6.1 Alternative Waste Disposal Options

Long term options for the management and minimisation of waste have been an ongoing issue for DCC to consider since at least the late 1980s. The Council has expended considerable time, resources, and investment in guiding its role and investment into waste management.

An extensive site selection process was completed by BECA in the early 1990's to identify a landfill site to replace the Green Island landfill at the end of its life. The process leading to the investigation, selection, and designation of Smooth Hill as a future landfill site is further outlined in **section 3.2**. The Council investigated thirty-two possible sites with input from consultants, iwi, the public, and regulatory agencies. Locations were assessed against the following criteria:

- Ecological (vegetation, wildlife, aquatic life, habitat, bird strike/airfield exclusion zone).
- Physical (available capacity, land use inventory classification, availability of cover material, geology/mass movement, topography/stability, climate, surface hydrology, proximity to water catchment area, hydrology, leachate control, gas control).
- Social (residential area, recreational areas, traffic access and impact, public health, visual impact/screening potential, cultural/archaeological features, impact on local water, end use of site).
- Economic (distance from refuse source/energy consumption, site purchase, establishment cost, requirement for road upgrading).

The evaluation of sites ultimately led to the Council confirming at its meeting on the 17th of May 1993 that the Green Island landfill be extended, and the Smooth Hill site be secured to provide a future long-term landfill solution for the city.

Since that time, Green Island has continued to be Dunedin's primary landfill option. The Green Island landfill remains the principal alternative option for the DCC to operate a landfill for municipal waste in the city. However,the current resource consents for the operation of Green Island expire in 2023, and even if new consents are sought and obtained, the landfill is expected to reach the end of its functional life sometime between 2023 – 2028. The foreseeable end of functional life of the Green Island landfill due to it reaching its physical capacity means it is not a long-term sustainable option for the city.

As part of the Waste Futures Programme of work, the Council initiated a Programme Business Case (PBC) process in 2018 to identify a preferred medium to long-term waste and diverted material system for Dunedin, which:

- *Reviewed current processes and identify alternative methods to manage waste and diverted material.*
- *Considered diverted material services that meet the expectations and needs of the community as well as the market.*
- *Identified a wide range of potential options that provide medium to long-term assurance for waste disposal for Dunedin residents, and evaluate those options against the problems, benefits and opportunities.*
- *Enabled integrated planning and investment in future waste and diverted materials facilities and services.*
- *Provided certainty and clarity for investors (public and private).*
- *Ensured services and facilities can meet current and projected future demand, and*

- *Ensured future solutions reduce impacts on the environment.*

As part of the PBC process, an evaluation of options and alternatives for waste was undertaken to address the identified problems facing Dunedin with respect to waste and diverted material. A long list of 57 possible interventions were developed. This included 11 long list interventions for waste disposal including exporting waste from the City, developing a waste to energy (WTE) facility and seeking a supply contract to dispose of ash, as well as the option of developing the Smooth Hill Landfill.

No other potential landfill sites in Dunedin, including those identified in 1992 were included in the long list as the Council already had a designated future landfill option at Smooth Hill. Furthermore, there had been no change in the relevant criteria upon which the Council had made its decision to select the Smooth Hill site in 1992, and there had been no significant change to the site or surroundings that necessitated reassessment of other sites. Nine potential programmes were developed incorporating elements of the 57 possible interventions and tested through multi-criteria analysis, and workshops and discussions with stakeholders. The nine programmes were scored against alignment with the investment objectives, and other criteria including flexibility to change, support to the local community and economy, local system (resilience and security), technical difficulty of solution, and cost.

The nine programmes varied in terms of:

- Kerbside waste collection, including bin and bag options.
- Diverted material collection, including glass, paper, plastic, and organic material options.
- Waste transfer and diverted material facilities, including resource recovery park, recycling hub options, with differing levels of waste separation.
- Council control and influence, with differing levels of collaboration, regulation, incentives, education, and advocacy for waste minimisation.
- Waste disposal, including development of Smooth Hill, waste export out of district, private landfills, or waste to energy options.

Five of the programmes included development of Smooth Hill for waste disposal, whereas three options involved waste export/private disposal, and one option involved waste to energy disposal. The waste to energy option involved establishing a municipal waste incinerator in Dunedin as a waste to energy (WTE) facility. The Council would enable separation of diverted material that has value, or non-combustible, and accept out of district waste and combustible materials up to the capacity of the facility. The Council would arrange a supply agreement for ash disposal (about 20% of initial waste volume) to an existing landfill(s), as well as agreements for receipt of suitable waste from out-of-District.

Key outcomes from the assessment were:

- Council withdrawal from all waste services, with or without regulation to achieve waste minimisation, would not achieve objectives for increased Council influence, change in waste behaviours, and increased waste diversion/reduction of waste to landfill. This was in contrast to programmes which provided for greater Council control of waste and community building to achieve waste minimisation and diversion, including quality control to protect the value of diverted materials, whilst still providing for the development of Smooth Hill for future waste disposal.
- Export of waste would mean reliance on other landfills to accept waste. Whilst indicative capital costs were likely to be relatively low, operating costs might be relatively high due to waste disposal at a combination of existing out-of-district landfills (‘export’) and local cleanfills, and transfer costs.

Waste to Energy had high indicative capital and operating costs and was reliant on securing large proportions of combustible waste (including from out of district) to be viable, and unlikely to change behaviour with respect to reducing waste production. Acceptance of non-local waste was unlikely to be culturally acceptable. Ash (~20% quantity of incoming waste) would still require disposal to landfill. Outcomes from the options assessment were workshopped with the Council to determine a preferred programme. Through this, it was recognised by the Council that the Green Island Landfill consents and capacity would expire and there was no other commercial landfill within Dunedin to take municipal waste. Despite diversion and recycling initiatives there would still be a need for secure access to a waste disposal facility.

Concerns were raised, including by manawhenua, over the export of waste out-of-district. This option also presented other risks and uncertainties including the capacity, waste acceptance criteria, and resource consent constraints on receiving landfills. Furthermore, export of waste would incur transport charges and may be impacted by future national levies and waste / CO2 charges.

A preferred programme and next phase of work was confirmed with the Council Steering Group on the 3rd of December 2018, which confirmed the following direction:

- **Preferred Programme:** Council's preferred programme was one that enabled Dunedin to move towards a circular economy, focusing on material streams (and sources) with the biggest impact with respect to waste reduction and carbon reduction (e.g. organics, construction and demolition material from commercial and industrial sources) and systems with low contamination and local (NZ) end markets. The preference was a transition to this programme over time from the existing domestic kerbside diverted materials collection and processing (or 'business as usual' approach)
- **Waste Disposal:** Council and other waste producers required secure access to a waste disposal facility both in the short and long term. A preference was identified for the Council enabling the development of Smooth Hill over securing arrangements for waste to be disposed at a combination of out-of-district landfills ('export') and local cleanfills due to the risks and uncertainties, and reduced disposal options for commercial waste producers.
- **Domestic Waste Collection:** Preference for a Council led collection system that included the introduction of organic material collection in urban areas and replacing pre-paid bags for general waste with rates-funded bins.

Following these directions, the Council's has reviewed its Waste Minimisation and Management Plan. The new plan adopted in 2020 is designed to reduce and divert as much waste as possible from landfill. This has led to a proposal that has been adopted by the DCC to establish a new kerbside collection service from 2023. This will provide for the separation of waste into a "four bins plus one" service for collection, comprising a:

- Food waste bin;
- General waste bin;
- Mixed recycling bin;
- Glass bin;
- Optional garden waste bin.

The recommended next steps from programme business case work included better understanding the relative costs and risks associated with:

- Extending the operational life of Green Island Landfill for a further 3-5 years beyond 2023.

- Securing arrangements for waste to be disposed of at a combination of out-of-district landfills ('export') and local clean fills in the short and long term.
- Enabling the development of Smooth Hill Landfill.

As a result, DCC engaged consulting engineers Stantec to assess the costs and risks associated with developing the designated Smooth Hill site for a landfill. This included assessing landfill filling plans; financial models; and feasibility in terms of engineering, economics, environment, social and cultural aspects, picking up the same considerations considered by BECA in 1992. The work concluded that Smooth Hill has the capacity to accommodate current waste quantities to 2063 and beyond. The work also confirmed the technical feasibility of the site to be developed and operated as a landfill and didn't highlight any fundamental reasons to not proceed with the consenting process, thereby effectively confirming the 1992 evaluation findings.[1] However it was recognised that additional characterisation and monitoring would need to be undertaken to support any consent application, including hydrogeology, ecology, water quality, bird strike hazard, and geotechnical assessments.

The subsequent concept and updated design process has involved technical input from a range of experts to more fully understand the baseline environment, minimise adverse environmental, social, and cultural effects to the extent possible. This body of work has reconfirmed the suitability of the site for a landfill. Through this process, adjustments have also been made to the landfill footprint and final form, including:

- Relocating the soils stockpiling area from West Gully 3, which contains regenerating kanuka treeland vegetation with high ecological values. The stockpile area was instead located on cleared forestry land to the north east of the landfill.
- Limiting the elevation of the final landfill cap to generally no more than 5 m above Big Stone Road to enable better integration into the surrounding landform, and screening by perimeter planting.
- Adjustment of the landfill footprint adjacent to Big Stone Road to provide sufficient room for landscape planting to screen the landfill from the road and adjacent properties to the south.
- Further updating and adjustment of the landfill footprint in 2021 to avoid wetlands located in the gullies to the north and west of the landfill footprint.

The Stantec technical feasibility work targeted a landfill waste volume of 6,000,000 m^3 (equivalent to 5,000,000 tonnes of waste) for the landfill. A similar landfill waste volume was initially targeted for the concept design. However subsequent updating of the design and the anticipated annual waste volumes have resulted in a smaller landfill capacity. Current Dunedin annual waste disposal rates are anticipated to be in the order of 60,000 tonnes per year. If these rates are maintained the landfill has a life of approximately 40 years. However, uncertainty exists over future rates of disposal. Issues include:

- Consistent with Waste Futures' directions and Waste Minimisation and Management Plan, the Council aspires to divert waste where possible as well as promote waste minimisation. This is likely to result in a long-term reduction in landfill waste per head of population over time but is dependent on technological improvements and facilities becoming available, such as the development of resource recovery and reduction facilities.
- Waste reduction may be offset to some extent by population and/or economic growth in the Dunedin area. Furthermore, the landfill may accept waste from other districts, increasing the annual rate of waste disposal.

[1] DCC Waste Futures 2023 – Landfill Feasibility Workstream, Stantec, February 2019

- Significant region wide unexpected events can result in spikes in waste disposal rates. This may include natural disasters, tighter standards for development/remediation of contaminated land leading to increased soil disposal demands, and disposal of waste/contaminants from exposure events at historic landfills.

Given the uncertainty regarding future requirements the landfill has been developed to allow future adaption. A key adaptive approach is that development of the landfill can change pace depending on demand.

Despite a commitment to waste minimisation and the Council's target of zero waste, it is anticipated that uncertainty will remain regarding the city's waste disposal needs. A conservative approach that retains the existing 60,000 tonnes per year as an average disposal rate but also allows for higher disposal rates is therefore appropriate, noting that the landfill has been designed to ensure any effects on the environment will be managed irrespective of the annual disposal rate.

Overall, the Smooth Hill site has been considered the preferred future site and catchment for a landfill since 1992. This has been reconfirmed through the more recent Waste Futures Programme of work that has investigated and discounted other waste disposal options including waste to energy and reconfirmed the technical feasibility of a landfill at Smooth Hill notwithstanding any other alternative locations or methods for the disposal of waste.