Euan Kyle

From: Euan Kyle
Sent: Monday, 16 March 2020 2:02 PM
To: 'requests@taxpayers.org.nz'
Cc: [redacted]
Subject: RE: LGOIMA: national waste levy changes [#4CB1ED]
Attachments: Waste Levy Impact - HCC Report Final 24-10-19v2.pdf

16/03/2020

[redacted]
requests@taxpayers.org.nz

Dear [redacted]

Request for Information – Local Government Official Information and Meetings Act 1987

We refer to your official information request dated 27 February 2020 for information regarding national waste levy changes.

The information you have requested is enclosed.

In order to provide you with further context in terms of the information you have requested, please note that Hutt City Council commissioned a report on the potential effect of an increased waste levy in terms of diverting material from the landfill. This report is attached, it was from October 2019.

We are not aware of any other reports or presentations that were put together in the context of waste levy increases. Hutt City Council did not make a submission on the national waste levy consultation.

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

If you have any questions or wish to discuss this decision with us, please feel free to contact me on euan.kyle@huttcity.govt.nz.

Yours sincerely,

Euan Kyle
Senior Advisor, Official Information and Privacy

Hutt City Council, 30 Laings Road, Private Bag 31912, Lower Hutt 5040, New Zealand
T 04 570 6702 W www.huttcity.govt.nz

Encl Waste Levy Impact - HCC Report Final 24-10-19v2.PDF

From: Contact
Sent: Thursday, 27 February 2020 4:59 PM
To: Corporate Records
Subject: FW: LGOIMA: national waste levy changes [#4CB1ED]

-----Original Message-----
From: requests@taxpayers.org.nz
Sent: Thursday, 27 February 2020 4:58:09 PM
To: contact@huttcity.govt.nz
CC: [redacted]
Subject: LGOIMA: national waste levy changes
This is a request for official information under the Local Government Official Information and Meetings Act 1987 relating to solid waste

We request all reports, summaries, presentations and similar (electronic or not) related to the proposed changes to national waste levies and what impacts this will have on Hutt City and its residents.

So as not to unnecessarily delay the release of the information, we ask that this request not be combined with any other requests made by the Taxpayers' Union, or its personnel.

We do not wish to cause unnecessary expense or burden on your agency. If clarification of any of our requests is needed, please call or email. Likewise, if a request proves unnecessarily burdensome in form and we are likely to be able to adjust it to be more specific or better suited to your information systems without losing the benefit of what is sought, please also get in touch. If there is likely to be a delay in being able to assemble or provide some of the information requested, please provide the rest of the information as it becomes available.

To avoid unnecessary printing and postage costs, we ask that you send a **confirmation of receipt**, the response and any other correspondence related to this request to requests@taxpayers.org.nz. Please include the following reference in the subject line: national waste levy changes

New Zealand Taxpayers' Union Inc. | **Main** +64 4 282 0300 | Level 4, 117 Lambton Quay, Wellington | PO Box 10518, The Terrace, Wellington | www.taxpayers.org.nz
Auckland Ratepayers' Alliance | **Main** +64 9 281 5172 | 3 Glenside Crescent, Eden Terrace, Auckland | PO Box 133099, Eastridge, Auckland | www.ratepayers.nz

eunomia

Waste Levy Impact Study

A report to Hutt City Council on the potential impact of changes to the waste disposal levy

Duncan Wilson

Lisa Eve

24 October 2019

Approved by

………………………………………………………….

Duncan Wilson

(Project Director)

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Disclaimer

Eunomia Research & Consulting has taken due care in the preparation of this report to ensure that all facts and analysis presented are as accurate as possible within the scope of the project. However, no guarantee is provided in respect of the information presented, and Eunomia Research & Consulting is not responsible for decisions or actions taken on the basis of the content of this report.

Executive Summary

E.1.1 Introduction

This study involved undertaking research and calculations to determine what, and how much, material could potentially be diverted from disposal if changes to the waste levy are introduced – specifically an increase in the level of the levy and/or an extension of the levy to class 2-5 landfills. The work focuses on estimated 'tipping points' for key organic and C&D material streams.

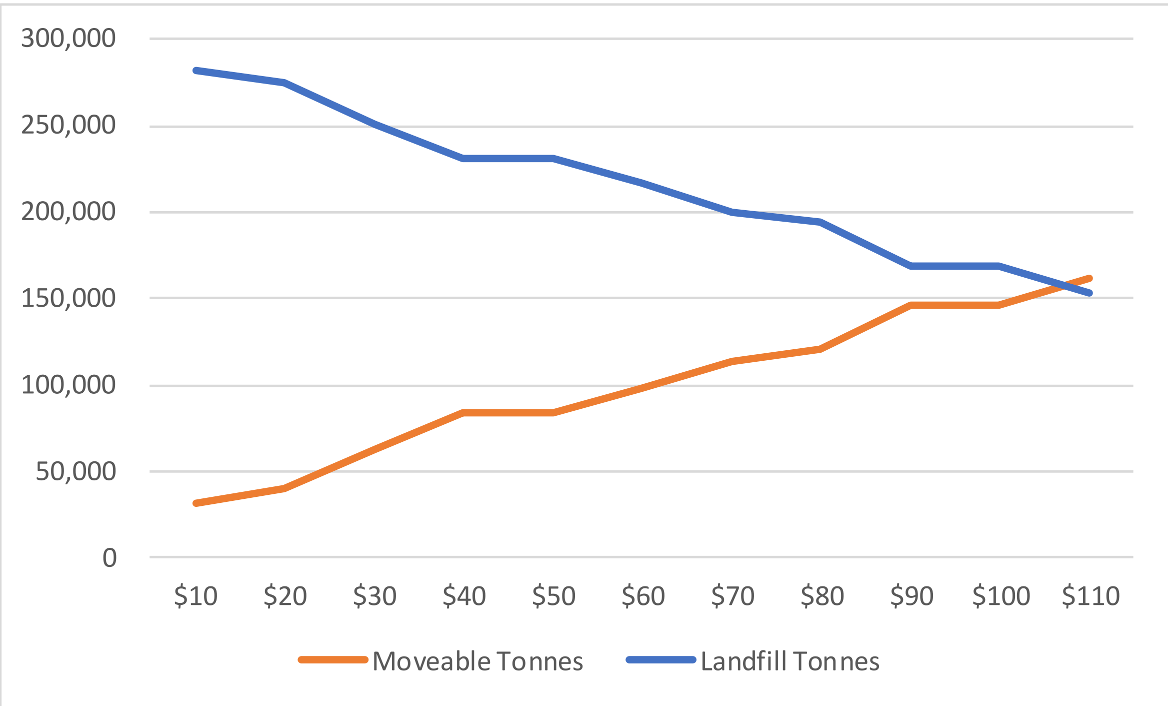
Two sets of results are provided: Results covering the catchments of the three landfills in the Wellington region and results for Silverstream landfill.

The modelling shows the point at which material becomes (on average) cheaper to recover than to landfill. This is not necessarily the same as the point at which the material will actually move from landfill to recovery (or alternative disposal), as there are a range of factors that can affect this - from the availability of facilities, the cost of changing to alternative collection or sorting systems, the costs and practicalities of recovering different grades of material, different cost structures within collection businesses etc.

E.1.2 Regional Results

The chart below shows the overall impact of tonnage to disposal at different levy rates.

Figure E - 1: Tonnes 'Moveable' by Landfill Levy Rate

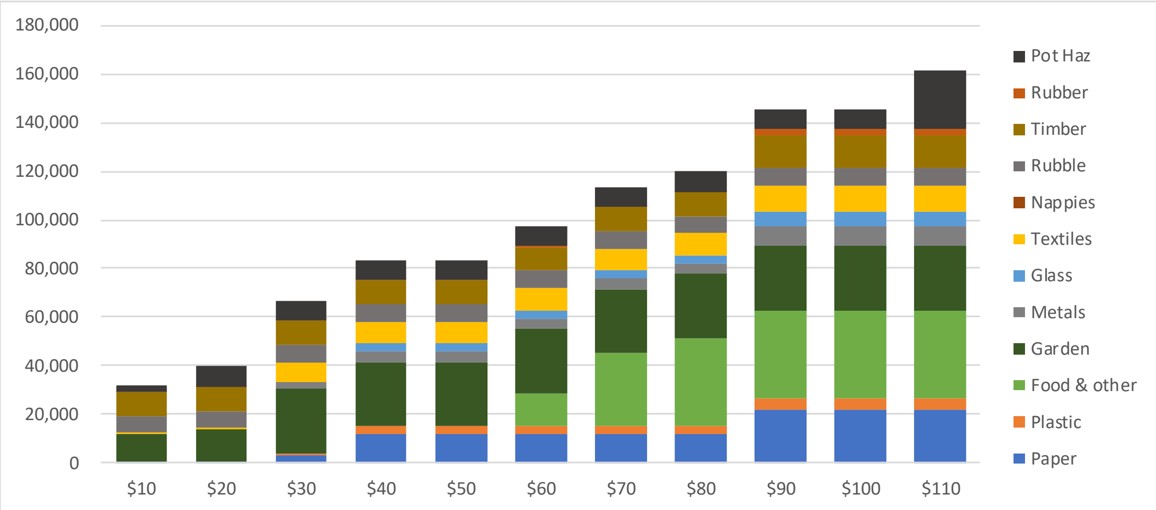


The chart shows a relatively steady progression of diversion as the rate increases. By the time the levy gets to $110 per tonne, fractionally more material is potentially able to be economically diverted than landfilled.

It is worth noting that even at the current rate of $10 per tonne, some material is classified as 'moveable' from landfill. This is because price is not the only driver for diverting waste from landfill. Convenience, and the need for appropriate facilities to process diverted material, are also key factors. In our interviews with operators, the lack of facilities for diversion, particularly for construction and demolition waste, was noted by some as the key impediment rather than price.

The chart below analyses the modelling outputs by levy rate and composition to illustrate the point at which different materials may become economic to recover.

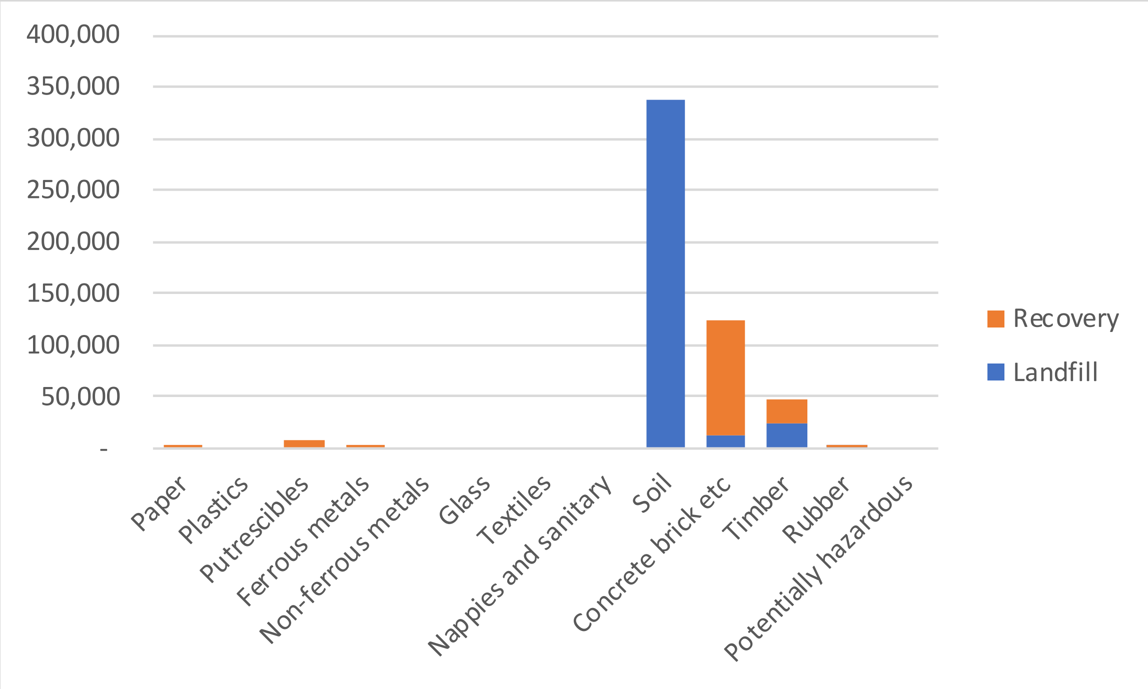
Figure E - 2: Recovery (tonnes) by Composition and Levy Rate



From the chart it can be seen that the modelling suggests more garden waste becomes economic from $30 per tonne, while food waste needs a levy of between $60 and $80 to become economic. Diversion of textiles needs around $30 per tonne, while paper and plastic both need $40 per tonne, although increasing the levy to $90 leads to a further increase in these streams. Some timber and rubber is already potentially economic to recycle at $10 per tonne but more timber can be diverted once the levy reaches $90 per tonne. At $110 per tonne it becomes economic to divert biosolids (a component of the Potentially Hazardous classification).

The chart below shows the potential impact of changes to the levy on disposal at class 2-5 landfills. Based on figures provided by industry, and our own modelling, a levy on Class 2-5 landfills of $40 per tonne would be required to ensure it is economic to divert a large portion of construction and demolition waste from these facilities to recovery. At this rate it is likely to be economical to establish a sorting facility, which would pull out a range of types of material. For this reason, we have not modelled differentials between material types.

Figure E - 3: Class 2-5 Recovery and Disposal at $40 Levy Rate (tonnes per annum)



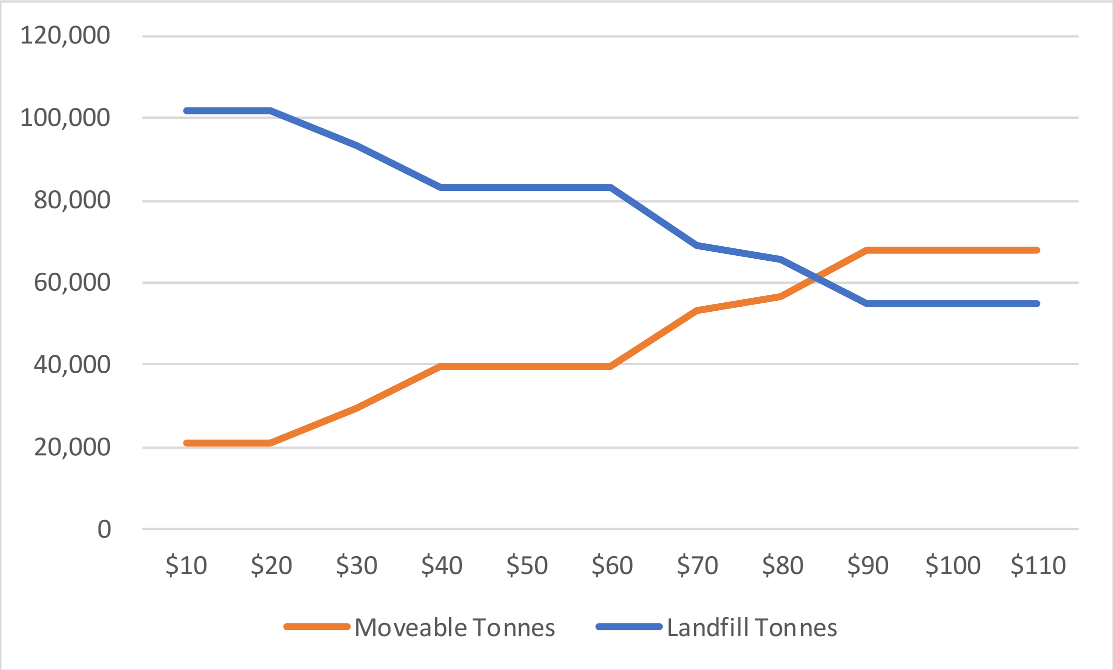
The materials going into Class 2-5 disposal facilities are dominated by soil and rock. Excluding these materials, approximately 80% of the remaining materials are able to be recovered. This is in line with rates being achieved in C&D recovery facilities elsewhere.[1]

E.1.3 Silverstream Results

The chart below shows the overall impact of tonnage to disposal at different levy rates for material into Silverstream Landfill.

[1] For example Green Gorilla's C&D recovery facility in Auckland claims a recovery rate of 79.8% https://www.greengorilla.co.nz/processing-facility/

Figure E - 4: Tonnes 'Moveable' by Landfill Levy Rate

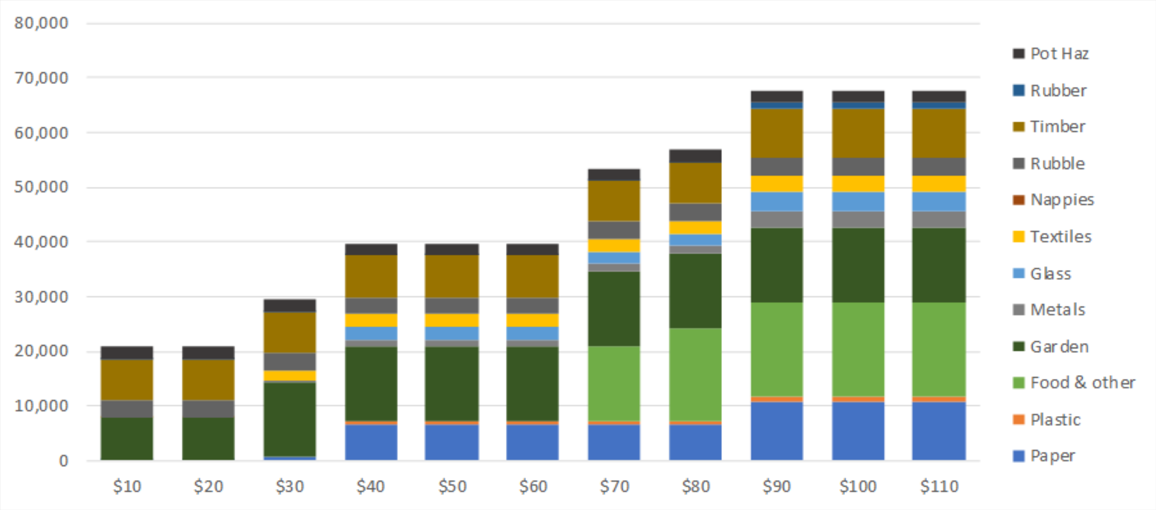


The chart shows a relatively steady progression of diversion as the rate increases. By the time the levy gets to $90 per tonne 55% of material is modelled as being potentially economically divertible.

It is worth noting that even at the current rate of $10 per tonne, some material is classified as 'moveable'. This is because price is not the only driver for diverting waste from landfill. Convenience, and the need for appropriate facilities to process diverted material, are also key factors. In our interviews with operators the lack of facilities for diversion, particularly for construction and demolition waste, was noted by some as the key impediment rather than price.

The chart below analyses the modelling outputs by levy rate and composition to illustrate at what point different materials become economic to recover.

Figure E - 5: Recovery (tonnes) by Composition and Levy Rate



From the chart it can be seen that the modelling suggests garden waste becomes economic from $30 per tonne as does biosolids, while food waste needs a levy of between $70 and $80 to become economic. Diversion of textiles needs around $30 per tonne, while paper and plastic both need $40per tonne; although increasing the levy to $90 leads to a further increase in both streams. Some timber and metal is already potentially economic to recycle at $10 per tonne but more timber can be diverted once the levy reaches $90 per tonne. At $90 per tonne more glass becomes economic to divert.

E.2.0 Conclusions

The study has yielded insight into the potential impacts of different rates of the levy on material that is sent to landfill in the Wellington landfill catchments.

The study draws out how different materials from different Activity Sources are likely to become economic to divert from landfill at different price points. This is key to understanding the dynamics of how a levy is likely to work.

In general, lower levy rates (around $30 a tonne) will incentivise diversion of heavy materials and those that have a relatively low cost of alternative processing and disposal. This includes C&D material such as rubble and concrete, and some timber and garden waste. Mid-level rates ($40-$60 a tonne) incentivise materials such as garden waste and textiles and some paper and plastic, while higher rates (over $70) are generally needed to incentivise diversion of materials such as food waste, biosolids, and some sources of timber, paper and plastic.

Contents

1.0 Introduction

Eunomia Research & Consulting is pleased to present this report to Hutt City Council to assist in determining the potential local impacts of changes to the waste disposal levy (the levy).

The study was undertaken jointly with Wellington City Council, Hutt City Council, and Porirua City Council (the Councils). Together the Councils own all of the Class 1 disposal capacity sited within Wellington region.

This information will support the Councils in planning for their landfill and resource recovery businesses and enabling informed and productive input to the Ministry for the Environment (MfE) regarding the local impact of potential levy changes.

The study has involved undertaking research and calculations to determine what, and how much, material could potentially be diverted from disposal if changes to the waste levy are introduced. The work focuses on estimated 'tipping points' for key organic and C&D material streams.

The objective of the study is to inform the Councils of the potential impacts of changes to the levy. We have looked at expanded application of the levy to class 2-5 landfills as well as changes to the rate of the levy.

For reasons of commercial confidentiality each Council is provided with a separate report. Each Council's report looks at impacts for their own catchment as well presenting aggregated information across the catchments for the three Class 1 landfills located in the region, and aggregated information on disposal in Class 2-5 facilities.

2.0 Methodology

2.1 Overview

Our methodology aimed to develop an enhanced understanding of the relative costs of disposal and diversion of waste materials faced by operators in the Wellington region catchment. This involved gathering information on actual costs faced by operators for different management options and then, based on the quantities of each type of material being disposed of to landfill, calculating the impacts that different rates of the levy would have on the economics of recovery and disposal.

2.2 Definitions

In developing our estimates we have used the following classifications:

2.2.1 Landfill Class

Our analysis used the different types of landfill classes developed by WasteMINZ[2]. The main focus is on 'Class 1' landfills (also called Municipal Solid Waste Landfills), which meet the definition of a 'disposal facility' under the Waste Minimisation Act 2008, and are subject to the waste disposal levy. We also consider Class 2-5 landfills as a group. The reason for this is because the definitions do not necessarily correspond directly to existing landfills which will have specific consent conditions, and because data on tonnage and composition of material going into these fills is limited, and so further distinction is unlikely to yield useful analysis. Refer to Appendix A.1.0 for landfill class Definitions

2.2.2 Activity Source:

This refers to the broad types of activity that generate waste. For the purposes of this exercise we used the classifications provided from the Waste Data Framework. These classifications are also used in generating waste composition data. The Activity Source classifications used are:

- Construction and Demolition (C&D)
- Industrial Commercial and Institutional (ICI)
- Landscaping
- Residential
- Kerbside
- Special

Refer to Appendix A.2.0 for Activity Source Definitions

[2] Technical Guidelines for Disposal to Land, published by the Waste Management Institute New Zealand (WasteMINZ), August 2018:

2.3 Research on Costs and Tonnages

The key methods used to develop our understanding of costs were:

- **Information from disposal facility operators.** This was the core data for determining disposal costs and tipping points. Information on total tonnages, charges and the tonnages disposed of at each rate of charge, Activity Source and Composition by Activity Source was sought from each of the disposal facilities. Information provided was analysed to enable it to be used in the model. Where the full range of information was not available assumptions were made.
- **Information held by Eunomia**. Eunomia holds a substantial amount of information from previous work we have done including work on the Wellington region Waste Assessment and Waste Management and Minimisation Plan and cost modelling done for the Councils in the region, as well as work done nationally on the waste levy. This provided a set of default assumptions, which could be modified by results from local research. Further data was analysed on cross boundary movements to arrive at a more detailed understanding of cost drivers.
- **Interview of collection, processing and disposal operators.** This was our primary research method and was aimed at trying to ensure that the costs used in the modelling were grounded in reality. 20 operators were contacted in the course of the research, with responses received from 10. A list of the operators contacted is provided in Appendix A.4.0. The main method of interview was telephone interview with e-mail follow ups. The interviews sought information on disposal pricing (for classes 1-5 disposal), and processing/ recovery costs, as well as what they viewed as the ‘tipping points’ where it would be economically viable to separate material. A copy of the pro-forma used for the interviews is provided in Appendix A.3.0. Informal discussion was also had with operators around costs of separate collections where relevant.
- **Cost Modelling**. Information provided by operators tended to lack granularity, particularly around collection costs for different material types. We undertook simple cost modelling of collection costs for different commercial waste streams as well as referencing previous cost modelling work undertaken by Eunomia for household collections in the Wellington region. The outcomes of the cost modelling were compared to information from the operators to ensure they were broadly realistic.

2.4 Landfill Diversion Model

A bespoke model was created to calculate the tonnage impacts of different levy rates on different materials and the points at which they might ‘move’ out of Class 1 landfill. The model is based on using composition data and Activity Source. For each material under each Activity Source, a cost of collection and disposal (including levy) was applied as well as a cost of separate collection and cost of alternative processing/recovery. When the cost of collection and disposal plus levy exceeded the cost of separate collection and alternative processing/recovery then the material would be identified by the model as ‘moveable’. In this way as different materials from different activity sources become ‘moveable’ at different rates, a picture is able to be constructed of the impact of changes to the rate of the levy.

This modelling exercise was undertaken for each landfill catchment and the results aggregated to give an overall result across the three catchments.

2.5 Data and Modelling Limitations

There are a number of limitations to the study that should be kept in mind when reviewing the outcomes. These include the following:

- **Moveable vs Diverted.** It should be emphasised that the modelling shows the point at which material becomes (on average) cheaper to recover than to landfill. This is not necessarily the same as the point at which the material will actually move from landfill to recovery (or alternative disposal). There are a range of factors which will mean that, in reality, diversion is likely to occur over a wider range of levy values for each material. These include:
  - The opportunity cost of changing to new systems or collection arrangements
  - Each operator has different cost structures, which means material becomes economic at different levy values
  - Within each classification, different product and material types from different sources have different costs of diversion
  - For some materials the issue may be more to do with a lack of facilities than with price - i.e. a material might be theoretically ‘moveable’ but practically not. Establishing a facility may divert materials that are ‘moveable’ at a range of price points (for example establishing an in-vessel composting facility might lead to more processing of both food and garden waste which are each moveable at different price points)

  Because the points at which material will move are complex and to a large extent uncertain at present, we have not attempted to show this in the modelling.

- **Incompleteness of Information.** Information was sought from a range of sources; however, information was not able to be obtained from all key sources. While some operators did not respond to our survey, others chose not to disclose financial information for reasons of commercial sensitivity. The most common response however was that operators were only able to provide rough (‘top of the head’) estimates of the costs per tonne, quantities at each applicable rate, and tipping points for different materials.[3] There was very little information provided on the differences between various grades of material, which will, in reality, be important for determining what is recovered.

- **Composition Data.** Available composition data breaks materials down into a standard number of classifications, which limits the granularity possible in any analysis. For example, plastics are classified as 'recyclable' or 'non-recyclable'. Recyclable plastics is defined as including plastic containers 1-7, but there is no further breakdown by polymer type. Some of these containers may not in fact be recyclable or there may be no viable market for those 'recyclable' plastics. On the other hand, plastic films and offcuts from commercial sources may be readily recyclable but would be classified as 'non-recyclable'. For the purposes of the modelling we assumed only the material classified as 'recyclable' or 'compostable' would be diverted in response to changes in the levy. This naturally limits the amount of material that can be diverted by a change in levy. Furthermore, different grades of material have different tipping points, depending on source, level of contamination etc. So different grades/sources will move at different points, but there is almost no data on this.
- **Market Prices and Costs.** The modelling uses commodity values and prices for recovered materials roughly in line with current market conditions. Given the volatility of markets, this is likely to change over time, which will affect when materials reach the tipping points.
- **No Waste Minimisation Effect.** For the purposes of the modelling we assumed that raising the levy would not result in a reduction in the total amount of waste produced.
- **Diversion to Other Forms of Disposal.** The model primarily identifies the price points at which it is economic for material to 'move' from landfill. It is not specific about where that material moves to. One option is that material could move to other forms of disposal (e.g. material could move from a Class 1 facility to a class 2-5 facility, which may have a lower rate of levy applied). We did not model the impact of differing rates of levy on different classes of landfill and the degree to which this might lead to material simply switching disposal facilities.
- **Facility Locations.** Our original intention was to model the impact of different facility locations on potential costs. However following discussions with operators it became clear that, at least within the Wellington/Hutt/Porirua catchments, facility location was not likely to be a major factor, and that given the uncertainties surrounding costs, modelling different facility locations would add complication without adding any accuracy (and could potentially make

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[3] This applies to those who were interviewed and provided responses to our questions, who were primarily the medium sized waste operators. We expect that the large waste companies have done some work in this area but are unwilling to share their findings as they consider them commercially sensitive.

estimates less accurate). Within the catchments, differences in location can be managed to a degree by optimising collection routes, using different vehicles, optimising loads etc.[4]

3.0 Key Assumptions and Base Data

3.1 Tonnages

Table 1: Class 1 Disposal Wellington Region

	Annual tonnes (rounded)
Southern	123, 400
Silverstream	122,600
Spicer	68,000
Total	**314,000**

3.2 Current Charges and Tonnage – Silverstream Landfill

The following pricing was supplied by HCC. The estimated annual tonnage breakdown was calculated based on monthly data supplied:

Table 2: Charges and Tonnages for Waste to Silverstream Landfill (2018)

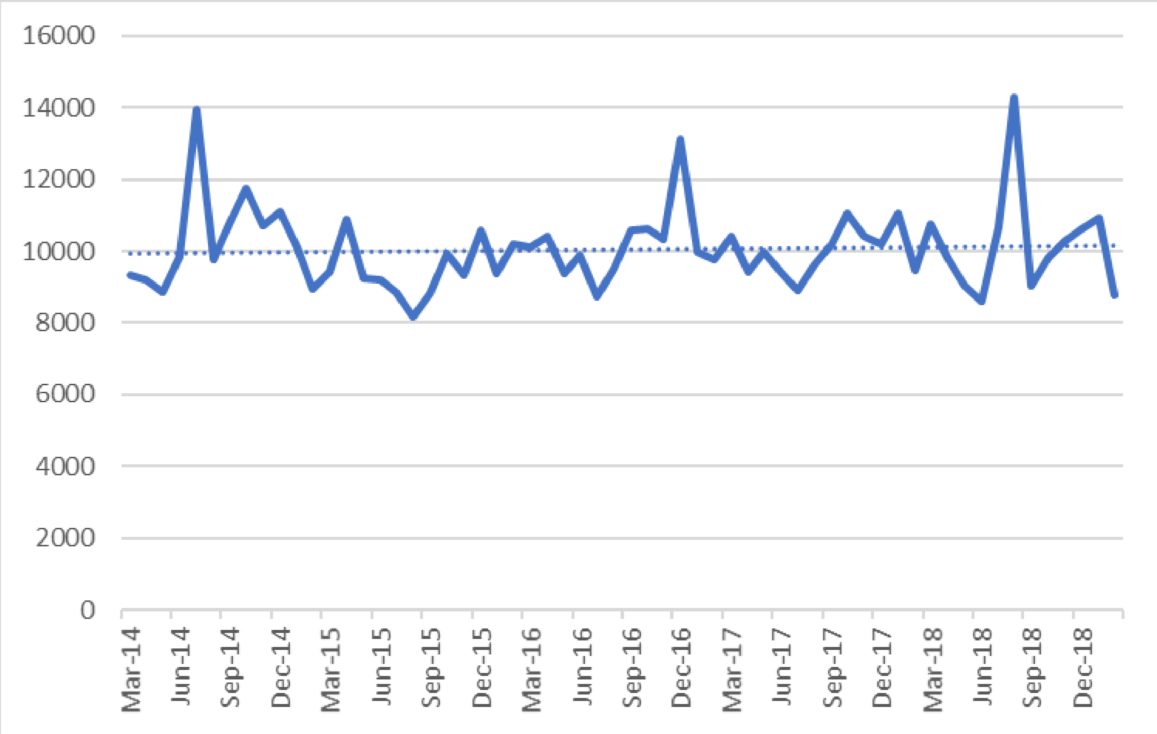
Classification	Price (incl GST and Levy)	Tonnes
Cover	$0.00	2,001
Organic	$123.00	611
General	$123.00	115,005

[4] It should be noted that for some materials, such as Construction and Demolition waste, there is a lack of existing facilities. Without identifying specific sites for potential facilities any analysis by location is unlikely to yield useful information.

Asbestos and Animals	$160.00	1,922
Polystyrene	$320.00	30
Biosolids & Special	$153.00	3060

Analysis was also conducted on the tonnages over time to check that current tonnages are a reasonable reflection of tonnage into the landfill. This showed that tonnages to Silverstream landfill have remained almost perfectly stable over the last 4-5 years. This is shown in the chart below. The blue dotted line is the linear trend line.

Figure 1: Tonnes to Silverstream Landfill March 2014- Dec 2018



3.3 Composition

The following composition data was supplied by HCC from analyses by Waste Not Consulting in 2014. The overall composition was calculated from compositions provided for the General waste stream and the Transfer Station.

Table 3: Composition by Activity Source at Silverstream Landfill

	C&D	ICI	Landscaping	Residential	Kerbside	Special
Paper Recyclable	2.4%	11.8%	1.7%	7.9%	12.9%	
Paper Non-recyclable	0.3%	1.7%	0.0%	0.2%	2.0%	
Paper Subtotal	**2.6%**	**13.5%**	**1.7%**	**8.2%**	**14.9%**	

Plastics Recyclable	0.1%	1.2%	0.0%	0.4%	1.3%	
Plastics Non-recyclable	3.1%	23.4%	0.9%	7.3%	7.9%	
Plastics Subtotal	**3.1%**	**24.6%**	**0.9%**	**7.7%**	**9.2%**	
Putrescibles Kitchen/food	0.0%	9.3%	0.0%	1.8%	30.4%	
Compostable greenwaste	1.6%	3.8%	83.4%	9.0%	13.6%	
Non-compostable greenwaste	0.4%	1.2%	5.2%	3.4%	1.5%	
Putrescibles Multi/other	0.0%	5.4%	0.0%	0.1%	4.3%	
Putrescibles Subtotal	**2.0%**	**19.7%**	**88.6%**	**14.3%**	**49.8%**	
Ferrous metals: primarily ferrous	0.4%	1.3%	0.5%	1.6%	1.2%	
Ferrous metals: multi/other	0.7%	2.6%	0.3%	4.0%	0.1%	
Ferrous metals Subtotal	**1.2%**	**3.9%**	**0.7%**	**5.5%**	**1.3%**	
Non-ferrous metals Subtotal	**0.0%**	**0.7%**	**0.0%**	**0.4%**	**0.8%**	
Glass Recyclable	0.1%	3.5%	0.0%	0.5%	4.9%	
Glass multi/other	0.3%	1.4%	0.0%	2.3%	0.3%	
Glass Subtotal	**0.3%**	**4.9%**	**0.0%**	**2.8%**	**5.2%**	
Textiles Clothing/textile	0.1%	1.9%	0.0%	4.6%	1.3%	
Textiles Multi/other	1.9%	8.4%	0.4%	18.8%	1.9%	
Textiles Subtotal	**2.0%**	**10.3%**	**0.4%**	**23.4%**	**3.2%**	
Nappies Subtotal	**0.0%**	**5.2%**	**0.0%**	**0.4%**	**8.5%**	
Rubble Cleanfill	9.4%	0.8%	0.4%	0.2%	0.0%	
Rubble Plasterboard	9.4%	0.1%	0.0%	0.8%	0.6%	
Rubble Multi/other	7.7%	2.3%	5.2%	0.7%	5.0%	
Rubble Subtotal	**26.5%**	**3.2%**	**5.6%**	**1.8%**	**5.6%**	
Timber Reusable	1.9%	0.6%	0.0%	0.4%		
Timber Untreated & unpainted	6.4%	3.9%	0.0%	0.6%	0.0%	
Timber Multimaterial/other	53.6%	5.7%	1.6%	32.1%	0.4%	
Timber Subtotal	**61.9%**	**10.3%**	**1.6%**	**33.1%**	**0.4%**	
Rubber Subtotal	**0.4%**	**2.9%**	**0.3%**	**2.1%**	**0.1%**	
Pot hazard Subtotal	**0.0%**	**0.7%**	**0.0%**	**0.1%**	**1.0%**	**100.0%**
TOTAL	**99.9%**	**99.7%**	**99.9%**	**100.0%**	**100.0%**	**100.0%**

3.4 Levy Rates

It was assumed that the structure of the levy would consist of a rate for Class 1 landfills and a separate lower rate for other facility types. We did not make any differentiation in respect of the levy rate for Class 2-5 landfills. To date the Ministry for the Environment has not publicly presented any proposals for how a levy is likely to be structured, other than commenting that it is likely to apply to more types of disposal facilities as well as go up.

It was also assumed that clean material, which is currently accepted at Class 1 facilities for engineering works and does not attract a levy, would not be levied.

Levy rates were modelled at $10 increments up to $110. Beyond this point, no further diversion was modelled to take place (although this could change if information is received that would change any of the key assumptions). The model could use any increment - $10 increments were used for the purposes of practicality – it was felt that any finer increments would likely give a false sense of accuracy while larger increments might conceal useful data.

4.0 Regional Results

4.1 Class 1 Disposal

This section aggregates the results for the three landfill catchments in the region.

4.1.1 Tonnes 'Moveable' by Landfill Levy Rate

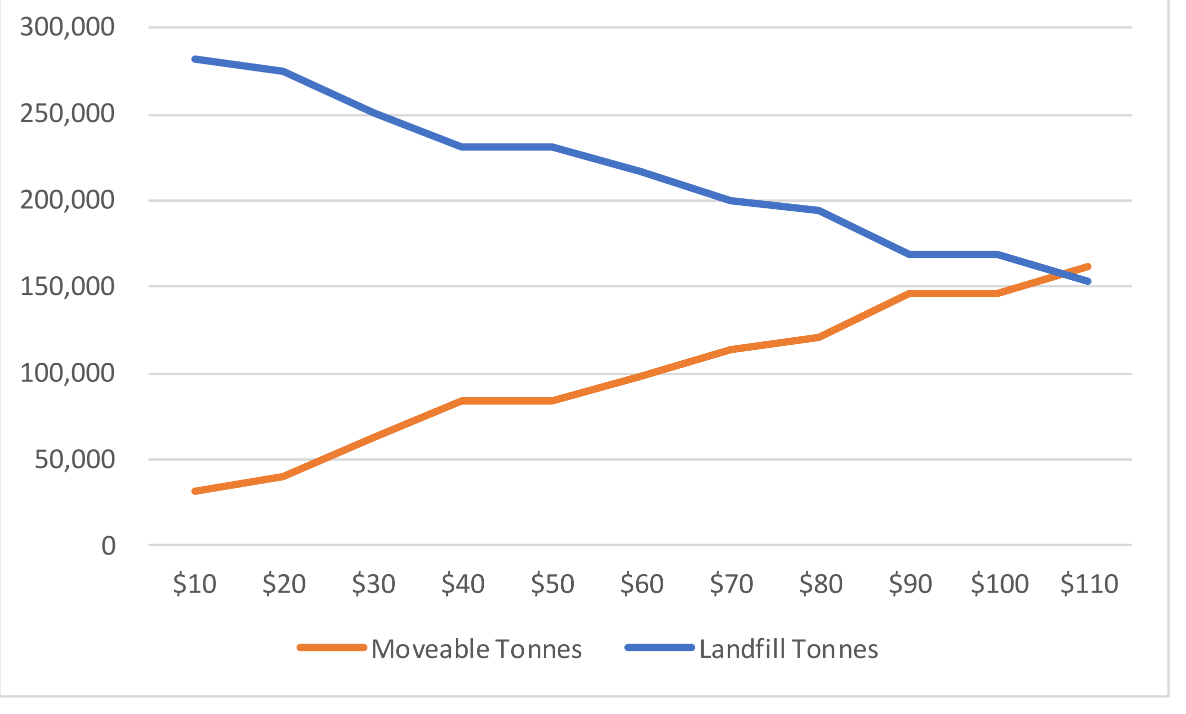
The table and chart below show the tonnage that will be incentivised to be diverted from landfill at each levy rate up to $110. It should be noted that this is not the same as what would actually be diverted (due to it being impossible to capture everything for diversion that could theoretically be).

Table 4: Tonnes 'Moveable' by Landfill Levy Rate

Levy Rate	Moveable Tonnes	Landfill Tonnes	% Moveable
$10	31,605	282,394	10%
$20	39,657	274,341	13%
$30	63,155	250,843	20%
$40	83,581	230,417	27%
$50	83,581	230,417	27%

$60	97,308	216,690	31%
$70	113,601	200,398	36%
$80	119,921	194,077	38%
$90	145,538	168,460	46%
$100	145,538	168,460	46%
$110	161,549	152,449	51%

Figure 2: Tonnes 'Moveable' by Landfill Levy Rate



The chart shows a relatively steady progression of diversion as the rate increases. By the time the levy gets to $110 per tonne fractionally more material is potentially able to be economically diverted than landfilled.

It is worth noting that even at the current rate of $10 per tonne, some material is classified as 'moveable'. This is because price is not the only driver for diverting waste from landfill. Convenience, and the need for appropriate facilities to process diverted material, are also key factors. In our interviews with operators, the lack of facilities for diversion, particularly for construction and demolition waste, was noted by some as the key impediment rather than price.

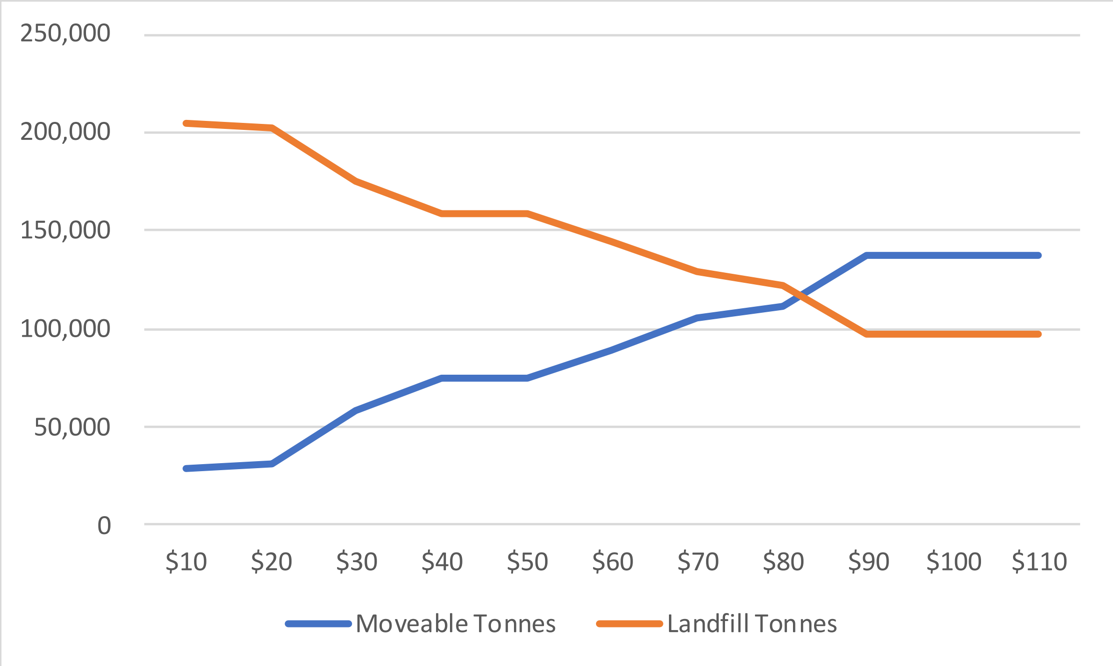
4.1.2 Tonnes Moveable excluding Special Waste

Special wastes such as contaminated soil and asbestos have no realistic alternatives to landfill disposal at present. The presence of these materials therefore lowers the overall diversion rate. The table and chart below exclude these from the calculations.

Table 5: Tonnes 'Moveable' by Landfill Levy Rate Excl. Special Waste

Levy Rate	Moveable Tonnes	Landfill Tonnes	% Moveable
$10	29,419	204,580	13%
$20	31,376	202,623	13%
$30	58,461	175,538	25%
$40	75,305	158,694	32%
$50	75,305	158,694	32%
$60	89,032	144,967	38%
$70	105,325	128,674	45%
$80	111,645	122,354	48%
$90	137,262	96,737	59%
$100	137,262	96,737	59%
$110	137,262	96,737	59%

Figure 3: Tonnes 'Moveable' by Landfill Levy Rate Excl. Special Waste

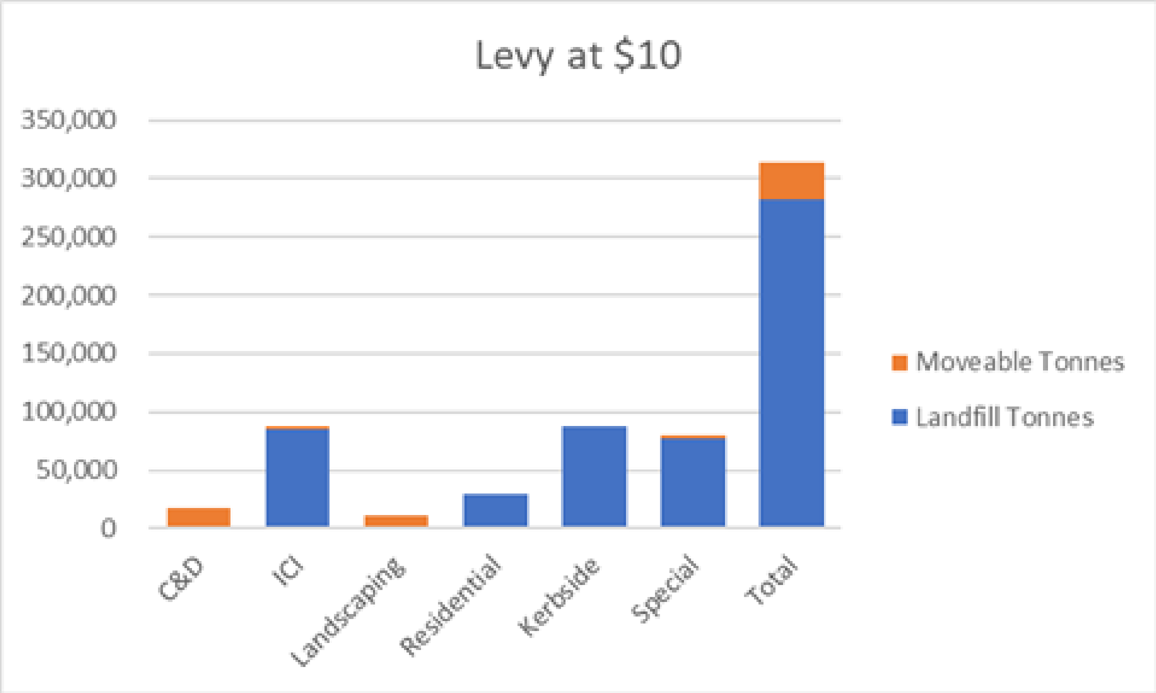


Excluding Special waste from the calculations increases the overall potential recovery from 51% to 59%. Some special waste (biosolids) is considered recoverable, but a relatively high rate of levy is required to influence this as the cost of processing can be relatively high compared to landfill.

4.1.3 Impact of Levy Rate by Activity Source

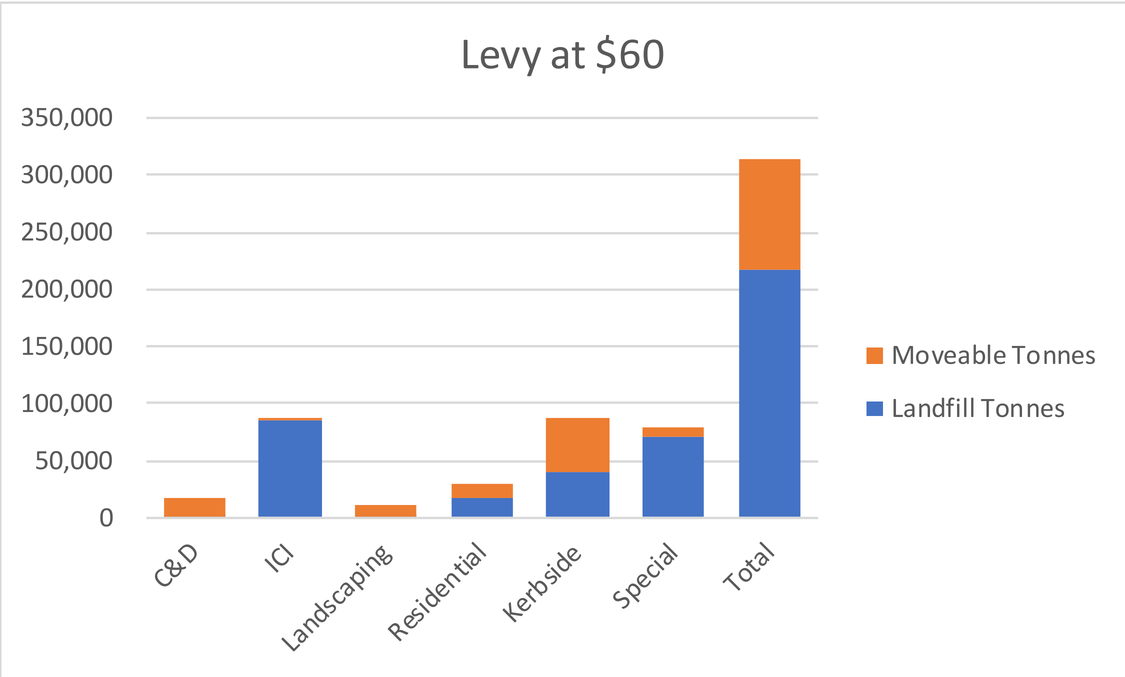
The next series of charts show the diversion by Activity Source. The model calculates the diversion for each $10 increment however, for simplicity of presentation, the impacts at the $10, $60 and $110 rates are shown below.

Figure 4: Tonnes Diverted by Activity Source at $10 per Tonne



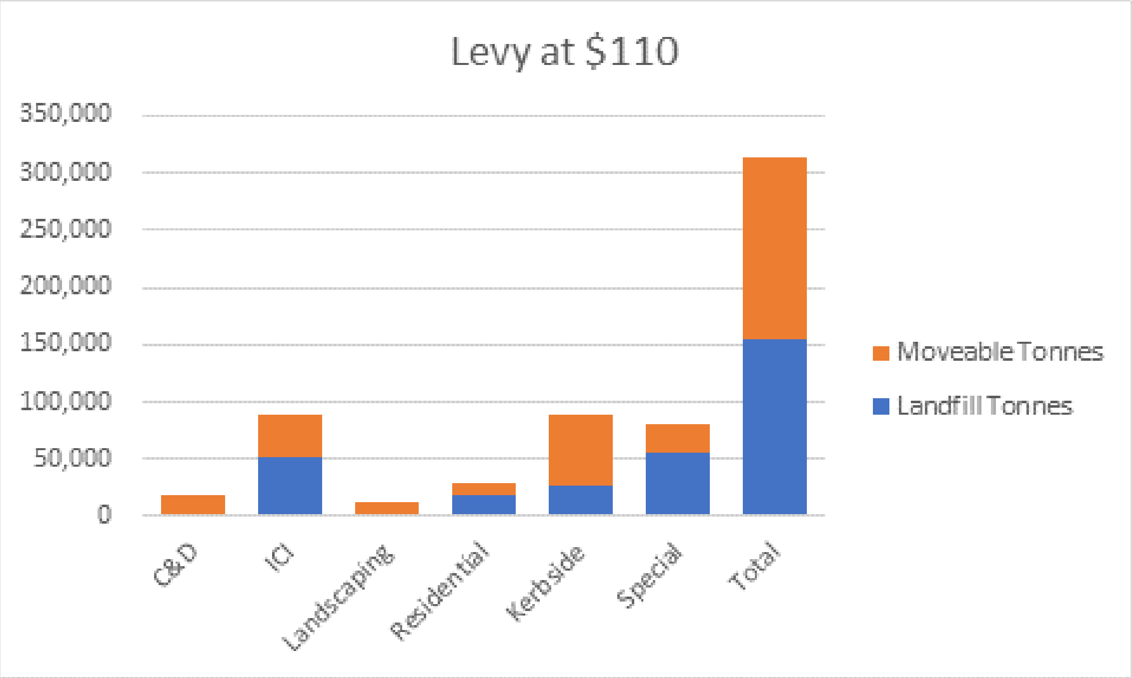
At $10 per tonne there is some C&D and landscaping waste (green waste) that could be diverted but for other streams the price incentive still favours landfill.

Figure 5: Tonnes Diverted by Activity Source at $60 per Tonne



At $60 per tonne the levy is starting to have a notable impact, particularly on kerbside and residential waste streams.

Figure 6: Tonnes Diverted by Activity Source at $110 per Tonne

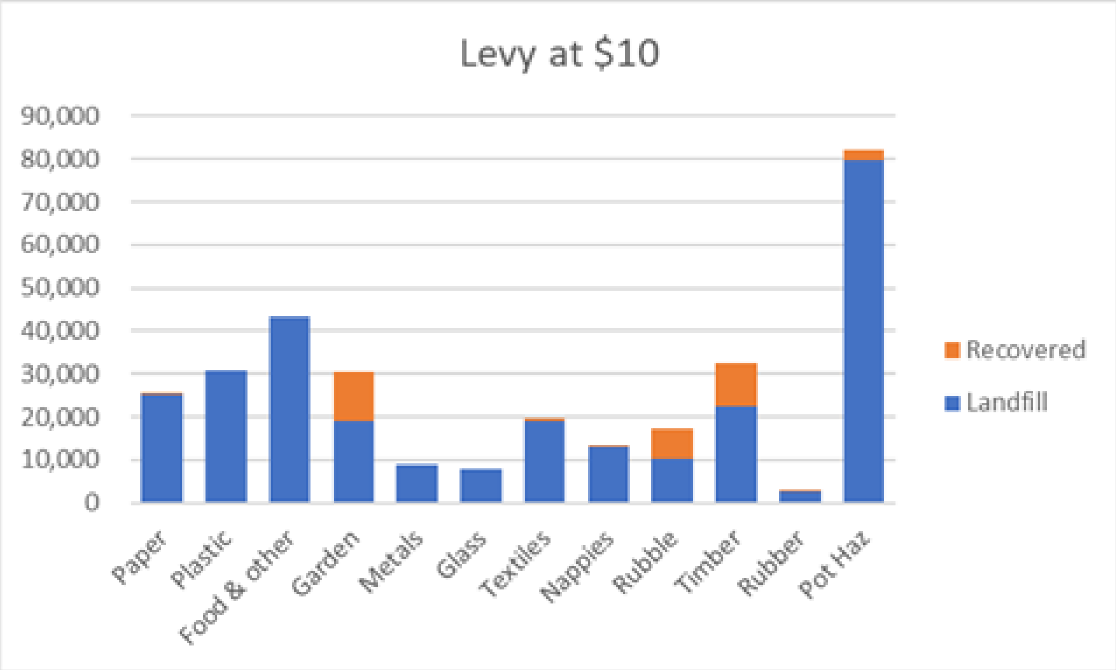


At $110 ICI and special waste diversion has kicked in and more kerbside material is also being diverted. The biggest single tonnages in terms of Activity Source is from kerbside sources followed by ICI.

4.1.4 Impact of Levy Rate by Material Type

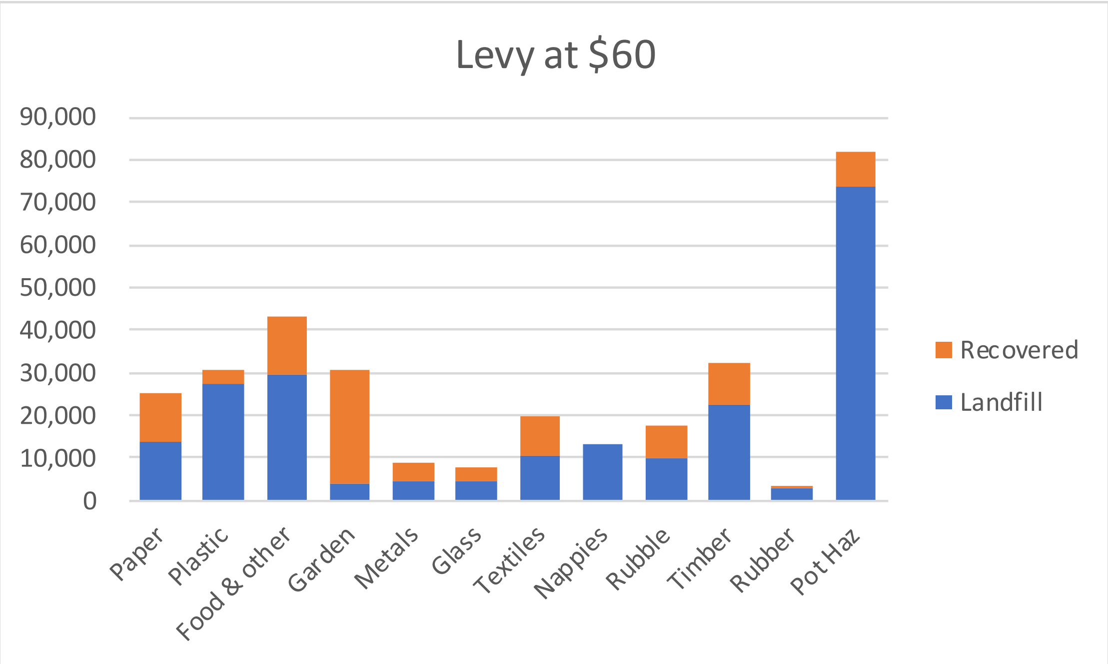
The next series of charts shows diversion of waste by material type for $10, $60 and $110 rates.

Figure 7: Tonnes Diverted by Material Type at $10 per Tonne



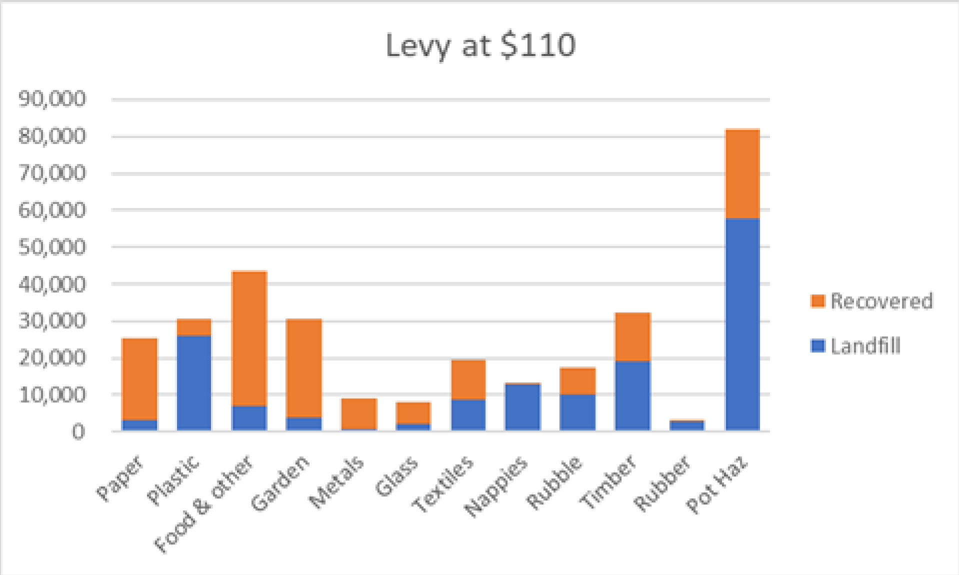
At $10 per tonne some garden waste and C&D materials such as rubble and timber are being landfilled that could, in theory, be economically diverted. It is likely that there are other impediments to their diversion such as convenience and lack of processing facilities.

Figure 8: Tonnes Diverted by Activity Source at $60 per Tonne



At $60 per tonne the modelling suggests that portions of most material types will become economical to recover. The key materials include garden waste, food waste, paper, and textiles.

Figure 9: Tonnes Diverted by Activity Source at $110 per Tonne



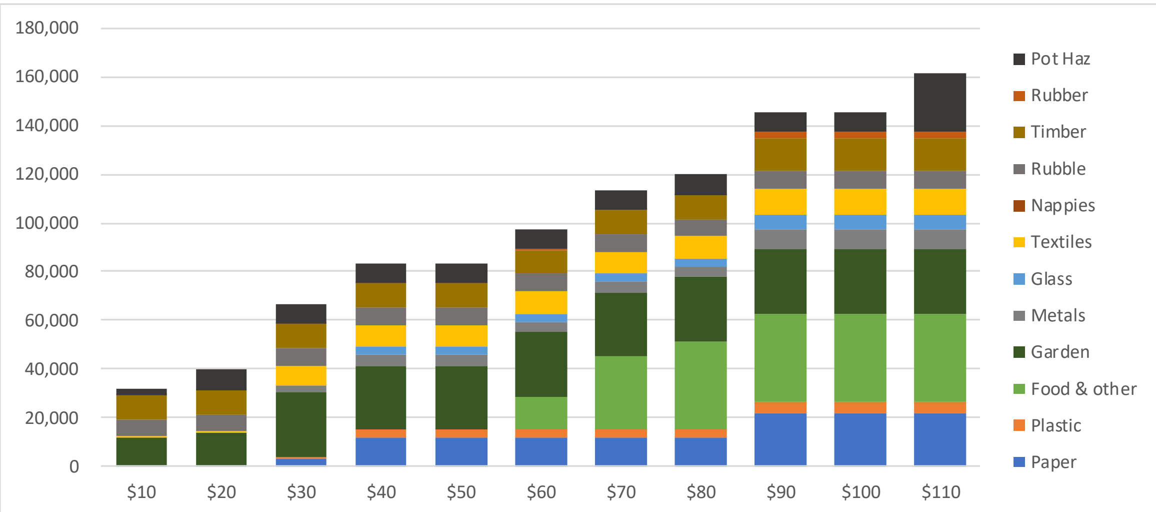
Raising the levy to $110 per tonne makes it economical to recover most food and garden waste, paper, metals and glass.

It should be noted that in the modelling there are a series of step changes for material type and source (which have different cost structures), and for each landfill catchment, but these tend to smooth out when the data is aggregated.

4.1.5 Recovery by Composition and Levy Rate

The chart below analyses the modelling outputs by levy rate and composition to illustrate at what point different materials become economic to recover.

Figure 10: Recovery (tonnes) by Composition and Levy Rate



From the chart it can be seen that the modelling suggests garden waste becomes economic from $30 per tonne, while food waste needs a levy of between $60 and $80 to become economic. Diversion of textiles needs around $30 per tonne, while paper and plastic both need $40 per tonne, although increasing the levy to $90 leads to a further increase in these streams. Some timber and rubber is already potentially economic to recycle at $10 per tonne but more timber can be diverted once the levy reaches $90 per tonne. At $110 per tonne it becomes economic to divert biosolids.

4.2 Class 2-5 Disposal

Data on Class 2-5 disposal is limited.

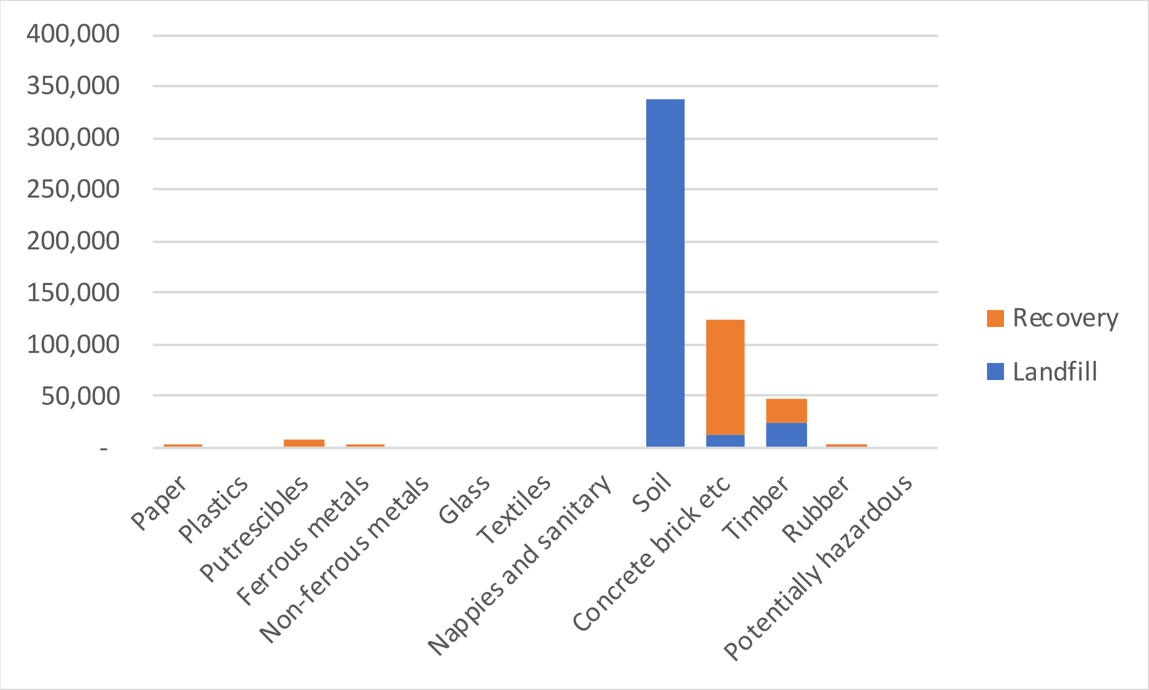
Based on figures provided by industry, and our own modelling, a levy on Class 2-5 landfills of $40 per tonne would be required to ensure it is economic to divert a large portion of construction and demolition waste from these facilities to recovery. At this rate it is likely to be economical to establish a sorting facility, which would pull out a range of types of material. For this reason, we have not modelled differentials between material types. The table and chart below show the estimated tonnage and composition of material that could be recovered.

Table 6: Class 2-5 Recovery and Disposal at $40 Levy Rate (tonnes per annum)

	Recovery	Landfill
Paper	516	-
Plastics	0	-
Organics	8,263	-
Ferrous metals	516	-
Non-ferrous metals	0	-
Glass	0	-
Textiles	0	-
Nappies and sanitary	0	-
Rubble (of which)	0	462,708
Soil	0	337,736
Concrete brick etc	112,475	12,497
Timber	24,013	24,013

Rubber	258	258
Potentially hazardous	0	-
Total	**146,042**	**374,505**
Total landfilled excluding soil		*35,424*
Total recovered and landfilled excluding soil	*176,126*	
Recovery Rate excl soil	*80%*	

Figure 11: Class 2-5 Recovery and Disposal at $40 Levy Rate (tonnes per annum)



The materials going into Class 2-5 disposal facilities are dominated by soil and rock. Excluding these materials, approximately 80% of the remaining materials are able to be recovered. This is in line with rates being achieved in C&D recovery facilities elsewhere.[5]

[5] For example Green Gorilla's C&D recovery facility in Auckland claims a recovery rate of 79.8% https://www.greengorilla.co.nz/processing-facility/

5.0 Silverstream Results

5.1 Class 1 Disposal

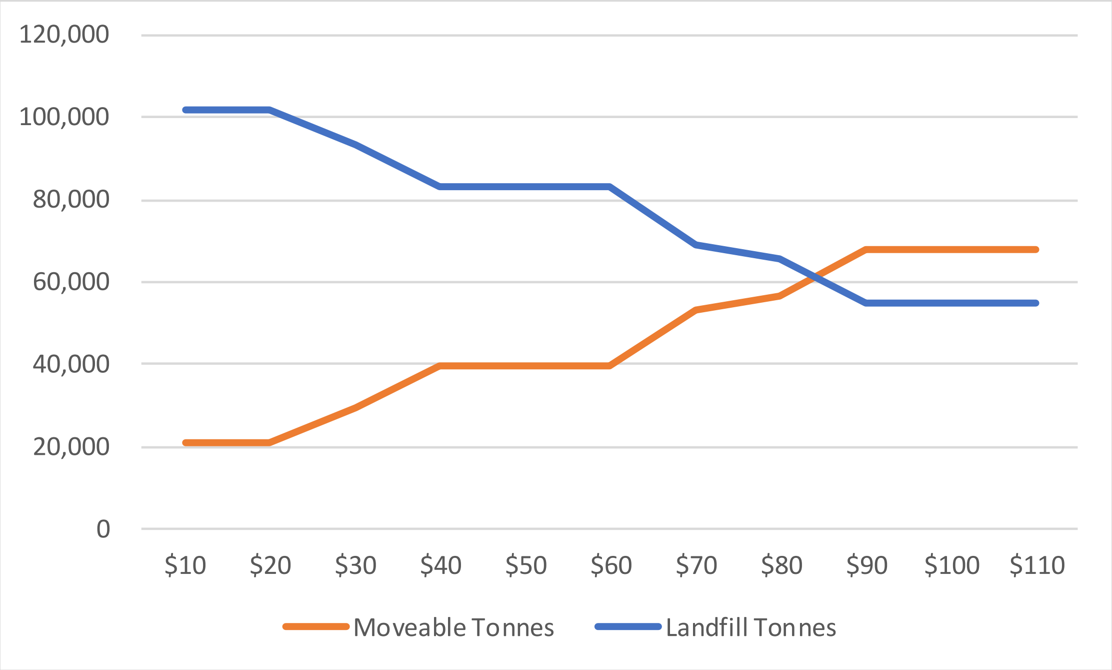
5.1.1 Tonnes 'Moveable' by Landfill Levy Rate

The table and chart below show the tonnage that will be incentivised to be diverted from landfill at each levy rate up to $110. It should be noted that this is not the same at what would actually be diverted (due to it being impossible to capture everything for diversion that could theoretically be).

Table 7: Tonnes 'Moveable' by Landfill Levy Rate

Levy Rate	Moveable Tonnes	Landfill Tonnes	% Moveable
$10	20,851	101,778	17%
$20	20,851	101,778	17%
$30	29,467	93,162	24%
$40	39,633	82,996	32%
$50	39,633	82,996	32%
$60	39,633	82,996	32%
$70	53,430	69,199	44%
$80	56,744	65,885	46%
$90	67,705	54,924	55%
$100	67,705	54,924	55%
$110	67,705	54,924	55%

Figure 12: Tonnes 'Moveable' by Landfill Levy Rate



The chart shows a relatively steady progression of diversion as the rate increases. By the time the levy gets to $90 per tonne 55% of material is being diverted.

It is worth noting that even at the current rate of $10 per tonne, some material is classified as 'moveable'. This is because price is not the only driver for diverting waste from landfill. Convenience, and the need for appropriate facilities to process diverted material, are also key factors. In our interviews with operators the lack of facilities for diversion, particularly for construction and demolition waste, was noted by some as the key impediment rather than price.

5.1.2 Tonnes Moveable excluding Special Waste

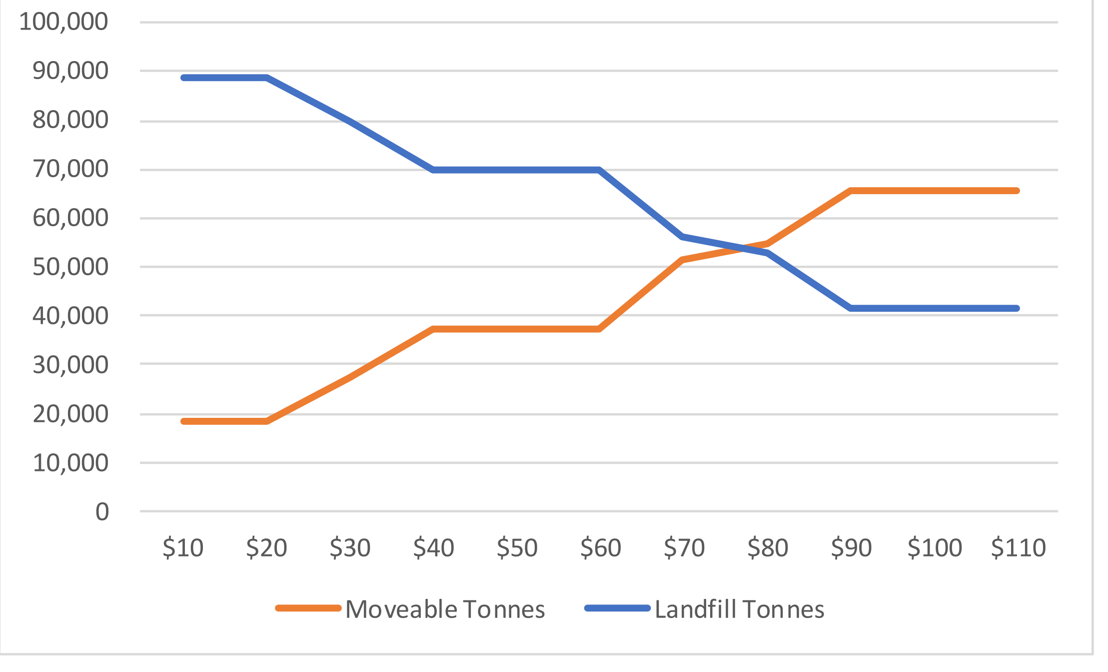
Special wastes such as contaminated soil and asbestos have no realistic alternatives to landfill disposal at present. The presence of these materials therefore lowers the overall diversion rate. Silverstream landfill accepts reasonable quantities of these materials (including biosolids) and this impacts the overall rates. The table and chart below exclude special waste from the calculations.

Table 8: Tonnes 'Moveable' by Landfill Levy Rate Excl. Special Waste

Levy Rate	Moveable Tonnes	Landfill Tonnes	% Moveable
$10	18,665	88,631	17%
$20	18,665	88,631	17%

$30	27,281	80,015	25%
$40	37,447	69,849	35%
$50	37,447	69,849	35%
$60	37,447	69,849	35%
$70	51,244	56,052	48%
$80	54,558	52,739	51%
$90	65,519	41,778	61%
$100	65,519	41,778	61%
$110	65,519	41,778	61%

Figure 13: Tonnes 'Moveable' by Landfill Levy Rate Excl. Special Waste

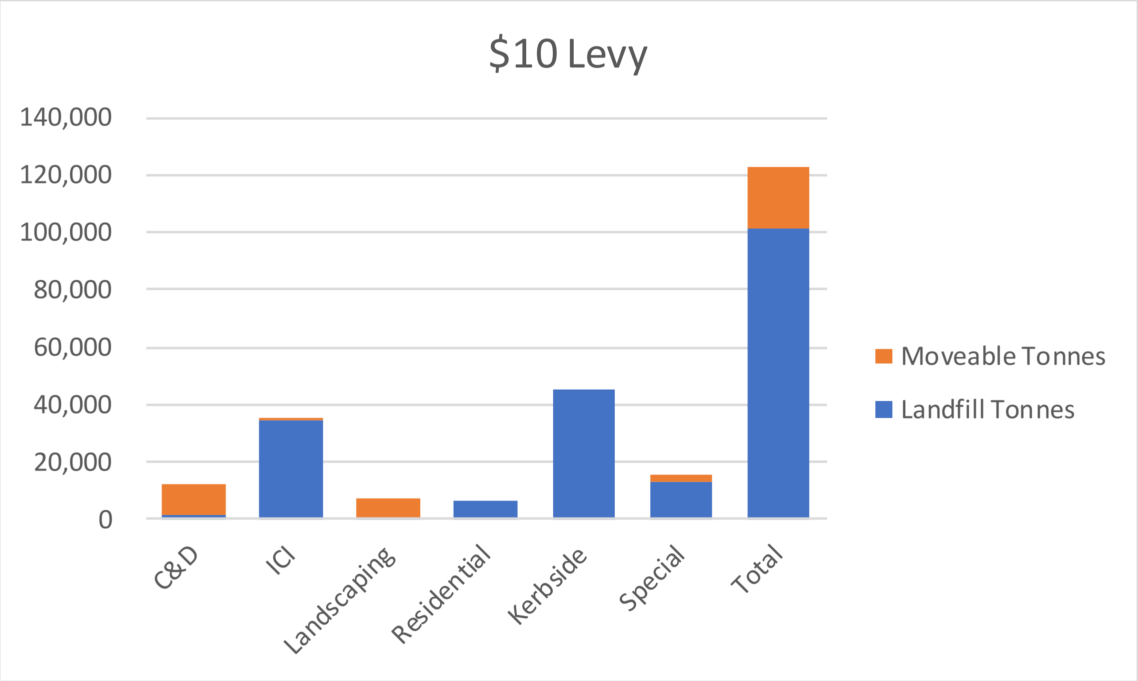


Excluding Special waste from the calculations increases the overall potential recovery from 55% to 61%. Some special waste (biosolids) is considered recoverable.

5.1.3 Impact of Levy Rate by Activity Source

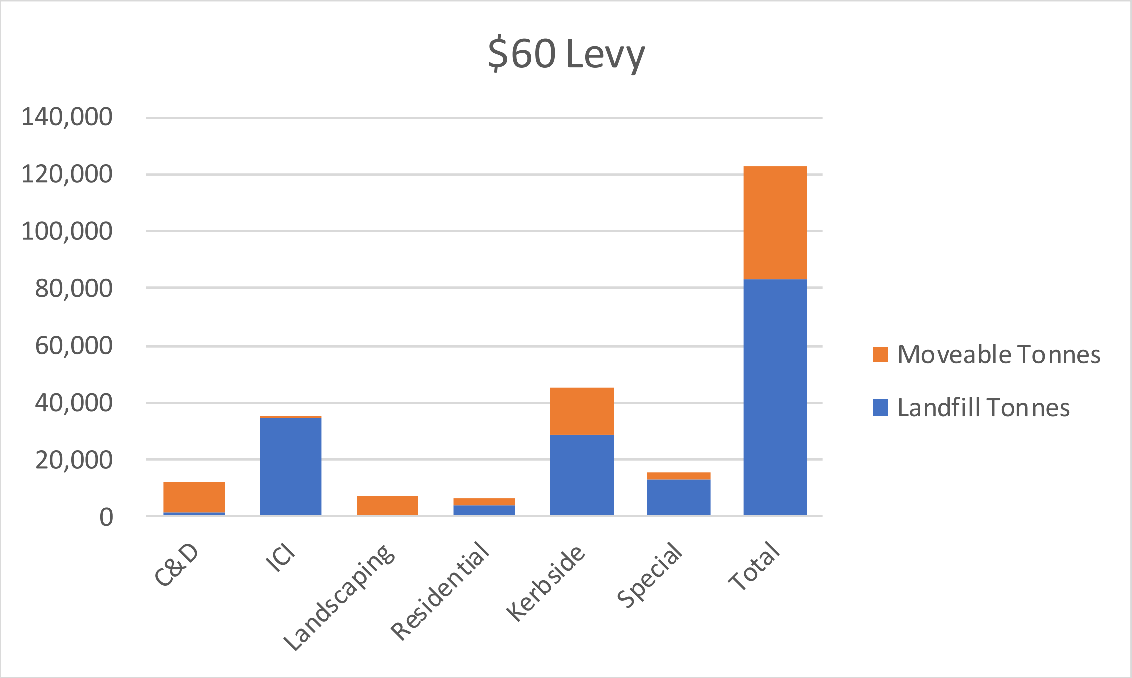
The next series of charts show the diversion by Activity Source. The model calculates the diversion for each $10 increment; however, for simplicity of presentation, the impacts at the $10, $60 and $110 rates are shown below.

Figure 14: Tonnes Diverted by Activity Source at $10 per Tonne



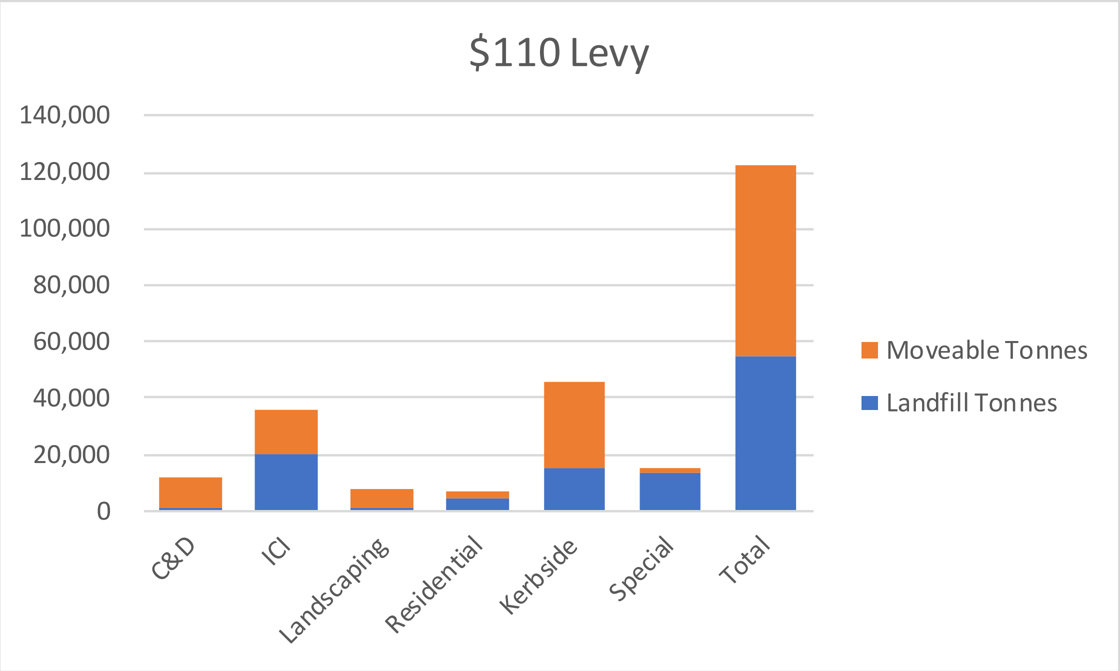
At $10 per tonne there are reasonable amounts of C&D and landscaping waste (green waste) and some special waste (biosolids) that could be diverted, but for other streams the price incentive still favours landfill.

Figure 15: Tonnes Diverted by Activity Source at $60 per Tonne



At $60 per tonne the levy is starting to have a notable impact, particularly on kerbside and residential waste streams.

Figure 16: Tonnes Diverted by Activity Source at $110 per Tonne

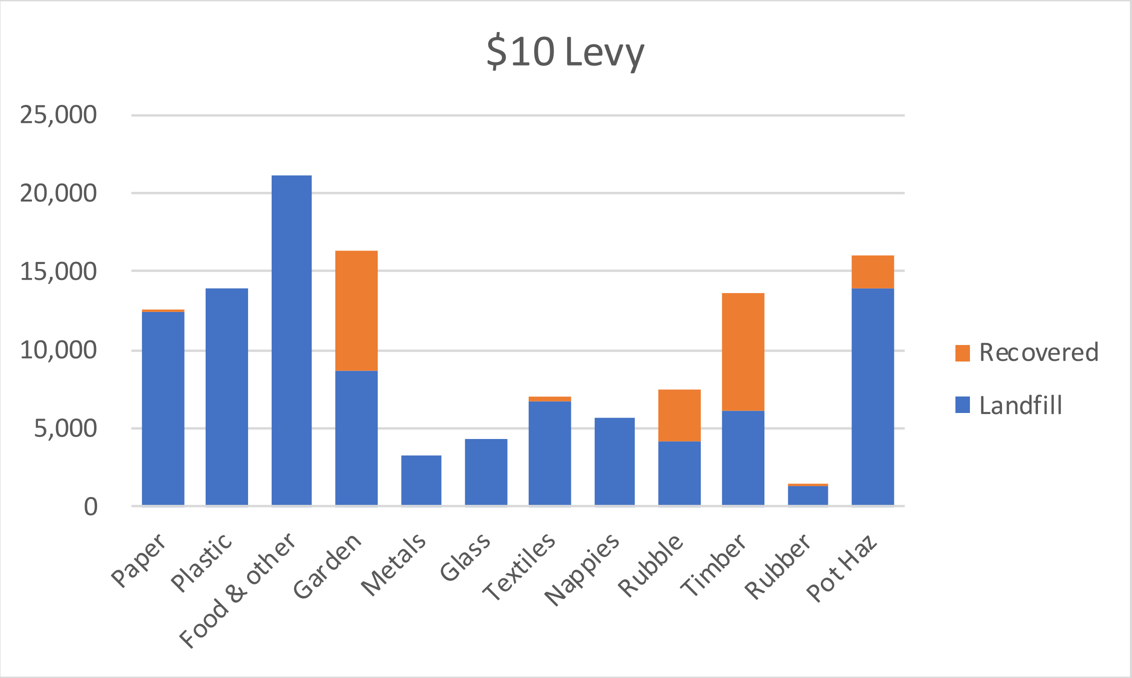


At $110 ICI and special waste diversion has kicked in. The biggest single tonnages in terms of Activity Source is from kerbside sources followed by ICI.

5.1.4 Impact of Levy Rate by Material Type

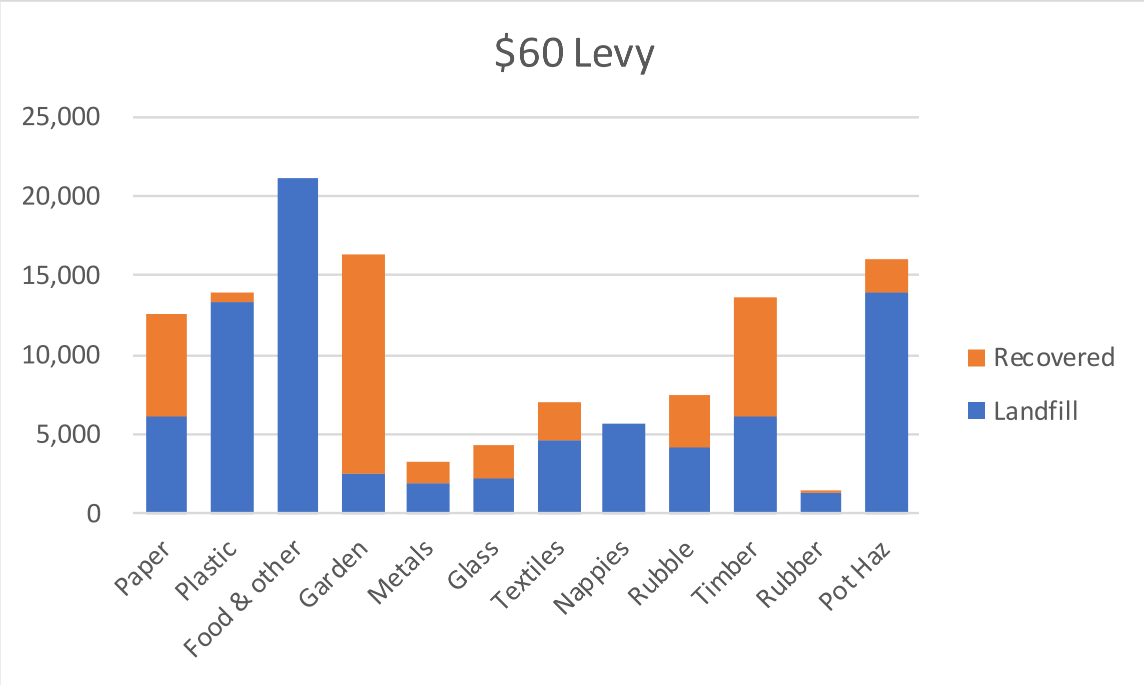
The next series of charts shows diversion of waste by material type for $10, $60 and $110 rates.

Figure 17: Tonnes Diverted by Material Type at $10 per Tonne



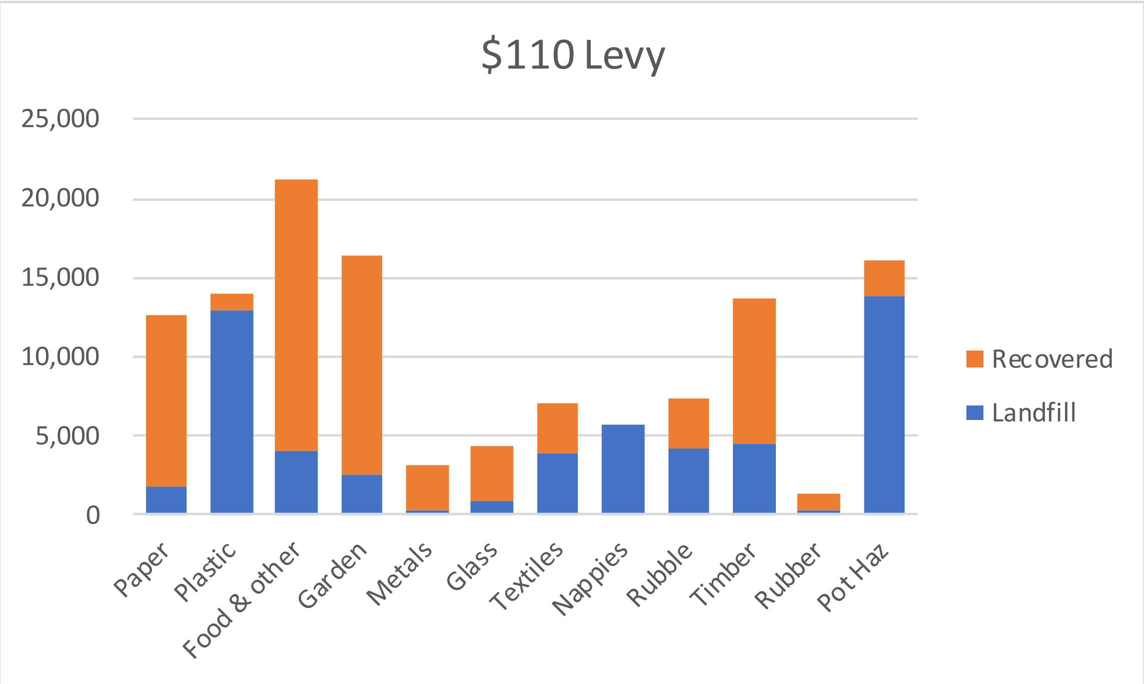
At $10 per tonne some garden waste, and construction and demolition materials such as rubble and timber, are being landfilled that could, from a price driver perspective, be diverted. It is likely that there are other impediments to their diversion such as convenience and lack of processing facilities.

Figure 18: Tonnes Diverted by Activity Source at $60 per Tonne



At $60 per tonne the modelling suggests that portions of most material types will become economical to recover. The key materials include garden waste, paper, plastic metal and textiles. The largest single material type to landfill however is food waste and other organics, which are not incentivised to be recovered with a $60 levy.

Figure 19: Tonnes Diverted by Activity Source at $110 per Tonne

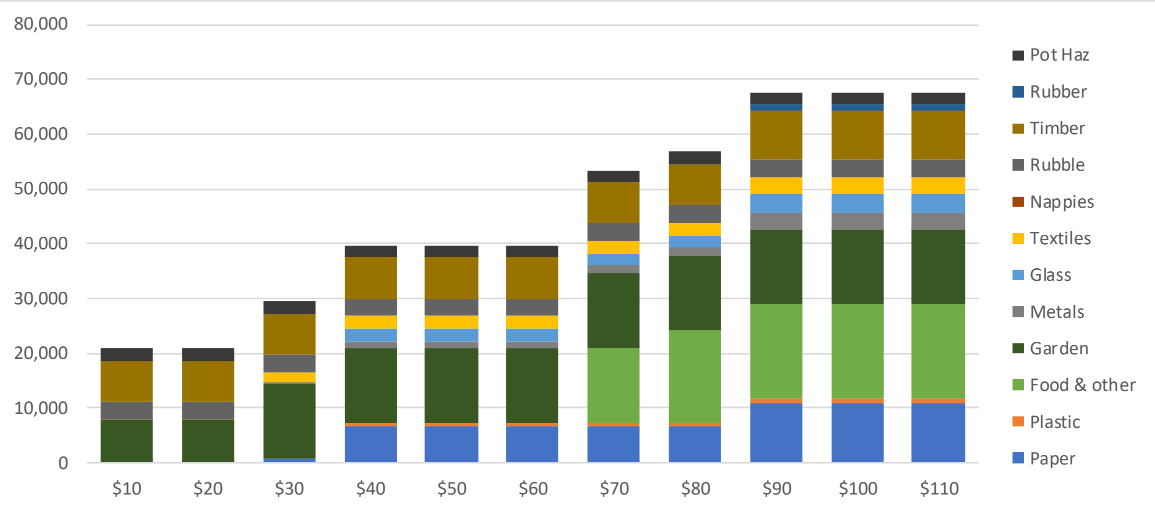


Raising the levy to $110 per tonne makes it economical to recover most paper, food and garden waste, metals and glass. However, there are still large quantities of plastic, nappies and potentially hazardous material where price is not a driver for recovery. This is likely to be because there are no practical alternatives to landfill for these materials at present (other than avoiding these materials or products in the first place).

5.1.5 Recovery by Composition and Levy Rate

The chart below analyses the modelling outputs by levy rate and composition to illustrate at what point different materials become economic to recover.

Figure 20: Recovery (tonnes) by Composition and Levy Rate



From the chart it can be seen that the modelling suggests garden waste becomes economic from $30 per tonne, while food waste needs a levy of between $70 and $80 to become economic. Diversion of textiles needs around $30 per tonne, while paper and plastic both need $40 per tonne; although increasing the levy to $90 leads to a further increase in the paper stream. Some timber and rubber is already potentially economic to recycle at $10 per tonne but more timber can be diverted once the levy reaches $100 per tonne. At $90 per tonne more glass becomes economic to divert.

6.0 Discussion

The study has highlighted a number of key factors including the following:

- The modelling makes it clear that (as would be expected) overall, the higher the rate of the levy the more material will be incentivised to ‘move’ from landfill disposal.
- Organic waste, particularly from kerbside (and also biosolids), is likely to be a key waste stream where diversion from landfill will occur. The levy will have the most significant impact in terms of diversion if it is set at a rate that enables the recovery of these materials to be driven by price.
- The movement of waste is driven by different ‘tipping points’ at which different materials become economic to divert

- There is considerable uncertainty around where the actual tipping points for materials 'moving' from disposal lie. Partly this is because few in the industry appear to have done detailed costings on the economics, or if they have, they are unwilling to share the outcomes. Partly it is also that, because in some cases facilities (such as processing food waste, C&D sorting, or sorting ICI waste streams) are not yet available at scale, the modelling is relying to a large extent on 'theoretical' costs for recovery, rather than prices actually being offered in the market. However, a large part of the uncertainty also lies with the fact that the drivers for diversion are complex. As noted earlier, convenience and a lack of facilities for recovery (particularly for C&D waste) are key factors. Other factors include variable cost of disposal accessed by operators (due to bulk rates, competition between disposal facilities etc.), the potential impact of government policies such as product stewardship and the NZ Emissions Trading Scheme (NZETS), variable costs of transport depending on distance and bulk density, and competition between operators (who may cross-subsidise services).
- In pure tonnage terms, there is likely to be significant potential for diversion from construction and demolition activity, however, the lack of reliable data on Class 2-5 landfill tonnage and composition limits the reliability of the estimates for these fills.
- Implementing an operator licensing regime (including data collection) would substantially improve the available data for making the type of estimates developed by this study and would therefore likely make any such future estimates more accurate.

6.1 Impact of the NZETS

The NZETS imposes costs on landfill disposal based on estimates of the quantity of methane generated by each landfill. It is often suggested that higher ETS costs would have the same effect as raising the levy and that the impact of the two need to be considered together. In our view there is some truth to this, but the effect is more complex and will vary by individual landfill as it depends on how each landfill is able to manage its ETS liabilities.

At present the high-level gross liability for landfills from the NZETS is about $29 per tonne[6], which is not insignificant. However, there are two key ways landfills are able to reduce their liabilities. The first is through capture and destruction of methane emissions. Landfills are allowed to claim up to 90% capture, which can, in effect, reduce the liabilities by 90% (i.e. down to about $2.90). The second is to apply for a unique emissions factor (UEF) which could potentially reduce the liability from the default emissions factor (which is currently 1.19 tonnes of CO_2e per tonne of waste). UEFs can

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[6] Based on a carbon price of $24.70 and a default emissions factor of 1.19 tonnes of CO_2e per tonne of waste.

be applied for to cover specific waste streams entering a landfill. For example, if Silverstream were to have a UEF for the special wastes (Asbestos, contaminated soil, and biosolids) the UEF would be substantially lower than the default and could reduce liabilities accordingly.

Even if the cost of carbon under the NZETS increases substantially, the ability of some landfills to significantly reduce their liabilities will mean that, for those landfills, the NZETS will not be a large price driver. For example, if the cost of carbon were to go to $100 a tonne this would only mean a liability of $11.90 per tonne for a landfill with 90% gas capture – which, based on our modelling, would not be enough to drive substantial movement of waste away from landfill.

In our view the impact of the NZETS will be primarily to drive material from landfills with low gas capture rates/high emissions to landfills with high gas capture rates/low emissions (which can effectively avoid most of the liability), rather than driving disposal away from landfills in a general sense. This could therefore shift the distribution of material between landfills in the Wellington region.

Recent changes announced by the Government to the NZETS include:

- The government will regulate the supply of New Zealand Units (NZUs) into the NZ market. In effect Government will be placing a cap what emissions are allowed. They can then actively reduce the amount of NZUs in the market over time, meaning that emissions correspondingly reduce, and the cost of NZUs will increase.
- The release of NZUs into the market will be done through auction (these could be monthly or quarterly).
- Once released into the market, NZUs can be traded on a secondary market. This would allow prices to fluctuate in line with demand as they are traded.
- Government will abolish the $25 price ceiling no later than 31 December 2022.
- The price ceiling will be replaced by a 'cost containment reserve'. In effect, the Government will hold NZUs in reserve that can be released into the market if demand is pushing price too far out of line with world prices, and allow them to control prices to an extent.
- The Government has also enabled a floor price through setting an auction reserve price.
- There are also supporting proposals to improve compliance, make the outcomes more transparent to the public through publishing emissions and removals data for individual scheme participants, and improving governance through a governance work programme

The changes are likely to improve the functioning of the NZETS markets and result in higher but more stable and predictable pricing, but will not alter the way that the scheme works for landfill emissions.

7.0 Conclusions

The study has yielded insight into the potential impacts of different rates of the levy on material that is sent to landfill in the Wellington landfill catchments.

The study draws out how different materials from different activity sources are likely to become economic to divert from landfill at different points. This is key to understanding the dynamic of how a levy is likely to work.

In general, lower levy rates (around $30 a tonne) will incentivise diversion of heavy materials and those that have a relatively low cost of alternative processing and disposal. This includes C&D material such as rubble and concrete, and some timber and garden waste. Mid-level rates ($40-$60 a tonne) incentivise materials such as garden waste and textiles and some paper and plastic, while higher rates (over $70) are generally needed to incentivise diversion of materials that are lighter, more costly to process, or have lower product value, such as food waste, biosolids, and some sources of timber, paper and plastic.

The main differentiation in the impacts between the three landfills are a result of the different landfill pricing structures and composition of material landfilled. Through our discussions with industry it was not found that location was a factor within the relatively tight Wellington catchment.

The study also highlighted however a lack of reliable detailed data, in particular in regard to material handled by the private sector, and a degree of uncertainty within the industry about how changes in disposal cost might impact their business.

APPENDICES

A.1.0 Landfill Class Definitions

The following definitions are from the Technical Guidelines for Disposal to Land, published by the Waste Management Institute New Zealand (WasteMINZ), August 2018:

Class	Common Name	Waste Material
1	Municipal Solid Waste Landfill	Non-hazardous waste. Typically mixed waste from multiple sources and containing a high content of organic material; may include waste cited for classes 2, 3, 4 and 5. May be developed for specific industrial wastes (for example, monofills or residual waste sites).
2	C&D Landfill	Unsorted/uncontrolled construction and demolition material. May be developed for specific industrial wastes (for example, monofills or residual waste sites).
3	Managed Fill	Inert material (e.g. selected inert construction or demolition material) or soils with specified maximum contaminant concentrations greater than applicable local background concentrations.
4	Controlled Fill	Inert material (e.g. selected inert construction or demolition material) or soils with trace element concentrations greater than applicable regional background concentrations.
5	Clean Fill	Virgin excavated natural material (VENM).

A.2.0 Activity Source Definitions

The following definitions are from the *New Zealand Waste Data Framework, VOLUME ONE: Definitions and Protocols for Waste to Disposal Facilities.* Prepared for Waste Management Institute New Zealand By Eunomia Research & Consulting Ltd and Waste Not Consulting Ltd. August 2015:

ACTIVITY SOURCE	Generally, the type of activity that generates the waste being recorded. The Activity Sources for use in National Waste Data Framework are listed below and defined in the following rows: • Domestic Kerbside • Residential • ICI • Landscape • C&D • Special • VENM
Construction and Demolition (C&D)	Waste produced directly or incidentally by the construction and demolition industries. This includes building materials such as insulation, nails, plasterboard and timber, roofing materials, as well as waste originating from site preparation, such as dredging materials, tree stumps, and rubble.
Domestic Kerbside	Domestic-type waste collected from residential premises by the local council (or by a contractor on behalf of the council), or by private waste collections (through kerbside or similar collection).
Industrial/commercial/ institutional (ICI)	Waste from industrial, commercial and institutional sources (i.e. supermarkets, shops, schools, hospitals, offices). For the purposes of these protocols Illegal dumping and litter should be classified under ICI
Landscaping	Waste from landscaping activity and garden maintenance (including public gardens), both domestic and commercial, as well as from earthworks activity, unless the waste contains only VENM, or unless the earthworks are for purposes of construction or demolition of a structure.

Residential	All waste originating from residential premises, other than that covered by any of the other Activity Source categories. For example, a person arriving with a trailer load after cleaning out the garage would classify as residential waste.
Special	Waste that fits into significant, identifiable waste streams, usually from a single generator. Special wastes are those that cause particular management and/or disposal problems and need special care. This includes, but is not restricted, to hazardous and medical wastes (including e-wastes). It also includes any substantial waste stream (such as biosolids, infrastructure fill or industrial waste) that significantly affects the overall composition of the waste stream, and may be markedly different from waste streams at other disposal facilities.
Virgin Excavated Natural Material (VENM)	Material that when discharged to the environment will not have a detectable effect relative to the background and comprising virgin excavated natural materials, such as clay, soil, and rock that are free of: • manufactured materials such as concrete and brick, even though these may be inert •combustible, putrescible, degradable, or leachable components • hazardous substances or materials (such as municipal solid waste) likely to create leachate by means of biological breakdown; • any products or materials derived from hazardous waste treatment, stabilisation or disposal practices; • materials such as medical and veterinary waste, asbestos, or radioactive substances that may present a risk to human health if excavated; • contaminated soil and other contaminated materials; • liquid waste.

A.3.0 Operator Interview Pro-forma

Step	Content
Introduction	Eunomia has been commissioned by the Wellington, Porirua and Hutt City Councils to undertake research into potential impact of proposed changes to the waste disposal levy
	We are contacting operators to survey what their current costs of disposal and of recovery are. We are hoping you will be willing to assist in supplying us information
	All information supplied to Eunomia will be held in the strictest confidence. Data supplied will be aggregated and/or anonymised to protect commercial sensitivity
	We are happy for you to contact officers at one of the councils to confirm our appointment - we can supply names.
	We are happy to sign a non-disclosure agreement if requested
Question 1.	Do you send waste to a class 1 (levied disposal facility) landfill or landfills you do not own?
Question 2.	What is the rate you currently pay for disposal to each landfill for general waste? (Excluding GST and Levy, but including ETS charges)
Question 3.	What is the rate you currently pay for disposal to each landfill for Special waste? (Excluding GST and Levy, but including ETS charges)
Question 4.	What is the rate you currently pay for disposal to each landfill for other types of waste (please define - e.g. polystyrene, asbestos etc.)? (Excluding GST and Levy, but including ETS charges)
Question 5.	How many tonnes do you send to each landfill at each rate annually?
Question 6.	Do you send material to recovery/or do you recover material yourselves?
Question 7.	What rates to you pay/charge/receive for each type of material recovered? Do you have bulk rates as well as standard gate rates?
Question 8.	Approximately how many tonnes do you recover at each rate annually?
Question 9.	Do you have a view as to what rate a landfill levy on class 1 disposal should be to enable more material to be recovered?
Question 10.	Do you have a view as to what rate a landfill levy on class 2-5 disposal should be to enable more material to be recovered?
Question 11.	Do you have anything else to add?
Finish	That is all the questions - thank you for your time. The information will be extremely valuable in determining the potential impacts of changes to the levy.

A.4.0 Organisations Contacted

Waste Management NZ Ltd

EnviroWaste Services Ltd

Daily Waste

Woods Waste

JJ Richards & sons NZ Pty Ltd

Fulton Hogan Ltd

Earthcare Environmental Ltd

C&D Landfill (Burrell Demolition)

T&T Landfills Ltd

Quality Demolition

Ward Demolition

Interwaste

OJI

Composting NZ

Organic Waste Management

IT recycla

RemarkIT

Macaulay Metals,

Sims Pacific Metals

Metallic Sweepings

A.5.0 Key Modelling Values

The values shown below are the key values used in determining the tipping points for different materials from different Activity Sources. Values are derived from a range of sources including operator interviews, published data including advertised gate fees, and cost modelling.

Collection Costs

	Approximate Collection Costs Per tonne
Kerbside Rubbish	$50
Kerbside Recycling	$150
Kerbside Food	$175
Kerbside Green	$90
Residential (Skips)	$165
Residential (Inorganic/Bulky)	$150
ICI	$50
C&D	$22
Landscaping	$165

Processing Costs

	Approximate Processing Costs Per tonne
Organics – greenwaste	$60
Organics – food waste	$130
Organic – sludge	$130 - $160
Mixed waste sorting	$125
C&D Sorting	$55
Recyclables processing (including income)	$30