Boffa Miskell

Green Island Landfill Closure

Landscape, Natural Character and Visual Effects Assessment
Prepared for Dunedin City Council]

15 March 2023

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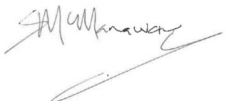
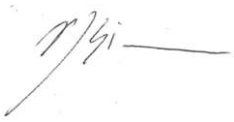
Prepared by:	Sue McManaway Principal / Landscape Architect Boffa Miskell Limited	
Reviewed by:	Rhys Girvan Senior Principal / Landscape Architect Boffa Miskell Limited	
	Rachael Eaton Senior Principal / Landscape Architect Boffa Miskell Limited	
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Executive Summary

Boffa Miskell were engaged to prepare a landscape and visual effects assessment for the proposed extended closure period at the existing designated Green Island Landfill (the landfill).

The Proposed Development comprises ongoing use and operation of the landfill, its staged closure over time and its associated aftercare once closed completely. Based on Dunedin's current waste disposal rates, the Council expect that Green Island landfill can keep accepting waste for another six years (until about 2029). The proposed landfill is entirely within the existing working footprint of the current landfill (the landfill footprint) which, together with the borrow pit, is located within a larger operational area and, in turn the Green Island Landfill Designation Area (D658).

As well as the extension to the period of operation, the volume of the landfill will be increased resulting in the final surface and contours at closure being shaped like a wedge with the high side along the western boundary of the Site at approximately 6.5 metres higher than currently anticipated.

Landscape Context

The Site occupies an area that was once part of the upper reaches of the Kaikorai Estuary. Within this area, natural character and landscape values are highly modified. The wider setting of the landfill has a rural and coastal context character to the west and south with a suburban, light industrial character to the north and east. Kaikorai Estuary is a key feature adjacent to the Site, modified but recognised as holding important values, including to mana whenua as well as important bird habitat. Saddle Hill landform is prominent in views.

Natural Character Effects

The proposed landfill extension will avoid any areas of outstanding natural character. The existing level of natural character at the Site is highly modified. The long history of reclamation, drainage and waste disposal has considerably altered biotic and abiotic systems. In this context, any change in natural character within the site will be **very low** in the context of the established landfill in its broader setting.

Landscape Effects

In landscape character terms, the Proposed Development will avoid any outstanding natural features and landscapes and highly valued amenity landscapes.

Physical change within the landfill footprint during operation will be very low however overall physical landscape effects on landform are assessed as **low-moderate adverse** effects due to the extent of cut from the extended borrow area. Following closure with completion of the capping and grassing at the landfill and borrow pit sites, landform effects will be **low**.

Any change in landcover during the operational stages is considered to generate **very low adverse** effects. Following rehabilitation of the landfill and

borrow pit sites with grass and implementation of the Vegetation Management and Restoration Plan, and the gradual increase in ecological connectivity over time, there will be **positive** landcover effects.

The Site has formed part of the character of this varied landscape since it started accepting waste in 1950's, and became Dunedin's main landfill in 1981, so while its appearance will continually change as the Proposed Development progresses, change is already part of this landscape. The existing perimeter vegetation and future planting as part of the proposed Vegetation Management and Restoration Plan will continue to assist with integrating the Site into the rural backdrop.

The Proposed Design will not compromise the landscape values associated with the Pukemakamaka/Saddle Hill Outstanding Natural Feature (ONF), including views of its iconic shape from east of the landfill.

The Proposed Development will not appear prominent within views or uncharacteristic within the receiving landscape generating **low-moderate adverse** landscape character effects during operation.

Once works are completed, the form and scale of the landform itself and the pattern of proposed vegetation would appear consistent with the existing rural landscape, generating **low adverse effects**.

Visual Effects

During the operation stages, there will be potential to see the raw, worked landform including the visual contrast of bare soil associated with stockpiles or final capping prior to grass becoming established, or small areas of exposed landfill under operation, as well as infrastructure such as operational plant and moving vehicles accessing and operating within the Site. This is the same type of activity that is currently occurring.

The visual containment of the Site by earth bunds and established vegetation also mitigates most visual effects of the Proposed Development on the surrounding area, particularly from close views. In most open views, the viewpoint is elevated but distant from the Site and therefore encompasses a broader overview of the landscape within which the Proposed Development will remain a small part.

On completion, where it is visible, the final landform will appear as a grassed, open terrace. The established vegetation on the perimeter will soften, screen and integrate the landform with the character and values of its wider setting including the adjacent Estuary.

Overall, visual effects from surrounding private viewing areas will largely range from **very low** to **low-moderate** temporary adverse effects during operation. There is also potential for up to **moderate** levels of effect to be experienced from a block of land that is zoned residential but not currently built on, approximately 300m northwest of the Site. All such effects will reduce to no more than **low** once closure is completed.

Views from surrounding public vantage points are considered to result in a range of temporary adverse effects from **very low to low-moderate,** the greater level of effect being experienced at Walton Park (VP6). These will

reduce to **very low adverse** effects once closure is completed and grass has fully established.

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Graphic Supplement

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1.0 Introduction

1.1 Scope of the report

Boffa Miskell Limited (BML) has been engaged by Dunedin City Council (DCC) to undertake a Landscape and Visual Effects Assessment (LVA) for a design (referred to as the Proposed Development) for the final volume, borrow area, surface and contours post closure proposed for the existing Green Island landfill. The LVA assessment forms one of a suite of technical assessments undertaken to support the Otago Regional Council consent application.

The following LVA assesses the landscape and visual effects of the proposed final landfill surface up to and following closure.

1.2 Project background

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 DCC are planning to make changes to the use of Green Island landfill site.

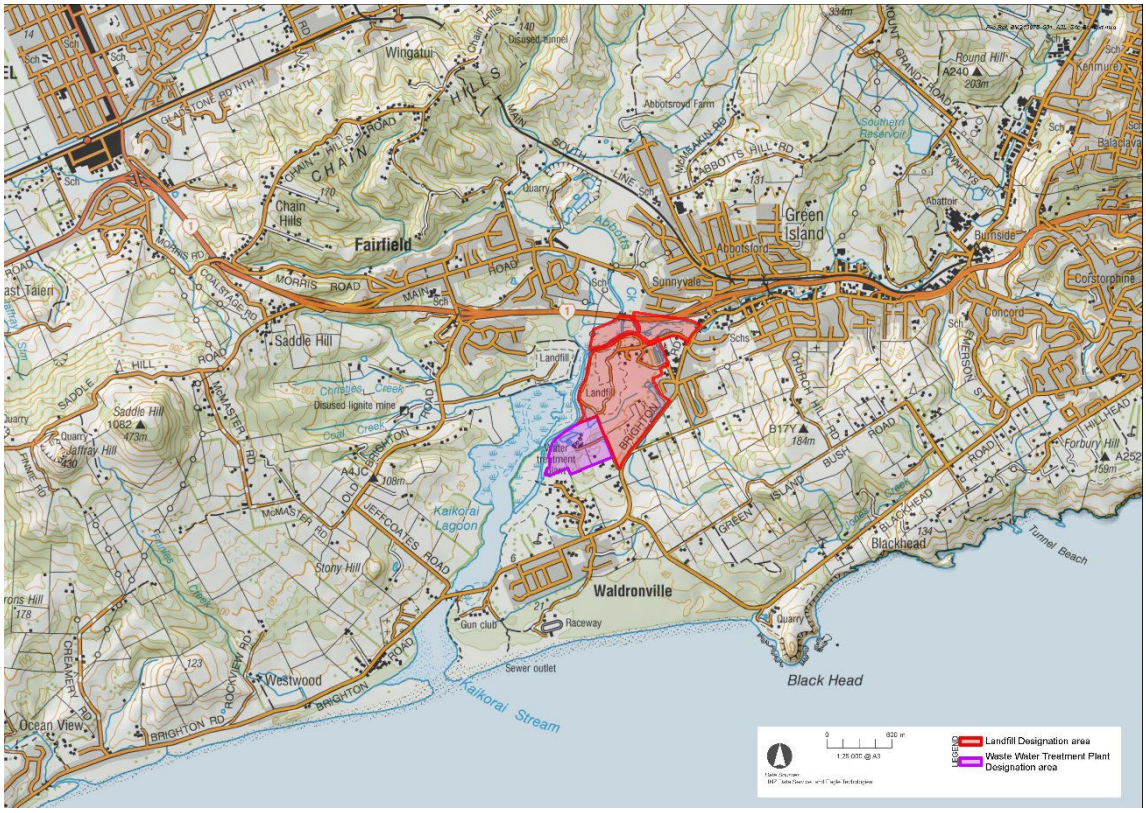


Figure 1: Green Island Landfill Site

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, DCC anticipate that the new Class I landfill facility, won't be able to accept waste until 2027/2028 at the earliest.

In the interim, DCC 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 resource consents needed to operate a landfill at Green Island expire in October 2023, the DCC are 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.

1.3 Relevant Reports

This report has drawn information from the Dunedin Landscape Management Area Review: Landscape Assessment[1] which characterised and evaluated the landscape in Dunedin including in the vicinity of the Site and provided landscape objectives and management recommendations; and the Coastal Environment of Otago Natural Character and Outstanding Natural Features and Landscapes Assessment Dunedin City Section Report (28 April 2015).

[1] Boffa Miskell Ltd (2007) Dunedin Landscape Management Area Review: Landscape Assessment

1.4 Assessment Process

This assessment has been undertaken and peer reviewed by NZILA registered landscape architects, following the concepts and principles outlined in *Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines*[2] and its signposts to examples of best practice, including the quality planning landscape note[3] and the UK guidelines for landscape and visual impact assessment[4].

In summary, this assessment involved the following tasks:

- Familiarisation of the proposed landfill design which continues the filling of the southwestern area of the landfill within the existing 38 ha landfill boundary and perimeter bund with an extension of the final landfill surface to the west
- Refined desktop analysis of the landscape context;
- Preparation of digital model of the proposed option, to assist with visual assessment;
- Site visit to understand the Site and its context, including confirming potential viewing audiences and the nature of available views;
- Preparation of visual simulations from six publicly accessible viewpoints, including visual simulations of the proposed stages of the design from two selected viewpoints; and
- An assessment of landscape, natural character and visual effects.

A full method is outlined in **Appendix 1** of this report.

Landscape, natural character and visual assessments are closely related and, in part, overlapping assessments. A brief explanation of the assessments made for this proposal is provided below.

1.4.1 Natural Character Assessment

The landfill is located outside the coastal environment however this assessment considers natural character insofar as this applies to freshwater bodies and their margins, (as defined in RMA Section 6(a)).

Natural character is described in terms of the natural elements, patterns and processes of such areas and how they are perceived and experienced. The level of natural character (naturalness) is determined by the level of human-induced modification, where the highest degree of natural character occurs where there is the least amount of modification.

This assessment describes and assesses the existing level of natural character of the relevant waterbodies and then assesses the effects of the proposed changes to the landfill on natural character.

[2] *'Te Tangi a te Manu: Aotearoa New Zealand Landscape Assessment Guidelines', Tuia Pito Ora New Zealand Institute of Landscape Architects, July 2022. (TTTM)*
[3] https://www.qualityplanning.org.nz/node/802
[4] Landscape Institute (2013) Guidelines for Landscape and Visual Impact Assessment (GLVIA3), 3rd Edition.

1.4.2 Landscape Assessment

The assessment has identified the extent of the relevant landscape and described and analysed its character and values in terms of physical, sensory and associative attributes and how they combine. The condition of the landscape (i.e. the state of an individual area of landscape or landscape feature) is also described.

The assessment has considered the sensitivity of the physical landscape features to the proposed change, together with the magnitude of change.

1.4.3 Visual Assessment

Landscapes are experienced visually and therefore, visual effects are considered to be the consequences of change on landscape values, as experienced in views.[5]

The visual assessment considers where the proposal will be seen from (including the nature of the view), who will see it, and the nature and scale of visual change that would result from the proposal.

For the purpose of this assessment, access to private property has not been obtained, with visual effects assessed based on desktop analysis and the nearest available public viewpoint from which representative views were obtained.

1.4.4 Site Visit

Boffa Miskell Landscape Planners, Rhys Girvan and Sue McManaway visited the site and surrounds on 15th December 2022 for the purposes of this assessment. The weather varied from low cloud to sunshine. An earlier site visit was also undertaken by Sue McManaway in July 2021, accompanied by Emma Taylor, Landscape Architect at BML and Lincoln Coe from DCC, prior to preparing the landscape and visual memo of the three options.

During the site visit, representative viewpoints were confirmed for the purposes of preparing visual simulations and additional site context photos taken. Guidance was also provided around the landfill, and an opportunity to view the working face.

2.0 Proposal Description

The Proposed Development comprises ongoing use and operation of the landfill, its staged closure over time and its associated aftercare once closed completely. Based on Dunedin's current waste disposal rates, the Council expect that Green Island landfill can keep accepting waste for another six years (until about 2029). The proposed landfill is entirely within the existing working footprint of the current landfill (the landfill footprint) which, together with the borrow pit, is located within a larger operational area and, in turn the Green Island Landfill Designation Area (D658).

[5] TTTM, pp61-62

Figures 1 and **2** in the Graphic Supplement show the location of the Designation Area and the proposed Landfill Footprint (the Site).

The development of the new Resource Recovery Park Precinct (RRPP) does not form part of these applications, and this assessment.

Further detail of the proposed development is provided in the Assessment of Environmental Effects (Boffa Miskell March 2023) and Green Island Landfill Closure Design Report (GHD March 2023). Key aspects of the proposal as they relate to potential landscape and visual effects are summarised below.

2.1.1 Operational Stages

During the operational phase, the landfill will be completed in stages which progress across the Site from north to south as shown below (and see **Figure 7** of the Graphic Supplement).

Figure 2A: Staging Plan, Stage 1

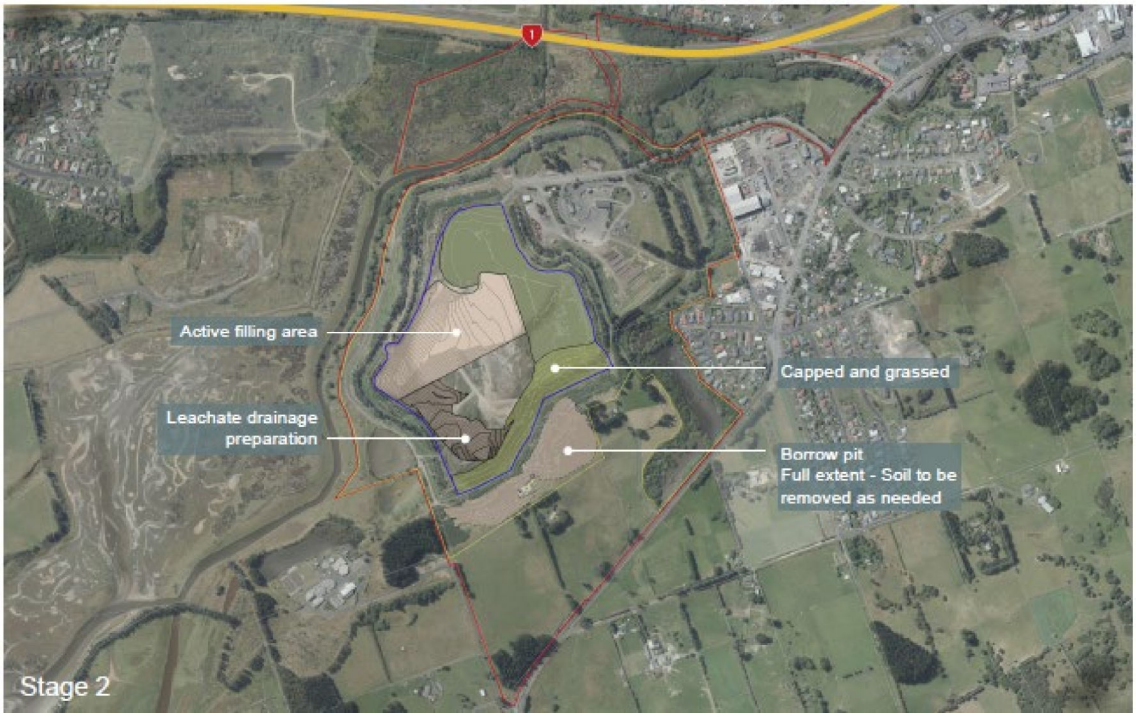


Figure 2B: Staging Plan, Stage 2

Figure 2C: Staging Plan, Stage 3

Figure 2D: Staging Plan, Stage 4

Stage 1 works are currently under construction and involve filling to create temporary access and the forming of leachate drainage in preparation for Stage 2. Under subsequent stages 2-3, further leachate drainage will be prepared, and waste will be placed in a broadly east to west direction in 30m strips up to the finished landfill surface level. Stage 3 will ultimately subsume the temporary access mound constructed in Stage 1. Stage 4 involves the capping and grassing of the remaining areas including the borrow pit.

As of December 2022, final capping with soil and grass of 3ha of the 13ha portion of the current landfill operation has been completed. As each subsequent stage is completed, the final cap will be placed.

Truck movements to and from the tip face will occur via an unsealed all-weather access road across the landfill surface. Connecting temporary access tracks will form and change as landfilling progresses. Operating machinery will spread and compact the refuse.

The current Landfill Development Management Plan (Feb 2023) restricts the width of the active tip face to 30m. The overall size is to be kept as small as practical and no larger than 500m^2.[6]

Daily cover soil will be placed at the end of each working day so that there are no uncovered areas of waste while the Site is not operating. The cover soils will be placed in compacted layers not less than 150mm thick for daily cover and 300 mm thick for areas being left unworked for greater than 3 months. Daily cover and intermediate cover material is sourced from material received from offsite, and stockpiled.

[6] The existing ability to increase to 1200m2 in special circumstances will remain

A borrow area used as source of soil the final capping layers and is located to the south of the landfill. The borrow area will be expanded by cutting away the hill slopes facing the landfill, with approximately 73,000m^3 of material required to complete the final cap over the entire landfill.

2.1.2 Closure and Aftercare

At closure, any remaining open areas of the landfill will be capped and any infrastructure not required for the ongoing aftercare of the landfill will be removed. Surface contour drains will be constructed on the capped surface to convey clean runoff to the perimeter stormwater system for discharge to the Kaikorai Stream.

The proposed final form of the landfill is shown in **Figure 3** below and **Figures 5** and **6** of the Graphic Supplement.

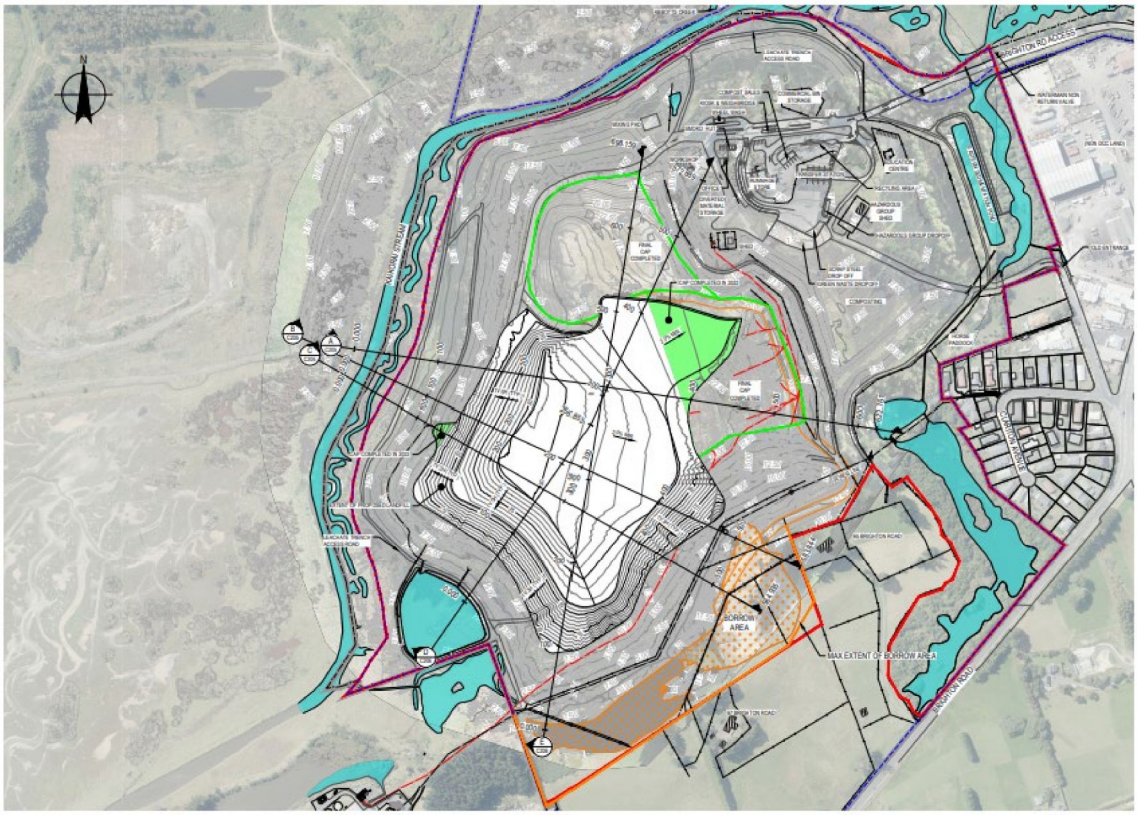


Figure 3: Proposed Final Contours: from GHD Drawings, DRG No.12547621-C202

The final contours will consist of a wedge shape reaching a maximum height of 31.5m asl at the southwestern edge of the landfill. The lower landfill slopes will be constructed at gradients largely between 1(v):3(h) and 1(v):5(h). The upper surface will have a gentle easterly fall at a grade of approximately 4.5% (1(v):22(h)). Grass will then be established and maintained.

Soil for the final cap will be obtained from the borrow area. Upon closure of the landfill, the final contour of the borrow area will consist of a flat bottom with an undulating slope that is generally between 20 and 26 degrees[7] and covered in grass or other vegetation.

[7] Refer to GHD 202 dwg

Under the proposal, the western most part of the landfill surface will be approximately 6.5m higher than the current approved surface. **Figure 4** below is an illustration to demonstrate the comparison between the existing surface level (and extent of historic waste) and the proposed final landform surface level at closure (dashed).

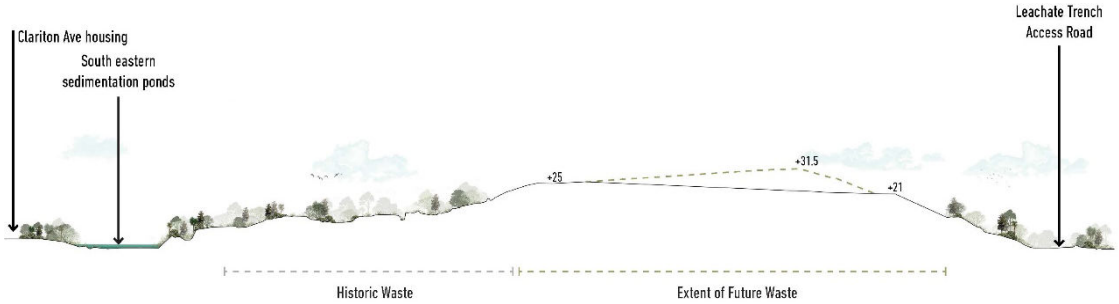


Figure 4: Illustrative Cross Section – Final Cap at Closure

While this landform profile means there may be sufficient capacity to accept waste at the Green Island landfill until 2030/2031, the Council expect that based on Dunedin's current waste disposal rates, the landfill will close around 2029.

Ongoing aftercare of the landfill will include the continued operation and maintenance of leachate collection, landfill gas collection/destruction, and stormwater infrastructure; maintenance of the landfill cap; and environmental monitoring.

The existing waste diversion and transfer facilities will be redeveloped as part of the RRPP during the remaining operating life of the landfill and will continue to operate post closure and during the aftercare period.

2.1.3 Mitigation as part of the Design

The proposed maximum height of the landfill will increase compared to the original GIL target however the wedge shape of the proposed final surface has been designed to ensure it remains below the viewing plane of residential properties at Clariton Ave towards Pukemakamaka/ Saddle Hill and is sympathetic to the surrounding landscape.

Perimeter landscape bunds and extensive screen planting around the site perimeter were established in the 1990's to provide visual screening to the existing landfill operations. The planting consists of a mix of exotic and native species, however exotic species represent most of the taller vegetation. Together they currently provide substantial screening and given ongoing management, will continue to assist considerably with visual screening of the proposed extension. Therefore, management of this vegetation is described further in the following section.

2.1.4 Vegetation Management and Restoration Plan

A Vegetation Management and Restoration Plan is proposed to continue the effective ongoing visual screening with potential long-term visions for the Site, after closure, in mind. It is also recommended to plan for a gradual transition to predominantly native plantings over time as set out in) the Cultural Impact Assessment (Aukaha 2023) and in collaboration with mana whenua.

The screening vegetation surrounding the landfill is currently comprised largely of exotic tree species. A routine monitoring and maintenance plan will promote their health and longer-term stability to ensure they continue to assist with mitigating potential adverse landscape and visual effects. However, it is also recommended that plantings of appropriately eco-sourced native tree species be established surrounding and within the existing screening vegetation. As native plantings mature, following closure of the landfill, exotic trees could be gradually felled and removed.

Long term use of the remaining landfill site and perimeter areas post closure will be determined in consultation with the community and confirmed plans will be included in the Landfill Closure Management Plan. Uses may include recreation facilities such as walking and cycling tracks, picnic areas and public access to the Kaikorai Stream and Estuary.

Figure 8 in the Graphic Supplement is an artist impression of a potential future scenario for the Site that has been provided as part of the community consultation process.

3.0 Relevant Statutory Provisions

The assessment of landscape, natural character and visual effects addresses the following relevant Resource Management Act 1991 (RMA) matters:

> **Section 6(a):** Preserving the natural character of wetlands, streams, rivers and their margins
>
> **Section 6(b):** Protection of outstanding natural features and landscapes
>
> **Section 7(c):** Maintain and enhance amenity values
>
> **Section 7(f):** Maintain and enhance the quality of the environment

In accordance with this overriding national direction, the following statutory planning documents have been considered with relevance to this project. Such direction also confirms that the Site has not previously been identified in the coastal environment nor part of an outstanding natural feature or landscape.

Consents are only being applied for with Otago Regional Council. Key landscape policy directions identified within the following Regional Plans are summarised below:

- Partially Operative Regional Policy Statement 2019 (PORPS)
- Proposed RPS (2021)
- Otago Regional Plan: Water (Water Plan)
- Otago Regional Plan: Waste (Waste Plan)

The Site is designated (D658) under the Proposed Dunedin City District Plan (2GP) and under the Operative Dunedin City District Plan (Operative DP). These plans are referenced in this assessment primarily in regard to understanding the existing environment.

3.1.1 Partially Operative Otago RPS 2019

Objective 3.1 of the Partially Operative Otago RPS (PORPS) relates to recognising the values of natural resources including natural features and landscapes. Objective 3.2 relates to the identification of significant and highly valued resources and the protection or enhancement where degraded. Policies 3.2.3 and 3.2.5 relates to identifying outstanding natural features landscapes (RMA Section 6b) and highly valued natural features and landscapes.

The Site and its general location are not identified as part of any outstanding natural feature or landscape or otherwise identified as being highly valued for their contribution to the amenity values or the quality of the environment. The Site also does not form part of the coastal environment.

The PORPS has been developed to give effect to the NPSFW requirements. PORPS objective 3.1, policy 3.1.1 requires freshwater to be managed to *"maintain or enhance as far as practicable"*; amenity and landscape values of rivers and wetlands among other matters.

PORPS objective 3.1, policy 3.1.1 requires *"maintenance"* of good water quality, and *"enhancement"* where it is degraded, including for: important recreation values.

PORPS objective 3.1, and policy 3.1.9 requires ecosystem and indigenous biodiversity be managed to *"maintain or enhance"* ecosystem health and indigenous biological diversity; and *"maintain or enhance as far as practicable"* areas of predominately indigenous vegetation.

3.1.2 Proposed Regional Policy Statement 2021 (Non-freshwater parts)

Objective NFL-O1 relates to the protection of outstanding natural features and landscapes and maintenance and enhancement of highly valued natural features and landscapes, none of which apply to the Site or its general location.

3.1.3 Regional Plan: Water for Otago

There are a number of key provisions relevant to this assessment that relate to the preservation of the natural character of waterbodies and their margins and protection from inappropriate use and development (RMA Section 6.a). These include:

- Protect the natural character of Otago's lakes and rivers and their margins from inappropriate subdivision, use or development. (Policy 5.3.3)
- Maintain or enhance the amenity values associated with Otago's lakes and rivers and their margins. (Policy 5.3.4)
- In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, to give priority to avoiding, in preference to remedying or mitigating adverse effects on the natural character of any lake or river, or its margins; and amenity values supported by any water body. (Policy 5.4.2)

- Have particular regard to the following features of lakes and rivers, and their margins, when considering adverse effects on their natural character:
    - The topography, including the setting and bed form of the lake or river;
    - The natural flow characteristics of the river;
    - The natural water level of the lake and its fluctuation;
    - The natural water colour and clarity in the lake or river;
    - The extent of use or development within the catchment, including the extent to which that use and development has influenced matters (a) to (e) above. (Policy 5.4.8)
- To have particular regard to the following qualities or characteristics of lakes and rivers, and their margins, when considering adverse effects on amenity values:
    - Aesthetic values associated with the lake or river; and
    - Recreational opportunities provided by the lake or river, or its margins. (Policy 5.4.9)
- Retain flows in rivers sufficient to maintain their life-supporting capacity for aquatic ecosystems, and their natural character. (Policy 6.3.1)
- Promote the creation, retention and enhancement of appropriate riparian vegetation. (Policy 8.7.1)
- Water Plan objectives 10.3.1, 10.3.2, and policies 10.4.1, 10.4.1A, and 10.4.2, require adverse effects are to be *"avoided"* on any regionally significant wetland, but remediation or mitigation of effects is allowed where the activity relates to nationally or regionally significant infrastructure. The landfill is adjacent to the regionally significant Kaikorai Estuary wetland identified in the Water Plan.

3.1.4 Otago Regional Plan: Waste

The key provision relevant to this assessment in the Waste Plan is, as summarised below:

- **7.4.3** The effects of landfills on a number of matters, including amenity values, must be considered when assessing any resource consents for continuation of landfill operations.

3.2 Other

The Kāi Tahu ki Otago Natural Resources Management Plan 2005 (NRMP) policies express the cultural importance of water to Kāi Tahu and the importance of protecting and restoring the mauri of all water. The policies cover the protection and enhancement of existing wetlands as well as the reinstatement of wetlands that have been neglected.

4.0 Existing Environment

This section describes the existing landscape context, natural character and available viewing audiences, which provides the baseline for the assessment of effects on such aspects.

Photographs **(Site Context Photographs A - J)** were taken from around the Site to illustrate the landscape character of the existing environment including visibility of the existing landfill. The locations of these photographs are shown in **Figure 4** of the Graphic Supplement.

4.1 Site Description

The proposal is located within Designated Landfill Area (D658) in Green Island, Dunedin with an underlying Coastal Rural Zone. Waste disposal first occurred at GIL in 1954 and the site has been used for waste disposal since that time.

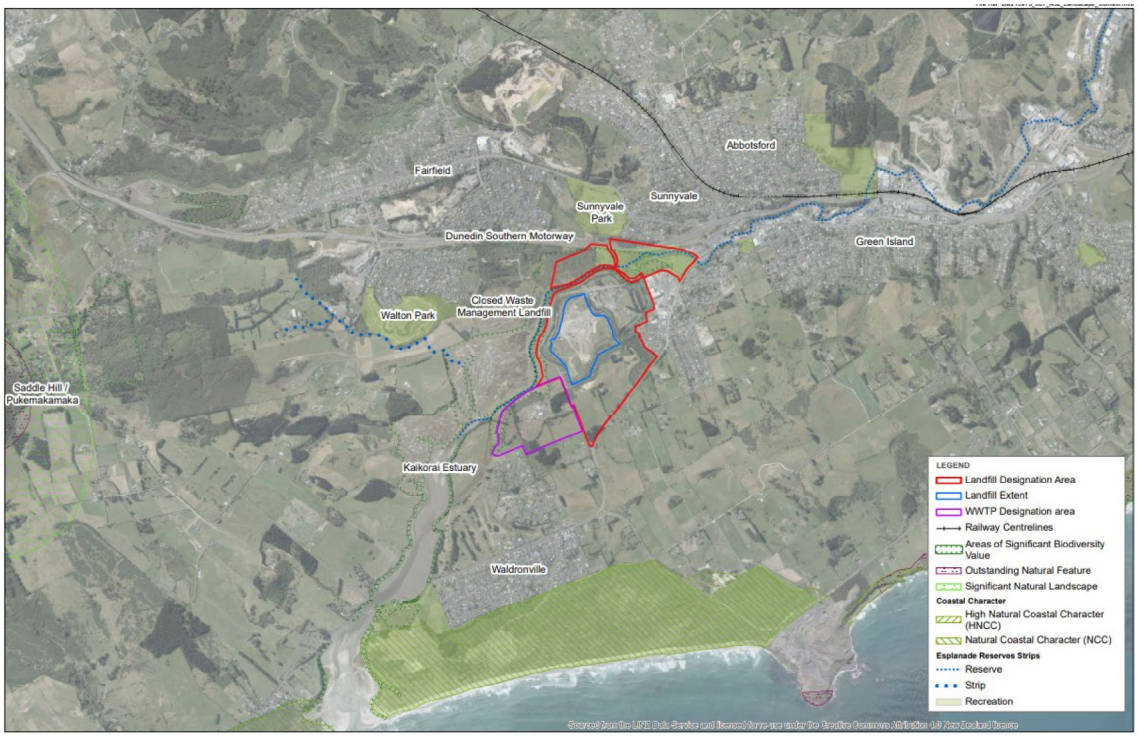


Figure 5: Landscape Context and Overlays

The Designation boundary adjoins State Highway 1 (Dunedin Southern Motorway) to the north, Kaikorai River and Estuary to the west, the Wastewater Treatment Plant to the southwest, and Brighton Road and Clariton Ave properties along the southeast and east boundary. Access to the Site is gained from Brighton Road (see **Figure 1** in the Graphic Supplement).

While the total area of the designated site is an envelope of 76 ha., the area of the designation that has been historically used for waste disposal, is an area of approximately 38 ha. contained by the existing leachate collection trench and drain as shown by the yellow outline in below. The blue outline represents the proposed landfill footprint (the Site) while the red outline is the Designation boundary. The eastern end of the Site where landfilling has been completed, accommodates waste diversion and transfer facilities.

The low-lying Site occupies an area that was once part of the upper reaches of the Kaikorai Estuary. Landfilling and final capping has been completed to the north and east of the Site. The highest part of the landfill currently reaches an elevation of approximately 25 m.a.s.l. High earth embankments have been constructed around much of the perimeter of the landfill footprint to assist with the visual containment of the operation. They also provide a physical and hydraulic barrier from the adjacent Kaikorai Stream and Lagoon. Details of the leachate collection system around the perimeter of the landfill are provided in the Green Island Landfill Closure Design Report (GHD 2023).

A series of vegetated constructed ponds located to the east of the landfill footprint but within the overall GIL designation, were created in recent decades on an area of former farmland.

Surfaces within the landfill footprint are highly modified. Much of the existing landcover is low ground cover and exposed areas consistent with an operating landfill. Where vegetation occurs on recently worked areas of the landfill, it appears to comprise exotic grassland and weedy exotic herbs and shrubs (e.g., gorse, scotch broom). Sparse indigenous plant species that have self-established may be present.[8]

Immediately surrounding the current landfill footprint to the southeast, areas of indigenous vegetation have been planted on previously filled and capped areas of the landfill while tall exotic trees have been planted for screening around the Site perimeter (**Site Context Photograph I and J**). This vegetation provides habitat for bird species and may provide poor-quality habitat for indigenous lizards.[9] The presence of seagulls in the vicinity of the active faces are a noticeable feature.

Neither the embankments nor the trees are proposed to be changed however there may be infill and enhancement planting as per the proposed Vegetation Management and Restoration Plan from now until closure.

Existing landfill plans include the 1994 resource consent applications which show a finished landfill surface rising to a maximum height of RL 25m. A revised filling plan was prepared in 2001 which removed filling in the southern corner of the site and formalised overfilling of the landfill by 2.25m above RL 25m to allow for settlement. This existing consented closure scenario is represented in **Figure 6** below:

[8] BML (2023) Green Island Landfill Ecological Assessment

[9] Ibid

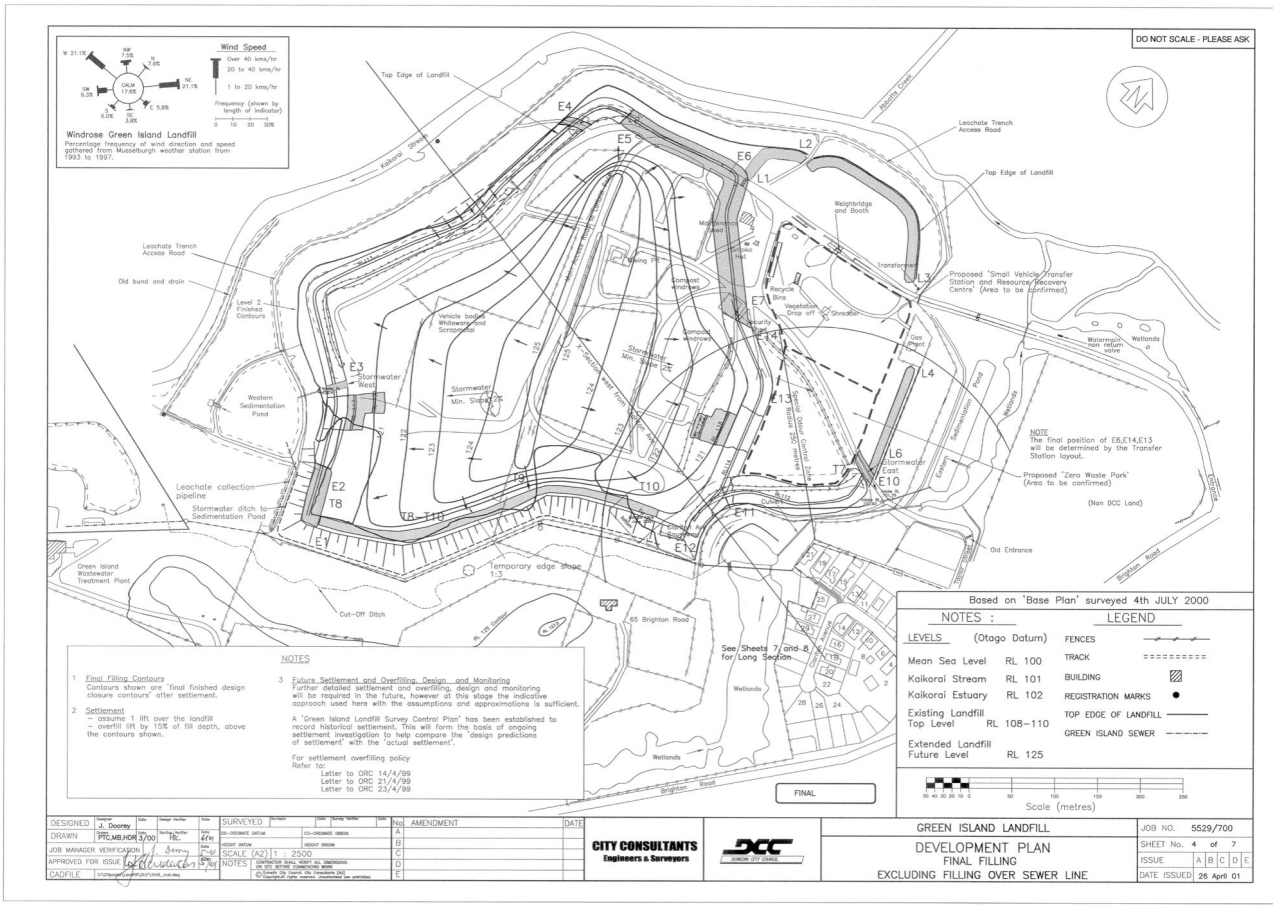


Figure 6: 2001 Approved Finished Landfill Surface

4.1.1 Mana Whenua

There are five papatipu rūnaka from the wider Otago region, Waihao, Moeraki, Puketeraki, Ōtākou and Hokonui. Te Rūnanga o Ōtākou has mana whenua rights relevant to the Site and vicinity of Green Island and the Kaikarae Estuary.

4.2 Landscape Context

The Landfill Site is located in the suburb of Green Island off State Highway 1 between central Dunedin, some 8km directly to the northeast, and the satellite town of Mosgiel, approximately 6km to the northwest.

Topographically, Green Island lies in a valley/basin landscape towards the southern end of the Kaikorai Valley, semi-enclosed by hills to the west, north and east.

Dunedin's Landscape Types and Landscape Character Areas (LCAs) have been previously identified as part of the Dunedin Landscape Management Area Review[10]. The Green Island landfill lies within the Volcanic Hills and Coast Landscape Type, on the fringes of the South Coast Hills. While the suburb of Green Island is largely within the Dunedin City urban area, and

[10] Boffa Miskell (2007) Dunedin Landscape Management Area Review: Landscape Assessment.

outside the scope of the study, the landfill, being on the margins of the Kaikorai Stream and Estuary, is broadly within South Coast LCA and bordered to the north and west by the hills and ridgelines of the Taieri Slopes LCA.

The defining characteristics of the South Coast LCA are set out below[11]:

- *Shallow spur and gully seaward slopes with numerous small stream and extensively farmed*
- *Kaikorai Lagoon is a key estuarine feature and important for Mana whenua*
- *The orientation of the working rural landscape of the upper slopes has a strong seaward focus and resulting coastal character*
- *Views inland are often focused on the Saddle Hill landform, which remains prominent in its elevation above Brighton.*
- *Extensive farming on coastal slopes*

The Site is not considered to be in the coastal environment or form part of any significant or outstanding natural feature or landscape.

While the landscape is described below in terms of each of the three landscape dimensions – physical, associative and perceptual, it is not intended that they be considered separately. The landscape as a whole is greater than the sum of its parts.[12]

4.2.1 Physical

Landform

The Green Island Landfill Site is low-lying, situated on the margins of the Kaikorai Stream and Estuary, approximately 2.5km from the coast. The geology underlying the landfill area comprises estuarine sediments underlain by Abbotsford Formation mudstone.[13]

The current landfill footprint within which filling has occurred rises to a maximum height of 25 m.a.s.l. Land immediately surrounding the landfill footprint such as the western perimeter access road between the landfill and Kaikorai Stream is low lying, being between 1.5 - 2.0 m.a.s.l. The landform of the landfill site is relatively steep with grades of up to 20%.

The landform pattern of the surrounding local landscape comprises moderate to steeply undulating hills, valleys or basins, the typical elevation varying from sea level to over 180 masl on the nearest ridge to the southwest (B17Y). It includes the modified landform of the closed, capped Waste Management Landfill. The topography can seen in the figure below and in **Figure 3** in the Graphic Supplement.

[11] Ibid.

[12] TTATM, p34

[13] The geological setting of the Site is described in the Green Island Landfill Liquefaction and Stability Assessment Report

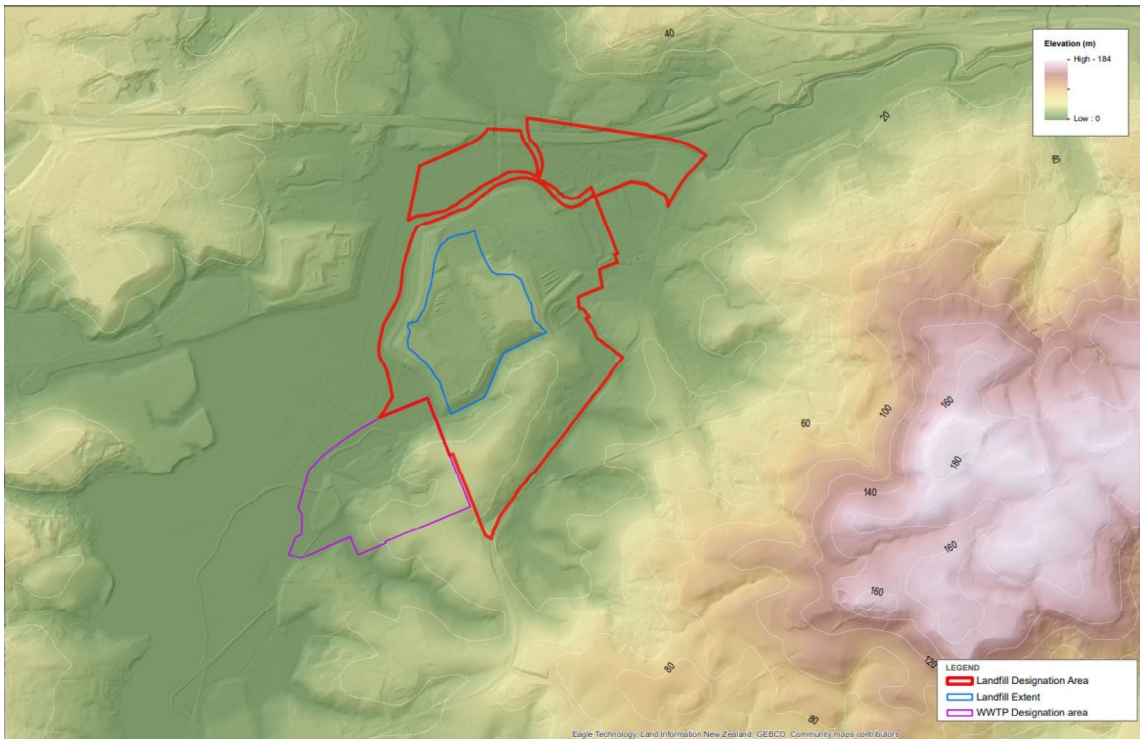


Figure 7: Topography Plan

Within a wider context, the enclosing hills of Mornington and Corstophine to the east and the Chain Hills to the northwest, reach some 160 masl. Abbots Hill (361 masl) to the north is a foothill to the higher, distant backdrop of Flagstaff and Swampy Summit at over 700 masl. Pukemakamaka/Saddle Hill is a distinctive basalt landform to the west, reaching 473 masl,

At the coast, southeast of the Site is the basalt headland of Blackhead, its columnar basalt formations on the lower slopes are listed on the Geopreservation index. The upper slopes are highly modified by quarrying.

Also at the coast, around the Kaikorai Stream mouth, the landform is gentler with the main landscape features being the long sweeping beaches and stream mouth. Approximately 2km offshore from the Kaikorai Stream mouth is Green Island, a small basalt island with intertidal reefs.

Ecological context

Kaikorai Valley, including the Landfill Site, is part of the Dunedin Ecological District (ED) in the Otago Coast Ecological Region. Prior to European settlement, the upper Kaikorai Stream catchment would have included large wetland areas and streams with surrounding hillslopes and elevated areas supporting mixed podocarp hardwood forest.[14] In the lower catchment, freshwater wetland and forest areas would have graded to intertidal / saltmarsh areas.

Today, land cover in the surrounding landscape is mainly exotic grassland with pockets of shrubland, small blocks of exotic forest and stands of large, generally exotic trees. There are also some large areas of mānuka and kanuka, and occasional remnant broadleaved indigenous hardwoods are still present, particularly on the Pukemakamaka/Saddle Hill and Chain Hills slopes.

[14] BML (2023) Green Island Landfill Ecology Assessment, p21

On the estuary and stream margins, much of the former indigenous vegetation has been replaced by weedy exotic species. Remaining indigenous vegetation is largely saltmarsh ribbonwood, pūrei and oioi.

Landuse

Following European settlement, vegetation was cleared and farming became a dominant land use. The lagoon was also drained, and parts reclaimed for farmland, a golf course and the landfill.

Historically, there have been several major industries in the Kaikorai Stream catchment, including a freezing works, cement factory, fertiliser works, steel yards, woollen mills, used oil refinery, and a tannery.

Today, the suburbs of Green Island, Abbortsford and Fairfield surround the Landfill Site to the northwest, north and east with a combination of residential, commercial and industrial development as well as recreational open space and the closed, capped Waste Management landfill site. To the south, the landscape has a varied character but predominantly rural, characterised by open space, stands of large trees, shelterbelts, narrow, gravel roads and farm buildings. There are also some rural lifestyle and large lot residential properties and the denser, small coastal settlement of Waldronville between the Kaikorai Lagoon and the beach. The basalt quarry at Blackhead is some 3km southeast of the Site.

4.2.2 Associative

Associative means the intangible things that influence how places are perceived, such as shared and recognised values of a community, history, identity, creation stories, and activities specifically associated with a landscape.

Tāngata whenua have a holistic relationship with whenua that integrates physical, associative, and perceptual dimensions. While described under the heading of 'Associative', it is intended that consideration of tāngata whenua landscape attributes will overlap with the physical and perceptual.[15] Refer to the Cultural Impact Assessment for further discussion on cultural values.

While the Site is not considered to form part of any outstanding natural feature or landscape, it is immediately adjacent to the Kaikorai Estuary which is associated with important values, being mapped in the 2GP as both an Area of Significant Biodiversity Value (C106 'Edge of Kaikorai Estuary, Estuary and Lagoon') and a Wāhi Tūpuna Mapped Area. The Estuary is also listed as a Regionally Significant Wetland by Otago Regional Council (Site 68, 'Kaikorai Lagoon Swamp').

Saddle Hill (made up of the two peaks of Pukemakamaka and Turimakamaka) is a distinctive landform approximately 4 kilometres to the west of the Site, also considered to hold important values. The middle to upper slopes (generally above the 80m contour but higher on the east facing slopes towards the Site), are identified as a Significant Natural Landscape (SNL). The double peak and uppermost slopes above the SNL (generally above the 280m contour on the east facing slopes) are considered an Outstanding Natural Feature (ONF). One of the values attributed to Pukemakamaka/Saddle Hill is its iconic cone shape which is experienced from a very large visual catchment including the suburbs around the Landfill Site.

An Area of Natural Coastal Character (NCC Island Park) is identified at the coast, 3km south of the Site in the vicinity of the Kaikorai Stream mouth. The area is assessed as having moderately

[15] TTATM, p33

high perceptual naturalness, and medium wild and scenic value[16] but exhibits significant modifications to natural processes.

Mapped wāhi tūpuna (in the 2GP) in this landscape include Pukemakamaka/Saddle Hill, the Kaikorai Estuary and beach and the island of Green Island. An Archaeological Alert Layer has also been mapped around the Kaikorai Estuary, margins, mouth and along the coast.

Following European settlement, Kaikorai Valley became important to Dunedin's industrial history, industries such as the freezing works, cement factories, wool and flour mills, using and discharging into the Kaikorai Stream.[17] The area continues to be associated with a mix of industrial businesses and residential homes.

Other landscape-related values associated with community identity and engagement include the community initiatives to restore vegetation, wetlands, and streams in the area such as the Kaikorai Estuary Restoration Project and Aroha Kaikorai Valley.

4.2.3 Sensory/Perceptual

The volcanic cone-shaped peaks of Pukemakamaka/Saddle Hill have a high degree of geomorphic legibility and form a key landmark in this landscape as well as featuring in the creation stories of the manawhenua. Together with the Chain Hills to the north, these ranges contribute to the setting and skyline for the Green Island areas.

The Kaikorai Estuary is also a key landscape feature. While modified, it retains aesthetic values and legibility relating to the presence of water, natural tidal, estuarine and formative processes.

State Highway 1, the main arterial route south from Dunedin traverses this landscape, with potential for high numbers of transient viewers through this landscape. The Landfill Site is part of a basin formed by the Kaikorai Stream delta, affording potential views from the more elevated roads, including SH1, and residential areas that surround it.

Views from these elevated areas around the Site also include potential views to the sea, the estuary and surrounding hills. The Landfill has been part of the landscape and visual context of Green Island since it was first used for waste disposal in 1954.

4.2.4 Summary

The dominant character of the Site is as a modified working landfill within the low-lying part of a wider basin-like landscape on the margins of the Kaikorai Estuary. Historically, the Estuary has been drained, and parts reclaimed for farmland, a golf course and two landfills.

Today the surrounding area has a settled, suburban, rural and coastal character. The suburbs of Green Island, Abbortsford and Fairfield surround the Landfill Site to the northwest, north and east with a combination of residential, commercial and industrial development as well as recreational open space and the grassed landform of the closed Waste Management landfill. To the south, the landscape has a varied character but predominantly rural, characterised by open space, stands of large trees, shelterbelts, narrow, gravel roads and farm buildings. There are also larger lot residential properties and the denser, small coastal settlement of Waldronville.

[16] Ibid, Island Park Natural Coastal Character (A5.3.6)

[17] https://teara.govt.nz/en/otago-places/page-8

Abbotts Creek, Kaikorai Stream, Kaikorai Estuary and Pukemakamaka/Saddle Hill are key landscape features nearby, recognised as holding important values including to manawhenua.

4.3 Natural Character of Waterbodies

Understanding natural character is relevant due to the location of the Site immediately adjacent to the Kaikorai Estuary.

The environments with the greatest natural character are those with comparatively low levels of human modification. Areas with high natural character are composed of natural elements appearing in natural patterns and underpinned by natural processes. Natural character is context and scale related.

The Site was once part of the intertidal saltmarsh area of the Kaikorai Estuary but has been progressively drained, filled, and capped since being occupied by the current landfill. The estuary is long, narrow, and shallow, its margins modified by roads, causeways, drainage channels and buildings as well as reclamation.

Vegetation patterns in and around the estuary are extensively modified. Much of the former indigenous vegetation has been replaced by weedy exotic species. However, Kaikorai Stream and Abbotts Creek have been considered to have Moderate ecological value while the Estuary is considered to have High ecological value despite extensive habitat and water quality degradation[18].

There is a series of constructed ponds located to the east of the proposed footprint (but within the overall Designation) which have been noted in the BML Ecological Assessment as having sparsely vegetated margins and / or margins of exotic vegetation (e.g., exotic grasses). The Ecology Assessment also notes that neither the ponds themselves nor any wetland vegetation that has developed or been planted on their margins can be considered a 'natural inland wetland'.[19]

The lagoon hosts large numbers of birds and is an important feeding and breeding ground for a high diversity of coastal, oceanic and wetland bird species. The margins of the Kaikorai Stream and Estuary bordering the landfill to the north and west are identified as a Regionally Significant Wetland in the Regional Plan: Water; and an Area of Significant Biodiversity Value, and a Wāhi Tupuna of cultural significance to mana whenua in the 2GP.

A 2015 Natural Character Assessment has rated the Kaikorai Estuary (Unit D49) as Medium-Low with the following comment:

> *While providing important habitat for wildlife this unit has been significantly modified by human habitation and lacks perceptual naturalness of wild and scenic value*. [20]

4.4 Viewing Areas and Audience

The Site is located in a basin landform but is visually well contained from close views, largely screened by the earth bunds and established trees put in place for that purpose as part of

[18] Green Island Ecological Assessment, pp44-45

[19] Ibid, pp15-16

[20] Coastal Environment of Otago Natural Character and Outstanding Natural Features and Landscapes Assessment, Dunedin City Section Report, 28 April 2015, prepared by Mike Moore et al.

consenting the original landfill. The hilly character of the surrounding landscape means visibility is obscured by intervening landform from some locations, but elevated views are available from others. Abbots Creek and Kaikorai Estuary, the motorway and the Green Island Wastewater Treatment Plant provide some spatial separation between the Site and residential neighbours to the south, west and north.

The viewing audience is varied with the Landfill Site surrounded by property in a range of public and private land ownership. **Figure 9** in the Graphic Supplement identifies the key viewing areas, labelling them from **A-K**. They are summarised below:

- Residential and light industrial properties to the east. The dwellings on Clariton Ave **(A)** are the nearest residential neighbours to the Site on low-lying land with dwellings on increasingly elevated slopes further east **(B, C);**
- The DCC Wastewater Treatment Plant immediately to the south with Island Park Golf Club, large lot residential and the settlement of Waldronville beyond **(D, E)**;
- The Dunedin City Council has also rezoned a block land between Weir Street and Brighton Road, south of Clariton Avenue (southeast of the Site), to a General Residential Zone enabling low-medium density residential living **(F);**[21]
- Undulating, increasingly elevated hills of grazed farmland and scattered vegetation with a low density of housing and sparse roading to the southeast **(G)** and southwest **(H)**;
- A grassed terraced landform that is a closed, former landfill site (private property), open sports fields and recreation areas, a motorway (State Highway 1) and residential suburbs largely on elevated slopes and terraces from the west through to the northeast **(I, J, K)**. An area of undeveloped land (at the time of writing) zoned General Residential is located approximately 270m northeast of the Site, between the motorway and the former landfill.

The surrounding residential development is predominantly in the General Residential Zone which covers the majority of the middle to outer suburban areas of Dunedin and has been characterised by low density suburban residential living. Over time, the zone is likely to transition to a denser suburban form, accommodating more residents, under the 2GP.

4.4.1 Site Context Photographs

To assist the assessment of available views and understand the landscape context, panoramic photographs (**Site Context Photographs A-J**) were taken at a range of distances and directions relative to the Site. Most photographs are from publicly available vantage points surrounding the Site, however **Site Context Photograph I** is taken from the eastern edge of the closed, Waste Management Maxwells landfill site.

Site Context Photograph A is taken from the Sunnyvale Sports Centre carpark approximately 670m north of the Site, illustrating the way in which the layers of intervening vegetation almost entirely screen the existing landfill from low-lying elevations in the vicinity of Main South Road, including in winter.

Site Context Photograph B is taken from the walkway between Thomson Street and Will Street, approximately 1km from the Site, representing views from elevated suburbs to the northeast. Due to the elevation, much of the existing landfill is visible in the centre of the photograph however it is broken up by the existing screening vegetation. Kaikorai Estuary can

[21] Variation 2 to the Proposed Dunedin City District Plan.

be seen immediately beyond the Site and the sea and horizon can be seen in the distance. The basin-like form and mixed rural, residential and industrial character of the landscape can be seen.

Site Context Photograph C is taken from Clariton Ave, approximately 250m east of the Site. This represents the occasional gaps between houses on Clariton Ave (the nearest residential properties) where close views towards the Site are available from the east. The intervening perimeter vegetation almost entirely screens views of the existing landfill. Pukemakamaka/Saddle Hill is visible above and beyond the Site in clear weather.

Site Context Photograph D is taken from Green Island Bush Road, approximately 1.3km from the Site. This represents elevated distant views available from the southwest. Much of the Site is visible in the centre of the photograph. Layers of undulating hills surround the Site which sits in a mosaic of vegetation and land use, including blocks of forestry and open pasture, rural and residential. The peak of Pukemakamaka/Saddle Hill is a prominent feature in clear weather.

Site Context Photograph E is taken from the edge of the Kaikorai estuary, in a layby just off Brighton Road, approximately 1.8km from the Site. This represents views from the south and southwest including the nearby settlement of Waldronville. Kaikorai Estuary is in the foreground with the slopes of Flagstaff and the Silver Peaks forming the distant backdrop. Intervening hills and trees, particularly the trees on the golf course, around the Wastewater Treatment Plant and the perimeter of the Site itself, almost entirely screen views of the Site.

Site Context Photograph F is taken from Old Brighton Road, approximately 1.6km southwest of the Site, illustrating the way intervening landform and vegetation will partially screen views for some dwellings in this visual catchment.

Site Context Photograph G is taken just off Old Brighton Road, at the access to the closed former landfill site, approximately 1.3km from the Site and orientated away, towards Pukemakamaka/Saddle Hill and the surrounding visual catchment. The potential viewing audience from this south westerly direction is generally comprised of scattered dwellings on undulating rural hill slopes within a mosaic of shelterbelts, open pasture and blocks of vegetation.

Site Context Photograph H is taken from the end of Walton Park Ave, approximately 700m northwest of the Site. Trees have recently been cleared on land in the foreground of this photograph for future residential development, so that the upper slopes of the existing landfill are visible in the distance, just above the perimeter vegetation and backdropped by a ridge of rural hill slopes. The grassed slopes of the closed, former landfill are also visible.

Site Context Photograph I is taken from the top of the closed former landfill, approximately 300m west of the Site. While not a publicly accessible location, it provides a useful image of the intervening perimeter vegetation and the margins of Abbotts Creek and the Kaikorai Estuary.

Site Context Photograph J is taken from the Green Island Landfill boundary Road, approximately 100m southwest of the Site, orientated to illustrate the perimeter vegetation on Site, the adjacent margins of the Kaikorai Estuary, and the appearance of the grassed slopes of the closed, former landfill.

4.4.2 Visual Simulations

Six viewpoints (**Visual Simulation Photographs 1-6**) have been identified to simulate and assist in understanding the change anticipated within the Site from key representative viewpoints. The locations of visual simulations are shown in **Figure 9** of the Graphic

Supplement. These include views of the progressive staging of the landfill from Thomson Street (**VS4A-C**) and Walton Park Recreation Reserve (**VS6A-C**) to show change over time as the landfill develops during each of the two proposed main stages (Stages 2 and 3). Simulations have been prepared in accordance with NZILA Best Practice as detailed in **Appendix 1** to show the anticipated change which will occur, as summarised below:

Viewpoint 1 (Allen Road) 600m, 27 m.a.s.l

Viewpoint 1 (VS1) shows the view from Allen Road which is representative of semi-elevated rural views from the southeast. The Site is located in the middle distance beyond and obscured by an intervening ridge and layers of vegetation and backdropped by hills. The closed, former landfill can just be seen beyond the Site but its grassed cap is difficult to discern from the intervening ridge. Pukemakamaka/Saddle Hill is the high point on the skyline in this view.

Viewpoint 2 (Elwyn Crescent) 640m, 15.3 m.a.s.l

Viewpoint 2 (VS2) shows the view from Elwyn Crescent which is representative of middle-distant, semi-elevated views from residential streets to the east. The Site is located beyond, and almost entirely obscured by the intervening ridge (Weir Street), housing and layers of vegetation. The Site is backdropped by hills with Pukemakamaka/Saddle Hill forming a clear high point on the skyline.

Viewpoint 3 (18 Clariton Ave) 350m, **7.8 m.a.s.l.**

VS3A shows the view from Clariton Ave which is representative of views from this nearby low-lying residential street. Properties on Clariton Ave are the closest residential neighbours to the Site which is located immediately beyond the buildings in the foreground. Visibility of the Site is negligible in public views from the street due to intervening built form and vegetation. A glimpse of Pukemakamaka/Saddle Hill can be seen above the roof and trees.

VS3B (6m above ground level) is a schematic model view to provide an indication of views to the proposed landfill form from two-storey houses in Clariton Ave. The model indicates that views to the Site are likely to be almost entirely screened by the perimeter vegetation from this height. This suggests that the Site is also likely to be almost entirely screened from single storey residential dwellings in Clariton Ave due to the existing perimeter vegetation and intervening buildings.[22]

Viewpoint 4 (Thomson Street) 840m, 41.3 m.a.s.l

Viewpoint 4 (VS4) shows the view from Thomson Street which is representative of distant, elevated views from residential streets to the northeast and illustrates the basin-like character of the landscape. The Site is located in the centre of the photograph, with houses and the motorway in the foreground, light industrial buildings to the left, Kaikorai estuary immediately to the right and the coast beyond. The volcanic slopes of Pukemakamaka/Saddle Hill form the skyline to the right. Much of the Site is visible above the perimeter vegetation and also backdropped by layers of vegetation.

Viewpoint 5 (Sunninghurst/Holyport) 750m, 20 m.a.s.l

Viewpoint 5 (VS5) shows the view from the top of Holyport Close near Sunninghurst Reserve which is representative of middle-distant, semi-elevated views from residential streets to the north. The Site is partially visible beyond intervening housing and the motorway at this point. Views are also partially screened and broken up by layers of vegetation and backdropped by

[22] This is based on visiting the street and use of the model. No private properties have been visited to confirm visibility.

rural hill slopes beyond. The closed, former landfill appears to the right as a grassed terrace landform.

Viewpoint 6 (Walton Park) 1030m, 39.5 m.a.s.l

Viewpoint 6 (VS6) shows the view from near the playground and pump track at the Walton Park sports fields, a distant, elevated view from the west, backdropped by rural hill slopes. Views from residential streets in the adjacent suburb are largely curtailed by intervening residential buildings and trees however this viewpoint and **Site Context Photo H** are representative of some potential public and private views from this area. Should the undeveloped residential block located between the motorway and the former landfill be developed, it will enable closer residential and public viewpoints (between approximately 270m to 700m away) at lower elevations as broadly represented by **Site Context Photo H**.

5.0 Assessment of Effects

Landscape and visual impacts result from natural or induced change in the components, character or quality of the landscape. Usually these are the result of landform or vegetation modification or the introduction of new structures, facilities or activities. All these impacts are assessed to determine their effects on character and quality, amenity as well as on public and private views.

In this study, the assessment of potential effects is based on a combination of the landscape's sensitivity and visibility together with the nature and scale of the development proposal.

Particular effects considered relate to the following:

- Natural Character effects
- Landscape character effects
- Visual effects from public and private locations; and
- Effects in relation to statutory provisions.

The principal elements of the proposal that will give rise to landscape and visual effects are:

- The daily activity of machines and exposed fill, working face and borrow area during the operational stages
- Physical changes to existing landform and vegetation, including proposed new vegetation
- Height and form of the final landform

5.1 Natural Character Effects

Natural character is the term used to describe the degree of naturalness in an area, and includes the natural elements, patterns, processes and experiential qualities attributes of an environment. The natural character of the coastal environment, and freshwater bodies and their margins, is comprised of a number of key attributes which include:

- Abiotic systems - physical processes, geomorphology, topography, landform, and water quantity/quality;
- Biotic systems - species, communities, habitats, and ecological processes;
- Experiential attributes - the ways in which people, including tangata whenua, experience the natural elements, patterns and processes.

The degree of natural character present in an area is commonly described on a continuum with areas of very high natural character due to the lack of human induced modification. In other areas, there may be little natural character remaining due to extensive human modification.

The existing level of natural character at the Site is highly modified. The long history of reclamation, drainage and waste disposal has considerably altered biotic and abiotic systems. However, although modified, natural character of the adjacent Kaikorai Stream, Abbotts Creek and Estuary is higher, particularly in regard to the birdlife it supports and scenic qualities present.

As identified in Section 4.3 above, the Kaikorai Estuary has been assessed as having Medium-Low natural character in the 2015 Natural Character Assessment[23].

The proposed increase in volume and height of the landfill will not reduce the abiotic or biotic aspects of natural character further on Site or within the context of adjoining waterbodies. The Ecological Assessment (BML, 2023) finds a very low level of effect on the aquatic environment and fauna.[24] Neither the Active Bed or River Margins will be impacted by the Proposed Development as the additional development remains within the existing landfill boundary. Changes are proposed to the leachate collection system as part of the Proposed Development to address any potential migration risks. The existing consents include a comprehensive regime for the monitoring of groundwater and surface water, which are proposed to form part of any replacement consents.

Experiential aspects of natural character may be adversely changed by a very small degree due to the extension in time and height from that currently anticipated however this is in the context of an existing designated landfill site.

Following closure, implementation of the proposed Vegetation Management and Restoration Plan will provide for an increase in native species within the perimeter plantings and the enhancement of wetlands within the designation, resulting in an increase in natural character.

Overall, natural character effects are assessed as **very low**.

5.2 Landscape Effects

5.2.1 Effects on landform and landcover

Landfill activities are physical processes that will alter the landform and landcover within the Site. At this Site, the existing landform has already been modified by the landfill activities and with the exception of Abbotts Creek, Kaikorai Stream and Estuary that are outside the landfill boundary, landcover is already wholly artificial or heavily modified.

[23] Coastal Environment of Otago Natural Character and Outstanding Natural Features and Landscapes Assessment, Dunedin City Section Report, 28 April 2015, prepared by Mike Moore et al.

[24] Green Island Ecological Assessment, p51

The existing consent conditions do not impose any specific limit on the overall finished height, shape, or contour of the landfill, however the plans included in the 1994 resource consent applications show a finished landfill surface rising to a (final, settled) maximum height of 25m a.m.s.l

Under the Proposed Development, the final landfill surface will be extended to the west so that at completion it will be shaped like a wedge. The high side of the wedge will lie along the western boundary of the Site at approximately 31.5 masl, with the highest point at the southwest corner.

During Stages 2 - 3, the volume, contours and form of those areas will shift and change as refuse is continuously deposited, moved, exposed and covered. During this period the active tip face will have a mutable, 'worked' character including the appearance of raw refuse at times, earth, and the operation of heavy machinery. The tip face area itself is a relatively small area in the context of the overall landfill site. When Stage 2 is completed, it will be fully capped with soil and seeded with grass and work in the Stage 3 area will begin.

The existing borrow pit is also proposed to be extended to the south of the landfill footprint, with material excavated from the hillside to be used as landfill capping material. At closure, the exposed cut slopes will be re-grassed.

The physical change to the Site during the operational stages therefore contrasts with surrounding land-use but is consistent with the underlying designation including the existing and anticipated land-use for the Site. The quantity of fill and height of the resultant landfill form is greater than is currently anticipated but within the same landfill boundary.

Following the completion of Stage 3, this final part of the landform will also be capped with soil, seeded with grass and maintained. The embankments that form the perimeter will have a uniformly steep, 'engineered' appearance however this form will be broadly sympathetic to the surrounding topography and land use. This is particularly so when considered in the context of the existing Green Island landfill base as well as the terraced landforms of the adjacent former Waste Management landfill and Walton Park to the west.

Any vegetation clearance remains within the landfill footprint which have already been cleared of their original vegetation. In this context any vegetation that may be cleared is comprised largely of exotic species and is not of ecological importance.

Development and implementation of a Vegetation Management and Restoration Plan may provide opportunities for riparian enhancement and lead to a more natural sequence of indigenous vegetation types in the area.

Physical change within the landfill footprint during operation will be very low however overall physical landscape effects on landform during operation are assessed as **low-moderate adverse** effects due to the extent of cut from the proposed borrow area. Following closure with completion of the capping and grassing at the landfill and borrow pit sites, adverse landform effects will be **low**.

Any change in landcover during the operational stages is considered to generate **very low adverse** effects. Following rehabilitation of the landfill and borrow pit sites and implementation of the proposed Vegetation Management and Restoration Plan, the gradual increase in ecological connectivity over time, there will be **positive** landcover effects.

5.2.2 Landscape Character Effects

Landscape character is derived from the distinct and recognisable pattern of elements that occur consistently in a particular landscape. It reflects particular combinations of geology, landform, soils, vegetation, land use and features of human settlement. It creates the unique sense of place defining different areas of the landscape.

The existing character of the Site is as a modified working landfill within the low-lying part of a wider basin-like landscape. The character of the surrounding area is mixed. To the south, the landscape has a predominantly rural and coastal character.

Rural characteristics include open pasture with hedgerows, shelterbelts, tall stands of exotic forest, areas of indigenous vegetation, scattered dwellings and a limited road network. The landscape becomes increasingly coastal to the south, characterised by sand dunes and coastal vegetation, the river/estuary mouth and views of the sea. To the north and east the character is dominated by built form including SH1, suburban streets and dwellings and an area with light industrial character immediately to the east.

Abbotts Creek, Kaikorai Stream, Kaikorai Estuary and Pukemakamaka/Saddle Hill are key landscape features nearby, recognised as holding important values.

The Site has formed part of the character of this varied landscape since it opened, so while its appearance will continually change as the Proposed Development progresses through sequences of bare ground, landfill operation and establishment of grass, change is already part of this landscape. The existing perimeter vegetation will continue to assist with integrating the Site into the rural backdrop.

Modelling from representative views indicates that the Proposed Design will not compromise the landscape values associated with the Pukemakamaka/Saddle Hill ONF, including views of its iconic shape. This is due in particular to the height of the embankments and existing trees around the landfill.

The Proposed Development will not appear prominent within views or uncharacteristic within the receiving landscape generating **low-moderate adverse** landscape character effects during operation.

Once works are completed, the form and scale of the landform itself and the pattern of proposed vegetation would appear consistent with the existing rural landscape, generating **low adverse effects**.

5.2.3 Summary of Landscape Effects

While the operational stages will generate some higher levels of visual and landscape effect, the land use remains the same as it is today, and overall, will retain rural and open characteristics including the exotic grassland with pockets of shrubland, small blocks of exotic forest and stands of large, generally exotic trees.

Residential suburban development is also a part of the wider landscape, and during the operational stages, the character of the Site will contrast with this land use. Views to the Site from these areas are typically backdropped by rural landscapes and at completion, the final landform will appear as a grassed, open terrace surrounded by established vegetation, broadly sympathetic with its wider setting.

5.3 Visual Effects

Visual amenity effects are influenced by a number of factors including the nature of the proposal, the landscape absorption capability and the character of the site and the surrounding area. Visual amenity effects are also dependent on distance between the viewer and the proposal, the complexity of the intervening landscape and the nature of the view.

It should also be emphasised that a change in view does not, of itself, constitute an adverse visual effect. Landscape is dynamic and is constantly changing over time so that any change in view must be assessed within the context of the landscape which such change occurs.

In regards to this Proposal, the nature of the activity or land use is not changing and the footprint remains within the existing landfill boundary. The Proposal is for a life extension until closure which means a greater height (6.5m), new locations (further south and west) of the active face, an altered shape to the current (albeit dynamic) landfill 'landform' and an extended borrow pit (as illustrated in **Figure 6**, the Form and Elevation Plan and **Figure 7**, Staging Plans in the **Graphic Supplement**).

The Site is the location of an existing, operating landfill and the Proposal is for this activity to continue (until closure, estimated to be in 2029). This means that during the operation stages, there is potential to see the raw, worked landform including the visual contrast of bare soil associated with stockpiles or final capping prior to grass becoming established, or areas of exposed landfill under operation, as well as infrastructure such as operational plant and moving vehicles accessing and operating within the Site, which is the same type of activity that currently occurs.

Therefore, in terms of potential visual effects of the Proposal, during operation, parts of the Site will continue to be visible for a longer period of time than currently authorised, and there is potential for a greater degree of visibility due to the increase in height and mass of the worked landform.

Views are predominantly a mix of transient views obtained from people in vehicles passing in the vicinity of the Site such as the motorway, views from people on foot or bicycle in residential streets or in recreation areas such as Sunnyvale, and views from people in residential dwellings.

The staging of the landfill and associated rehabilitation processes means only a portion of the Site would be under development at any one time. As of December 2022, final capping of 3ha of the 13ha portion of the current landfill operation has been completed. As each subsequent stage is completed, the final cap will be placed. During Stage 2, the limited works that will occur outside the Stage 2 active filling area will typically remain screened. During Stage 3, the Stage 2 area will be capped and then works will be limited to the final active filling area.

The continued cycle of the growth, health and longevity of the perimeter vegetation will also influence the extent to which views towards the Site remain enclosed. Therefore, the monitoring and management of these trees is proposed in the Vegetation Management and Restoration Plan to maintain a high level of visual screening.

Six publicly accessible representative viewpoints have been identified to simulate the shape and location of the Proposed Design and assist in understanding its potential visibility from both private and public vantage points. One additional viewpoint (**VS3B**) has been modelled but not incorporated into a photograph as the viewpoint simulates the potential view from private property (2nd storey of 18 Clariton Ave) and has not been visited**.** A sequence of simulations from **VP4** (**VS4A-C**) have been prepared to show views of the anticipated change within the Site over the two key stages.

An assessment of visual effects from these representative viewpoints is set out below.

5.3.1 Effects from private vantage points

No private properties were visited for the purpose of this assessment except for the former Maxwells landfill, immediately west of the Site.

The location of the Site is in a valley/basin landscape, semi-enclosed by hills to the west, north and east. As noted in the Dunedin Landscape Management Review, the orientation of the upper slopes has a strong seaward focus, towards and beyond the Site, while views inland are often focused on the Pukemakamaka/Saddle Hill landform.

However, the low-lying Site is visually well-contained and generally well separated from close views. While the surrounding hills mean elevated views are available, they are largely from at least middle-distant locations (approximately 400m-700m) and typically at least partially screened due to intervening built form and vegetation as well as undulating contours. As views become more elevated, the level of visibility tends to increase but views become long-distance (greater than 700m) which means discerning change at the Site becomes increasingly more difficult as a smaller part of a wider landscape.

Based on the nature of available views, the potential for adverse visual effects from private dwellings resulting from the proposed landfill is largely limited to more elevated areas in the east, north and west, which are typically a greater distance away.

Due to the number of dwellings in the surrounding area, views have not been assessed from individual properties. Rather, views considered were from adjacent streets with a similar vantage as nearby dwellings and are considered representative of the typical viewing audience in the surrounding catchments as set out in **section 4.4** and mapped in **Figure 9** of the Graphic Supplement. Available views are described and assessed below:

Viewing Area A

The dwellings on Clariton Ave are the nearest residential neighbours to the Site on low-lying land with increasingly undulating and elevated slopes further east.

Views from residential dwellings in Clariton Ave will be screened, or almost entirely screened by other dwellings and the perimeter planting around the landfill, as indicated in the simulation from the street (**VS3**) and the modelled view indicating visibility from a 2-storey dwelling (**VS3B**).

Given the gradual and sequential nature of the Proposed Development, its design with the high point to the west, and given the context of established perimeter planting, visibility of the landfill from these dwellings will remain extremely limited during operation although movement of vehicles and contrast in exposed fill may draw the eye should small glimpses be available from these close views.

Views of Pukemakamaka/Saddle Hill's cone form will not be impacted by the Proposed Development in views from residential dwellings to the east. While the final landform will be higher than is currently anticipated, the high side of the wedge will lie along the western boundary of the Site to help maintain existing viewshafts to the feature.

Visual effects are assessed as **Low** during operation and **Very Low** following closure.

Views from dwellings further east on Brighton Road are generally similarly low-lying and will be screened by intervening residential and larger light industrial buildings as well as the perimeter vegetation.

Viewing Area B

East of Brighton Road, the topography becomes more undulated, as elevation gradually rises. Views from dwellings at lower elevations such as the lower part of Elwyn Crescent are screened from the Site by landform, buildings and vegetation. Dwellings in higher elevations such as in the vicinity of Burgess Street, Brooklyn Street, Elwyn Crescent (**VP2**) and Weir Street will also be largely screened by the perimeter trees and built form in the foreground however glimpses are likely to be possible from some locations, particularly from two storey homes. As indicated by the simulation from the street in the upper part of Elwyn Crescent (**VS2**), it is considered likely that where views are possible they will be difficult to discern.

Visual effects are assessed as **Low** during operation and **Very Low** following closure.

Viewing Area C

There are limited dwellings further east, such as at the western end of Kirkland Street and District Road (40-60m.a.s.l), and Church Hill Road (approximately 160 m.a.s.l) that are more elevated and therefore have potential for more open views. These locations are more than 1.1km from the Site. It is considered that at these long distances, any views of the Site will form a smaller part of a much larger, diverse landscape and any change to the configuration of the Site as proposed will be limited and reasonably difficult to see.

Visual effects are assessed as **Low** during operation and **Very Low** following closure.

Viewing Area D

There are no private dwellings with close views to the Site available from the south. The landscape immediately to the south features Abbots Creek, the Kaikorai Estuary and the DCC Wastewater Treatment Plant site. The nearest dwellings to the south that are outside the designated landfill area are 176 and 172 Brighton Road (approximately 430m and 530m respectively from the Site) located at the southern end of the ridge between the Site and Brighton Road. Modelling indicates that the Proposed development will be screened or barely visible due to the intervening ridge landform and vegetation.

Visual effects are assessed as **Very Low** during operation and **Very Low** following closure.

Viewing Area E

Further southwest is a large lot residential subdivision (Wavy Knowes Drive), the Island Park Golf Club and the settlement of Waldronville. Modelling indicates that views to the Proposed Development from these locations are likely to be entirely screened from most dwellings by a combination of the intervening landform and tall trees. Partial visibility to upper slopes may be visible from dwellings to the northwest (16-20 Wavy Knowes Drive, some 700-750m away).

While the extent of change is likely to appear relatively difficult to discern in views between trees from these limited viewpoints, there may be a greater level of daily activity focused at the southern end of the Site which may draw the eye. This will be temporary and as each stage is finished, it will be capped and grassed, reducing potential visual contrast and visibility. Following closure, once the Site has been fully capped and grass established, the wedge form of the Proposed Design will blend into the treed landscape.

Visual effects are assessed as **Low-Moderate** during operation and **Very Low** following closure.

Viewing Area F

To the southeast, the topography becomes increasingly elevated with a low density of housing. Potential views to the Site from private dwellings may become available as the land rises and

vegetation allows, such as from a small number of existing dwellings on Allen Road as indicated by the simulation (**VS1**),

VS1 is also representative of potential views from a block of land that is proposed to be rezoned to a higher density of residential living between this viewpoint on Allen Road and Brighton Road.[25] The land slopes steeply down to the north from Allen Road so if it is developed as residential in the future, houses may be lower than this viewpoint meaning less of the Proposed Development will be visible.

Currently, from Allen Road, the uppermost slopes of the southern end of the Site are visible but difficult to discern above the intervening ridge. The rest of the Site is largely screened by the ridge and vegetation.

As the Proposed Development progresses during the operational stage, the extent of worked landform visible will gradually increase as a greater height of fill is achieved to the south and west of the Site. While the extent of change is likely to appear relatively difficult to discern in views from this general elevation (**VS1:** 27m.a.s.l), there may be a greater level of daily activity focused at the visible southern end of the Site which may draw the eye. This will be temporary and as each stage is finished, it will be capped and grassed, reducing potential visual contrast and visibility. Following closure, once the Site has been fully capped and grass established, the wedge form of the Proposed Design will appear as another ridge or terraced landform in the wider landscape (**VS1**).

Visual effects are assessed as **Low-Moderate** during operation and **Very Low** following closure

Viewing Area G

At higher elevations, such as Green Island Bush Road, open views may be available from a small number of dwellings[26] such as in the vicinity of the loop in the road as represented by the selected viewpoint in this location (**Site Context Photo D**). At this distance and elevation (approximately 1.4km from the Site and more than 130 m.a.s.l), more of the Site is visible but the perspective 'flattens' the view so that it is more difficult to discern changes to height. Works are not proposed outside the existing landfill boundary so there will be no change to extent. At these longer distances, the Site becomes a smaller part of a much larger, diverse landscape and any visible change typically becomes less prominent.

Visual effects are assessed as **Low** during operation and **Very Low** following closure.

Viewing Area H

There are few dwellings on the elevated rural hill slopes to the southwest. The nearest are a loose cluster of houses in the vicinity of Old Brighton Road between Jeffcoates Road and Walton Park (**Site Context Photos F and G**) broadly orientated towards the Site, between approximately 1-2km away.

The topography in this area varies from valley floor to undulating slopes with large stands of exotic forest. Intervening landform and vegetation will at least partially screen views for many of these dwellings. Where views are available, modelling indicates the perimeter vegetation on Site will screen the lower slopes with the upper slopes of the wedge landform potentially visible above these trees in the distance.

[25] Variation 2 to the Proposed Dunedin City District Plan.

[26] Undulating landform and layers of vegetation also screens views to the Site from some dwellings in the vicinity of Green Island Bush Road

As the Proposed Development progresses during the operational stage, where views are available, the extent of worked landform visible will gradually increase as a greater height of fill is achieved to the south and along the western edge of the Site.

The distance from these potential residential viewpoints is considered to reduce the ability to discern change at the Site when compared to the existing and anticipated scenario for the landfill, reducing potential visual effects.

Visual effects are assessed as **Low** during operation and **Very Low** following closure.

Viewing Area I

Views to the Site from most dwellings within the Walton Park sub-division (**VS6**) will largely be obscured by other houses while for those dwellings closest to the eastern extent of the neighbourhood, views are largely screened by existing tall trees (outside of the Site and not associated with the landfill perimeter planting). Some of these have been recently removed at the eastern end of Walton Park Ave (**Site Context Photo H**) indicating that views to the Proposed Development will be possible for a small number of existing dwellings in this location. Should more trees be removed in this area, additional dwellings at the eastern edge of the suburb between Walton Park Ave and Blanc Ave are likely to obtain some further views towards the landfill.

Views to the Site for those dwellings could potentially see elevated parts of the Site in middle-distant views beyond approximately 600 metres, including the highest finished elevation of the landfill along its western edge. It will appear higher than the anticipated final landfill form. Perimeter vegetation will continue to screen lower slopes. Beyond this, part of the borrow pit may also be visible to the south of and beyond the landfill.

When the final landform is fully capped and grassed, it will be a noticeable new terrace landform. The steep western embankments may appear unexpectedly uniform however overall, as a grassed form it will blend into the grassed fields and vegetation of the rural backdrop. It will also appear consistent with the grassed form of the existing closed landfill site in the foreground.

During operation, movement on the site and its raw, worked state will draw attention to its height and scale however the staging process means that the extent of active face is limited with only a portion of the Site under development at any one time.

Should dwellings be built on the block of residential zoned land that is currently undeveloped, immediately east of Walton Park Ave, there is potential for close views (e.g. potentially within 300m) to the Proposed Development. Much of this land is at low elevations so the perimeter vegetation around the Site is likely to have a considerable screening effect however the uppermost slopes may be visible above the trees with some potential moderate as yet unsubstantiated effects.

Overall visual effects are assessed as **Low-Moderate** during operation and **Low** following closure.

Viewing Area J

Private views to the Proposed Development from Fairfield will be possible from a limited number of dwellings, south of Main Road, in the vicinity of Holyport Close, Sunninghurst Drive (including the Te Kura Kaupapa) and Awa Toru Drive (**VS5**). From this elevation, where open, direct views are available, a slim band of the upper slopes of the landfill is currently partially visible between trees. The size of this band will increase to the southwest (or to the right as seen in the simulation) as work on the stages progresses. The extent of visibility will broadly decrease for those dwellings lower than the location of **VS5** (approximately 20.m.a.sl.)

During operational stages of the Proposed Development, movement on the Site and its raw, worked state is likely to be eye-catching and therefore temporarily increase its prominence however the degree of visual change, compared to that anticipated at the Site, will be low. The proposal to cap and grass each stage as the landfill progresses, the partial screening and softening effect of the intervening trees, and the trees and hill slopes that backdrop the Site will also all help to reduce potential visual effects during the operational stages.

Following closure, once grass is established across the Site, the landform will visually blend into and appear consistent with the rural backdrop in public views from this area.

Visual effects are assessed as **Low** during operation and **Very Low** following closure

Viewing Area K

The Proposed Development will be screened or barely visible from the closest dwellings to the north which are on Pottinger Street, Watson Street and Sunnyvale Lane, on low-lying land between the motorway and Main South Road. Potential views are likely for some dwellings on Main South Road however most will be largely screened by other dwellings and vegetation in the foreground.

Open views from most dwellings in the vicinity of Thomson Street (**VP4**) will be available, as well as those at the end of Will Street and Miller Street. There may also be views from some dwellings at the western and southernmost edge of the ridge accessed off Reeves Street and Severn Street.

Private views from north and northeast of the Site are broadly represented by the simulation prepared from the upper end of Thomson Street (**VP4**) due to its proximity to the Site, similar elevation (40-50 m.a.s.l) and open views.

A sequence of simulations (**VS4A-C**) have been prepared from this viewpoint to show views of the anticipated change within the Site as the stages progress.

The modelling indicates (and shown in **VS4A-B**) that once stage 1 is complete and grass has established on the capped area, vehicles accessing the working face will be visible from this direction, but the active face will not be, during either of Stages 2 or 3. **VS4C** has been prepared to clearly show the difference in extent between stages 2 and 3 as the volume and height increases.

While the movement of vehicles during the operation stages will continue to have potential to draw the eye, the degree of visual change will be low. The proposal to cap and grass each stage as the landfill progresses, the partial screening and softening effect of the intervening trees, and the trees and hill slopes that backdrop the Site will also all help to reduce potential visual effects during the operational stages.

Following Stage 3 and closure, the Site will appear as a low hill form of open grassed slopes. The final form will be higher than that currently anticipated however the footprint remains within the existing landfill boundary. The new landform will not break the skyline created by the hills and trees that currently backdrop the Site and the overall basin-like appearance of the landscape in these views is retained. Views to Kaikorai estuary are also maintained.

Visual effects are assessed as **Low-Moderate** during operation and **Low** following closure.

5.3.2 Table of Visual Effects from Private Viewing Areas

Viewing Area	Rep. Site Context Photo / Vis. Sim.	Approx. Distance	Approx. Elevation (m.a.s.l)	Angle/Nature of view	Level of Effect: Operation Stages	Level of Effect/: Closure
A	VS3	350m	5-15	West/ none to very small glimpses/ does not break skyline	Low	Very low
B	VS2	640m	8-30	West/ none to very small glimpses/ does not break skyline	Low	Very low
C	NA	1100m	60	West/ partial to open/ does not break skyline	Low	Very low
D	NA	430m	30	North/ none to very small glimpses/ does not break skyline	Very low	Very low
E	NA	700m	10	North/ none to partial/ does not break skyline	Low-Moderate	Very low
F	VS1	600m	5-30	Northwest/ partial/ does not break skyline	Low-Moderate	Very low
G	VPD	1400m	130	Northwest/ open	Low	Very low
H	VP F/G	1000-2000m	10-120	East/ Northeast/ none to open/ does not break skyline	Low	Very Low
I	VS6 / VPH	300-1030m	5-40	East/ Southeast/ partial to open/ does not break skyline	Low / Moderate (Potential for up to Moderate from undeveloped Residential Land)	Low
J	VS5	750m	15-25	Southeast/ glimpses/ does not break skyline	Low	Very low
K	VS4	840m	20-50	Southwest/ open/ does not break skyline	Low-Moderate	Low

5.3.3 Effects from public vantage points

The low-lying Site is visually relatively well-contained from close views, particularly from the south. This means the potential for adverse visual effects on public vantage points resulting from the proposed landfill are limited to more elevated areas in the east, north and west, which are typically a greater distance away.

Transient views are generally limited to intermittent, elevated sections of road, including residential streets (**VP1-5**) and the motorway, that are otherwise largely screened by intervening landform, buildings or vegetation. Other publicly accessible vantage points include recreational areas – primarily Walton Park (**VP6**), Elwyn Crescent Park (**VP2**) and Sunnyvale Sports Centre. (**Site Context Photo A**) Views from other nearby recreational grounds such as Shands Park are screened by vegetation.

Views will be possible from elevated parts of the motorway, primarily travelling west to east as the road descends, orientated towards the Site and where views over roadside embankments and intervening layers of vegetation allows (approximately 400 metres to the north at the closest point). Views are intermittent, at speed and amongst 4 lanes of traffic.

East

When approaching the access to the Site from the north or south on Brighton Road, views are screened by trees and landform, with residential and industrial buildings adding further intervening layers.

Views from low-lying sections of the closest residential streets to the east such as Clariton Ave (**VS3**), the Elwyn Crescent neighbourhood and Burgess Street area are similarly screened. Occasional very small glimpses may be available from some elevated sections of the streets in these areas however it is considered that they will be extremely difficult to discern and generally appear obscured such as from high points of the park and street at Elwyn Crescent (**VS2**).

Overall, visual effects from these closest streets to the east are assessed as **Very Low** during operation and **Very Low** visual effects following closure.

More open but still intermittent views to the Site become available on roads further to the southeast as the land rises and vegetation allows, such as stretches of Allen Road (**VS1**) and further still, on Green Island Bush Road (**Site Context Photo D**).

Following closure, where views are available from Allen Road (**VS1**), the wedge form of the Proposed Design will appear as a narrow band above the intervening ridge. Once the grass has established, the landform will appear as another ridge or terraced landform in the wider landscape and will be difficult to discern for transient viewers.

Visual effects from Allen Road are assessed as **Low**, reducing to **Very Low** following closure.

From higher viewpoints such as Green Island Bush Road (**Site Context Photo D**), more of the Site is visible but the perspective ‘flattens’ the view so that it is difficult to discern changes to height, only to the extent of the footprint.

Visual effects from Green Island Bush Road are assessed as **Very Low** during operation and **Very Low** following closure.

North

Views from low-lying public vantage points to the north of the Site such as the motorway, Watson Street and the sports fields at Sunnyvale, will be screened by vegetation and buildings. Intermittent, small glimpses may be possible from slightly more elevated locations such as Main

South Road and the carpark and building at the Sunnyvale Sports Centre (**Site Context Photo A**). These will be difficult to discern, particularly for transient viewers and in seasons when there are leaves on the intervening trees. Visual effects are assessed as **Very Low** during operation and **Very Low** following closure.

Further north, above Main South Road, the topography rises steeply. Public views from most of the streets in this Sunnyvale/Abbortsford area are obscured by trees, landform and buildings. However, there are occasional vantage points such as Thomson Street (**VS4**) where there will be elevated, open views to the Proposed Development. During the operational stages, movement on the Site and its raw, worked state may draw attention to its scale. Stockpiled mounds would further increase its prominence.

When the final landform is grassed, it will be noticeable but will appear lower than the adjacent southeastern knoll (to the left in the photograph) which will help minimise its prominence and maintain the overall basin-like appearance. The simulation indicates the Proposed Design will not break the skyline created by the hills and trees that currently backdrop the Site and that views to Kaikorai estuary are maintained. Visual effects are assessed as **Low** during operation and **Very Low** following closure.

Northwest of the Site and the motorway is the suburb of Fairfield where public views to the Site and Proposed Development will be largely obscured by vegetation and buildings. However, there are occasional vantage points from streets and pocket parks such as upper Holyport Close and Sunninghurst Reserve (**VS5**). From this elevation a narrow band of the upper slopes of the landfill is currently visible between trees. The size of this band will increase to the southwest (or to the right as seen in the simulation) as work on the stages progresses.

During operation, movement on the Site and its raw, worked state will draw attention to its scale with potential for visual prominence. The screening effect of the intervening trees will help reduce the potential impact. Following closure, once grass is established across the Site, the landform will visually blend into and appear consistent with the rural backdrop in public views from this area. Visual effects are assessed as **Very Low** during operation and **Very Low** following closure.

West

Open public views west of the Site are largely limited to Walton Park (**VS6**) and from the eastern end of Walton Park Ave in the adjacent residential neighbourhood. Views from Old Brighton Road (**Site Context Photo F**) and further west and elevated such as McMasters Road are intermittently available but largely obscured.

From the western end of Walton Park near the carpark and playground, the intervening treed ridge at the end of Blanc Ave generally obscures the northern end of the Site during Stage 1 (**VS6A**) but open views are available to the southern end as work progresses during Stages 2 (**VS6B**) and 3 (**VS6C**). The borrow area is also visible during these subsequent stages.

During the operational stages of the Proposed Development, movement on the Site and its exposed, worked state will draw attention to its additional height. The degree of change will be noticeable. The distance of the Site (over 1km from VS6) will help to mitigate potential visual effects during this period in views from much of the park.

When the final landform is grassed, it will be a noticeable new terrace landform. The uniformly steep embankments may contrast with the naturally undulating hill slopes in the wider landscape, however as a grassed landform it will generally blend into and appear largely consistent with the rural backdrop. It will appear similar to the existing landform created by the closed, former landfill nearby. Visual effects are assessed as **Low-Moderate** during operation and **Low** following closure.

Overall, views from surrounding public vantage points are considered to result in a range of temporary adverse effects from **very low to low-moderate,** the greater level of effect being experienced at Walton Park (**VS6**). These will reduce to **very low adverse** effects once closure is completed and grass has fully established.

5.3.4 Summary of Visual Effects

The landfill has been part of the landscape and visual context of Green Island since it was first used for the disposal of waste in 1954.

The Site is located in a basin but is largely screened from close views by earth bunds and established trees around the site perimeter. The hilly character of the surrounding landscape means visibility is obscured by intervening landform from some locations, but elevated views are available from others. Views from elevated areas around the Site also include potential views to the sea, the estuary and surrounding hills and these will not be impacted.

In 'worst case' views, the viewpoint is either elevated so that the landfill is largely without the benefit of intervening vegetation but some distance from the Site e.g. Thomson Street (840m away), or views are close but almost entirely screened by the perimeter vegetation so that only glimpses between trees are available e.g. potentially two storey homes on Clariton Ave (350m away). In these close views it is likely to be movement on Site (such as moving vehicles or seagulls) that draws the eye, otherwise the small areas of bare soil or exposed landfill will be less apparent.

The effective ongoing maintenance and management of the existing perimeter trees will be essential in mitigating potential adverse visual effects.

Any works and landform development seen, will appear as part of a wider landscape, primarily a working rural backdrop, within which the underlying designation anticipates such change.

Once the closure stage is reached and grass is established on the final capping, where the landfill is visible, it will appear as part of and sympathetic to the surrounding landscape, similar to the existing closed landfill to the west of the Site and therefore the nature of visual effects is considered neutral.

5.4 Effects in relation to Statutory Provisions

The Site is not identified as within the coastal environment or part of any outstanding natural feature or landscape or highly valued amenity landscape within which statutory protection must occur. However, consideration of natural character is relevant insofar as this applies to freshwater bodies and their margins (RMA S6a) due to the location of the Site immediately adjacent to the Kaikorai Stream and Estuary.

While the Kaikorai Estuary is a Regionally Significant Wetland, an Area of Significant Biodiversity Value and a Wāhi Tupuna of cultural significance to mana whenua in the 2GP, the magnitude of change as a result of the Proposed Development is very low due to the existing use and management of the highly modified landfill Site. Adverse effects in terms of natural character are therefore assessed as **very low** overall.

Designation D658

The Site is designated (D658) under the Proposed Dunedin City District Plan (2GP) and under the Operative Dunedin City District Plan (Operative DP). The Proposed Development represents a continuation of the current purpose of the designation - for landfilling and associated refuse processing operations and activities.

Effects on amenity and landscape values of rivers and wetlands

The Site was once part of the intertidal saltmarsh area of the Kaikorai Estuary but has been progressively modified since being occupied by the current landfill. The Estuary, Stream and Abbotts Creek now skirt the Site immediately to the north and west of the Designation boundary. The Estuary margins are further modified by roads, causeways, drainage channels and buildings as well as other areas of reclamation but overall remains a key feature in this landscape with important associative values including cultural significance for Mana whenua.

The Site is largely screened from close views by earth bunds and established trees around the perimeter. Some views, particularly from the southwest and from elevated areas around the Site, include potential views to the Estuary and waterways adjacent to the Site and these will not be limited by the Proposed Development.

Where the Proposed Development will be visible on the margins of the Estuary, the proposal to increase the volume, height and duration of activity at the Site will have temporary adverse impacts on amenity and landscape values during the operational stages. Once the closure stage is reached, where it is visible, the final landform will appear as a grassed, open terrace. The established vegetation on the perimeter will be essential to soften and screen the landform and ensure it appears broadly sympathetic with its wider setting including the adjacent Estuary.

Overall, when considered in the context of the type of activity currently occurring and anticipated within the same boundary, the level of effect on the Estuary is assessed as **very low**. However, the effective ongoing maintenance and management of the existing perimeter trees will be essential in continuing to mitigate potential adverse visual effects. Following closure, should there be an opportunity to gradually replace the existing vegetation with appropriate native species, there is potential for **positive** effects on the amenity and landscape values of the adjacent waterways and wetlands.

6.0 Recommendations

The screening vegetation surrounding the landfill is currently largely comprised of exotic tree species. The height and density of the vegetation reduces the potential significance of adverse natural character, landscape and visual effects, primarily during the working, operational stages. Once the final surface is capped and grassed, the importance of the screening function of the trees will reduce but they need to continue to soften and break up views and assist with integrating the landform into the character of the surrounding landscape.

Therefore, a Vegetation Management and Restoration Plan will be prepared as part of the Proposal, setting out the routine monitoring and maintenance necessary to promote the health and longer-term stability of these trees.

There is also an opportunity, as part of this Plan, to prepare for a longer-term vision post-closure to enhance natural character and contribute to positive effects on the amenity and landscape values through gradually transitioning to native plantings.

Appropriately eco-sourced native tree species could be established within the existing screening vegetation and as they mature, following closure of the landfill, exotic trees could be gradually felled and removed. For example, taller species such as the fast-growing lowland ribbonwood and narrow-leaved houhere could be appropriate for some ongoing screening while lower native plantings in riparian margins would further improve habitat values.

Long term use of the remaining landfill site post closure will be determined in consultation with the community and confirmed plans will be included in the Landfill Closure Management Plan. Uses may include passive and active recreation such as walking and cycling tracks and picnic areas.

Figure 8 in the Graphic Supplement is an artist impression of a potential future scenario for the Site that has been provided as part of the community consultation process.

7.0 Conclusions

The Proposed Development comprises the ongoing operation of the Green Island Landfill until 2029, based on current annual waste disposal rates. Prior to full closure the landfill will be closed and capped in stages, followed by ongoing aftercare. The Site is entirely within the existing working footprint of the current landfill which is located within a larger Designation Area (D658).

As part of the extension to the period of operation, there will be additional volume and final surface and contours so that at closure the landfill will be shaped like a wedge with the high side along the western boundary of the Site at approximately 6.5 metres higher than currently anticipated.

The dominant character of the Site is as a modified working landfill within the low-lying part of a wider basin-like landscape on the margins of the Kaikorai Estuary. The surrounding area has a varied, settled, suburban, rural and coastal character. Abbotts Creek, Kaikorai Stream, Kaikorai Estuary and Pukemakamaka/Saddle Hill are key landscape features nearby, recognised as holding important values including to mana whenua.

The Site is not identified as within the coastal environment or part of any outstanding natural feature or landscape or highly valued amenity landscape. The Proposed Design will not compromise the landscape values associated with the Pukemakamaka/Saddle Hill ONF, including views of its iconic shape.

Effects during the operational stages on landscape and natural character will remain limited due to the effective screening from close viewing areas and consistent with the underlying designation purpose for the Site.

The visual containment of the Site by earth bunds and established vegetation also mitigates most visual effects of the Proposed Development on the surrounding area, particularly from close views. In most open views, the viewpoint is elevated but distant from the Site.

On completion, where it is visible, the final landform will appear as a grassed, open terrace. The established vegetation on the perimeter will be essential to soften, screen and integrate the landform with the character and values of its wider setting including the adjacent Estuary.

The proposed Vegetation Management and Restoration Plan will ensure views will continue to be contained and no more than low adverse visual effects will occur in the long-term.

Appendix 1: Natural Character and Landscape Effects Assessment Method

Introduction

The Natural Character and Landscape Effects Assessment (NCLEA) process provides a framework for assessing and identifying the nature and level of likely effects that may result from a proposed development. Such effects can occur in relation to changes to physical elements, changes in the existing character or condition of the landscape and the associated experiences of such change. In addition, the landscape assessment method includes an iterative design development processes, which seeks to avoid, remedy or mitigate adverse effects (see **Figure 1**).

This outline of the landscape and visual effects assessment methodology has been undertaken with reference to the **Te Tangi A Te Manu: Aotearoa New Zealand Landscape Assessment Guidelines** and its signposts to examples of best practice, which include the **Quality Planning Landscape Guidance Note**[27] and the **UK guidelines for landscape and visual impact assessment**[28]**.**

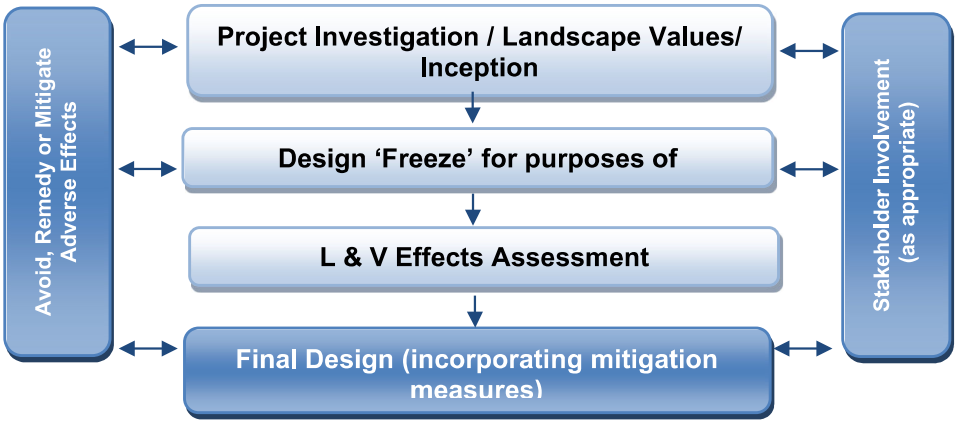


Figure 1: Design feedback loop

When undertaking any landscape assessment, it is important that a **structured and consistent approach** is used to ensure that **findings are clear and objective**. Judgement should be based on skills and experience and be supported by explicit evidence and reasoned argument.

While natural character, landscape and visual effects assessments are closely related, they form separate procedures. Natural character effects consider the characteristics and qualities and associated degree of modification relating specifically to waterbodies and their margins, including the coastal environment. The assessment of the potential effects on landscape considers effects on landscape character and values. The assessment of visual effects considers how changes to the physical landscape affect the viewing audience. The types of effects can be summarised as follows:

[27] http://www.qualityplanning.org.nz/index.php/planning-tools/land/landscape
[28] Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3)

Natural Character effects: *Change in the characteristics or qualities including the level of naturalness*

Landscape effects: *Change in the physical landscape, which may affect its characteristics*

Visual effects: *Consequences of change on landscape values as experienced in views*

The policy context, existing landscape resource and locations from which a development or change is visible, all inform the 'baseline' for landscape and visual effects assessments. To assess effects, the first step requires identification of the landscape's **character** and **values** including the **attributes** on which such values depend. This requires that the landscape is first **described**, including an understanding of relevant physical, sensory and associative landscape dimensions. This process, known as landscape characterisation, is the basic tool for understanding landscape character and may involve subdividing the landscape into character areas or types. The condition of the landscape (i.e. the state of an individual area of landscape or landscape feature) should also be described together with, a judgement made on the value or importance of the potentially affected landscape.

Natural Character Effects

In terms of the RMA, natural character specifically relates to the coastal environment as well as freshwater bodies and their margins. The RMA provides no definition of natural character. RMA, section 6(a) considers natural character as a matter of national importance:

> *…the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development.*

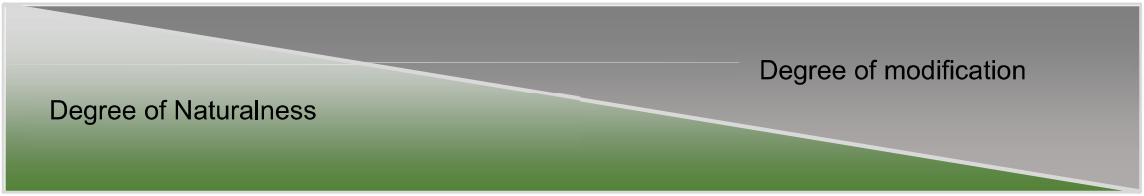
Natural character comprises the natural elements, patterns and processes of the coastal environment, waterbodies and their margins, and how they are perceived and experienced. This assessment interprets natural character as being the degree of naturalness consistent with the following definition:

> *Natural character is a term used to describe the naturalness of waterbodies and their margins. The degree or level of natural character depends on:*
>
> - *The extent to which natural elements, patterns and processes occur;*
> - *The nature and extent of modifications to the ecosystems and landscape/seascape;*
> - *The highest degree of natural character (greatest naturalness) occurs where there is least modification; and*
> - *The effect of different types of modification upon the natural character of an area varies with the context and may be perceived differently by different parts of the community.*

The process to assess natural character involves an understanding of the many systems and attributes that contribute to waterbodies and their margins, including biophysical and experiential factors. This can be supported through the input of technical disciplines such as marine, aquatic and terrestrial ecology, and landscape architecture.

Defining the level of natural character

The level of natural character is assessed in relation to a seven-point scale. The diagram below illustrates the relationship between the degree of naturalness and degree of modification. A high level of natural character means the waterbody is less modified and vice versa.



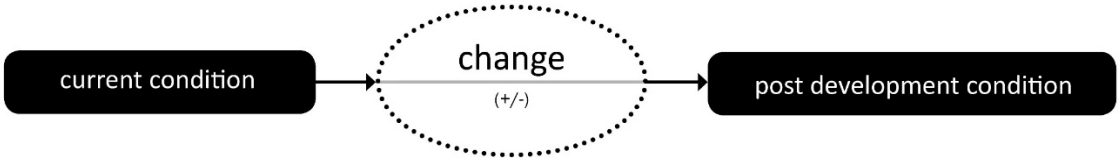
Very High	High	Moderate - High	Moderate	Moderate - Low	Low	Very Low

Scale of assessment

When defining levels of natural character, it is important to clearly identify the spatial scale considered. The scale at which natural character is assessed will typically depend on the study area or likely impacts and nature of a proposed development. Within a district or region-wide study, assessment scales may be divided into broader areas which consider an overall section of coastline or river with similar characteristics, and finer more detailed 'component' scales considering separate more local parts, such as specific bays, reaches or escarpments. The assessment of natural character effects has therefore considered the change to attributes which indicate levels of natural character at a defined scale.

Effects on Natural Character

An assessment of the effects on natural character of an activity involves consideration of the proposed changes to the current condition compared to the existing. This can be negative or positive.



The natural character effects assessment involves the following steps;

- assessing the existing level of natural character;
- assessing the level of natural character anticipated (post construction); and
- considering the significance of the change

Landscape Effects

Assessing landscape effects requires an understanding of the landscape resource and the magnitude of change which results from a proposed activity to determine the overall level of landscape effects.

Landscape Resource

Assessing the sensitivity of the landscape resource considers the key characteristics and qualities. This involves an understanding of both the ability of an area of landscape to absorb change and the value of the landscape.

Ability of an area to absorb change

This will vary upon the following factors:

- Physical elements such as topography / hydrology / soils / vegetation;
- Existing land use;
- The pattern and scale of the landscape;
- Visual enclosure / openness of views and distribution of the viewing audience;
- The zoning of the land and its associated anticipated level of development;
- The scope for mitigation, appropriate to the existing landscape.

The ability of an area of landscape to absorb change takes account of both the attributes of the receiving environment and the characteristics of the proposed development. It considers the ability of a specific type of change occurring without generating adverse effects and/or achievement of landscape planning policies and strategies.

The value of the Landscape

Landscape value derives from the importance that people and communities, including tangata whenua, attach to particular landscapes and landscape attributes. This may include the classification of Outstanding Natural Feature or Landscape (ONFL) (RMA s.6(b)) based on important physical, sensory and associative landscape attributes, which have potential to be affected by a proposed development. A landscape has values even if it is not recognised as being an ONFL.

Magnitude of Landscape Change

The magnitude of landscape change judges the amount of change that is likely to occur to areas of landscape, landscape features, or key landscape attributes. In undertaking this assessment, it is important that the size or scale of the change is considered within the geographical extent of the area influenced and the duration of change, including whether the change is reversible. In some situations, the loss /change or enhancement to existing landscape elements such as vegetation or earthworks should also be quantified.

When assessing the level of landscape effects, it is important to be clear about what factors have been considered when making professional judgements. This can include consideration of any benefits which result from a proposed development. **Table 1** below helps to explain this process. The tabulating of effects is only intended to inform overall judgements.

Contributing Factors		Higher	Lower
Landscape (sensitivity)	**Ability to absorb change**	The landscape context has limited existing landscape detractors which make it highly vulnerable to the type of change resulting from the proposed development.	The landscape context has many detractors and can easily accommodate the proposed development without undue consequences to landscape character.
	The value of the landscape	The landscape includes important biophysical, sensory and shared and recognised attributes. The landscape requires protection as a matter of national importance (ONF/L).	The landscape lacks any important biophysical, sensory or shared and recognised attributes. The landscape is of low or local importance.

Contributing Factors		Higher	Lower
Magnitude of Change	**Size or scale**	Total loss or addition of key features or elements. Major changes in the key characteristics of the landscape, including significant aesthetic or perceptual elements.	The majority of key features or elements are retained. Key characteristics of the landscape remain intact with limited aesthetic or perceptual change apparent.
	Geographical extent	Wider landscape scale.	Site scale, immediate setting.
	Duration and reversibility	Permanent. Long term (over 10 years).	Reversible. Short Term (0-5 years).

***Table 1**: Determining the level of landscape effects*

Visual Effects

Visual effects are a subset of landscape effects. They are consequences of change on landscape values as experienced in views. To assess the visual effects of a proposed development in a landscape, a visual baseline must first be defined. The visual 'baseline' forms a technical exercise which identifies the area where the development may be visible, the potential viewing audience, and the key representative public viewpoints from which visual effects are assessed.

The Sensitivity of the viewing audience

The sensitivity of the viewing audience is assessed in terms of assessing the likely response of the viewing audience to change and understanding the value attached to views.

Likely response of the viewing audience to change

Appraising the likely response of the viewing audience to change is determined by assessing the occupation or activity of people experiencing the view at particular locations and the extent to which their interest or activity may be focussed on views of the surrounding landscape. This relies on a landscape architect's judgement in respect of visual amenity and the reaction of people who may be affected by a proposal. This should also recognise that people more susceptible to change generally include: residents at home, people engaged in outdoor recreation whose attention or interest is likely to be focussed on the landscape and on particular views; visitors to heritage assets or other important visitor attractions; and communities where views contribute to the wider landscape setting.

Value attached to views

The value or importance attached to particular views may be determined with respect to its popularity or numbers of people affected or reference to planning instruments such as viewshafts or view corridors. Important viewpoints are also likely to appear in guide books or tourist maps and may include facilities provided for its enjoyment. There may also be references to this in literature or art, which also acknowledge a level of recognition and importance.

Magnitude of Visual Change

The assessment of visual effects also considers the potential magnitude of change which will result from views of a proposed development. This takes account of the size or scale of the effect, the geographical extent of views and the duration of visual change, which may distinguish between temporary (often associated with construction) and permanent effects where relevant. Preparation of any simulations of visual change to assist this process should be guided by best practice as identified by the NZILA[29].

[29] Best Practice Guide: Visual Simulations BPG 10.2, NZILA

Visual Simulations
As part of the assessment process, visual simulations have been prepared in accordance with NZILA Best Practice Guide: Visual Simulations BPG 10.2[30]. This has entailed taking digital photographs from each of the identified viewpoints and recording their GPS locations. Preparation of visual simulations required the preparation of a 3D model of the proposed landfill and its staging as supplied by GHD. The GPS coordinates for each viewpoint were also added to the model and using the same focal length parameters as that of the camera, an image of the 3D wire frame of the proposed landform was then generated for each viewpoint. This was then registered over the actual photograph, using known reference points to bring the two together. The surface of the proposed landform was then rendered to approximate the likely appearance of the Site.

When determining the overall level of visual effect, the nature of the viewing audience is considered together with the magnitude of change resulting from the proposed development. **Table 2** has been prepared to help guide this process:

Contributing Factors		Higher	Lower	Examples
The Viewing Audience (sensitivity)	**Ability to absorb change**	Views from dwellings and recreation areas where attention is typically focussed on the landscape.	Views from places of employment and other places where the focus is typically incidental to its landscape context. Views from transport corridors.	Dwellings, places of work, transport corridors, public tracks
	Value attached to views	Viewpoint is recognised by the community such as an important view shaft, identification on tourist maps or in art and literature. High visitor numbers.	Viewpoint is not typically recognised or valued by the community. Infrequent visitor numbers.	Acknowledged viewshafts, Lookouts
Magnitude of Change	**Size or scale**	Loss or addition of key features in the view. High degree of contrast with existing landscape elements (i.e. in terms of form scale, mass, line, height, colour and texture). Full view of the proposed development.	Most key features of views retained. Low degree of contrast with existing landscape elements (i.e. in terms of form scale, mass, line, height, colour and texture. Glimpse / no view of the proposed development.	- Higher contrast/ Lower contrast. - Open views, Partial views, Glimpse views (or filtered); No views (or obscured)
	Geographical extent	Front on views. Near distance views; Change visible across a wide area.	Oblique views. Long distance views. Small portion of change visible.	- Front or Oblique views. - Near distant, Middle distant and Long distant views
	Duration and reversibility	Permanent. Long term (over 15 years).	Transient / temporary. Short Term (0-5 years).	- Permanent (fixed), Transitory (moving)

Table 2: Determining the level of visual effects

Nature of Effects

In combination with assessing the level of effects, the landscape and visual effects assessment also considers the nature of effects in terms of whether this will be positive (beneficial) or negative (adverse) in the context within which it occurs. Neutral effects can also occur where landscape or visual change is benign.

It should also be noted that a change in a landscape does not, of itself, necessarily constitute an adverse landscape or visual effect. Landscape is dynamic and is constantly changing over time in both subtle and more dramatic transformational ways; these changes are both natural and human induced. What is important in managing landscape change is that adverse effects are

[30] Best Practice Guide: Visual Simulations BPG 10.2, NZILA

avoided or sufficiently mitigated to ameliorate the effects of the change in land use. The aim is to provide a high amenity environment through appropriate design outcomes.

This assessment of the nature effects can be further guided by **Table 3** set out below:

Nature of effect	Use and Definition
Adverse (negative):	The activity would be out of scale with the landscape or at odds with the local pattern and landform which results in a reduction in landscape and / or visual amenity values
Neutral (benign):	The activity would be consistent with (or blend in with) the scale, landform and pattern of the landscape maintaining existing landscape and / or visual amenity values
Beneficial (positive):	The activity would enhance the landscape and / or visual amenity through removal or restoration of existing degraded landscape activities and / or addition of positive elements or features

Table 3: Determining the Nature of Effects

Determining the Overall Level of Effects

The landscape and visual effects assessment conclude with an overall assessment of the likely level of landscape and visual effects. This step also takes account of the nature of effects and the effectiveness of any proposed mitigation. The process can be illustrated in Figure 2:

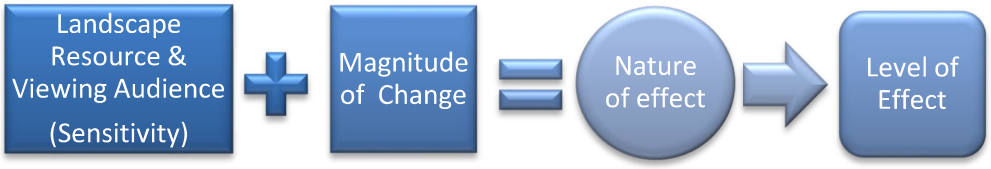


Figure 2: Assessment process

This step informs an overall judgement identifying what level of effects are likely to be generated as indicated in **Table 4** below. This table which can be used to guide the level of natural character, landscape and visual effects uses an adapted seven-point scale derived from Te Tangi A Te Manu.

Effect Rating	Use and Definition
Very High:	Total loss of key elements / features / characteristics, i.e. amounts to a complete change of landscape character and in views.
High:	Major modification or loss of most key elements / features / characteristics, i.e. little of the pre-development landscape character remains and a major change in views. *Concise Oxford English Dictionary Definition* *High: adjective- Great in amount, value, size, or intensity.*
Moderate- High:	Modifications of several key elements / features / characteristics of the baseline, i.e. the pre-development landscape character remains evident but materially changed and prominent in views.
Moderate:	Partial loss of or modification to key elements / features / characteristics of the baseline, i.e. new elements may be prominent in views but not necessarily uncharacteristic within the receiving landscape. *Concise Oxford English Dictionary Definition* *Moderate: adjective- average in amount, intensity, quality or degree*
Low – Moderate:	Minor loss of or modification to one or more key elements / features / characteristics, i.e. new elements are not prominent within views or uncharacteristic within the receiving landscape.
Low:	Little material loss of or modification to key elements / features / characteristics. i.e. modification or change is not uncharacteristic or prominent in views and absorbed within the receiving landscape. *Concise Oxford English Dictionary Definition* *Low: adjective- **1.** Below average in amount, extent, or intensity.*
Very Low:	Negligible loss of or modification to key elements/ features/ characteristics of the baseline, i.e. approximating a 'no change' situation and a negligible change in views.

Table 4: Determining the overall level of landscape and visual effects

Determination of "minor"

Decision makers determining whether a resource consent application should be notified must also assess whether the effect on a person is less than minor[31] or an adverse effect on the environment is no more than minor[32]. Likewise, when assessing a non-complying activity, consent can only be granted if the s104D 'gateway test' is satisfied. This test requires the decision maker to be assured that the adverse effects of the activity on the environment will be 'minor' or not be contrary to the objectives and policies of the relevant planning documents.

These assessments will generally involve a broader consideration of the effects of the activity, beyond the landscape and visual effects. Through this broader consideration, guidance may be sought on whether the likely effects on the landscape or effects on a person are considered in relation to 'minor'. It must also be stressed that more than minor effects on individual elements or viewpoints does not necessarily equate to more than minor landscape effects. In relation to this assessment, moderate-low level effects would generally equate to 'minor' (see **Table 5**). Where low effects occur, it may be necessary to assess whether this is minor.

The third row highlights the word 'significant'. The term 'significant adverse effects' applies to particular RMA situations, namely as a threshold for the requirement to consider alternative sites, routes, and methods for Notices of Requirement under RMA s171(1)(b), the requirements to consider alternatives in AEEs under s6(1)(a) of the 4th Schedule. It may also be relevant to tests under other statutory documents such as for considering effects on natural character of the coastal environment under the NZ Coastal Policy Statement (NZCPS) Policy 13 (1)(b) and 15(b).

very low	low	low-mod	moderate	mod-high	high	very high

less than minor	minor	more than minor	
			significant[33]

Table 5: Determining adverse effects for notification determination, non-complying activities and significance

[31] RMA, Section 95E

[32] RMA Section 95D

[33] To be used only about Policy 13(1)(b) and Policy 15(b) of the New Zealand Coastal Policy Statement (NZCPS), where the test is 'to avoid significant adverse effects'.

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GREEN ISLAND LANDFILL CLOSURE

GRAPHIC SUPPLEMENT

MARCH 2023

Green Island Landfill Closure

CONTENTS

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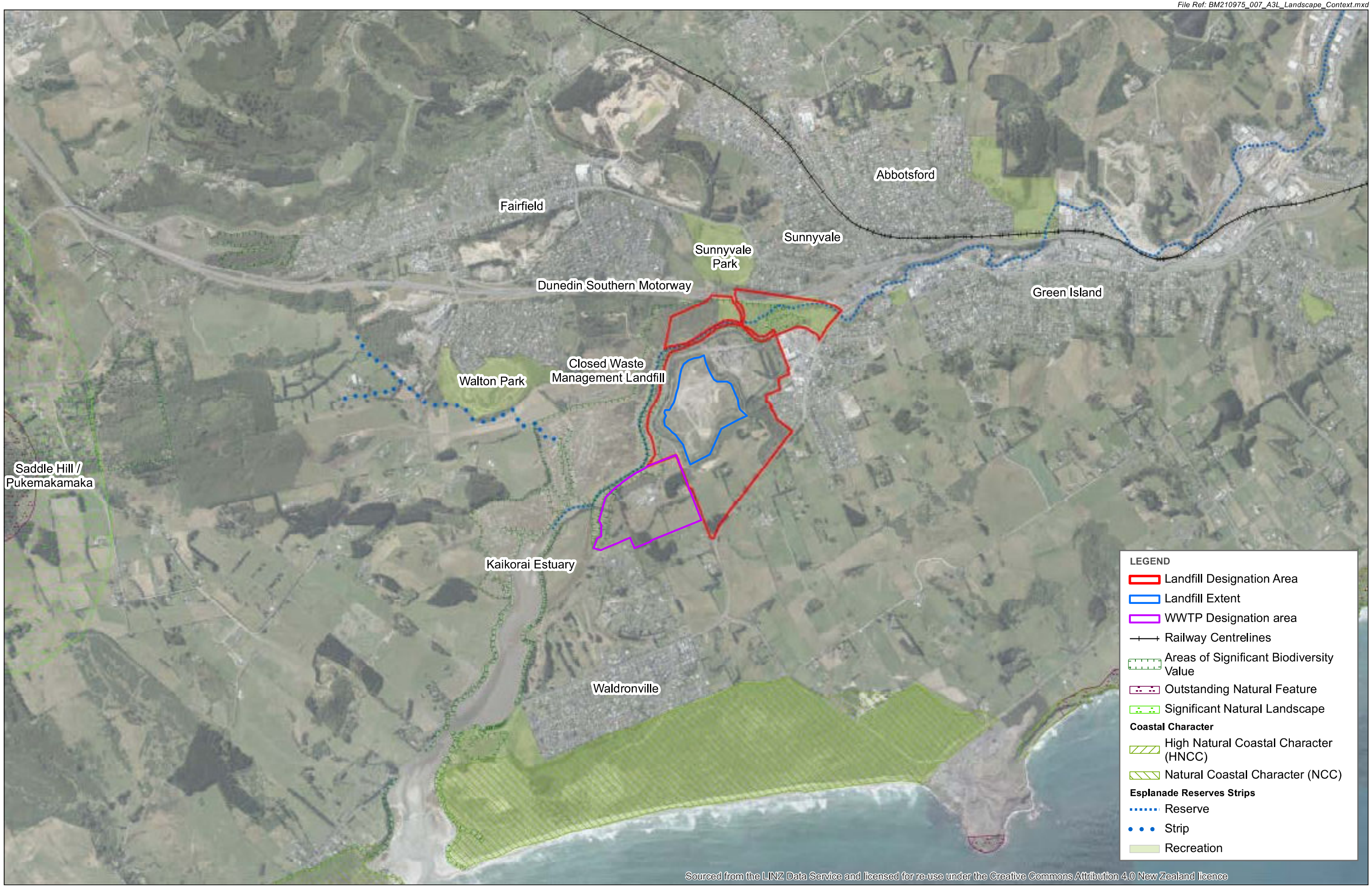

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LINZ Data Service, Dunedin City Council

Projection: NZGD 2000 New Zealand Transverse Mercator

GREEN ISLAND LANDFILL CLOSURE

Landscape Context and Overlays Plan

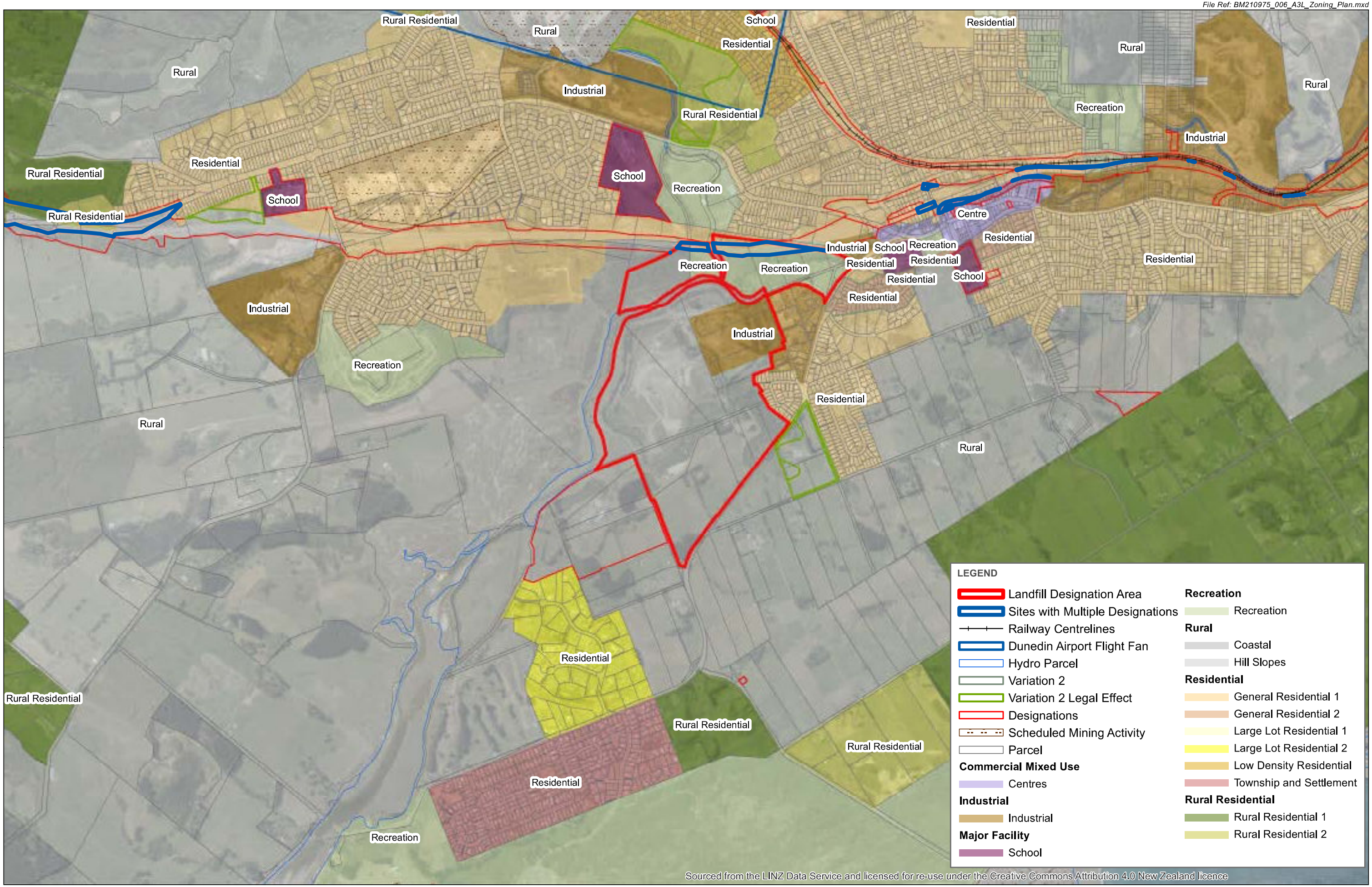
Date: 12 January 2023 | Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 1

File Ref: BM210975_006_A3L_Zoning_Plan.mxd



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GREEN ISLAND LANDFILL CLOSURE

Zoning Plan

Date: 12 January 2023 | Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 2

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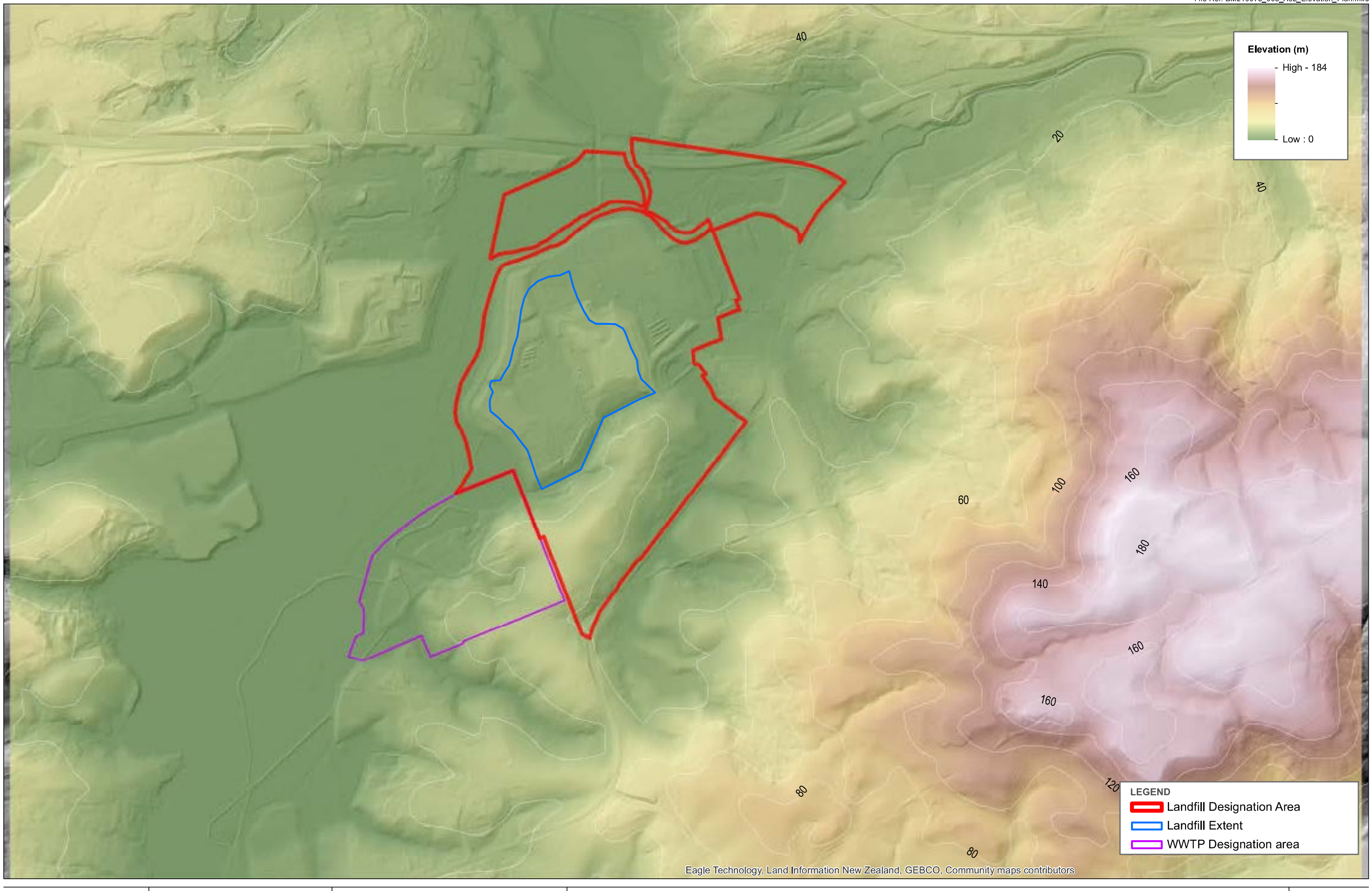

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Date Data Captured: 2009

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GREEN ISLAND LANDFILL CLOSURE

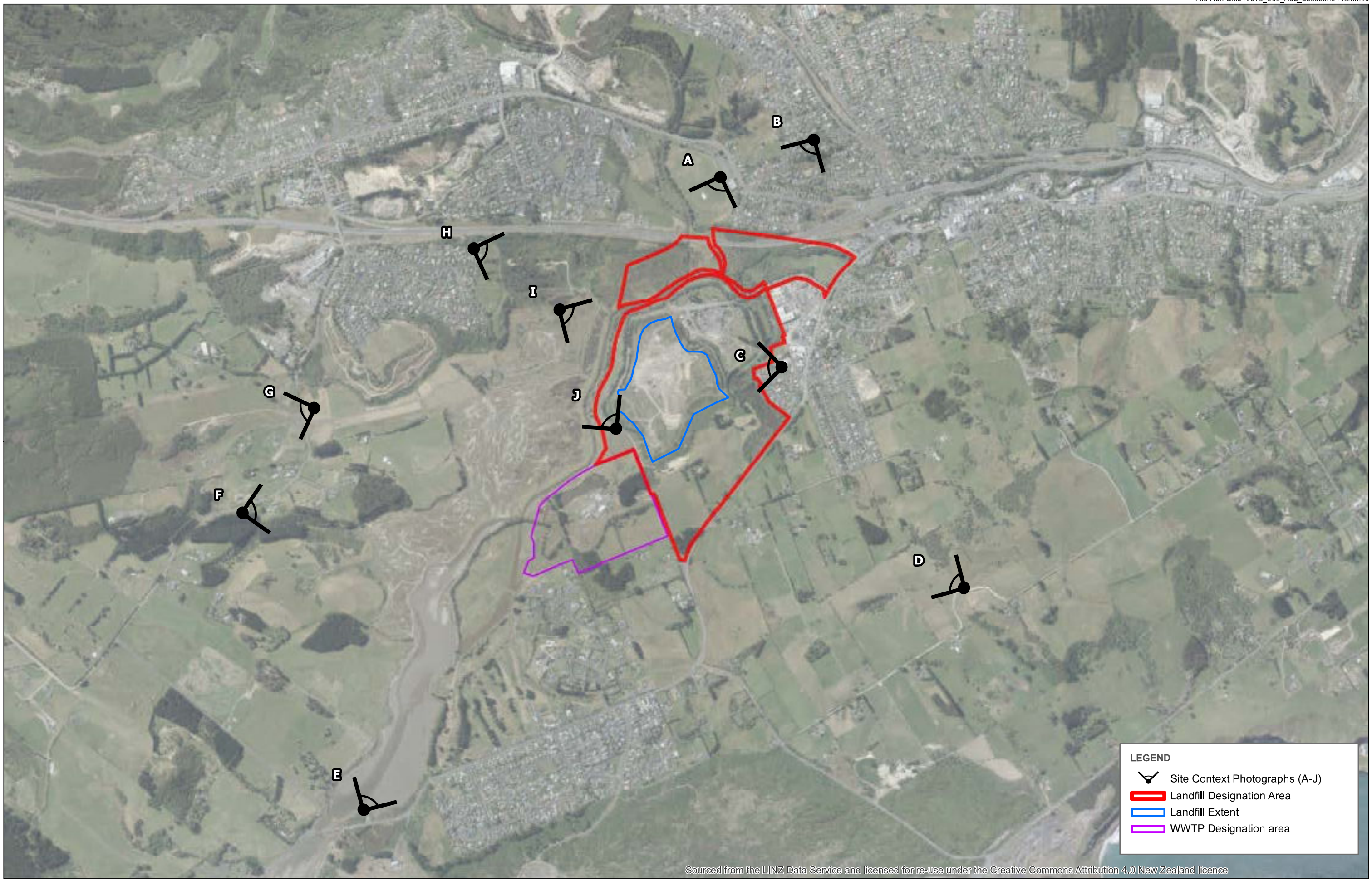
Topography Plan

Date: 12 January 2023 | Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 3



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Data Sources:
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GREEN ISLAND LANDFILL CLOSURE

Site Context Photographs

Date: 12 January 2023 | Revision: 0

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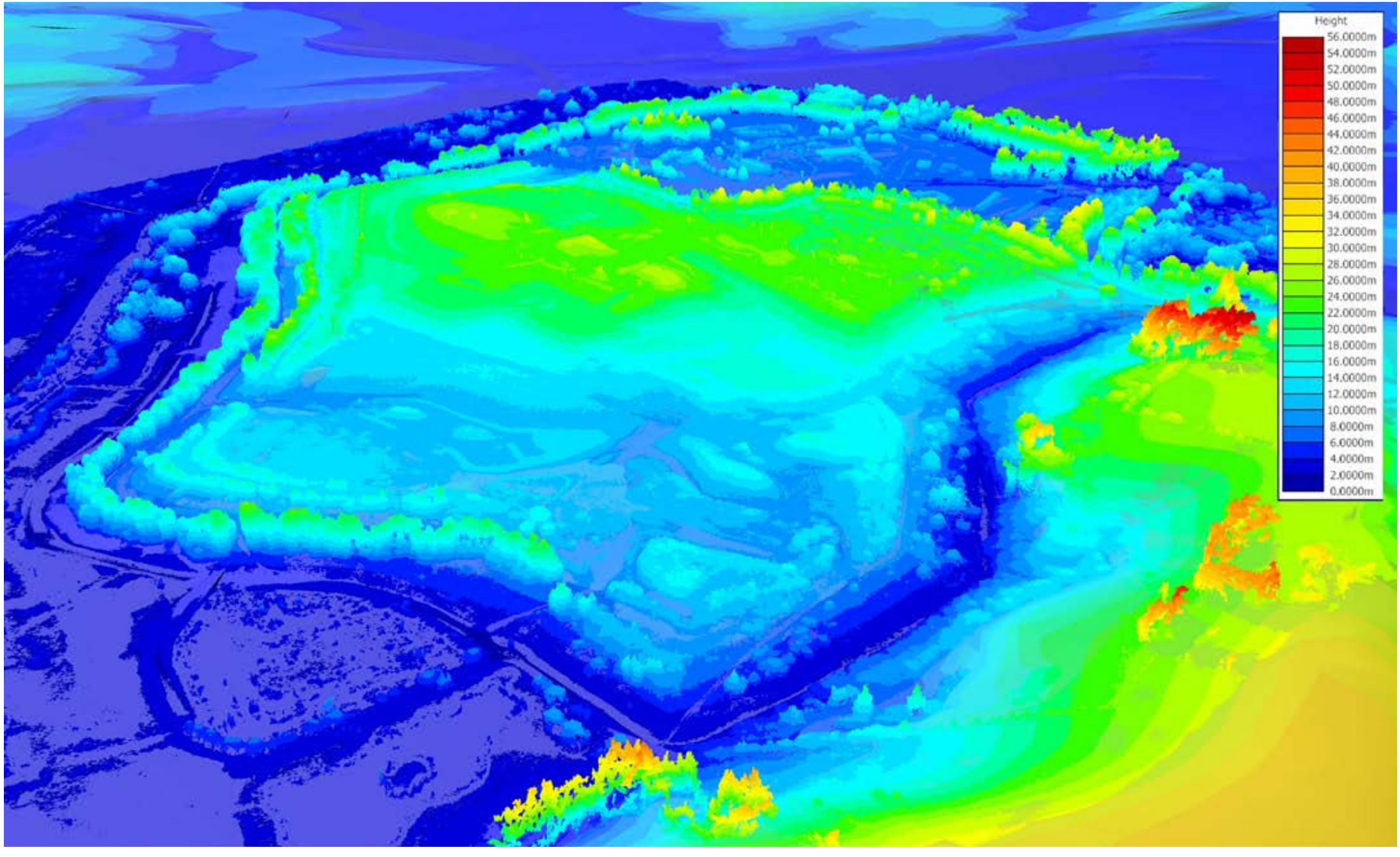
Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 4



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Data Sources:
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Datum:
NZVD2016.

GREEN ISLAND LANDFILL CLOSURE

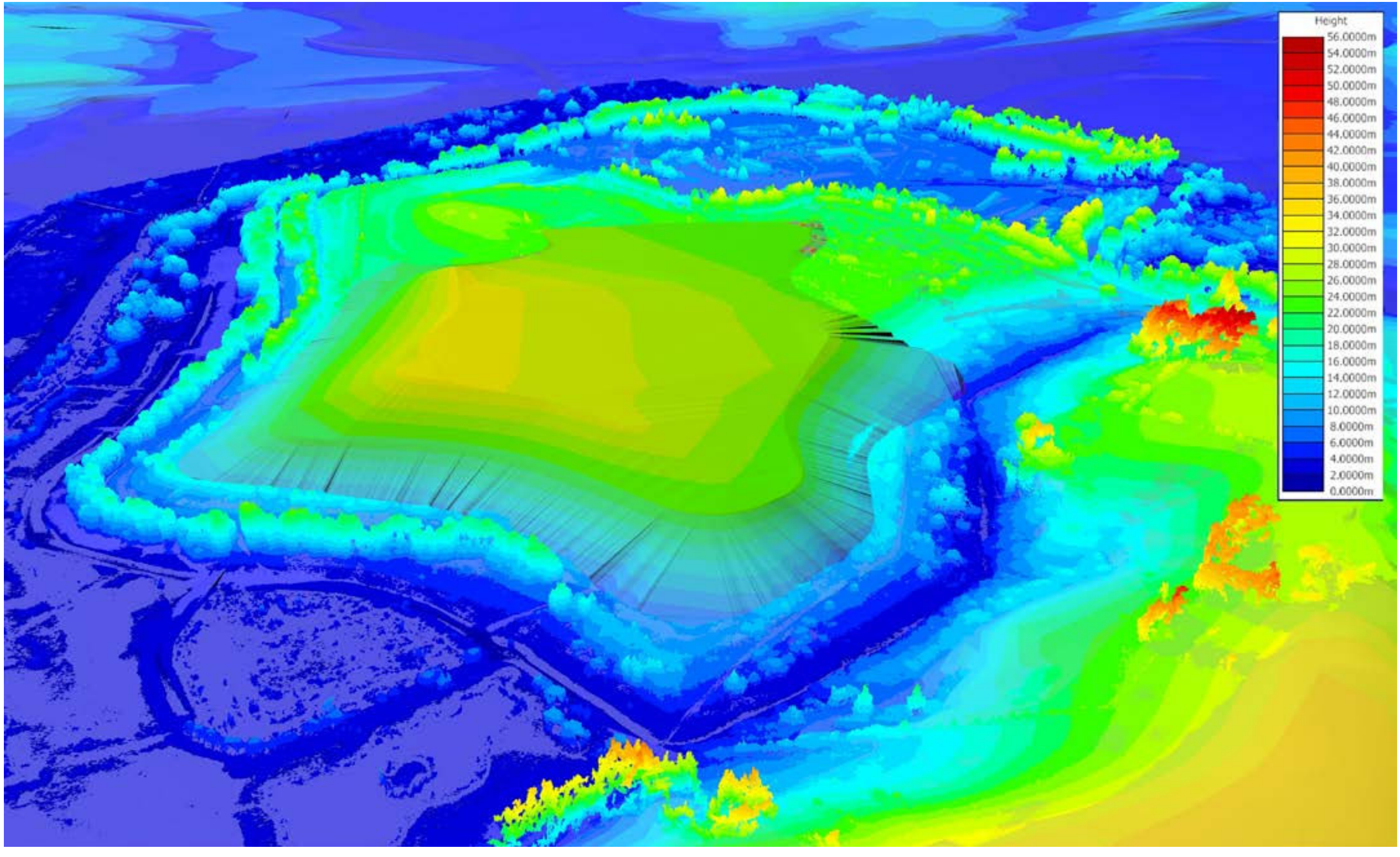
Form and Elevation Plan - Existing

Date: 12 January 2023 Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

Figure 5



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Data Sources:
Stantec - Captured 17/07/2021.

Datum:
NZVD2016.

GREEN ISLAND LANDFILL CLOSURE

Form and Elevation Plan - Stage 3

Date: 12 January 2023 Revision: 0

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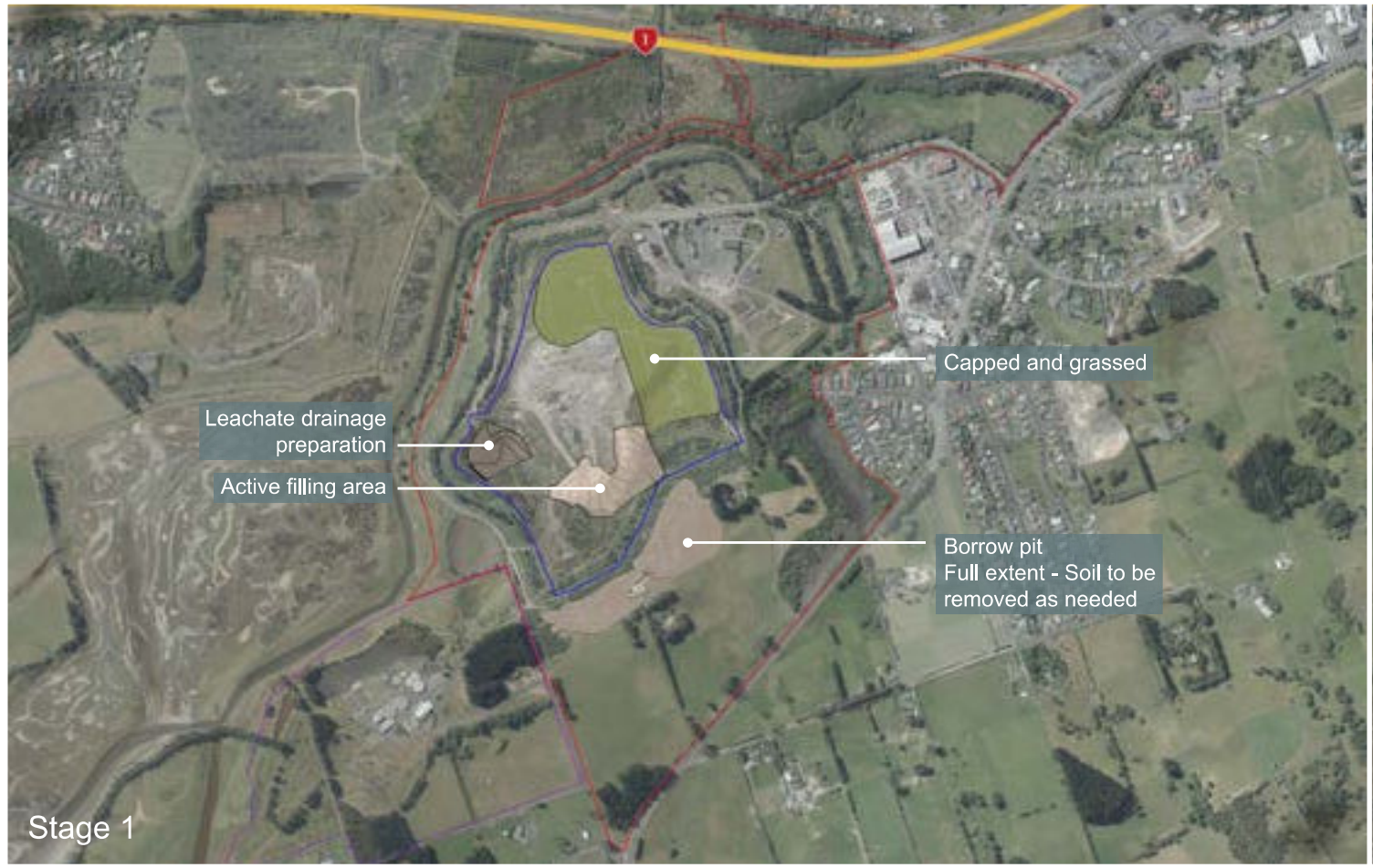
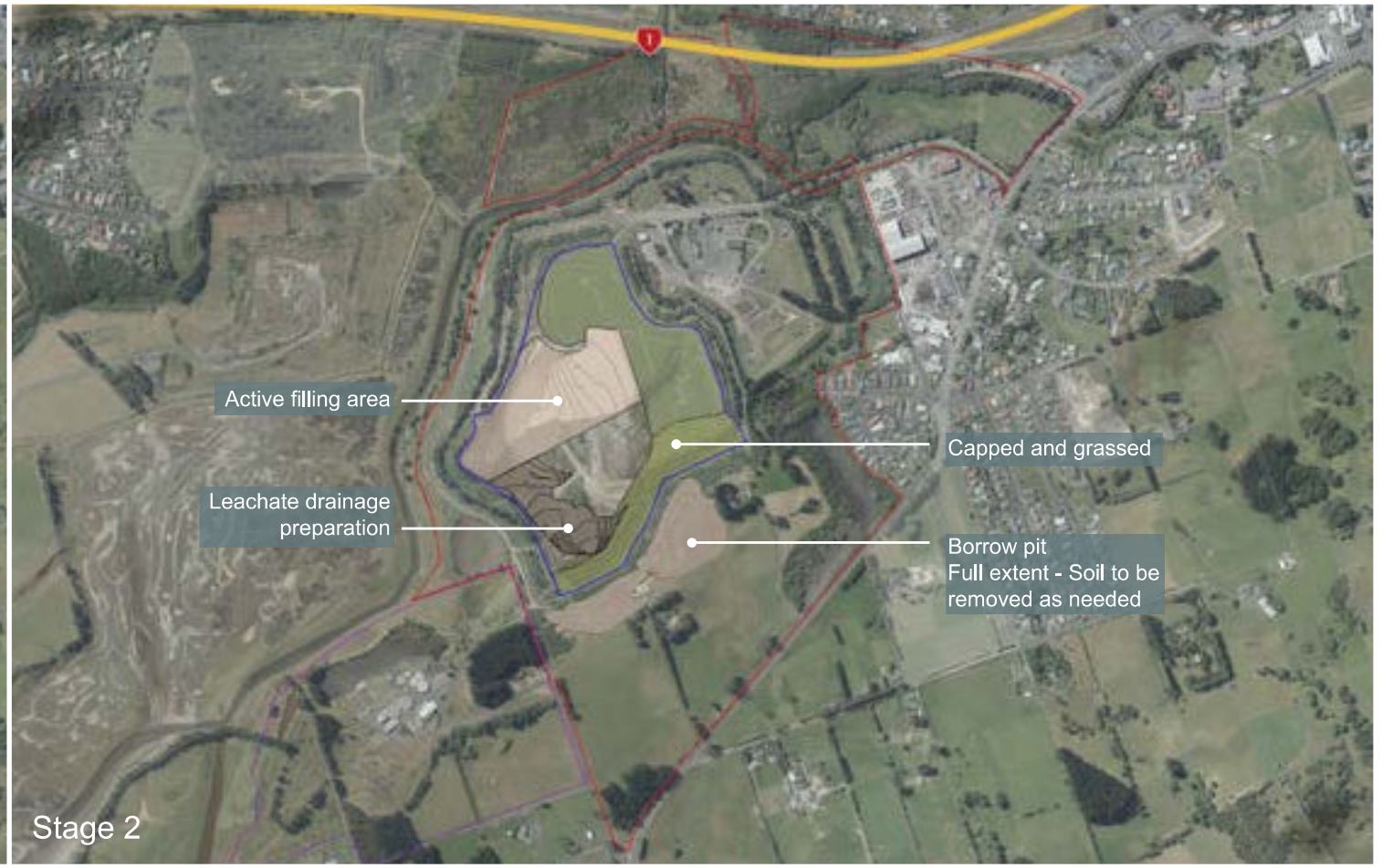
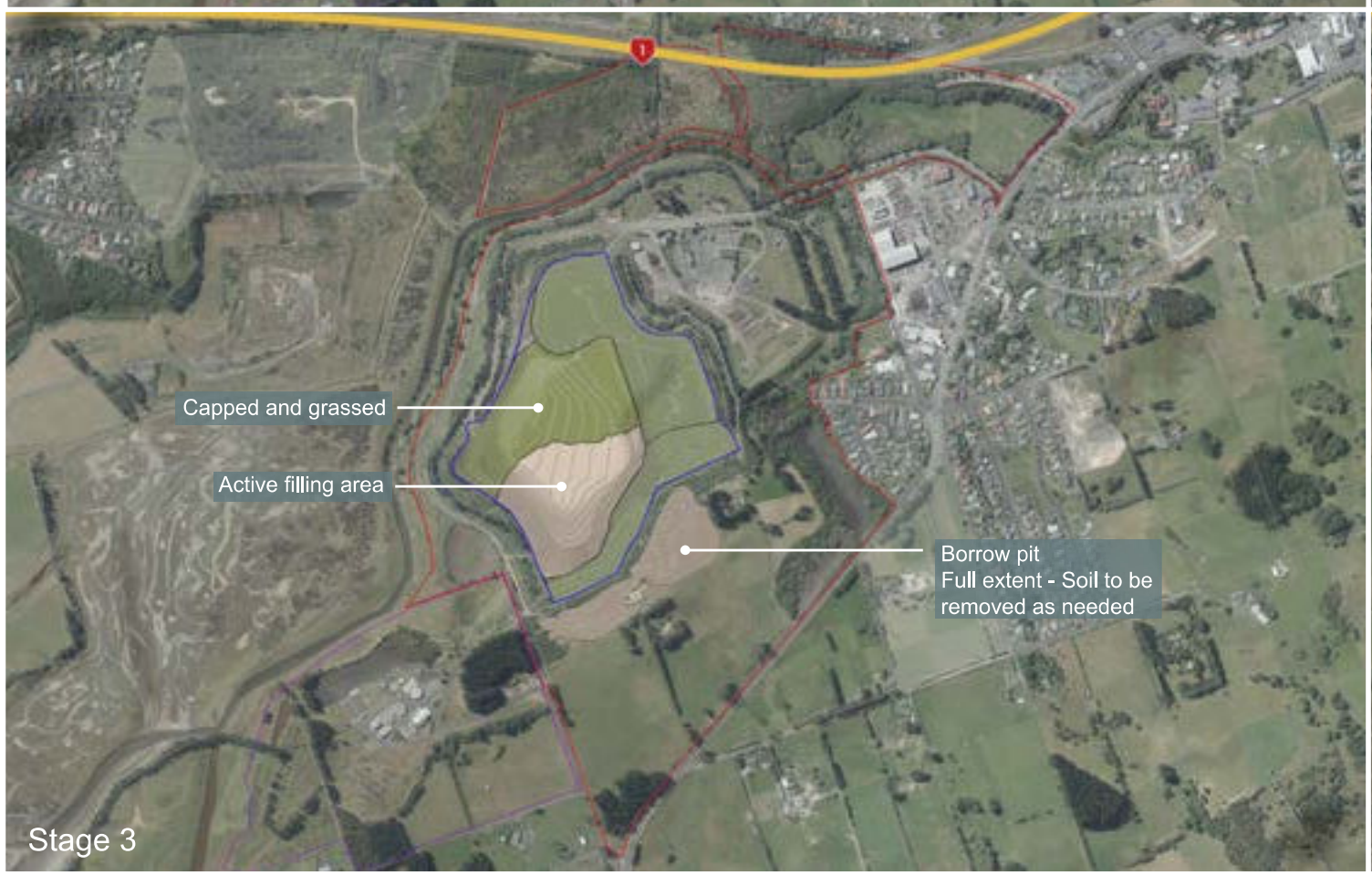
Figure 6







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GREEN ISLAND LANDFILL CLOSURE

Staging Plans

Date: 12 January 2023 Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 7

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GREEN ISLAND LANDFILL CLOSURE

Potential Future 'Artist Impression' Simulation

Date: 12 January 2023 Revision: 0

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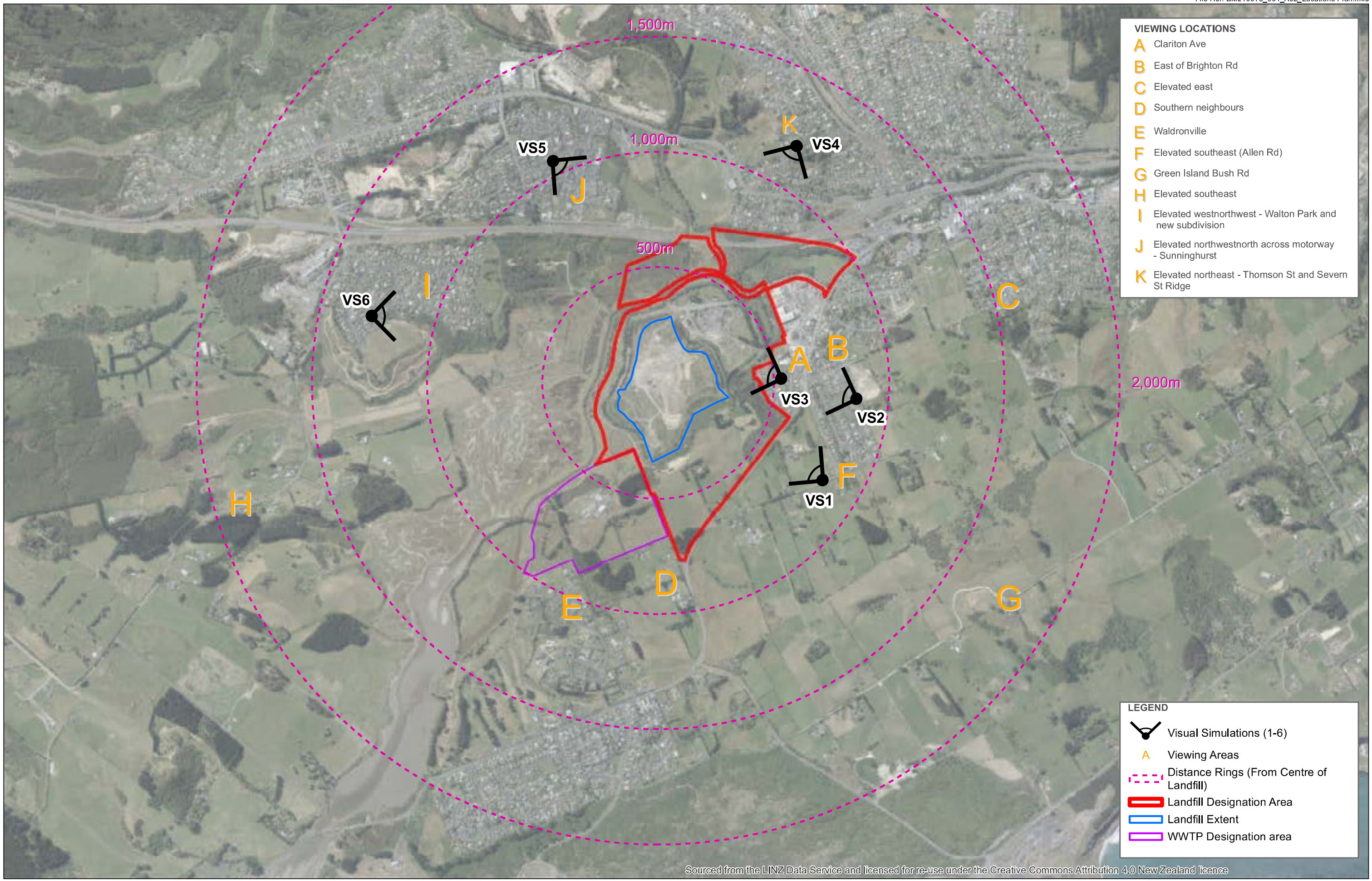
Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 8

File Ref: BM210975_004_A3L_Locations Plan.mxd



VIEWING LOCATIONS

- A Clariton Ave
- B East of Brighton Rd
- C Elevated east
- D Southern neighbours
- E Waldronville
- F Elevated southeast (Allen Rd)
- G Green Island Bush Rd
- H Elevated southeast
- I Elevated westnorthwest - Walton Park and new subdivision
- J Elevated northwestnorth across motorway - Sunninghurst
- K Elevated northeast - Thomson St and Severn St Ridge

LEGEND

- Visual Simulations (1-6)
- A Viewing Areas
- Distance Rings (From Centre of Landfill)
- Landfill Designation Area
- Landfill Extent
- WWTP Designation area

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0 250 m

1:15,000 @ A3

Data Sources:
LINZ Data Service

Projection: NZGD 2000 New Zealand Transverse Mercator

GREEN ISLAND LANDFILL CLOSURE

Visual Simulations and Viewing Areas

Date: 12 January 2023 | Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 9

Date of Photography : 11:00am 21 July 2021 NZST

Site Context Photograph A: *Photograph taken from Sunnyvale Park Recreation Centre, approximately 670m north east of the Site, looking in a south westerly direction*

Site Context Photograph B: *Photograph taken from end of Thomson St, approximately 1km north east of the Site, looking in a south westerly direction.*

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Viewpoint Details

NZTM Easting	: 1 683 554 mE	Horizontal Field of View	: 90°
NZTM Northing	: 6 012 263 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 2m / 1.7m	Projection	: Rectilinear
Date of Photography	: 10:00am 15 December 2022 NZST	Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Site Context Photographs A to B

Date: 12 January 2023 Revision: 0

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Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 10

Date of Photography : 1:00pm 21 July 2021 NZST

Site Context Photograph C: *Photograph taken from a location on Clariton Ave, approximately 250m east of the Site, looking in a westerly direction.*

Date of Photography : 12:00pm 21 July 2021 NZST

Site Context Photograph D: *Photograph taken from a location on Green Island Bush Rd, approximately 1.3km south east of the Site, looking in a north westerly direction.*

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Viewpoint Details

NZTM Easting	: 1 683 554 mE	Horizontal Field of View	: 90°
NZTM Northing	: 6 012 263 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 2m / 1.7m	Projection	: Rectilinear
Date of Photography	: 10:00am 15 December 2022 NZST	Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Site Context Photographs C to D

Date: 12 January 2023 Revision: 0

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Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 11

Site Context Photograph E: *Photograph taken from a location on Brighton Rd, approximately 2km south west of the Site, looking in a north easterly direction.*

Date of Photography : 11:00am 21 July 2021 NZST

Site Context Photograph F: *Photograph taken from a location on Old Brighton Rd, approximately 1.6km south west of the Site, looking in an easterly direction.*

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Viewpoint Details

NZTM Easting	: 1 683 554 mE
NZTM Northing	: 6 012 263 mN
Elevation/Eye Height	: 2m / 1.7m
Date of Photography	: 10:00am 15 December 2022 NZST

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Site Context Photographs E to F

Date: 12 January 2023 Revision: 0

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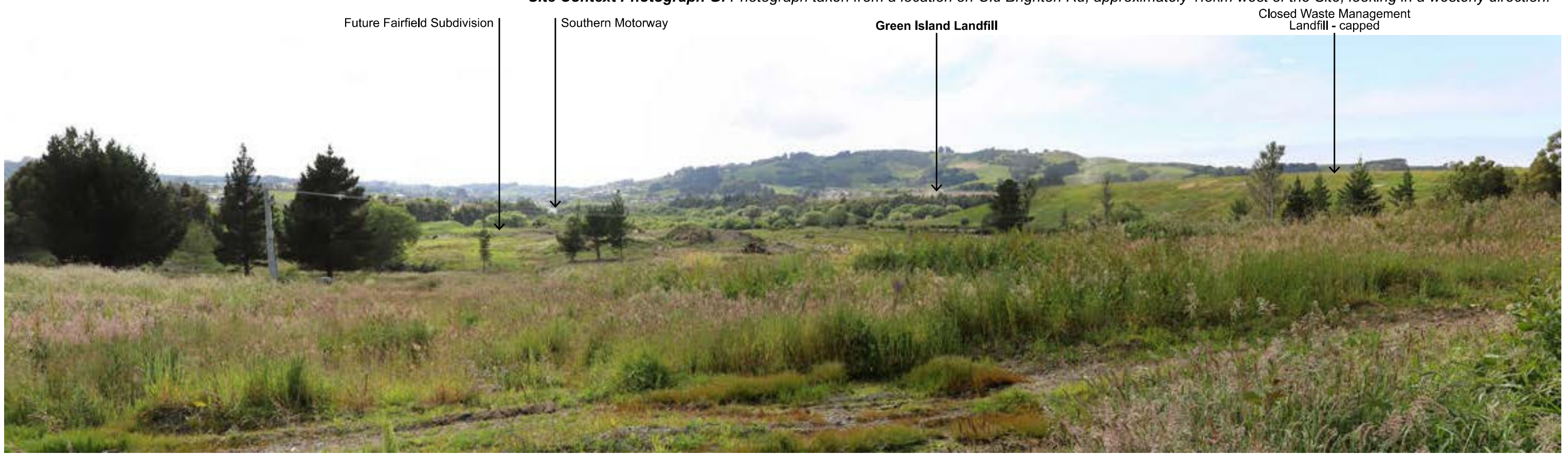
Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 12

Site Context Photograph G: *Photograph taken from a location on Old Brighton Rd, approximately 1.3km west of the Site, looking in a westerly direction.*



Site Context Photograph H: *Photograph taken from the end of Walton Park Ave, approximately 700m north west of the Site, looking in a south easterly direction.*

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Viewpoint Details

NZTM Easting	: 1 683 554 mE	Horizontal Field of View	: 90°
NZTM Northing	: 6 012 263 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 2m / 1.7m	Projection	: Rectilinear
Date of Photography	: 10:00am 15 December 2022 NZST	Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Site Context Photographs G to H

Date: 12 January 2023 Revision: 0

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Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: EFa | Checked: SMc

Figure 13

Site Context Photograph I: *Photograph taken from a location at the Closed Waste Management Landfill (private vantage point), approximately 300m west of the Site, looking in an easterly direction.*

Site Context Photograph J: *Photograph taken from the Green Island Landfill boundary road, approximately 100m south west of the Site, looking in a north westerly direction.*

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Viewpoint Details

NZTM Easting	: 1 683 554 mE	Horizontal Field of View	: 90°
NZTM Northing	: 6 012 263 mN	Vertical Field of View	: 30°
Elevation/Eye Height	: 2m / 1.7m	Projection	: Rectilinear
Date of Photography	: 10:00am 15 December 2022 NZST	Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Site Context Photographs I to J

Date: 12 January 2023 Revision: 0

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Figure 14

Existing View

Potential Visibility - Landfill Site
approximately 600m to closest edge of the Site

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Viewpoint Details

NZTM Easting	: 1 399 917 mE
NZTM Northing	: 4 912 426 mN
Elevation/Eye Height	: 27m / 1.7m
Date of Photography	: 12:44pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Allen Road South

Date: 12 January 2023 Revision: 0

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Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS1

Existing View

Landfill extent obscured by intervening landform and vegetation

Potential Visibility - Landfill Site
approximately 640m to closest edge of the Site

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Viewpoint Details

NZTM Easting	: 1 400 029 mE
NZTM Northing	: 4 912 785 mN
Elevation/Eye Height	: 15.3m / 1.7m
Date of Photography	: 12:58pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Elwyn Cresent

Date: 12 January 2023 Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS2

Existing View

Landfill extent obscured by intervening landform and vegetation

Potential Visibility - Landfill Site
approximately 350m to closest edge of the Site

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Viewpoint Details

NZTM Easting	: 1 399 729 mE
NZTM Northing	: 4 912 818 mN
Elevation/Eye Height	: 7.8m / 1.7m
Date of Photography	: 1:19pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

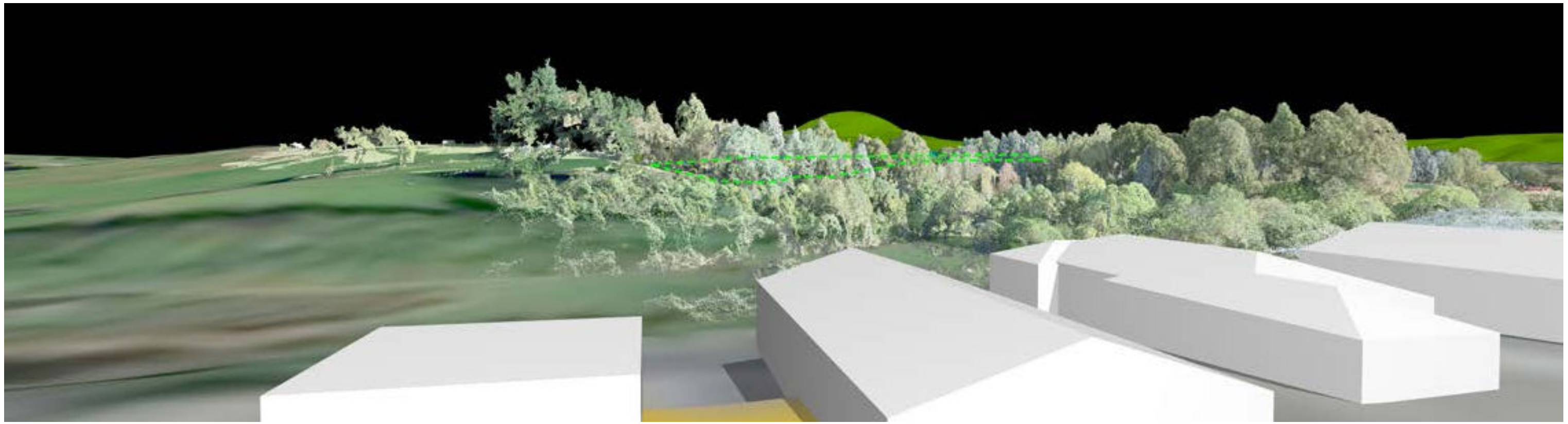
Clariton Avenue

Date: 12 January 2023 Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS3A



Landfill extent obscured by intervening landform and vegetation

Schematic View from 6m above ground level

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Viewpoint Details

NZTM Easting : 1 399 729 mE
NZTM Northing : 4 912 818 mN
Elevation/Eye Height : 7.8m / 7.7m

Horizontal Field of View : 90°
Vertical Field of View : 30°
Projection : Rectilinear
Image Reading Distance @ A3 is 20 cm

GREEN ISLAND LANDFILL CLOSURE

18 Clariton Avenue

Date: 12 January 2023 Revision: 0

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VS3B

Existing View

Potential Visibility - Landfill Site- Stage 1 during operation
approximately 840m to closest edge of the Site

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Viewpoint Details

NZTM Easting	: 1 399 788 mE
NZTM Northing	: 44 913 798 mN
Elevation/Eye Height	: 41.3m / 1.7m
Date of Photography	: 2:18pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Thomson Street

Date: 12 January 2023 Revision: 0

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Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS4A

Existing View

Potential Visibility - Landfill Site- Stage 2 during operation
approximately 840m to closest edge of the Site

Boffa Miskell
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Viewpoint Details

NZTM Easting : 1 399 788 mE
NZTM Northing : 44 913 798 mN
Elevation/Eye Height : 41.3m / 1.7m
Date of Photography : 2:18pm 22 July 2021

Horizontal Field of View : 90°
Vertical Field of View : 30°
Projection : Rectilinear
Image Reading Distance @ A3 is 20 cm

GREEN ISLAND LANDFILL CLOSURE

Thomson Street

Date: 12 January 2023 Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited
Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS4B

Existing View

Potential Visibility - Landfill Site- Stage 3 during operation
approximately 840m to closest edge of the Site

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Viewpoint Details

NZTM Easting	: 1 399 788 mE
NZTM Northing	: 44 913 798 mN
Elevation/Eye Height	: 41.3m / 1.7m
Date of Photography	: 2:18pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Thomson Street

Date: 12 January 2023 Revision: 0

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Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS4C

Existing View

Potential Visibility - Landfill Site - Stage 3 during operation
approximately 750m to closest edge of the Site

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Viewpoint Details

NZTM Easting	: 1 398 797 mE
NZTM Northing	: 4 913754 mN
Elevation/Eye Height	: 20m / 1.7m
Date of Photography	: 2:47pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Holyport Close

Date: 12 January 2023 Revision: 0

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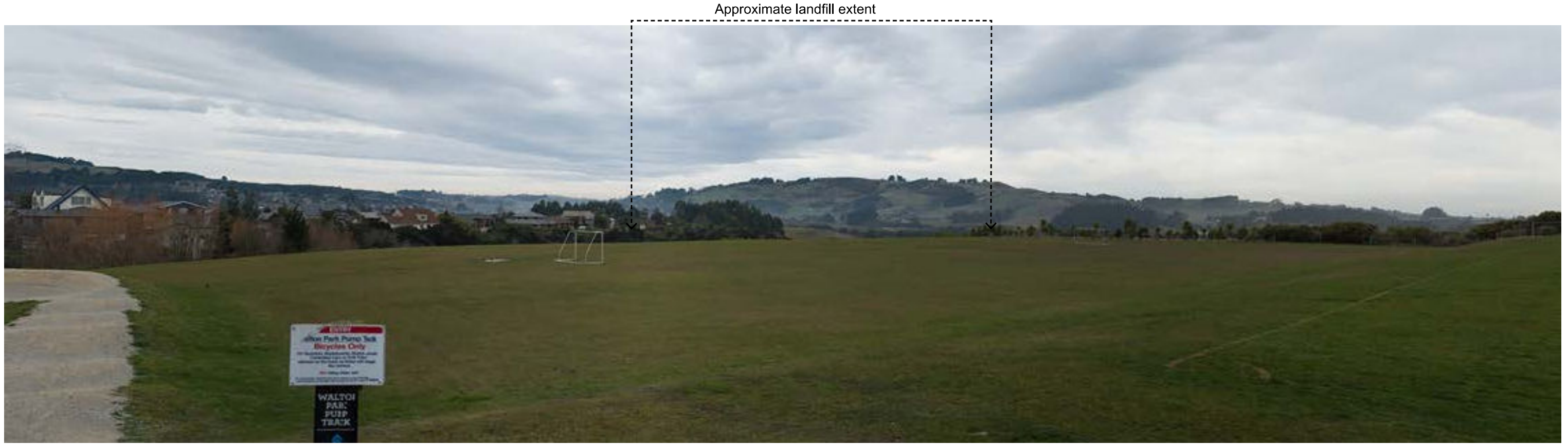
Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS5



Existing View

Potential Visibility - Landfill Site - Stage 1 during operation
approximately 1030m to closest edge of the Site

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Viewpoint Details

NZTM Easting	: 1 398 034 mE
NZTM Northing	: 4 913 084 mN
Elevation/Eye Height	: 39.5m / 1.7m
Date of Photography	: 3:03pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

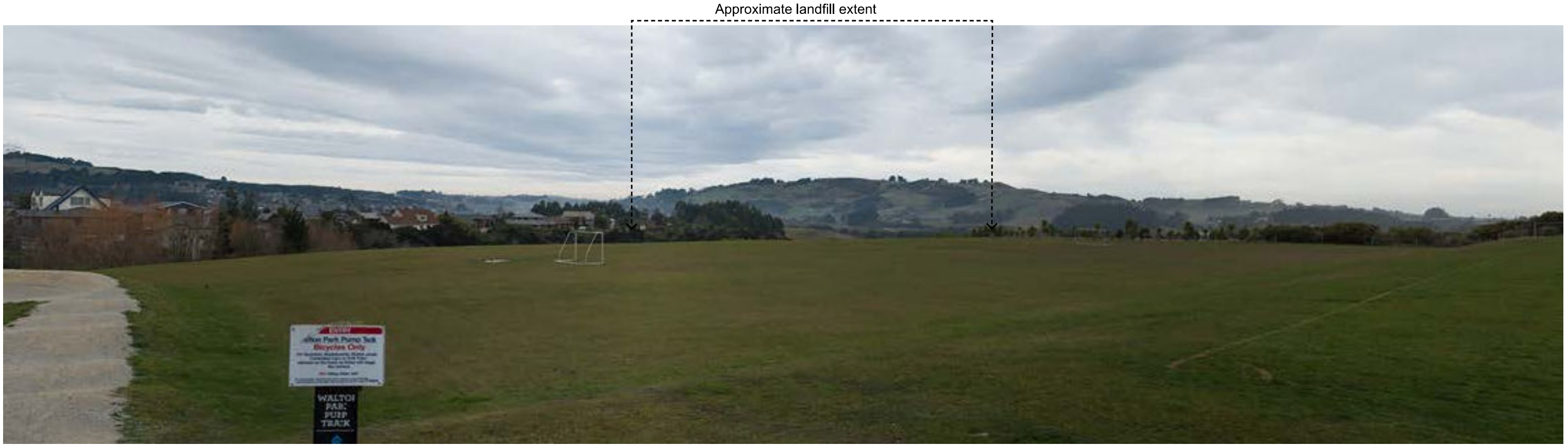
Walton Park Recreation Reserve

Date: 12 January 2023 Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS6A



Existing View

Potential Visibility - Landfill Site - Stage 2 during operation
approximately 1030m to closest edge of the Site

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Viewpoint Details

NZTM Easting	: 1 398 034 mE
NZTM Northing	: 4 913 084 mN
Elevation/Eye Height	: 39.5m / 1.7m
Date of Photography	: 3:03pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

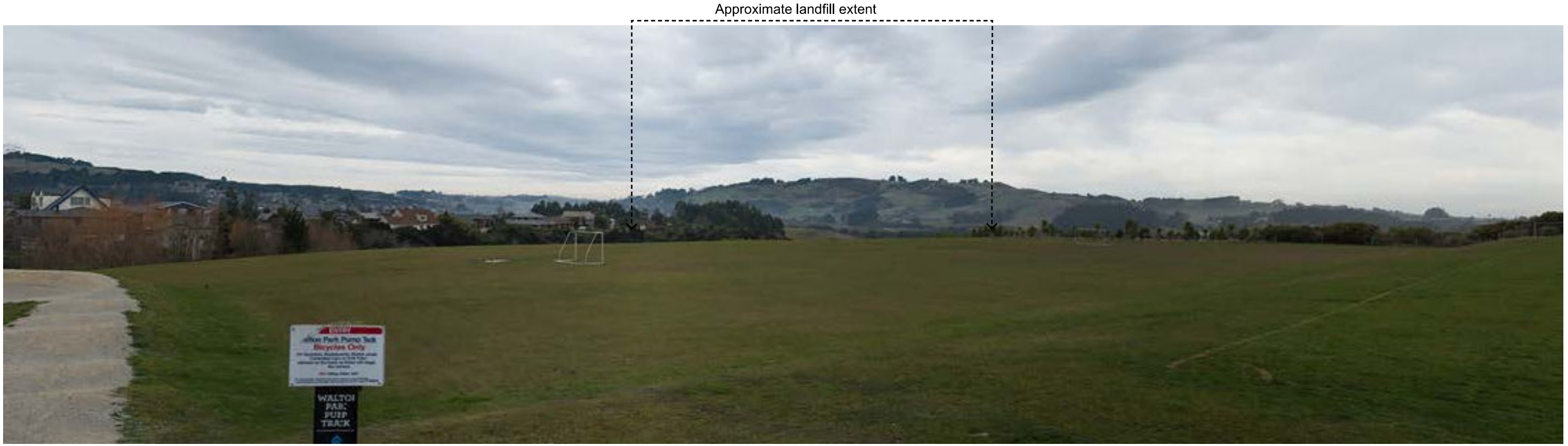
Walton Park Recreation Reserve

Date: 12 January 2023 Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS6B



Existing View

Potential Visibility - Landfill Site - Stage 3 during operation
approximately 1030m to closest edge of the Site

Boffa Miskell

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Viewpoint Details

NZTM Easting	: 1 398 034 mE
NZTM Northing	: 4 913 084 mN
Elevation/Eye Height	: 39.5m / 1.7m
Date of Photography	: 3:03pm 22 July 2021

Horizontal Field of View	: 90°
Vertical Field of View	: 30°
Projection	: Rectilinear
Image Reading Distance @ A3 is 20 cm	

GREEN ISLAND LANDFILL CLOSURE

Walton Park Recreation Reserve

Date: 12 January 2023 Revision: 0

Plan prepared for Dunedin City Council by Boffa Miskell Limited

Project Manager: Rachael.Eaton@boffamiskell.co.nz | Drawn: DIr | Checked: SMc

VS6C

About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Whangarei, Auckland, Hamilton, Tauranga, Wellington, Nelson, Christchurch, Dunedin, and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural heritage, graphics and mapping. Over the past four decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.