for farmers is minimal.</td>
<td>Moderate</td>
<td>Low</td>
<td>Farmers would need to transport waste to a landfill or transfer station or secure a commercial waste collection.</td>
</tr>
<tr>
<td>Potential alignment with extrinsic or intrinsic drivers is strong.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Alignment with existing farm assurance programmes or even farmer internal motivations is likely to be weak based on the current business model.</td>
</tr>
<tr>
<td>Multiple focus waste streams are handled.</td>
<td>Moderate</td>
<td>High</td>
<td>WTL can handle most organic-based waste streams including plastics.</td>
</tr>
<tr>
<td>Assessment Factor</td>
<td>Importance</td>
<td>Rating</td>
<td>Comments</td>
</tr>
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</tr>
<tr>
<td>Farmers are aware of option or strong community support is present.</td>
<td>Moderate</td>
<td>Low</td>
<td>Option does not currently exist outside of Timaru and may face community opposition over concerns at emissions.</td>
</tr>
<tr>
<td>Development requirements and timeframes are minimal.</td>
<td>Moderate</td>
<td>Low</td>
<td>Development and expansion timeframes are expected to be measured in years.</td>
</tr>
<tr>
<td>Waste can be managed from a wide geographical area.</td>
<td>Moderate</td>
<td>Low</td>
<td>Expansion will be a gradual process and likely focus on main centres.</td>
</tr>
<tr>
<td>Provider has a strong track record.</td>
<td>Moderate</td>
<td>Moderate</td>
<td>WTL is well regarded but is still establishing its business model.</td>
</tr>
</tbody>
</table>

**Overall comment:**

This option has good potential in regions where capable community organisations are present. It would not be easy to launch and operate such a service sustainably, but Wastebusters Canterbury is showing it can be done, and they are seeing growth. If other organisations are willing to replicate this model, it is definitely worth assisting them to do so, subject to a strong business case. This will not be a model that works nationwide, but may make a significant difference in some communities.

**Overall assessment:**

**The overall rating for this option is Low.**

This option is not considered to offer a preliminary economic and technical feasibility. It is not recommended this option be further considered and developed under this project.

7.2.16. **Option 16 – Inclusion of New Services into Farm Assurance Programmes**

As new options for farm waste minimisation become established, companies providing farm assurance or certification programmes are encouraged to include these services specifically in the programmes.

As this option is not a business model per se, but rather a way to increase extrinsic drivers for other options, it is evaluated generally rather than via the assessment factors utilised for other options.

**Overall comment:**

This option simply involves efforts to persuade existing farm assurance, certification or similar programmes to include new service options as recommendations or requirements under their programmes. To date, services that offer a cost-effective and near-nationwide service have been welcomed by such programmes, and this inclusion has positively impacted farmer take-up. Potential exists to add waste elements to the Sustainable Dairy Water Accord, but this is considered a fairly unlikely eventuality given the focus of the accord on water. Whichever programmes new services are included in, ensuring sufficient service coverage and stability will likely take a year or, more likely, several years to achieve.
**Overall assessment:**

The overall rating for this option is High.

This option is considered to offer a high preliminary economic and technical feasibility. It is recommended this option be further considered and developed under this project.
8. RECOMMENDATIONS AND STRATEGY

The New Zealand Rural Waste Minimisation Project (NZRWMP) is being undertaken to better understand the nature of waste on farms and to begin to identify alternatives to burning, burial and bulk storage of waste. The NZRWMP has the following objectives:

1. To determine the impacts on and risks to New Zealand’s natural resources (land, water and air), economy, and social and cultural wellbeing from current rural waste burning, burying and stockpiling practices.
2. To identify new waste minimisation options for rural waste management and assess the technical and economic feasibility of these.
3. To develop implementation plans with service providers for feasible waste minimisation options.

The focus of the work undertaken in this report has been on the second objective: identifying and assessing the economic and technical feasibility of new waste minimisation options. This work also requires development of a strategy which identifies where and how best to focus waste minimisation efforts.

Based on the option preliminary economic and technical feasibility assessments undertaken, the following options and accompanying strategies for implementation are recommended:

<table>
<thead>
<tr>
<th>Option Description</th>
<th>Assessed Feasibility</th>
<th>Proposed Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EnviroWaste Plastics Collection and Recycling</strong></td>
<td>Very High</td>
<td>• Monitor service progress and volumes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seek farmer feedback as to service convenience.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Offer suggestions as to service refinements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Assist with farmer awareness.</td>
</tr>
<tr>
<td>EnviroWaste commences processing of polypropylene fertiliser bags, of which it currently has a stockpile and is continuing to collect via a series of hubs in conjunction with key partners. As the service grows, EnviroWaste begins collection of fertiliser bags from farms using back-haulage arrangements with fertiliser delivery contractors. EnviroWaste then extends service to include other forms of plastic from farms. In time, the service may extend to other waste streams.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Agrecovery Agrichemical and Plastics Collection</strong></td>
<td>Very High</td>
<td>• Engage with farmers to determine ways in which service delivery and collection rates could be improved.</td>
</tr>
<tr>
<td>Agrecovery collects agrichemicals from farms, and accepts agrichemical containers at its nationwide network of collection hubs. Support is given to Agrecovery to consider how collection rates might be further improved.</td>
<td></td>
<td>• Provide support to the Agrecovery board and/or service provider to determine strategies to improve collection rates.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Support implementation, monitoring and/or evaluation of strategies.</td>
</tr>
<tr>
<td>Option Description</td>
<td>Assessed Feasibility</td>
<td>Proposed Strategy</td>
</tr>
<tr>
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</tbody>
</table>
| **Vehicle Battery Nationwide Collection:** A regular (likely annual) nationwide vehicle battery collection is organised to recycle batteries from farms. Local charities such as the Lion’s Club are engaged to organise local hubs and manage collections. These charities receive the proceeds from collections. The local collections are promoted as ‘community events’. Local councils and other industry organisations assist with marketing and awareness. | Very High            | • Confirm willingness to participate with Dominion Trading or other scrap metal recyclers.  
• Seek farmer feedback on proposed service.  
• Determine local sites for collection.  
• Engage local charities to organise collections.  
• Determine schedule for collections.  
• Engage local councils and other industry organisations to assist with publicity.  
• Undertake nationwide pilot collection to determine effectiveness. |
| **Plasback Plastics Collection:** Plasback provides agricultural soft plastic on-farm collections to farmers through its network of local contractors. Support is given to Plasback to consider ways in which collection requests and pick-ups can be more effectively planned and monitored to ensure customer satisfaction and increase collection rates. | High                 | • Work with Plasback contractors to better understand how collections are planned and executed.  
• Communicate directly with a range of existing and potential Plasback customers to understand collection needs and expectations.  
• Design a system for better planning and monitoring collections.  
• Prepare a business case for system creation and launch. |
| **Plasback Expanded Waste Stream Collection:** Plasback provides agricultural soft plastic on-farm collections to farmers through its network of local contractors. Plasback contractors pick up additional waste streams from farmers while collecting plastics. | High                 | • Communicate with contractors to determine willingness to collect additional waste streams.  
• Determine waste streams that would be suitable and ensure local recycling outlets for waste streams are in place.  
• Determine revenue model for contractors.  
• Test concept with target customers.  
• Determine system for logging and booking collections.  
• Pilot service to determine effectiveness. |
<table>
<thead>
<tr>
<th>Option Description</th>
<th>Assessed Feasibility</th>
<th>Proposed Strategy</th>
</tr>
</thead>
</table>
| **Agrecovery Expanded Waste Stream Collection:** Agrecovery collects agrichemicals from farms, and accepts agrichemical containers at its nationwide network of collection hubs. As part of the on-farm hazardous waste collection, additional non-bulky, hazardous wastes are collected by contractors. As part of the container collection, additional non-hazardous recyclable wastes are collected at collection hubs. | High                 | • Determine new focus waste streams and confirm outlets and potential revenue models.  
• Confirm transportation service provider and collection site operator willingness to participate, and confirm waste stream transportation logistics.  
• Seek farmer feedback on service options.  
• Seek approval from Agrecovery board and product stewardship brand owners to expand waste streams.  
• Pilot new waste stream service to determine effectiveness. |
| **Scrap Metal Nationwide Collection:** A regular (likely annual) nationwide scrap metal collection is organised to recycle metal waste from farms. Local hubs are utilised for easily transportable metal waste, whereas on-farm pick-ups can be organised for larger items such as used machinery or vehicles. SMRANZ assist with coordination (and perhaps host the booking system) and local members are engaged to manage the process and recycle waste. Farmers are given receipts when items are collected and paid once items have been weighed. Local councils and other industry organisations assist with marketing and awareness. | High                 | • Confirm willingness to participate with SMRANZ and local scrap metal recyclers.  
• Seek farmer feedback on service options.  
• Determine local sites for collection.  
• Determine booking system requirements and design/implement.  
• Determine schedule for collections.  
• Engage local councils and other industry organisations to assist with publicity.  
• Undertake nationwide pilot collection to determine effectiveness. |
| **Expanded ROSE Oil Recycling Scheme Drop-Off Hubs:** Additional sites are established for the collection of oil containers and oil filters at convenient locations for farmers, such as rural stores. | High                 | • Confirm ROSE and provider willingness to participate.  
• Confirm site handling and storage requirements.  
• Select potential site partner/s and confirm willingness to participate and ability to meet handling requirements.  
• Seek farmer feedback on proposed services and sites.  
• Establish pilot sites and monitor for effectiveness. |
| **Fonterra Sharps Collection:** Fonterra is currently undertaking a pilot to provide sharps collection containers to farmers. This pilot will be completed in June, 2017. Farmers fill these up and drop them off at local participating vet clinics from which they are sent for disposal. | High                 | • Monitor service progress and volumes.  
• Seek farmer feedback as to service convenience.  
• Offer suggestions as to service refinements.  
• Assist with farmer awareness. |
<table>
<thead>
<tr>
<th>Option Description</th>
<th>Assessed Feasibility</th>
<th>Proposed Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inclusion of New Services into Farm Assurance Programmes:</strong> As new options for farm waste minimisation become established, companies providing farm assurance or certification programmes are encouraged to include these services specifically in the programmes.</td>
<td>High</td>
<td>• In terms of the SDWA, work with DairyNZ to identify opportunities for existing services to be considered in the current review round.  &lt;br&gt;• Profile other services as they become established and work with programme providers to seek inclusion.</td>
</tr>
<tr>
<td><strong>Community Organisation On-Farm Collection:</strong> Community organisations, such as Wastebusters Canterbury, roll out multi-bin on-farm waste collection services based on a farmer-owned bin swap arrangement, as Wastebusters Canterbury currently provides. Organisations pursue both recycling and reuse opportunities.</td>
<td>Moderate</td>
<td>• Communicate with potential service providers to determine willingness to develop services.  &lt;br&gt;• Undertake more analysis on Wastebusters Canterbury’s model (subject to obtaining permission to do so) to capture learnings for other organisations.  &lt;br&gt;• Test concept with target customers.  &lt;br&gt;• Seek outlets for funding support or sponsorship.  &lt;br&gt;• Assist organisations to plan for service delivery and confirm outlets for waste.  &lt;br&gt;• Undertake marketing activities.</td>
</tr>
<tr>
<td><strong>Expanded Territorial Authority Recycling Drop-Off Hubs:</strong> Territorial Authorities with a substantial rural population provide recycling hubs in locations convenient to farmers. Both existing and new rural hubs expand waste streams to include some recyclable commercial rural waste streams, such as soft plastics, which would be collected from the hub by recyclers.</td>
<td>Moderate</td>
<td>• Identify target Territorial Authorities for expansion of waste streams and establishment of new sites and confirm willingness to consider participation.  &lt;br&gt;• Determine waste streams to be targeted and confirm engagement with recyclers.  &lt;br&gt;• Determine optimum hub siting using GIS tools.  &lt;br&gt;• Seek council approval for proposed services and sites.  &lt;br&gt;• Seek farmer feedback on proposed services and sites.  &lt;br&gt;• Establish pilot sites and monitor for effectiveness.</td>
</tr>
<tr>
<td>Option Description</td>
<td>Assessed Feasibility</td>
<td>Proposed Strategy</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>Expanded Paint Recycling Scheme Drop-Off Hubs:</strong> Additional sites are established for the collection of waste paint at convenient locations for farmers, such as rural stores. It is probable that wastes would need to be within the free categories of existing schemes to avoid payment requirements.</td>
<td>Moderate</td>
<td>• Determine Resene and/or Dulux willingness to participate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Confirm site handling and storage requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Determine transportation logistics and business case.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Select potential site partner/s and confirm willingness to participate and ability to meet handling requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seek farmer feedback on proposed services and sites.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Establish pilot sites and monitor for effectiveness.</td>
</tr>
<tr>
<td><strong>Territorial Authority On-Farm Collection:</strong> Territorial Authorities that provide an on-farm domestic waste collection extend this to include certain recyclable commercial waste streams. A separate bin would be provided for these wastes, and the volume collected would be sent to either Plasback or EnviroWaste for recycling.</td>
<td>Low, however it may be worth communicating the idea to councils to see if there were any that would be interested in piloting such a service. A successful pilot may require a reconsideration of feasibility.</td>
<td>• Communicate concept to Territorial Authorities to determine interest levels, then consider strategy if interest exists.</td>
</tr>
<tr>
<td><strong>Commercial On-Farm Collection:</strong> National and regional waste collection service providers develop and/or refine on-farm waste collection services for farmers. Service providers provide a range of bin sizes (including larger wheelie bins) and also allow farmers to purchase their own bins to use in a bin swap system. Both domestic and commercial waste streams are accepted, including both non-hazardous general waste and recyclables. Soft plastics collected would be sent to Plasback or EnviroWaste for recycling.</td>
<td>Low, however it is recommended that service providers be contacted to see if any are prepared to trial recycling as described in this option in a key region such as Taranaki.</td>
<td>• Communicate with potential service providers to determine interest in trialling recycling, then consider strategy if interest exists.</td>
</tr>
</tbody>
</table>

The next milestones of this project will focus on further developing these options and enacting the indicated strategies with a view to finalising feasibility and selecting potential options for implementation.
9. REFERENCES


ACRC. (2016, June 3). Where to Recycle. Retrieved from ACRC:
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Crop Protection Association/The Voluntary Initiative/ESTET. (2003). Options for Agricultural Waste Collection. Crop Protection Association/The Voluntary Initiative/ESTET.


10. **CONSULTATION**

The following people were consulted in the preparation of this report, and their assistance is greatly appreciated:

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>3R Group</td>
<td>Duncan Scotland</td>
</tr>
<tr>
<td>Agrecovery Foundation</td>
<td>Simon Andrew</td>
</tr>
<tr>
<td>Agrecovery Foundation</td>
<td>Adrienne Wilcock</td>
</tr>
<tr>
<td>Ashburton District Council</td>
<td>Craig Goodwin</td>
</tr>
<tr>
<td>Astron Plastics</td>
<td>Steve Mead</td>
</tr>
<tr>
<td>ChemWaste</td>
<td>Rupinder Brar</td>
</tr>
<tr>
<td>Community Recycling Network</td>
<td>Dorte Wray</td>
</tr>
<tr>
<td>DairyNZ</td>
<td>Matt Highway</td>
</tr>
<tr>
<td>Dominion Trading Limited</td>
<td>Mee Clarke</td>
</tr>
<tr>
<td>Environment Canterbury</td>
<td>Rowan Latham</td>
</tr>
<tr>
<td>Environment Canterbury</td>
<td>Isla Hepburn</td>
</tr>
<tr>
<td>EnviroNZ</td>
<td>Dave Elder</td>
</tr>
<tr>
<td>EnviroWaste Services</td>
<td>Mike Aberhart</td>
</tr>
<tr>
<td>Farmlands Cooperative</td>
<td>Colm Hamrogue</td>
</tr>
<tr>
<td>Federated Farmers of New Zealand</td>
<td>Anders Crofoot</td>
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<td>Filter Crusher NZ</td>
<td>Merv Fergusson</td>
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<tr>
<td>Fulton Hogan</td>
<td>Reuben Harrison</td>
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<td>Fonterra</td>
<td>Kirsten Blinge</td>
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<td>Fonterra</td>
<td>Walter Hillyer-Brandt</td>
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<tr>
<td>Hastings District Council</td>
<td>Angela Atkins</td>
</tr>
<tr>
<td>HortNZ</td>
<td>Matthew Dolan</td>
</tr>
<tr>
<td>Innovative Waste Kaikoura</td>
<td>Rob Roche</td>
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<tr>
<td>JBL Environmental</td>
<td>John Larcombe</td>
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<td>JBL Environmental</td>
<td>Chloe Abermethy</td>
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<tr>
<td>Marlborough District Council</td>
<td>Alec McNeil</td>
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<tr>
<td>Miraka</td>
<td>Grant Jackson</td>
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<tr>
<td>New Zealand Winegrowers</td>
<td>Justine Tate</td>
</tr>
<tr>
<td>PGG Wrightson</td>
<td>John Skurr</td>
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<tr>
<td>Plasback</td>
<td>Chris Hartshorne</td>
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<td>Wayne Maskill</td>
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<tr>
<td>ROSE</td>
<td>Peter de Goldi</td>
</tr>
<tr>
<td>Scrap Metal Recyclers of New Zealand</td>
<td>Kathleen Crisley</td>
</tr>
<tr>
<td>Silver Fern Farms</td>
<td>Daryn Jemmett</td>
</tr>
<tr>
<td>Smart Environmental</td>
<td>Blair Griffiths</td>
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<tr>
<td>Sue Angove Consulting</td>
<td>Sue Angove</td>
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<tr>
<td>Synlait</td>
<td>Mark Wren</td>
</tr>
<tr>
<td>Waikato Regional Council</td>
<td>Marianna Tyler</td>
</tr>
<tr>
<td>Waste Management</td>
<td>Tracy Cousins</td>
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<tr>
<td>Waste Management</td>
<td>Karen Boyes</td>
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<tr>
<td>Waste Management</td>
<td>Shane Robbertsen</td>
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<tr>
<td>Waste Management</td>
<td>Andrew Shipley</td>
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<tr>
<td>Waste Management Technical Services</td>
<td>Dean McGregor</td>
</tr>
<tr>
<td>Waste Transformation Limited</td>
<td>Mike Henare</td>
</tr>
<tr>
<td>Wastebusters Canterbury</td>
<td>Sharon Breakwell</td>
</tr>
<tr>
<td>WasteMINZ</td>
<td>Jenny Marshall</td>
</tr>
<tr>
<td>XtremeZeroWaste</td>
<td>Rick Thorpe</td>
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</table>
11. APPENDICES

11.1. APPENDIX 1 – NEW ZEALAND RURAL WASTE MINIMISATION - FARMER SURVEY TEXT

New Zealand Rural Waste Minimisation Survey

The New Zealand Rural Waste Minimisation project is headed by Environment Canterbury and has received funding from the Ministry for the Environment's Waste Minimisation Fund as well as Waikato Regional Council, WasteMINZ, Agrecovery Foundation, Bay of Plenty Regional Council, 3R Group, Canterbury Waste Joint Committee and Synlait Milk.

The project's objectives are:

- To determine the impacts on and risks to New Zealand's natural resources (land, water and air), economy, and social and cultural wellbeing from current rural waste burning, burying and stockpiling practices.
- To identify new waste minimisation options for rural waste management and assess the technical and economic feasibility of these.
- To develop implementation plans with service providers for feasible waste minimisation options.

The purpose of this survey is to help build an understanding of what farmers are currently doing in terms of rural waste and what sort of alternative solutions might work in terms of rural waste minimisation.

The responses to this survey will be treated with confidentiality and results published only in aggregated form.

If you are willing to be contacted for further discussion about the content of the survey, please note your details when indicated. You will then be contacted by Fraser Scott from True North Consulting, who is managing the project for Environment Canterbury.

If you have any questions about the survey, please contact Fraser Scott at True North Consulting at fraser@tnc.co.nz or on 021 122 4167.

1. Where do you live? (list of districts supplied)
2. What type of farm do you operate?
   - Dairy
   - Beef
   - Sheep
   - Deer
   - Viticulture/winery
   - Arable (please specify type below)
   - Horticulture (please specify type below)
   - Other/type (please specify)
3. What methods do you use to dispose of waste on your farm (tick as many as apply)?
   - Burning, burying and/or storage on farm (e.g. storing broken metal/machinery until scrap merchant collects)
   - Waste collected on farm
   - Recycling collected on farm (e.g. Plasback, ROSE etc)
   - Waste delivered to local tip/dropped off
   - Recycling delivered to recycling facility/transfer station
   - Other (please specify)

4. Do you currently use any of the following recycling services (tick as many as apply)?
   - PlasBack
   - Agrecovery
   - PaintWise
   - Dulux Paint Take-back Service
   - ROSE Oil Recycling
   - Council transfer station / recycling drop off
   - Other / comments on services used (such as ease of use)

5. What motivates you to recycle farm waste? (scale from ‘Very Unmotivated’ to ‘Very Motivated’)
   - To protect the environment generally
   - To avoid spoiling my land
   - To 'do the right thing'
   - To create a 'positive legacy'
   - To create a positive brand for my farm
   - To create a positive brand for New Zealand

6. How likely is it that you would consider utilising the following services? (scale from ‘Very Unlikely’ to ‘Very Likely’, plus ‘I already do this’)
   - On farm waste collection (1 bin)
   - On farm waste and recycling collection (separate waste and recycling bins)
   - A drop-off in the nearest town for recyclables
   - A drop off for waste at the nearest council transfer station
   - A drop off for recycling at the nearest council transfer station
   - Return of recyclable materials (such as plastic containers) back to the place of purchase
7. How much would you be prepared to pay annually to use the following services? (scale from ‘Nothing’ to ‘More than $3,000’)
   - On farm waste collection (1 bin)
   - On farm waste and recycling collection (separate waste and recycling bins)
   - A drop-off in the nearest town for recyclables
   - A drop off for waste at the nearest council transfer station
   - A drop off for recycling at the nearest council transfer station
   - Return of recyclable materials (such as plastic containers) back to the place of purchase

8. What are the best ways to make you aware of new opportunities to recycle farm waste?
   - Email
   - Local newspaper
   - Local radio
   - Mailed flyer
   - Flyers at rural stores
   - Social media
   - Other (please specify)

9. If you would be willing to be contacted in relation to this survey, please note your contact details below:
   - Phone
   - Email
New Zealand Rural Waste Minimisation - Territorial Authority Survey

The New Zealand Rural Waste Minimisation project is headed by Environment Canterbury and has received funding from the Ministry for the Environment’s Waste Minimisation Fund as well as Waikato Regional Council, WasteMINZ, Agrecovery Foundation, Bay of Plenty Regional Council, 3R Group, Canterbury Waste Joint Committee and Synlait Milk.

The project’s objectives are:

- To determine the impacts on and risks to New Zealand’s natural resources (land, water and air), economy, and social and cultural wellbeing from current rural waste burning, burying and stockpiling practices.
- To identify new waste minimisation options for rural waste management and assess the technical and economic feasibility of these.
- To develop implementation plans with service providers for feasible waste minimisation options.

The purpose of this survey is to help build an understanding of what Territorial Authorities are currently doing and where they are wanting to take or support action in terms of rural waste minimisation.

The responses to this survey will be treated with confidentiality and results published only in aggregated form.

If you are willing to be contacted for further discussion about the content of the survey, please note your details when indicated. You will then be contacted by Fraser Scott from True North Consulting, who is managing the project for Environment Canterbury.

If you have any questions about the survey, please contact Fraser Scott at True North Consulting at fraser@tnc.co.nz or on 021 122 4167.

1. Which Territorial Authority do you represent? (territorial authorities listed)

2. What is your job title?

3. How does your council prioritise rural waste as an issue to address? (scale from ‘Very Low’ to ‘Very High’)

4. What strategies or regulations have been put in place, or are being planned, to address rural waste in your area (e.g. district council plan, waste minimisation plan, district council bylaws)?

5. Would your Council consider offering or subsidising rural waste collections? (scale from ‘We would not consider this’ to ‘We are prepared to do this’, plus ‘We are already doing this’ – for each of the two options below)
   - Waste collection for landfill
   - Recyclables
6. Does your council operate a domestic kerbside waste and recycling collection service? If so, would your council consider extending this service to rural properties? (options – ‘We do not provide this domestic kerbside collection’, ‘We already provide a collection service to some rural properties’, ‘We already provide a collection service to all/most rural properties’, ‘We would not extend this service to rural properties’, ‘We are unlikely to consider extending this service to rural properties’, ‘We would consider extending this service to rural properties’, ‘We are prepared to extend this service to rural properties’ – for each of the two options below)
   - Waste collection for landfill
   - Recyclables

7. Would your Council consider providing ‘drop-off’ points or ‘local hubs’ for rural waste? (scale from ‘We would not consider this’ to ‘We are prepared to do this’, plus ‘We are already doing this’ – for each of the two options below)
   - Waste collection for landfill
   - Recyclables

8. Which, if any, commercial waste collection companies (such as EnviroWaste) provide waste collection services from local rural properties? (Please provide details of known providers and service details)

9. Listed below are the top ten rural wastes which cause the most environmental damage if burnt or buried on farm. Please indicate which ones you are most interested in seeing solutions for (scale from ‘Very low priority’ to ‘Very high priority’)
   - Paints/solvents
   - Oil containers
   - Used oil
   - Aerosols
   - Vehicle batteries
   - Waste oil filters
   - Agricultural sprays
   - Drenches/dips
   - Sharps
   - Metal netting

10. What are the best ways, in your view, that Territorial Authorities can contribute to the minimisation of rural waste?

11. If you would be willing to discuss your answers to this survey, please note your contact details below:
   - Phone
   - Email