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ENVIRONMENT CANTERBURY

NEW ZEALAND RURAL WASTE MINIMISATION PROJECT:

MILESTONE 3 PHASE II:

EXPLORATION OF POTENTIAL WASTE MINIMISATION OPTIONS

TRUE NORTH CONSULTING

12 OCTOBER, 2016

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1. EXECUTIVE SUMMARY

The New Zealand Rural Waste Minimisation Project (the Project) 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 Project 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. Following the initial work undertaken in Milestone 2, the work undertaken in Milestone 3 has been focused on building more detail and understanding of the options.

Milestone 2 Options and Feasibility

At the conclusion of Milestone 2, a range of options were identified as potential alternatives to burning, burying and bulk storage of commercial waste on farms. The options identified and assessed for technical and economic feasibility were as follows:

Option Description	**Assessed Feasibility**
EnviroWaste Plastics Collection and Recycling	Very High
Agrecovery Agrichemical and Plastics Collection	Very High
Vehicle Battery Nationwide Collection	Very High
Plasback Plastics Collection	High
Plasback Expanded Waste Stream Collection	High
Agrecovery Expanded Waste Stream Collection	High
Scrap Metal Nationwide Collection	High
Expanded ROSE Oil Recycling Scheme Drop-Off Hubs	High
Fonterra Sharps Collection	High
Inclusion of New Services into Farm Assurance Programmes	High
Community Organisation On-Farm Collection	Moderate
Expanded Territorial Authority Recycling Drop-Off Hubs	Moderate
Expanded Paint Recycling Scheme Drop-Off Hubs	Moderate
Territorial Authority On-Farm Collection	Low
Commercial On-Farm Collection	Low

Options Refinement

As these options have been further investigated and developed, those that present feasibility have been refined and a number of options previously identified will no longer be considered under this project. In addition, a new option - Temporary Pop-up Recovery Events - has been created based on refining and extending several options from Milestone 2.

Each of the options carried forward for further assessment has been evaluated based on:

- *Supply chain modelling:* This considers the pathways for collected waste from farmer to reuse, recycling or waste disposal.
- *Life-cycle assessment:* This analyses the potential impacts in terms of energy consumption, waste generation, air pollution, water pollution and soil contamination of each option.
- *Financial and operational modelling*: This considers the capital requirements to establish or modify the business model, plus a broad assessment of costs and profitability. This also provides an indication as to the geographical reach and scalability of options.
- *Risk assessment:* This considers the risks presented by the option in the areas of business model, finances, supply chain, market, technical/process, compliance and environment.

In each of the assessments undertaken, and in the table below, a 'traffic light' system of colour coding of results is used. Green indicates a positive result (high performance or low risk), orange indicates a neutral or acceptable result (moderate performance or moderate risk) and red indicates a negative result (low performance or high risk).

Based on the assessments and analysis undertaken the list of options and their updated feasibility has been assessed as follows:

Option	Milestone 2 Feasibility Assessment	Assessments undertaken in Milestone 3				**Revised Feasibility Assessment**
		Supply Chain Assessment	Life-cycle Assessment	Financial and Operational Assessment	Risk Assessment	
EnviroWaste Plastics Collection and Recycling	VERY HIGH	MODERATE	HIGH	HIGH	MODERATE	**HIGH**
Agrecovery Expanded Waste Stream Collection	HIGH	HIGH	HIGH	HIGH	MODERATE	**HIGH**
Plasback Plastics Collection	HIGH	MODERATE	HIGH	MODERATE	HIGH	**MODERATE**
Community Organisation On-Farm Collection	MODERATE	LOW	HIGH	LOW	HIGH	**LOW**

Option	Milestone 2 Feasibility Assessment	Assessments undertaken in Milestone 3				Revised Feasibility Assessment
		Supply Chain Assessment	Life-cycle Assessment	Financial and Operational Assessment	Risk Assessment	
Expanded Territorial Authority Recycling Drop-Off Hubs	MODERATE	LOW	HIGH	MODERATE	MODERATE	MODERATE
Expanded ROSE Oil Recycling Scheme Drop-Off Hubs	HIGH	MODERATE	HIGH	HIGH	MODERATE	HIGH
Fonterra Sharps Collection	HIGH	HIGH	HIGH	HIGH	LOW	HIGH
Temporary Pop-up Recovery Events	N/A	MODERATE	HIGH	HIGH	MODERATE	MODERATE

As these options have been developed, a new model has been created that rationalises and coordinates the options so that they work together more effectively as a coherent strategy. This new Rural Waste Minimisation Model is shown in Figure 1 on the following page:

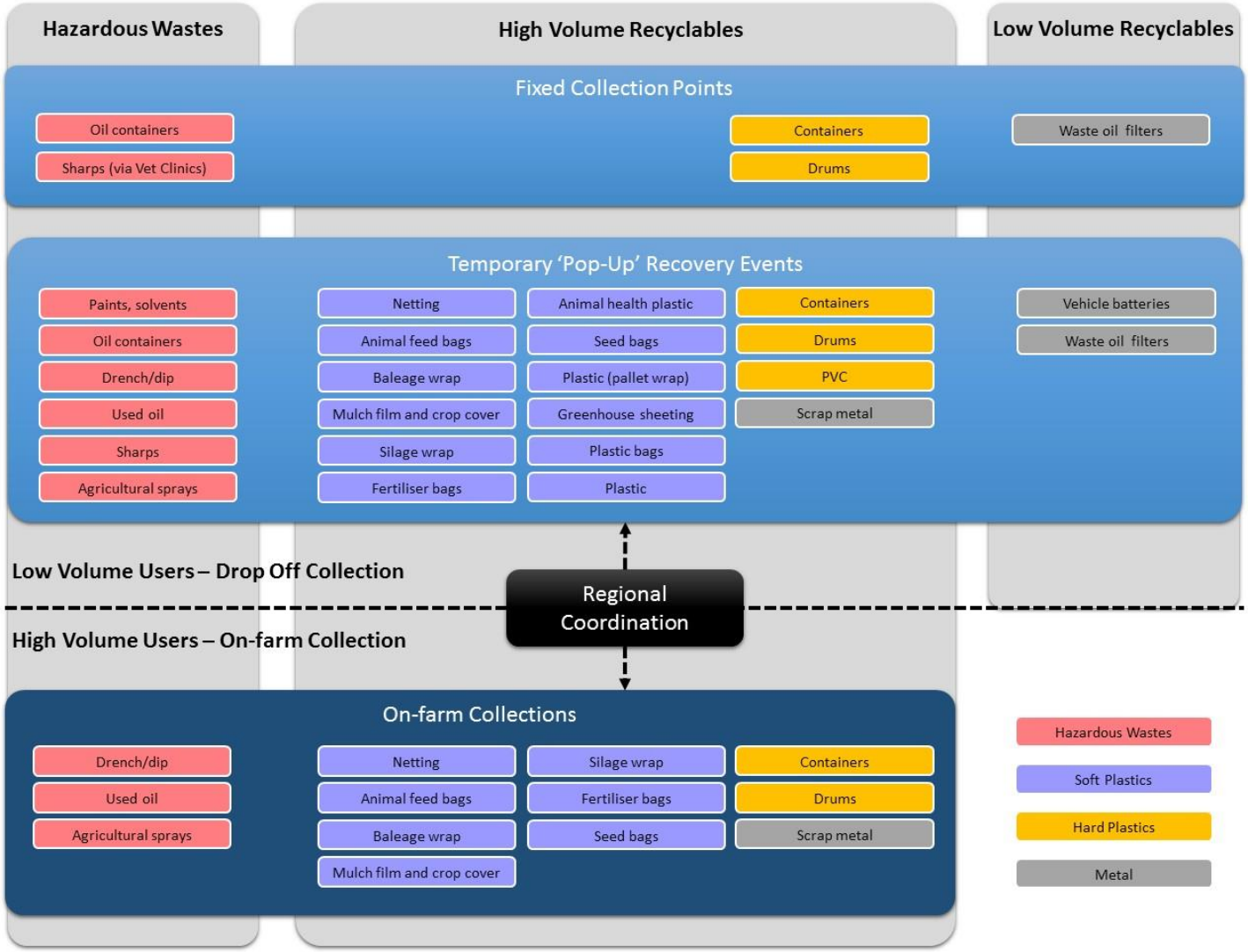

Figure 1: Rural Waste Management Model and priority waste streams

This strategy is based on simplifying waste streams into Hazardous Wastes (such as agrichemicals and sharps), High Volume Recyclables (such as hard and soft plastics) and Low Volume Recyclables (such as vehicle batteries and oil filters). These streams are then split in terms of strategic approach between Low Volume Users and High Volume Users. Under the model the broad strategy for high volume users is on-farm collection, and for low volume users the strategy is the provision of a range of drop-off points for waste.

The next milestone of this project focuses on building detailed business cases for the eight remaining options, including ensuring the partners required for each option are in place and the financial implications of pursuing new options are well understood and accepted by all involved.

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. 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* (the Project).

In addition to funding from the Waste Minimisation Fund for the Project, 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 Project 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 Project comprises six milestones across three project phases, as follows:

Phase	Milestone	Description	Status
1	1 - Risk assessment	• Undertake risk assessment of rural waste disposed on-farm and prioritise high risk waste streams for further work.	Complete
Project stage-gate: MfE and ECAN agreement required to proceed past this point.			
2	2 - Situational analysis and options for minimising rural waste	• National and international review of options for increasing rural waste reduction, reuse, recycling, recovery and disposal, and a preliminary feasibility assessment of each.	Complete
2	3 - Explore potential waste minimisation options	• 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.	This report
2	4 - Detailed business cases	• Prepare complete and detailed business cases for each preferred option.	Due 3/3/2017
Project stage-gate: MfE and ECAN agreement required to proceed past this point.			
3	5 - Implementation of preferred options & communications strategy	• 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.	Due 9/6/2017 (To Be Confirmed)
3	6 - Option pilot trials & communications roll-out	• 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.	Due 10/11/2017 (To Be Confirmed)

This report represents the deliverable for Phase 2, Milestone 3: *Explore potential waste minimisation options*. Informed by the strategy developed in Milestone 2, this milestone aims to explore options for rural waste minimisation previously identified as feasible in more detail, including financial implications, potential risks and barriers, and benefits. This milestone has the following objectives:

- Build potential options into operational scenarios for implementing scaled-up systems, where appropriate.
- Undertake risk analyses on options, including any environmental risks.
- Undertake brief Life Cycle Assessments to understand the life cycle impact of each option scenario.
- Build broad supply chain and financial models for each option based on stated assumptions and risks and undertake more detailed feasibility analysis.

2.2. PROJECT SUMMARY - MILESTONES 1 AND 2

Phase 1 of the Project 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.

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

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)

This prioritised list of waste was carried forward into Phase 2 of the Project to help focus and guide endeavours to minimise rural waste, although opportunities are sought which address waste streams beyond this list.

The overall focus for Phase 2 of the Project 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.

Consideration of waste streams in Phase 2 is based on wastes being categorised as follows:

- 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)

Based on these waste groupings, Milestone 2 considered a range of waste collection options as follows:

- On-farm collection by councils/territorial authorities
- On-farm collection by waste contractors
- On-farm collection via distributor backhaulage
- On-farm collection via one-off collection rounds
- Drop off collection at council/territorial authority hubs
- Drop off collection at commercial waste hubs
- Drop off collection at one-off collection hubs

- Drop off collection at permanent collection hubs
- Drop off collection at retail stores

The options for waste categories were also considered in terms of how they could be addressed in accordance with the waste hierarchy as follows:

- Reduction of waste
- Re-use of waste
- Recycling of waste
- Energy recovery from waste
- Disposal of waste

At the conclusion of Milestone 2 the following options were identified and assessed for preliminary technical and economic feasibility:

Option Description	**Preliminary Feasibility**
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.	Very High
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.	Very High
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
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
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
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

Option Description	Preliminary Feasibility
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. 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.	High
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
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.	High
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.	High
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.	Moderate
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.	Moderate
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 wastes would need to be within the free categories of existing schemes to avoid payment requirements.	Moderate
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.	Low
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 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.	Low

This report explores each of these options, with the exception of '*Inclusion of New Services into Farm Assurance Programmes'* which will not be addressed until other options become established.

At the conclusion of Milestone 2 a range of disparate and largely unconnected options for addressing rural waste were evaluated and presented for further consideration in the Project, as shown above. As further feasibility assessment and stakeholder engagement activity has been undertaken it has become clear that

opportunities exist to connect and rationalise a number of the options, and to modify others, so that they sit more comfortably together. This provides an overarching approach focused on maximising farmer participation and acceptance of the options offered as alternatives to burning, burying and bulk storage of rural wastes.

This approach is driven by two key conclusions drawn from the work undertaken in this project to date:

1. *There is a tension between cost and convenience.* As concluded in Milestone 2, the ideal solution to any rural waste issue is one that is low (or no) cost and very convenient to farmers. Economically, this is difficult to achieve. Solutions that are highly convenient (such as on-farm collection) tend to be expensive. Solutions that are low cost (such as territorial authority drop-off points) tend to be time consuming and inconvenient for farmers. Clearly a trade-off needs to be made such that those who value convenience over cost are able to access a service that fits their needs, while those who value economy over convenience are also able to access a service that works.
2. *A 'one stop shop' approach is desirable.* Farmers having to separate out different wastes and take separate action for each of them in terms of recycling or disposal is not an ideal approach. Farmers are busy and do not appear to want to deal with a range of disconnected interventions for waste management. A preferred approach is one that can deal with as many priority waste streams at once as possible.

The Rural Waste Management Model (the Model) produced in this report, and detailed in Section 4, seeks to enact these two strategies and to rationalise and align the options that remain feasible for addressing rural waste.

The first of the two conclusions above – cost vs. convenience – is addressed, based on discussion with a wide range of stakeholders, by splitting the strategy inherent in the Model between high-volume users and low volume users.

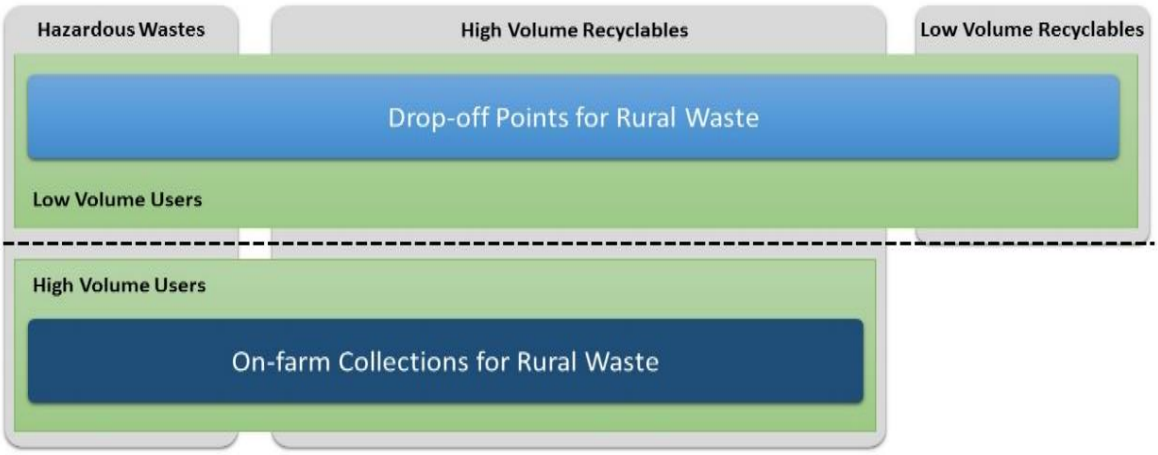

Figure 2: Overall Rural Waste Minimisation Strategy

This strategy is based initially on simplifying waste streams into Hazardous Wastes (such as agrichemicals and sharps), High Volume Recyclables (such as hard and soft plastics) and Low Volume Recyclables (such as vehicle batteries and oil filters).

These streams are then split in terms of strategic approach between Low Volume Users and High Volume Users. What constitutes high or low volume must be determined by the organisation handling each waste stream, but Agrecovery, for instance, currently determines 'high use' customers (for whom on-farm collection of containers is warranted) as those that have in excess of 300 containers available for recycling at any one time.

The rationale for this split is the observation that, in general, farmers' preferred method of diverting waste from their farms is determined by the volume of waste generated. For farmers in possession of large volumes of waste to transport this to a secondary location is often impractical and inconvenient. Farmers with lower volumes of waste are more likely to be prepared to transport this waste to a secondary location themselves rather than incur high transportation costs for an on-farm pick-up when volumes do not warrant this.

With this in mind, the broad strategy pursued in the Model for high volume users is on-farm collection. Having considered all the available options, collecting waste directly from farms for those with high volumes of waste is still considered the preferable strategy. While costs are likely to be higher for on-farm collection than options that involve the farmer taking waste to a secondary location, it is understood that convenience for high volume users is a more important consideration. Where this is not the case, the options pursued for lower volume users will also be available. It should be noted here that on-farm collection is not considered a key strategy for low volume recyclables such as vehicle batteries.

The broad strategy for low volume users in the Model is the provision of a range of drop-off points for waste. Those that are in possession of lower volumes of waste are understood to be likely to prefer lower costs over convenience and will tend to utilise less expensive options even if they involve taking waste to a secondary location.

It should be noted, however, that even though with each strategy a determination is made as to whether low cost or high convenience is preferable, both need to be pursued concurrently. In practice this means that the focus for on-farm collection needs to be on ways to reduce the cost of these services. For drop-off points the emphasis needs to be on how to make these services more convenient. The full Model, discussed in Section 4, has been designed to pursue these strategic goals.

3. OPTIONS UPDATE

Following the preliminary feasibility assessments undertaken in Milestone 2, Milestone 3 has been focused on further building and understanding these options. The following sections detail additional key information and developments relating to the options, as well as indicating whether each option will continue to be assessed under the Project, or whether it has been dismissed as an option. Where options have been identified as no longer presenting feasibility for the purposes of the Project, the reasons for this are clearly stated.

At the commencement of Milestone 3 of this project, a survey was developed and sent to those farmers that provided their contact details following the Farmer Survey undertaken in Milestone 2. This latter survey sought farmer feedback as to whether they would be likely to participate in a number of the new options put forward at the conclusion of Milestone 2. The survey results are included in Appendix 1.

3.1. ENVIROWASTE PLASTICS COLLECTION AND RECYCLING

Feasibility:	Preliminary technical and economic feasibility assessed as very high.				
Type:	Waste Contractor Collection		Recycling of Waste		
Waste Categories:	Hazardous Wastes	**Soft Plastics**	Hard Plastics	Metal	Other Wastes

At the conclusion of Milestone 2 of this project, General Manager Market Development and Sales for EnviroWaste Waste Services' parent group EnviroNZ Dave Elder reported that EnviroWaste's new plastics recycling plant had been tested successfully and was being independently evaluated from a health and safety perspective before commencing operation in October, pending final board sign-off and the arrival of a final piece of equipment being sourced internationally.

Subsequently, Elder has reported that interest in the plant has grown substantially. The plant is reported to be "batch processing" currently with estimates of full-time operation varying between December, 2016 and February, 2017. Despite these delays – understood to be attributed to the late arrival of a piece of equipment required for the process – confidence in the plant at EnviroWaste remains very high.

This option is still considered to be feasible and will be further considered later in this report.

3.2. AGRECOVERY AGRICHEMICAL AND PLASTICS COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as very high.				
Type:	Permanent Collection Hubs & Waste Contractor Collection		Recycling of Waste & Disposal of Waste		
Waste Categories:	**Hazardous Wastes**	Soft Plastics	**Hard Plastics**	Metal	Other Wastes

Agrecovery is an accredited voluntary product stewardship scheme. Since the conclusion of Milestone 2, it has undertaken a major restructure in how it delivers services. Key in this process has been bringing the overall management and marketing of Agrecovery services in-house. This means that instead of

programme management being contracted out to a third party (currently 3R Group) this function will, as of 1 July, 2017, be undertaken by the Agrecovery Foundation itself. This function will be led by new Agrecovery General Manager Simon Andrew, who previously provided business support to the foundation.

The new General Manager role will be responsible for:

- Growing participation by farmers in Agrecovery services
- Marketing the services
- Assessing initiatives to add new waste streams to Agrecovery
- Liaising and engaging stakeholders
- Contractor and site management

In addition to changes in programme management, Agrecovery are also due (by mid-October, 2016) to release a tender for the provision of container and drum collection services from 1 July, 2017. This is the first time that procurement for this service provision has been offered as an open tender. The tender is currently only for the container and drum collection services.

While the tender documents have not yet been finalised, indications from Agrecovery are that the tender will emphasise the following:

- While two contracts are offered (container and drum collection) the preference is for a single provider.
- The collection mechanism for containers will be fixed collection sites, collection events and on-farm collection.
- Participation in collection events will be specifically required of tenderers.
- On-farm collection will be required to be made available for 'high-volume users' in possession of at least 300 containers ready for recycling.
- Innovation in service delivery will be explicitly sought.
- Increased volumes and decreased marginal costs over time will be explicitly sought.
- Plastic will continue to require triple-rinsing and plastics must be recycled into new industrial products, with no unacceptable risk to people or the environment presented during processing or in new products.

In addition, it is understood that Agrecovery will be very interested in tenderers that have the ability and willingness to consider additional waste streams, such as soft plastics, and that provision of services for new waste streams will be a conversation that begins early in the engagement of the successful contracted service provider.

Throughout Milestone 3, close communication has been maintained with Agrecovery to ensure the new Rural Waste Management Model detailed in Section 4 is aligned closely with Agrecovery's future direction and evolving service delivery designs.

This option is still considered to be feasible and will be further considered later in this report.

3.3. VEHICLE BATTERY NATIONWIDE COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as very high.				
Type:	One-off Collection Hubs			Recycling of Waste	
Waste Categories:	Hazardous Wastes	Soft Plastics	Hard Plastics	Metal	Other Wastes

At the conclusion of Milestone 2 it was determined that there was merit in further investigating the feasibility of undertaking 'community events' at which vehicle batteries could be collected. Christchurch-based Dominion Trading expressed interest in this concept and already had relationships with a number of rural Lions clubs with whom they had undertaken small fundraisers centred on vehicle battery collections in the past.

Dominion Trading confirmed that this approach, which has been undertaken in a small number of rural areas, has worked well. The volunteers stack the collected batteries onto pallets and provide secure storage for these until Dominion Trading can collect them. A recent collection in Amberley saw over 3 tonnes of batteries (about three pallets) collected.

Discussions with a number of Lions clubs in rural areas in Canterbury and neighbouring regions suggested that these 'low hanging fruit' areas for Dominion Trading had already been well serviced, and the clubs contacted were not keen to participate in another collection in the near future, suggesting that relatively large volumes of batteries are collected, but that another such collection is not then required for some time.

As part of the follow-up farmer survey undertaken during Milestone 3 (see Appendix 1), farmers were asked to comment on the proposed battery collection. 80% of the 105 respondents said they would be 'somewhat likely' or 'very likely' to participate. 14% of respondents said they would be 'somewhat unlikely' or 'very unlikely' to participate. This is considered a very positive response in terms of the desirability of offering such a service.

As with the Scrap Metal Nationwide Collection option, the Vehicle Battery Nationwide Collection option has been essentially superseded by - and incorporated into – the Temporary Pop-up Recovery Events option that forms a key part of the Rural Waste Management Model outlined in Section 4. Despite this, the Vehicle Battery Nationwide Collection still stands as a key component of this new option.

This option is still considered to be feasible and will be further considered later in this report.

3.4. PLASBACK PLASTICS COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as high.				
Type:	Waste Contractor Collection			Recycling of Waste	
Waste Categories:	Hazardous Wastes	**Soft Plastics**	**Hard Plastics**	Metal	Other Wastes

Plasback is an accredited voluntary product stewardship scheme and has been a key service provider in the rural waste sector for some time. It continues to be one of the most recognised brands offering waste collection services to farms. A key challenge for Plasback however, as identified in the report for Milestone 2 of this project, was concern over service delivery planning and monitoring.

As part of the strategy formulated in Milestone 2 time has been spent with Plasback and a number of its contractors to better understand how the service functions and where opportunities lie for service improvement and better quality control. As a result of this, and in accordance with the strategy identified, a specification for an improved service management system has been prepared and submitted to Plasback for review.

This specification includes:

- An overview of current service management and customer interactions.
- Observations as to how this system and process currently works and where opportunities for improvement may lie.
- Recommendations for an improved system to manage customer interactions, service quality monitoring, proactive marketing and transportation logistics rationalisation.
- A broad system design.

This option is still considered to be feasible and will be further considered later in this report.

3.5. PLASBACK EXPANDED WASTE STREAM COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as high.				
Type:	Waste Contractor Collection		Recycling of Waste		
Waste Categories:	Hazardous Wastes	**Soft Plastics**	**Hard Plastics**	Metal	Other Wastes

During Milestone 2, initial feedback was sought from Plasback and a number of contractors as to whether additional waste streams could be collected while contractors are picking up soft plastics. At that stage, initial feedback was positive. Subsequently, more detailed discussions have been held with Plasback and its primary contractors covering Waikato, King Country, the lower North Island, Canterbury, Otago and Southland.

The contractor for Southland and Otago is the only one of Plasback's contractors that is solely focused on waste collections in his business. The contractor is already collecting recyclable plastic bottles from a small number of farms in addition to the plastics covered under the Plasback programme. Farmers pay a $40 collection fee for collection of a bag of plastic bottles (the same fee paid for a liner full of Plasback wrap) and these are taken to the local recycling centre. The contractor is keen to consider other waste streams, but sees few opportunities, and none among the priority waste streams focused on in this project.

Contractors from other areas tend to be less enthusiastic in considering other waste streams. While the concept is initially appealing, more detailed discussions on the practicalities of collecting other priority wastes centre on the following barriers:

- *Collection trucks are not configured for multiple waste streams and do not have spare capacity.* A number of contractors pointed out that the collection trucks used do not have the space to pick up waste streams beyond the core Plasback plastics. In addition, introducing waste streams such as scrap metal has the potential to tear the plastic liners. Keeping waste streams separate on these trucks is unlikely to be feasible.
- *Contractors are not able to transport hazardous wastes.* Hazardous wastes make up a significant proportion of priority waste streams, but the transportation of such wastes requires special certification, which these contractors do not have.
- *There is a lack of easily accessible outlets for wastes.* The collection and processing mechanisms for Plasback's waste streams are well established and organised. Plasback contractors expressed concern, particularly based on the large geographical areas they cover, in the logistics of transporting diverse waste streams to separate collection and processing points. While this may not be insurmountable, there is not an evident appetite (and perhaps business case) for working through these issues.

Overall, when considering the priority rural waste streams on which this project is focused, there are few additional opportunities for Plasback contractors to consider that are likely to work in practice, given how the contractors currently function. Certainly, the extension of collection services to additional waste streams would require a high degree of commitment and motivation from Plasback contractors to doing so. As all but one of these contractors are providing a range of other services to farmers and are not strategically focused on opportunities around new waste stream collections, it is unlikely this option will be successful.

Therefore, based on this specific feedback from Plasback's contractors, this option is not considered feasible at this time and will not be further considered in this project.

3.6. AGRECOVERY EXPANDED WASTE STREAM COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as high.				
Type:	Permanent Collection Hubs & Waste Contractor Collection		Recycling of Waste & Disposal of Waste		
Waste Categories:	**Hazardous Wastes**	**Soft Plastics**	**Hard Plastics**	**Metal**	Other Wastes

As noted in Section 3.2, Agrecovery has maintained its strategic intention to extend the waste streams collected under the Agrecovery brand, subject to the successful engagement of a capable contractor, preparation of a viable business case and the approval of the Agrecovery board.

The current timetable for Agrecovery's service tendering process envisages the successful contractor working closely with Agrecovery over the first half of 2017 on service planning and development prior to the contract officially commencing on 1 July, 2017.

Should the successful contractor have the capacity, capability and willingness to collect additional waste streams it is likely this will be discussed early in 2017 with the Agrecovery General Manager and board. Conceptually new waste streams could be collected from 1 July, but lead times and marketing may require a later start date for any such new initiatives.

In any event, this will depend on the nature and capabilities of the organisation that is successful in securing Agrecovery's service contracts.

This option is still considered to be feasible and will be further considered later in this report.

3.7. SCRAP METAL NATIONWIDE COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as high.				
Type:	One-off Collection Hubs & One-off Collection Round			Recycling of Waste	
Waste Categories:	Hazardous Wastes	Soft Plastics	Hard Plastics	Metal	Other Wastes

At the conclusion of Milestone 2 it was determined that coordinating on-farm collections of scrap metal for high volume users with local 'hub' drop-off sites for lower volume users may be a useful solution for recycling of scrap metal from farms.

Subsequent discussions around such a model with the Scrap Metal Recycling Association of New Zealand, the national professional association of New Zealand's metal recycling industry, indicate that the industry is likely to be very interested in such a model. The value inherent in scrap metal enables this approach to work more easily for this waste stream than some others.

In more remote locations, it is likely that farmers would be paid a relatively low (or perhaps even no) fee for scrap metal, but there would in all likelihood be no collection fees. Where an area is closer to a main centre, a standard price per kilogram of metal collected can be returned to farmers.

SMRANZ has suggested that the best approach for coordinating local events with on–farm collections would be to have a system that allowed higher volume users in the area in which the event is being held to register for an on-farm collection for the days immediately before or after the event. This would reduce transportation costs for the scrap metal collector and provide a more convenient service for higher volume users. SMRANZ has also agreed in principle to assisting in selecting appropriate member providers for events in different regions and to providing advice for farmers as to which materials can and cannot be collected.

As part of the follow-up farmer survey undertaken during Milestone 3 (see Appendix 1), farmers were asked to comment on the idea of a nationwide scrap metal collection. 74% of the 105 respondents said they would be 'somewhat likely' or 'very likely' to participate. 18% of respondents said they would be 'somewhat unlikely' or 'very unlikely' to participate. This is considered a very positive response in terms of the desirability of offering such a service.

As consideration of how best to coordinate the options identified in Milestone 2 has developed, the Scrap Metal Nationwide Collection option has been essentially superseded by - and incorporated into – the Temporary Pop-up Recovery Events option that forms a key part of the Rural Waste Management Model outlined in Section 4. Despite this, the Scrap Metal Nationwide Collection still stands as a key component of this new option.

This option is still considered to be feasible and will be further considered later in this report.

3.8. EXPANDED ROSE OIL RECYCLING SCHEME DROP-OFF HUBS

Feasibility:	Preliminary technical and economic feasibility assessed as high.				
Type:	Retail Store Drop-off			Recycling of Waste	
Waste Categories:	**Hazardous Wastes**	Soft Plastics	Hard Plastics	**Metal**	Other Wastes

It was concluded in Milestone 2 that permanent collection sites, such as rural stores, may afford farmers a convenient location at which to dispose of some forms of commercial rural waste. Given the current success and reach of the ROSE oil recycling programme, this was seen as a potential partner in exploring the collection of new waste streams at locations such as rural stores.

Discussions with the senior management of the ROSE programme concluded that provision of ROSE collection containers at rural stores was, in principle, a sensible and appealing concept, and ROSE are very keen to explore this further. The provision of collection containers for both oil containers and oil filters are options to be considered. Discussions are underway with two key rural store chains – Farmlands and Farmsource - to find an appropriate partner for such service provision and the initial response has been very positive in both instances. It is expected that a joint discussion with ROSE and one or both of the rural store chains will commence early in Milestone 4 of this project.

Both the rural store chains and ROSE have confirmed that successful operation of the project requires careful monitoring of health and safety issues related to the particular contents of oil containers disposed of in collection bins. It is very important that containers hold oil only, and not antifreeze, solvents or other chemicals. This will need to be monitored by rural stores if this option proceeds as the inclusion of non-permitted chemicals can be extremely hazardous. This is no different, however, from the situation that currently – and successfully – exists at other retail partners for the ROSE programme such as Supercheap Auto.

As part of the follow-up farmer survey undertaken during Milestone 3, farmers were asked to comment on the idea of rural store drop-off hubs. 77% of the 105 respondents said they would be 'somewhat likely' or 'very likely' to participate. 12% of respondents said they would be 'somewhat unlikely' or 'very unlikely' to participate. This is considered a very positive response in terms of the desirability of offering such a service.

This option is still considered to be feasible and will be further considered later in this report.

3.9. FONTERRA SHARPS COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as high.				
Type:	Retail Store Drop-Off			Disposal of Waste	
Waste Categories:	Hazardous Wastes	Soft Plastics	Hard Plastics	Metal	**Other Wastes**

During Milestone 2 of this project Fonterra advised they were conducting a pilot that involved providing sharps containers to farmers and then allowing farmers to drop these containers off at local, participating veterinary clinics.

These containers were sent to farmers in late July, 2016 and the pilot will be conducted by Fonterra, concluding in July, 2017. Results from this pilot and conclusions as to its ongoing feasibility as a service to safely dispose of a priority waste stream under this project will not be known until this time, although preliminary feedback will be sought from Fonterra prior to the conclusion of Milestone 4 of this project in early 2017.

As part of the follow-up farmer survey undertaken during Milestone 3, farmers were asked to comment on the idea of a sharps collection. 55% of the 105 respondents said they would be 'somewhat likely' or 'very likely' to participate. 22% of respondents said they would be 'somewhat unlikely' or 'very unlikely' to participate. This is considered a moderately positive response in terms of the desirability of offering such a service.

This option is still considered to be feasible and will be further considered later in this report.

3.10. COMMUNITY ORGANISATION ON-FARM COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as moderate.				
Type:	Waste Contractor Collection			Recycling/Reuse of Waste	
Waste Categories:	Hazardous Wastes	**Soft Plastics**	Hard Plastics	**Metal**	Other Wastes

As part of the strategy under this option, considerable time has been spent with Wastebusters Canterbury to better understand their model and the challenges in endeavouring to replicate it in other areas. This consultation has highlighted a number of aspects of Wastebusters Canterbury service that may be seen as critical success factors for any organisation seeking to pursue a similar business model:

- *Strong and informal customer relationships*
  - Wastebusters Canterbury considers the key aspect of their service to be the strength of relationships with farmers. These relationships are kept deliberately informal and aid in dealing with issues in a non-confrontational or 'business-like' manner.
  - Wastebusters Canterbury ensures expectations and details as to how the service works are communicated clearly and early in the relationship. Farmers receive an information pack and one of Wastebusters Canterbury's staff will conduct an on-farm workshop with farmers after the first pick-up to provide feedback and direction to ensure the relationship runs smoothly. During the workshop farm workers are told what can and can't be collected, what goes in each bin and how bins must be prepared for collection. This process sometimes involves rationalisation of the bins, with fewer bins being used than originally intended.
  - The primary motivator for farmers to participate in the programme, according to Wastebusters Canterbury, is concern over damage to their land from burning, burying or bulk-storage of wastes. This is followed as a motivator by peer pressure from other farmers and pressure applied by children within the farmers' households.
  - About 70% of participants in the service are dairy farmers. About 20% are dry stock (pasture grazing beef cattle, sheep, and deer for meat, wool, and velvet production).

- Wastebusters Canterbury has seen a recent surge in demand and now has 107 customers. Silage and Baleage wrap volumes are markedly increasing. These are presenting with minimal contamination.

- *A simple and flexible service model that can grow with the customer*
  - Service flexibility is very important, and farmers need to be able to grow their engagement with the service over time.
  - The service typically commences with 3 to 5 bins based often on what is most visible in farm pits. The typical initial configuration is household plastic, glass, paper and cardboard, and silage/bale wrap. Over time, string and twine, steel and cans, and polypropylene bags are usually added.
  - The wooden crates used by farmers patronising the service are constructed by a local sawmill at minimal cost. Farmers are not permitted to manufacture their own crates because of concerns over quality. Bins are always labelled to show the wastes that should be placed in them.
  - Farmers will typically need to pay about $750 for their initial bin set-up, and they will then own these bins. Wastebusters Canterbury advises that farmers are sometimes hesitant about this up-front purchase. Wastebusters Canterbury maintains the bins but will charge the farmer if they are badly damaged whilst on-farm.
  - Farmers are charged a $40 pick-up fee per bin, regardless of how many bins are collected. A mileage fee, usually between $50 and $100 per visit, is also charged. Thus a four bin collection from a farm that is 70km from Wastebusters Canterbury's Ashburton base will cost $260 (4 bins @ $40, plus a $100 collection fee). Bins are picked up every 3 to 4 weeks on average. These figures suggest farmers are paying over $3,000 per annum for the service on average.
  - Wastebusters Canterbury is happy to pick up domestic waste streams as well as commercial ones.
  - At least one farmer has begun using a wool press to compress plastic for ease of transport. This is an interesting idea that may warrant further consideration.
  - In addition to the on-farm collection, eight farms bring in their recyclables to Wastebusters Canterbury directly. These farmers are charged no fee to drop off these recyclables unless contamination is found, at which point a contamination fee of $120 is charged.
  - Wastebusters Canterbury does not handle oil or oil containers, or any form of hazardous waste. These are referred to other providers. Wastebusters Canterbury is very keen to support other service providers that operate effectively.

- *Responsive service delivery*
  - Pick-ups are regular but peak during certain times of the year based on the nature of the farming activity (e.g. during calving season).
  - Pick up usually occurs within 24 hours of request and farmers typically get 30 to 60 minutes notice of the collection time. Farmers must ensure the bins are out for collection and away from buildings, and ensure Wastebusters Canterbury knows exactly where the bins are located on the farm. The transport company then swaps out empty bins for full ones. The truck that collects the bins has the ability to lift the bins directly. Prior to this feature being

available the service was much more difficult to provide as it required farmers to lift the bins onto the truck using their own equipment.

- Wastebusters Canterbury utilises a trucking service for pick-ups that is familiar with farms and how they operate. Wastebusters Canterbury considers this a key requirement in a successful model, although they would like to be in a position to operate trucks themselves. They do not currently have the capital available to do so. Wastebusters Canterbury says that more planning and rationalisation would be possible if they owned and directly managed transportation logistics.

Wastebusters Canterbury have indicated a strong willingness to mentor other service providers motivated to offer a comparable service. One of the challenges in setting up a service is the capital equipment requirements. Wastebusters Canterbury indicate that the following are core equipment needs:

- A baler (which is likely to cost $90 – 100,000)
- A forklift (which may cost $10,000 or more)
- Access to a weighbridge or scales

One of the elements of the initial strategy for this option was to "communicate with potential service providers to determine willingness to develop services". In line with this, advice was sought from the Community Recycling Network as to community organisations that had the capability and mandate to develop a service of a similar kind to that offered by Wastebusters Canterbury. Based on this advice, communication was initiated with:

- Waitaki Resource Recovery Trust
- Wanaka Wastebusters
- Community Resources Whakatane
- Helensville Recycling Centre
- Seagull Centre Thames

Waitaki Resource Recovery Trust

Like Wastebusters Canterbury, Waitaki Resource Recovery Trust is well known and considered professional and innovative in the rural waste sector. Waitaki Resource Recovery Trust is a local collector of soft plastics contracted to Plasback in their area of operation, covering as far south as Gore and as far north as South Canterbury. They also provide their own silage wrap recycling drop-off service for customers close to their base in Oamaru for those customers wanting to save collection fees payable through the Plasback service.

Waitaki Resource Recovery Trust also allows drop off of triple-rinsed hard plastic containers which they sell to a third party processor based in Christchurch. These are recycled into new plastic products.

Most of Waitaki Resource Recovery Trust's customers are from the dairying sector, and are increasingly motivated to recycle waste streams that would previously have been disposed of on-farm. The Trust believes that most of their customers utilising drop-off services do so when already travelling to town on other business. Like Wastebusters Canterbury, Waitaki Resource Recovery Trust charges for any contamination, which largely keeps the issue under control.

As a result of the services provided by Waitaki Resource Recovery Trust, it is collecting and recycling over 500 tonnes of plastic each year, primarily through local drop-offs, although not all of this is agricultural plastic.

While Waitaki Resource Recovery Trust is clearly well-run and well-regarded, its primary service focus is based on providing a permanent drop-off point for commercial farm waste, rather than expanding on-farm collections. A key influencer in this thinking is what Waitaki Resource Recovery Trust believes is a strong recycling ethic in the Waitaki region, which results in most farmers being willing to bring waste into Oamaru.

Despite this, Waitaki Resource Recovery Trust is very open to look at on-farm collections, particularly in terms of farms more distant from Oamaru.

Figure 3: WRRT Flyer (Source: Waitaki Resource Recovery Trust)

Wanaka Wastebusters

Wanaka Wastebusters already has a number of containers available for waste drop-offs in Central Otago as part of their contract with Central Otago District Council. These are, however, focused on domestic waste streams from rural properties. Wanaka Wastebusters also collects some commercial waste streams from horticultural operations (such as orchards and pack-houses) and a small number of farms. While some commercial farm waste streams such as vineyard netting are collected, much of what they are handling are waste streams not considered high priority under this project.

Overall, the organisation has not strategically focused on farms based on the view that the waste recovered does not justify the costs of collection. They are very keen to offer user-pays solutions where they are demanded by farmers but, as yet, they have not perceived a demand for on-farm collections of the type offered by Wastebusters Canterbury. Wanaka Wastebusters have also suggested that offering 'hubs' for farmers to collect volumes, which Wanaka Wastebusters could then bale and send for processing, may be a more viable option.

Community Resources Whakatane

Community Resources Whakatane is currently focused on the 'front-end' of what Wastebusters Canterbury does in terms of diverting reusable items from landfill. They do not, currently, provide any collection or recycling services. As a result, Community Resources Whakatane does not have any of the equipment that an on-farm collection service would require, nor do they have the space on their current site to manage recycling of this kind.

Despite this, Community Resources Whakatane advises that moving into this area aligns well with their strategic planning and there are elements of the service – particularly around education and relational management – that they would excel at. Community Resources Whakatane says they have already adopted elements of Wastebusters Canterbury's model and would be very keen to understand better how they provide services to farms to determine whether this is a pathway they could also pursue.

Helensville Recycling Centre

The Helensville Recycling Centre has already piloted provision of services similar to Wastebusters Canterbury, albeit at a smaller scale. They have particularly focused on the recovery of silage wrap. This activity has apparently ceased due to issues with contamination but the Centre has indicated a desire to further investigate this model and determine whether it might work in their area.

Seagull Centre Thames

The Seagull Centre in Thames is understood to be the only facility of its kind in a wide geographical area that covers the farming regions of Matamata-Piako and Hauraki, although, the Seagull Centre is not directly providing any services beyond the immediate Thames/Hauraki Plains region. The Centre is currently in a strategic planning phase and is considering what its focus will be over the next five years. They have recently received a funding boost and has been given additional land by the local council to expand operations, and providing services to rural communities is seen as an attractive proposition. The concept of providing on-farm collections for rural waste is definitely of interest to the Seagull Centre and they are very keen to investigate this model further.

At this stage it is apparent that Community Organisation On-Farm Collection is likely to continue to be a niche service viable only in certain areas and within reasonable proximity to the base of operations for the community organisation providing the service. Among the community organisations noted above there is, however, sufficient interest to justify consideration of some forum in which Wastebusters Canterbury might better explain their model to these (and any other) interested organisations to determine whether they could execute this business model in their local area.

This option is still considered to be feasible and will be further considered later in this report.

3.11. EXPANDED TERRITORIAL AUTHORITY RECYCLING DROP-OFF HUBS

Feasibility:	Preliminary technical and economic feasibility assessed as moderate.				
Type:	Council/TA Waste Hubs		Recycling of Waste		
Waste Categories:	Hazardous Wastes	**Soft Plastics**	Hard Plastics	Metal	Other Wastes

Following the release of the Milestone 2 report under this project, communication was initiated with 18 territorial authorities that had, through WasteMINZ's Territorial Authority Forum, rated rural waste as being a strategic priority for their council.

This communication highlighted the two options that centre on extended Territorial Authority activity) and sought to engage with those councils that saw either of these options as desirable for further development.

While most of these territorial authorities were reluctant to pursue on-farm collection, a number expressed interest in – or already are – pursuing new or additional drop-off sites for rural waste, or for new commercial rural waste streams.

The key challenge in pursuing these types of hubs appears to be the perceived need for such hubs to be staffed when open. There are two key reasons given by territorial authorities for ensuring hubs are staffed:

- *Illegal dumping*: A number of councils expressed concern over providing unmanned drop-off hubs for rural commercial waste in that they believed illegal disposal of waste – fly-tipping – would be a serious problem under such circumstances. While in Milestone 2 it was noted that some councils countered this issue by ensuring strong community ownership over such sites, others that provide such sites simply pay staff to monitor the sites when open to the public.
- *User-pays charging*: Most councils are of the view that, as commercial waste streams, non-residential rural wastes need to be paid for directly by farmers and not be subsidised by all ratepayers across a region. In order for such charging to take place – short of a substantial investment in computer-based access and billing – sites must be staffed.

The requirement that Territorial Authority Recycling Drop-Off Hubs be manned presents two key issues that somewhat weaken the feasibility of such sites:

- *Increased site costs:* The need to employ staff to manage drop-off hubs makes the provision of these sites considerably more expensive to councils, and decreases the likelihood of maintaining a larger number of sites conveniently accessible to farmers.
- *Reduced hours of operation:* Based on the first issue above, the most obvious strategy for keeping site operation costs down is to open the sites only for a few hours each week or so. This is a sensible strategy, but it reduces the convenience of the site – particularly if the hours of operation do not align well with how farmers in the area typically work – and may therefore reduce the volumes of waste taken to these sites by farmers.

While these issues make the provision or extension of Territorial Authority Recycling Drop-Off Hubs more challenging there is a clear interest from a number of territorial authorities in considering such sites and in piloting their operation in new areas. These opportunities will be further developed in subsequent milestones under this project.

As part of the follow-up farmer survey undertaken during Milestone 3 (see Appendix 1), farmers were asked to comment on the idea of Territorial Authority recycling drop off hubs. 84% of the 105 respondents said they would be 'somewhat likely' or 'very likely' to participate. 5% of respondents said they would be 'somewhat unlikely' or 'very unlikely' to participate. This is considered a very positive response in terms of the desirability of offering such a service.

This option is still considered to be feasible and will be further considered later in this report.

3.12. EXPANDED PAINT RECYCLING SCHEME DROP-OFF HUBS

Feasibility:	Preliminary technical and economic feasibility assessed as moderate.				
Type:	Retail Store Drop-off		Recycling/Disposal of Waste		
Waste Categories:	**Hazardous Wastes**	Soft Plastics	Hard Plastics	Metal	Other Wastes

Following the recommendation at the conclusion of Milestone 3 that both Dulux and Resene be approached to ascertain their interest in extending permanent drop-off hubs into rural areas, discussions have been undertaken with both companies to understand their recycling offerings and strategic direction in terms of product stewardship.

Both Resene and Dulux are committed to recycling waste paint, and both participate in the PaintWise programme. As noted in Milestone 2:

> Resene 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 Resene 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.

Currently, both programmes require that paint be taken back to one of the branded trade shops operated by these companies. No such outlets are easily accessible to rural customers.

Discussions with Resene, which has overall control of the Resene PaintWise programme, have indicated that there is little interest in establishing permanent collection sites at, for example, rural stores based on the business case inherent in paint recycling. There are considerable costs in collecting and recycling paint and Resene consider it very unlikely that they would be able to accept even their own brand of paint at sites in rural areas for free. While indicated costs for users of a rural service have not been calculated with certainty, they are likely to be at a level that would dissuade farmers from utilising the service.

Dulux have indicated that they would also seek to work through Resene PaintWise if a rural collection service were launched, and this would result in drop-off charges that may be higher than those paid for Resene paints.

With these challenges in mind the discussions on paint recycling have shifted from permanent collection hubs to inclusion of paint in temporary events as detailed in the Rural Waste Management Model outlined in Section 4. This change in strategy is likely to produce a better business case – and lower costs for farmers – than permanent sites, but the potential participation of Resene and Dulux (likely through Resene PaintWise) at such events is still under discussion, along with potential avenues for funding or subsidisation of paint recycling in rural communities.

As part of the follow-up farmer survey undertaken during Milestone 3, farmers were asked to comment on the idea of paint recycling hubs. 60% of the 105 respondents said they would be 'somewhat likely' or 'very likely' to participate. 21% of respondents said they would be 'somewhat unlikely' or 'very unlikely' to participate. This is considered a moderately positive response in terms of the desirability of offering such a service.

Based on the strong financial barriers to making permanent rural hubs for paint recycling work sustainably, and the shift in focus for paint recycling to temporary events, this option is not considered feasible at this time and will not be further considered in this project.

3.13. TERRITORIAL AUTHORITY ON-FARM COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as low.				
Type:	Council/TA Collection			Recycling of Waste	
Waste Categories:	Hazardous Wastes	**Soft Plastics**	Hard Plastics	**Metal**	**Other Wastes**

As noted in Section 3.11, following the release of the Milestone 2 report under this project, communication was initiated with 18 territorial authorities that had, through WasteMINZ's Territorial Authority Forum, rated rural waste as being a strategic priority for their council. This communication highlighted the two options that centre on extended Territorial Authority activity and sought to engage with those councils that saw either of these options as desirable for further development.

While some interest was expressed in Expanded Territorial Authority Recycling Drop-Off Hubs none of the councils expressed a desire to pursue on farm collection. Where reasons were given for this, they included:

- *The absence of domestic waste collections in rural areas*. Some areas make these available where rural properties lie on an existing waste collection route, but routes tend not to extend into more remote areas.
- *Logistical challenges for waste separation*. For a waste collection vehicle to collect new waste streams, such as soft plastics, either these waste streams would need to be kept separate within the truck somehow – which is probably not feasible in most instances – or the waste would need to be manually sorted at some later point – which requires time and further expense. Alternatively, a separate truck could be sent for these waste streams, but this would put such a collection firmly into the commercial sphere and would be unlikely to be of interest to most councils.
- *Lack of council mandate around commercial waste streams.* Most councils appear to be of the view that the collection of commercial waste streams (those produced by revenue-generating activity) is a business expense for farms and not the responsibility of the council. There is, therefore, a reluctance to incur significant expense or build new services that are focused on the collection of commercial waste streams such as silage wrap.
- *Unavailability of resourcing.* A significant number of councils report being under-resourced in terms of waste management, and some are facing budget cuts in this area. Investing substantially in new services is unlikely to be feasible in many predominantly rural regions.

In Milestone 2, it was concluded that:

> 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 are any that would be interested in piloting such a service. A successful pilot may require a reconsideration of feasibility.

Based on the execution of this strategy, and the lack of a positive response to undertaking a pilot, this option is not considered feasible at this time and will not be further considered in this project.

3.14. COMMERCIAL ON-FARM COLLECTION

Feasibility:	Preliminary technical and economic feasibility assessed as low.				
Type:	Waste Contractor Collection			Recycling/Disposal of Waste	
Waste Categories:	Hazardous Wastes	**Soft Plastics**	Hard Plastics	**Metal**	Other Wastes

There is a general sense in talking with waste collection service providers that rural collection activity is steadily increasing, but that this growth appears to be based on a strategy of identifying opportunities based on existing collection routes. Where a collection truck is moving from one existing customer or collection round to another, and that truck passes by rural properties, some providers are seeking collection opportunities among these properties. To date, these opportunities appear to involve the exclusive utilisation of conventional bins and waste streams, with a focus on general waste rather than recyclables. The potential provision of farmer-owned bins has been discussed, but this concept may present unacceptable health and safety risks to waste collection service providers.

No waste collection service provider contacted has expressed a desire to pilot alternative service delivery models focused on key recyclable commercial rural waste streams.

In Milestone 2, it was concluded that:

> 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 are 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.

Based on the execution of this strategy, and the lack of a positive response to undertaking a pilot, this option is not considered feasible at this time and will not be further considered in this project as a standalone option.

However, commercial on-farm collection is likely to grow in the future, and innovation in this space has the potential to positively impact rural waste behaviour. To this end, commercial on-farm collection will form part of the ongoing options encapsulated in the model detailed in Section 4.

3.15. REVISED OPTIONS SUMMARY

Based on the updates given in Sections 3.1 to 3.14 the modified status of the options identified in Milestone 2 is therefore:

- *EnviroWaste Plastics Collection and Recycling* – This will continue to be developed and assessed as a standalone option under the banner of 'On-Farm Collection' and may also be integrated into the new option of 'Temporary Pop-up Recovery Events'.
- *Agrecovery Agrichemical and Plastics Collection* – Given Agrecovery's stated intention of extending the waste streams to be collected under the programme, this option will be integrated into the Agrecovery Expanded Waste Stream Collection option.
- *Vehicle Battery Nationwide Collection* – This option will be integrated into the new option of 'Temporary Pop-up Recovery Events'.
- *Plasback Plastics Collection*– This option will continue to be developed and assessed as a standalone option under the banner of 'On-Farm Collection' and will also be integrated into the new option of 'Temporary Pop-up Recovery Events'.
- *Plasback Expanded Waste Stream Collection* – This option will no longer be pursued in this project.
- *Agrecovery Expanded Waste Stream Collection* – This option will continue to be developed and assessed as a standalone option under the banner of 'On-Farm Collection' and 'Fixed Collection Points', and will also be integrated into the new option of 'Temporary Pop-up Recovery Events'.
- *Scrap Metal Nationwide Collection* – This option will be integrated into the new option of 'Temporary Pop-up Recovery Events'.
- *Expanded ROSE Oil Recycling Scheme Drop-Off Hubs* – This option will continue to be developed and assessed as a standalone option under the banner of 'Fixed Collection Points' and will also be integrated into the new option of 'Temporary Pop-up Recovery Events'.
- *Fonterra Sharps Collection* – This option will continue to be developed and assessed as a standalone option under the banner of 'Fixed Collection Points' and will also be integrated into the new option of 'Temporary Pop-up Recovery Events'.
- *Community Organisation On-Farm Collection* – This option will continue to be developed and assessed as a standalone option under the banner of 'On-Farm Collection'.
- *Expanded Territorial Authority Recycling Drop-Off Hubs* – This option will continue to be developed and assessed as a standalone option under the banner of 'Fixed Collection Points'.
- *Expanded Paint Recycling Scheme Drop-Off Hubs* – This option will be integrated into the new option of 'Temporary Pop-up Recovery Events'.
- *Territorial Authority On-Farm Collection* – This option will no longer be pursued in this project.
- *Commercial On-Farm Collection* – This option will no longer be pursued in this project.

4. RURAL WASTE MANAGEMENT MODEL

As noted in Section 2.2 the further consideration of the options identified in Milestone 2 gave rise to a rationalisation of these options based on the consolidation of waste streams and the strategic separation of high and low volume users, as follows:

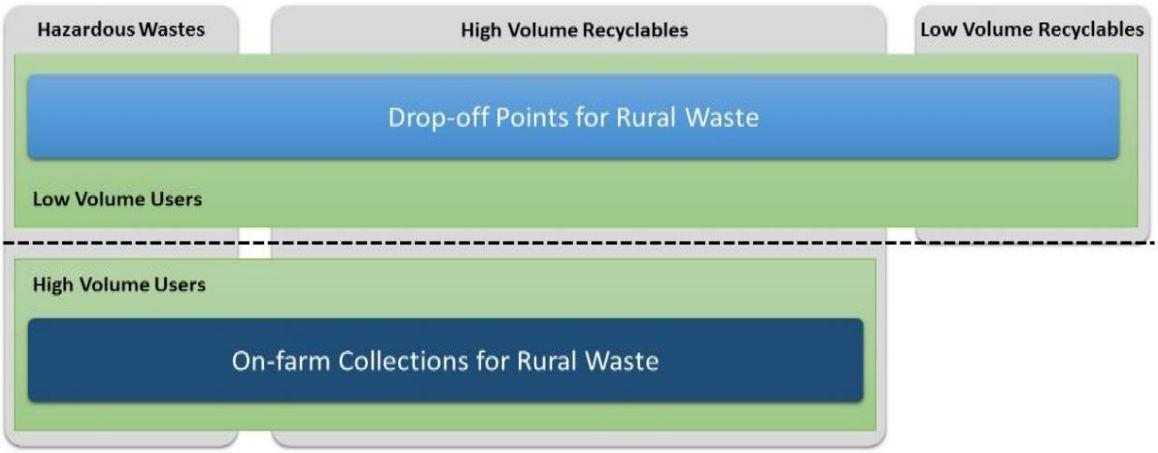

Figure 4: Overall Rural Waste Minimisation Strategy

The Rural Waste Minimisation Model (the Model) builds on this initial strategy and splits overall rural waste service delivery into three key types:

- *On-farm Collections:* This includes all services in which the primary focus is collecting waste directly from farms.
- *Fixed Collection Points:* These are those permanent locations at which a farmer can drop off rural waste streams, with or without charge.
- *Temporary 'Pop-up' Recovery Events*: These are events undertaken for a fixed period of time, and at which farmers can drop off a wide range of rural waste streams.

Temporary 'Pop-up' Recovery Events

The third of these service types - Temporary 'Pop-up' Recovery Events – is a new strategy being developed for this project based on feedback from key stakeholders and opportunities that exist to collect rural waste in a more cost-effective and convenient manner.

The overall vision for these events is to hold a local event for a specific time frame – most likely a day – to which farmers can bring a range of rural wastes and have them dealt with all at once. This reflects the desirability of a 'one stop shop' model as discussed in the previous section.

The events have the potential to cater to a wide range of rural waste streams, including:

- *Hazardous wastes:* The events could provide a drop-off point for chemicals included in the Agrecovery programme, as well as oil containers and filters under the ROSE programme, paint under the PaintWise programme and sharps under Fonterra's sharps programme.

- *Soft plastics*: The full range of recyclable soft plastics could be collected at these events. As this space is becoming increasingly competitive, this may involve more than one supplier.
- *Hard plastics:* The events could provide a drop-off point for the full range of plastic containers and drums included in Agrecovery and Plasback's programmes.
- *Scrap metal:* The events could provide a location for smaller volumes of scrap metal to be received, including vehicle batteries.
- *Other waste streams*: Should territorial authorities partner in the events, farmers may be able to drop off household recyclables or general waste streams for landfill.

Ideally, these events would be:

- *Strategically aligned with service provider requirements:* If these events are not seen as valuable by service providers such as Agrecovery and Plasback, and do not contribute to increased volumes and/or lower operational costs, then they are unlikely to be sustainable.
- *Coordinated with local on-farm collections*: If an event were to take place in a particular region on, for example, March the 1st, then it would be logical to proactively seek out high volume users in the region to arrange on-farm collections before or after this date. Such an approach is a key element of the overall strategy in that it offers the ability to better rationalise on-farm collections and potentially lower collection costs. In order for suppliers to take advantage of this rationalisation they will require systems that can support this kind of proactivity and planning, and transportation capacity that will allow a local collection round undertaken in this manner.
- *Executed based on farmer demand*: Considerable effort will be required to determine how often such events would be required in different regions, and when in the year key waste streams are being produced. If events are held too often, volumes will be too low and attendance by service providers will be uneconomic. If events are poorly timed or too infrequent, volumes may become unmanageable or the event will not meet farmer expectations. Planning of events and timing will likely depend on dominant farming activities in each region.
- *Community-focused:* Stakeholder feedback suggests that running these events as a 'community day' that includes other activities may assist in better engaging farmers and achieving higher participation rates. The opportunities here are open-ended, but may include family activities such as 'bouncy castles and sausage sizzles' or rural community education sessions on subjects such as composting. The key is to make the event a 'destination' that encourages family participation and a sense of community among farmers. Potential also exists to co-locate or otherwise align these events with A & P shows or other prominent community events, but there are currently mixed views on whether or not this would be desirable to farmers.
- *In partnership with territorial authorities:* Support from local councils would be sought in the form of facility provision, event management and marketing. The event location will need to be easily accessible and may require storage facilities to allow service providers to collect waste in the days following the event. Support from councils would also be required at the event in terms of traffic management and, potentially, coordination of the different waste service providers. In addition, councils are well placed to publicise the event to rural communities through a number of channels, including inclusion of event details with rural rates notices. This latter element may work well for councils as it allows them to demonstrate activity in support of waste management for farmers, which was an issue raised as a concern for farmers in Milestone 2.

- *Centralised in terms of measurement and billing:* It may be easier, as farmers drop off each waste stream at events, for farmers to be given a document showing all the waste types that can be deposited and for each service provider to note weights or volume and cost on this. Ideally, there would be a centralised billing and logistics systems so farmers would pay once for billable waste streams, if appropriate, at the end of the process and retain their document showing waste streams collected and weights or volume. Such documentation would support inclusion of these events as a requirement under farm accreditation programmes such as NZ GAP or Synlait's Lead with Pride. To coordinate on-farm pick-ups of various waste streams it would also be advantageous for farmers to be able to log waste streams and volumes for collection on a single centralised system that sends this information to the respective service providers. The logistics around both of these functions will require further consideration and development in Milestone 4 of this project.

Ultimately it would be desirable for farmers to be able to drop off any and all wastes that they have on their farms, although some waste streams may attract considerable fees for disposal. Conceptually this may look similar to the illustration shown below:

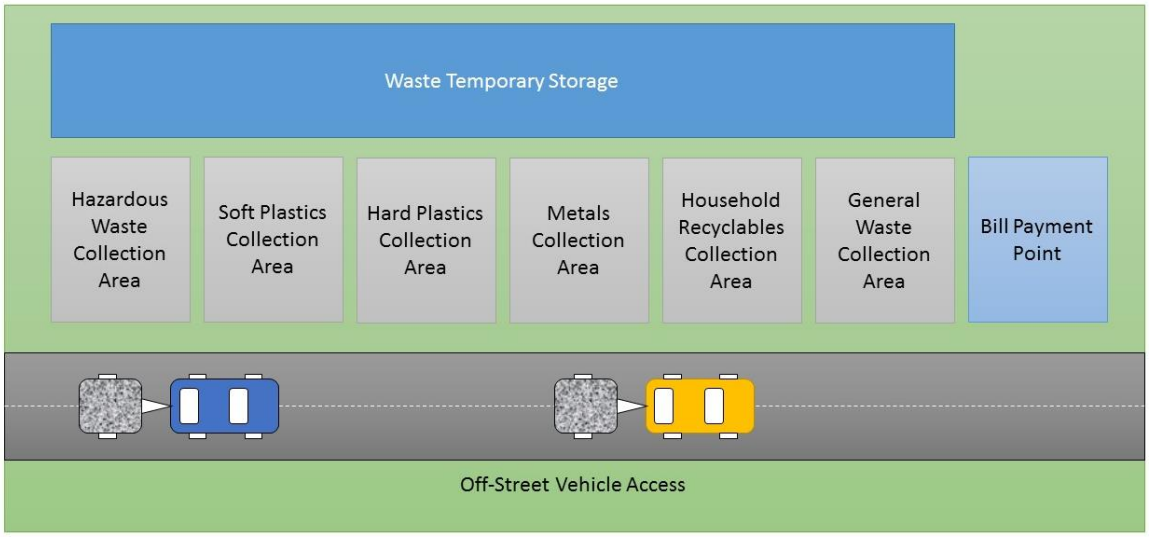

Figure 5: Recovery Event Concept Illustration

If successfully executed, it is believed these events could deliver the following benefits:

- *Reduced burning, burying and bulks storage of rural wastes:* The events, mainly focused on lower volume users, offer the opportunity for farmers to offload most if not all of their rural waste to providers who will ensure that it is recycled where possible, or otherwise disposed of in a controlled manner. The events would be well publicised so farmers know exactly when they can dispose of wastes. By making the events as cost-effective and convenient as possible for farmers, the likelihood of participation is increased and rates of burning, burial and bulk storage of rural wastes should decrease.
- *Volume consolidation for providers:* The events provide a focus point for the consolidation of waste volumes at a specific location at a specific time. This is likely to improve collection efficiencies for service providers and should generate increased volumes for processing.
- *Reduced transportation costs for providers:* The events and coordinated on-farm collections can be deployed in a planned and rationalised way which should reduce transportation costs for both service providers and service end users.

- *Increased profile for service providers*: The events offer service providers an opportunity to communicate their services and also to identify farmers who may benefit from on-farm collections. Farmers will also be able to clearly see all the waste streams that they can dispose of, raising overall awareness of options.

In addition to these benefits, the events also offer territorial authorities the opportunity to partner with a solution for commercial rural waste streams that is simple and low cost. In the farmer survey undertaken in Milestone 2 of this project a significant number of farmers noted their dissatisfaction with their local territorial authority not providing any service options for commercial rural waste streams. While many territorial authorities believe that such rural waste streams are a commercial issue, and should be paid for by farmers as with any other commercial waste stream, the events offer an opportunity for councils to be seen to be supporting farmers and effective rural waste management in a way that requires very low resource commitment.

A number of international precedents for these kinds of events were explored in Milestone 2 of this project. Similar programmes operate internationally in terms of rural waste, but they tend to focus on single waste streams, such as silage wrap, rather than covering a wide range of waste streams. Other events of this kind focus on domestic rural waste streams, rather than commercial wastes.

The broad concept of recovery events has, during Milestone 3, been discussed with most of the key stakeholders involved in this project. Indicative support for the concept and a willingness, in principle and subject to more detailed plans, to support eventual piloting of the concept has been received from all of the key service providers that would be required for successful events, as well as from a number of territorial authorities.

These 'Temporary Pop-up Recovery Events' have been added to the list of options being evaluated under this project, superseding and integrating a number of the pre-existing options determined at the conclusion of Milestone 2.

Overall, the Model and the priority waste streams included are conceptualised in Figure 6 and the options identified at the conclusion of Milestone 2 are accounted for in this model as noted in Figure 7.

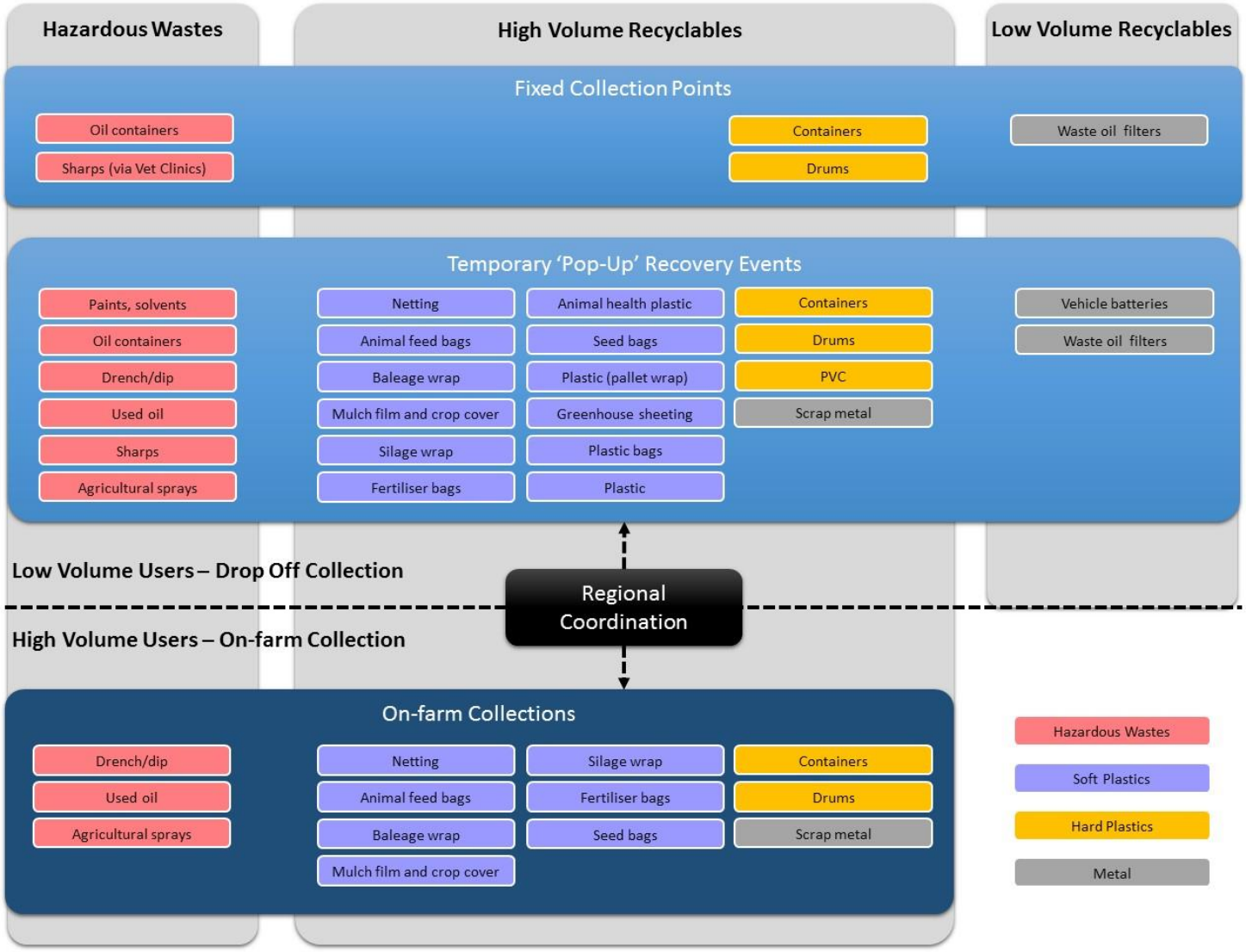

Figure 6: Rural Waste Management Model and Priority Waste Streams

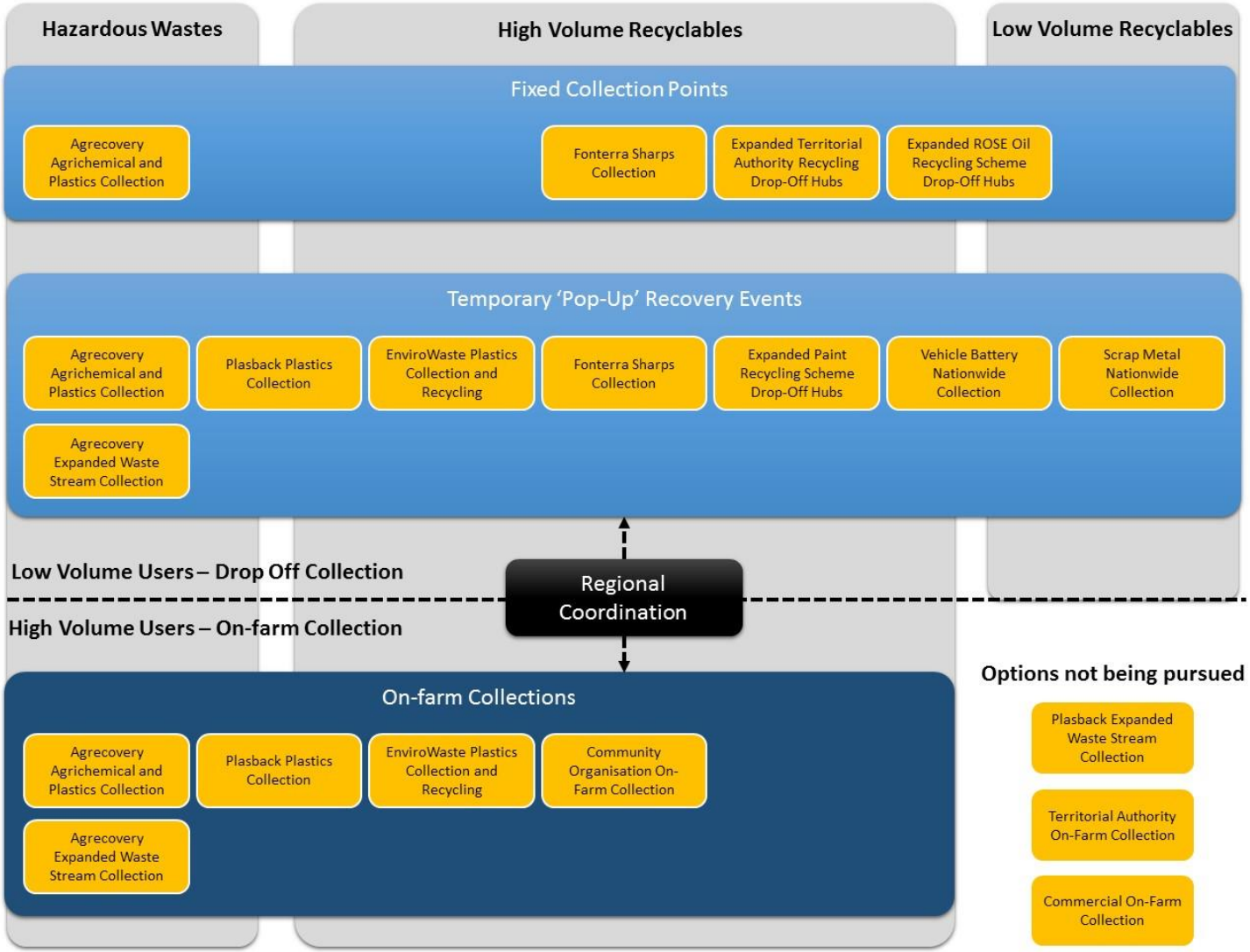

Figure 7: Rationalisation of Milestone 2 Options

The modifications made to the Milestone 2 options result in the following refined options being carried forward for further analysis and assessment in the remainder of this report:

1. EnviroWaste Plastics Collection and Recycling
2. Agrecovery Expanded Waste Stream Collection
3. Plasback Plastics Collection
4. Community Organisation On-Farm Collection
5. Expanded Territorial Authority Recycling Drop-Off Hubs
6. Expanded ROSE Oil Recycling Scheme Drop-Off Hubs
7. Fonterra Sharps Collection
8. Temporary Pop-up Recovery Events

5. MODIFIED OPTIONS ASSESSMENT

5.1. ASSESSMENT TOOLS

During Milestone 2 of this project an initial group of options for addressing rural waste in New Zealand was established and assessed in terms of feasibility. In Sections 3 and 4 of this report these options were reviewed, refined and rationalised to produce a new set of options that will be further developed and assessed in this section of the report, and in subsequent milestones.

In Sections 5.2 to 5.9 each of these options is further assessed in terms of feasibility using four assessment tools:

- Supply chain modelling
- Life cycle assessment
- Financial and operational modelling
- Risk assessment

In each of the assessments undertaken a 'traffic light' system of colour coding of results is used. Green indicates a positive result (high performance or low risk), orange indicates a neutral or acceptable result (moderate performance or moderate risk) and red indicates a negative result (low performance or high risk).

It should be noted that the assessments undertaken and evaluations or scores given are based on qualitative analysis and information available at the time the assessment was undertaken.

Supply chain modelling is a method of showing the pathway for collected waste from farmer to waste reuse, recycling or disposal. Where known, details such as pricing and waste flow volumes are noted to provide a sense of how waste moves through each stage of the option being considered.

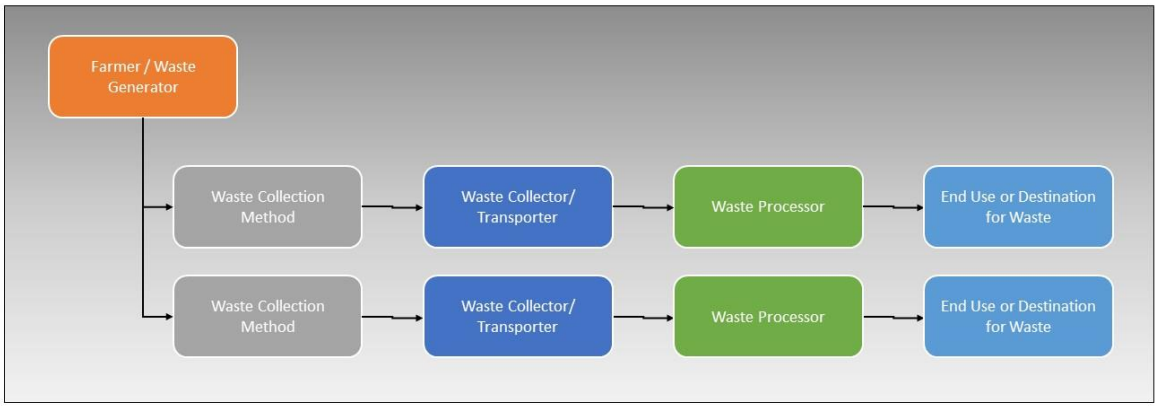

Figure 8: Supply Chain Model Format

Supply chains are modelled using the format shown above to note how waste is collected, transported, processed and finally utilised or disposed of. The evaluation of supply chains considers the robustness and reliability of each of these elements and the degree to which has been established and proven to be successful. Overall assessments given have the following meaning:

- *Low* – The supply chain is particularly vulnerable and/or key elements are not in place.
- *Moderate* – The supply chain is, or is likely to be, functional, but one or more elements is either not finalised or is considered vulnerable.
- *High* – Each of the key elements of the supply chain is in place or is seen as being easily achievable and the overall supply chain is considered robust and reliable.

The *Life Cycle Assessment*[1] analyses the potential impacts of the waste minimisation options in terms of energy consumption, waste generation, air pollution, water pollution and soil contamination of each option. These environmental impacts are scored as a 1, 2 or 3 based on the following classifications:

- Energy consumption
    1. Process or method with low energy consumption
    2. Average energy consumption
    3. Large consumption
- Waste generation
    1. Little waste, none hazardous
    2. Average waste, no especially high volumes or risks
    3. High volumes, including hazardous waste
- Air pollution
    1. No air pollution at this stage
    2. Some air pollution, but not considerably high
    3. Considerable air pollution
- Water pollution
    1. No water pollution at the stage
    2. Some water pollution under control or treated
    3. The process often pollutes water, or high risk of this exists
- Soil contamination
    1. No potential to contaminate soil
    2. The process potentially pollutes the soil, but it is not likely
    3. Frequent occurrence of normal or accidental soil contamination

Scores for transportation phases reflect both energy use (fuel) and air pollution from transportation.

Based on the scores for each stage and environmental impact an overall score is tallied. This is converted to a percentage utilising the methodology outlined in Appendix 2.

[1] The 'Simple LCA' tool used was developed by Balázs Havér of the Hungarian Association for Environmentally Aware Management (KÖVET-INEM Hungária). It is based on the Hungarian version originally published in his handbook Termékek és környezetvédelem (Products and Environment), KÖVET, Budapest, 2001. See http://ec.europa.eu/environment/archives/emas/toolkit/downloads/5_1_lca.pdf

Overall assessments given have the following meaning:

- *Low* – The life cycle assessment indicates the option will produce unacceptable environmental outcomes.
- *Moderate* – The life cycle assessment indicates the option will produce acceptable environmental outcomes, but one at least one of the environmental impacts gives cause for concern.
- *High* – The life cycle assessment indicates the option will produce favourable environmental outcomes.

The *Financial and Operating Modelling* considers a range of factors relating to the business operation of the models, including:

- *Capital requirement*: How much funding is required to establish the model? What value of new assets would be required?
- *Service provider access to capital*: How likely is it that the service provider/s will be able to access the capital required to establish the model?
- *Public funding required*: What level of external government funding would the service provider likely need to establish the model?
- *Priority waste streams covered*: How many of the priority waste streams under this project would the option address?
- *Waste volume capacity:* What volumes of different waste streams can the option collect and process?
- *Profitability:* What level of profit will the service provider likely make on providing the services in the option?
- *Return on investment:* Given the capital required to establish the option, will the service provider make a reasonable rate of return on their initial investment?
- *Growth potential:* Does the option have the ability to grow over time and attract more and more volume?
- *Reliability of output markets:* What are the avenues for selling the recycled material processed by the option? Are these stable and sustainable?
- *Farmer affordability:* Will farmers have to pay to use the option? Are they likely to be willing to pay what is being asked?
- *Geographical reach:* Does the option cover a wide geographical area or, ideally, all of New Zealand?
- *Scalability:* Will the option be relatively easy to scale if volumes increase over time?
- *Service provider capability/track record:* Does the service provider have a strong brand in the rural community? Is the organisation well run and well regarded? Does it have a track record of running similar services?

Each of these factors is rated based on assessed performance and an overall rating is assigned to the model based on the perceived robustness of the organisation and service offering.

For each element of the assessments, and for the overall assessments, the ratings given have the following meaning:

- *Very Low* - The element or overall model is considered to offer a very poor outcome or show very low potential, or otherwise be fundamentally vulnerable or unacceptable.
- *Low* – The element or overall model is considered to offer a poor outcome or show low potential, or otherwise be somewhat vulnerable or unacceptable.
- *Moderate* – The element or overall model is considered to offer an acceptable outcome or show modest potential. Some vulnerability is indicated.
- *High* – The element or overall model is considered to offer a positive outcome or show strong potential.
- *Very High* - The element or overall model is considered to offer a very positive outcome or show very strong potential.

The *Risk Assessment* considers the risks presented by the option in the areas of business model, finances, supply chain, market, technical/process, compliance and environment. Each risk factor under these headings is assessed based on:

- *Likelihood of Occurrence* – The probability that the risk factor will actually materialise in the option.
- *Impact of Occurrence* – How serious the consequences of the risk factor occurring will be to the option.
- *Mitigation in Place* – How much has been done, and how robust the strategies are, to ensure the occurrence and any potential impacts of the risk are minimised.
- *Overall risk* – Taking into account the previous three factors, the overall level of risk faced by the option in terms of the risk factor.

For each element of the risk elements and headings, and for the overall assessments, the ratings given have the following meaning:

- *Very Low* - The factor or overall profile is considered to offer a very low risk or immaterial consequences if the risk is realised. For *Mitigation in Place* this rating indicates that there are no known strategies in place or strategies are assessed as fundamentally inadequate to mitigate the risk.
- *Low* – The factor or overall profile is considered to offer a low risk or minimal consequences if the risk is realised. For *Mitigation in Place* this rating indicates that there are only low level strategies in place or strategies are assessed as unlikely to successfully mitigate the risk.
- *Moderate* – The factor or overall profile is considered to offer an acceptable risk or only moderate consequences if the risk is realised. For *Mitigation in Place* this rating indicates that there are basic strategies in place and strategies are assessed as having the potential to successfully mitigate the risk.
- *High* – The factor or overall profile is considered to offer a high risk or serious consequences if the risk is realised. For *Mitigation in Place* this rating indicates that there are well developed strategies in place and strategies are assessed as likely to successfully mitigate the risk.

- *Very High* - The factor or overall profile is considered to offer a very high risk or fundamentally unacceptable consequences if the risk is realised. For *Mitigation in Place* this rating indicates that there are strong and astute strategies in place and strategies are assessed as highly likely to successfully mitigate the risk.

5.2. OPTION 1 – ENVIROWASTE PLASTICS COLLECTION AND RECYCLING

Supply Chain Model

The overall supply chain model for the EnviroWaste Plastics Collection and Recycling option is as follows:

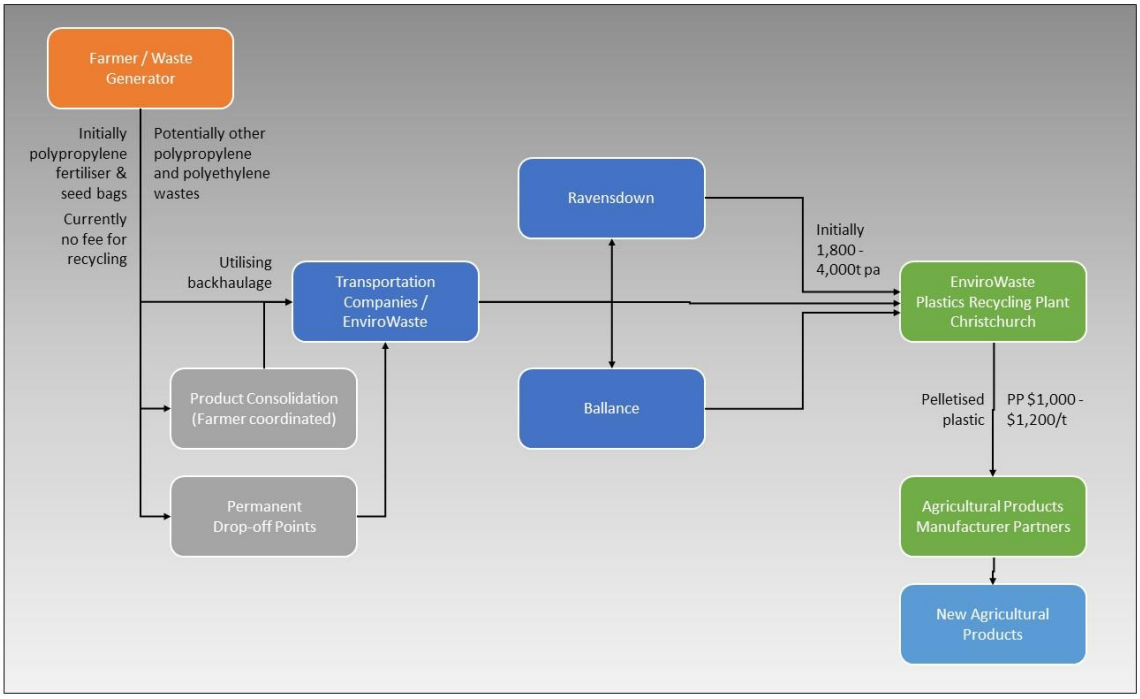

Figure 9: EnviroWaste Plastics Collection and Recycling Supply Chain Model

The following notes and observations are made regarding the EnviroWaste Plastics Collection and Recycling supply chain model:

- While EnviroWaste has expressed an intention to source other agricultural plastics (in particular silage wrap) the initial focus is Ravensdown and Ballance fertiliser and seed polypropylene bags. A substantial stockpile of these bags has already been collected.
- The collection mechanisms for polypropylene fertiliser and seed bags are still being finalised, and may include a mix of on-farm collection using backhaulage (when new products are delivered) and collection alongside other waste streams (by EnviroWaste), as well as the use of permanent drop-off points for the consolidation of bags. Whichever mechanism is used for collection of bags, potential exists for other waste streams to be collected concurrently.
- As the Christchurch plant is not yet fully operational, volumes are not yet known. The plant has a capacity of 4,000 tonnes per year at full-time operation, and EnviroWaste has advised they have reliably sourced 1,800 tonnes per year of polypropylene.
- The Christchurch plant is considered the weakest point of the supply chain as it is not yet fully operational and this type of processing, particularly with contaminated products, is notoriously difficult. EnviroWaste advise that their washing process has been substantially modified to avoid the pitfalls suffered by similar lines, and they have successfully batch-processed polypropylene bags through the line.
- Recycled plastic prices are estimated based on a one-third discount over virgin plastic prices, which are typically $1,500 – 1,800 per tonne.

- EnviroWaste has advised that they have secured several confirmed outlets for recycled plastic, but these – and the end products for which the plastic will be used - are considered commercially sensitive.
- The robustness of the overall supply chain for the EnviroWaste Plastics Collection and Recycling option is considered **MODERATE**.

Life Cycle Assessment

The Life Cycle Assessment for the EnviroWaste Plastics Collection and Recycling option, based on available information, is as follows:

Process Stage	Energy	Waste	Air	Water	Soil	Total
Collection/drop off of waste from farmers	2	1	2	1	1	7
Storage of waste at Christchurch facility	1	1	1	1	1	5
Washing of waste through plant initial stage	3	2	1	2	1	9
Production of recycled plastic	3	1	1	1	1	7
Transportation of plastic to manufacturers	2	1	2	1	1	7
Manufacturing of new agricultural products	3	2	2	1	1	9
Overall Scores	14	8	9	7	6	44
Overall Performance						77%

The following notes and observations are made regarding the EnviroWaste Plastics Collection and Recycling Life Cycle Assessment:

- It is expected that the washing phase of EnviroWaste's plant will use relatively high levels of energy and produce some waste, particularly as a result of plastic contamination, but air pollution is not expected and, as the process is understood to be predominantly 'dry wash', water pollution is not expected to be particularly high.
- The second part of EnviroWaste's plant, which produces plastic pellets, is expected to be a high energy user, but no other significant environmental impacts are anticipated.
- The manufacturing of new agricultural products is expected to require high energy use and some waste and air pollution.
- The overall life cycle performance for the EnviroWaste Plastics Collection and Recycling option is considered **HIGH**.

Financial and Operational Modelling

The key financial and operational information relating to the EnviroWaste Plastics Collection and Recycling option, based on available information, is as follows:

Financial/Operational Factor	Rating	Comment
Capital requirement	VERY HIGH	The exact costs of EnviroWaste's plastics recycling plant are not known, but are certainly in the millions of dollars. For national coverage, at least one additional plant would be required in the North Island.
Service provider access to capital	VERY HIGH	EnviroWaste is owned by Hong Kong-based Cheung Kong Infrastructure and is understood to have both strong access to required capital and a strong mandate to increase waste diversion.
Public funding required	LOW	EnviroWaste is not understood to require funding for its current plant, but may seek public funding for any additional plants, particularly if the business case is marginal and environmental outcomes as a result would be strong.
Priority waste streams covered	HIGH	EnviroWaste is seeking to cover most soft plastic waste streams.
Waste volume capacity	VERY HIGH	The Christchurch plant has a capacity of 4,000 tonnes per year. This plant can receive a second line effectively doubling capacity if required. A second plant in the North Island would likely have similar capacity if built.
Profitability	MODERATE	Contamination may prove to be very difficult for the new plant to handle, which may negatively impact profitability. Until fully operational, this cannot be reliably assessed. The final model for collection for larger volumes of plastic will also impact profitability.
Return on investment	MODERATE	As above, this will depend on the new plant effectively dealing with contamination and efficiently collecting large volumes of waste. The cost of the plant (and any future additions) will require substantial profitability to offer strong returns on this investment.
Growth potential	HIGH	The flexibility and capacity of the plant, matched with the attractiveness of potential on-farm collection, indicates strong growth potential for this option.
Reliability of output markets	HIGH	EnviroWaste advises that it has secured several domestic markets for its recycled plastic. At a one-third discount over virgin plastic, this recycled raw material is likely to be attractive to manufacturers, provided it meets quality and durability requirements.
Farmer affordability	VERY HIGH	Currently farmers pay no fee for recycling of seed and fertiliser bags. Whether this will continue to be the case as the model grows is not known.
Geographical reach	VERY HIGH	EnviroWaste has expressed an intention to collect plastics – in time – from all over New Zealand.
Scalability	HIGH	Given the reach of EnviroWaste and its partners in this model, scalability pathways appear clear. The need to invest in a second plant in order to efficiently service the North Island will require a large scale change.
Service provider capability/track record	HIGH	EnviroWaste is well resourced and managed and has a strong record as a waste service provider.

Based on this information, the robustness of the financial and operational model for the EnviroWaste Plastics Collection and Recycling option is considered **HIGH**. The major risk here is likely to be the new plant's ability to cope with waste stream contamination.

Risk Assessment

The risk assessment for the EnviroWaste Plastics Collection and Recycling option is as follows:

EnviroWaste Plastics Collection and Recycling					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model risks					MODERATE
Business model proves unprofitable or unsustainable.	MODERATE	VERY HIGH	HIGH	There is some risk here in terms of dealing with contamination.	MODERATE
Provider does not have required management capability.	VERY LOW	HIGH	VERY HIGH	EnviroWaste is a well-resourced organisation and very well managed.	VERY LOW
Alignment with farmer extrinsic or intrinsic drivers is not achieved.	LOW	HIGH	HIGH	The business model and collection method aligns well with known farmer drivers.	LOW
Business model cannot handle multiple focus waste streams.	LOW	MODERATE	MODERATE	There is some risk that only polypropylene plastic will work with the operation, but EnviroWaste are confident other plastics can be processed.	MODERATE
Business development requirements or timeframes are unacceptable.	LOW	MODERATE	MODERATE	Achieving full operational status may take more time than anticipated as there have been a number of delays to date.	MODERATE
Scale-up requirements and timeframes are unacceptable.	MODERATE	MODERATE	LOW	Scale-up beyond initial capacity may take more time than anticipated, particularly if a second plant is required.	MODERATE
Waste cannot be managed from a wide geographical area.	LOW	MODERATE	LOW	The business case for a second North Island plant may not be compelling.	MODERATE
Financial risks					LOW
Required start-up or scale-up capital cannot be accessed.	VERY LOW	VERY HIGH	VERY HIGH	EnviroWaste is very well capitalised.	VERY LOW
Revenue targets are not met.	MODERATE	HIGH	MODERATE	Some market risk exists here in terms of fluctuating virgin plastic prices.	MODERATE
Operating costs are too high.	HIGH	HIGH	HIGH	Additional costs may be incurred to deal with plastics contamination.	HIGH
Foreign exchange fluctuations impact profitability negatively.	VERY LOW	VERY LOW	VERY HIGH	All outputs are being utilised on-shore.	VERY LOW
Supply chain risks					LOW
Waste volumes are low or inconsistent.	LOW	HIGH	HIGH	Plastic volumes are known to be high and the plastics plant is reportedly able to process different plastic types.	LOW
Necessary transportation logistics cannot be readily and economically secured.	MODERATE	VERY HIGH	HIGH	EnviroWaste has its own transport fleet, but cost-efficiency may be an issue.	MODERATE
Other key participants in the supply chain are not in place or cannot be secured.	LOW	HIGH	HIGH	EnviroWaste has already formed several partnerships here.	LOW

EnviroWaste Plastics Collection and Recycling					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Market risks					LOW
Farmer uptake is low.	LOW	VERY HIGH	HIGH	Based on the current model, EnviroWaste is planning to collect waste for a low or no fee.	LOW
Competition significantly diminishes market share or profitability.	LOW	HIGH	HIGH	EnviroWaste is likely to be dominant in the market once fully operational.;	LOW
Output revenue is low or inconsistent.	LOW	VERY HIGH	HIGH	Some market risk exists here based on fluctuations in virgin plastic pricing.	MODERATE
Domestic or international markets for outputs become unavailable.	LOW	VERY HIGH	HIGH	EnviroWaste has formed a partnership to utilise recycled plastic and is understood to have several 'back-up' outlets in place.	LOW
Technical/Process risks					HIGH
Process technology does not function effectively.	HIGH	VERY HIGH	HIGH	Parts of the technology that EnviroWaste is using did not function successfully when used previously by Mastagard.	HIGH
Provider does not have required technical capability.	LOW	HIGH	HIGH	EnviroWaste has secured highly skilled personnel to run the plant.	LOW
Waste contamination cannot be dealt with easily.	HIGH	VERY HIGH	HIGH	Waste contamination typically causes serious issues to plastics recycling plants.	HIGH
Option is unable to process large volumes of waste.	MODERATE	VERY HIGH	HIGH	Technology has not yet been proven at full scale operation.	MODERATE
Technical development requirements or timeframes are unacceptable.	HIGH	HIGH	HIGH	Technology is likely to require modifications once operating at full scale.	HIGH
Output quality is poor or inconsistent.	MODERATE	VERY HIGH	HIGH	Contamination in the line and use of different types of plastic may cause issues with output quality.	HIGH
Compliance risks					LOW
Option has high health and safety risk.	LOW	VERY HIGH	VERY HIGH	Some risk exists for a plant of this kind but has been carefully considered by EnviroWaste.	LOW
Provider does not have required health and safety compliance regime.	VERY LOW	VERY HIGH	VERY HIGH	EnviroWaste is very focused on health and safety.	VERY LOW
Provider does not meet required hazardous waste transportation compliance requirements.	VERY LOW	VERY HIGH	VERY HIGH	EnviroWaste will not be handling hazardous wastes under this option.	VERY LOW
Provider cannot ensure subcontractors meet compliance requirements.	LOW	VERY HIGH	VERY HIGH	EnviroWaste is very focused on health and safety.	LOW
Environmental risks					MODERATE
Waste is unable to be recycled or reused and ends up being disposed of.	HIGH	HIGH	HIGH	Contamination may be too great with some waste types or loads.	HIGH

EnviroWaste Plastics Collection and Recycling					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Waste throughput is insufficient and results in stockpiling.	LOW	HIGH	HIGH	This may occur if the plant faces issues and needs modification.	MODERATE
Process inadvertently causes environmental pollution.	LOW	VERY HIGH	VERY HIGH	This is unlikely to occur based on the focus EnviroWaste has placed on health and safety and environmental monitoring.	LOW

Based on this information, the overall risk profile for the EnviroWaste Plastics Collection and Recycling option is considered **MODERATE**. The key concerns in the risk assessment are around the fact that EnviroWaste's process is not yet fully functional and may struggle – as many similar processes have – to deal with waste contamination.

5.3. OPTION 2 – AGRECOVERY EXPANDED WASTE STREAM COLLECTION

Supply Chain Model

As Agrecovery has not yet determined the additional waste streams and supply chain partners that may be added to its core services, the full expanded waste collection supply chain model cannot yet be mapped. The figure below is focused on Agrecovery's current core services in terms of supply chain:

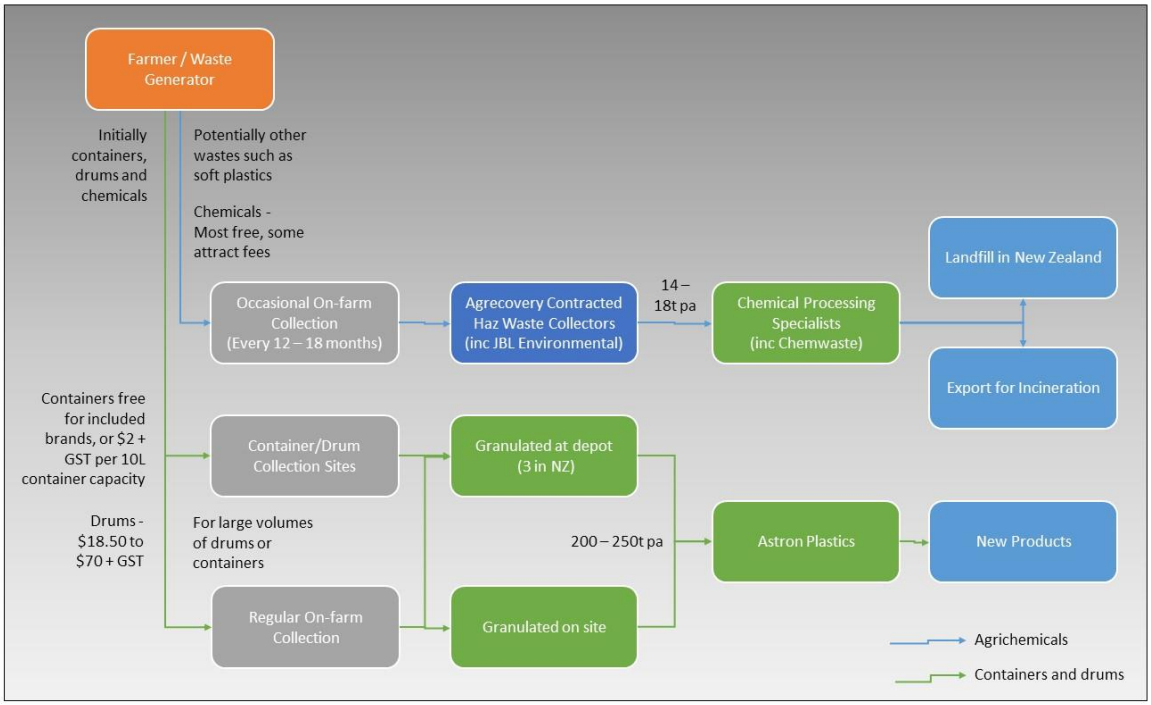

Figure 10: Agrecovery Agrichemical and Plastics Collection Supply Chain Model

The following notes and observations are made regarding the Agrecovery Agrichemical and Plastics Collection supply chain model:

- Agrecovery's model has historically been to contract out all aspects of programme management and service delivery to a single entity (currently 3R Group Ltd). This is considered a vulnerability in Agrecovery's model and effectively prevents Agrecovery from maintaining control over the supply chain. The new model being deployed by Agrecovery involves the Agrecovery board maintaining overall control of all areas of operation and contracting out service delivery only. This addresses this vulnerability (as of 1 July 2017 when the new model takes effect) and will allow Agrecovery to have more control of its supply chain.
- Aspects of charging and service delivery for drums, containers and agrichemicals may change in the medium term as Agrecovery undertakes restructuring.
- Approximately 95% of Agrecovery container volume is from brands that sit inside the programme. Approximately 75% of containers were received at collection sites.
- Agrecovery has expressed a desire to pursue increased volume through one-off events as noted in the Temporary Pop-Up Recovery Events option.
- Agrecovery is well set up to add additional waste streams to its model, either by collection through existing sites, on-farm collection or through one-off events. This flexibility puts Agrecovery in a

strong position to be able to offer farmers services that are tailored either to a 'cost-focused' orientation or a 'convenience-focused' orientation.

- The robustness of the overall supply chain for the Agrecovery Agrichemical and Plastics Collection option is considered **HIGH**.

Life Cycle Assessment

The Life Cycle Assessment for the Agrecovery Expanded Waste Stream Collection option, based on available information, is as follows:

Process Stage	Energy	Waste	Air	Water	Soil	Total
Transportation to/from farms for collections	2	1	2	1	1	7
Transportation by farmers to drop-off sites	2	1	2	1	1	7
Transportation to depots for granulation	2	1	2	1	1	7
On-site granulation	2	1	1	1	1	6
Transportation of plastics to Astron Plastics	2	1	2	1	1	7
Manufacture of new plastic products	3	2	2	1	1	9
Analysis of agrichemicals	1	1	1	1	1	5
Processing of agrichemicals for local landfill	1	2	1	1	1	6
Transportation of agrichemicals to landfill	2	1	2	1	1	7
Landfilling of agrichemicals	1	2	1	2	2	8
Transportation of agrichemicals internationally	2	1	2	1	1	7
Incineration of agrichemicals internationally	3	1	2	1	1	8
Overall Scores	23	15	20	13	13	84
Overall Performance						80%

The following notes and observations are made regarding the Agrecovery Expanded Waste Stream Collection Life Cycle Assessment:

- The manufacturing of new agricultural products is expected to require high energy use and some waste and air pollution.
- Landfilling of agrichemicals, though treated and contained within a licensed landfill, is expected to present some risk around soil and water pollution. In addition, the elements added to some chemicals for treatment present a new waste stream.
- The incineration of certain agrichemicals, undertaken overseas, is understood to involve limited risk of pollution through air discharge.
- The overall life cycle performance for the Agrecovery Agrichemical and Plastics Collection option is considered **HIGH**, although energy use is high. This is considered a reasonable trade-off to the air, water and soil pollution that may result from other options for managing plastic and agrichemical waste.

Financial and Operational Modelling

The key financial and operational information relating to the Agrecovery Expanded Waste Stream Collection option, based on available information, is as follows:

Financial/Operational Factor	Rating	Comment
Capital requirement	LOW	Agrecovery's service is already in place and the addition of new waste streams is not expected to require extensive capital input.
Service provider access to capital	HIGH	Agrecovery's 2014/2015 Annual Report shows a total equity position of $943,204 and $946,304 of cash assets.
Public funding required	VERY LOW	There are no known plans for Agrecovery to seek additional public funding for any aspect of service delivery. It is not expected that the addition of new waste streams would involve seeking public funding.
Priority waste streams covered	VERY HIGH	Agrecovery currently handles hard plastics and hazardous agrichemicals. Should soft plastics be added, Agrecovery would be covering a very substantial proportion of the priority waste streams under this project.
Waste volume capacity	HIGH	In 2014/2015 Agrecovery processed approximately 236 tonnes of plastic and 15 tonnes of hazardous agrichemicals. With a renewed focus on increasing volumes and consideration of additional waste streams, waste volume capacity is expected to increase.
Profitability	HIGH	In 2014/2015 Agrecovery posted a net surplus of $191,403 (12% of revenue) versus the 2013/2014 net surplus of $261,685 (17% of revenue). Profitability is expected to be down in the current (and potentially next) financial year as Agrecovery incurs costs associated with its restructure, but this restructure may actually improve profitability by rationalising service management. The pursuit of new waste streams may not be successful, but Agrecovery is considered a prudent manager in this regard and substantial impacts to profitability are not expected.
Return on investment	VERY HIGH	Agrecovery's service is consistently profitable and is expected to become more so without substantial additional investment.
Growth potential	HIGH	As Agrecovery has a very strong agricultural brand and seeks to consider additional waste streams, growth potential is expected to be strong.
Reliability of output markets	HIGH	The consideration of output markets does not apply to hazardous wastes, which are disposed of, but to plastics. Agrecovery's plastic outputs are currently sold to Astron Plastics and used domestically. The entry by EnviroWaste into the plastics recycling market is only expected to provide additional opportunities for the sale of plastics.
Farmer affordability	HIGH	Currently farmers pay no fees for most of the waste Agrecovery receives. Those from brands outside the programme do attract fees. Agrecovery is understood to be focusing efforts on bringing more brands into the programme, thus reducing farmer fees. Should soft plastics be included in the programme in the future, farmer fees for collection are likely.
Geographical reach	VERY HIGH	Agrecovery covers almost all of New Zealand.

Financial/Operational Factor	Rating	Comment
Scalability	VERY HIGH	Agrecovery already services almost all of New Zealand. Adding additional waste streams into the programme, as is anticipated, should work well with existing collection mechanisms.
Service provider capability/track record	HIGH	Agrecovery is well established and well regarded in the rural community. It is, in all likelihood, the strongest brand among all the service providers focused on rural waste. Agrecovery's restructure is expected to further enhance its operational and management capabilities.

Based on this information, the robustness of the financial and operational model for the Agrecovery Expanded Waste Stream Collection option is considered **HIGH**.

Risk Assessment

The risk assessment for the Agrecovery Expanded Waste Stream Collection option is as follows:

Agrecovery Expanded Waste Stream Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model risks					MODERATE
Business model proves unprofitable or unsustainable.	MODERATE	HIGH	VERY HIGH	Agrecovery faces some risk here in adding new waste streams but is likely to evaluate options very carefully before any implementation.	MODERATE
Provider does not have required management capability.	LOW	HIGH	VERY HIGH	Agrecovery is very well managed.	LOW
Alignment with farmer extrinsic or intrinsic drivers is not achieved.	LOW	VERY HIGH	VERY HIGH	Agrecovery maintains very close links with farmers directly and through its association with Federated Farmers.	LOW
Business model cannot handle multiple focus waste streams.	LOW	HIGH	VERY HIGH	Agrecovery faces some risk here in adding new waste streams but is likely to evaluate options very carefully before any implementation.	LOW
Business development requirements or timeframes are unacceptable.	MODERATE	MODERATE	MODERATE	Implementing new services or waste streams may take considerable time.	MODERATE
Scale-up requirements and timeframes are unacceptable.	MODERATE	MODERATE	MODERATE	Implementing new services or waste streams may take considerable time.	MODERATE
Waste cannot be managed from a wide geographical area.	LOW	HIGH	MODERATE	New services may work well close to main centres and be less economical in more remote regions, particularly if on-farm collection is a key element of service delivery.	MODERATE
Financial risks					MODERATE

Agrecovery Expanded Waste Stream Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Required start-up or scale-up capital cannot be accessed.	LOW	VERY HIGH	VERY HIGH	Agrecovery is likely to have access to required capital to expand waste streams collected.	LOW
Revenue targets are not met.	MODERATE	HIGH	MODERATE	There is some risk that uptake of new services may not be sufficient to meet revenue targets.	MODERATE
Operating costs are too high.	HIGH	HIGH	HIGH	Collection costs may be higher than anticipated, particularly for on-farm collections if included.	HIGH
Foreign exchange fluctuations impact profitability negatively.	VERY LOW	VERY LOW	VERY HIGH	All outputs are likely to be utilised on-shore.	VERY LOW
Supply chain risks					LOW
Waste volumes are low or inconsistent.	LOW	HIGH	MODERATE	Some risk exists here but it is likely Agrecovery will plan well to ensure uneven volumes are allowed for.	MODERATE
Necessary transportation logistics cannot be readily and economically secured.	LOW	HIGH	HIGH	Agrecovery will shortly tender for these services and has reportedly high market interest.	LOW
Other key participants in the supply chain are not in place or cannot be secured.	LOW	HIGH	HIGH	Agrecovery will shortly tender for these services and has reportedly high market interest.	LOW
Market risks					MODERATE
Farmer uptake is low.	MODERATE	HIGH	HIGH	Market uptake of new waste stream services entails risk, but it is likely Agrecovery will ascertain demand carefully before launching any new services.	MODERATE
Competition significantly diminishes market share or profitability.	MODERATE	HIGH	HIGH	Addition of new waste streams is likely to involve competition with existing services.	MODERATE
Output revenue is low or inconsistent.	LOW	VERY HIGH	HIGH	As soft plastics is the likely area of initial expansion, numerous market opportunities to utilise this resource exist.	LOW
Domestic or international markets for outputs become unavailable.	LOW	VERY HIGH	HIGH	As soft plastics is the likely area of initial expansion, numerous market opportunities to utilise this resource exist.	LOW
Technical/Process risks					MODERATE
Process technology does not function effectively.	LOW	VERY HIGH	VERY HIGH	Agrecovery's business model involves passing collected wastes to existing processors.	LOW
Provider does not have required technical capability.	LOW	VERY HIGH	VERY HIGH	Agrecovery's business model involves passing collected wastes to existing processors.	LOW
Waste contamination cannot be dealt with easily.	HIGH	VERY HIGH	HIGH	The addition of soft plastics would likely cause some issues with contamination.	HIGH
Option is unable to process large volumes of waste.	MODERATE	HIGH	HIGH	New waste streams may prove challenging to processors if they have not previously processed substantial quantities.	MODERATE

Agrecovery Expanded Waste Stream Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Technical development requirements or timeframes are unacceptable.	MODERATE	HIGH	HIGH	Existing processes may need to be modified to cope with new waste streams, particularly soft plastics.	MODERATE
Output quality is poor or inconsistent.	MODERATE	HIGH	HIGH	Contamination may cause issues here.	MODERATE
Compliance risks					LOW
Option has high health and safety risk.	MODERATE	VERY HIGH	VERY HIGH	Agrecovery will be contracting this capability out and will ensure strict adherence to health and safety as part of contracting.	LOW
Provider does not have required health and safety compliance regime.	LOW	VERY HIGH	VERY HIGH	Agrecovery will be contracting this capability out and will ensure strict adherence to health and safety as part of contracting.	LOW
Provider does not meet required hazardous waste transportation compliance requirements.	LOW	VERY HIGH	VERY HIGH	Contracted providers will be monitored closely in this regard and are likely to be well established industry players.	LOW
Provider cannot ensure subcontractors meet compliance requirements.	LOW	VERY HIGH	VERY HIGH	Contracted providers will be monitored closely in this regard and are likely to be well established industry players.	LOW
Environmental risks					MODERATE
Waste is unable to be recycled or reused and ends up being disposed of.	MODERATE	HIGH	HIGH	Contamination may cause issues here if waste streams are new to the processor.	MODERATE
Waste throughput is insufficient and results in stockpiling.	MODERATE	HIGH	HIGH	Contamination may require process modifications.	MODERATE
Process inadvertently causes environmental pollution.	LOW	VERY HIGH	HIGH	New processes may have unintended outputs, but this is likely to be closely monitored.	LOW

Based on this information, the overall risk profile for the Agrecovery Expanded Waste Stream Collection option is considered **MODERATE**. The key risks here are based on the 'unknowns' connected with the potential addition of new waste streams, particularly around contamination in soft plastics.

5.4. OPTION 3 – PLASBACK PLASTICS COLLECTION

Supply Chain Model

The overall supply chain model for the Plasback Plastics Collection option may is as follows:

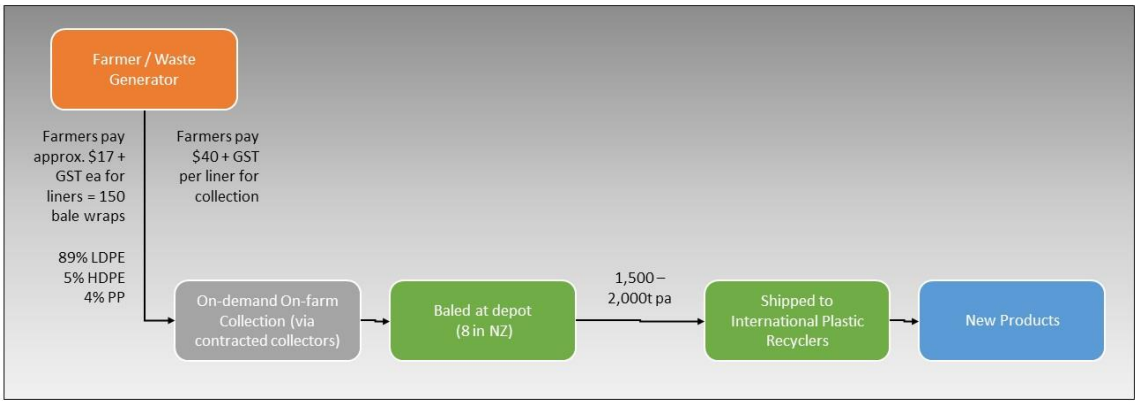

Figure 11: Plasback Plastics Collection Supply Chain Model

The following notes and observations are made regarding the Plasback Plastics Collection supply chain model:

- A number of Plasback's contracted collectors report that the delivery of the Plasback service is not highly profitable for them, and that they are motivated by belief in the service rather than economic returns. This is considered something of a vulnerability in Plasback's supply chain, particularly given the large size of the territories covered by some of these contractors.
- Plasback does not currently appear to actively monitor contractors' performance in terms of responsiveness and customer satisfaction. This may lead to poor 'word of mouth' marketing outcomes and either slow growth or loss of customers. This is considered a vulnerability in supply chain management.
- Plasback has invested extensively in building a national network of plastic balers. These balers are expensive (they can be $100,000 or more each) and having a national network of this type is a strong advantage for Plasback.
- Plasback is currently exporting all of its plastic internationally, and so is subject to exchange rate fluctuations and changes in international regulations around export of waste. This is considered a vulnerability in the supply chain. It is understood, however, that Plasback is currently working with New Zealand-based Astron Plastics as a potential alternative market for recycled plastic.
- The robustness of the overall supply chain for the Plasback Plastics Collection option is considered **MODERATE**.

Life Cycle Assessment

The Life Cycle Assessment for the Plasback Plastics Collection option, based on available information, is as follows:

Process Stage	Energy	Waste	Air	Water	Soil	Total
Transportation to/from farms for collections	2	1	2	1	1	7
Plastics baling at depots	2	1	1	1	1	6
Transportation to international recyclers	2	1	2	1	1	7
Manufacture of new plastic products	3	2	2	1	1	9
Overall Scores	9	5	7	4	4	29
Overall Performance						78%

The following notes and observations are made regarding the Plasback Plastics Collection Life Cycle Assessment:

- The manufacturing of new plastic products is expected to require high energy use and some waste and air pollution.
- The overall life cycle performance for the Plasback Plastics Collection option is considered **HIGH**.

Financial and Operational Modelling

The key financial and operational information relating to the Plasback Plastics Collection option, based on available information, is as follows:

Financial/Operational Factor	Rating	Comment
Capital requirement	MODERATE	Plasback's collection model and infrastructure is already in place. It is recommended that Plasback invest in a service management system to improve service monitoring, but this is unlikely to require a major investment.
Service provider access to capital	HIGH	Plasback is a division of Agpac - part of the Australian-owned Tapex Group. Both Agpac and Tapex are substantial corporate entities with a strong interest in the success and growth of Plasback.
Public funding required	VERY LOW	There are no known plans for Plasback to seek additional public funding for its operations.
Priority waste streams covered	MODERATE	Plasback currently focuses on soft plastics and some hard plastics. It has no known plans to expand the waste streams being collected.
Waste volume capacity	HIGH	In 2015/2016 Plasback collected 1,822 tonnes of plastic, up from 1,744 tonnes the previous year. This volume may plateau in the current year and next year based on reduced dairy prices and a relatively warm winter. Plasback contractors report that they have the ability to collect significantly higher volumes than are currently being received.
Profitability	LOW	No publicly available information pertaining to Plasback's financial performance exists. It is understood that Plasback is minimally profitable, but is strongly supported by its parent company given its commitment to product stewardship.
Return on investment	LOW	See above.

Financial/Operational Factor	Rating	Comment
Growth potential	MODERATE	Plasback has excess capacity, and there is certainly more soft plastics volume on farms than is being collected, but Plasback's growth may be constrained more by the limits of its service management and contractor network than on market potential.
Reliability of output markets	HIGH	Plasback is currently exporting plastic, which is a somewhat vulnerable position. Plasback is also understood to be engaged with Astron Plastics to determine the suitability of its plastics for this market. Sale of plastics to EnviroWaste may also be an option if EnviroWaste has spare capacity to process additional volumes.
Farmer affordability	LOW	The cost of Plasback's services is an apparent barrier for many farmers, even though the price has remained unchanged for some time. Plasback has recently arranged to collect plastic from the Gisborne region, but this has required a transportation subsidy and a cost increase to farmers for liners.
Geographical reach	VERY HIGH	Plasback covers almost all of New Zealand.
Scalability	MODERATE	Plasback has capacity to grow, but may not have the systems in place to support and manage such growth. Should volumes increase however, route density may reduce service delays and improve service provision.
Service provider capability/track record	HIGH	Plasback has withstood strong challenges in its market and considerable volatility in the rural sector, and has continued to provide its services uninterrupted. Plasback may soon face competitive challenges, but it is well run and has the support of a strong industry player in Agpac.

Based on this information, the robustness of the financial and operational model for the Plasback Plastics Collection option is considered MODERATE.

Risk Assessment

The risk assessment for the Plasback Plastics Collection option is as follows:

Plasback Plastics Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model risks					LOW
Business model proves unprofitable or unsustainable.	MODERATE	MODERATE	HIGH	Plasback's model is stable and backed up by Agpac's financial support, but does have some vulnerabilities.	MODERATE
Provider does not have required management capability.	MODERATE	HIGH	HIGH	Plasback is well managed, but would benefit from improved management systems.	MDOERATE
Alignment with farmer extrinsic or intrinsic drivers is not achieved.	LOW	HIGH	HIGH	Plasback is already operating successfully.	LOW

Plasback Plastics Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model cannot handle multiple focus waste streams.	VERY LOW	LOW	HIGH	Plasback handles multiple plastic types and is not focused on expanding waste streams.	VERY LOW
Business development requirements or timeframes are unacceptable.	VERY LOW	HIGH	VERY HIGH	Plasback's model is in place and stable.	VERY LOW
Scale-up requirements and timeframes are unacceptable.	VERY LOW	VERY LOW	VERY HIGH	Plasback is already in operation around New Zealand.	VERY LOW
Waste cannot be managed from a wide geographical area.	VERY LOW	VERY LOW	VERY HIGH	Plasback is already in operation around New Zealand.	VERY LOW
Financial risks					HIGH
Required start-up or scale-up capital cannot be accessed.	VERY LOW	VERY LOW	VERY HIGH	Plasback is already in operation around New Zealand.	VERY LOW
Revenue targets are not met.	HIGH	VERY HIGH	LOW	Plasback is likely to face competition in the short to medium term from other business models.	HIGH
Operating costs are too high.	HIGH	HIGH	MODERATE	Plasback is understood to be finding it difficult to maintain current pricing due to transportation costs.	HIGH
Foreign exchange fluctuations impact profitability negatively.	MODERATE	HIGH	HIGH	Plasback is currently exposed to currency risks but is exploring sales of plastic to domestic processors.	MODERATE
Supply chain risks					MODERATE
Waste volumes are low or inconsistent.	MODERATE	HIGH	LOW	Lower volumes are expected over the coming 12 to 24 months due to weather and dairy prices.	HIGH
Necessary transportation logistics cannot be readily and economically secured.	MODERATE	HIGH	MODERATE	Plasback is facing challenges in ensuring transportation costs are reasonable, particularly in remote regions.	MODERATE
Other key participants in the supply chain are not in place or cannot be secured.	LOW	VERY HIGH	HIGH	Plasback contractors are not understood to view service provision as highly profitable, but they do appear to be loyal and committed.	MODERATE
Market risks					HIGH
Farmer uptake is low.	MODERATE	VERY HIGH	HIGH	Plasback has a large customer base, but there are indicators of inadequate customer management, and competition may be entering this market.	MODERATE
Competition significantly diminishes market share or profitability.	HIGH	VERY HIGH	LOW	Plasback is likely to face competition from one or more players in the next 12 to 24 months.	HIGH
Output revenue is low or inconsistent.	LOW	VERY HIGH	HIGH	Markets for plastic are currently numerous but must always compete against virgin material.	MODERATE

Plasback Plastics Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Domestic or international markets for outputs become unavailable.	LOW	VERY HIGH	HIGH	The current market appetite for recycled plastic is strong.	LOW
Technical/Process risks					LOW
Process technology does not function effectively.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW
Provider does not have required technical capability.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW
Waste contamination cannot be dealt with easily.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW
Option is unable to process large volumes of waste.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW
Technical development requirements or timeframes are unacceptable.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW
Output quality is poor or inconsistent.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW
Compliance risks					LOW
Option has high health and safety risk.	LOW	HIGH	MODERATE	Plasback has a reliable and stable process already in place, but the ability to closely monitor contractors is limited.	LOW
Provider does not have required health and safety compliance regime.	LOW	HIGH	MODERATE	Plasback has a reliable and stable process already in place, but the ability to closely monitor contractors is limited.	LOW
Provider does not meet required hazardous waste transportation compliance requirements.	LOW	HIGH	MODERATE	Plasback has a reliable and stable process already in place, but the ability to closely monitor contractors is limited.	LOW
Provider cannot ensure subcontractors meet compliance requirements.	LOW	HIGH	MODERATE	Plasback has a reliable and stable process already in place, but the ability to closely monitor contractors is limited.	LOW
Environmental risks					LOW
Waste is unable to be recycled or reused and ends up being disposed of.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW
Waste throughput is insufficient and results in stockpiling.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW
Process inadvertently causes environmental pollution.	LOW	HIGH	VERY HIGH	Plasback has a reliable and stable process already in place.	LOW

Based on this information, the overall risk profile for the Plasback Plastics Collection option is considered **HIGH**. The key concerns here are the likely entry of competition in the collection and recycling of agricultural soft plastics, and the pressure Plasback is understood to be experiencing in maintaining pricing levels based on transportation costs.

5.5. OPTION 4 – COMMUNITY ORGANISATION ON-FARM COLLECTION

Supply Chain Model

As each potential community organisation providing on-farm waste collection services will be different, and as other providers have not yet been finalised, Wastebusters Canterbury is utilised here as an example of how a Community Organisation On-Farm Collection option may be organised. The overall supply chain model is as follows:

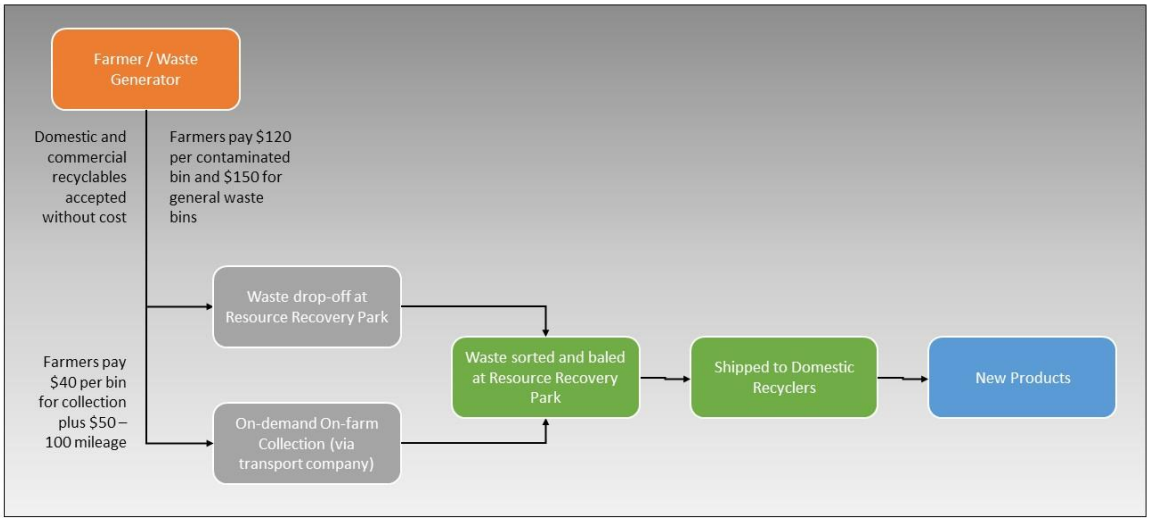

Figure 12: Community Organisation On-farm Collection Supply Chain Model

The following notes and observations are made regarding the Community Organisation On-Farm Collection supply chain model:

- In this model, the community organisation maintains control over nearly every aspect of the supply chain and is well-equipped to incrementally improve different elements as required.
- Wastebusters Canterbury does not have its own transportation fleet and must contract this function out to a third party transportation logistics company. While this requires less capital investment than providing this capability in-house, Wastebusters Canterbury considers that it increases operational costs, flexibility and responsiveness in service delivery.
- Community organisations that have a resource recovery mandate as part of their organisational mandate will be in a better position to operate a waste sorting and recovery facility as they will be willing to spend more time on this activity and take a lower profit in doing so in accordance with their organisational goals.
- Community organisations, which are typically under-capitalised, may struggle to meet the asset investment requirements inherent in this supply chain model, particularly around movement and baling of bulk waste. Forklifts and balers are required, and these capital purchases will be difficult for many community organisations to afford. Proper maintenance and eventual replacement of these assets may also be challenging. This is considered a vulnerability in this model.
- The robustness of the overall supply chain for the Community Organisation On-Farm Collection option is considered **MODERATE**.

Life Cycle Assessment

The Life Cycle Assessment for the Community Organisation On-Farm Collection option, based on available information, is as follows:

Process Stage	Energy	Waste	Air	Water	Soil	Total
Transportation to/from farms for collections	2	1	2	1	1	7
Transportation by farmers to drop-off sites	2	1	2	1	1	7
Waste sorting and baling at recovery park	2	1	1	1	1	6
Transportation of plastics to manufacturers	2	1	2	1	1	7
Manufacture of new plastic products	3	2	2	1	1	9
Overall Scores	11	6	9	5	5	36
Overall Performance						78%

The following notes and observations are made regarding the Community Organisation On-Farm Collection Life Cycle Assessment:

- The manufacturing of new plastic products is expected to require high energy use and some waste and air pollution.
- The overall life cycle performance for the Community Organisation On-Farm Collection option is considered **HIGH**.

Financial and Operational Modelling

The key financial and operational information relating to the Community Organisation On-Farm Collection option, based on available information, is as follows:

Financial/Operational Factor	Rating	Comment
Capital requirement	MODERATE	A community organisation seeking to set up a new service will require a baler, a forklift and access to a weighbridge or scales for waste. This capital investment is likely to be $100,000 or more. Some organisations may already have some of these assets in place.
Service provider access to capital	VERY LOW	Community organisations are very unlikely to have retained earnings they can access and will in most cases not have investors they can readily call upon.
Public funding required	HIGH	It is likely that public funding would be required for a new community organisation to enter this type of service delivery unless asset requirements are already met.
Priority waste streams covered	MODERATE	Community organisations will, in all likelihood, not include hazardous waste streams, but instead focus on recyclables. Service delivery in this case is likely to be focused on perceived gaps in relation to existing services such as Plasback and Agrecovery.

Financial/Operational Factor	Rating	Comment
Waste volume capacity	MODERATE	Wastebusters Canterbury is currently servicing over 100 customers, while Waitaki Resource Recovery Trust collects over 500 tonnes of plastic annually (although not all is agricultural). Community organisations have the potential to be substantial, but are likely to offer services in relatively small geographical areas.
Profitability	LOW	Wastebusters Canterbury's 2014/2015 annual return to the Charities Commission showed that it made a deficit of $49,457 on revenue of $637,816. Waitaki Resource Recovery Trust's 2014/2015 annual return showed that it made a deficit of $12,878 on revenue of $752,864. While these results do not represent just rural waste services, it is apparent that providing these services is not yet highly profitable, but motivated more by a desire to see waste being diverted.
Return on investment	LOW	See above.
Growth potential	MODERATE	This model focuses on collecting waste from farms where the farmer is highly motivated to recycle and is willing to pay for collection. This appears to be a growing market, but is still likely to be a minority of farmers.
Reliability of output markets	HIGH	This will depend on the exact waste streams each organisation focuses on but, with plastic being a key focus, there are currently numerous options for selling plastics both within New Zealand and internationally. Most community organisations are likely to focus on domestic recycling.
Farmer affordability	MODERATE	The cost of the service provided by Wastebusters Canterbury is quite high, but very reasonable considering the level of service offered. The service will likely be seen as competitively priced by those motivated to recycle rural waste, but will be viewed as prohibitively expensive by others, and certainly by those more than 100km from the organisation's home base. It is likely other community organisations would follow similar pricing models.
Geographical reach	LOW	Each organisation has a viable operating area of probably 100km from its home base, unless services can be tacked onto existing collection routes. Currently only services in South Canterbury, Whakatane, Otago, Thames and north Auckland have expressed interest in developing similar services.
Scalability	LOW	The model offered by community organisations is likely to be a niche service and is limited in terms of scalability by availability of capital, transportation costs and availability of operators.
Service provider capability/track record	MODERATE	Community organisations tend to be run by highly motivated and relationally skilled individuals, but highly developed business skills and experience are not always present and can be a vulnerability in operating a low margin service.

Based on this information, the robustness of the financial and operational model for the Community Organisation On-Farm Collection option is considered **LOW**.

Risk Assessment

The risk assessment for the Community Organisation On-Farm Collection option is as follows:

Community Organisation On-Farm Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model risks					MODERATE
Business model proves unprofitable or unsustainable.	HIGH	VERY HIGH	MODERATE	Making this kind of service work is very difficult and profitability is far from assured. Sustainability may require time and substantial reserves which many organisations will not have.	HIGH
Provider does not have required management capability.	MODERATE	HIGH	MODERATE	Community organisations often do not have access to the skilled and experienced business managers that would be required to successfully run such a service.	HIGH
Alignment with farmer extrinsic or intrinsic drivers is not achieved.	LOW	HIGH	HIGH	Community organisations tend to have strong relationships with customers and are skilled at understanding community needs.	LOW
Business model cannot handle multiple focus waste streams.	MODERATE	MODERATE	HIGH	Handling multiple waste streams may be challenging, but these can be added gradually as capacity allows.	MODERATE
Business development requirements or timeframes are unacceptable.	HIGH	MODERATE	MODERATE	Building up a service of this kind may take considerable time and reserves may be insufficient to fund this development.	MODERATE
Scale-up requirements and timeframes are unacceptable.	HIGH	MODERATE	MODERATE	Building up a service of this kind may take considerable time, and customer growth may be very slow.	MODERATE
Waste cannot be managed from a wide geographical area.	VERY HIGH	LOW	LOW	It is not anticipated that these services will have a wide geographical reach.	LOW
Financial risks					VERY HIGH
Required start-up or scale-up capital cannot be accessed.	VERY HIGH	VERY HIGH	LOW	It will be very difficult for community organisations that do not already own required assets to find funds internally to purchase them.	VERY HIGH
Revenue targets are not met.	VERY HIGH	VERY HIGH	LOW	It is highly likely that revenue, at least initially, will not be sufficient to achieve profitability.	VERY HIGH
Operating costs are too high.	VERY HIGH	VERY HIGH	LOW	Operating costs will depend on route density, which may be very low in the early stages of operation.	VERY HIGH
Foreign exchange fluctuations impact profitability negatively.	LOW	LOW	HIGH	It is probable that most wastes collected will be recycled domestically.	LOW
Supply chain risks					MODERATE

Community Organisation On-Farm Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Waste volumes are low or inconsistent.	HIGH	MODERATE	MODERATE	There is considerable risk that waste volumes from customers would be low for some time until such a service becomes established.	MODERATE
Necessary transportation logistics cannot be readily and economically secured.	HIGH	HIGH	MODERATE	There is a high risk of being unable to secure transportation at a rate that makes service provision economical and attractive to customers.	HIGH
Other key participants in the supply chain are not in place or cannot be secured.	LOW	VERY HIGH	HIGH	Providing reasonable rates are paid, securing supply chain partners should not be highly problematic.	LOW
Market risks					MODERATE
Farmer uptake is low.	HIGH	HIGH	HIGH	There is some risk that farmers may not participate, but community organisations are particularly skilled at customer engagement.	MODERATE
Competition significantly diminishes market share or profitability.	LOW	HIGH	HIGH	Competition may be faced, but it is likely that community organisations would simply focus on other waste streams.	MODERATE
Output revenue is low or inconsistent.	LOW	HIGH	HIGH	Waste streams are only likely to be targeted if they offer a reasonable return.	LOW
Domestic or international markets for outputs become unavailable.	LOW	VERY HIGH	HIGH	Waste streams are only likely to be targeted if they have a reliable output market.	LOW
Technical/Process risks					MODERATE
Process technology does not function effectively.	LOW	VERY HIGH	VERY HIGH	Community organisations would pass collected wastes to existing processors.	LOW
Provider does not have required technical capability.	LOW	VERY HIGH	VERY HIGH	Community organisations would pass collected wastes to existing processors.	LOW
Waste contamination cannot be dealt with easily.	HIGH	VERY HIGH	HIGH	This will depend on waste streams chosen, but is likely to prove a challenge for any community organisation.	HIGH
Option is unable to process large volumes of waste.	MODERATE	HIGH	HIGH	Community organisations may not have the capacity or equipment to process large volumes of waste.	MODERATE
Technical development requirements or timeframes are unacceptable.	MODERATE	HIGH	HIGH	Modifying processes to handle growth may take some time for resource-limited organisations.	MODERATE
Output quality is poor or inconsistent.	MODERATE	HIGH	HIGH	Contamination may cause issues here.	MODERATE
Compliance risks					MODERATE
Option has high health and safety risk.	HIGH	VERY HIGH	HIGH	Handling multiple waste streams presents considerable risk.	MODERATE

Community Organisation On-Farm Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Provider does not have required health and safety compliance regime.	HIGH	VERY HIGH	HIGH	Having a full and current health and safety compliance regime may prove challenging for a community organisation.	MODERATE
Provider does not meet required hazardous waste transportation compliance requirements.	LOW	VERY HIGH	VERY HIGH	It is not anticipated that any hazardous waste would be handled under this option.	VERY LOW
Provider cannot ensure subcontractors meet compliance requirements.	HIGH	VERY HIGH	HIGH	Community organisations may have limited ability to monitor and oversee transportation contractors.	MODERATE
Environmental risks					LOW
Waste is unable to be recycled or reused and ends up being disposed of.	LOW	HIGH	VERY HIGH	It is likely community organisations will be highly motivated to ensure waste is diverted.	LOW
Waste throughput is insufficient and results in stockpiling.	MODERATE	MODERATE	VERY HIGH	This may occur as systems and processes reach capacity but is likely to be carefully managed.	MODERATE
Process inadvertently causes environmental pollution.	LOW	VERY HIGH	VERY HIGH	It is likely community organisations will be highly motivated to ensure pollution is avoided.	LOW

Based on this information, the overall risk profile for the Community Organisation On-Farm Collection option is considered **HIGH**. The key concerns here are based on the ability of community organisations to access the capital and expertise they need to develop new services, and their ability to fund operations as these new services grow.

5.6. OPTION 5 – EXPANDED TERRITORIAL AUTHORITY RECYCLING DROP-OFF HUBS

Supply Chain Model

As each potential supply chain model for territorial authority recycling drop-off hubs is likely to be slightly different, the figure below is representative of a generic model of how these hubs are likely to be established based on feedback from territorial authorities received to date.

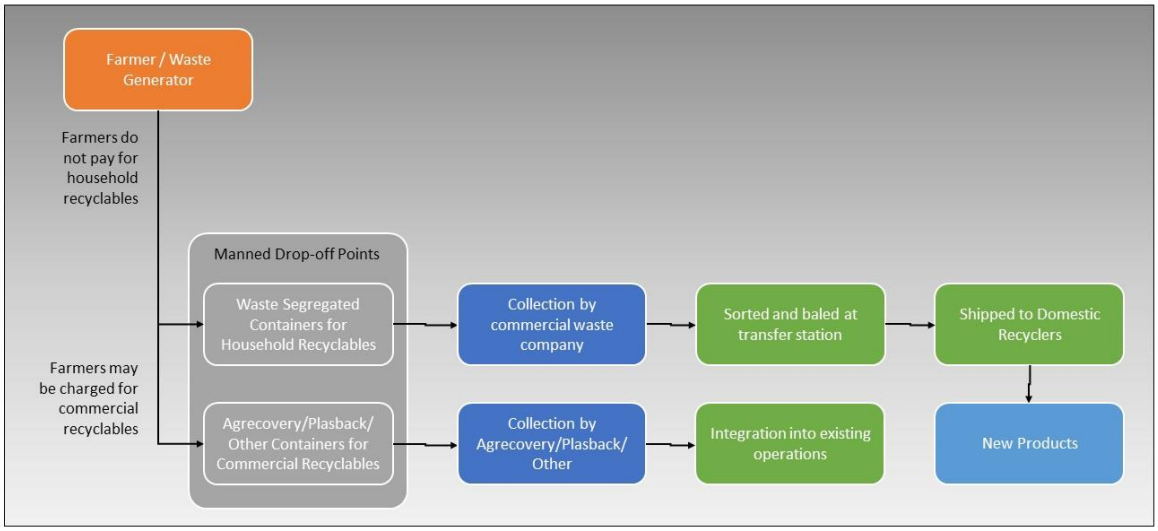

Figure 13: Expanded Territorial Authority Recycling Drop-Off Hubs Supply Chain Model

The following notes and observations are made regarding the Expanded Territorial Authority Recycling Drop-Off Hubs supply chain model:

- A key challenge in making the supply chain for this model work is the location of drop-off sites. A balance must be struck between having sufficient sites to make travelling to drop off waste convenient for farmers, and not having so many that operational and maintenance costs become untenable for the territorial authority.
- As discussed in Section 3.11, the need to man sites is a significant cost and a challenge to this model. While making sites unmanned is possible - utilising fencing and swipe card entry, number plate recognition and CCTV monitoring – this is likely to be very expensive to establish and monitor, and makes volume-based charging for any wastes very difficult indeed. Despite this, Ashburton District Council is in the process of designing an unmanned weighbridge system for their Rakaia site which utilises a self-service touchscreen kiosk and number plate camera, so this approach is possible, but scalability to more remote rural communities may not be feasible.
- While managing of domestic waste will be relatively straightforward under this model – and this has proven to be successful in a number of rural areas in New Zealand – the addition of permanent collection sites for multiple commercial farm waste streams may be more challenging. Ensuring waste storage receptacles are closely monitored to ensure 'just in time' collection (so as to manage collection costs and efficiency) will be more difficult. This is considered a vulnerability in the supply chain, but may simply require trial of different models for monitoring and collection timing.
- The robustness of the overall supply chain for the Expanded Territorial Authority Recycling Drop-Off Hubs option is considered **LOW**.

Life Cycle Assessment

The Life Cycle Assessment for the Expanded Territorial Authority Recycling Drop-Off Hubs option, based on available information, is as follows:

Process Stage	Energy	Waste	Air	Water	Soil	Total
Transportation by farmers to drop-off sites	2	1	2	1	1	7
Transportation of recyclables to transfer station	2	1	2	1	1	7
Collection of wastes by recycling partners	2	1	2	1	1	7
Waste sorting and baling at transfer station	2	1	1	1	1	6
Transportation of plastics to manufacturers	2	1	2	1	1	7
Manufacture of new plastic products	3	2	2	1	1	9
Overall Scores	13	7	11	6	6	43
Overall Performance						78%

The following notes and observations are made regarding the Expanded Territorial Authority Recycling Drop-Off Hubs Life Cycle Assessment:

- While the use of hubs as an intermediate consolidation point for waste adds an additional transportation movement phase, this is considered to be more efficient than farmers taking waste individually to a centralised location.
- The manufacturing of new plastic products is expected to require high energy use and some waste and air pollution.
- The overall life cycle performance for the Expanded Territorial Authority Recycling Drop-Off Hubs option is considered **HIGH**.

Financial and Operational Modelling

The key financial and operational information relating to the Expanded Territorial Authority Recycling Drop-Off Hubs option, based on available information, is as follows:

Financial/Operational Factor	Rating	Comment
Capital requirement	HIGH	The capital requirements for establishing rural hubs will depend on the model used. If access-controlled sites (using swipe cards or similar technology) are utilised, capital set-up costs will be substantial. For other sites, set-up and container costs may also be significant.
Service provider access to capital	MODERATE	While territorial authorities obviously have access to significant funds, these funds are strongly contested and any new projects must make a strong case to secure funding. Projects for a minority of the ratepayers in a region (as may be the case with farmers) will struggle to easily access funding.

Financial/Operational Factor	Rating	Comment
Public funding required	MODERATE	While anything done by a territorial authority involves public funding, external public funding from outside rates and existing funding streams may also be required to establish new recycling hubs. This will depend on location and – potentially – the level of innovation being employed in the model.
Priority waste streams covered	HIGH	It is likely that hard and soft plastics would be the focus in terms of commercial rural waste streams.
Waste volume capacity	MODERATE	It is unlikely that the capacity and access to rural hubs will be such that they will receive particularly large volumes of waste.
Profitability	LOW	Profitability will depend on how territorial authorities choose to charge for commercial rural waste, but this will likely only be on a cost-recovery basis.
Return on investment	MODERATE	Given that the operators here will be territorial authorities, the return on investment will be seen more in terms of waste diversion than direct financial returns.
Growth potential	MODERATE	As with waste volume capacity, potential for growth will be limited by the capacity of hubs to store waste and the likely limited hours of access.
Reliability of output markets	HIGH	As plastics are likely to be the focus here, there are numerous options currently available for the profitable sale of such wastes. Territorial authorities are likely to pass these wastes directly on to other providers such as Plasback and Agrecovery.
Farmer affordability	HIGH	Once again, this will depend on the charging model developed by the local council but, if this is done on a cost recovery basis, rates are likely to be reasonable.
Geographical reach	MODERATE	While, obviously, territorial authorities cover all of the country, only a few have expressed interest in pursuing this model. In addition, the costs involved in establishing hubs means it is unlikely they will be convenient for all farmers in a given region.
Scalability	MODERATE	Territorial authorities are in a reasonable position to respond to demand and scale up here if demand for access to hubs is strong. Extending access hours, increasing storage capacity and adding new hubs are all options, but would require access to council funding to implement.
Service provider capability/track record	HIGH	Territorial authorities, while not 'business entities' tend to maintain close communication and generally positive relationships with rural communities. This will, of course, be variable from one council to another.

Based on this information, the robustness of the financial and operational model for the Expanded Territorial Authority Recycling Drop-Off Hubs option is considered **MODERATE**.

Risk Assessment

The risk assessment for the Expanded Territorial Authority Recycling Drop-Off Hubs option is as follows:

Expanded Territorial Authority Recycling Drop-Off Hubs					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model risks					MODERATE
Business model proves unprofitable or unsustainable.	MODERATE	LOW	HIGH	It is unlikely TAs would expect profitability in providing such services.	LOW
Provider does not have required management capability.	LOW	HIGH	HIGH	TAs are likely to deploy highly skilled staff to undertake such developments.	LOW
Alignment with farmer extrinsic or intrinsic drivers is not achieved.	MODERATE	MODERATE	MODERATE	TAs have the means to ensure service design aligns with farmer drivers, but do not always engage successfully.	MODERATE
Business model cannot handle multiple focus waste streams.	MODERATE	MODERATE	HIGH	Soft and/or hard plastics may work well in this context, but any additional waste streams would prove challenging.	MODERATE
Business development requirements or timeframes are unacceptable.	HIGH	MODERATE	LOW	Seeking council approval and budget for new hubs may prove time consuming.	MODERATE
Scale-up requirements and timeframes are unacceptable.	HIGH	MODERATE	LOW	Seeking council approval and budget for new hubs may prove time consuming.	MODERATE
Waste cannot be managed from a wide geographical area.	HIGH	MODERATE	LOW	This will depend on the ability of council staff to secure new sites for additional hubs. The law of diminishing marginal returns will apply.	MODERATE
Financial risks					MODERATE
Required start-up or scale-up capital cannot be accessed.	HIGH	HIGH	LOW	While TAs have access to considerable funding, securing funding for such a new service may prove challenging.	HIGH
Revenue targets are not met.	LOW	LOW	HIGH	It is unlikely TAs would expect any more than cost recovery in providing such services.	LOW
Operating costs are too high.	MODERATE	HIGH	MODERATE	If hubs need to be manned it is likely operational costs may prove unacceptably high.	HIGH
Foreign exchange fluctuations impact profitability negatively.	LOW	LOW	HIGH	It is probable that wastes collected will be recycled in New Zealand.	LOW
Supply chain risks					LOW
Waste volumes are low or inconsistent.	HIGH	LOW	HIGH	Low waste volumes are not expected to impact this model hugely but may limit expansion opportunities.	LOW
Necessary transportation logistics cannot be readily and economically secured.	MODERATE	HIGH	HIGH	TAs are unlikely to struggle to secure cost-effective collection contracts, but this will depend on site locations.	MODERATE

Expanded Territorial Authority Recycling Drop-Off Hubs					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Other key participants in the supply chain are not in place or cannot be secured.	LOW	HIGH	HIGH	TAs should be able to secure partners to make hubs work.	LOW
Market risks					LOW
Farmer uptake is low.	MODERATE	LOW	HIGH	It is likely that TAs will work diligently to promote hubs and ensure reasonable farmer uptake.	LOW
Competition significantly diminishes market share or profitability.	LOW	HIGH	HIGH	Competition is unlikely to seriously affect this option.	LOW
Output revenue is low or inconsistent.	HIGH	LOW	HIGH	It is unlikely TAs would expect any more than cost recovery in providing such services.	LOW
Domestic or international markets for outputs become unavailable.	LOW	HIGH	HIGH	Markets for the likely wastes being collected at hubs are expected to remain stable in the medium term.	LOW
Technical/Process risks					MODERATE
Process technology does not function effectively.	MODERATE	HIGH	HIGH	While waste processing will be left to contractors, the technology to run unmanned hubs, if pursued, may prove challenging.	MODERATE
Provider does not have required technical capability.	LOW	HIGH	HIGH	TAs are likely to be able to access required skills.	LOW
Waste contamination cannot be dealt with easily.	HIGH	HIGH	MODERATE	Waste contamination may cause serious issues with this option.	HIGH
Option is unable to process large volumes of waste.	MODERATE	HIGH	HIGH	Waste storage on site may be a limiting factor here.	MODERATE
Technical development requirements or timeframes are unacceptable.	LOW	HIGH	HIGH	Technical development is not expected to be a major issue with this option.	LOW
Output quality is poor or inconsistent.	HIGH	HIGH	MODERATE	Waste contamination may cause serious issues with this option.	HIGH
Compliance risks					LOW
Option has high health and safety risk.	MODERATE	VERY HIGH	VERY HIGH	Having farmers drop off waste presents a significant health and safety risk.	MODERATE
Provider does not have required health and safety compliance regime.	VERY LOW	VERY HIGH	VERY HIGH	TAs are likely to be very strong in this regard.	VERY LOW
Provider does not meet required hazardous waste transportation compliance requirements.	VERY LOW	VERY HIGH	VERY HIGH	TAs are likely to be very strong in this regard.	VERY LOW
Provider cannot ensure subcontractors meet compliance requirements.	VERY LOW	VERY HIGH	VERY HIGH	TAs are likely to be very strong in this regard.	VERY LOW
Environmental risks					MODERATE

Expanded Territorial Authority Recycling Drop-Off Hubs					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Waste is unable to be recycled or reused and ends up being disposed of.	MODERATE	HIGH	HIGH	There is some risk that contamination may cause issues here.	MODERATE
Waste throughput is insufficient and results in stockpiling.	MODERATE	HIGH	HIGH	This may be an issue for remote hubs.	MODERATE
Process inadvertently causes environmental pollution.	LOW	VERY HIGH	VERY HIGH	TAs are likely to monitor these issues very closely.	LOW

Based on this information, the overall risk profile for the Expanded Territorial Authority Recycling Drop-Off Hubs option is considered **MODERATE**. Key concerns here are around the ability for council staff to attract and maintain the internal funding required to operate hubs. Issues around contamination and effective management of remote sites also pose some risk.

5.7. OPTION 6 – EXPANDED ROSE OIL RECYCLING SCHEME DROP-OFF HUBS

Supply Chain Model

The overall supply chain model for the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs option is as follows:

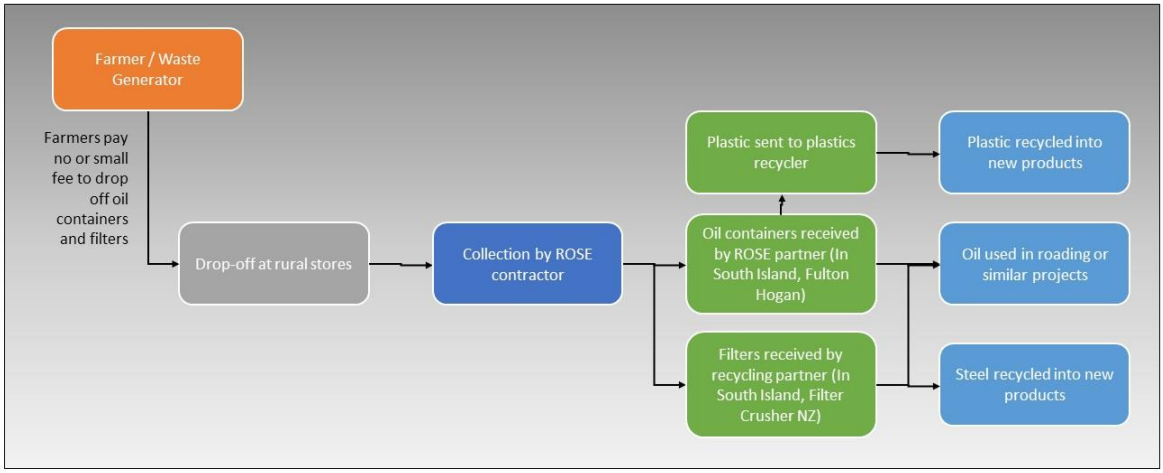

Figure 14: Expanded ROSE Oil Recycling Scheme Drop-Off Hubs Supply Chain Model

The following notes and observations are made regarding the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs supply chain model:

- The volumes of oil containers and filters that will be presented at rural stores if this model is deployed are not yet known. This impacts the logistics around the timing and costs of collecting these wastes. Because of this, it is not yet known whether farmers will need to pay for dropping off oil containers and, if so, how much they will pay. These variables, along with farmer willingness to pay, will need to be ascertained in a future pilot of the service. Collection logistics is clearly a vulnerability in this supply chain model, whereas the processing and use of collected containers and filters is well established.
- Another vulnerability in this model is the interface between farmers and the collection receptacles. Inwards containers need to be carefully managed so that only permitted items are disposed of. This will require effective communication between hosting sites and farmers, and may require monitoring. This is a vulnerability in that this model does not allow for any direct financial return to the host sites - any charging would simply cover transportation costs – and so management of the service must not be time consuming or demanding or it is unlikely the service will be sustainable. This model does work well, however, in other stores such as Supercheap Auto, so it is probable that these issues will not be insurmountable.
- The robustness of the overall supply chain for the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs option is considered **MODERATE**.

Life Cycle Assessment

The Life Cycle Assessment for the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs option, based on available information, is as follows:

Process Stage	Energy	Waste	Air	Water	Soil	Total
Transportation by farmers to drop-off sites	2	1	2	1	1	7
Collection by ROSE contractors	2	1	2	1	1	7
Use of oil in roading projects	1	1	1	2	2	7
Crushing steel and preparation for recycling	2	1	1	1	1	6
Transportation of steel to manufacturers	2	1	2	1	1	7
Transportation of plastics to manufacturers	2	1	2	1	1	7
Manufacture of new plastic products	3	2	2	1	1	9
Overall Scores	14	8	12	8	8	50
Overall Performance						79%

The following notes and observations are made regarding the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs Life Cycle Assessment:

- It is expected that the use of used oil in roading or similar projects may involve some level of water and/or soil pollution. This would not be a factor of using recycled oil particularly, but more in terms of the overall processes utilised.
- No process stage is included for the final use for steel as the potential uses for this resource are numerous and may vary in terms of environmental impact.
- The manufacturing of new plastic products is expected to require high energy use and some waste and air pollution.
- The overall life cycle performance for the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs option is considered **HIGH**.

Financial and Operational Modelling

The key financial and operational information relating to the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs option, based on available information, is as follows:

Financial/Operational Factor	Rating	Comment
Capital requirement	VERY LOW	The only asset purchases required to establish this service are the wheelie bins used for waste collection.
Service provider access to capital	VERY HIGH	Each of the partners being considered for this option is a very significant and well established corporate entity.
Public funding required	LOW	No public funding is expected to be sought for this option.
Priority waste streams covered	MODERATE	Initially, only oil containers and oil filters are being considered under this option.
Waste volume capacity	HIGH	It is unlikely that waste volumes here will be limited by capacity, but rather by the level of participation by farmers.
Profitability	VERY LOW	It is likely that either cost recovery will be sought from farmers or that one of the option partners will subsidise the service as a market or corporate social responsibility activity. In either case profitability will not be expected.
Return on investment	VERY LOW	See above.

Financial/Operational Factor	Rating	Comment
Growth potential	MODERATE	The service offered here has the potential to grow as farmers become more aware of it, but given the inherently low volumes for these waste streams, rapid and sustained growth is not expected.
Reliability of output markets	HIGH	This option involves the recycling of oil, plastic and steel. Each of these, based on current end uses, is considered reliable. The involvement of companies like Fulton Hogan, which uses the oil itself, further strengthens this stability.
Farmer affordability	HIGH	It is likely waste oil containers and filters will be able to be dropped off without charge. Otherwise a small cost-recovery fee may be levied.
Geographical reach	HIGH	Farmlands has 83 rural stores throughout New Zealand. Farmsource has 71 stores around New Zealand.
Scalability	HIGH	It is likely that this option would begin at a small number of stores to test viability. The ability then exists to roll the option out to all stores managed by the service partner/s.
Service provider capability/track record	HIGH	Both the ROSE programme and the potential rural store partners have strong performance track records. Both rural stores engaged in discussion on this option are well regarded in rural communities and have strong understanding of rural waste issues.

Based on this information, the robustness of the financial and operational model for the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs option is considered **HIGH**.

Risk Assessment

The risk assessment for the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs option is as follows:

Expanded ROSE Oil Recycling Scheme Drop-Off Hubs					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model risks					MODERATE
Business model proves unprofitable or unsustainable.	HIGH	VERY HIGH	LOW	As the basis for cost recovery for this model is not yet known, this is a significant risk.	HIGH
Provider does not have required management capability.	LOW	HIGH	VERY HIGH	All parties involved in discussions for this option are highly capable.	LOW
Alignment with farmer extrinsic or intrinsic drivers is not achieved.	MODERATE	HIGH	MODERATE	It is not yet known to what extent farmers will be prepared to patronise such a service.	MODERATE
Business model cannot handle multiple focus waste streams.	HIGH	LOW	HIGH	Initially only oil filters and oil containers are being considered.	LOW
Business development requirements or timeframes are unacceptable.	MODERATE	MODERATE	MODERATE	Given the size and complexity of the organisations involved in this option, development timeframes may be long.	MODERATE

Expanded ROSE Oil Recycling Scheme Drop-Off Hubs					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Scale-up requirements and timeframes are unacceptable.	MODERATE	MODERATE	MODERATE	Moving from initial pilots to full scale rollout may be a fairly complex process.	MODERATE
Waste cannot be managed from a wide geographical area.	MODERATE	MODERATE	MODERATE	Transportation logistics in more remote areas may limit rollout potential.	MODERATE
Financial risks					MODERATE
Required start-up or scale-up capital cannot be accessed.	LOW	VERY HIGH	HIGH	The capital requirements for this option are very low.	LOW
Revenue targets are not met.	HIGH	HIGH	MODERATE	As the basis for cost recovery for this model is not yet known, this is a significant risk.	HIGH
Operating costs are too high.	HIGH	HIGH	MODERATE	As the basis for cost recovery for this model is not yet known, this is a significant risk.	HIGH
Foreign exchange fluctuations impact profitability negatively.	LOW	LOW	HIGH	It is intended that recovered wastes are utilised locally.	LOW
Supply chain risks					MODERATE
Waste volumes are low or inconsistent.	HIGH	LOW	HIGH	Waste volumes may well be low, but this is not overly problematic in the model.	LOW
Necessary transportation logistics cannot be readily and economically secured.	HIGH	HIGH	MODERATE	This may be a significant issue for more remote locations.	HIGH
Other key participants in the supply chain are not in place or cannot be secured.	MODERATE	HIGH	HIGH	As yet the partners for this option have not been determined.	MODERATE
Market risks					LOW
Farmer uptake is low.	HIGH	MODERATE	HIGH	This may be the case and would be a key focus for piloting activity.	MODERATE
Competition significantly diminishes market share or profitability.	LOW	LOW	HIGH	Little competition is expected here.	LOW
Output revenue is low or inconsistent.	LOW	LOW	HIGH	This is not a significant issue for this option.	LOW
Domestic or international markets for outputs become unavailable.	LOW	LOW	HIGH	This is not a significant issue for this option.	LOW
Technical/Process risks					LOW
Process technology does not function effectively.	LOW	LOW	HIGH	Processes for recycling collected wastes are well established and stable.	LOW
Provider does not have required technical capability.	LOW	LOW	HIGH	Processes for recycling collected wastes are well established and stable.	LOW
Waste contamination cannot be dealt with easily.	MODERATE	HIGH	HIGH	Any contamination would cause issues for the processes involved in this option.	MODERATE

Expanded ROSE Oil Recycling Scheme Drop-Off Hubs					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Option is unable to process large volumes of waste.	LOW	LOW	HIGH	Processes for recycling collected wastes are well established and stable.	LOW
Technical development requirements or timeframes are unacceptable.	LOW	LOW	HIGH	Processes for recycling collected wastes are well established and stable.	LOW
Output quality is poor or inconsistent.	MODERATE	HIGH	HIGH	Any contamination would cause issues for the processes involved in this option.	MODERATE
Compliance risks					LOW
Option has high health and safety risk.	MODERATE	VERY HIGH	HIGH	While the overall process is well established, the entry of a new partner raises the health and safety risk level.	MODERATE
Provider does not have required health and safety compliance regime.	VERY LOW	VERY HIGH	VERY HIGH	All potential partners are very focused on health and safety and have well developed systems and processes.	VERY LOW
Provider does not meet required hazardous waste transportation compliance requirements.	VERY LOW	VERY HIGH	VERY HIGH	All potential partners are very focused on health and safety and have well developed systems and processes.	VERY LOW
Provider cannot ensure subcontractors meet compliance requirements.	VERY LOW	VERY HIGH	VERY HIGH	All potential partners are very focused on health and safety and have well developed systems and processes.	VERY LOW
Environmental risks					MODERATE
Waste is unable to be recycled or reused and ends up being disposed of.	MODERATE	MODERATE	HIGH	This may be an issue if contamination is not carefully monitored.	MODERATE
Waste throughput is insufficient and results in stockpiling.	LOW	MODERATE	HIGH	Demand for wastes is likely to be consistently high.	LOW
Process inadvertently causes environmental pollution.	MODERATE	VERY HIGH	HIGH	This may be an issue on sites and spill kits will need to be available.	MODERATE

Based on this information, the overall risk profile for the Expanded ROSE Oil Recycling Scheme Drop-Off Hubs option is considered **MODERATE**. Key concerns here are around the novelty of this approach for farmers and the degree to which it will actually be used in practice. Transportation logistics for remote sites is also a concern. As the nature of cost recovery for this model is not yet known, this presents a considerable risk.

5.8. OPTION 7 – FONTERRA SHARPS COLLECTION

Supply Chain Model

The overall supply chain model for the Fonterra Sharps Collection option is as follows:

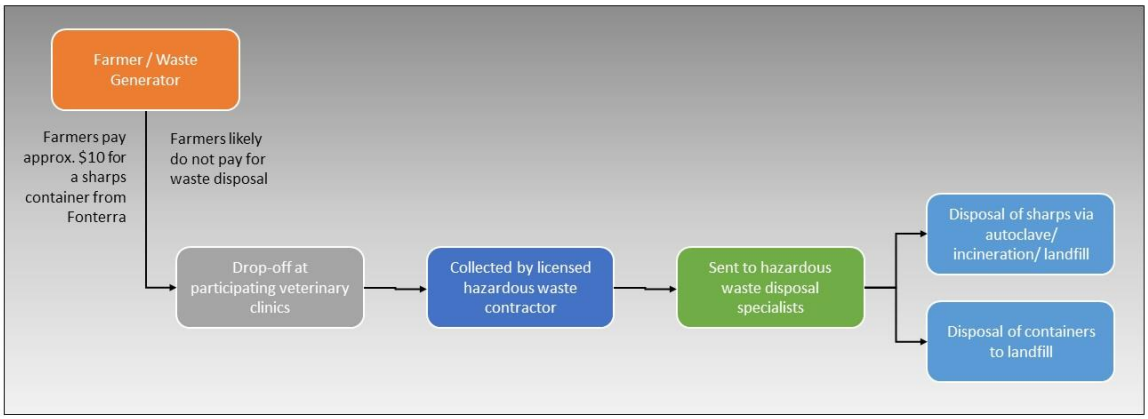

Figure 15: Fonterra Sharps Collection Supply Chain Model

The following notes and observations are made regarding the Fonterra Sharps Collection supply chain model:

- The Fonterra Sharps model is very straightforward and unlikely to present many supply chain issues. Key questions will be the willingness of farmers to take full sharps containers to their local vet practice when full and the willingness of vets to include these in regular sharps disposal systems. It is not yet known whether farmers will be required to pay for the disposal of sharps.
- A question also exists as to whether a farmer may actually transport a sharps container in a private vehicle. Section 2.1(2) of the Land Transport Rule: Dangerous Goods 2005 appears to indicate that "Dangerous goods transported for use as tools-of-trade, for agricultural use or for a commercial purpose, but not transported for hire or direct reward" (which would likely cover sharps in this instance) must be "loaded, secured, segregated, transported and unloaded safely to ensure that the packaging remains fit for its purpose and the dangerous goods do not present a hazard to any person, to property or to the environment" and be of a quantity less than 5kg. If this is correctly interpreted, then farmers transporting sharps to a vet clinic is likely to be acceptable if handled responsibly.
- The robustness of the overall supply chain for the Fonterra Sharps Collection option is considered **HIGH**.

Life Cycle Assessment

The Life Cycle Assessment for the Fonterra Sharps Collection option, based on available information, is as follows:

Process Stage	Energy	Waste	Air	Water	Soil	Total
Transportation by farmers to drop-off sites	2	1	2	1	1	7
Transportation to hazardous waste specialists	2	1	2	1	1	7
Incineration/autoclave/disposal of sharps	3	1	2	2	1	9
Landfilling of sharps containers	1	3	1	1	1	7
Overall Scores	8	6	7	5	4	30
Overall Performance						75%

The following notes and observations are made regarding the Fonterra Sharps Collection Life Cycle Assessment:

- The incineration, autoclaving and/or disposal of sharps may involve limited risk of pollution through air and/or water discharge.
- It is assumed that sharps containers will not be reused, but rather disposed of to landfill. Reuse of these containers, if practicable, may slightly improve the score for this option.
- The overall life cycle performance for the Fonterra Sharps Collection option is considered **HIGH**.

Financial and Operational Modelling

The key financial and operational information relating to the Fonterra Sharps Collection option, based on available information, is as follows:

Financial/Operational Factor	Rating	Comment
Capital requirement	VERY LOW	No up-front capital expenditure is required for this option.
Service provider access to capital	VERY HIGH	Fonterra is a very significant and well established corporate entity.
Public funding required	LOW	No public funding is expected to be sought for this option.
Priority waste streams covered	LOW	Only sharps are being considered under this option.
Waste volume capacity	HIGH	It is unlikely that waste volumes here will be limited by capacity, but rather by the level of participation by farmers.
Profitability	VERY LOW	It is likely that only cost recovery will be sought from farmers so profitability is not expected.
Return on investment	VERY LOW	See above.
Growth potential	MODERATE	The service offered here has the potential to grow as farmers become more aware of it, but given the inherently low volumes for these waste streams, rapid and sustained growth is not expected.
Reliability of output markets	N/A	Sharps are disposed of using an autoclave and landfill or incineration.
Farmer affordability	HIGH	The containers are likely to be inexpensive, but costs for disposal are not yet known. Given the volume of sharps being generated, overall cost is likely to be low.
Geographical reach	VERY HIGH	As the containers will be dropped off at local veterinary practices, Fonterra is likely to be able to offer this service throughout the country.

Financial/Operational Factor	Rating	Comment
Scalability	VERY HIGH	Provided veterinary practices are willing to participate, the ability for Fonterra to upscale this service is very high.
Service provider capability/track record	VERY HIGH	Fonterra is clearly a very successful and well regarded organisation, and the demands of this option are very low in terms of its capabilities.

Based on this information, the robustness of the financial and operational model for the Fonterra Sharps Collection option is considered **HIGH**.

Risk Assessment

The risk assessment for the Fonterra Sharps Collection option is as follows:

Fonterra Sharps Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model risks					LOW
Business model proves unprofitable or unsustainable.	HIGH	HIGH	MODERATE	There is considerable risk that the costs of transport and/or disposal of sharps may not be accepted by farmers.	HIGH
Provider does not have required management capability.	LOW	HIGH	VERY HIGH	Fonterra is a very well-resourced and capable organisation.	LOW
Alignment with farmer extrinsic or intrinsic drivers is not achieved.	LOW	HIGH	HIGH	Fonterra is in close communication with farmers and is piloting the service with a small group of farmers.	LOW
Business model cannot handle multiple focus waste streams.	VERY HIGH	VERY LOW	VERY LOW	This option focuses exclusively on sharps.	VERY LOW
Business development requirements or timeframes are unacceptable.	LOW	LOW	MODERATE	Resolving the business model here, if the pilot is successful, should not be a time-consuming task.	LOW
Scale-up requirements and timeframes are unacceptable.	LOW	LOW	MODERATE	Scaling up the service should be straightforward providing vet clinic support is secured.	LOW
Waste cannot be managed from a wide geographical area.	LOW	LOW	HIGH	Geographical coverage will likely depend only on vet clinic support of the programme.	LOW
Financial risks					MODERATE
Required start-up or scale-up capital cannot be accessed.	VERY LOW	HIGH	HIGH	Capital requirements for the service are very low.	LOW
Revenue targets are not met.	MODERATE	HIGH	MODERATE	The service is being developed on a cost recovery basis, but farmers may not accept the service costs.	MODERATE
Operating costs are too high.	HIGH	HIGH	MODERATE	The costs of collection and disposal of sharps are not yet known and may be unacceptably high.	HIGH

Fonterra Sharps Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Foreign exchange fluctuations impact profitability negatively.	VERY LOW	VERY LOW	VERY HIGH	Foreign exchange fluctuations are unlikely to impact this option.	VERY LOW
Supply chain risks					MODERATE
Waste volumes are low or inconsistent.	HIGH	LOW	HIGH	It is highly likely volumes will be both low and inconsistent, but the model is built on this basis.	LOW
Necessary transportation logistics cannot be readily and economically secured.	MODERATE	HIGH	MODERATE	Ensuring collection costs are reasonable will be a key challenge for this option.	MODERATE
Other key participants in the supply chain are not in place or cannot be secured.	HIGH	HIGH	HIGH	Geographical coverage of the service will depend on the agreement of vet clinics to be the collection point for full sharps containers.	MODERATE
Market risks					LOW
Farmer uptake is low.	MODERATE	MODERATE	HIGH	Farmer uptake will likely depend on service costs.	MODERATE
Competition significantly diminishes market share or profitability.	VERY LOW	VERY LOW	HIGH	Competition is not expected in this space.	VERY LOW
Output revenue is low or inconsistent.	VERY LOW	VERY LOW	VERY HIGH	Wastes will be disposed of.	VERY LOW
Domestic or international markets for outputs become unavailable.	VERY LOW	VERY LOW	VERY HIGH	Wastes will be disposed of.	VERY LOW
Technical/Process risks					VERY LOW
Process technology does not function effectively.	VERY LOW	VERY LOW	VERY HIGH	Option uses well established process technology for sharps disposal.	VERY LOW
Provider does not have required technical capability.	VERY LOW	VERY LOW	VERY HIGH	Option uses well established providers for sharps disposal.	VERY LOW
Waste contamination cannot be dealt with easily.	VERY LOW	VERY LOW	VERY HIGH	Contamination is not an issue for this option.	VERY LOW
Option is unable to process large volumes of waste.	VERY LOW	VERY LOW	VERY HIGH	Option uses well established process technology for sharps disposal.	VERY LOW
Technical development requirements or timeframes are unacceptable.	VERY LOW	VERY LOW	VERY HIGH	Option uses well established process technology for sharps disposal.	VERY LOW
Output quality is poor or inconsistent.	VERY LOW	VERY LOW	VERY HIGH	Wastes will be disposed of.	VERY LOW
Compliance risks					LOW
Option has high health and safety risk.	MODERATE	VERY HIGH	HIGH	Collection and transportation of sharps does present some health and safety risk.	MODERATE
Provider does not have required health and safety compliance regime.	VERY LOW	VERY HIGH	VERY HIGH	Fonterra has a well-developed health and safety compliance regime.	VERY LOW

Fonterra Sharps Collection					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Provider does not meet required hazardous waste transportation compliance requirements.	LOW	VERY HIGH	HIGH	Current legislation indicates this is not an issue where transportation is not for financial gain.	LOW
Provider cannot ensure subcontractors meet compliance requirements.	LOW	VERY HIGH	HIGH	Collection for disposal will be undertaken by hazardous waste specialists.	LOW
Environmental risks					VERY LOW
Waste is unable to be recycled or reused and ends up being disposed of.	VERY LOW	VERY LOW	VERY HIGH	Wastes will be disposed of.	VERY LOW
Waste throughput is insufficient and results in stockpiling.	VERY LOW	VERY LOW	VERY HIGH	Wastes will be disposed of through processes capable of tackling very large volumes.	VERY LOW
Process inadvertently causes environmental pollution.	VERY LOW	VERY LOW	VERY HIGH	Collection for disposal will be undertaken by hazardous waste specialists.	VERY LOW

Based on this information, the overall risk profile for the Fonterra Sharps Collection option is considered **LOW**. There is some concern as to how this process will be funded, but overall costs are not expected to be high.

5.9. OPTION 8 – TEMPORARY POP-UP RECOVERY EVENTS

Supply Chain Model

The overall supply chain model for the Temporary Pop-Up Recovery Events option is as follows:

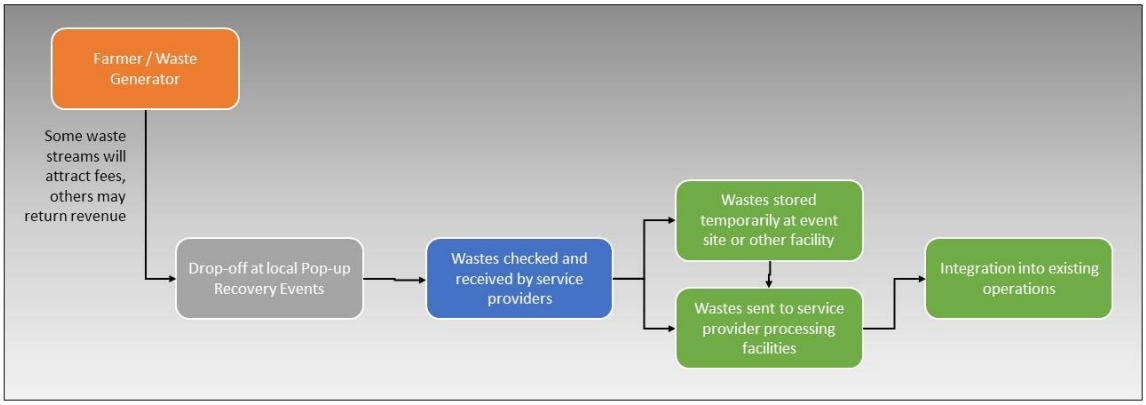

Figure 16: Temporary Pop-Up Recovery Events Supply Chain Model

The following notes and observations are made regarding Temporary Pop-Up Recovery Events supply chain model:

- The exact challenges of this model will ultimately depend on what wastes are collected and what service providers participate, but a number of issues will likely prove a challenge regardless of the make-up of the events.
- Determining the appropriate timing and frequency of events to balance convenience and demand for farmers with efficiency and costs for service providers will be a primary challenge for this model.
- Should events prove popular, traffic management as farmers arrive to drop off waste may become an issue. This will need to be considered in the layout design for events.
- The process for farmers offloading waste must also be considered. Some wastes may be hazardous or bulky so consideration needs to be given as to the right order for dropping off wastes (if the service providers are laid out in a linear fashion) and also to health and safety precautions in terms of moving wastes from private vehicles to collection areas. Service providers will also need to ensure best practice health and safety management is maintained in the process of receiving, weighing (if applicable) and consolidation of wastes.
- Some service providers may not be able to remove wastes from the collection location immediately after the conclusion of the event, so storage facilities will likely be required. These will need to be secure, so managing access for service providers for subsequent collections will need to be considered.
- The robustness of the overall supply chain for the Temporary Pop-Up Recovery Events option is considered **MODERATE**.

Life Cycle Assessment

The Life Cycle Assessment for the Temporary Pop-Up Recovery Events option, based on available information, is as follows:

Process Stage	Energy	Waste	Air	Water	Soil	Total
Transportation by farmers to drop-off sites	2	1	2	2	2	9
Temporary storage of wastes on site	1	1	1	2	2	7
Transportation by providers for processing	2	1	2	1	1	7
Overall Scores	5	3	5	4	4	23
Overall Performance						73%

The following notes and observations are made regarding the Temporary Pop-Up Recovery Events Life Cycle Assessment:

- Essentially the recovery events add an additional layer to existing processes for collection and recycling of disposal of rural wastes. The life cycles for each of these options, such as Plasback or Agrecovery, should be added on to that represented here.
- The movement of wastes – in particular hazardous wastes – from farmer vehicles to collection sites, and the temporary storage of wastes in non-specialist facilities is considered to present a moderate risk of water and/or soil pollution through waste spillage.
- The overall life cycle performance for the Temporary Pop-Up Recovery Events option is considered **HIGH**.

Financial and Operational Modelling

The key financial and operational information relating to the Temporary Pop-Up Recovery Events option, based on available information, is as follows:

Financial/Operational Factor	Rating	Comment
Capital requirement	VERY LOW	No capital expenditure is required for this option. All required equipment will be arranged by the service providers involved in the events. Use of existing council facilities may be sought.
Service provider access to capital	MODERATE	A range of service providers will be involved in the events.
Public funding required	MODERATE	It is not yet known if public funding will be required. Ideally each of the service providers will participate based on the consolidated volumes and reduced transportation costs the events will offer, as well as the opportunity to rationalise on-farm collection costs. However, some service providers may seek subsidisation of service to cover transportation costs for more remote areas. This will be further considered in Milestone 4.
Priority waste streams covered	VERY HIGH	The events have the potential to cover virtually all of the priority waste streams under this project.

Financial/Operational Factor	Rating	Comment
Waste volume capacity	MODERATE	The events are targeted at lower volume users, and the logistics of receiving very large volumes of waste would be challenging. The events work in conjunction with on-farm collections which are targeted at higher volume users.
Profitability	MODERATE	Service providers will set pricing for the events individually. Some – such as Plasback – will charge farmers to drop-off waste based on their existing business models, which include a profit margin. Others – such as scrap metal recyclers – may pay farmers for waste. It is likely all providers will earn a margin on volumes collected at these events.
Return on investment	MODERATE	As a standalone option, events will offer some advantages in terms of reduced transport costs and volume consolidation. The full return on investment will be enjoyed only if providers coordinate events effectively with on-farm collections.
Growth potential	MODERATE	Events can be scheduled as often as required to meet farmer demand while still ensuring volumes are reasonable. It is likely rapid growth will occur in the first few events as farmers' awareness grows, but this is likely to plateau and stabilise once participation becomes standard behaviour for those farmers who wish to be involved.
Reliability of output markets	HIGH	Each of the service providers likely to participate in the events has strong and stable output markets for (or disposes of) wastes collected.
Farmer affordability	HIGH	Wastes dropped off at these events may attract a cost but this is likely to be markedly less than any other options for diversion of these wastes.
Geographical reach	HIGH	Events may be offered in virtually any part of the country, subject to the economics of transportation of reaching outlying regions.
Scalability	HIGH	Additional service providers may be added to events as they become established, and additional events can be scheduled based on farmer demand. Any limitation here will be based on ensuring that volumes and revenue received by service providers justifies participation in any given event.
Service provider capability/track record	HIGH	Each of the service providers likely to participate in the events are strong and well established organisations.

Based on this information, the robustness of the financial and operational model for the Temporary Pop-Up Recovery Events option is considered **HIGH**.

Risk Assessment

The risk assessment for the Temporary Pop-Up Recovery Events option is as follows:

Temporary Pop-Up Recovery Events					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Business model risks					MODERATE
Business model proves unprofitable or unsustainable.	MODERATE	VERY HIGH	HIGH	There is a reasonable risk that this model will not prove profitable to participants, but the model will be refined to minimise this risk before any piloting.	MODERATE
Provider does not have required management capability.	LOW	HIGH	HIGH	All likely participants, and TA partners, are highly capable in terms of service management.	LOW
Alignment with farmer extrinsic or intrinsic drivers is not achieved.	LOW	MODERATE	HIGH	The concept behind this model is based on farmer feedback and can potentially align with farm accreditation programmes.	LOW
Business model cannot handle multiple focus waste streams.	LOW	HIGH	HIGH	If the overall concept works, the ability to handle multiple waste streams should not be an additional challenge.	LOW
Business development requirements or timeframes are unacceptable.	MODERATE	HIGH	HIGH	Bringing together a range of diverse partners may prove challenging here.	MODERATE
Scale-up requirements and timeframes are unacceptable.	LOW	MODERATE	HIGH	If the model proves successful, deploying in other regions should not prove to be particularly difficult.	LOW
Waste cannot be managed from a wide geographical area.	HIGH	HIGH	HIGH	Events may work well in some areas and not in others. More remote areas will be more challenging.	HIGH
Financial risks					MODERATE
Required start-up or scale-up capital cannot be accessed.	LOW	HIGH	HIGH	Capital requirements for events are expected to be low.	LOW
Revenue targets are not met.	HIGH	VERY HIGH	HIGH	Low farmer participation may not make events economic for service providers.	HIGH
Operating costs are too high.	HIGH	VERY HIGH	HIGH	High transport costs may make events uneconomic in some areas.	HIGH
Foreign exchange fluctuations impact profitability negatively.	LOW	MODERATE	MODERATE	Foreign exchange fluctuations are not expected to have a major impact on these kinds of events.	LOW
Supply chain risks					HIGH
Waste volumes are low or inconsistent.	HIGH	HIGH	HIGH	The timing and frequency of events will take time to resolve and may result in volumes being somewhat unpredictable.	HIGH
Necessary transportation logistics cannot be readily and economically secured.	HIGH	VERY HIGH	HIGH	Securing economical transport of wastes from events will be a key challenge.	HIGH

Temporary Pop-Up Recovery Events					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Other key participants in the supply chain are not in place or cannot be secured.	HIGH	VERY HIGH	HIGH	Ensuring a wide range of service providers may be a challenge in undertaking events around the country.	HIGH
Market risks					MODERATE
Farmer uptake is low.	HIGH	VERY HIGH	HIGH	While the events have been designed to appeal to farmers, currently they would participate only based on intrinsic drivers.	HIGH
Competition significantly diminishes market share or profitability.	LOW	HIGH	HIGH	Events are designed to work alongside existing services, not in competition to them.	LOW
Output revenue is low or inconsistent.	MODERATE	HIGH	MODERATE	This is a risk that will impact all service providers undertaking recycling.	MODERATE
Domestic or international markets for outputs become unavailable.	MODERATE	HIGH	MODERATE	This is a risk that will impact all service providers undertaking recycling.	MODERATE
Technical/Process risks					LOW
Process technology does not function effectively.	LOW	HIGH	HIGH	Option uses well established technologies and processes for waste recycling.	LOW
Provider does not have required technical capability.	LOW	HIGH	HIGH	Option uses well established technologies and processes for waste recycling.	LOW
Waste contamination cannot be dealt with easily.	LOW	HIGH	HIGH	Option uses well established technologies and processes for waste recycling.	LOW
Option is unable to process large volumes of waste.	LOW	HIGH	HIGH	Option uses well established technologies and processes for waste recycling.	LOW
Technical development requirements or timeframes are unacceptable.	LOW	HIGH	HIGH	Option uses well established technologies and processes for waste recycling.	LOW
Output quality is poor or inconsistent.	LOW	HIGH	HIGH	Option uses well established technologies and processes for waste recycling.	LOW
Compliance risks					MODERATE
Option has high health and safety risk.	MODERATE	VERY HIGH	HIGH	Events involve significant numbers of farmers bringing a range of wastes to a single site and transporting them. This poses a material risk.	MODERATE
Provider does not have required health and safety compliance regime.	LOW	VERY HIGH	HIGH	It is expected all participants will be vetted in this regard.	LOW
Provider does not meet required hazardous waste transportation compliance requirements.	LOW	VERY HIGH	HIGH	It is expected all participants will be vetted in this regard.	LOW
Provider cannot ensure subcontractors meet compliance requirements.	LOW	VERY HIGH	HIGH	It is expected all participants will be vetted in this regard.	LOW
Environmental risks					LOW

Temporary Pop-Up Recovery Events					
Risk Factor	**Likelihood of Occurrence**	**Impact of Occurrence**	**Mitigation in Place**	**Comments**	**Overall Risk**
Waste is unable to be recycled or reused and ends up being disposed of.	LOW	HIGH	HIGH	Service providers will be responsible for removing and processing all wastes collected.	LOW
Waste throughput is insufficient and results in stockpiling.	LOW	HIGH	HIGH	Service providers will be responsible for removing and processing all wastes collected.	LOW
Process inadvertently causes environmental pollution.	MODERATE	VERY HIGH	HIGH	Temporary storage of multiple waste streams on sites may result in unintended spills.	MODERATE

Based on this information, the overall risk profile for the Temporary Pop-Up Recovery Events option is considered **MODERATE**. There are a number of risks here relating to the novelty of the model. Ensuring that the option is profitable for service providers, and convenient and cost-effective for farmers is a challenge and presents risk. There is also some risk in terms of waste handling.

6. CONCLUSIONS AND NEXT STEPS

Options Refinement

Milestone 3 has further investigated, developed and refined the waste minimisation options previously identified in Milestone 2. As a result, a number of options will no longer be considered under this project. In addition, a new option - Temporary Pop-up Recovery Events - has been created based on refining and extending several options from Milestone 2.

Based on the assessments and analysis undertaken in Section 5, the list of options and their updated feasibility has been assessed as follows:

Option	Milestone 2 Feasibility Assessment	Assessments undertaken in Milestone 3				**Revised Feasibility Assessment**
		Supply Chain Assessment	Life-cycle Assessment	Financial and Operational Assessment	Risk Assessment	
EnviroWaste Plastics Collection and Recycling	VERY HIGH	MODERATE	HIGH	HIGH	MODERATE	**HIGH**
Agrecovery Expanded Waste Stream Collection	HIGH	HIGH	HIGH	HIGH	MODERATE	**HIGH**
Plasback Plastics Collection	HIGH	MODERATE	HIGH	MODERATE	HIGH	**MODERATE**
Community Organisation On-Farm Collection	MODERATE	LOW	HIGH	LOW	HIGH	**LOW**
Expanded Territorial Authority Recycling Drop-Off Hubs	MODERATE	LOW	HIGH	MODERATE	MODERATE	**MODERATE**
Expanded ROSE Oil Recycling Scheme Drop-Off Hubs	HIGH	MODERATE	HIGH	HIGH	MODERATE	**HIGH**
Fonterra Sharps Collection	HIGH	HIGH	HIGH	HIGH	LOW	**HIGH**
Temporary Pop-up Recovery Events	N/A	MODERATE	HIGH	HIGH	MODERATE	**MODERATE**

As these solutions have been developed and rationalised, a new model has been created that rationalises and coordinates the options so that they work together more effectively and coherently.

The next milestone of this project focuses on building detailed business cases for the eight remaining options, including ensuring the partners required for each option are in place and the financial implications of pursuing new options are well understood and accepted by all involved.

Particular focus will be on the following:

- Developing the Temporary Pop-up Recovery Events option in conjunction with territorial authorities and potential service providers.
- Assisting motivated community organisations in developing plans for on-farm rural waste collection services.
- Securing partnerships for extension of the ROSE programme into rural stores.
- Identifying territorial authorities willing to develop or extend recycling drop-off hubs.
- Working with Agrecovery to consider additional waste stream collections and engaging with the service provider appointed based on the upcoming tender process.
- Monitoring the progress of EnviroWaste's plastics plant operational status.
- Working with Plasback on development of management systems.
- Monitoring progress in Fonterra's sharps pilot.

The progress made on the project objectives to date, and the degree of activity gaining momentum to address rural waste is extremely encouraging. The work undertaken in this milestone has moved the project to a state where the various options are now organised into a novel and compelling strategy that has the potential to significantly impact how rural waste is managed on New Zealand farms.

The level of engagement from key stakeholders and the farming community lays a solid foundation for moving the project forward towards the piloting and implementation of new initiatives to greatly increase the amount of rural waste that is recycled or disposed of in a safe and environmentally friendly way.

7. APPENDICES

7.1. APPENDIX 1 – FARMER RURAL WASTE MINIMISATION OPTIONS SURVEY

The following survey was issued to gauge farmer interest in the new service options identified during Milestone 2. The survey was made available to those participants in the Farmer Survey undertaken in Milestone 2 that notified their email addresses and expressed a willingness to be contacted for further input. The survey was made available from 15 July, 2016 to 6 August, 2016. 105 responses were received.

1. *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. How likely is it that you would want to participate in this option?

Very unlikely	Somewhat unlikely	Neutral / unsure	Somewhat likely	Very likely	Total
7.62% 8	6.67% 7	5.71% 6	32.38% 34	47.62% 50	105

2. *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. Farmers are given receipts when items are collected and paid once items have been weighed. How likely is it that you would want to participate in this option?

Very unlikely	Somewhat unlikely	Neutral / unsure	Somewhat likely	Very likely	Total
6.67% 7	11.43% 12	7.62% 8	32.38% 34	41.90% 44	105

3. *Oil Recycling Drop-Off Hubs*: Sites are established for the collection of oil containers and oil filters at convenient locations for farmers, such as rural stores. This would likely be without cost. How likely is it that you would want to participate in this option?

Very unlikely	Somewhat unlikely	Neutral / unsure	Somewhat likely	Very likely	Total
2.88% 3	9.62% 10	9.62% 10	29.81% 31	48.08% 50	104

4. *Paint Recycling Drop-Off Hubs*: Sites are established for the collection of unused paint at convenient locations for farmers, such as rural stores. This would likely be without cost. How likely is it that you would want to participate in this option?

Very unlikely	Somewhat unlikely	Neutral / unsure	Somewhat likely	Very likely	Total
4.76% 5	17.14% 18	18.10% 19	27.62% 29	32.38% 34	 105

5. *Sharps Collection*: Farmers purchase a small sharps container (about $10). When full (about once a year) farmers drop them off at convenient locations, such as a local vet clinic. How likely is it that you would want to participate in this option?

Very unlikely	Somewhat unlikely	Neutral / unsure	Somewhat likely	Very likely	Total
11.65% 12	10.68% 11	22.33% 23	18.45% 19	36.89% 38	 103

6. *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 recycling centres (such as bottle banks or those for domestic recycling streams), are expanded to accept commercial farm waste such as silage wrap. How likely is it that you would want to participate in this option?

Very unlikely	Somewhat unlikely	Neutral / unsure	Somewhat likely	Very likely	Total
2.88% 3	2.88% 3	9.62% 10	28.85% 30	55.77% 58	 104

7.2. APPENDIX 2 – LIFE CYCLE ASSESSMENT PERFORMANCE SCORE METHODOLOGY

For each stage and environmental impact under the Life Cycle Assessment, a score of 1 to 3 is given.

Scores are added horizontally (for each stage) to determine the environmental impact of each stage of the process, as well as vertically (for each environmental pollution type) to determine the severity for each type of environmental impact (such as water pollution). Lower scores are obviously preferable.

To allow comparison of options, a methodology has been developed for this project to convert final scores into a percentage. This is calculated as follows:

- The maximum and minimum scores are calculated based on the number of steps in the process. Each step has a maximum of 15 points and a minimum of 5 points. For a six-step process the maximum is 90 points and the minimum is 30.
- The range for the process is calculated as the maximum number of points less the minimum number of points. For a six-step process the range is 60 points (90 points – 30 points).
- The overall score has the minimum score subtracted from it to get the marginal score. This represents the number of points over the minimum the process has scored. For a six-step process, if the overall score is 50 points the marginal score is 20 points (50 points – 30 points).
- Because lower points are a better result, the marginal score is then deducted from the range to invert the result and produce a performance score. For a six-step process, if the overall score is 50 points and the marginal score is 20, the performance score is 40 (60 points – 20 points).
- The performance score is then shown as a percentage of the range to show overall performance. For a six-step process, if the performance score is 40, the overall performance is 67% (40 points / 60 points).