Green Island Resource Recovery Park Precinct – Air Quality Assessment

Prepared for

Enviro NZ Services Limited

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Limitations:

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Table of Contents

Table of Figures

Table of Tables

Appendices

1.0 Introduction

As part of Dunedin's wider commitment to reducing carbon emissions and reducing waste going to landfill, the Dunedin City Council (DCC) has embarked on the Waste Futures Programme to develop an improved comprehensive waste management and diverted material system for Ōtepoti Dunedin. The programme aligns with DCC's responsibility under the Waste Minimisation Act 2008 to 'promote effective and efficient waste management and minimisation within its district'.

Improving Dunedin's whole waste system includes enhancing collection services for reuse and recycling, and safe disposal of residual waste to landfill.

The Waste Futures Programme includes provision of an enhanced kerbside recycling and waste collection service for Dunedin from July 2024. The new kerbside collection service will include collection of food and green (organic) waste.

To support the implementation of the new kerbside collection service, the DCC is planning to make changes to the use of Green Island landfill site (the Site) (Figure 1) in coming years including:

- Developing an improved Resource Recovery Park Precinct (RRPP) for food and green waste and to process recycling; and
- Providing new waste transfer facilities to enable the safe disposal of any residual waste to landfill.

In addition, DCC is planning for the ongoing operation and closure of the Green Island landfill, which is coming to the end of its operational life. The existing Otago Regional Council (ORC) resource consents, required to operate a landfill at Green Island, expired in October 2023. In March 2023, DCC applied 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. These consent applications are in the process of being considered by ORC.

1.1 Green Island Resource Recovery Park Precinct

To meet the requirements of the new kerbside collection service the DCC is investing in improvements and expansion to the existing resource recovery area at Green Island landfill site. Proposed new facilities are shown on Figure 2 and include:

- organic receivals building (ORB) and processing facilities to support the organic waste kerbside collection;

- organic processing facility (OPF) processing of organic waste (kerbside collection, green waste and commercial organic waste) using forced air static composting;
- materials recovery facility (MRF) to sort and bale items collected from kerbside mixed recycling bins; and
- bulk waste transfer station (BWTS) to facilitate the compaction and trucking of waste to landfill.

Additional facilities also include new glass bunkers, staff offices, parking, and breakrooms and associated access roads and truck parking areas. Several existing facilities are to be retained including the rummage shop, public drop-off areas and the education centre.

The resource consents for the development and operation of the new facilities relate to ground disturbance, and discharges to land and air. The Green Island landfill 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 RRPP will be run by EnviroNZ on behalf of DCC and will start operating in July 2024 following construction of the ORB, which is currently underway. Resource consent to operate the ORB was granted by ORC in September 2023 under the existing landfill consents.

The other new RRPP facilities are planned to start operating from mid to late 2025.

Pattle Delamore Partners Limited (PDP) has been engaged by Enviro NZ Services Limited (Enviro NZ) to assess the discharges to air from the RRPP.

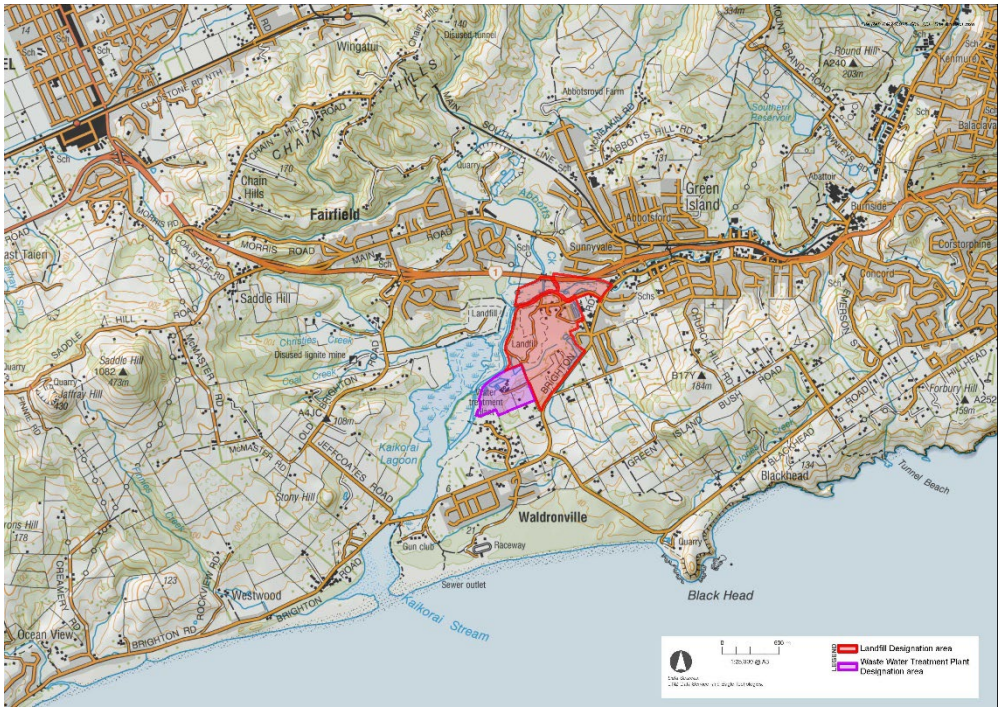


Figure 1: Site Location

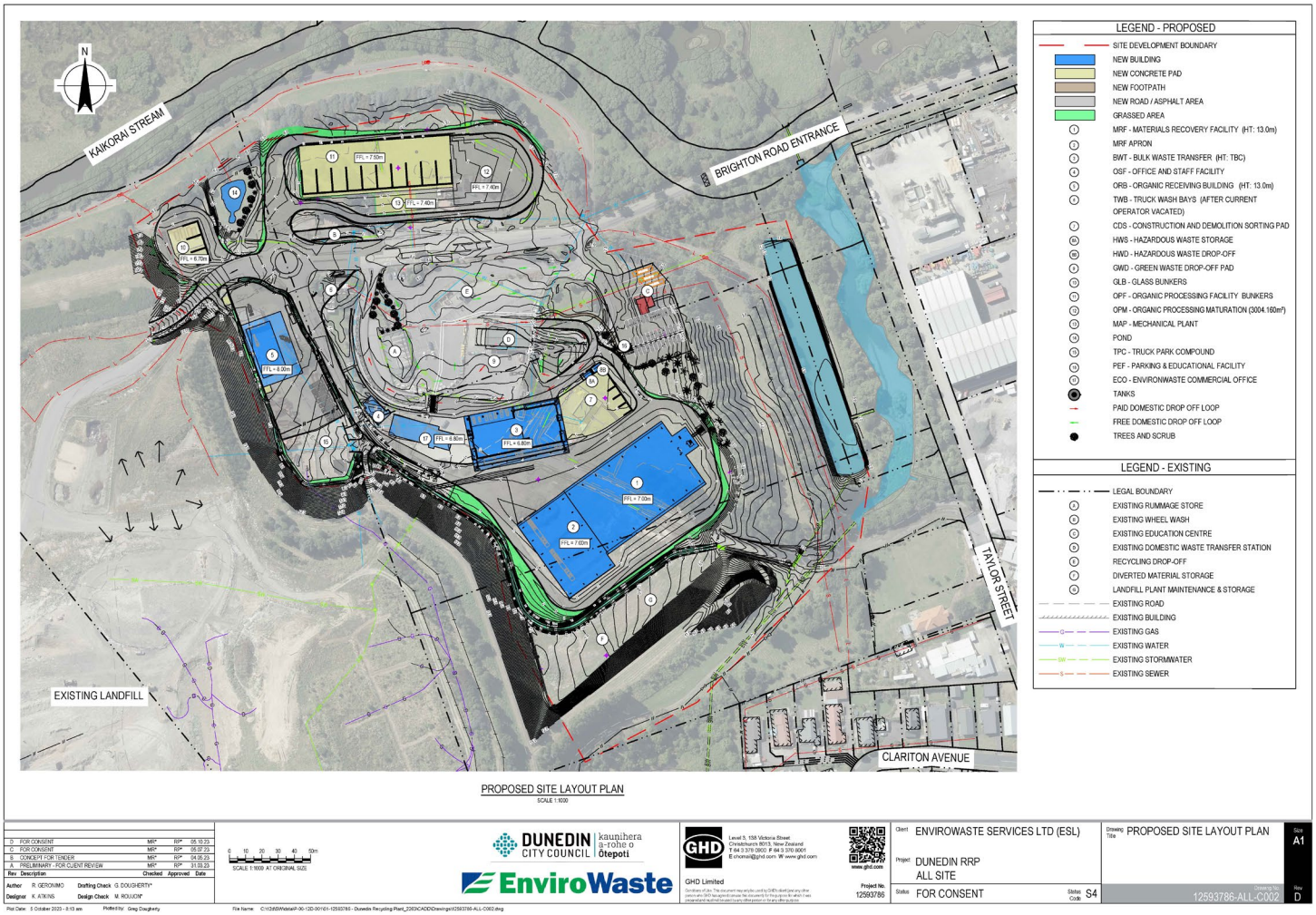


Figure 2: Green Island Resource Recovery Park Development Area Proposed Layout

2.0 Background Information

The Green Island landfill is operated by DCC and its contractors and is currently the primary disposal facility for the region. The Site's primary function is to receive, store, and manage solid waste generated in the region; this includes waste generated by residential, commercial, and industrial activities.

Currently the landfill is designed to accommodate household waste (solid waste), construction and demolition (C&D) waste, and other non-hazardous materials that comply with the waste acceptance criteria. In addition to landfill operations, the Site also undertakes composting of green waste with a waste transfer station within the northern section of the Site.

2.1 Site Location and Surrounding Area

The Site is located in the suburb of Green Island, approximately 8 kilometres (km) southwest of the Dunedin City Centre and has an area of 75.6 hectares.

The Site is designated for landfilling in the DCC 2GP.

In addition to the RRPP, the wider Site is an active landfill with a landfill gas collection system. The landfill tipping face is in the southwest corner of the Site with the landfill also expanding in that direction. Based on the current waste disposal rates the Green Island landfill has a further six years of operational capacity.

The proposed RRPP is located in the northern portion of the Site and is bordered by the Kaikorai Stream to the north, industrial land to the east and residential and rural-residential land to the south and west. Further to the north, beyond State Highway 1 is residential land.

The Site is located on the upper parts of the low-lying Kaikorai Estuary. The elevation increases to the east and west of the Site with the elevation decreasing to the south of the Site towards the coast.

The location and zoning of the Site are shown in Figure 3.

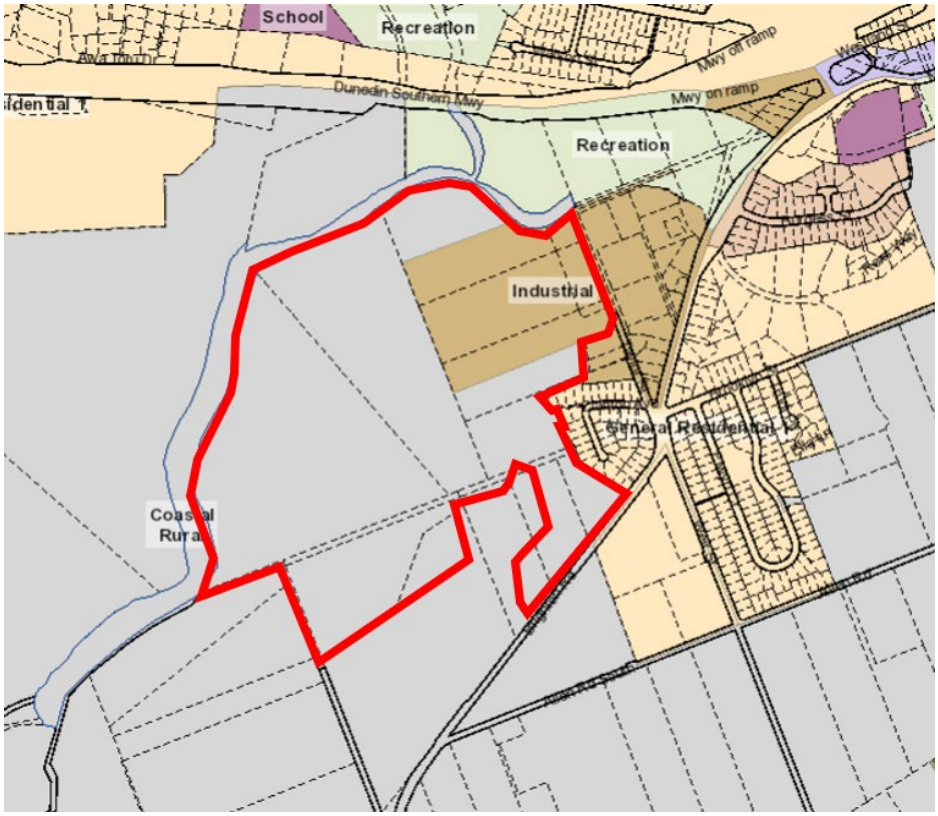


Figure 3: Site Location and Planning Designations

2.1.1 Similar Facilities

The food and organics processing facility that Enviro NZ is proposing to install at Green Island has been successfully implemented by Enviro NZ at similar facilities elsewhere in New Zealand. Enviro NZ operates a static aerated composting system at its' Hampton Downs landfill in North Waikato. This composting operation is consented to process up to 30,000 tonnes per annum (tpa) of both green and food waste. Hampton Downs has many similarities to the proposal, albeit on a larger scale. Given these similarities, PDP has used observations from the Hampton Downs site to inform this assessment, with odour observations undertaken at this site presented in section 5.1.3. Additionally, in 2022 Enviro NZ obtained consent to operate another static aerated composting system at the Redruth Landfill in Timaru. The Redruth facility will be used to process organic waste from the Dunedin organic kerbside waste collection until the OPF at the RRPP is operational.

In terms of the BWTS and the MRF, Enviro NZ operates a number of standalone (no MRF operations) waste transfer stations. Some of which accept up to 200,000 tpa of waste including green waste, and C&D waste. Given the similarities to the Hamilton site, PDP has undertaken odour observations at the existing Hamilton site (presented in section 5.2.1) to inform this assessment.

2.2 Sensitive Receptors

A site investigation was undertaken to identify discrete receptors deemed sensitive to changes in air quality as a result of potential discharges to air from the RRPP. This included reviewing the sensitive receptors used in the GHD assessment for the overall landfill consents[1].

In the context of this assessment, the term 'sensitive receptors' is defined as a location where people or surroundings may be particularly sensitive to the effects of air pollution. This type of receptor includes:

- residential properties;
- hospitals;
- schools;
- indoor facilities used by the public (e.g. libraries, community centres, sports facilities); and,
- public outdoor locations (e.g. parks, reserves, beaches, sports fields).

Figure 4 presents the location of the nearest receptors in relation to the RRPP. PDP has identified a number of nearby sensitive receptor clusters and identified individual sensitive receptors in each cluster that are considered to be representative of that cluster. These receptors are summarised in Table 1.

[1] GHD Limited, *Waste Futures – Green Island Landfill Closure Air Quality Impact Assessment,* March 2023.

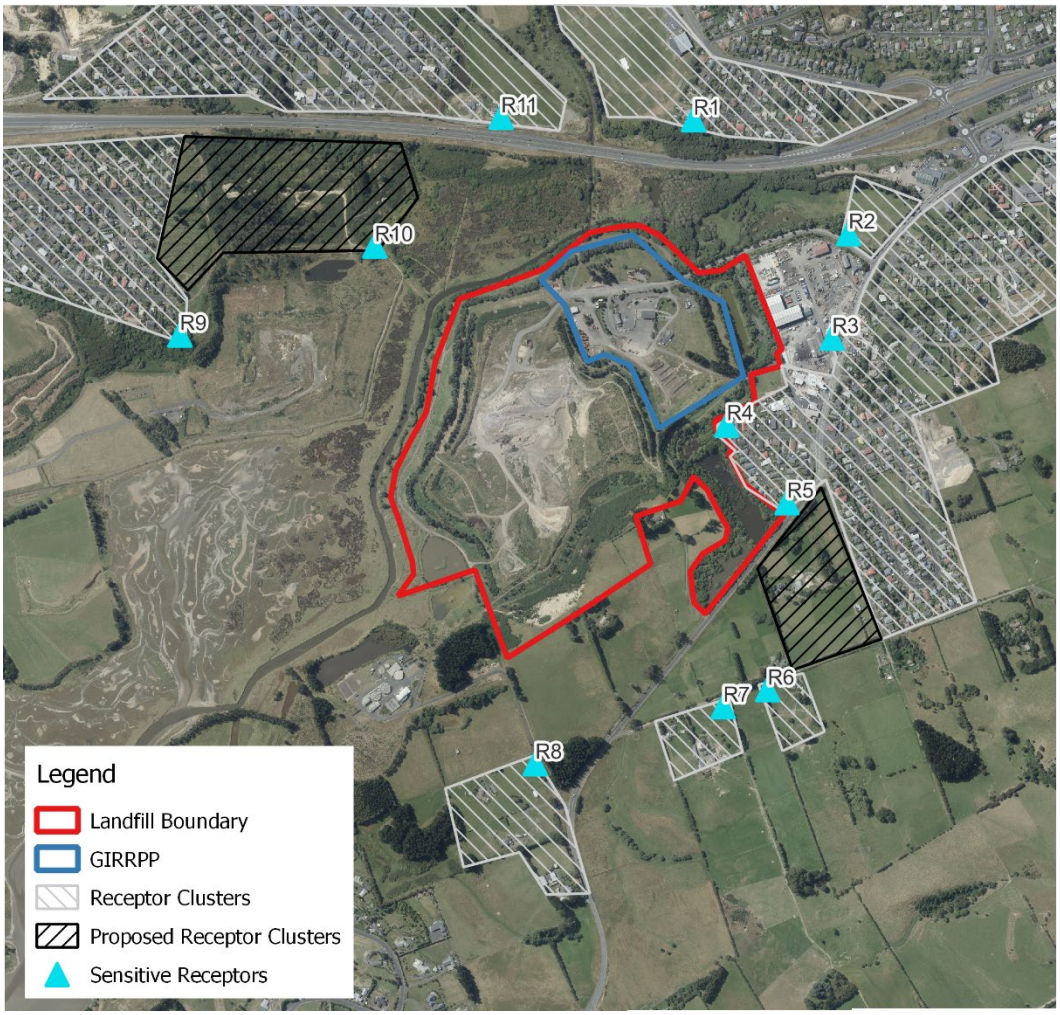


Figure 4: Receptor Locations

Table 1: Location of Receptors located close to the RRPP				
Receptor Name	**Address**	**Closest Distance to RRPP (m)**	**Direction Relative to the RRPP**	**Closest RRPP Odour Source**
R1	Watson Street, Green Island	300	North northeast	OPF Maturation
R2	Shand Park	410	East	OPF Maturation
R3	27 Brighton Road	290	East	MRF
R4	Clariton Ave, Green Island	130	Southeast	MRF
R5	Proposed residential area, Green Island	330	Southeast	MRF
R6	17 Allen Road South, Waldronville	660	South southeast	MRF
R7	51 Allen Road South, Waldronville	680	South	MRF
R8	Brighton Road, Waldronville	840	South southwest	MRF
R9	Blanc Ave, Fairfield	880	West	OPF
R10	Proposed residential area, Fairfield	440	West	OPF
R11	Te Kura Kaupapa Maori O Otepoti	340	North northwest	OPF

Notes:

1. *Distance and direction is on the closest odour source.*
2. *Receptors R6 to R10 the closest odour source is the Green Island Landfill.*

2.3 Meteorology

Wind can have a significant effect on dust generation and transportation. The Green Island landfill has its own Automatic Weather Station (AWS), and PDP has reviewed the data collected and considers that it provides a good representation of wind in this area.

The distribution of hourly average wind speeds and directions recorded at the AWS for a one-year period between 1 March 2022 and 28 February 2023[2] is shown in Figure 5 and Table 2 presents the distribution frequency of wind speed. The predominant lower speed winds (less than 3 metres per second (m/s)) originate from the northeast (14.3 percent of the time), with calms (winds less than 0.5 m/s) occurring 0.3 percent of the time. Based on PDP's experience, it is these light wind conditions which have the greatest potential to cause odour nuisance effects due to a reduction in the dispersion and dilution of odour emissions. The predominant stronger winds (greater than 5 m/s) originate from the southwest quarter, and it is these wind speeds that are capable of transporting dust.

Seasonal wind roses are presented in Figure 7 and these indicate that:

- In spring the prevailing winds are from the east northeast, with a significant component coming from the west and west southwest;
- In summer the prevailing winds are from the east northeast;
- In autumn the prevailing winds are from the northeast, with very few winds coming from the southwest quadrant; and,
- In winter the prevailing winds are from the northeast, with very few winds coming from the southwest quadrant.

Figure 7 and Table 3 presents all data collected on site up to 31 December 2023. As shown in Figure 7 the windspeeds and wind direction are similar to the one year of data presented in Figure 5.

[2] Meteorological monitoring data is only based on one year as the monitor site was installed in February 2022.

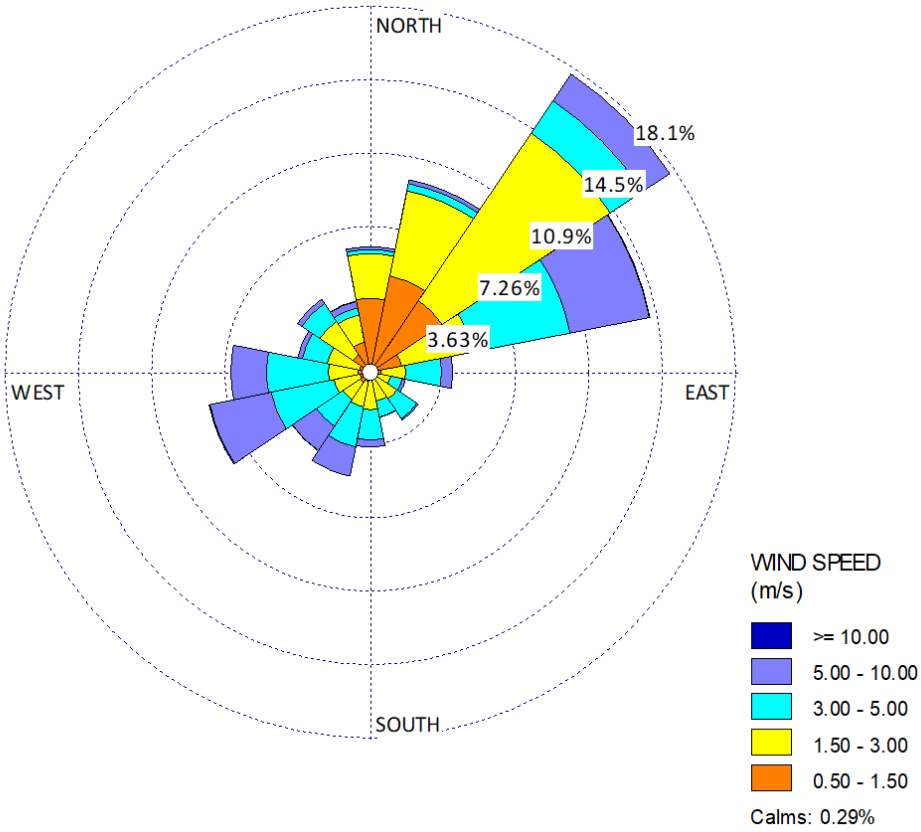
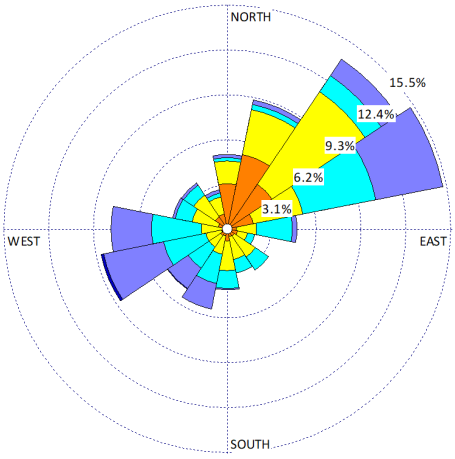
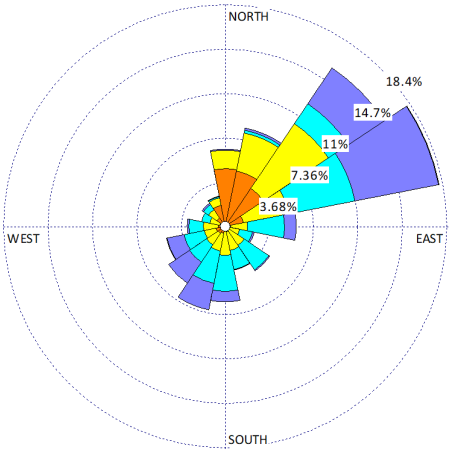


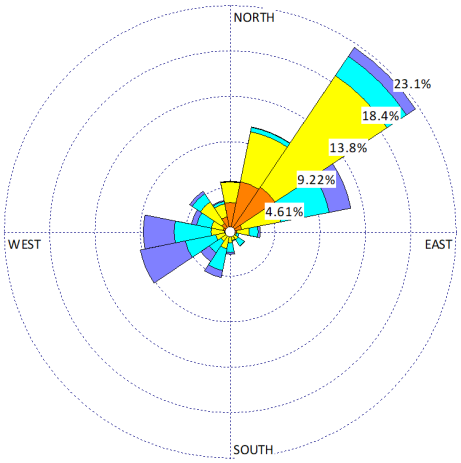
Figure 5: Green Island Windrose – 1 March 2022 to 28 February 2023



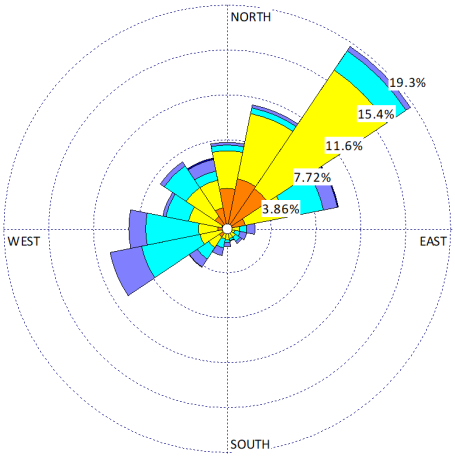
Spring (September, October, November)



Summer (December, January, February)



Autumn (March, April, May)



Winter (June, July, August)

Figure 6: Green Island Seasonal Windroses – 1 March 2022 to 28 February 2023

Table 2: Wind Speed Frequency Distribution (March 2022- February 2023)				
Direction	Wind Speed (m/s)			Total (%)
	0-<3	3-5	>5	
North	5.9	0.2	0.1	6.2
North northeast	9.2	0.4	0.2	9.7
Northeast	14.3	1.9	1.6	17.8
East northeast	5.3	4.9	4.0	14.1
East	1.8	1.8	0.6	4.1
East southeast	1.1	0.6	0.2	1.8
Southeast	1.6	1.2	0.1	2.9
South southeast	1.5	0.8	0.0	2.3
South	1.9	1.5	0.4	3.8
South southwest	1.8	2.0	1.5	5.3
Southwest	1.7	1.6	1.5	4.7
West southwest	1.9	3.2	3.1	8.2
West	2.1	3.0	1.8	6.9
West northwest	2.2	1.3	0.2	3.7
Northwest	3	1.1	0.3	4.4
North northwest	2.9	0.4	0.4	3.6
TOTAL	**58.2**	**25.9**	**16.0**	**99.5**

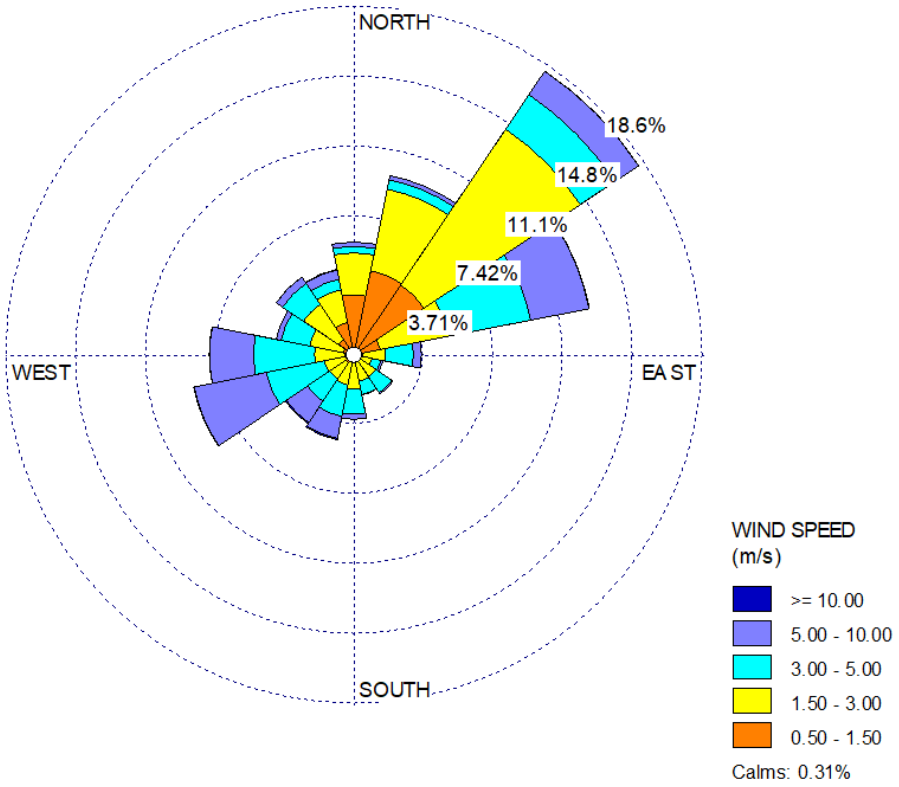


Figure 7: Green Island Windrose – 1 March 2022 to 31 December 2023

Table 3: Wind Speed Frequency Distribution (March 2022- December 2023)				
Direction	Wind Speed (m/s)			Total (%)
	0-<3	3-5	>5	
North	5.5	0.4	0.0	6.0
North northeast	9.0	0.5	0.0	9.7
Northeast	14.5	2.2	0.0	18.2
East northeast	5.2	4.4	0.0	12.8
East	1.7	1.5	0.0	3.6
East southeast	1.0	0.5	0.0	1.7
Southeast	1.5	1.0	0.0	2.6
South southeast	1.5	0.7	0.0	2.2
South	1.9	1.3	0.0	3.5
South southwest	1.7	1.7	0.0	4.7
Southwest	1.6	1.4	0.0	4.4
West southwest	1.7	3.1	0.0	8.7
West	2.1	3.2	0.0	7.7
West northwest	2.4	1.6	0.0	4.2
Northwest	3.3	1.3	0.0	5.0
North northwest	3.6	0.6	0.0	4.7
TOTAL	**58.0**	**25.4**	**16.2**	**99.7**

2.4 Environmental Performance Standards

The Site falls under the jurisdiction of the ORC and the policies, objectives and rules contained in the Regional Plan: Air and the Regional Plan: Waste. Under these plans, discharge of contaminants (inclusive of odour and dust) into air from waste transfer facilities and composting operations fall under rules presented in Table 3.

Table 4: Location of Receptors located close to the RRPP		
RRPP activity	**ORC Waste Plan Rules**	**ORC Air Plan Rules**
Facilities including organics composting, MRF, BWTS, C&D processing.	⁘ Rule 5.6.1 (5) Hazardous wastes at contaminated site – discretionary activity ⁘ Rule 6.6.1 (3) Operation of facilities for the treatment or disposal of hazardous wastes – discretionary activity ⁘ Rule 7.6.1 (3) Discharge of odour and dust into air from composting activities – discretionary activity	⁘ Rule 16.3.5.9 Other discharges from industrial or trade processes – discretionary activity

2.5 Complaints

There have been 166 complaints relating to odour from Green Island landfill between July 2017 and June 2023, with the number of complaints peaking in 2018 and 2019, with 45 and 48 complaints respectively. Since 2020, the number of complaints has reduced to an annual average of 18 complaints per year. The increase in complaints in 2018 and 2019 is attributable to the construction of fifteen new landfill gas extraction wells. In order to install some of these wells, historical waste was disturbed resulting in odour releases.

Of the 166 odour complaints, almost all have been attributed to the landfill operations with only six complaints associated with composting operations and there appear to be no complaints related to the operation of the transfer station, which is an open-air facility accepting limited quantities of material from the public.

The composting operation currently being undertaken utilises traditional windrows and this is quite different to that being proposed at the RRPP. With the proposed aerated static pile system, the compost is constantly monitored and actively aerated based on key parameters such as temperature and air flow rate. Also when under negative aeration, foul air will be treated via a biofilter and therefore PDP considers the odour potential for the proposed composting will be low. While the volume of material processed will increase, this will be offset as the compost operations will move further away from the current nearby dwellings and therefore further reduce any potential for off-site odour effects at these locations. It is noted that while the composting operations will move away from some receptors, they will move closer to others. However with the additional controls in place with the new system, odour discharges will be lower when compared to the current traditional windrows operations.

2.6 Separation Distances

Separation distances are often used as a screening tool to assess if there is any potential for air quality effects on nearby sensitive receptors. These separation distances are generally very conservative and generally do not always take into account the specific processes, mitigation measures, or the size and nature of the operation.

2.6.1 Composting Operations

There are several published separation distance guidelines for composting operations throughout the world, including the following:

- Netherlands Ministry of Infrastructure and Water: "Netherlands Emission Guidelines for Air" 2007
  - 200 m for composting >20,000 tonnes per year;
- Nova Scotia Environment: "Compost Facility Guidelines" September 2010
  - 500 m for open windrows that exceed 1,000 tonnes annually of food waste or 10,000 tonnes annually of total feedstock;
- The South Australia Environmental Protection Agency: "Evaluation distances for effective air quality and noise management" August 2016:
  - 1,000 m for composting operation processing > 200 tonnes per year; and,
- The Victorian Environmental Protection Agency: "Separation distances for large composting facilities" August 2012
  - 1,000 m for composting more than 55,000 tonnes per annum.

As can be seen in the above there is a large range of separation distances used, however the commonly used distance in New Zealand is 500 m which is based on an Emission Impossible report prepared for the Auckland Council[3]. The 500 m used in the Emission Impossible report comes from the Tasmania Environmental Protection Agency (EPA)[4]. A review of the Tasmania EPA document reveals that there are no site-specific criteria for this distance i.e. size of the operation, composting methodology, or mitigation. Therefore, it appears to be a generic distance, and would mean the same separation for a large static windrow composting operation or an actively monitored and aerated system despite the fact that these two systems have quite different odour potential.

[3] Wickham, L (2012). Separation Distances for Industry, A discussion document prepared for Auckland Council, July 2012. Prepared by Emission Impossible Ltd.
[4] Attenuation Distances and Air Quality Code (Tasmania Planning Commission, 2011).

The control systems for forced aeration actively monitor the temperature profile of the compost in the bunkers and automatically aerates them based on this temperature profile data, which ensures that the compost always remains aerobic. Additionally, when the bunkers are under vacuum the air is treated via a biofilter before being discharged to the atmosphere further reducing the odour potential. Given that the composting process is actively managed and there is good mitigation in place to reduce odour emissions, using a 500 m separation distance in this situation is not appropriate in PDP's opinion.

2.6.2 Bulk Waste Transfer Station

Like composting operations, there are a number of published separation distances for waste transfer stations. The following summaries some the recommended distances from Australia and New Zealand:

- Auckland Council - Separation Distances for Industry, 9 July 2012 (Emission Impossible)
  - 300 m for odour and dust;
- Victoria EPA - 1518: Recommended Separation Distances for Industrial Residual Air Emissions – Guideline, 7 March 2013
  - 250 m recommended separation distance;
- Victoria EPA DRAFT Separation distance guideline, Publication 1949, December 2022
  - 500 m for odour and 250 m for dust;
- Western Australia EPA - Guidance for the Assessment of Environmental Factors - Separation Distances between Industrial and Sensitive Land Uses, June 2005
  - 200 m recommended separation distance;
- South Australia EPA – Evaluation distances for effective air quality and noise management, August 2016
  - 300 m recommended separation distance; and,
- Tasmania EPA – Tasmanian Planning Scheme – State Planning Provisions, C9.0 Attenuation Code
  - 300 m recommended separation distance.

As with the composting operations, these separation distances are generally simplistic, applied in all directions and do not consider factors such as meteorological conditions, terrain effects, odour/dust mitigation or the sensitivity of the surrounding environment. Having reviewed them PDP considers that in the absence of a detailed site-specific assessment or site-specific mitigation and

management responses, 300 m is an appropriate distance within which to consider that there is potential for effects. However, based on PDP's experience with waste transfer stations of this size and design it is unlikely for odour to be detected out to 300 m.

3.0 Assessment Methodology

This assessment has been undertaken in accordance with the Ministry for the Environment (MfE) guidance for assessing and managing the environmental effects of dust (MfE GPG Dust)[5] and odour emissions (MfE GPG Odour)[6]. Note this report addresses effects associated with the operation of the facilities. Potential air quality related effects during construction and associated mitigation measures are addressed in the Draft Construction Environmental Management Plan (GHD 2024)[7]

It is common practise in New Zealand to undertake a qualitative assessment of the potential effects associated with dusty material and large open area sources of odour such as waste operations. This assessment has involved a review of the activities that are being undertaken, and then determining the potential for these activities to cause nuisance dust or odour which could affect the surrounding environment. In determining whether there is the potential for nuisance to occur, the following considerations have been made:

- The nature of the activity undertaken;
- How long the activities are likely to occur;
- The nature of the material being handled, placed, or stored;
- Whether mitigation measures can be implemented to control the potential of effects (e.g. covering or storage of materials, use of water or odour suppression, management practises, etc.);
- How close the local community is to the activities;
- The nature of the receptors in these communities and their sensitivity to dust and odour; and,
- The prevailing meteorological conditions.

[5] MfE Good Practice Guide for Assessing and Managing the Environmental Effects of Dust Emissions, November 2016

[6] MfE Good Practice Guide for Assessing and Managing Odour, November 2016

[7] RRPP Management Plans, Appendix A-1, GHD 2024)

3.1 Comparison with Assessment Criteria

The assessment criteria used in the Otago Regional Plan is based on the FIDOL (Frequency, Intensity, Duration, Offensiveness and Location) factors to determine whether an odour or dust discharge has caused an objectionable or offensive effect.

PDP has undertaken a qualitative assessment to predict the effects from the proposed RRPP using the FIDOL assessment tool.

The FIDOL factors are explained in detail below:

- Frequency; relates to how often an individual is exposed to dust or odour. Factors determining this include the frequency that the source releases dust or odour (including its source type, characteristics and the rate of emission of the compound or compounds); prevailing meteorological conditions; and topography.
- Intensity: is the concentration of dust or odour at the receptor location.
- Duration: is the amount of time that a receptor is exposed to dust or odour. Combined with frequency, this indicates the exposure to dust or odour. The duration of dust emissions, like its frequency, is related to the source type and discharge characteristics, meteorology and location. The longer the dust or odour detection persists in an individual location, the greater the level of complaints that may be expected.
- Offensiveness: is a subjective rating of the unpleasantness of the effects of nuisance dust or odour. Offensiveness is related to the sensitivity of the 'receptors' to the dust or the odour emission, i.e. industrial premises may be more tolerant to dust and odour concentrations than residential properties. Offensiveness can also be related to the colour of the dust, with natural tones being more acceptable than more distinct colours such as black from coal dust or yellow from sulphur. Whereas the character and hedonic tone of the odour can determine the offensiveness, with odours such as freshly baked bread being considered less offensive than wastewater odours.
- Location: is the type of land use and the nature of human activities in the vicinity of a dust and odour source. The same process in a different location may produce more or less dust depending on local topography and meteorological conditions. It is also important to note that in some locations certain higher dust and odour concentrations may be more acceptable than in others.

PDP has assessed each of these factors to determine if off-site dust and odour are likely to be offensive or objectionable.

4.0 Potential Air Emission Sources and Mitigation Measures

The RRPP has a number of areas that have the potential to generate odour if not managed correctly. These are the MRF, BWTS, OPF (including the aerated static pile bunkers), and leachate system. The following processes are described in further detail in the following sections.

4.1 Waste Accepted

Waste accepted at the RRPP will include the following:

- Wastes from a variety of business and commercial activities, both self-haul and from waste collection companies;
- Domestic/household wastes;
- Whiteware;
- Dry recyclable materials such as paper and cardboard, glass, plastic, aluminium cans, ferrous and non-ferrous metals;
- Comingled food and green waste from kerbside collection;
- Green waste from domestic and commercial drop-off; and,
- Food waste.

In addition, Enviro NZ will establish a waste control policy as it has for other sites. This will include establishing procedures for determining the acceptability of waste materials. Generally, this involves the weighbridge operator questioning the drivers of each load to determine the nature and acceptability of the load. Additionally, signs will be placed at the entrance listing the waste materials that are not accepted. This includes the following material:

- Asbestos;
- Explosives and Fireworks;
- Volatile / Liquid wastes;
- Petroleum products;
- Timber preservatives;
- Medical wastes;
- Scrap motor cars;
- Animal by-products (offal), including fish by-products;
- Grease interceptor trap residues;
- Residues from agriculture activities (e.g. silage, piggery wastes, poultry wastes);

- Residue from chemical manufacturing processes containing esters, acrylates, solvents, aliphatic hydrocarbons;
- Residues from tanneries;
- Herbicides / insecticides;
- Commercially derived resins, oils, paints, tars;
- Particularly dusty loads (e.g. coal ash, sawdust fines); and,
- Particularly odorous loads.

4.2 MRF and BWTS facilities

4.2.1 Materials Resource Facility

The MRF building will facilitate the sorting, processing and recovery of recyclable materials. The MRF will process approximately 5 tonnes per hour (TPH) with an expected annual processing of 9,300 tonnes per annum (TPA). The plant will operate for a 10 hour shift on business days only, with some limited night time working to be undertaken when required.

The MRF will:

- Have a dedicated space for sorting different types of recyclable materials;
- Be designed (both layout and equipment) to optimise the sorting process, allowing workers or automated systems to separate and categorise recyclables efficiently;
- Have facilities for further processing following sorting. This involves bailing recyclables to prepare them to be sent off-site to recycling facilities or end markets;
- Have large commercial motorised roller doors to allow for the movement of vehicles and waste material in and out of the building in addition to hinged personal doors for day-to-day movement and fire egress doors;
- Be designed so that incoming recyclable materials are received and dispatched through the north-west façade and the canopy for storage and loading zones to the north and west as well; and
- Be connected by roadways to the existing infrastructure of the waste transfer station.

4.2.2 Bulk Waste Transfer Station and C&D Sorting Pad

The proposed BWTS will be designed to efficiently handle the receiving and loading of all general waste within its premises and streamline the waste management process. The BWTS is designed to process 50,000 tonnes of waste per annum.

The building will:

- Have large commercial motorised roller doors to allow for the movement of vehicles and waste material in and out of the building in addition to hinged personal doors for day-to-day movement and fire egress doors (open during operating hours);
- Have domestic drop off on the northern façade and have commercial drop off accessing through two doors on the eastern façade. There will also be a drive through lane along the south side for the loading and offtake of (semi-trailers) inside the building; and,
- Have C&D waste deposited onto the concrete slab designated for C&D waste adjoining the BWTS. The waste will be sorted and any waste that cannot be recycled or reused will be pushed into the BWTS.

4.2.3 Potential Discharges

There is the potential for odour to be discharged from the MRF and BWTS if mitigation measures are not in place via open doors and mechanical ventilation. The BWTS and C&D pad also have the potential to result in dust and litter nuisance effects. While there may be other discharges to the air such as combustion emissions from vehicles or the refuelling of loader on-site, these emissions are expected to be insignificant and therefore have not been considered further in this assessment.

4.2.3.1 Odour

There are two types of odour associated with the operation of the MRF and BWTS, these are background odours associated with refuse and odours associated with specific highly odorous loads.

Enviro NZ will not accept odorous loads, however from time to time, loads may be deposited that contain odorous material. There is no way of estimating the nature of these loads, however Enviro NZ has procedures in place to manage these issues. These will be the same procedures that Enviro NZ implements at its other sites and have been included in the draft site operations management plan.

4.2.3.1.1 Mitigation

In addition to the stringent waste acceptance criteria to minimise the potential for odour discharges, the Site will implement a number of additional mitigation measures. The mitigation measures are set out below and are based on mitigation successfully implemented at other Enviro NZ operations and will be incorporated into the operations management plan for Green Island.

4.2.3.1.2 Odour Control Measures

- Highly odorous loads will not be accepted at the Site. Signs specifying this will be clearly posted at the entry to the RRPP;
- The weighbridge operator will enquire as to the nature of all incoming loads for odour content with unacceptable loads not permitted entry;
- All staff working at the facility will have training, which includes any consent requirements, control of odorous waste, odour monitoring, housekeeping procedures, and contingency measures;
- Wash down waste collected will be discharged into the Site leachate collection system;
- All putrescible waste will be removed from the Site within a maximum of 72 hours. The maximum of 72 hours is to allow for holiday weekends when the landfill is closed, but typically putrescible waste will be removed within 24 hours. However, if putrescible waste is onsite for extended periods of time, it will be covered with inert waste until it can be collected;
- Deodorant will be kept on-site and applied to odorous material using a handheld sprayer;
- The site hardstand areas will be regularly cleaned to minimise the potential for spillage to become odorous;
- The Site will install a spray odour/dust suppressant misting system in both the MRF and BWTS buildings; and,
- Truck and trailers removing refuse from the Site will be covered.

4.2.3.2 Odour Contingency Measures

In the event that odorous material is deposited and/or odour can be detected off-site, or a complaint is received the Site manager and operations staff will undertake the following measures as required to mitigate the odour:

- Immediately cover the odorous load with other waste;

- If necessary, apply deodorant chemicals directly to the odorous material and manually activate the misting suppressant system to run continuously until the material is removed or covered;
- Remove the offending waste as soon as possible; and,
- Report an odour incident using the incident reporting and investigation procedures.

4.2.4 Dust

The dust released from the act of depositing loads of refuse into the BWTS or C&D pad, and the loading of the refuse, is the main potential source for the discharge of dust to the air. When these activities occur within the confines of the semi-enclosed BWTS building it is unlikely to result in any off-site effects, however the disturbance of C&D in the bunkers has the potential to result in off-site effects.

If an obviously dusty load was to arrive on the Site, as with other sites, the Site manager will monitor the transfer. If dust is being emitted, the transfer would be stopped until the load is dampened down with water or if in the opinion of the manager, the load is unacceptable, the transfer would be stopped, and the load rejected.

The dust from vehicle movements is expected to be insignificant as the entire site will be sealed and swept regularly.

4.2.4.1.1 Dust Control Measures

- Particularly dusty loads will not be accepted at the Site;
- All vehicles off-loading refuse (excluding green waste and C&D) must off-load into the BWTS;
- The Site access and transfer areas will be sealed in order to minimise dust from the Site;
- Misters will be installed on the roof and doorways of the BWTS which can be manual turned on if a dust load is deposited;
- Regular cleaning of interior walls to avoid the build-up of dust;
- The Site will be kept clean and free from waste and dust through regular sweeping of the transfer areas and routes and hosing down of clear floor areas in the transfer building at the end of each day; and,
- Vehicle speeds on-site will be limited to a maximum of 20 kilometres per hour (kph) in order to minimise dust from the Site.

4.2.4.1.2 Dust Contingency Measures

- If dust is being emitted, the tipping of the load will be temporarily stopped until the load is dampened using water, or if in the opinion of the BWTS manager or supervisor the load is unacceptable, the tipping of the load is stopped, and the load refused entry.
- Dust on Site will be monitored by operations staff, especially in summer, and when necessary, Enviro NZ will employ a road sweeper to keep the Site clean.

4.2.5 Litter

There is potential for litter to be deposited around the Site or beyond the site boundary, particular during transport of waste to the Site, during off-loading from vehicles into the BWTS, or when loading from the BWTS into the load-out vehicles. Enviro NZ will have measures in place firstly to avoid litter nuisance as far as practicable, and to manage any litter nuisance effects that may arise. Based on other Enviro NZ transfer stations, Enviro NZ will implement the following control measures:

- All waste carriers will be required to avoid litter escaping from their vehicles;
- Operations will take place inside a purpose-built building, minimising the potential for nuisance litter, with the proposed perimeter fencing acting as an additional barrier;
- The refuse loading bay will be swept as required to decrease the amount of loose litter on site. Litter checks of the property will be undertaken by site staff at least daily. Any wind-blown litter will be recorded in the odour and litter assessment form and picked up and returned to the BWTS for recycling or disposal;
- Any complaints regarding litter nuisance will be investigated and, if required, litter collected as soon as practicable; and,
- The Site undertakes regular inspections of the site and collects and disposes of any windblown litter.

Based on these proposed control measures and the observations PDP staff have undertaken at other Enviro NZ transfer stations where little litter nuisance was observed, PDP considers that the proposed activity will not generate adverse litter nuisance effects and therefore have not addressed litter any further in this assessment.

4.3 Bioaerosols

Bioaerosol is a term given to a variety of airborne micro-organisms (bacteria, fungi/mould or viruses). Bioaerosols naturally occur as a result of the decay of organic material and most people are constantly exposed to them. Composting operations that promote the natural decay of organic material will also produce bioaerosols and large-scale operations have the potential to generate large quantities of bioaerosols. However, these elevated concentrations of bioaerosols appear to be localised. The United Kingdom Environment Agency[8] technical guidance for the composting and aerobic treatment sector states that: "*The consensus from various studies is that bioaerosols from composting activities decline rapidly within the first 100 metres from a site and generally decline to background levels within 250 metres*".

Given that the composting operations will be at least 300 m from any sensitive receptor it is unlikely that these locations will be exposed to elevated levels of bioaerosols and therefore bioaerosols will not be considered any further as part of this assessment.

4.4 Organics Receival Building

Organic material, which is food scraps from some households and a mixture of food scraps and green waste (FOGO) from others, will be unloaded into the Organics Receival Building (ORB) for shredding. The shredded organic materials will be blended on the same day they are received with additional shredded green waste, before the mixture is taken to the OPF.

The OPF is designed for 20,000 tpa of organics waste.

The ORB structure will be a concrete slab and steel portal frames. The sides will be made of 3hm high concrete block walls and metal cladding above. The overall dimension will be approximately 17 m by 31 m. The southern side of the ORB will have a roller door which will allow a truck to enter and unload organic waste onto the concrete floor. The northern side of the ORB will have two roller doors for the loader access.

The ORB is the subject of separate resource consent applications and is covered by the existing landfill discharge consents, however contextual information is provided below.

4.4.1 Sources of Odour

The amount of odour that could be associated with the proposed ORB is dependent to a large degree on the state of the raw materials that are received and probably more importantly the control of the process. The Site only

[8] Environment Agency – Additional Technical Guidance for Composting and Aerobic Treatment Sector.

consolidates and shreds green waste and organic waste, with these types of material being less likely to produce odorous emissions when compared to other organic facilities that accept other material such as animal waste. The kerbside organic waste stream could also include small quantities of meat, fish, and dairy which can be more odorous when compared to green waste.

The primary purpose of the proposed ORB is for controlling odours from the receival of the kerbside organic collection. Here organic material will be received, shredded, and blended in a relatively enclosed environment which should contain most odours. However, due to the nature of the operation odorous loads may arrive at the Site from time to time. Enviro NZ can employ measures to mitigate any potential odours that might occur from waste that might be received. A number of the mitigation measures discussed in sections 4.2.3.1.2 and 4.2.3.2 for the BWTS are also applicable to the ORB. The following are the additional mitigation measures will be implemented to control odour from the ORB:

- Any food waste spillages that occur outside the building whilst organic material is being tipped off will be cleaned up immediately;
- There is no ventilation on this building and the door to the ORB will be closed, when practicable, in between deposits and load-outs. (At times it will be necessary to have doors open when diesel machinery is operating);
- Any kerbside organic material will be blended with green waste on the same day it is received. Green waste will remain on site for no more than 72 hours unshredded or 48 hours if shredded; and,
- In the event that an odour complaint is received the Site manager will undertake an odour investigation.

4.5 Composting Operations

The composting of material is proposed to occur via a two-phase process. Phase 1 occurs in the aerated static pile bunkers. Enviro NZ is proposing to build 10 high aeration bunkers, however only six bunkers will be built initially with the additional bunkers added when required. The aerated static pile bunkers will be used to undertake the active stages of composting before it is transferred to the OCS maturation pads to complete the composting process (phase 2).

Following material being processed (shredded and blended) in the ORB, the blended material will be transferred to the aerated bunkers for composting. Each bunker can hold approximately 330 cubic metres (130 tonnes) of material and the rate at which the bunkers are fill is dependent on the rate of raw material coming in, however typically each bunker will take up to four days to fill a bunker. If required the compost pile can be capped with a 150 - 300 mm layer

of screened compost overs (this is material post composting), or mature compost, as the bunker is filled, to act like a biofilter to help supress any odours.

During the filling of the bunkers the aeration system is operated manually in the positive aeration mode (air is blown up through the aeration holes and into the material) until the bunker is full. Running in positive mode during loading and unloading helps prevent the aeration holes from clogging.

Once the pile is complete, the system is switched to automated operation with reversing aeration mode, controlled by the computerised "controller" aeration control and temperature monitoring system.

The temperature probes have two sensors, one at the tip of the pile and another one metre up the shaft, that monitor the temperatures of the piles in the bunkers. When the system detects that the temperature between the two temperature sensors has stratified beyond an operator selected set-point, the aeration mode automatically reverses direction. The aeration directions are called "positive" (positive pressure at the base of the pile forcing air up through the pile) or "negative" (negative pressure at the base of the pile sucking air down through the pile). In addition to controlling the aeration direction, the control system also modulates the volume of air flowing through the pile for oxygenation and cooling (temperature control). Air-flow volume is controlled by opening and closing motorised dampers and varying the fan speed.

The automated reversing aeration system ensures a relatively uniform environment throughout the material pile and that all parts of the pile reach a minimum temperature of 55°C for at least three days to ensure pathogen destruction. When the bunkers are under negative aeration the foul odorous air is discharged via a biofilter to treat odour.

Material within the bunkers (phase 1) will be composted over a period of at least 21 days before being moved to the OCS maturation pads (phase 2). However, during phase 1 material may be required to be transferred between bunker to bunker. This helps redistribute moisture content throughout the pile and helps speed up composting. This bunker-to-bunker transfer will only occur when the material is at least nine days old as the material is less odorous.

Material will only be transferred out of the bunkers and onto the maturation pads when an acceptable Solvita test indicates that the active phase of composting is complete. The transfer from the bunker to the maturation pad should only take a few hours and depending on the amount of incoming material this could occur no less than every four days. The above time frames are based on the consented operations at Hampton Downs which had to undergo a range of testing which was review and approved by the Waikato Regional Council to ensure that there were no adverse odour effects. The trial that was presented to Council is appended in Appendix A.

During the maturation and curing process, the microbial activity decreases and so does the temperature within the pile, and therefore the rate of decomposition slows. During this period the organic material still continues to slowly decompose into humus over a period of months before being screened and transported off-site.

While the ECS system is a continuous operation with aeration switching between positive and negative pressure, other operational activities such as shredding and blending, bunker transfer and screening will only occur between 8:00 am and 5:30 pm Monday to Friday. Work will only be undertaken on the weekends if required to ensure the composting operation does not result in adverse effects.

4.5.1 Sources of Odour

The amount of odour that is associated with a composting operation is dependant to a large degree on the raw materials that are used and probably more importantly the control of the process. The proposed OPF site will only compost green waste and organic food waste, with these types of composting material being less likely to produce odorous emissions when compared to those that involve other materials such as animal waste. The kerbside organic waste stream could also include small quantities of meat, fish and diary, which can be more odorous when compared to green waste.

Composting is essentially a natural process, one that occurs for example within the bush, as leaf litter is broken down by micro-organisms. Because it is a decay process there will also be some odour associated with it. The degree of odour generated relates to the level of aeration that occurs and the raw material used. In the aerated composting processes aerobic bacteria break down the plant and food waste, and generally generate what are considered “typical” mild compost odours, i.e. the “earthy” smell that you might associated with the leaf litter in the bush. If the compost is not adequately aerated then anaerobic bacteria break down the plant and food based material and generate relatively offensive anaerobic odours.

4.5.2 Odour Control

A working group was formed to develop a New Zealand Standard for composts, mulches and soil conditioners. The intention in developing the standard was to determine best practice and improve quality assurance within the sector.

Part of this guidance[9] is on how to maintain aerobic conditions within the bunkers and windrows, and appropriate temperatures to ensure that pathogenic micro-organisms within the compost are minimised. Composting will produce some odour, but the odour associated with aerobic composting is considered not to be offensive, and therefore it is important that the conditions within the

[9] New Zealand Standard – Composts, Soil Conditioners and Mulches NZS 4454:2005.

bunkers and windrows are kept aerobic. Composting at the RRPP will employ a static pile system with forced ventilation to achieve aerobic conditions within the bunkers, which has its advantages over the traditional windrows system as the ventilated air used for maintaining aerobic conditions can be treated for odour before being discharged to the atmosphere.

As already discussed, the aerated static pile bunkers at the RRPP will be actively aerated by either forcing air from the bottom of the bunkers and into the compost or sucking air into the compost. This means that any potentially odorous air is either treated via a biofilter or by the mature compost that covers the pile, which acts like a biofilter.

As previously mentioned, food waste has the potential to be more odorous than green waste, and therefore good management of these sources is required in order to minimise odour. As already discussed, to reduce odour emissions Enviro NZ will construct the ORB to receive the kerbside organic waste stream.

In addition to the above, Enviro NZ will also adopt the following which will also control odour effects:

- Ensuring the carbon to nitrogen ratio (C:N) is between 25 to 40:1. Additionally, ensuring there is enough carbon material to create a more porous pile as nitrogen material tends to compact which will allow for better aeration;
- Managing the moisture content of the mix to be between approximately 55% and 62%;
- Emptying of bunkers will not be undertaken when windspeeds are less than 3 m/s and blowing in the direction of the immediate neighbours to the north northeast;
- Transporting the material from the bunkers in Huka bins to the maturation pad; and,
- If the composting material “goes off” and becomes odorous and putrid, loading the material in Huka bins and transporting for disposal at a landfill.

4.6 Leachate System

The leachate collected from the composting operation via the aeration vents on the floor of the bunker and the BWTS, including washdown water will be transferred directly to the existing leachate collection system and disposed of at the Green Island Wastewater Treatment Plant which is located approximately 200 m to the southwest of the landfill via a closed pipe and storage tank system. Based on this, PDP does not consider that the leachate from the Site will result in

any significant odours provided that the collection system is flushed regularly, which should be achieved through the day-to-day washdowns.

5.0 Assessment of Environmental Effects

This section provides an assessment of the potential emissions resulting from the proposed RRPP.

5.1 Odour Assessment

To understand the potential odour from the proposal, PDP has undertaken a number of odour observations from a number of Enviro NZ's composting and transfer station operations.

5.1.1 Methodology

The qualitative ambient odour monitoring methodology used in the assessment is a variation of the method described in the German Standard Verein Deutscher Ingenieure (VDI) 3940 "Determination of Odorants in Ambient Air by Field Inspections" (VDI Method). This is the method recommended in the MfE GPG Odour and is commonly used in Australia and Europe for odour assessment.

5.1.2 Qualitative Odour Scout

The modified method used by PDP involved using a single 'field odour scout' to visit a selection of sites and sample the ambient air every 10 seconds for 10 minutes giving a total of 60 samples per location. The field odour scout recorded the intensity of the odour (according to a set intensity scale), the odour character (from a list of 40 various odour descriptors), the wind direction, the wind speed, any rainfall, and the time and date for every sample. The intensity scale is that described in the MFE Good Practice Guide and is listed in Table 3. The wind direction was determined and recorded by the field odour scout using a compass.

Table 5: Odour Intensity Scale

Intensity Level	Odour Intensity	Odour Description
0	No Odour	No Odour
1	Very Weak	Odour is difficult to smell and there is doubt as the whether the odour is actually present.
2	Weak	Odour is present, but the character is difficult to determine.

Table 5: Odour Intensity Scale		
Intensity Level	**Odour Intensity**	**Odour Description**
3	Distinct	The odour is present, and the character/source of the odour is recognisable.
4	Strong	The odour is present, and the character/source of the odour is obvious.
5	Very Strong	The odour is offensive. Exposure to this level would be considered undesirable.
6	Extremely Strong	Odour is overpowering inciting nausea.

5.1.3 Composting Odour Investigation

To understand the potential odour from the proposed composting facility PDP has undertaken a number of site investigations at the Hampton Downs compost facility in the Waikato. While PDP staff have been to the composting operation many times at Hampton Downs the following is based on a site visit on the 11 February 2021. These observations are consistent with the many other visits that PDP has undertaken, and PDP therefore considers these observations to be representative.

PDP staff arrived onsite at approximately 7:30 am, and during the observations green waste was being shredded, green waste and food scraps were being mixed and material from a bunker was being moved to the curing pile. The weather conditions during the Site visit were overcast, with calm to light winds originating from the southwest. PDP considers that these conditions, especially wind speeds, were good in terms of undertaking odour observations during worst-case conditions.

Description of Odours Experienced

- Location 1: Downwind of the composting facility (200 m). No odour detected.
- Location 2: Downwind of the composting facility (150 m). Intermittent very weak to weak compost odours.
- Location 3: Downwind of the composting facility (100 m). Intermittent very weak to weak compost odours.
- Location 4: Downwind of the composting facility (50 m). Intermittent very weak to distinct compost and vegetation odours.

- Location 5: Downwind of the aerated static pile bunkers during mixing (20 m). Intermittent but almost constant, weak to strong compost and food waste odours.
- Location 6: Downwind of the biofilter (5 m). Intermittent but almost constant, weak to distinct woody/earthy/compost odours.
- Location 7: In between the aerated static pile bunkers. Constant weak to strong compost odours.
- Location 8: Downwind of the curing compost pile (20 m). Intermittent, weak to distinct earthy and compost type odours.

Where odour associated with the composting facility was detectable the odour was classified as "very weak" to "strong" and having a compost odour character (neutral to unpleasant). Odour associated with composting was only ever detected downwind of the Site and the strongest odours were directly adjacent to the composting bunkers. However once away from the Site the odour was weaker in intensity. As experienced with other similar odour sources, the odour became weaker and transient in nature the greater the distance from the source, and compost odours were not detected more than 200 m from the composting operations.

No odours that might be considered objectionable or offensive were detected more than 50 m from the composting operations. Overall, the odour from the composting operations on the day of observations was low and consistent with the level of odour expected from this type of composting operation. There was no indication that there was any anaerobic decomposition occurring, with all the compost having a typical 'earthy" compost odour.

PDP considers that the odour observations undertaken at the Hampton Downs site and any conclusions drawn from them are comparable and also add some conservatism based on the following:

- While Hampton Downs has physical capacity to process up to 50,000 tpa of material, the odour observations were undertaken when the Site was processing the equivalent of the currently consented 30,000 tpa which is more waste than would be processed at Green Island OPF;
- Hampton Downs utilises both aerated static pile bunkers and Gore windrows composting systems. While the Gore system utilises aeration similar to the aerated static pile system, the Gore system is only positively ventilated and therefore no foul air is treated via a biofilter and therefore is potentially more odorous when compared to the proposal at Green Island;

- The raw kerbside waste at Green Island is a mix of green waste and food scraps, which results in less odours when compared to just food waste which is accepted at Hampton Downs before it is blended with green waste; and
- Hampton Downs has a higher component of food waste in the raw composting material compared to what is anticipated at Green Island.

Additionally, Enviro NZ also undertakes proactive odour monitoring around the Hampton Downs Landfill. PDP has reviewed this data, and while the main focus of these observations appears to be to observe landfill odours, there is one location, that is approximately 80 m from the aerated bunkers and 40 m from the maturation piles. Based on the odour observations at this particular location, the intensity of the odour from the composting is between no odour and distinct. These observations are in line with the odour experienced by PDP staff when visiting the site.

5.2 Waste Transfer Odour Investigation

To understand the potential odour from the proposed BWTS and MRF, PDP undertook a site investigation at the Enviro NZ's Sunshine Avenue waste transfer station (WTS) and MRF. The Sunshine Avenue WTS is located in Hamilton and receives and processes kerbside waste and commercial waste from Hamilton and the surrounding area. PDP understands that the proposed BWTS and MRF at Green Island will be of a similar, design, size and scale, and will have similar controls in place for the management of dust and odour.

5.2.1 Waste Transfer Odour Investigation

The odour observations were undertaken on 6 July 2023 when wind speeds were low (typically below 2 m/s), PDP considers that these conditions were suitable for undertaking odour observations. During the odour observations, there was a constant flow of domestic and commercial waste being deposited.

Where odour associated with the WTS and MRF was detectable the odour was classified as "very weak" to "distinct" and having a rubbish character (neutral to unpleasant). Odour associated with the WTS and MRF was only ever detected downwind of the Site and the strongest odours were detected inside the WTS facility. For the most part odour from the MRF should be at lower intensity compared to the WTS, however this is dependent on the amount of putrescible material included in the recyclable materials stream. No odour from the site was detected more than 50 m from the receival buildings.

Overall, the odour from the WTS and MRF, especially for the size of the operation, was consistent with the level of odour expected from this type of operation and PDP expects similar at the proposed Green Island facility. PDP has undertaken odour observations at many different types and sizes of transfer

station for Enviro NZ, and based on this experience, the proposed BWTS and MRF could result in weak odours up to 100 m from the source on occasions.

5.3 Assessment of Odour Effects

It is generally accepted that odours associated with waste transfer facilities and composting operations are considered unpleasant by the general population if the source becomes anaerobic or highly odorous waste is deposited, and therefore odour from these activities needs to be appropriately managed.

However, it is PDP's experience that even with all appropriate mitigation measures in place there is the potential that from time to time odours may be detectable off-site. Consequently, PDP considers that it is appropriate to use the FIDOL assessment tool to determine whether the odours have the potential to be offensive and objectionable.

This assessment is based on the odour observations undertaken at the Hampton Downs composting plant and the Sunshine Avenue WTS and MRF as well as PDP's experience at other waste transfer stations and composting facilities. PDP has reviewed the draft Site Environmental Management Plan and the draft Composting Management Plan which are similar to other successful management plans that Enviro NZ undertakes at other sites and considers that the mitigation and management techniques adopted are suitable for the RRPP.

5.3.1 Frequency

Frequency relates to how often odours will be experienced at an off-site receptor. In terms of odour from the OPF, BWTS and the MRF, odour emissions will be variable due to different types of loads that are received and the frequency of loadout, moving or blending of compost and during forced ventilation (compost). Therefore, the frequency at which odour could be detected at any of the nearby receptors will be a combination of the odour emission rate from the Site and certain meteorological conditions, such as those which produce poor dispersion conditions.

As already mentioned, for odours to be experienced off-site these odour events have to occur during periods of poor dispersion, typically when wind speeds are below 3 m/s. Table 5 presents the frequency of low wind speeds in the direction of the nearby receptors which indicates that low wind speeds in the direction of receptors R1, R2, R3, R5, R6, R9, R10 and R11 are infrequent and receptors R4, R7 and R8 are moderately frequent.

Table 6: Frequency of low wind speeds in the direction of nearby receptors

Receptor Name	Closest source of Odour	Downwind direction	Percentage of low windspeeds	Frequency of wind
R1	OPF	SSW	1.8	Infrequent
R2	MRF	W	2.1	Infrequent
R3	MRF	W	2.1	Infrequent
R4	MRF	NNW – WNW	8.1	Moderately frequent
R5	MRF	NW	3.0	Infrequent
R6	MRF	NNW	2.9	Infrequent
R7	MRF	N	5.9	Moderately frequent
R8	MRF	NNE	9.2	Moderately frequent
R9	OPF	E	1.8	Infrequent
R10	OPF	E	1.8	Infrequent
R11	OPF	SE	1.6	Infrequent

Notes:

1. *The closer the receptor is to the source a wider angle of wind direction is used.*
2. *<5% infrequent, 5-12% moderately frequent, 12-20% frequent, >20% very frequent.*[10]

As already discussed, the Site is currently also an active landfill which will also result in odour discharges. To understand the potential combined frequency of odour effects from the landfill operations and the RRPP, PDP has used the frequency analysis from the GHD assessment and combined it with this assessment. PDP notes that this assessment has included additional receptors to those presented in the GHD assessment due to the proximity of the Site to receptors to the east. For the new receptors, PDP has used the GHD wind analysis data to present the potential frequency of effects at these locations[11].

As presented in Table 6, based on the combined frequencies for the landfill operations and the proposed RRPP, the low wind speeds in the direction of the nearby receptors would be considered infrequent at receptors R1, R2, R3, R9, R10 and R11, moderately frequent at receptors R4, R5, R6, and R7 and frequent at receptor R8.

[10] Institute of Air Quality Management, Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016

[11] The GHD and PDP receptor labelling does not always match due to the additional receptors considered for the GIRRPP assessment.

Additionally, as the landfill approaches closure more areas of final capping will be completed, reducing the potential for discharges of landfill gas. This potential reduction in fugitive landfill gas emissions should result in lower odour from the landfill and therefore any combined effects it might have with the RRPP will also be lower.

Table 7: Frequency of low wind speeds in the direction of nearby receptors

Receptor Name	Percentage of low windspeeds downwind of the landfill	Percentage of low windspeeds down of the RRPP	Combined Percentage of low windspeeds	Frequency of wind
R1	1.7	1.8	3.5	Infrequent
R2	2.1	2.1	4.2	Infrequent
R3	2.1	2.1	4.2	Infrequent
R4	2.4	8.1	10.5	Moderately frequent
R5	2.1	3.0	5.1	Moderately frequent
R6	3.1	2.9	6.0	Moderately frequent
R7	3.1	5.9	9.0	Moderately frequent
R8	5.3	9.2	14.5	Frequent
R9	2.3	1.8	4.1	Infrequent
R10	1.6	1.8	3.4	Infrequent
R11	1.6	1.6	3.2	Infrequent

Notes:

3. *The closer the receptor is to the source a wider angle of wind direction is used.*
4. *<5% infrequent, 5-12% moderately frequent, 12-20% frequent, >20% very frequent.*

5.3.2 Intensity

Odour associated with rubbish and compost can have a strong intensity and can be considered offensive and objectionable, particularly if an undisclosed malodourous load is deposited or compost becomes anaerobic. However, based on the waste acceptance criteria that will be implemented and the active aeration system used and the constant monitoring of the composting process, it is very unlikely that strong offensive odours will occur. Based on PDP's experience under normal operations, strong odours are contained to within the BWTS and MRF buildings and distinct odours are usually only detected within 50 m of the receivals buildings. Based on the proposed volume of waste that Green Island will receive, it is possible that weak transient rubbish odours may be experienced up to 100 m from the source, however for the most part it is expected to be less than this. PDP has undertaken monitoring near a number of transfer stations including Enviro NZ's Wiri and Sunshine Avenue sites, and has never experienced offensive or objectionable odours more than 50 m from a transfer station. Given that the nearest sensitive receptor is 210 m from the BWTS it is unlikely that any receptor to experience odour from this source.

For composting odours, based on PDP's experience both at Hampton Downs and other locations, odours associated with aerobic conditions are not usually detected more than 150 to 200 m from the Site, and the intensity of odours at this distance would be described as weak.

The intensity is also related to the wind conditions and the resulting level of dilution that occurs between the source and the receptor. In essence, the stronger the wind, the more dilution of odour will occur. Considering the distance between the site and the receptors, odour from the RRPP operations should be well diluted before it reaches any receptor, especially considering that the closest receptor to the composting operation is 300 m away, while the closest receptor to the BWTS is 210 m away and the closest receptor to the MFR is 140 m away.

For the majority of the time any odours that are generated are expected to be weak at or beyond the Site boundary.

For combined/cumulative intensity effects with the current landfill operations, the RRPP must be downwind of a receptor at the same time as the receptor is downwind from the current landfill operations. Given the orientation of the Site it is not possible for a number of receptors to be downwind of both operations at the same time and therefore combined intensity effects will not occur. For receptors R2, R5, R6, R7 and R8 there is some potential in certain winds that they will be downwind of both operations, however PDP considers that the combined intensity effects at a receptor will be low. This is due to the distance between either one or both of the sources and the receptor. For example, receptor R7 is

over 800 m from the RRPP and therefore is unlikely to experience any odour from this operation and therefore there would be no combined effect.

Even if combined effects were to occur, the odour would not necessarily be additive due to the way the human nose perceives odour. Combined effects are more likely to result in an increase in the frequency of odour if the odour is at an intensity to be detected and to a lesser extent an increase in duration.

5.3.3 Duration

As with frequency, the duration that anyone would be exposed to odour depends on the time the wind blows in a specific direction along with the duration of the activities.

Typically, the duration of odour experienced off-site under normal day to day running of the RRPP will be short and intermittent. For the BWTS and MRF the greatest potential for odour to be detected off-site, will be during the hours of operation. Outside of this time, when the material is loaded out for transporting off-site, odour could occur, however the frequency will be low. In the event that an undeclared odorous load is deposited at the BWTS or MRF, Enviro NZ will develop appropriate contingency measures such as covering with inert material and/or odour suppression sprays to control the odour, and therefore the duration of any event should be short.

Likewise, for the OPF under normal day-to-day operations odour events will be short and intermittent. During other parts of the process such as moving of material from the bunkers to the maturation pad, which can take a number of hours to complete, the duration of the odour event could be for extended periods. However, the movement of material from the aerated static pile bunkers to the maturation pad will occur after 21 days of composting and the greatest potential for odour generation would have occurred. This material will still have some odour but the intensity should be lower.

As discussed earlier, the landfilling operations on site are nearing an end. The exact timeframe for closure of the landfill is unknown as it will depend on the volume of waste received but it is expected to close by the end of 2029. For the combined duration effects to occur both the RRPP operations and the landfill operation must be occurring at the same time. From mid-2024 organics will be processed at the ORB but will be trucked off-site for composting. The rest of the RRPP facilities (except the BWTS) will be constructed by mid-2025. The timing of construction of the BWTS is dependent on the timing of the closure of the landfill, but the BWTS may be operational during the final year of the landfilling operation. Therefore processes such as the ORF and MRF and the landfill will occur concurrently for a few years, whereas the BWTS will only become operational when the Landfill is closed to receiving further waste. Therefore the concurrent operation of the landfill and BWTS is likely less than a few months.

5.3.4 Offensiveness

Odours associated with refuse and composting of organic waste would be generally considered offensive by a member of the public if observed inside the facility or adjacent to an active composting bunker. Given that the closest receptor is 300 m away from the composting operation, 210 m from the BWTS and 140 m from the MRF any odour from these sources should be diluted by the time it reaches any receptor and is unlikely to be at an intensity that would be considered to be offensive.

Additionally, Enviro NZ will have controls in place to mitigate stronger offensive odours. These controls include: the BWTS not accepting odorous loads and removing the offending waste as soon as practicable, plus the use of odour suppression spray systems. For the organics facility, Enviro NZ will have controls to mitigate offensive odours including: blending food scraps with green waste within a building, continuous monitoring for the composting piles to optimise aeration and treating of foul air with a biofilter when under negative aeration.

In terms of combined effects, PDP does not consider that the landfill and the RRPP will result in a combined offensiveness. This is due to the distance between the source where offensive odours might occur.

5.3.5 Location

To a large extent the location of the source in proximity to sensitive receptors is possibly the most important of the FIDOL factors.

In this case, PDP considers that the location of the Site is well placed, firstly as it is located in the appropriate industrial zone and designated for landfilling. Secondly, the site and the proposed activities have a reasonable separation distance to nearby receptors with the closest receptor being 300 m from the proposed composting facility, 210 m from the BWTS and 140 m from the MRF. At these distances it is unlikely that any odour from the proposed RRPP will be detectable.

5.4 Assessment of Alternatives

The alternative option to the proposed forced air aeration system that is proposed for the RRPP is essentially the same operation, however enclosing this system within a large building.

When comparing the three stages of a composting operation; raw material handling, active composting and maturation between the proposed open-air system and an enclosed system, the potential for odour emission will be similar for both the raw material handling and maturation phase. At the RRPP the handling and processing of the raw material will be undertaken in an enclosed building (ORB). The ORB is not mechanically ventilated as it would most likely be at fully enclosed operations so therefore there is potential for more odour from

the ORB compared to the alternative option. However, this is anticipated to be a small given that the doors will be closed as much as practical and odour observations at a similar site with the door open resulted in indiscernible odour adjacent to the open door. In terms of the maturation phase, there will be little difference in odour potential (provided that the material is of equal quality) as both open and enclosed compositing operations undertake this process outside.

Therefore, the key difference between the two operations is in the active phase. It is during this phase that the two different systems control odour differently. The enclosed systems control odour prior to discharge via an engineered solution such as a scrubber or a biofilter and typically less attention is required for the composition of the composting mix. Whereas an open-air composting system puts more effort into ensuring the mix of composting material (C:N ratio, density and moisture content) is optimal to start with as this has one of the biggest bearings on odour. Additionally, the proposed forced air aeration system at RRPP will both aerate the material both negatively and positively and when under negative pressure air from the composting is collected and treated via a biofilter, so therefore it is only during the positive aeration cycle that odour discharges could be different from an enclosed system.

In addition to odour control, there are other factors that need to be considered when building either of these systems. Firstly, an enclosed system comes at a much greater cost, typically at least twice the cost to build when compared to an open-air system. Enclosed systems typically take up more space and require a much larger biofilter to treat the large volume of air inside the building.

While it might appear that an enclosed system might have better control of odour compared to an open-air system, there are many examples, both here in New Zealand and around the world, of enclosed composting operations that have resulted in adverse odour effects. A New Zealand example is discussed further in the following section.

In regard to the BWTS, the proposed approach is generally similar for all modern waste transfer facilities with variations in the design detail. Not all facilitates include doors. However, in this case doors have been included to assist in mitigating odour and dust issues. As noted earlier in this report, it is likely that the doors will be open most of the time during operational periods but closed outside of normal operating hours cease and this is beneficial for managing any odour issues outside working hours.

5.5 Bromley Odour Issues

Over the last couple of years there has been a number of well publicised issues around the composting operations at Bromley, Christchurch and how this has resulted in off-site odour effects on the surrounding area. The Bromley composting operation is enclosed with the air inside the building ventilated via a

biofilter, however PDP doesn't consider that the proposal for the RRPP at Green Island will result in the same level of odour effects based on the following:

- The material will be composted in aerated static bunkers for a minimum of 21 days to achieve a Solvita score of at least 6 (mature)[12]. The compost at Bromley is in the bunkers for 10 days and has a Solvita score of 2 to 3 (still requires active management). The higher the number the more resistant the compost will be to further decomposition and free of compounds such as ammonia and organic acids therefore, the higher the number the less odorous the compost is likely to be;
- The proposed aerated static bunkers will be designed to allow for bidirectional air flow though the material, which allows for good control over temperature and aeration. At Bromley air is only blown through the compost;
- The aerated static bunker design will ensure that there is a consistent distribution of air throughout the pile, the Bromley system is not able to consistently achieve this;
- PDP is aware that Bromley has not been able to consistently achieve the correct carbon to nitrogen ratio (approximately 25:1 to 40:1) in the compost. This means that there is a high propensity for the compost to become anaerobic;
- Because of the short duration in the bunkers, the compost at Bromley that was placed in the yard to "mature" was still highly active and generated odour as it was not turned frequently enough. Ensuring the compost is more mature when it leaves the bunker as is intended for the ECS will ensure that the maturation piles generate little odour; and,
- Recently there have been issues at Bromley as they have been screening (removing un-composted woody material) immature compost in the open to reduce the weight for cartage off-site. At Green Island only mature (and non-odorous) compost will be screened.

In addition to the above, PDP staff have been both to Hampton Downs (similar site to the proposed operations at Green Island) and Bromley. PDP staff observed that the odour experienced at Hampton Downs compared to odour around Bromley was much more contained with no composting odour detected beyond 200 m.

[12] The Solvita test measures carbon dioxide and ammonia simultaneously determine if compost is stable and mature. Based on the combined measurements a Compost Maturity Index can be determined.

5.6 Assessment of Dust Effects

The following section will present the potential for dust associated with the operation of the proposed RRPP. Based on PDP's experience the highest potential for dust emissions would be from the BWTS and C&D waste. PDP does not envisage any combined dust effects from the landfill operations as the tipping face and cover placement is occurring at least 300 m from the RRPP and is moving in a southwest direction away from the RRPP. Therefore combined dust effects have not been considered.

5.6.1 Frequency

The frequency of dust discharges is influenced by the regular occurrence of suitable meteorological conditions to carry dust beyond the boundary to a sensitive receptor. Typically nuisance dusts have a diameter between 100 µm and 200 µm and would need winds greater than 5 m/s to travel beyond the Site boundary. Given the information provided in Table 2, the predicted frequency of wind greater than 5 m/s occurs 15.8% of the time from all directions.

Table 7 presents the frequency of high wind speeds in the direction of the nearby receptors and based on guidance prepared by the Institute of Air Quality Management[13] these winds are considered to be infrequent. For dust nuisance to occur, dust producing activities would need to coincide with the receptor affecting winds. As the two events must occur at the same time the chances of dust nuisance occurring are lower. Additionally, as refuse is placed within a building, wind effects are greatly reduced. Additionally, Enviro NZ will implement mitigation measures such as wetting down dusty loads or refusing to accept particularly dusty loads.

Given all of the above, PDP considers that it is unlikely for off-site dust nuisance to occur with any significant frequency.

[13] Institute of Air Quality Management, Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016 No

Table 8: Frequency of high wind speeds in the direction of nearby receptors			
Receptor Name	**Downwind direction**	**Percentage of high windspeeds**	**Frequency of wind**
R1	S	0.4	Infrequent
R2	W	1.8	Infrequent
R3	NNW – WNW	0.8	Infrequent
R4	NW	0.3	Infrequent
R5	NNW	0.4	Infrequent
R6	N	0.1	Infrequent
R7	NNE	0.2	Infrequent
R8	E	0.6	Infrequent
R9	ESE	0.2	Infrequent
R10	SSE	<0.1	Infrequent

Notes:

1. *<5% infrequent, 5-12% moderately frequent, 12-20% frequent, >20% very frequent*

5.6.2 Intensity

The greatest potential for dust on this site will come from the C&D sorting pad. However, Enviro NZ will implement mitigation measures such as: not accepting particularly dusty loads at the Site; dampening down the material to contain the dust and using dust fogging cannons; keeping drop heights to a minimum when unloading and; undertaking this type of operation in low wind speeds when possible. Additionally, if required, fences around these operations could be upgraded to provide shelter from stronger winds.

5.6.3 Duration

In this case, under normal operations of the BWTS and its auxiliary operations, it is the time taken to mitigate dust discharges that determines the duration of dust effects. PDP considers that the duration would be limited to a period of less than 15 minutes, from the time that the occurrence of dust emissions is recognised to the implementation of mitigation.

5.6.4 Offensiveness

PDP consider that dust emissions are unlikely to result in any off-site offensive or objectionable effects when disposal occurs within a building, however there is an increased risk when using the C&D sorting pad. However, for the C&D sorting pad, any off-site effects will be low. This is due to the limited frequency of suitable meteorological conditions, the distance to sensitive receptors and mitigation measures that will be implemented.

5.6.5 Location

The closest sensitive receptor is approximately 210 m from the BWTS. At this distance, even with no mitigation, it is unlikely that dust effects will be experienced at this location.

5.7 Summary of Combined Effects

5.7.1 Odour

Both the existing landfill and the proposed RRPP have the potential to result in odour and therefore there is the potential for combined odour effects. As the landfill nears closure, the completion of final capping in more areas is expected to reduce the release of landfill gas, leading to a decrease in odour emissions from the landfill. This reduction in fugitive landfill gas emissions is likely to result in lower odour levels, therefore potentially reducing any combined odour effects that may have occurred with the proposed RRPP. Even if combined effects were to occur, they may not be additive, as the human nose perceives odours differently. Instead, combined effects are more likely to increase the frequency of odour occurrences at nearby receptors.

Furthermore, the RRPP facilities, except for the BWTS, are scheduled for construction by mid-2025, and the BWTS's timing depends on landfill closure, potentially operating in the final years of landfilling operations. Consequently, the potential for combined effects with the landfilling operation will be limited to a few years.

Overall, PDP does not anticipate a combined offensive odour impact from the landfill and RRPP due to the significant distance between potential odour sources.

5.7.2 Dust

As discussed, the potential activities from the proposed RRPP that could result in dust effects are from the BWTS and C&D waste, with some potential from the OPF when screening. The main source of dust from the landfilling operations will be from around the tipping face and when applying cover. Therefore, for combined effects to occur both the landfill operations and the proposed RRPP need to be generating dust at the same time while down wind of each other.

The likely distance that nuisance dust from the Site could travel if no mitigation were undertaken is 300 m. Therefore, for a receptor to be affected by combined dust effects from the existing landfilling operations combined with the proposed RRPP activities, both these activities must be generating dust within 300 m of a receptor at the same time when winds are blowing towards the receptor. Given the landfill operations such as the tipping face and cover placement is occurring at least 300 m from the RRPP and is moving in a southwest direction away from

the RRPP, combined effects are unlikely even when not considering wind direction.

If wind conditions were considered, it is only winds from the northeast and southwest that could result in combined dust effects as both dust sources need to be downwind of each other at the same time. Strong wind speeds in these directions are relatively infrequent, therefore even if combined effects were to occur the chances of impacting a receptor are low.

6.0 Conclusion

Having assessed the odour and dust results against the FIDOL factors, PDP considers that there is a low likelihood of off-site odour and dust from the proposed RRPP being categorised as objectionable and offensive at nearby receptor locations. This is based on the following factors:

6.1 Odour

- Based on the predicted meteorological data for the area, the nearest receptors would only be downwind of the Site when wind speeds are less than 3 m/s at a frequency that would be considered infrequent or moderately frequent. Based on the varied emission rates from the composting operations and waste transfer facilities, there is a low probability of higher odour emission rates occurring at the same time as poor dispersive conditions in the direction of these receptors.
- There is a reasonable separation distance between the proposed RRPP operations and the nearest sensitive receptors. The closest receptor (R3) is approximately 130 m from the MRF (210 m from the BWTS and 360 from the OPF), however based on PDP's experience the MRF has a lower odour potential compared to both the BWTS and OPF. Based on these separation distances any odour that might be generated by these operations should be sufficiently diluted.
- The Site has demonstrated good compliance around its current composting operations with only a small number of odour related complaints received over the last few years. The volume of material to be processed will increase under this proposal. However, the new location of the composting plant will be further away from nearby receptors and will adopt better technology with sophisticated monitoring and management techniques which will result in better control of odour.
- Enviro NZ will not accept particularly odorous loads in the first place which will greatly reduce the odour potential. If odorous material is received, Enviro NZ will implement mitigation measures such as covering with inert material, use of odour suppressants and prioritising the loadout of this waste to a landfill.

- When considering the current landfilling operation and the potential for combined effects, there is the potential for an increase in frequency of odour experienced off-site as a result of this proposal. However, given the locations of the potential odour sources relative to the nearby receptors, PDP doesn't consider that there will be any increase in intensity or offensiveness as a result of potential combined effects. There is some limited potential for some increase in combined odour duration, but this can only occur when new activities are established. Given that the landfill has a limited lifespan and it will be a number of years until composting will occur on this site and even longer until the BWTS is established, the combined duration will be limited.

6.2 Dust

- Even with little to no mitigation the majority of the nearby receptors are at a sufficient distance to be unaffected by dust from the Site operations.
- Based on the meteorological data for the area, the nearest receptors would only be downwind of the Site during high wind speeds (>5 m/s) at a frequency that would be considered infrequent. As the dust emission rates from the Site are low, there is an even lower probability of high dust emission rates occurring at the same time as dust transporting wind speeds blowing in the directions of these receptors.
- Enviro NZ will not accept particularly dusty loads in the first place which will greatly reduce the potential for dust emission. If dusty material is received, Enviro NZ will implement mitigation measures such as covering with material or dampening down the material.
- All refuse material is placed inside the ORB, so that even if the load was dusty, the windspeeds within the building should be sufficiently low enough to stop this dust becoming airborne.
- Enviro NZ can undertake screening of compost material when the wind is blowing away from the nearby receptors.
- PDP does not consider that there will be any combined dust effects from the landfill operations and the proposed RRPP, as the tipping face and cover placement is occurring at least 300 m from the RRPP. At this distance combined effects are unlikely.

Appendix A: Hampton Downs Compost Trial

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23 November 2021

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Dear Laurence

GREEN ISLAND – CONSENTABILITY OF PROPOSED COMPOSTING OPERATIONS

1.0 Introduction

EnviroWaste Services Limited (EnviroWaste) is currently in a tender process with Dunedin City Council to design, build and operate an Organics processing facility at Green Island. While the final design is yet to be determined, EnviroWaste is proposing to build a forced aeration composting system designed by Engineered Compost Systems (ECS) capable of composting up to 20,000 tonnes per year of green waste and food waste as part of its tender.

EnviroWaste has requested that Pattle Delamore Partners Limited (PDP) assesses this proposal and provide advice on the consentability from an odour perspective.

2.0 Proposed Composting Operation

EnviroWaste is proposing to build and operate a total of 12 high aeration ECS bunkers to compost green waste and food waste at Green Island. Eight ECS bunkers will initially be built, with the intention to expand to 12 bunkers as required.

In addition to building the ECS bunkers, a Receival Building will also be built where organic waste from the kerbside collection, which is primarily green waste and food scraps, will be unloaded for shredding. The shredded organic kerbside waste will then be blended with additional shredded green waste before the material is loaded into the ECS bunkers for composting.

Once in the bunkers, the temperature of the material is continuously measured and the ECS system automatically controls the aeration of the pile. When the system detects that the temperature has stratified the aeration mode automatically reverses direction. The aeration directions are called “positive” (positive pressure at the base of the pile forcing air up through the pile) or “negative” (negative pressure at the base of the pile sucking air down through the pile).

The automated reversing aeration system ensures a relatively uniform environment throughout the material pile to ensure optimal composting conditions. This constant control over the aeration of the pile ensures only the required amount of aeration is provided, and therefore minimise the potential for odour emissions to occur. Additionally, when the bunkers are under negative aeration

any odorous air is discharged via a biofilter to treat odour, which based on data from an existing ECS composting facility at Hampton Downs occurs approximately 50 percent of the time.

The piles will be actively composted using the ECS system for at least 21 days before being moved and placed in windrows for the maturation phase. During the maturation process, the microbial activity decreases and so does the temperatures within the pile, and therefore the rate of decomposition slows. During this period the cellulose and lignin in the organic material continues to slowly decompose into humus over a period of weeks before being screened and transported off-site.

3.0 Consent Requirements

Based on the above description of the activity PDP has reviewed the Regional Plan: Waste for Otago and considers that the proposed composting operation would fall under the discretionary activity Rule 7.6.13 as it wouldn't meet the permitted activity Rule 7.6.12 and in particular requirement 'e'.

7.6.12 Composting (permitted activity)

1. *The discharge of any contaminant into or onto land;*
2. *The discharge of any contaminant or water into water; or*
3. *The discharge of any contaminant to air, when occurring as the result of composting of organic material is a permitted activity provided that:*
   - *a) Any excavation is dug in a manner so as to avoid groundwater seepage into the pit;*
   - *b) The activity is not undertaken within 100 metres, horizontally, of a well used to provide water for domestic purposes or drinking water for livestock;*
   - *c) Any leachate produced from compost does not enter any water body;*
   - *d) The composting is not undertaken within 50 metres horizontally, of any river, lake, stream, pond, wetland or mean high water springs;*
   - *e) The composting is undertaken on the property from which the majority of the material is sourced;*
   - *f) The composting does not cause a nuisance and is not noxious, dangerous, offensive, or objectionable beyond the boundaries of the property.*

7.6.13 Composting (discretionary activity)

1. *The discharge of any contaminant into or onto land;*
2. *The discharge of any contaminant or water into water; or*
3. *The discharge of any contaminant to air, when occurring as the result of the composting of organic material other than in accordance with Rule 7.6.12 is a discretionary activity.*

Additionally, PDP also reviewed the Regional Plan: Air for Otago which also appears to capture the proposed activity by Rule 16.3.7.3 which is also a discretionary activity. This rule would also potentially cover the operation of all other waste management activities that may be undertaken on-site, using the definitions set out in the Regional Waste Plan as it is not defined in the Air Plan.

3.1 Consentability of the Proposal

Given that the proposed composting operations would be considered a discretionary activity an air discharge consent will be required from the Otago Regional Council (ORC) and therefore an assessment of effects will need to be presented to the ORC to demonstrate that the air discharge (mainly odour) will not result in adverse effects at nearby sensitive locations.

While the final design is yet to be defined it appears that the proposed ECS bunkers and the maturation and screen operations will be located on land zoned both industrial and rural under the Operative Dunedin City Council District Plan, with the industrial zoning suiting the nature of this activity. As shown in Figure 1 the proposed composting facility will be located within the current waste management area of Green

Island which already contains landfilling operations and composting activities. To the east of the site are industrial activities, with nearest residential dwellings approximately 300 metres to the northeast and southeast of the proposed composting operations.

Figure 1: Surrounding Environment

EnviroWaste already operates ECS bunkers at Hampton Downs Landfill which are currently consented to process up to 24,000 tonnes per year of green waste and food waste which is similar to what is being proposed at Green Island and therefore comparisons can be made based on the level of odour experienced at Hampton Downs.

PDP staff have undertaken a number of odour observations at Hampton Downs and when odour associated with the composting facility was detectable, the odour was classified as “very weak” to “strong” and having a compost odour character (neutral to unpleasant). Odour associated with composting was only ever detected downwind of the site and the strongest odours were directly adjacent to both the ECS bunkers. However once away from the bunkers the odour was weaker in intensity. As experienced with other similar odour sources, the odour became weaker and transient in nature the greater the distance from the source, and compost odours were not detected more than 200 metres from the composting operation.

No odours that might be considered objectionable or offensive were detected more than 50 metres from the composting operations. Overall, the odour from the composting operations during these observations was low and consistent with the level of odour expected from this type of composting operations. There was no indication that there was any anaerobic decomposition occurring, with all the compost having a typical ‘earthy” compost odour.

Recently PDP has also prepared an application on behalf of EnviroWaste for a proposed ECS composting operation in Timaru which would also be of a very similar size to what is being proposed at Green Island. This application has been reviewed by the air quality expert working for Environment Canterbury (ECAN) and this review concluded that there was potential that the proposed operation could cause no more than minor effects out to 300 metres from the ECS bunkers. In this case, ECAN’s air quality expert used 300 metres as the area of potential effects, as

at the time of the application PDP had only undertaken a limited number of odour observations at Hampton Downs, and in the opinion of the reviewer this may not have allowed for potential worst-case scenarios to have been observed at Hampton Downs during the observations. PDP has since undertaken numerous site visits to Hampton Downs since preparing the application for Timaru, and based on these observations our initial conclusions of odour being detected out to 200 metres would not change.

Both our odour observations at Hampton Downs and the conclusions reached by the air quality expert for ECAN are important given that based on the preliminary drawings provided for Green Island the nearest residential dwellings are approximately 300 metres from either the ECS bunkers or the maturation windrows meaning there should be a low potential for odour effects at these locations.

While this letter does not replace a full qualitative assessment which would take into account other factors such as terrain and meteorological effects, in PDP's opinion, the 300 metres between the proposed composting operation and the residential areas should provide adequate separation distance from the composting operations and therefore increase the consentability of this site.

Should you have any further questions please contact the undersigned.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

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Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Enviro (NZ) Limited. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

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