

# Waste Futures – Green Island Landfill Closure



## Economic Assessment

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→ **The Power of Commitment**



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# Contents

<b>1.</b>	<b>Introduction</b>	<b>1</b>
<b>2.</b>	<b>The strategic economic case</b>	<b>1</b>
<b>3.</b>	<b>The ongoing need for landfill capacity</b>	<b>2</b>
<b>4.</b>	<b>Alternatives for landfill capacity provision</b>	<b>2</b>
4.1	Long-term options	2
4.2	Medium-term options	2
4.2.1	Export waste out of Dunedin	3
4.2.2	Increase capacity at the existing Green Island landfill	4
<b>5.</b>	<b>Further benefits of Green Island extension</b>	<b>4</b>
<b>6.</b>	<b>Conclusions</b>	<b>5</b>
<b>7.</b>	<b>Limitations</b>	<b>5</b>
7.1	Assumptions	5

# 1. Introduction

This report demonstrates the strategic economic case for continuing to operate Green Island Landfill for approximately a further six years to provide for medium-term waste disposal while a new long-term waste disposal option is developed.

As part of Dunedin's wider commitment to reducing carbon emissions and reducing waste going to landfill, the Dunedin City Council (Council) has embarked on the Waste Futures Programme to develop an improved comprehensive waste management and diverted material system for Ōtepoti Dunedin. The Waste Futures Programme includes the roll out of an enhanced kerbside recycling and waste collection service for the city from July 2024. The new service will include collection of food and green waste.

To support the implementation of the new kerbside collection service, the Council is planning to make changes to the use of Green Island landfill site in coming years.

The proposed changes include:

- planning for the closure of the Green Island landfill, which is coming to the end of its operational life
- developing an improved Resource Recovery Park (RRPP) to process recycling, and food and green waste
- providing new waste transfer facilities to service a new Class 1 landfill currently planned for a site south of Dunedin, at Smooth Hill.

The resource consents for the new Smooth Hill landfill are subject to appeal. Depending on the outcome of this appeal process, and the time needed to undertake baseline monitoring, preparation of management plans, landfill and supporting infrastructure design and construction, the Council anticipates that the new Class I landfill facility, won't be able to accept waste until 2027/2028 at the earliest.

In the interim, the Council therefore plans to continue to use Green Island landfill for waste disposal. Based on Dunedin's current waste disposal rates, it is likely that that the Green Island landfill can keep accepting waste for another six years (until about 2029). Between now and then, and as it continues to fill up, the landfill will be closed and capped in stages. When the landfill closes completely, there will be opportunities for environmental enhancements and public recreational use around the edge of the site. Examples could be planting restoration projects and new walking and biking tracks beside the Kaikorai Estuary. Long term use and public access to the landfill site post-closure will be determined in consultation with Te Rūnanga o Ōtākou, the local community and key stakeholders.

As current Otago Regional Council (ORC) resource consents needed to operate a landfill at Green Island expire in October 2023, the Council is now applying to ORC for replacement resource consents to continue to use the landfill until it closes completely, and waste disposal can be transferred to a new landfill facility. The replacement consents relate to ground disturbance, flood defence and discharges to land, water, and air. The site is subject to an operative designation (D658) in the Proposed Second-Generation Dunedin City District Plan (2GP) for the purpose of Landfilling and Associated Refuse Processing Operations and Activities.

The development of the new RRPP and waste transfer facilities at Green Island does not form part of the replacement consent applications. Resource consents for the development and operation of the RRPP will be applied for following the completion of design work and technical assessments later in 2023.

## 2. The strategic economic case

The most well-accepted definition of economics is that it is ***how we use limited resources to maximise utility***. Utility is simply a technical word that means wellbeing or even happiness. Resources include clean air and water, a resilient climate, wind (for energy for example), finances, labour, intellectual property or anything else that we value. Economics therefore considers how we use our resources in a way that maximises the benefits and minimises the costs of the choices we make.

This report does not provide a detailed estimation of all the costs and benefits associated with expanding the capacity of the Green Island landfill. This is because the strategic economic case, as set out below, is relatively simple to demonstrate:

1. There is an ongoing need for landfill capacity to meet the needs of Dunedin residents.
2. Long-term, the proposed solution is likely to be a new landfill at Smooth Hill.
3. In the medium-term, extra capacity is needed. This capacity could be provided by exporting waste to other landfills, but that has other negative impacts including higher costs, increased congestion and emissions due to more trucks travelling longer distances, and potential job losses in Dunedin.
4. Adding capacity at the existing Green Island landfill site until a new landfill is finalised is comparably low cost, within achievable timeframes, and with limited further impact on the environment or on visual amenity as demonstrated by the other completed technical assessments.

The remainder of this brief report sets out this case in greater detail.

### **3. The ongoing need for landfill capacity**

The Council has embarked on the Waste Futures Project to develop an improved comprehensive waste management and diverted material system for Dunedin. Nevertheless, the GHD technical assessment of waste volumes sent to the Green Island landfill show an average of around 89,000 m<sup>3</sup> of void consumed per year between 2019 and 2021.<sup>1</sup> Even with waste diversion and reduction plans in place, it is estimated that around 76,000 m<sup>3</sup> of void will be consumed each year to 2030.

With the current resource consents for landfill operations at Green Island due to expire on 1 October 2023, a landfill solution is required for the medium term (up to five years) and the long term (beyond five years).

### **4. Alternatives for landfill capacity provision**

Three locational options exist for dealing with landfill waste in the medium to long term. These are to build a new landfill at a different location, export waste out of Dunedin to other landfills in neighbouring areas, or increase capacity at Green Island. Various combinations of three locational options are set out in scenarios examined in the Design Report:<sup>2</sup>

#### **4.1 Long-term options**

- Build a new landfill.

The long-term plan is for development of a new landfill at Smooth Hill. Resource consent was granted for the new landfill in September 2022, and remains subject to appeal. However, development of the new landfill is expected to take until at least 2027, well beyond the 1 October 2023 expiry of the resource consents at the current site.<sup>3</sup>

#### **4.2 Medium-term options**

- Export (truck) waste out of Dunedin to other landfill(s)
- Increase capacity at the existing Green Island landfill.

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<sup>1</sup> *Green Island Landfill Closure: Design Report*, Chapter 4, completed by GHD for Dunedin City Council, February 2023.

<sup>2</sup> *Ibid.*, Chapter 4

<sup>3</sup> Accessed on 12 December 2022: <https://www.odt.co.nz/news/dunedin/dcc/consent-granted-smooth-hill-landfill>

## 4.2.1 Export waste out of Dunedin

Exporting waste has been explored as an option to fill the gap between expiry of the Green Island resource consents and a new landfill being operationalised. An alternative municipal landfill site is the AB Lime site at Winton, an approximately 388 kilometre round-trip from the Smooth Hill site proposed for the new landfill, and an even longer distance from the current Green Island site.

Hauling waste this distance will manifestly be costly, and will have significant impacts on emissions, congestion and road wear-and-tear compared to any options located closer to the population the waste disposal route services.

Council advises that out-of-district disposal in the past has been expected to cost in excess of \$150/tonne, including consolidation, transport and disposal costs (exclusive of Waste Disposal Levy and Emissions Trading scheme costs). Analysis undertaken by Council in the past indicates that the out-of-District disposal would need to reduce to around \$100/tonne (for consolidation, transport and disposal) to be financially competitive with the option of building a new landfill at Smooth Hill. In other words, the full cost of disposal outside of Dunedin would have to fall by around one third to compare favourably with the Smooth Hill option.

These values have been updated by the Council, but further quantitative comparison is not available due to commercial sensitivity. However, for the purposes of the current analysis, the appropriate comparison is relative difference between the out-of-District option and the costs of disposal at the current Green Island site. It is possible to get a high level understanding of how these options compare by considering the comparison between the out-of-District option and the Smooth Hill option set out above. The Green Island landfill site would unequivocally compare favourably in terms of cost to the new Smooth Hill site given the much lower capital costs and better proximity to Dunedin's main population areas. By extension then, because the **Green Island site** is more cost-effective than the Smooth Hill site, it is likely to be **at least 33% more cost-effective than the out-of-District option**.

There are other costs associated with out-of-District disposal compared to local disposal. These include, firstly, **higher emissions**. Work by Waste Management New Zealand aimed at cutting the emissions of its fleet included the introduction of electric vehicles<sup>4</sup>. These vehicles work well for waste collection as the constant stop-start driving helps recharge batteries during deceleration. However, they are far less fit for transporting waste over long distances on the open road. This means that for now at least, the out-of-District option would require diesel or hybrid vehicles. The expectation is that waste would be consolidated at a site in Dunedin, then transported in 35-40 tonne loads to the landfill.

Diesel generates approximately 2.68 kilogrammes of emissions per litre burned, and a diesel waste collection truck typically uses one litre per 1.6 kilometres travelled.<sup>5</sup> Each collection truck carries around 16 tonnes.<sup>6</sup> According to a study for the Ministry of Transport, vehicles of a gross weight of 40 tonnes (including weight of vehicle and its load) are estimated to consume in the order of one litre per 1.4 kilometres, not greatly more than the collection trucks, presumably because they are not subject to the same stop-start driving of a collection truck.<sup>7</sup> One truck travelling to and from the AB Lime site 100 times a year would generate around 75 tonnes a year in emissions. At an estimated 35,000 tonnes of Council-managed waste needing to be disposed of each year<sup>8</sup>, this would equate to around 1,000 trucks each carrying 35 tonnes making the trip each year, or nearly **750 tonnes of CO<sub>2</sub> equivalents a year**.

Second, heavier vehicles impose **much bigger costs on the road network in terms of wear-and-tear**. The Generalised Fourth Power Law summarises the fact that as the weight on an axle increases (e.g. from a light passenger vehicle to a heavy waste collection or transfer truck), its effect on the road increases by a factor equal to the fourth power of the increase in weight.<sup>9</sup> This is a technical way to say that 1,000 or more heavy vehicles

<sup>4</sup> Case study: how Waste Management New Zealand cut emissions through their fleet, Ministry for the Environment, accessed on 12 December 2022: <https://environment.govt.nz/what-you-can-do/stories/case-study-how-waste-management-new-zealand-cut-emissions-through-their-fleet/>

<sup>5</sup> Accessed on 12 December 2022: <https://www.drivingtests.co.nz/resources/fuel-co2-calculator-carbon-dioxide-emissions-in-kg/> and the WMNZ case study.

<sup>6</sup> Accessed on 12 December 2022: <https://www.stuff.co.nz/business/96541958/waste-management-launches-first-electric-rubbish-truck>

<sup>7</sup> Accessed on 2 February 2023: <https://www.knowledgehub.transport.govt.nz/assets/TKH-Uploads/TKC-2019/Real-world-fuel-economy-of-heavy-trucks.pdf>. See equation on Slide 9 in particular.

<sup>8</sup> *Out of District Option: Detailed Business Case Addendum*, Draft, completed by Morrison Low for Dunedin City Council, November 2022

<sup>9</sup> Accessed on 12 December 2022: <https://pavementinteractive.org/reference-desk/design/design-parameters/equivalent-single-axle-load/>



(once disposal of commercial waste is included) travelling almost 400 kilometres return to an out-of-District landfill will have an additional impact on the roading network that will impose further costs on ratepayers and taxpayers.

Thirdly, a minimum of 1,000 more trucks travelling nearly 400 kilometres to Winton and back each year will have **congestion impacts**. Because these vehicles are likely to be slower moving than light vehicle traffic, they will slow traffic down along the route.

Finally, from a Dunedin perspective, closing the landfill in Dunedin to use a landfill outside of Dunedin will lead to **job losses locally** as the landfill will no longer be within Dunedin city limits. According to Council, approximately seven to eight staff work at the Green Island site.

Given these challenges, exporting waste is not a desirable solution over the medium or long term for dealing with Dunedin's waste.

## 4.2.2 Increase capacity at the existing Green Island landfill

The final option is therefore to continue use of the current Green Island landfill and potentially to increase its consent terms and capacity. As of June 2022, an estimated 529,000 m<sup>3</sup> of void remained at the Green Island site (excluding cap).<sup>10</sup> Using a range of 76,000 m<sup>3</sup> to 89,000 m<sup>3</sup> likely to be needed to deal with Dunedin's household and commercial waste each year to 2030, this implies that capacity at the current site will be reached somewhere between April 2027 and July 2029, should operation at the current site be allowed beyond expiry of the current resource consents on 1 October 2023. An increase in capacity has also been evaluated by the Council and is presented in the Green Island Landfill Closure Design Report (GHD 2023). This option increases the height of the landfill while retaining all activities within the current footprint. This increase in capacity may extend the life of the landfill to the end of 2029, depending on waste volumes.

While Smooth Hill is unlikely to open before 2027, any delay on that project given the current labour and even plant and materials shortfalls could mean that Dunedin is left without a financially responsible landfill option should Smooth Hill not be ready by April 2027 and landfill be consumed at Green Island at the current average of 89,000m<sup>3</sup>/year.

The proposed increase of the void capacity at Green Island would extend the operational life of the site by approximately two more years to provide a buffer for Smooth Hill to be developed, as well as a cost-effective way of dealing with waste in the medium term.

## 5. Further benefits of Green Island extension

The option to expand capacity at Green Island to beyond its current resource consent allowance is compelling. It avoids all the additional environmental impacts that the waste export option involves, including additional emissions of longer truck trips, more congestion and wear-and-tear on the roads, and the potential loss of jobs out of the region.

It also offers several other benefits compared to the out-of-District option:

- The impact on the existing local environment is limited by using the existing site, as demonstrated by the other completed assessments. Plans and processes are already in place for managing the impacts of the existing site. This represents efficient use of the existing purpose-built infrastructure.
- In a resource constrained world, it is prudent to maximise use of an existing asset before beginning to consume another.
- The impacts on visual amenity are limited because of the use of an existing site.
- Reverse sensitivity is likely to be limited given the expansion will be to an existing, long-standing landfill site.
- The expansion option is cost-competitive compared to both the out-of-District option and the long-term solution of a new landfill at Smooth Hill. As indicated above, costs of out-of-region disposal would need to fall around

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<sup>10</sup> *Green Island Landfill Closure: Design Report*, Chapter 4, completed by GHD for Dunedin City Council, February 2023.

34% to be competitive with disposal at Smooth Hill, and Green Island itself is expected to be a lower price again.

## 6. Conclusions

This brief report summarises the clear case for expansion of capacity at Green Island landfill. Additional landfill capacity is needed. While Smooth Hill has been identified as a long-term solution, that will be ready in 2027 at the earliest. The most cost-effective solution that minimises emissions, road wear-and-tear, congestion, job losses and site-specific environmental impacts in Dunedin is that resource consent be granted to extend operation beyond October 2023 for the Green Island site, and that the void there be expanded. This will ensure enough capacity is provided to accommodate delays in commissioning the Smooth Hill site.

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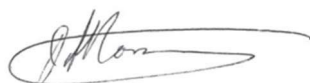
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### 7.1 Assumptions

This brief report has relied on the various data sources set out in the footnotes. No independent verification of the numbers used has been done.



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