Green Island Landfill

Development and Management Plan

PREPARED FOR DUNEDIN CITY COUNCIL | SEPTEMBER 2023

Stantec

Revision schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	**Checked by**	**Reviewed by**	**Approved by**
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02	02/02/23	Final	P Landmark	GHD Staff	DCC Staff	V Salva
03	09/23	Final with minor changes	P Landmark & GHD Staff	P Landmark	DCC Staff	V Salva

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Contents

List of appendices

List of tables

List of figures

Abbreviations

Abbreviation	Full Name
ACM	Asbestos cement material
BTEX	Benzene, toluene, ethylbenzene, and xylene
BTU	British thermal units
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
DCC	Dunedin City Council
DP	discharge permit
GJ	Giga Joules
GTE	Gas to energy
HSE Act	Health and Safety in Employment Act
H_2S	hydrogen sulphide
Ha	hectare
IBC	intermediate bulk container
kg	kilogram
LEL	lower explosive limit
LFG	landfill gas
LDMP	Landfill Development and Management Plan
LMP	Landfill Management Plan
m	metre
m^3	cubic metre
MfE	Ministry for the Environment
mg	milligram
mm	millimetre
MW	megawatt
N_2	nitrogen
NMOC	Non-methane organic compound
O_2	oxygen

Abbreviation	Full Name
ORC	Otago Regional Council
ppm	parts per million
RC	resource consent
RMA	Resource Management Act
SOP	standard operating procedures
TC	total concentration
TCLP	toxicity characteristic leaching procedure
TL1	trigger level 1
TL2	trigger level 2
TPH	total petroleum hydrocarbons
UEL	upper explosive limit
WasteMINZ	Waste Management Institute of New Zealand
WM	Waste Management New Zealand Ltd
WWTP	wastewater treatment plant

Glossary

Definitions and Terms commonly used throughout this Landfill Management and Development Plan	
Term	**Definition**
Act	The term "Act" refers to the Resource Management Act.
Available airspace	The volume, or space, available within a landfill where waste can legally be disposed.
Biosolids[1]	The semi liquid residue from sewage treatment plants, septic tanks, and the processing of organic materials.
Clean fill[1]	A Class 5 landfill. Accepts only clean fill material, including clean excavated natural materials.
Clean fill material1	Virgin excavated natural materials (VENM) such as clay, soil and rock that are free of: • combustible, putrescible, degradable or leachable components, • hazardous substances or materials (such as municipal solid waste) likely to create leachate by means of biological breakdown, • products or materials derived from hazardous waste treatment, stabilisation or disposal practices, • materials such as medical or veterinary waste, asbestos, or radioactive substances that may present a risk to human health if excavated, • contaminated soil and other contaminated materials, • liquid waste.
Closed landfill[1]	Any landfill that no longer accepts waste for disposal.
Co-disposal[2]	The disposal of hazardous waste by mixing in an informed and predetermined manner, with municipal refuse, so as to use the attenuation and biochemical processes operating within the landfill to reduce the environmental impact from the mixed waste to a significant level.
Condensate	Liquid that condenses out of landfill gas and collects in the landfill gas collection infrastructure.
Consent Holder	The term "Consent Holder" used in this document will mean the Dunedin City Council.
Construction and Demolition (C&D) Waste[1]	Non-household, non-putrescible construction, and demolition wastes. This includes waste generated from the construction, renovation, repair, and demolition of structures such as residential and commercial buildings, roads, and bridges. The composition of C&D waste varies for these different activities and structures. Overall, C&D waste is composed mainly of wood products, asphalt, plasterboard, and masonry. Other components often present in significant quantities include metals, plastics, earth, shingles, insulation, and paper and cardboard.
Contaminated land[3]	Land that has a hazardous substance in it or on it that: a) has significant adverse effects on the environment, b) is reasonably likely to have significant adverse effects on the environment.
Contaminated soil[1]	Soil from contaminated land as defined in the Resource Management Act 1991 (RMA).
Controlled fill[1]	A Class 4 landfill. Accepts only controlled fill materials.
Controlled fill material[1]	Predominantly clean fill material that may also contain inert construction and demolition materials and soils from sites that may have contaminant concentrations in excess of local background concentrations, but with specified maximum total concentrations that will not restrict future land use.
Council	Means the Dunedin City Council (DCC).

Definitions and Terms commonly used throughout this Landfill Management and Development Plan	
Term	**Definition**
Designation	A provision in a district plan that provides for a particular public work or project of a requiring authority.
Dirty stormwater	In the context of landfills, dirty stormwater is stormwater that has been in contact with refuse, and which must then be treated as if it is leachate.
Discharge permit[1]	A consent to do something that otherwise would contravene section 15 of the RMA (other than in the coastal marine area).
Hazardous substance[4]	Any substance: a) With 1 or more of the following intrinsic properties: (i) explosiveness (ii) flammability (iii) a capacity to oxidise (iv) corrosiveness (v) toxicity (including chronic toxicity) (vi) ecotoxicity, with or without bioaccumulation. b) Which on contact with air or water (other than air or water where the temperature or pressure has been artificially increased or decreased) generates a substance with any 1 or more of the properties specified in (a)
Hazardous waste[1]	Any waste that: • Contains hazardous substances at sufficient concentrations to exceed the minimum degrees of hazard specified by Hazardous Substances (Minimum Degrees of Hazard) Regulations 2000 under the Hazardous Substances and New Organism Act 1996. • Meets the definition for infectious substances included in the Land Transport Rule: Dangerous Goods 1999 and NZ Standard 5433: 1999 - Transport of Dangerous Goods on Land. • Meets the definition for radioactive material included in the Radiation Protection Act 1965 and Regulations 1982. Hazardous waste contains contaminants such as heavy metals and human-made chemicals, at levels high enough to require treatment to render them acceptable for landfill disposal.
Hazardous waste landfill[1]	Any landfill that accepts waste formally defined as “hazardous waste” in statutory instruments or as specifically determined through any special requirements that may be set by the relevant regulatory authority.
Industrial or Trade Premises[1]	• Any premises used for industrial or trade purposes. • Any premises used for the storage, transfer, treatment, or disposal of waste materials or for other waste management purposes or used for composting organic materials. • Any other premises from which a contaminant is discharged in connection with any industrial or trade process; but does not include production land.
Industrial waste[1]	Waste specific to a particular industry or industrial process. It may contain higher levels of contaminants such as heavy metals and human-made chemicals than municipal solid waste or have physical or biological properties that require specific management procedures. Industrial waste needs to be managed with environmental controls appropriate to the specific waste(s) being landfilled.
Intractable waste[5]	A hazardous waste for which no appropriate treatment method is nationally available. Such waste must be stored and is often shipped overseas for treatment.
Landfill[1]	A waste disposal site used for the controlled deposit of solid wastes onto or into land.
Landfill gas[1]	Gas generated as a result of the decomposition processes on biodegradable materials deposited in a landfill. It consists principally of methane and carbon dioxide but includes minor amounts of other components.

Definitions and Terms commonly used throughout this Landfill Management and Development Plan	
Term	**Definition**
Landfill operational area	Means the land on which landfilling activities and activities which relate to waste management, including areas of landscaping, planting, surface water management, transfer station, composting and resource recovery activities. The transfer station and resource recovery activities will remain after the landfill closure.
Landfill (or site) operator	Means the company or consortia that develops and manages the landfill. Waste Management New Zealand Ltd. currently holds a contract for this work.
Leachate[1]	Liquid that, in passing through waste, extracts solutes, suspended solids or any other component of the waste material through which it has passed. This includes liquid included in the waste as received and that drains as a result of waste compression, or the ongoing breakdown of organic matter.
Managed fill[1]	A Class 3 landfill. Accepts only clean fill material, controlled fill material and managed fill material.
Managed fill material[1]	Predominantly clean fill material and controlled fill material that may also contain material with contaminant concentrations in excess of controlled fill limits where site specific management controls are in place to manage discharges to the environment.
Municipal solid waste[1]	Any non-hazardous, solid waste from household, commercial and/or industrial sources. It includes putrescible waste, garden waste, biosolids, and clinical and related waste sterilised to a standard acceptable to the Ministry of Health. All municipal solid waste should have an angle of repose of greater than five degrees (5°) and have no free liquid component. It is recognised that municipal solid waste is likely to contain a small proportion of hazardous waste from households and small commercial premises that standard waste screening procedures will not detect. However, this quantity should not generally exceed 200 ml/tonne or 200 g/tonne.
Municipal solid waste landfill[1]	Any landfill that accepts municipal solid waste.
Permit Holder	Means the same as “Consent Holder”.
Regional Council	The term “Regional Council” used in this document will mean the Otago Regional Council.
Regulatory authority	Means either Otago Regional Council (ORC) or the Dunedin City Council (DCC), or both.
Shall	The word “shall” implies a requirement under this document.
Should	The word “should” implies a recommendation.
Site	Means that land defined in Section 2 of this Plan. It also refers to that land where landfill operations are taking place.
Waste[6]	• Anything disposed of or discarded. • Includes a type of waste that is defined by its composition or source (for example, organic waste, electronic waste, or construction and demolition waste). • To avoid doubt, includes any component or element of diverted material, if the component or element is disposed of or discarded.
Will	The word “will” implies either a fact or intention or a requirement under some other document.

[1]From the “*Technical Guidelines for Disposal to Land*”, WasteMINZ 2022
[2]From “*CAE Landfill Guidelines*”
[3]From the *Resource Management Act*
[4]From the *Hazardous Substances and New Organisms Act 1996*
[5]From the “*CAE Management of Hazardous Waste*” Guidelines
[6]From the *Waste Minimisation Act 2008*

Table A: List of Manual Holders

Manual Number:		
Status	Revision No: 03	Date: 14 September 2023

Number	Holder of Manuals
1	Dunedin City Council
2	Otago Regional Council

1 Introduction

The Green Island Landfill resource consents require the consent holder to exercise the consent in conformity with a Landfill Work Programme, also referred to as a Landfill Management Plan. The Landfill Works Programme is required to be reviewed annually, or at such lesser frequency as approved by the consent authority.

As Green Island Landfill is progressively worked to a position of closure, so it has been necessary to update the Landfill Management Plan.

This document is the updated Landfill Management Plan which has been called a Landfill Development and Management Plan and replaces all previous versions of the Landfill Management Plan.

For purposes of clarity, the term “Landfill Development and Management Plan (LDMP)” is used throughout this document to refer to the plan. Where the terms “Landfill Work Programme (LWP)” or “Landfill Management Plan (LMP)” are used, they refer to the resource consent requirements relating to those documents.

1.1 Resource Consents and Designation

1.1.1 Existing Resource Consents

Dunedin City (DCC) holds 12 separate resource consents (discharge and water permits) relating to the ongoing operation of the Green Island Landfill[1]. Copies of the resource consents are attached to this LDMP as Appendix A.

The resource consents were granted by Otago Regional Council (ORC) between 1994 and 1995 and all expire on 1 October 2023. Table 1 below provides a summary of the current resource consents.

Table 1: Green Island Landfill Resource Consents

Consent Type	Consent Reference	Description
Discharge to Water	3839A_V1	To discharge landfill and composting leachate to land in a manner that may enter water. For the purpose of sanitary landfill and composting operation.
Water Permit	3839B_V1	To take groundwater and leachate from groundwater bores and from a leachate collection drain located at and around the Green Island Sanitary Landfill. For the purpose of managing a sanitary landfill and composting facility leachate discharge from the Green Island Landfill.
Water Permit	3839C_V1	To divert stormwater at a landfill and composting facility within a 38ha area bounded by a leachate collection drain. For the purpose of control of landfill and composting leachate at the Green Island Landfill.
Water Permit	3839D_V1	To take stormwater from a landfill and composting facility within a 38ha area bounded by a leachate collection drain. For the purpose of control of landfill and composting facility leachate at the Green Island Landfill.
Water Permit	3840A_V1	To divert stormwater from the non-working areas of a landfill. For the purpose of intercepting clean stormwater and silt control of stormwater at the Green Island Landfill.
Water Permit	3840B_V1	To take diverted stormwater from the non-working areas of a landfill. For the purpose of silt control of stormwater at the Green Island Landfill.
Discharge to Water	3840C_V1	To discharge stormwater to the Kaikorai Stream. For the purpose of disposal of stormwater from a landfill facility, after treatment in silt retention ponds at the Green Island Sanitary Landfill.
Water Permit	4139_V1	To take groundwater (originating from the Kaikorai Stream) through a leachate collection drain. For the purpose of maintaining

[1] Water permits 4140 and 4185 (granted in 1993) relate to diversions of streams to enable the installation of leachate collection drains and sumps, and these consents do not have ongoing monitoring requirements for Dunedin City Council.

Consent Type	Consent Reference	Description
		groundwater levels within the surrounding ground at the Green Island Landfill.
Discharge to Land	94262_V1	To discharge up to 270 cubic metres per day of municipal, domestic, hazardous, industrial waste and organic waste to land. For the purpose of operating a sanitary landfill and composting operation.
Discharge to Air	94524_V1	To discharge to air landfill gas, dust and odour generated from landfilling up to 100,000 cubic metres a year of compacted municipal, domestic, hazardous and industrial waste and including a composting operation. For the purpose of operating a sanitary landfill.
Discharge to Water	94693_V1	To discharge up to 270 cubic metres per day of municipal, domestic, hazardous and industrial waste, including a composting operation, to land in circumstances which may result in contaminants entering natural water. For the purpose of operating a sanitary landfill.
Discharge to Water	3839A_V1	To discharge landfill and composting leachate to land in a manner that may enter water. For the purpose of sanitary landfill and composting operation.

1.1.2 Resource Consents Requirements for a LDMP

Most of the Discharge Permits have conditions that require the consent holder to exercise the consent in conformity with a Landfill Work Programme that is, for some consents, referred to as a Landfill Management Plan. The wording of the consent conditions is such that it is concluded that they are one and the same document.

The specific matters required to be addressed in the Landfill Work Programme (or Landfill Management Plan) are similar for all discharge permits, with small variations being made to account for the different activities. Table 2 below lists the requirements that generally cover all the specific activities.

Table 2: Resource consent requirements for the Landfill Work Programme (aka Landfill Management Plan in various consent conditions)

Specific Matter to be Addressed
The consent shall be exercised in conformity with a landfill work programme prepared by the consent holder. The work programme shall be prepared within 6 months of the first exercise of this consent and shall thereafter be reviewed at least annually or at such lesser frequency as the Consent Authority may approve: The work program shall:
Review the exercise of the consent and the monitoring relating thereto (including actions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [including toxic, biological, medical and radioactive wastes] and stormwater management and monitoring).
Evaluate and analyse trends and any matters having, or likely to have an adverse impact on water resources or the use of those resources, resulting from the operation of the landfill.
Present projections and intentions for landfill operations in relation to the future exercise of this consent (including intentions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [as defined above] and stormwater management and monitoring).
Describe sequencing of works, procedures to be adopted during construction and filling, and the maintenance and management of facilities.
Describe measures to be taken so that the conditions of this consent will be met at all times, and that adverse effects on natural water are avoided or mitigated.
Describe the precautionary measures that prevent unauthorised discharges or other adverse effects on natural water and present a contingency plan which will describe how any event will be managed so as to avoid or mitigate any adverse effects on natural water.
Describe any additional monitoring necessary to identify the impacts of the exercise of this consent and means of effective avoidance or mitigation of adverse effects both during and post closure of the landfill.
Provide for the managed recycling of leachate over the landfill where and when this is practicable and will not result in adverse environmental effects.

Specific Matter to be Addressed
Any hazardous waste accepted for disposal must be managed in accordance with the requirement of the landfill management plan provided in support of the application, including the deposition in an appropriate manner to prevent any adverse environmental effect due to discharges to air.

The Landfill Work Programme is required to be reviewed annually, or at such lesser frequency as approved by the consent authority.

1.1.3 Existing Designation

The Green Island Landfill site is designated (reference D659) within both the Operative Dunedin City District Plan and the proposed second-generation Dunedin City District Plan (the 2GP).

The designation purpose is stated as" Green Island Landfill - Landfilling and Associated Refuse Processing Operations and Activities".

The designation has one condition that places a limit on the noise generated from site activities.

1.1.4 Otago Regional Waste Plan Requirements

Policy 7.4.11 of the Otago Regional Waste Plan (2022) requires a site-specific management plan to be prepared in accordance with the Waste Management Institute New Zealand's Technical Guidelines for Disposal to Land (August 2018) that includes (but is not limited to):

- Methods for leachate management, collection, treatment, and disposal.
- Methods for stormwater capture and control from both off-site and on-site sources.
- Methods to minimise contamination of the receiving environment.
- Controls to manage hazardous waste and avoid any discharge of hazardous wastes or the leaching of contaminants from hazardous wastes.

1.2 Landfill Classification

The 2004 Ministry for the Environment guidelines[2] advise minimum requirements for a Class A landfill and requirements for a Class B landfill, which addresses landfills developed prior to government guidelines.

As defined in terms of the MfE guideline, the Green Island Landfill is classed as a Class B landfill.

A different landfill classification system has more recently been introduced in New Zealand, whereby landfills are classed on the type of waste that is disposed of at landfills. This classification system is stated in the "best practice" guideline developed by WasteMINZ[3].

In terms of those guidelines, Green Island Landfill is a Class 1: Municipal Solid Waste Landfill. It accepts municipal solid waste (as defined in this LDMP) and will also generally accept some C&D waste, some industrial wastes, and contaminated soils. Managed fill and clean fill materials are often used as a daily cover.

Whilst Green Island Landfill may be Class 1 in terms of waste accepted it is not Class 1 in terms of its design.

1.3 Related Documents

This LDMP is one of several documents that relate to the activities at Green Island Landfill. Relevant documents are listed in Table 3 below.

Table 3: Related documents

Title	Author	Date	Comment
Resource Consents and Designation	ORC	1994-97	Section 2 and Appendix A.
Waste Management Contract	DCC	2017	Contract No 6865
Landfill Management Plan (LMP)	Waste Management NZ Ltd	2018	Operations Plan

[2] MfE - Module 2 – Hazardous Waste Guidelines: Landfill Waste Acceptance and Criteria and Landfill Classification; Wellington; New Zealand; May 2004.
[3] Technical Guidelines for Disposal to Land; Waste Management Institute of New Zealand; October 2022.

Title	Author	Date	Comment
Health and Safety Plan	Waste Management NZ Ltd	2021	Appendix B
Filling Plan including Estimate of Waste Settlement	Stantec	2019	Section 3
Site Emergency Management Plan	Waste Management NZ Ltd	2022	Operations Plan and Appendix C
Environmental Monitoring Report	GHD	Annual	
Green Island Landfill Perimeter Bund Assessment	Tonkin + Taylor	2021	
Landfill Gas Master Plan	Tonkin + Taylor	2021	
Green Island Landfill Capping – Design Report	GHD	2021	

Waste Management's Landfill Management Plan (WM's LMP) provides details of the landfill operations. To avoid duplication in this LDMP, sections of WM's LMP have been referred throughout this document.

References to WM's LMP have been shown in bold, underlined red text (e.g., **WM's LMP section 2.1.2).**

1.4 "Best Practice" Guidelines

In preparing this LDMP the following guidelines have been referenced:

- "*A Guide to the Management of Cleanfills",* Ministry for the Environment, January 2002.
- *"A Guide for the Management of Closing and Closed Landfills in New Zealand",* Ministry for the Environment, May 2001.
- *"Technical Guidelines for Disposal to Land",* Waste Management Institute of New Zealand, October 2022.
- *"Ministry for the Environment - Module 2 – Hazardous Waste Guidelines: Landfill Waste Acceptance and Criteria and Landfill Classification",* Wellington; New Zealand; May 2004.
- *"Health and Safety Guidelines: for the Solid Waste and Resource Recovery Sector – parts one, two, three, four and five",* Waste Management Institute of New Zealand, March 2017.

1.5 Document History

DCC has submitted three versions of the Landfill Management Plan (in 2004, 2007 and April 2023) and the landfill operator has been submitting a report annually which has been accepted by the Otago Regional Council as the Landfill Work Programme.

In 2017 DCC submitted WM's LMP in lieu of updating the Green Island Landfill Management Plan.

This LDMP replaces all previous Landfill Management Plans and/or Landfill Work Programmes.

1.6 Status of this LDMP

The status of the LDMP shall be managed through a Revision Schedule (see second page of the LDMP) that records any changes/revisions done to this document.

DCC, as consent holder, is the owner of the Master Copy of this LDMP and shall be responsible for making changes to it or arranging for others to make changes.

Table A on page xiii identifies who has been issued with a copy of this LDMP.

DCC and ORC will each hold a copy of this updated LDMP. Copies of this LDMP shall also be made available to the landfill operator and, on request, to members of the local neighbourhood.

1.7 LDMP Review

Changes in landfill management, operational techniques and community expectations may influence landfill management in the future and provision for a review of the plan may be necessary.

The LDMP is a flexible document to be adjusted as required for changes to the resource consent. It may be reviewed periodically, as required by the resource consent conditions.

Further updates of this LDMP shall be carried out whenever there is a change in the landfill operator.

The LDMP will also be updated with contract details during the period between the award of a new site management contract and the contractor (i.e., landfill operator) being given possession of the site. A revision of the LDMP will be issued to the new landfill operator, as applicable.

2 Site Management

2.1 Site Description

The Green Island Landfill site is located immediately south of the suburb of Green Island and nearly 10 kilometres from the Octagon (see Figure 1). Access to the site is from 9 Brighton Road. The site occupies approximately 38 hectares of what was once wetland and farmland in the lower reaches of the main valley of the Kaikorai Stream at the point where it enters the Kaikorai Lagoon.

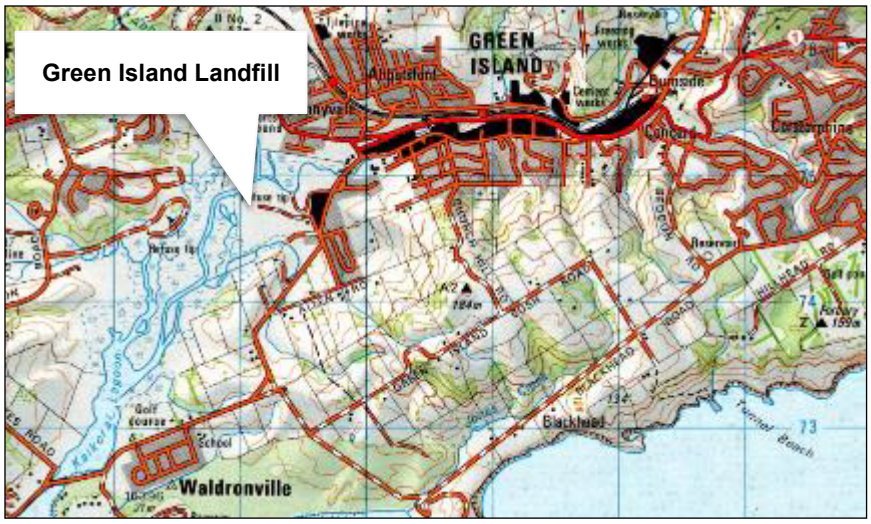

Figure 1: Location map of Green Island Landfill

The estuary is fed by four streams, the two significant ones being Abbots Creek which drains an area to the north of the estuary, and the larger Kaikorai Stream which drains the Kaikorai Valley catchment.

Closely adjacent to the south of the wetland is a low ridge of predominantly open pasture. To the east is residential, commercial, and industrial development and to the north is the main state highway south of Dunedin.

2.2 Legal Description

The Green Island Landfill site covers some 14 properties. The legal descriptions of those properties are recorded in the table attached as Appendix D.

2.3 ORC Audit Reports

ORC conducts periodic audits of Green Island Landfill. The results of the audits shall be taken account of in future reviews of this LDMP by DCC.

2.4 Site Owner and Responsibilities

The Green Island Landfill site and resource consents are owned by the DCC which has the overall responsibility for compliance of the site and solid waste management and minimisation activities. DCC may choose to assign the responsibilities for managing and operating the site to others.

2.5 Waste Management Contract

DCC has appointed Waste Management NZ Ltd (WM) to operate the Green Island Landfill (Contract No 6865) and associated facilities. In this LDMP WM is referred to variously as the “landfill operator” and the “site operator”.

The intent of the contract is for WM to:

- Provide a sustainable environment.
- Meet the ‘Precautionary Principle’.
- Meet the Resource Management Act (1991) and its amendments, and the requirements of the Resource Consents.

- Implement a proactive approach to ‘environmental management’.
- Achieve improved standards of operation, environmental management, and public service.
- Continuously provide predictable outcomes.
- Be effective in achieving cost efficiencies.
- Meet the public stakeholders’ expectations.
- Be a co-operative partner with DCC.
- Maximise waste minimisation activities.

Figure 2 shows the overall organisational structure of Contract No 6865.

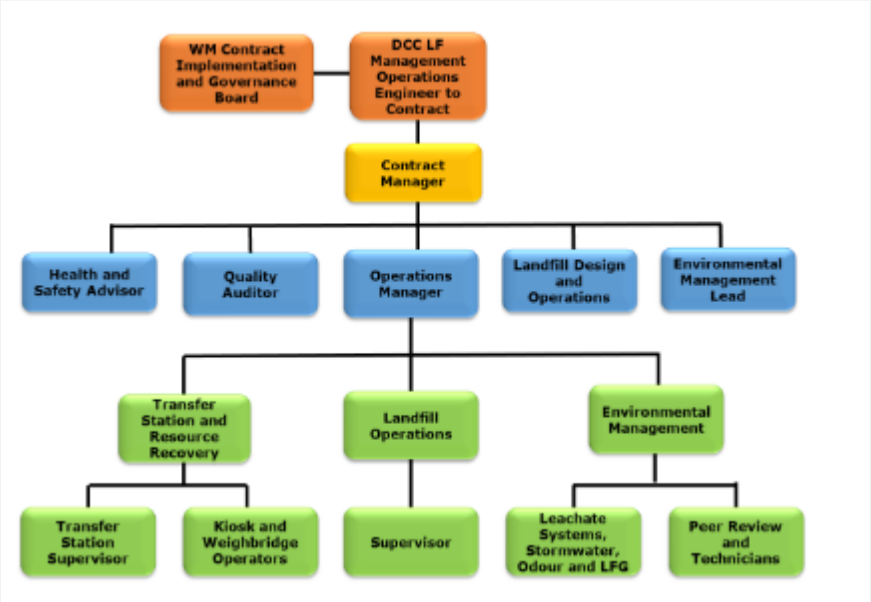

Figure 2: Organisational Structure of Contract No. 6865 (Source: Section 2.2.1 of the WM LMP)

2.6 Landfill operator's Responsibilities

2.6.1 Overview

In general terms, through Contract No. 6865 the Landfill operator has been assigned responsibility for the following activities:

- The operation and maintenance of the landfill, the associated infrastructure, the monitoring systems, and the landfill site.
- Fulfilling the monitoring and reporting requirements of the resource consent conditions that are relevant to the daily, weekly, monthly operations of the site.
- The management of the landfill site.

WM’s LMP section 2.2.2 of WM’s LMP provides detailed descriptions of the roles and responsibilities of the staff involved in the daily site operations.

Details of the contract activities and scope of operation are described in WM’s LMP under the following sections:

- Pre- and post-closure activities **(WM’s LMP section 2.1.2).**
- Rummage Shop **(WM’s LMP section 3.2.1).**
- Composting **(WM’s LMP section 3.3.1).**
- Transfer station **(WM’s LMP section 3.4.1).**
- Landfill operations **(WM’s LMP section 3.5.1).**

2.6.2 Maintenance of Buildings and Critical Equipment

WM's LMP section 2.4.2 describes how the asset condition of buildings and equipment is to be recorded at the start of the contract and then maintained through the course of the contract. All staff will be encouraged to care for all installations in their areas of work and to promptly report items needing attention for proper functioning.

Maintenance is to be carried out on an as-required basis.

In the event of failure of the weighbridge or its computer system, back-up will be provided by alternative manual systems.

WM's LMP section 3.1.22 describes how plant, equipment and materials are to be maintained.

The landfill compactor is regarded as being the most critical plant item. A suitable standby machine is to be made available, should the compactor break down.

For other critical machines, arrangements are to be in place to either obtain another machine at short notice or an alternative machine is to be located permanently on the site.

2.6.3 Training

2.6.3.1 Recruitment

WM's LMP section 2.2.3 of WM's LMP requires all aspects of WM recruitment for permanent staff to be handled via a centralised recruitment team. Recruitment of WM temporary staff is managed through Randstad.

2.6.3.2 Induction

All new site employees are required to undertake Health and Safety induction training upon their first day of work **(WM's LMP section 2.2.4)** and all external workers are required to undertake site induction training.

2.6.3.3 Requirements

WM's LMP section 2.2.5 sets out the requirements for training of site personnel.

As a minimum, these requirements include:

- Staff who inspect or direct the placement of incoming wastes will be skilled at identifying wastes that are unacceptable or require special handling procedures. These staff include supervisors, inspectors, equipment operators and weighbridge attendants.
- Operators of plant and equipment are skilled at undertaking all tasks required of them.
- All staff will be familiar with the landfill facilities, operational practices, site hazards, as well as safety practices and procedures, and environmental requirements.
- All staff will be familiar with site emergency procedures.

2.6.4 Occupational Health and Safety

2.6.4.1 General Requirements

The landfill operator is required to conduct all operations in accordance with their Health and Safety Plan. At contract commencement and every two years after, the landfill operator is required to confirm in writing that the provisions of the Health and Safety at Work Act 2015 and its stated Health and Safety Plan are being complied with. The Health and Safety Plan identifies possible hazards and records how these hazards are to be eliminated, isolated or minimised.

The landfill operator is required to nominate a person responsible for health and safety. The person nominated is responsible ensuring that the landfill operator's obligations under the Health and Safety at Work Act 2015 are met. The landfill operator is responsible for the provision of all safety equipment and is required to ensure that it is readily accessible and fully functional.

The contractor's Health and Safety Plan is included in Appendix B.

2.6.4.2 General Site Instructions

- All personnel required to visit the site to undertake their works (other than to attend meetings) are to be inducted by the landfill operator.
- Always work in accordance with the contractor's directions and instructions.
- All persons must sign in the Visitors Book on arrival and sign out before leaving the site.
- Always notify the contractor of your arrival on site.
- If you identify additional hazards or unsafe practises, you are to notify the contractor.

- If in doubt of your own safety or the safety of others you are to stop work, move to a safe area, alert others, and contact the worksite contractor.

2.6.4.3 Hazard Identification sheets

There are many hazards associated with visiting the site. The hazard identification sheets attached as Appendix E list the typical hazards that can be encountered on the landfill.

The landfill operator is to take note of these hazards and to include them in its Health and Safety Plan.

2.7 Site Infrastructure

2.7.1 Buildings and Facilities

The site buildings and facilities that are to be maintained during the operation of the landfill and after care period include:

- Weighbridge.
- Rummage shop.
- Transfer station.
- Staff facilities.
- Wheel wash.
- Leachate collection system.
- Landfill gas collection system.
- Stormwater control structures.
- Existing roads and paved areas.

2.7.2 Staff Amenities

The staff facilities include a site office, staff lunchroom and staff amenities. Facilities include those for record keeping, office supplies and equipment, kitchen, toilets, and shower.

Services to the staff facilities include a telephone connection, electricity, and a water supply.

2.8 Landfill Charges and Checks

DCC will determine the landfill charges annually to be applied to different waste types.

WM's LMP section 3.1.6 provides details of the requirements for charging customers, including the process to be followed for takings at the weighbridge and resource recovery centre.

DCC uses the Landfill 3000 weighbridge software, and all transactions must be recorded on the computer database which must be backed up daily, and the entire computer backed up weekly.

Checks will be conducted of the weighbridge and resource recovery centre operations and cash register records will be checked against banking records.

DCC may also conduct spot audits from time to time to ensure that performance is to the standard required. Spot audits may also include review of video footage from the weighbridge and re-sale shop.

2.9 Community Liaison

DCC will be responsible for organising community liaison meetings as and when required with representatives of the community affected by the activities of the landfill, DCC, and the landfill operator.

The purpose of the meetings will be for the community representatives to express any concerns and for the landfill operator to take account of these concerns, and to identify and rectify or reduce nuisances.

Typically, the meeting's agenda will include:

- Concerns and complaints of neighbours.
- Procedures to mitigate complaints.
- Site and landfill developments.
- LDMP modifications.

DCC's representative at each meeting will take minutes and distribute these to the nominated community representatives and the landfill operator.

When meetings are not occurring, members of the local community have the phone numbers of the Waste Management's Operations Manager and the DCC Contracts Manager and Landfill Engineer.

3 Site Development

3.1 Site Areas

The site comprises various areas characterised by the activities undertaken in each. Generally, these include:

- A landfill footprint area, within which waste is deposited; the landfill footprint has reached its full extent on the site and filling is now occurring over previously placed waste.
- A reception area that provides access to the site for waste haulage vehicles.
- Resource recovery area, including the Rummage Shop (reuse facility).
- Transfer station area for disposal of waste by the public.
- Landscaping and planting areas to provide screening of on-site activities, buffer zones to mitigate potential effects of aerial discharges and litter, and amenity enhancement.
- Areas where leachate, groundwater and dirty stormwater are collected, stored, or treated prior to discharge on site or disposal off site.

These areas are shown in the site layout drawing in Appendix F.

3.2 Ongoing Development

The site has been developed with supporting infrastructure such as: buildings, sealed roads, and a leachate collection system. On-going development relates to:

- Landfill formation as filling progresses to its final form.
- Perimeter bund construction.
- Surface water management.
- Landfill gas management.
- Access roads to the tipping face.
- Landscaping and screen planting.

3.3 Design Principles

The design principles are:

- To generally maintain the main surface water run-off paths within the sites by realigning these around the landfill footprint or beneath the landfill footprint in stages during landfill development.
- To generally maintain the groundwater divide created by the engineered leachate/groundwater cut off trench that surrounds nearly all the landfill footprint and intercepts leachate seepage from the landfill and directs it to the Green Island Wastewater Treatment Plant.
- To provide leachate drainage pipework internally within the landfill and underlying areas of future waste placement above, with these drains being directed to the external leachate collection system.
- To control the ingress of precipitation by the staged placement of landfill cover (intermediate and final).
- To control the release of landfill gas using a gas collection system coupled with the application of landfill cover.
- To place waste within the landfill footprint using modern landfilling techniques.
- To provide stability to the waste fill, either by progressively constructing earth bunds around the perimeter of the landfill for each successive lift of the landfill (as has been done to date) or adopting an alternative “waste-to-face” filling design as outlined in the Tonkin + Taylor report ‘Green Island Landfill Perimeter Bund Assessment’.
- To undertake a “Safety in Design” process for all new site development, in line with the requirements of the Health and Safety at Work Act (2015).

3.4 Site Capacity

The area covered by landfilling operations including waste disposal, recycling, and composting at the Green Island Landfill site enclosed within the leachate trench comprises 38 hectares. Landfilling to date has covered approximately all this area, and second level filling is ongoing.

The final landform shape is discussed in section 3.5 which deals with the filling plan, and it is shown in Figure 3. This landform is based on the original landfill profiles provided with the resource consent application, though there have been changes since with agreement from ORC.

The remaining landfill capacity, rate of filling and remaining life has been estimated based on drone surveys carried out in 2019[4] and revised final contours (see Final Landform Plan – Figure 3). Indicative results are as follows:

- Remaining landfill airspace, excluding the final cover and allowing for settlement, as of June 2022, was about 529,000 m^3.
- Solid waste quantity currently received at landfill is about 60,000 tonnes/year plus about 60,000 tonnes/year of soils.
- Landfill airspace is currently being consumed at about 90,000 m^3/year.
- Indicative life of landfill at current rate of filling is until about April 2027, assuming the following:
    - Perimeter bunds are not required for the remainder of the landfill footprint.
    - Cleanfill is not disposed of in the landfill other than as landfill cover and there is no change in the proportion of landfill cover relative to waste.
    - There is constant quantity and composition of waste disposal at landfill, e.g., constant population size, no change in waste minimisation activities, no change in sludge quantities.

3.5 Filling Plan

3.5.1 Final Landform Shape and Settlement Allowance

The currently consented final height of the landfill, following closure and settlement, is at RL25.0m, with the landform consisting of a central ridgeline trending approximately north south and having a shallow grade over the top area above the moderately steep (1V:3H) bund side slopes.

Overfilling of the landfill to allow for settlement has been accepted by ORC[5].

Following some minor changes to the landform shape (e.g., to accommodate a new access road), the accepted final shape is as shown in Figure 3.

3.5.2 Site Constraints

The following site constraints need to be taken account of in formulating the Filling Plan:

- Site access road.
- Disposal of special wastes (i.e., treatment plant sludges, mudtank wastes, fellmongery wastes).
- Stormwater control.

3.5.2.1 Site Access Road

DCC constructed a new access road onto the landfill during 2020. In Figure 3 this new access road is seen accessing the landfill from the north-east to tie into the proposed final capping levels.

[4] Drone surveys were carried out on 10 July, 7 August, 3 September, 4 October, 2 November, 29 November 2019.

[5] Recorded in series of correspondence between DCC and ORC in April 1999.

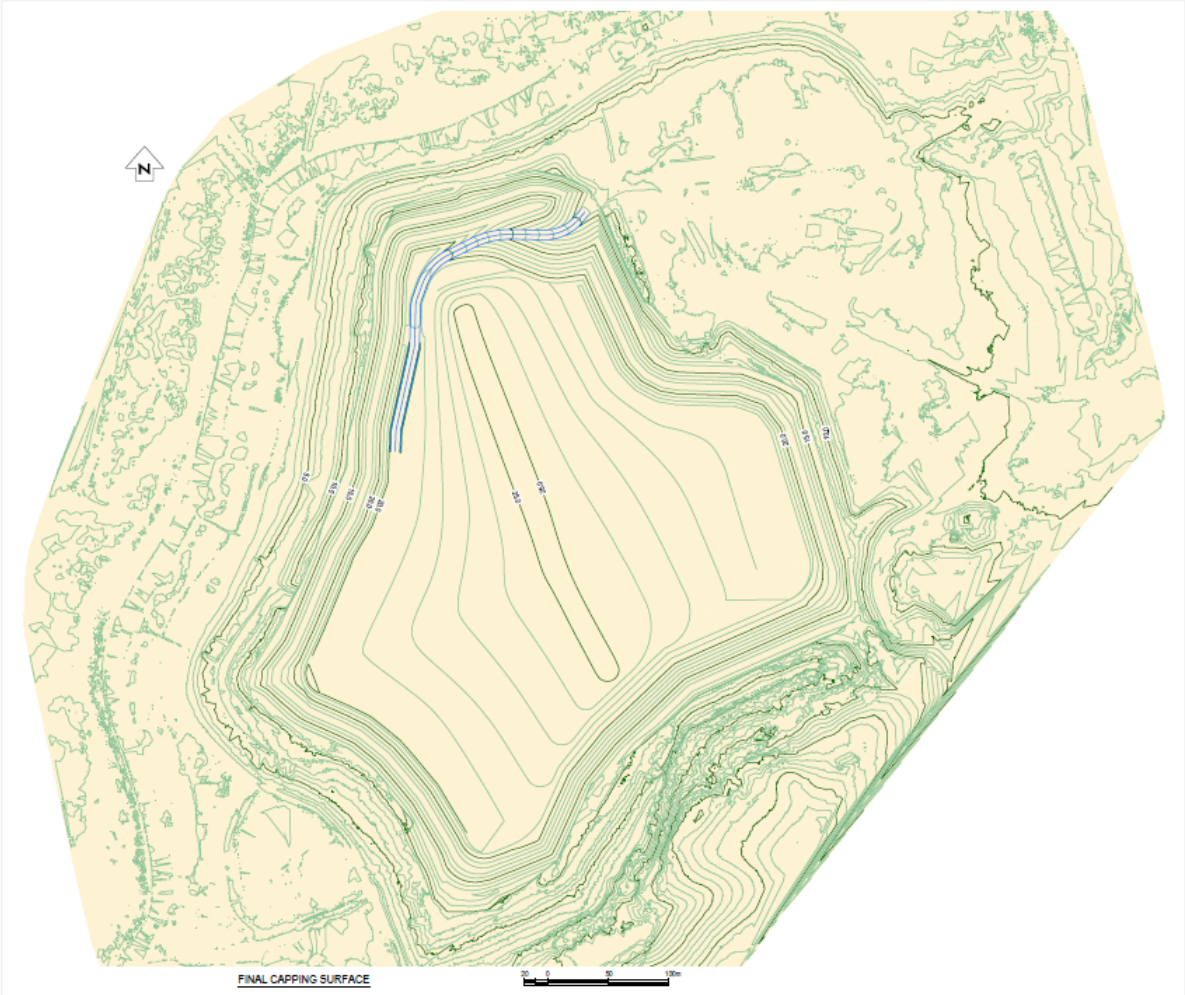

Figure 3: Plan showing the proposed final landform shape (top of capping), with new access road

3.5.2.2 Disposal of Special Wastes

Past, current, and future disposal practices of special waste on site all require consideration for the future filling plan.

The special wastes that most require attention on site are:

- Liquid wastes from sumps etc.
- Asbestos waste.
- Sludge from wastewater treatment plants.

The southern end of the landfill has and still is being used for the disposal of liquid sump wastes and, until recently, asbestos. This area is saturated and, from a practical point of view, is not considered technically feasible presently for filling over. With specifically designed engineering works, this area is likely to be able to be utilised.

DCC anticipates that a dewatering facility will be established in the city by a commercial operator within the next two years. Once this facility is operational, DCC intends to no longer accept liquid wastes at the landfill and to remediate the saturated area as required to enable filling to occur in the southern end of the landfill as per the final landform shape shown in Figure 3. A temporary facility will be constructed on the landfill in 2023 to deal with some of the liquid wastes and wastes that currently go to the dewatering pond areas. In the meantime, the filling plan needs to take account of the poor ground conditions in the southern end of the site and leave the filling of this area as far as possible into the future.

The waste contractor has commenced with disposing of asbestos in other parts of the site. There are restrictions on the proximity to the surface that the asbestos waste can be placed and special considerations around not disturbing the areas in the future where asbestos waste has been placed.

The most problematic special waste is wastewater treatment plant sludges because of the quantity that is disposed of annually, and the wet and odorous nature of the waste requires special handling and covering.

The sludge can only be disposed of in relatively thin layers, comprising both sludge and cover material. The sludge and cover are currently 2 to 2.5m deep and will be 1 to 1.5m in the top (i.e., northern) area but will need a minimum of 4m depth of waste cover under the cap.

Having placed a layer of sludge it is not trafficable and can only be accessed by pioneering a thick layer (up to 3 metres) of waste over the top of the sludge layer. Even so, the sludge layer deforms extensively and gets pushed out as a "bow wave" ahead of the placed general waste.

The contractor and DCC Landfill Engineer have identified the areas where sludge has been disposed of most recently (2018 and 2019) and in July 2019 identified the potential future areas available for sludge disposal within the landfill footprint. The areas available for future sludge disposal are shown in Figure 4 below, encompassing a total area of some 18,340m^2 as of July 2019. The contractor continues to track the areas being used for sludge disposal. Given the limited area remaining for sludge disposal, DCC are investigating alternative routes and methods for future sludge disposal as a matter of urgency.

Figure 4: Plan showing proposed sludge disposal areas

During 2022 and early 2023, DCC invested in facilities at its two primary WWTPs to lime-dose sludges. This kills the pathogens and reduces odour, as well as making the material more physically stable. Lime-dosed sludges can be co-mingled in with waste at the main tip-face, meaning receipt of sludges can continue, so long as waste is being placed. Sludges from these treatment plants have been lime-treated since early 2023, with disposal mostly to sludge areas, with work continuing to refine a suitable method of co-mingling lime-dosed sludge with waste.

Only limited areas are now available to receive un-limed, raw, or raw sludges. So, most of the sludge will be received pre-limed.

3.5.2.3 Stormwater Control

The over-riding philosophy for stormwater control on site is that any stormwater that contacts waste should be treated as being "dirty" stormwater and managed as leachate. Only stormwater that runs off areas underlain by permanent grassed and vegetated capping or bund can be regarded as being "clean" and are able to flow directly to stream or estuary. Areas of intermediate cover containing sediment laden waters can be directed initially to a sedimentation pond, although many of these areas, at the present time, are conservatively directed to leachate for convenience purposes.
Figure 5 shows the stormwater catchments on the landfill site. The light blue area shows a "clean" stormwater catchment; the light orange area is stormwater from the recently capped area shedding to the north; the pink area is "dirty" stormwater that is captured and treated as leachate; and the light green area is "clean" stormwater shedding off the capped and vegetated bunds.

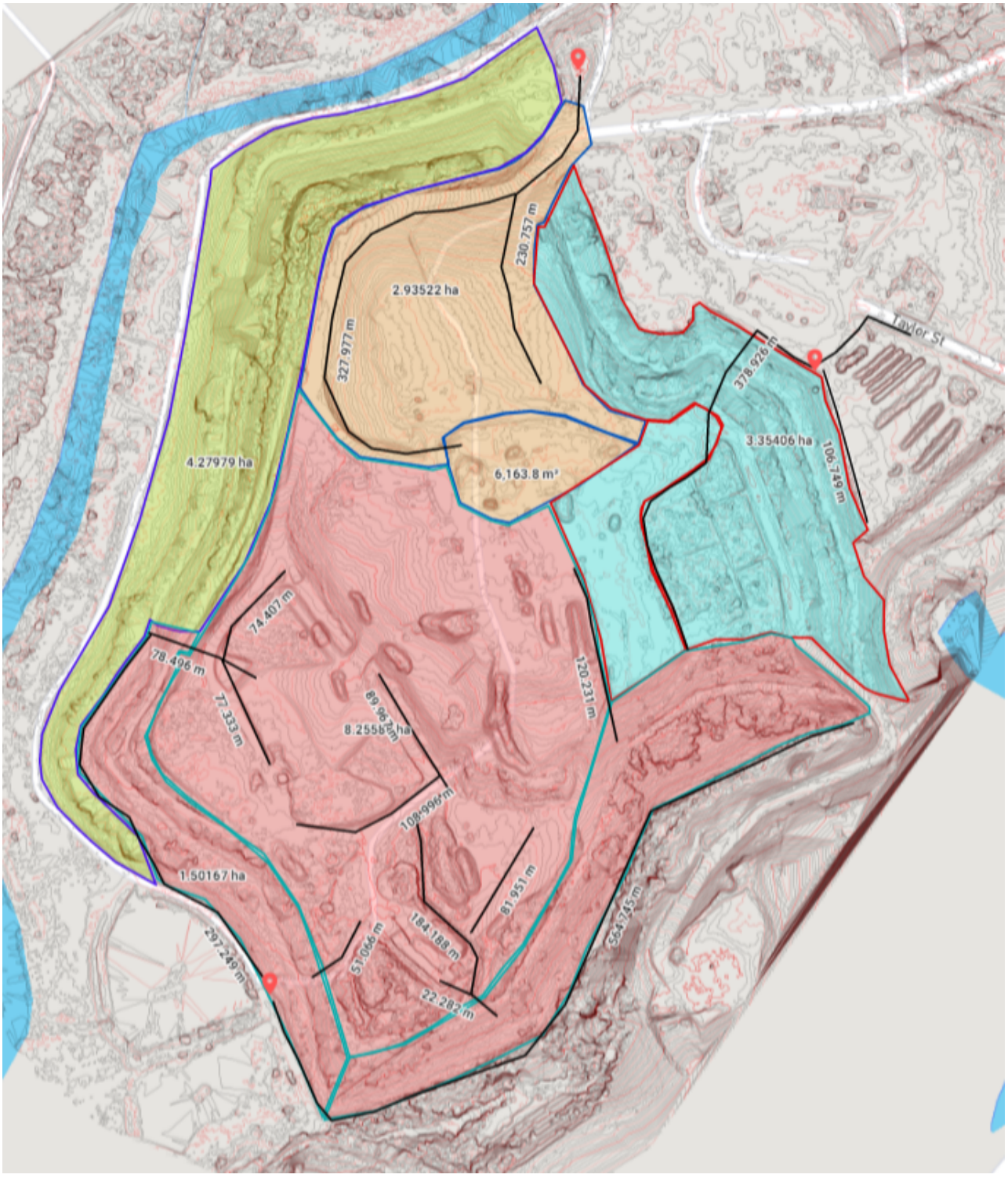

Figure 5: Clean and dirty stormwater flows from the landfill site

DCC has constructed in 2020 a collection system for the “dirty” stormwater flowing to the northern end of the landfill (Northern Leachate Pond).

There is a low-lying area within the south-western part of the landfill which drains “dirty” stormwater to one of the pump stations located around the perimeter of the landfill footprint, from where it is pumped to the wastewater treatment plant.

DCC constructed a perforated leachate collection pipe, surrounded by drainage gravels, in this low-lying area in 2019 to facilitate drainage of leachate when the area is filled over with solid waste. Further leachate drainage was added in this area during 2021.

The filling plan needs to take account of the directions of stormwater flow and ensure that “clean” and “dirty” stormwater flows are kept separate, and as far as is possible, completed areas of waste filling are capped as soon as possible to allow “clean” stormwater to be shed off site, thus reducing quantities of leachate and “dirty” stormwater.

3.5.3 Tipping Face Parameters

Based on a review of various “good practice” information, the following landfill cell and compactive effort parameters have been adopted in determining the filling plan:

- Individual landfill cells:
  - Width of 30m.
  - Cell height of approximately 3m.
  - Filling to be done in approximately 0.3 to 0.5m lifts on a near horizontal surface (in the longitudinal direction) but with a shallow lateral slope into the waste pile.
  - Side slopes of landfill cells to be no steeper than 3H:1V.
- Compactive effort:
  - Compaction to be applied over 3 to 5 passes.
  - Waste density more than 0.85t/m^3 to be targeted.

3.5.4 Concept Filling Plan

Figure 6 shows the adopted concept filling plan that was developed in conjunction with DCC staff and the landfill operator.

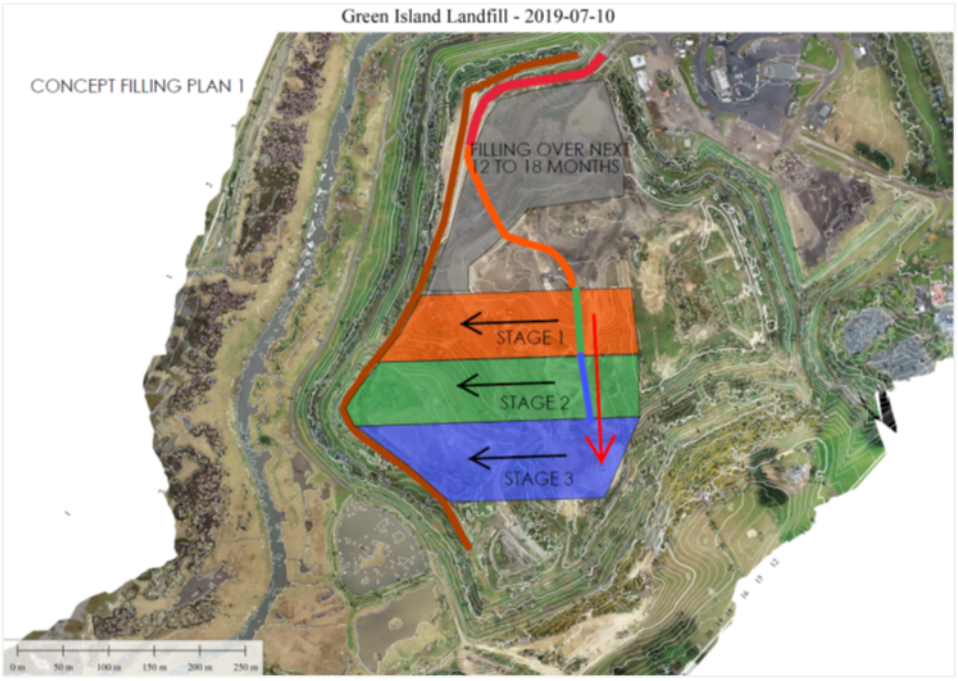

Figure 6: Concept filling plan for Green Island Landfill

It has the following advantages:

- Reduced length of access road to construct at the outset.
- It promotes gas production in that areas are filled to final height instead of filled in layers.
- Bund construction is avoided as the western slopes will be constructed using the waste-to-face filling method.
- The area available for disposal of special waste (see Figure 4) is filled over later than with other concept filling plans.
- The area in the southern end of the landfill currently used for disposal of liquid wastes is filled over later, providing greater time for remediation of the saturated area as required to enable landfilling to occur.

3.5.5 Waste Settlement Allowance

Using waste settlement data measured at Green Island Landfill at various locations between 2009 and 2016, a settlement equation has been developed for Green Island Landfill, based on a landfill settlement theory model.

Settlement calculations have then been applied to a 5m-by-5m grid “laid over” the Green Island Landfill surface where there is remaining airspace.

At the various grid points the calculated settlements have then been added to the final landform heights, less depth of capping, to provide target landfilling heights for each grid point. A maximum settlement of 15% of the remaining depth of waste has been accepted.

A 10-year post-closure settlement period has been adopted as being “reasonable” and generally consistent with previous communications between DCC and ORC. Figure 7 shows the contours of the completed top of waste levels for this settlement period assuming the 15% overfilling (i.e., settlement) limitation.

This gives an available airspace volume of about 529,000m^3, excluding final cap, from the date of the June 2022 drone survey.

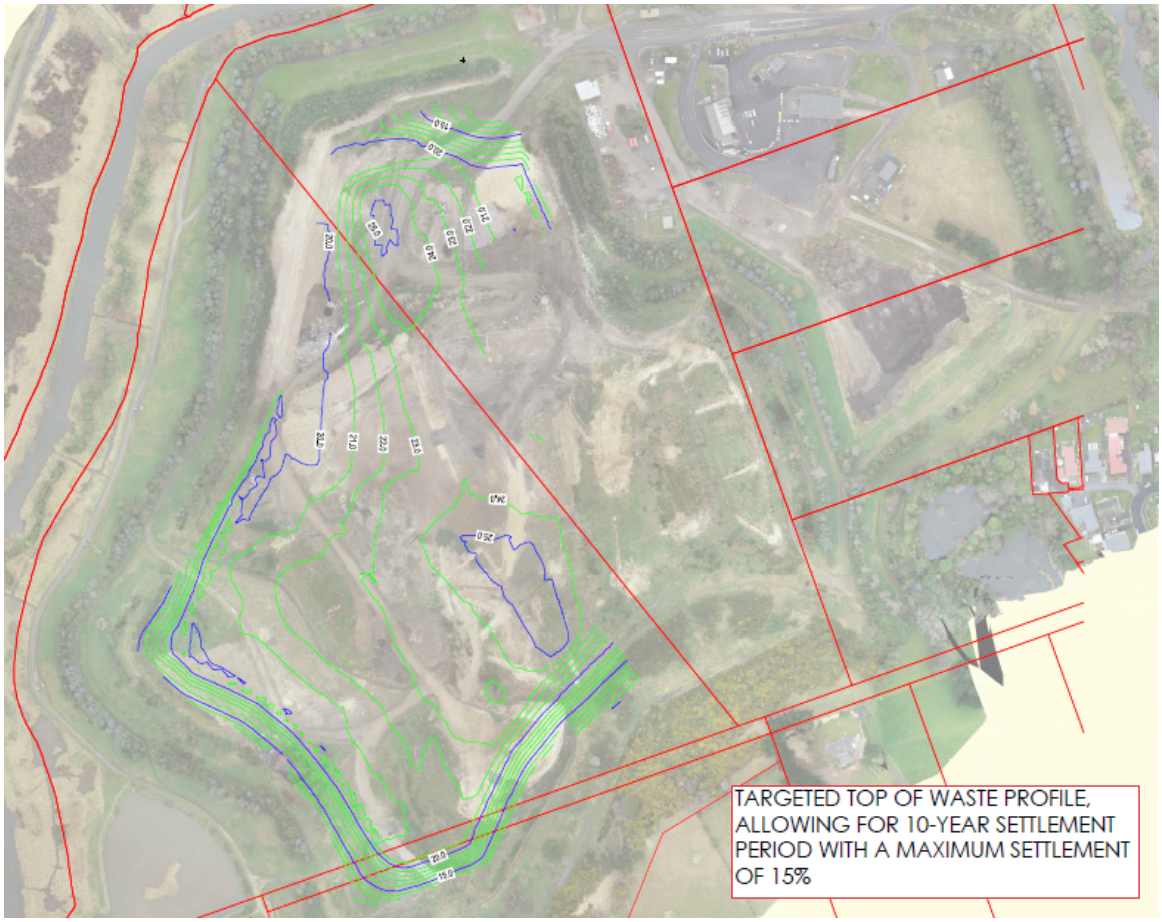

Figure 7: Top of waste contours for 10-year settlement period and 15% overfilling limitation

3.5.6 Proposed Filling Programme

Figure 8 below shows the proposed filling programme, assuming a 10-year post-closure settlement period, and limiting the overfilling to 15%.

The green shaded area at the northern end of the landfill was completed with waste filling in late 2021.

The yellow shaded area at the southern end of the landfill is “at risk” on account of the saturated ground conditions in this area from disposal of liquid wastes, as discussed previously in Section 3.5.2.2. The airspace volume “at risk” is estimated to be about 70,000m^3.

As discussed previously in Section 3.5.2, the areas available for future disposal of raw sludge is very limited, so co-mingling of limed sludge with general waste at the tip-face will be required.

It is proposed that filling in the southern part of the landfill (shaded orange) proceeds from north to south in strips that are 30m wide, and that each strip is filled from east to west.

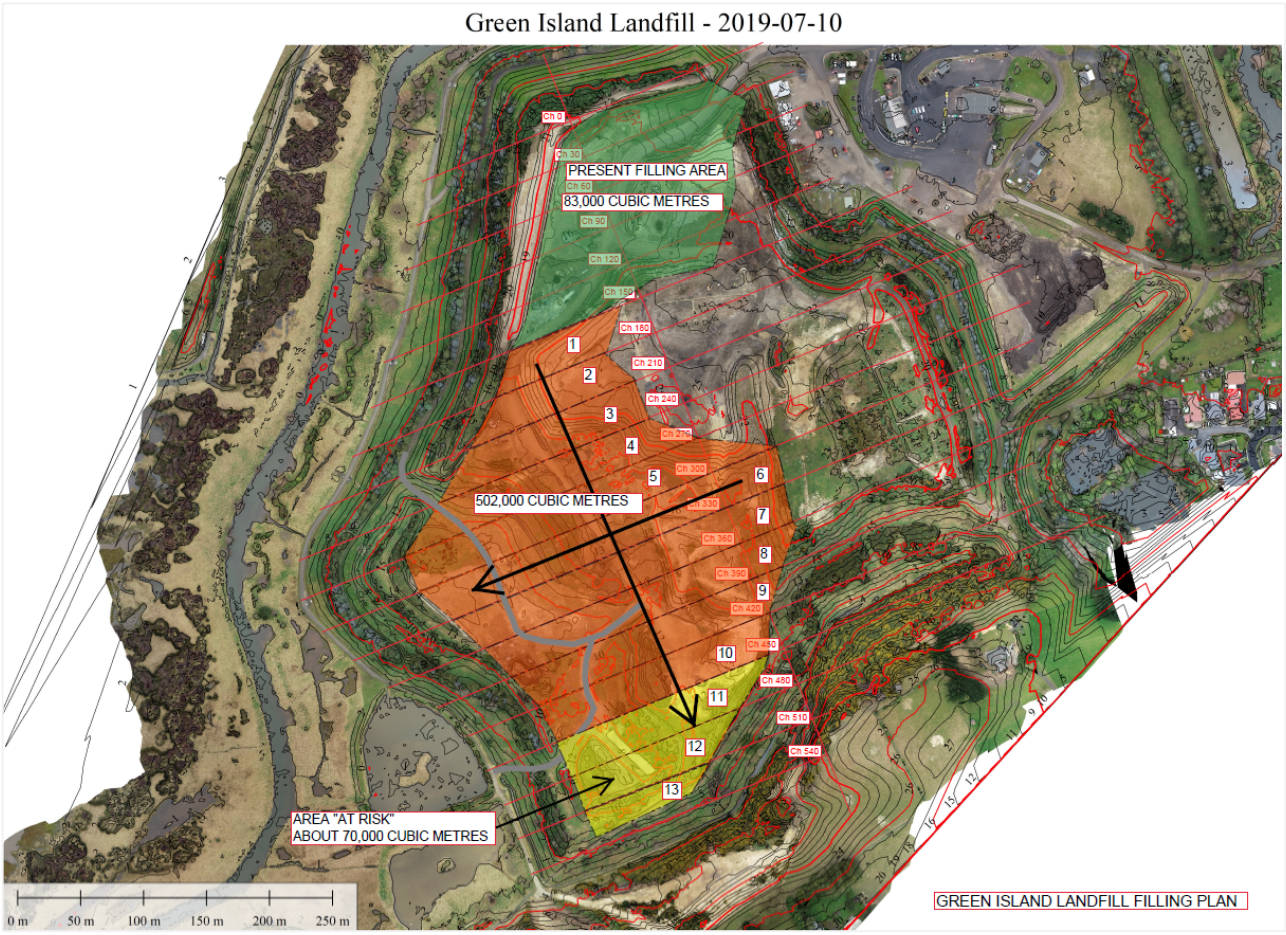

Figure 8: Proposed filling programme at Green Island Landfill

3.5.7 Proposed Filling Sequence

As stated above, filling of each of the 30m wide strips (cell width) is to be from east to west (generally), which is from the existing waste pile across to the bunds.

Because filling will be across areas underlain by sludge, the waste contractor has proposed filling in a sequence shown in the general cross-section in Figure 9 below.

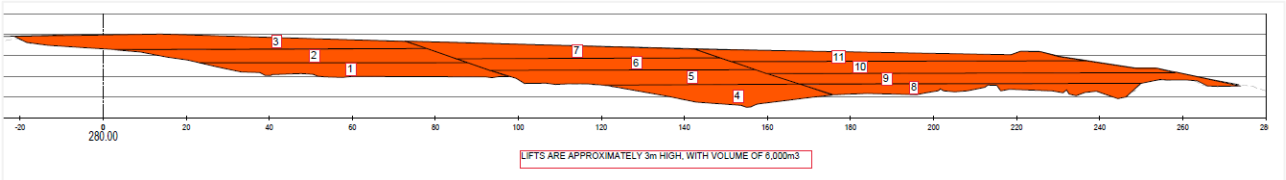

Figure 9: Schematic filling sequence in "east to west" direction across the landfill

The landfill cell geometrics are:

- Filling in 3m (approximately) layer thicknesses.
- Cell widths assumed to be 30m wide.
- Edge slopes are 1V:3H.
- Cell sizes are approximately 1-month's volume of waste.

4 Site Operations

4.1 Access Control

4.1.1 Transfer Station

A transfer station is used to limit the number of vehicles accessing the operational area (i.e., tipping face) to those that have larger quantities of waste. Generally, only commercial vehicles are permitted to access the tipping face with the public making use of the transfer station for dropping off loads from smaller vehicles such as cars, trailers, and utes.

The transfer station allows:

- Greater site safety with fewer vehicles in the operational area of the landfill.
- Greater control over the discharge of refuse.
- Customers to discharge their wastes in a “clean environment”.
- A smaller discharge face to be operated, which means greater control over litter, rodents, and birds, and decrease in the infiltration area of rainwater and thus reduced leachate production.

4.1.2 Customer Accounts

Customers may open an account with DCC and dispose of waste during opening hours. Under special circumstances and with special conditions, access will be permitted after hours to some commercial customers. The landfill operator will only accept waste outside of normal hours when instructed by DCC.

4.1.3 Opening Hours

DCC informs the public of operational hours and conditions on its website (www.cityofdunedin.com) and other DCC publications. Opening hours may be updated periodically.

The normal opening hours are as follows:

- Monday to Saturday: 8:00 to 17:30.
- Sunday: 9:00 to 17:30.

4.1.4 Access Control Signs

The landfill operator/DCC is to inform the public through signs at the site of:

- Directions to the transfer station and Rummage Shop for the public.
- Directions to the tipping face for commercial vehicles.
- The user charges.
- The types and minimum quantities of waste that will be accepted at the site.
- Operational hours.
- Traffic controls.
- Site rules and requirements.

4.1.5 Access Infrastructure and Services

The landfill operator facilitates access to the tipping face for haulage vehicles by providing and maintaining:

- All weather roads.
- Barriers and signs to control where the haulage vehicles tip.
- Supervision.
- Opening and closing the site.

WM’s LMP section 3.1.15 describes the provisions for site access.

4.1.6 Vehicle Restrictions

WM’s LMP section 3.1.3 describes the vehicle restrictions applicable to various vehicles entering the site.

Vehicles other than those complying with the bulk waste haul vehicle criteria may enter the site if:

- They do not deposit refuse.
- Are visiting the facility.
- Make deliveries to the facility.
- Have business at the facility.
- Or have other purposes related to the efficient running of the landfill.

Bulk waste haul vehicles must:

- Comply with regional by-laws, if any, relating to waste haulage vehicles.
- Comply with national transportation laws.
- Have their loads enclosed, covered or secured so that refuse, litter and excessive odour do not escape.

4.1.7 Weighbridge and Kiosk Operations

WM's LMP section 3.1.5 describes the purposes of the weighbridge and kiosk operations, which include:

- Restricting entry only to authorised persons and vehicles.
- Assessing the nature of all waste coming to the landfill and receiving only approved wastes.
- Collecting fees.
- Providing information on safe disposal methods and encouraging increased diversion.
- Recording details of the waste delivery.
- Advising tip face operators of the arrival of waste which may have special handling instructions.
- Rejecting unacceptable waste.

All deliveries of special waste and potentially odorous waste are pre-notified by either carrier, or by DCC.

Pre-notification provides time for landfill tip face operators to prepare in accordance with the special waste handling instructions for that waste. Handling instructions for non-standard special wastes will be agreed between DCC/WM.

WM's LMP section 3.1.5.2 provides details of load documentation. Details of all wastes are to be captured by computer-based data management methods at the weighbridge.

Details of special wastes will also be recorded on a separate log of Special Disposal.

Acceptance of non-standard or project specific special or hazardous wastes should only be done by the weighbridge operators if DCC's assessment and acceptance for landfill documentation is available. Otherwise, the customer is to be advised to contact DCC so that the waste acceptability may be determined.

Weighbridge records are also to be kept of all recyclables removed from the site.

4.2 Site Infrastructure

4.2.1 Site roading

Refer to section 4.8 of this LDMP for details of site roading. The site development plan shows the permanent roads on the site.

The site operator is responsible for developing and maintaining site roads onto and across the landfill to the various disposal facilities.

4.2.2 Signs

WM's LMP section 3.1.14 provides general details of signs that are to be provided and maintained on site.

These are to include:

- Entrance information sign with:
  - Name of site.
  - Days and hours of opening.
  - Name, address, and telephone number of the landfill operator.
  - Name of landfill owner (DCC).
  - Prohibited waste.

- Conditions of entry.

- Signs to direct traffic to and away from the tipping face and other areas of the site.
- Signs to give site personnel and haulage vehicle drivers correct procedures.
- Warning signs where there are identified dangers.

Signage is to be maintained to the same standard existing at the commencement of the contract.

4.2.3 Perimeter Fencing

Perimeter fencing is provided around the whole of the landfill site.

4.2.4 Screens

Screens are required to manage windblown litter. They shall be placed as close to the tipping face as possible to limit opportunities for litter to be picked up by the wind. As the site becomes progressively higher, so the importance of using litter fences will increase.

4.3 Stormwater Control

4.3.1 Objectives

The surface water control objectives are:

- To minimise erosion.
- To minimise sediment transport from the site.
- To control infiltration into the landfill.
- To provide effective interception and diversion of surface water around the landfill footprint, and other operational areas.
- To ensure that all water that has come into contact with waste is directed to the landfill leachate collection system.

WM's LMP section 3.1.19 describes the overall philosophy for dealing with stormwater, required maintenance activities and opportunities and good practice for improving performance.

The required maintenance activities are to include:

- Regular inspections, especially after significant rainfall events.
- Cleaning of sumps.
- Clearing of culverts.
- Repair and reinstatement of eroded areas.
- Servicing of pumps as required.
- Monitoring the systems.

Good practices to drain stormwater from the landfill include:

- Avoid excavations that direct stormwater to drain into underlying waste.
- Provide adequate grades to minimise ponding on the landfill.
- Line surface drains with an impermeable material and where necessary to avoid erosion damage.
- Keep surface drains free of obstructions including litter.

4.3.2 Contamination Risk

WM's LMP section 3.5.8 describes the primary risk of contamination of surface waters posed from leachate and sediment runoff. Additionally, discharges of vehicle or machinery wash water, litter, fuel spills, etc can cause stormwater contamination.

Clean stormwater that is considered substantially free of contaminants and sediment can be discharged directly to the environment. Stormwater containing sediment will be discharged to existing sediment ponds on the site before discharging to the environment. Stormwater that contacts waste or leachate will be regarded as leachate and will be treated and disposed of accordingly.

4.3.3 Operation and Maintenance of Surface Water Drains

WM's LMP section 3.5.8.2 describes the regular programme of preventative maintenance to be implemented to ensure that the existing stormwater system operates as intended. In addition to the activities noted above in section 4.5.1, this includes de-silting silt ponds, and lining drains that service pumps.

Where erosion and scouring are occurring, repairs and maintenance may include:

- Re-profiling the drain or area to a shallower grade.
- Concrete lining (over a geotextile base).
- Rock armouring.
- Installing down chutes or downspouts.

4.3.4 Stormwater Provisions for Active Tipping Face

Stormwater cut-off drains and diversions will be formed to minimise storm water run-on to the active tip face and daily cover areas.

Stormwater run-off from the tipping pad will be encouraged to soak into the waste and to minimise the generation of run-off from the tipping pad. Water which has contacted waste will be treated as leachate and disposed accordingly.

Water that has only contacted cleanfill will be considered as uncontaminated and will be diverted into the onsite surface water drainage system and thence to one of the sediment ponds before discharging from the site.

Vegetation growth on intermediate cover is encouraged. The final cap has a layer of topsoil and is seeded to establish vegetation cover at the earliest opportunity to minimise soil erosion.

4.3.5 Sedimentation Ponds and Wetlands

WM's LMP section 3.5.8.3 describes the operational management of the sedimentation ponds within the landfill boundary, including requirements for de-silting.

The purpose of these two wetlands is to receive sediment-laden stormwater flows and to enable that sediment to fall out and be contained within these ponds, with clean stormwater being discharged.

The wetlands are located immediately downstream of the Eastern Sedimentation Pond and are designed to provide polishing of stormwater before discharging to the Kaikorai Stream.

The Western Sedimentation Pond currently receives no input catchments from the landfill.

Desilting is not undertaken on a regular schedule. Ponds are surveyed and assessed at times to confirm their ability to receive the design storm flows.

4.4 Leachate Management

4.4.1 Overview

Leachate can be defined as the sum of liquids that are released as waste decomposes, water that soaks through waste in the landfill and surface water that contacts waste (see **WM's LMP section 3.5.9**).

Control of leachate is fundamental to the protection of both surface and stormwater quality, and groundwater. Where possible, leachate should be separated from stormwater and should never be allowed to enter the stormwater system.

Any stormwater that is contaminated with leachate is to be treated as leachate. Any discharge of leachate to the environment may be assessed as being non-compliant which could also result in costs, levies and fines being imposed by Regulatory or Judicial Authorities.

WM's LMP section 3.5.9.1 provides an overview of the leachate collection system.

Due to the history of GI having no formal landfill liner barrier and no blanket leachate drainage and collection system, it has instead been retrofitted with a leachate collection system comprising of the following.

- A peripheral subsoil cut off drain has been installed around the west, north and east sides of the landfill to intercept groundwater flow moving from beneath the landfill towards the Kaikorai Stream and other wetland areas outside the landfill.
- Collected leachate flows to a series of 9 pump stations located at intervals along the drain, from where it is pumped into the wastewater pipeline which runs adjacent to the south of the landfill.
- A clay bund has been constructed above the leachate collection drain that provides access around the western and northern sides of the landfill.

- There is a shallow swale between the bund and the toe of the landfill outer face that collects leachate breakouts or surface water that is contaminated by contact with refuse at the active tipping area and drains it to the leachate collection system.
- An open leachate ditch along the southern side of the landfill drains in a southerly direction to a pump station.
- Perforated leachate drains have been progressively installed within the landfill since 2019 (see Figure 10). Being placed at existing low levels with future waste to be placed above will maximise the ability to collect leachate in the future and keep the leachate levels within the body of the landfill as low as possible.

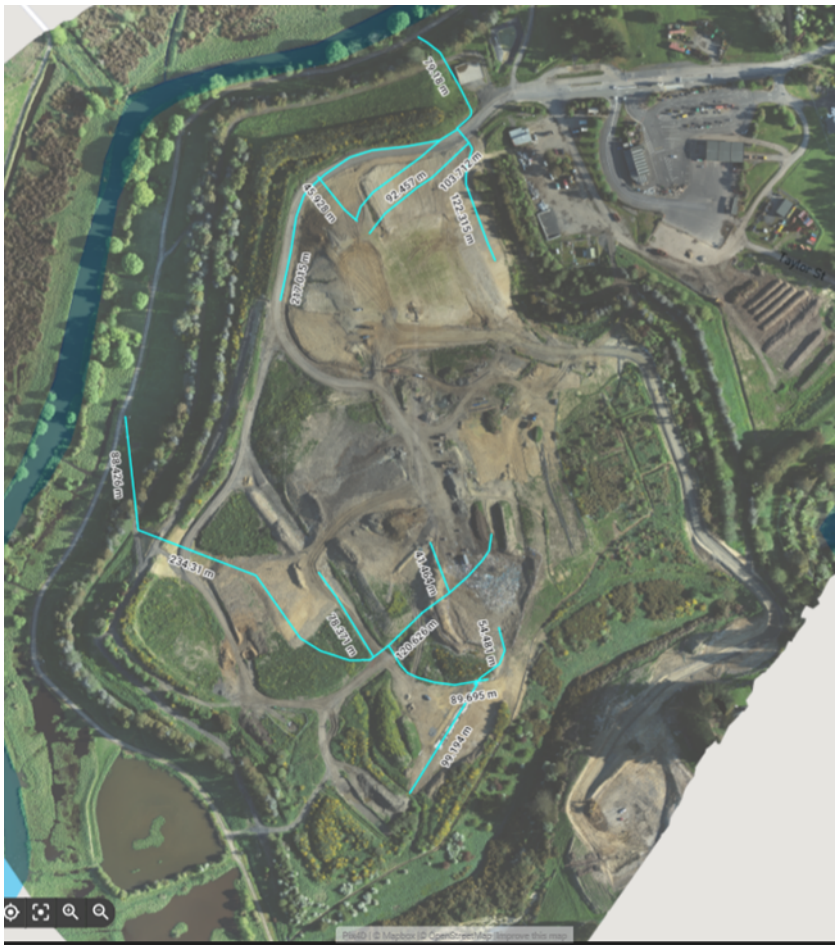

Figure 10: Location of perforated leachate drains within Green Island Landfill

Water levels within the landfill and adjacent to the leachate collection system have previously been measured, and it has been confirmed that the groundwater profile rises on either side of the leachate collection trench. Provided that this condition is maintained, leachate escape to the Kaikorai Stream will be minimised. The monitoring of the groundwater levels along and adjacent to the perimeter leachate collection trench is ongoing and continuous.

4.4.2 Leachate Minimisation

WM's LMP section 3.5.9.2 provides a list of practices and methods to be adopted to reduce the amount of leachate to a practical minimum. These include:

- Controlling surface water drainage.
- Placing, maintaining, and repairing intermediate and final cover as soon as possible and at appropriate grades.
- Managing wet waste streams to minimise the negative affect on the landfill.
- Maintaining the efficient function of the leachate extraction system.
- Mowing to increase evapotranspiration.

4.4.3 Operation and Maintenance of Leachate System

WM's LMP section 3.5.9.3 describes the scope of work required to operate and maintain the leachate system.

The landfill operator is responsible for monitoring levels, and daily operation and maintenance of the leachate system, and for taking immediate action to rectify any alarm received, which will be directed to both the technician and the Operations Manager.

4.5 Landfill Gas Management

4.5.1 Overview

The site has an established landfill gas (LFG) extraction system to harvest LFG through a system of vertical wells and horizontal pipes which traverse the site at various locations.

The network supplies landfill gas to the Green Island Wastewater Treatment Plant (WWTP) where it is mixed with digester gas and used to generate electricity. There is also a mobile solar flare that can be moved around the site and connected to up to 5 wells that are not able to be on the main network. The solar flare is typically located close to the active tip-face.

When generation is not required or stopped for any reason, the two gas streams are both flared at the WWTP.

Currently the existing gas extraction system requires constant tuning to maintain gas quality (methane content). This work is undertaken by the landfill operator, in conjunction with the Landfill Engineer and the team at the Wastewater Treatment Plant/Tuning of the gas field is achieved by adjusting valve settings at each well head depending on a range of conditions.

4.5.2 Objectives

WM's LMP section 3.5.10 provides extensive information on the management of landfill gas (LFG). It is produced in landfills as organic waste materials decompose under anaerobic conditions.

WM's LMP section 3.5.10.1 describes the principal objectives of a landfill gas extraction system, which are to:

- Maximise the capture and treatment of landfill gases.
- Minimise fugitive emissions.
- Control odour discharges.
- Reduce health and safety risks (accumulation of landfill gas in confined spaces, causing explosion, or asphyxiation).
- Avoid air ingress into the landfill and to minimise the risk of underground fires.
- Minimise the risk of damage to soils and vegetation within the rehabilitated landfill area.
- Reduce the impact on air quality and the effect of greenhouse gas emissions and minimise the value of the levy that applies.
- Allow a beneficial use of the gas resource (e.g., Electricity generation).
- Comply with conditions of consent.

4.5.3 Composition

WM's LMP section 3.5.10.1.2 describes the composition of LFG.

It is comprised of approximately equal parts of methane and carbon dioxide, with trace amounts of non-methane organic compounds and other substances.

Methane (CH_4) is a colourless, odourless, and tasteless gas. It is explosive in concentrations ranging from 5 percent (the lower explosive limit, LEL) to 15 percent (the upper explosive limit, UEL) in air, when a source of ignition is present. It is flammable in concentrations above 15 percent methane.

Carbon dioxide (CO_2) is a colourless and odourless gas. It is non-combustible.

Trace compounds, including esters, phenols, organic acids, solvents, and sulphur compounds, give the LFG its own characteristic odour. Other important trace compounds include carbon monoxide (CO), which may indicate combustion or landfill fire, and hydrogen sulphide (H_2S), which is a colourless gas with an offensive odour like that of rotten eggs and is poisonous at any concentration. At high concentrations H_2S is odourless and flammable.

4.5.4 Condensate

LFG condensate (see **WM's LMP section 3.5.10.1.3**) is liquid which accumulates inside LFG reticulation pipes. It is considered harmful and possibly carcinogenic to humans. Harm may be received by contact via skin, inhalation, or ingestion.

Condensate traps are used to remove condensate from the LFG pipes and return it to the landfill by injection into the waste at the traps or LFG well heads or at condensate soakaways and injection wells. Condensate is also directed in some locations to the leachate collection system.

4.5.5 Emission Paths

WM's LMP section 3.5.10.1.5 describes the typical three paths by which LFG can leave a landfill:

- By migration into the adjacent soils and underground structures.
- By emissions into the atmosphere from the landfill operating areas and final cover areas.
- By extraction through the LFG collection system.

4.5.6 Potential Impacts and Liabilities

Besides the potential for explosion or fire presented by methane, **WM's LMP section 3.5.10.1.6** describes other potential impacts and liabilities of LFG, such as presenting a nuisance in terms of odour and displacing ambient air with gas which may be toxic and deficient in oxygen.

Temperatures higher than 65°C could occur in decomposing waste, presenting a risk of spontaneous combustion, and waste may contain hot items or heat sources like charged batteries which have the potential to ignite waste and gas.

4.5.7 Site Specific Design

The Site incorporates the following design features for minimising the potential environmental impacts associated with LFG (**WM's LMP section 3.5.10.2**):

- Buffer zone.
- Phased development.
- Final cover system.
- Landfill gas extraction system.
- Landfill gas treatment by combustion.

4.5.8 Design Criteria

The Landfill Engineer and the Landfill operator will be responsible for designing and installing the landfill gas collection infrastructure in accordance with the Gas Masterplan design prepared by Tonkin + Taylor Ltd.

WM's LMP section 3.5.10.2.1 provides the general criteria that will apply to the design of the landfill gas system.

WM's LMP section 3.5.10.2.2 describes the requirements for the collection infrastructure, including details of the vertical wells and pipework.

WM's LMP section 3.5.10.2.3 describes how the LFG is to be conveyed by pipe to an LFG engine and flare station for a combination of treatments including destruction and beneficial use. The aim will be to optimise use of the LFG as an energy resource.

The Gas-To-Energy (GTE) facility is located outside the landfill site, within the boundaries of the adjacent Wastewater Treatment Plant (WWTP). LFG will be mixed with biogas from the WWTP to augment the gas supply and maximise generation.

The features of permanent flares for primary use for gas destruction are described.

WM's LMP section 3.5.10.2.5 describes the hazardous area classification system used for LFG infrastructure.

Depending on the zone classification, there are various operational safety requirements that will be managed in accordance with site's Health and Safety programme.

After new plant is installed at the landfill engine and flare site, the Landfill Engineer will prepare a new hazardous area classification assessment.

4.5.9 Contractor's Responsibilities

The landfill operator has the following responsibilities in operating the gas management system:

- Carrying out routine monitoring, operating, and expanding incrementally the LFG system as the landfill is filled over the remaining life, and through the aftercare period.
- Preparing records (as-builts) of the constructed LFG infrastructure (**WM's LMP section 3.5.10.2.6**).
- Establishing operational criteria for the LFG control systems based on engineering judgment, operational experience, and regulatory requirements (**WM's LMP section 3.5.10.3.1**).
- Monitoring a range of parameters at each well head.
- Identifying opportunities to improve to the existing collection system and increase the volume of gas recovered.

- Working closely with DCC to plan and implement a structured programme of work for improvements that are identified.
- Developing maintenance schedules for each element of the gas system as it is completed (**WM's LMP section 3.5.10.3.2**).
- Employing skilled staff who can restore full operation of the landfill gas system as soon as practical after any fault.
- Maintaining records of landfill gas operations, as-built plans, completed checklists, LFG monitoring results and reviews of LFG flow rate estimates (**WM's LMP section 3.5.10.3.3**).
- Regular monitoring and reporting of odours, LFG surface emissions and structures and confined spaces (**WM's LMP section 3.5.10.4**), including weekly walk-over surveys.
- Analysing data and undertaking actions according to the Contingency Plan (**WM's LMP section 3.5.10.4.10**).
- Conducting an annual review (**WM's LMP section 3.5.10.4.11**) in conjunction with the Landfill Engineer to compare actual gas flow against predicted gas flow.

4.5.10 Landfill Gas – Contingency Plan

WM's LMP section 3.5.10.5 sets out a contingency plan which provides pre-specified "response limits" or "trigger levels" for monitoring results which, if exceeded, prompt a course of remedial action. The contingency plan also provides guidelines for the appropriate remedial action and timeframes for completion.

WM's LMP section 3.5.10.5.5 provides a contingency plan flow chart to follow on receiving LFG monitoring results.

Trigger levels are set, and response guidelines provided for the following events:

- Odour.
- Surface emission of methane.
- Methane in structures and confined spaces.
- Methane in perimeter probes.
- Findings from walk-over inspection.
- Residual nitrogen, temperature, and carbon monoxide in a gas well.
- Difference between actual and predicted total gas flow.
- Dust.

4.5.11 Landfill Gas – Safety

WM's LMP section 3.5.10.6 describes the safety requirements for dealing with LFG.

Methane is the main component in LFG and is the main potential source of harm.

WM's LMP section 3.5.10.6.1 describes how an air/methane mixture passes through three specific ranges; lean, explosive, and rich when methane is introduced into an area, with fresh air being gradually displaced until the area may be filled with methane.

- Mixtures in the lean range, from fresh air to 5% CH_4 by volume (LEL), contain too little gas in relation to the amount of air to burn. Propagation of flame does not occur on contact with a source of ignition.
- Mixtures in the explosive or flammable range, from 5% (LEL) to 15% (UEL) by volume, will propagate flame. If ignited, the gas can cause damage and personal injury.
- Mixtures in the rich range, which extends from the UEL to 100% CH_4, contain too much gas in relation to air to be combustible. However, since the addition of air to these high concentrations of CH_4 creates mixtures in the flammable region, rich mixtures must be considered equally dangerous.

WM's LMP section 3.5.10.6.2 lists the processes that HSE legislation requires must be addressed at the site, including but not limited to:

- Identification of gas hazards.
- Hazard control, by elimination, isolation, and minimisation.
- Information for employees and contractors.
- Training and supervision.
- Monitoring of employee health.
- Emergency procedures.

- Recording, reporting and investigation of accidents.

These topics are each discussed in subsequent sections of WM's LMP and it is important that all people involved in activities at the Green Island Landfill familiarise themselves with them.

The landfill operator will operate internal systems to address and communicate health and safety issues relating to landfill gas for the benefit of employees. This will include regular meetings which all relevant staff are expected to attend (**WM's LMP section 3.5.10.6.5**).

The landfill operator will maintain Operations and Maintenance manuals for specific items of plant and standard operating procedures for specific activities relating to landfill gas. These manuals will contain specific instructions and safety notes for any installation, operation, maintenance, and monitoring.

Systems will also be operated for the safety of visitors and contractors.

WM's LMP section 3.5.10.6.6 provides details of the training that will be provided to employees to familiarise them with aspects of LFG.

The landfill operator will assign each employee who works with LFG with a suitably trained or experienced person as their supervisor.

Section 3.5.10.6.7 describes the monitoring that the landfill operator will undertake with respect to health and safety associated with LFG. It includes reviewing of:

- Hazards.
- Employee training.
- Employees' health.
- Content and suitability of reports.

The landfill operator will report events relating to safety around LFG and track resolutions as for general contingencies and emergencies at the site (**WM's LMP section 3.5.10.6.8**).

The Site Emergency Management Plan will contain procedures for addressing emergency events regarding landfill gas safety.

WM's LMP section 3.5.10.6.9 lists the records, pertinent to LFG, that will be maintained on site, for the purposes of health and safety.

4.6 Greenwaste Shredding and Composting

WM's LMP section 3.3.1 lists the scope of work required to undertake greenwaste shredding and composting activities on site.

Composting greenwaste material is currently accepted in the concrete pad area directly opposite the transfer station. Greenwaste is dumped on the concrete pad where it is moved and stockpiled ready for mulching. Once the greenwaste is mulched it is stockpiled in windrows and left to compost. It will then be screened and turned into a product that can be sold (**WM's LMP section 3.3.2**). Separation of non-desirable materials from the compost feedstock occurs. The likes of grass clippings, cabbage tree leaves and flax leaves are removed before shredding occurs.

Stormwater falls to the south of the composting area where it disperses through a large bund and then soaks into a soak pit at the far end of the bund (**WM's LMP section 3.3.3**).

Any leachate produced from the current composting system migrates through the ground and is captured by the leachate system (**WM's LMP section 3.3.4**).

4.7 Salvage and Management of Diverted Materials

4.7.1 Rummage Shop

WM's LMP section 3.2.1 describes the scope of work required to undertake the salvaging and management of recyclables, including the Rummage Shop.

WM's LMP section 3.2.2 describes the activities required to manage the Rummage Shop.

It describes the conditions for accepting and selling used goods and records that are to be kept.

There are certain used goods that cannot be re-sold, including:

- Pushchairs/strollers/prams/baby walkers or other similar items.
- Children's car seats or booster seats.
- Cycle or motorcycle helmets or any type of safety headgear.
- Toys that have safety warnings.

- No toys with small parts that are detachable and could be a choking hazard.
- Electrical goods, unless they have been checked by a certified electrical inspector/electrician and has the appropriate sticker placed on it, which states that it has been checked and is safe for sale.
- Bicycles, which will not be sold, but will be handed over to Malcom Trust, who repairs the bikes and put them back out into the community. If a bicycle is not suitable for re-use, it will be disabled and placed in the scrap metal bin or sold for spare parts.
- Gas cylinders of any type or age.

The landfill operator will provide training to staff on the principles of resource recovery, waste hierarchy, goods suitable for re-use/recovery, and customer service.

The facility will be audited annually through a comprehensive audit to identify areas of improvement and to work collaboratively with DCC to agree priorities and implementation programme.

4.7.2 Recycling Areas

WM's LMP section 3.2.3 describes the requirements for operating and managing the public recycling drop-off facilities.

The layout of recycling bins will provide easy and safe access, use and service, to encourage customers to use the facilities and maximise recycling.

Separate recycling bins will be provided for different types of recyclables, including sorting glass by colour.

All recyclable materials will be weighed and recorded prior to leaving the site.

4.7.3 Hazardous Waste – Household Drop-off

WM's LMP section 3.2.4 describes the requirements for managing the operation of the hazardous waste drop-off which must be closely monitored and managed.

Hazardous waste includes gas bottles, chemicals, used oil, corrosives, and flammable material. These will be notified at the weighbridge and dropped off at the correct hazardous waste area.

The landfill operator is to appoint staff, who are certified chemical handlers, to meet with customers and ensure that the waste is handled correctly and placed in the correct location in the hazardous waste drop-off facility, in a safe manner (**WM's LMP section 3.2.4.1**).

Certified chemical handlers are to transfer hazardous wastes regularly to the dangerous goods shed facility. Wastes are to be classified and documented appropriately, with each class of waste being stored in an appropriate location within the store to ensure separation of in-compatible dangerous substances (**WM's LMP section 3.2.4.2**).

WM's LMP section 3.2.4.3 describes the disposal of hazardous wastes.

Gas bottles will be de-gassed and scrapped.

When the dangerous goods shed is close to being full, DCC will organise a suitably qualified contractor to remove from site the current stock of chemical/hazardous wastes and dispose of them either locally, nationally, or internationally.

Used oil and/or will be collected by an approved Contractor/Recycler.

4.7.4 Scrap Steel

Scrap steel will be recovered and placed in the bin provided.

Scrap steel will not be accumulated on the site for a duration longer than five months.

Fridges are degassed prior to be processed as scrap.

4.7.5 Compost Sales and Vegetation Area

WM's LMP section 3.2.6 describes the requirements for accepting and dealing with greenwaste.

Greenwaste that is unacceptable for composting includes:

- Flax, cabbage tree leaves and grass clippings.
- Noxious plants and weeds (e.g., Hemlock, gorse, etc).
- Branches greater than 500mm.
- Stumps and roots.

The landfill operator is to keep the greenwaste receiving area tidy so that customers can dispose of their wastes safely and into the designated areas.

The landfill operator is responsible for selling compost and other landscape products to the public at the scheduled rates and for providing customers with assistance with loading compost and other landscape supplies. Much of the compost produced on site is used on top of recently capped areas.

4.7.6 Cleanfill

WM's LMP section 3.2.7 describes the cleanfill activities on site. Cleanfill will be removed for on-site uses as and when required.

4.8 Roading and Traffic Management

WM's LMP section 3.1.17.1 provides details on access roads.

The condition of the roads around the transfer station and onto the landfill is critical to efficient operations and to minimise nuisances (dust, mud, and noise), and ensures traffic moves around the site safely in all weather conditions.

The landfill operator will inspect the condition of the roads regularly and will make provision in work plans and annual operating budgets to maintain good drainage, repair potholes in the sealed surfaces as they appear, and grade metalled roads to maintain a good quality running surface.

WM's LMP section 3.1.17.2 describes the traffic management activities to be undertaken by the landfill operator.

The landfill operator will use appropriate signs to direct traffic through the site to and from the various drop-off areas (resource recovery, transfer station, green waste, tip face and special waste). On arrival at the tip face, a spotter/pointsman or machine operator will direct the truck where to tip. Clear signage and/or traffic lights will be used in and around the tip face area.

The speed limit on the site will be 30 km/hr. Standard road rules will apply.

4.9 Waste Acceptance

4.9.1 Resource Consent Requirements

Discharge permits 94693_V1 and 94262_V1 permit the discharge of municipal, domestic, hazardous, industrial waste and organic waste to land for the purpose of operating a sanitary landfill and composting operation.

There are no explicit requirements in the resource consent for waste acceptance, but the resource consent is to be exercised in conformity with the landfill work programme (i.e., the landfill management development plan).

WM's LMP section 3.1.23 describes the requirements for waste acceptance at Green Island Landfill. It has been repeated in its entirety in this LDMP with some minor amendments. It has been checked against the waste acceptance criteria provided in the 2007 LMP. The following are noted:

- Screening for wastes that generate leachate that exhibits hazardous characteristics occurs in the following way. Class A total concentration (TC) limits as are used as screening acceptance limits, followed by Class B leachability limits using the USEPA Toxicity Characteristics Leaching Procedure if the waste fails the Class A TC limits.
- If there are no guidelines set for contaminants in the MfE Guidelines or other documents cited in WM's LMP, then TCLP limits are set using various Trade Waste Bylaw limits, NZ drinking water standards and ANZECC Guidelines for Fresh and Marine Water quality. This same approach was used in the 2007 LMP.

4.9.2 Roles and Responsibilities

See **WM's LMP section 3.1.23.1**.

DCC take primary responsibility for establishing waste acceptance policy and criteria, assessing wastes against those policies, as well as communicating and documenting assessment information and decisions. This section is focussed primarily on the DCC's role.

The landfill operator is to use the advice and communication from DCC to correctly receive, charge and document loads across the weighbridge, as well as informing the disposal location and methodology. Specific details of these tasks are in separate sections of this section of the LDMP. The landfill operator is only to receive waste to dispose at Green Island Landfill if an assessment for acceptance has been undertaken by DCC and documentation for that waste has been provided to the landfill operator.

4.9.3 Waste Categorisation - All Categories

See **WM's LMP section 3.1.23.2**.

Waste is accepted in accordance with the MfE Landfill Classification Guidelines: Module 2 (2004), with waste streams assigned specific categories within DCC's computer software Landfill 3000. The waste acceptance criteria have evolved over time and are in-line with current best practise and industry standards (and recognised guidelines). Liquid wastes are accepted, which is not in accordance with Module 2 and the guidelines.

The following waste types are accepted at Green Island Landfill (the definitions on the website assist the booth operators when deciding if a load of material meets the criteria of a specific waste category).

- General Waste.
- Cleanfill.
- Cover.
- Rubble.
- Construction and Demolition Waste.
- Special and Hazardous Waste.
- Asbestos (including Asbestos in Soils).
- Contaminated soil.
- Household mattress.
- Sludges and Liquids (including some used oil).
- Tyres.

4.9.4 Prohibited Waste

See **WM's LMP section 3.1.23.3**.

Some materials are prohibited from the landfill due to the risks they pose to the environment or human health. Prohibited materials include radioactive material, liquid paint, refrigerant gases, gas cylinders PCB's and intractable organic chlorine.

4.9.5 Liquid Wastes

See **WM's LMP section 3.1.23.4**.

Green Island Landfill has historically always received bulk liquid wastes that would in many other landfills not be accepted. Included in the liquid wastes received are some loads from ship and vessel bilges that contain quantities of used oil. Historically the handling and disposal methods related to bulk liquids is not known to have resulted in either safety or environmental issues associated with increased leachate, increased or un-manageable odour issues, or the reduced stability of waste or landfill structure.

Bulk liquids do continue to be accepted for disposal. The same methodologies associated with acceptance sampling for other special wastes are also applied to liquid wastes. Some bulk liquid wastes are non-contaminated. DCC intends to stop receiving liquid waste in the future. Businesses producing the waste, will have to look for an alternative commercial solution.

4.9.6 Special Waste (Contaminated soils, Sludges and Liquids)

See **WM's LMP section 3.1.23.5**.

The special waste categories listed in Landfill 3000 are:

- Special/hazardous waste.
- Sludges and liquids (solids content at least 20%).
- Sludges and liquids (solids content less than 20%).
- Low level contaminated.

These types of waste are generally carried by commercial haulage companies and are produced by wastewater treatment facilities and industries.

4.9.7 Carrier Declaration

See **WM's LMP section 3.1.23.6**.

All customers are required to declare special or hazardous wastes. Any wastes which have been illegally dumped is a breach of the Resource Management Act. ORC may also be involved for clear breaches by members of the public undertaking illegal dumping of such wastes. Fines under the RMA are substantial.

4.9.8 Material from a Hazardous Activities and Industries List (HAIL)

See **WM's LMP section 3.1.23.7.1**.

Any material being received from an identified HAIL (Hazardous Activities and Industries List) site is required to provide sampling information to adequately demonstrate the acceptability of material for receipt at Landfill. The HAIL outlines the type of activities/industries that have resulted in contaminated sites, so if a site is being developed and the site history indicate that it may be contaminated it is up to the landowner to investigate the soils and provide evidence about the soils that are being disposed of.

The acceptance assessment undertaken by the DCC Landfill Engineer will be targeted to the potential risks associated with the site of origin and nature of material and contamination.

Material from a HAIL site will only be received at Landfill after confirmation of its acceptability (email documentation and form).

4.9.9 Random Audits/Suspicious Load

See **WM's LMP section 3.1.23.7.2**.

Random audits are at times undertaken which target non-declared loads of material being brought to the landfill that are being declared by the carrier as non-contaminated, and of any material type (cleanfill, cover, C&D material). If in the instance that a load declared as non-contaminated by a customer did not comply with the landfill acceptance criteria, follow-up by DCC would occur.

Similarly, if the landfill operator suspects a load brought by a customer might be contaminated then sampling of this material may be undertaken (DCC initial cost). If the material fails, the acceptance criteria for the declared waste type then again follow-up by DCC would occur.

In either of the above instances the follow-up from DCC could result in cost recovery for testing and/or potential remediation costs from the customer. In addition, there could also be consequences (fines/prosecution) under the Resource Management Act 1991 and/or the Local Government Act 2002.

Many of the carriers know that the random sampling occurs.

4.9.10 Acceptance Process and Criteria

See **WM's LMP section 3.1.23.8**.

The decision-making process applied to acceptance and classification is in accordance with MfE Landfill Classification Guidelines: Module 2 (2004). The decision-making tree from these guidelines and included as Figure 11, is the decision-making process applied by DCC.

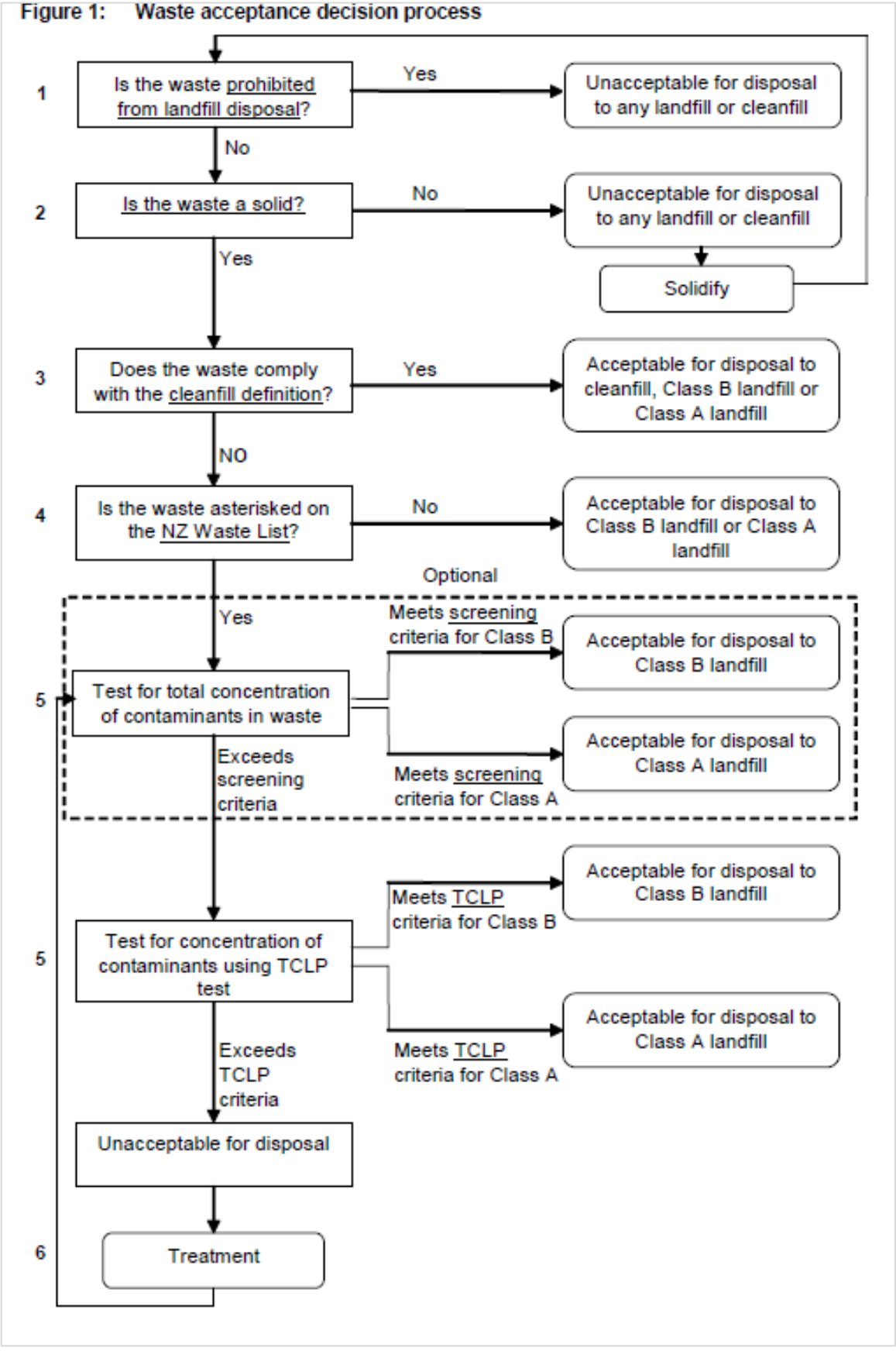

Figure 11: Waste Acceptance Decision process (source: MfE Landfill Classification Guidelines)

4.9.11 Class A Screening/Class B TCLP

See **WM's LMP section 3.1.23.8.1**.

Class A Total Concentration (TC) limits are used as screening acceptance limits, in place of historically used Class B screening acceptance limits. This methodology has been in place since 1 February 2016, after a joint review by the then landfill operator, DCC and the ORC. That review identified that most of the samples failing the Class B TC limit easily passed the Class B Toxic Characteristic Leaching Procedures (TCLP) limit, which resulted in unnecessary time effort and costs associated with testing.

The Class B TCLP limits are historically used are appropriate for overall class and type of landfill that Green Island Landfill is, Class B.

Materials undergo an initial screening test (TC), with the elements of interest measured in milligrams per kilogram (mg/kg). Material with Total Concentrations (TC) below these criteria, as measured against the Class A limit, is non-contaminated and can therefore be classified in accordance with its material characteristics, i.e., "Cleanfill/Rubble/Cover".

Material that exceeds (fails) the Class A screening criteria but passes the TCLP for Class B will be known as "Low level contaminated fill". Any material failing both will be defined as a "Special waste". Material in the special waste category will require treatment to meet the TCLP requirements of the landfill before being disposed.

From a contaminated-land perspective the key naturally occurring contaminants of concern are Arsenic (As), Cadmium (Cd), Copper (Cu), Chromium (Cr), Nickel (Ni), Lead (Pb), Zinc (Zn), and Mercury (Hg). Table 4 provides DCC, landfill customers and their advisors simple guidance on these limits.

Table 4: Green Island Landfill Acceptance Criteria for Common Heavy Metals

Metal	Class A (TC)	Class B (TCLP)
Arsenic	100	0.5
Cadmium	20	0.1
Chromium	100	0.5
Copper	100	0.5
Lead	100	0.5
Nickel	200	1
Zinc	200	1

4.9.12 Acceptance Limits – General, TC and TCLP

See **WM's LMP section 3.1.23.8.2**.

The waste acceptance criteria used at Green Island Landfill is (but not limited to):

- MfE Document Module 2- Hazardous Waste Guidelines, Landfill Waste acceptance Criteria and Landfill Classification (2004).
- NSWEPA leachability criteria for Solid Waste Landfills, as given in the CAE 2000 Landfill Guidelines (available on the ministry for the environment website), which include total concentration limits as well as TCLP limits.
- Alberta Hazardous Waste Regulatory Framework 2006.
- Other criteria appropriate to the waste type being received.

If none of the above sources have criteria for the relevant compound, then either set TCLP limit through site-specific risk analysis or use the lesser of the following:

- NZS 9201 Model Trade Waste Bylaw limits.
- 100 times the New Zealand drinking water standard.
- 1000 times the guidelines for the protection of aquatic species, as given in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000).

DCC had an independent review undertaken in 2017 of these acceptance limits, criteria and approach which affirmed the appropriateness of use and application.

4.9.13 Total Petroleum Hydrocarbon material (TPH)

See **WM's LMP section 3.1.23.8.3**.

Hydrocarbon contamination (TPH) is common in soils from some sites such as fuel station or petrol and diesel tank remediation works. MfE does not have a landfill acceptance level for TPH, instead focusing on BTEX or PAH indicators. The primary concern with TPH material is worker safety considerations in terms of exposure to both gas and liquid phases. Landfill acceptance criteria are:

- Material with a TPH of less than 200 mg/kg considered non-contaminated (i.e., cleanfill/cover).
- Material in range of 200 -1,000 mg/kg TPH considered low level contaminated fill.
- Material with greater than 1,000 mg/kg TPH will not be accepted.

4.9.14 Low Level Contaminated Fill

See **WM's LMP section 3.1.23.8.4**.

If the material fails test the TC test, the TCLP is then undertaken. This type of testing considers the leachability of the material in a slightly acidic environment (similar to a landfill). If the material meets the MfE landfill acceptance criteria for the TCLP indicators for a class A landfill, then the material is considered "Low level contaminated" fill. The TPH must still be less than 1,000 mg/kg.

4.9.15 Asbestos Soils

See **WM's LMP section 3.1.23.8.5**.

Asbestos soils require to testing in accordance with and are assessed against the BRANZ "Asbestos in Soil Guideline", formally known as "New Zealand Guidelines for Assessing and Managing Asbestos in Soil. The assessment requires testing of respective weight of material found in a sample and compared against the guideline value of 0.001%w/w FA (fibrous asbestos) and/or AF (asbestos fines).

Soil that is tested BELOW the guideline value is categorised as non-contaminated and hence is then classified and used depending on its material characteristic (cleanfill, cover, rubble).

Soil that is tested ABOVE the guideline value is categorised as Asbestos-containing and requires special handling/treatment.

4.9.16 Asbestos-containing Materials

See **WM's LMP section 3.1.23.8.6**.

Building materials containing Asbestos are, by definition, immediately classified as such and received and charged accordingly.

4.9.17 Special Waste

See **WM's LMP section 3.1.23.8.7**.

If the material fails the TC and TCLP, it is considered "Special Waste" and cannot be accepted to the landfill without treatment. At this stage it is likely that the landowner/developer will want to consider their options. Often the most cost-effective method of dealing with contaminated material is to mix a designed percentage of cement or lime to the material which binds the soluble material thus reducing the leachability of the contaminates (micro encapsulation). Or in the case of TPH levels are greater than the landfill acceptance criteria of 1,000 mg/kg then the material treated at a different site and re-tested before being confirmed for acceptance

4.9.18 Holding Materials Awaiting Testing

See **WM's LMP section 3.1.23.8.9.**

This was an activity and service provided in the past where materials were temporarily stored awaiting the test results to confirm acceptance or otherwise. This service is no longer provided as if is considered unduly risky and could potentially put landfill staff and/or site visitors at risk.

4.9.19 Manifest System

WM's LMP section 3.5.5.1.2 deals with operational procedures, handling instructions and future waste manifests since there is presently no formal waste manifest system.

Special and hazardous wastes are declared at the booth, so they can be managed correctly. Commercial quantities of special/hazardous waste require approval from the Landfill Engineer. Once these materials have been assessed and approval granted, the Landfill Operator is informed of the material. Depending on the material and if any preparation is required, up to five days' notice may be required to allow the operator time to receive the material.

4.10 Site Procedures

4.10.1 Routine Development

Prior to starting a new landfill cell, the landfill operator will carry out development work as follows:

- Peg out the location of the new cell.
- Strip previous cover and stockpile in an approved location on the site.
- Re-route the access road and relocate any water diversion structures as necessary.
- Re-route the surface water runoff drains.

Cell development will include the following activities:

- Each cell will be located according to the Operations Plan.
- There will be a fall across the cell, to a soakage trench that will drain through the intermediate cover into the waste below.
- Generally, fill layers will be shaped to fall towards the centre of the landfill rather than to the sides.
- There will be sufficient suitable gravel or an alternative on the surface of the cell to provide an all-weather surface for the haulage vehicles.
- As much of the underlying daily or intermediate cover as practicable will be progressively removed to allow leachate to migrate downwards, rather than sideways, before it is covered by waste. Any remaining cover material will be scarified to facilitate vertical drainage.
- During wet periods, when it is difficult to remove cover material, trenches will be dug in the primary cover to expose the underlying waste to facilitate leachate migration into the landfill.

4.10.2 Access Roads and Tip Pad

WM's LMP section 3.5.3 describes the requirements for providing roads to the tipping face and formation of a tip pad.

Roads to the tipping face will be formed with all-weather surfaces from the site entrance to the tip face and maintained so that they are able to be safely trafficked by customer vehicles in all weather conditions.

Culverts will be provided as required for drainage of surface water beneath and away from the access roads.

An adequate turning area will be maintained on the tip face for trucks to manoeuvre and tip. The surface of this turning area will be maintained for easy, safe traffic movements and to reduce the transport of mud onto access roads.

The speed limit on the site will be 30 km/hr. Standard road rules will apply.

4.10.3 Compaction/Placement of Waste Fill

WM's LMP section 3.5.4 describes requirements for placing waste and compacting it.

4.10.3.1 Access

Access to deliver waste direct to the landfill will be restricted to selected large commercial customers, and consolidated loads of the waste dropped off at the transfer station.

4.10.3.2 Roads, Traffic Control, Temporary Fences and Barricades

Traffic control will be instigated as required for safety and for keeping vehicles to defined road surfaces to reduce nuisances (dust, mud, noise). Appropriate signage will be prominently displayed to direct customers to the various areas of the landfill.

Barricades and temporary fences will be erected where necessary to make excavations safe and ensure that customers can traverse the site and dispose of their wastes in safety.

4.10.3.3 Minimum Personnel

The tip face will be always manned during open hours. A minimum of 1 person will be allocated at all times to tip face duties.

4.10.3.4 PPE

Operators and pointsmen/spotters will be provided with adequate personal protective equipment in accordance with the site's Health and Safety Plan.

4.10.3.5 Tip face

Supervision of disposal activity at the tip face will be maintained when wastes are received to ensure the accountability and safety of those depositing wastes at the site, and to identify inappropriate loads before they are covered and incorporated into the waste mass. DCC will be advised if any waste that contravenes the waste acceptance criteria is tipped at the landfill for disposal (e.g., prohibited, or hazardous waste). A spotter/pointsman or machine operator will direct customers where to tip.

If the landfill operator identifies waste as being unacceptable while it is still in the possession of the transporter, the load will be rejected and remain the responsibility of the transporter. If inappropriate waste is identified after unloading at the tip face, then immediate steps will be taken to separate and secure the waste. Contingency plans for identification of the waste and special handling procedures will be implemented immediately. Landfill users and staff must be protected from any health and safety hazards that might be caused by such waste materials.

Waste and fill materials are primarily delivered by commercial operators using a variety of collection trucks and bulk transfer methods. Members of the public will deliver materials in cars and trailers, boot loads or utility vehicles directly to the reuse shop and or RTS facility.

The tipping platform is a 9m x 12m rectangle, delineated by 4 large tyres. Lights allowing access to the tipping platform are red until the bulldozer operator switches the lights to green, indicating that a vehicle can enter the tipping platform and dispose of its load.

Once the material is discharged onto the tip face, it is moved and compacted by heavy mobile plant.

In general, only one tip face will be operated at any one time. A second tip face with equivalent restrictions will be allowed at the same time on a day-by-day/as necessary basis.

- During placement of special waste which for operational reasons requires its own dedicated disposal site.

The tip face size will follow the following limits and guidelines:

- The purpose of minimising the active tip face size is to reduce the amount of odour from freshly delivered waste, to reduce odour from landfill gas escaping while these is no cover, to reduce cover requirements, to reduce stormwater ingress, to reduce access for vermin and to reduce nuisances such as litter and dust.
- The area of refuse exposed at the active tip face will be kept as small as practical, depending on numbers of refuse trucks, practicality of operations of compactors and bulldozers, slope, surface water run-off controls, odour from underlying waste, soil cover management and safety. The area will be no more than 900 m^2, unless special circumstances prevail that necessitate its expansion to a maximum of 1,200 m^2.
- The width of the active tip face will be restricted to 30m. this provides sufficient room to allow customer vehicles to manoeuvre and unload quickly and safely.
- Refuse will be unloaded as close as practical to the active tip face.
- The distance from the site where the trucks tip their waste to the active tip face where the waste will be buried will be kept to a practical minimum and not greater than 50m.

The special circumstances when the tip face size may be expanded to 1,200 m^2 are as follows:

- During times of day when the demand, i.e., rate of truck arrivals, is 25% more than average as decided by operational staff on a shift-by-shift basis (shifts of maximum 4 hours).
- During waste placement in areas with unusual constraints such as shaping to form an extreme corner of the waste pile.
- Circumstances where gas escape from underneath the day's refuse and odour from the day's refuse are unlikely.

Machine operation:

- A suitable site traffic management will be developed to ensure the safe passage of vehicles and customers around the site. This plan should address hazards associated with all vehicle movements on site, including mobile plant.
- Reversing vehicles, speed, traffic flow and customer movements should all be considered, and landfill operators should ensure clear segregation between customers and mobile plant and vehicles (e.g., through using physical barriers or distance).
- When towing stuck vehicles, landfill operators should undertake a risk assessment prior to towing a stuck vehicle; use properly engineered towing points on trucks and mobile plant; ensure chains, wire ropes and strops are certified; complete a pre-use inspection process for chains, wire ropes and strops; enforce an exclusion zone during the towing process; ensure only essential personnel are involved in the process; and ensure people are properly trained in towing procedures.
- Additional measures that should be considered to ensure people are not exposed to crush injuries include spotters directing traffic at the tip face, rotating beacons/strobes, audible alarms, reversing beepers and/or reversing cameras, and clear and concise signage and exclusion zones around working equipment.

- Reversing should be minimised wherever possible by implementing a good traffic management plan.
- Landfill operators shall ensure the tip face area is made safe for vehicles discharging waste including consideration of ground stability and evenness; traffic and pedestrian management; sufficient distance between unloading vehicles; management of stuck loads; control of vehicles while backing; and edge protection when tipping off a wall/batter.
- Drivers of vehicles should ensure three points of contact are maintained when entering and exiting vehicle cabs and should always face the vehicle when entering or exiting. Handholds should be installed, and steps maintained in a non-slip condition.
- Mobile plant should be used for the purposes for which it was designed, and users must be trained, assessed, and authorised. Operating procedures should describe the safe and correct use of the mobile plant. All mobile plant should be maintained in accordance with the manufacturer's recommendations and certified where necessary.
- Landfill operators should refer to machine operations manuals, develop and implement maintenance schedules and conduct daily inspections. Externally performed maintenance schedules should also be developed for each machine.
- Machine inspections should be completed, and records retained on all mobile plant.
- Measures to warn other operators and workers of mobile plant movements should be considered, such as reversing buzzers, cameras, flashing beacons and lighting.
- Where required, all mobile plant will be fitted with a suitable Operator Protective Structure (ROPS, TOPS, COPS, FOPS).
- Strict rules will be applied in respect of mobile plant access and egress including rules requiring handrails and guards, maintaining three points of contact, and ensuring steps and surfaces used to access mobile plant are non-slip.
- Seatbelts should be always used.

Various combinations of mobile plant will be used to meet operational requirements at the discretion of site management depending on factors at the time such as materials to be handled, nature of seasonal works, waste acceptance rate, type of waste, compaction standards, cover requirements, earth haul distances and grades, safety, operator comfort and safety, and machine economics.

While waste is being placed, the following minimum list of mobile machines will be always maintained readily available on the site. Machines that are larger than the indicated minimums will be used by the landfill operator if required to conform to good modern landfill practice.

- 1 x Compactor (minimum 24 tonnes, 180 kW, "816" size).
- 1 x Bulldozer (minimum 16 tonnes, 110 kW, "D6" size).
- 1 x Hydraulic excavator (minimum 12 tonnes, 60 kW).
- 1 x Water truck.
- 1 x 4WD utility vehicle.

The landfill operator is to periodically employ, by owning or hiring, more equipment to improve efficiency of the operation. The typical ancillary mobile plant list which may change from time to time is:

- Additional Compactor.
- Additional Hydraulic excavator.
- Additional Dump truck(s).
- Tractor.
- Re-fuelling truck.
- Motor-grader.
- Wheel loader.
- Roller.

4.10.3.6 Tipping

The landfill will be developed progressively in accordance with the pre-determined plan agreed with DCC.

The tip face will be opened each day by stripping back daily cover. General waste will be allowed to be tipped on a tipping pad, or directly into a specially prepared burial site.

The landfill filling plan will consider site conditions, the optimum size of the work face and, where possible, provide for an alternative tipping area that can be opened in response to specific conditions such as high winds or heavy rain.

Landfill operators will be responsible for reporting any abnormal loads. These will be recorded, by way of inspection registers or incident reports or a similar system which is readily accessible to all staff.

4.10.3.7 Compaction

Compaction improves the stability of the waste mass and minimises the airspace and land used for landfilling. It also minimises cover requirements, and minimises the formation of voids that encourage vermin, reduction in fires and decreases leachate generation. The waste will be compacted efficiently and safely with specialised heavy mobile compaction equipment. Equipment will be selected with due regard to efficiency and environmental factors such as noise and emissions.

For efficient compaction, the layers will be generally flat. Waste will be spread as thin as practical e.g., less than 0.6 m before compaction. The waste being compacted will be ramped up at the outside slope edge or sloped away and down towards the existing waste pile to reduce potential future leachate breakouts.

General waste containing bulky refuse items will not be placed in the final lift, to avoid puncturing the final cap after settlement, unless a specific blinding and separation layer is formed.

Special waste which has significantly different compressibility properties from the surrounding general waste (e.g., compressible, or stiff) will not be placed within 2-3 m underneath final cover, to avoid sharp differential settlement which could affect the integrity of the cap.

Special waste which is potentially odorous will not be placed within 2 to 3 m underneath final cover, to avoid difficulties with gas collection and potential odour emissions.

Special waste which has implications for health and safety such as asbestos will not be placed within 1m underneath the final cover, to avoid accidental disturbance during capping and underground services works.

4.10.3.8 Density of waste

Periodic (at least annual) topographic surveys of the waste pile will be used to monitor progress regarding compaction and density and calculate airspace consumption. Together with weighbridge records of the amounts of waste received, the density of the waste will be calculated.

4.10.3.9 Maximum Gradient

To ensure slope stability and safe operations, all waste and cover will be placed at a gradient no steeper than 3:1 (3 horizontal to 1 vertical).

4.11 Site Cover

4.11.1 Daily Cover, including variations in Cover Types

4.11.1.1 Purpose

WM's LMP section 3.5.6.1 outlines the purpose of daily cover:

- To reduce nuisances (birds, vermin e.g., flying insects and rodents, litter, odour, dust).
- To reduce fugitive gas emissions.
- To reduce air intrusion when the waste is under vacuum for gas extraction.
- To minimise the risk of fire.
- To reduce infiltration of stormwater that generates leachate.

4.11.1.2 Materials

WM's LMP section 3.5.6.1.1 describes the types of materials that are suitable for use as daily cover.

Stockpiles of a variety of materials will be held around the site where appropriate to control landfill nuisances.

Daily cover will comprise natural earth material. A minor organic content from vegetation will be acceptable. A minor amount of contamination or flagging with waste will be acceptable if the soil has been used previously as cover.

Natural earth materials which have a low level of contamination (e.g., soil contaminated by petroleum or LLCS) may be used as daily cover and left overnight without further daily cover provided that:

- It is machine-rolled to seal it against stormwater infiltration and erosion, or it is covered with an alternative daily cover e.g., tarpaulin.
- There is no stormwater run-on.

- It is not odorous and will not become odorous.
- It will be covered regardless with clean daily cover if the forecast next delivery of the waste intended to overlie it is more than a fortnight away.

It will be the responsibility of the landfill operator to ensure that an adequate supply of soil cover is always available and accessible, either from stockpiles or borrow areas. This issue will be important in winter when the non-landfill parts of the site may become inaccessible due to severe softening of wet ground.

4.11.1.3 Methods

WM's LMP section 3.5.6.1.2 describes how daily cover is to be applied.

In dry weather, when the available soils are friable in nature, bulldozers will be used to spread the soils as daily cover. The daily cover will be track-rolled or otherwise compacted by rolling heavy equipment to seal and stabilise it.

In wet weather, when the available soils are saturated and plastic, hydraulic excavators (diggers) with wide buckets will be used, to spread and smooth the cover. No further compaction would be applied.

Daily cover will normally be stripped off at the beginning of each operating day, commencing half an hour before the posted operating hours for that day. Both bulldozers and diggers will be used as required. The removed soil will be stockpiled alongside the tip face for re-use.

If satisfactory removal of cover is impractical, 'windows' will be cut through the cover to permit future gas and leachate migration. This avoids perched leachate tables.

If the underlying waste or the cover soil itself is known to be or found to be unusually odorous, either the cover will not be stripped at all (provided this would not seriously affect future leachate and gas migration), or additional odour controls would be used during the cover stripping e.g., direct application of odour suppressant.

4.11.1.4 Thicknesses

As stated in **WM's LMP section 3.5.6.1.3**, daily cover will be placed over all refuse that has been delivered that day to a minimum thickness of 150 mm.

Occasionally more daily cover soil may be added to create 'thickened daily cover' as described below.

4.11.1.5 Slopes

WM's LMP section 3.5.6.1.4 describes how daily cover is to be sloped to promote surface water run-off.

To address stability of temporary slopes in refuse, all waste and cover will be placed at a maximum gradient of 3:1 (3 horizontal to 1 vertical) for slopes up to 30 m height measured vertically, and at a maximum overall slope of 4:1 for slopes more than 30 m height.

4.11.1.6 Timing of daily cover

WM's LMP section 3.5.6.1.5 addresses the timing of daily cover placement.

Daily cover will be placed each day. Daily cover placement may commence at any time during the day on areas of exposed refuse that will not be receiving more refuse that day.

Daily cover or interim soil cover will be placed immediately over odorous waste if no other control is immediately available to either neutralise or bury the odorous waste.

If more refuse is not expected to be placed within the next three months, then intermediate or final cover will be placed.

4.11.1.7 Alternative daily cover

WM's LMP section 3.5.6.1.6 allows for the use of alternative daily cover.

The use of alternative daily cover will not be excluded if it can be demonstrated that an alternative will perform as effectively as soil cover for compliance with respect to nuisances, stability, and environmental effects, subject to consultation with and obtaining approval from DCC.

4.11.1.8 Cover – Contingency

WM's LMP section 3.5.6.1.7 provides guidelines for suitable responses to identified events. These events include:

- Leachate breakout.
- Gas escape from cover.
- Cover cracking.
- Erosion.
- Differential settlement.

- Flagging of waste through daily cover.
- Overfilling still high after five years.
- Litter escape (wind-blown).
- Landslip in cover.

4.11.2 Intermediate Cover

WM's LMP section 3.5.6.2 deals with intermediate cover.

Intermediate cover will be placed over areas of the landfill that will not be worked for at least the next three months, subject to suitable weather conditions, and will:

- Minimise water ingress to the landfill.
- Minimise odour in areas subject to significant delay in further waste placement.
- Reduce air intrusion when waste is under vacuum for better gas extraction.

Intermediate cover will comprise at least 300mm of soil capping material. Vegetation growth on intermediate cover will be encouraged.

Intermediate cover will comprise material capable of achieving a maximum permeability of 10^{-7} cm/sec after compaction with the plant and equipment employed to spread and place it.

Care will be taken when stripping intermediate cover before placing further waste to render the surface permeable to landfill gas and leachate.

4.11.3 Final Cover

4.11.3.1 Purpose of Final Cover

WM's LMP section 3.5.6.3 describes the requirements for final cover.

Final cover is placed on areas of the landfill that have been filled to final grade and shaped to final profile.

The purpose of the final capping layer is to:

- Prevent leachate breakout.
- Provide a stable platform or edge for landscaping.
- Be erosion resistant by being well compacted.
- Using low permeability materials retain landfill gas such that it can be captured and destroyed, to minimise odour impacts, to minimise surface landfill gas emissions that can present risks to health and safety, and such that plants on the surface do not die from oxygen depletion.
- Provide final contour and stormwater management to limit the ingress of stormwater to the landfill and subsequent generation of leachate.
- Rehabilitate the site surface as appropriate for the planned end use.
- Provide a stable, maintainable long-term landform that allows plant growth and maintains physical separation between waste and animal life.

4.11.3.2 Composition of Final Cover

The design and composition of the final cover is to be consistent with the GHD, September 2021, *Green Island Landfill Capping – Design Report*. The construction process is to include appropriate quality control testing and the quality control process is to be approved by a suitably qualified Engineer. The final cover shall consist of (from the top down):

- 350 mm topsoil and sub-topsoil
- 600mm compacted cohesive soil placed and compacted in a minimum of two layers to achieve a minimum bearing pressure of 100 kPa and with a permeability < 10^{-7} m/s.
- 300mm intermediate cover.
- Waste.

All soils used in final cover will be required to be free from contamination and rubbish. Final cover soils will be obtained primarily from stripping on the site from the borrow area located on the southeastern edge of the landfill, as well as materials imported or brought to site.

Topsoil will be natural organic topsoil, containing negligible roots and stones that could hamper proper harrowing and sowing.

Sub-topsoil will be soil that is suitable for supporting growth of plant roots and could include friable natural soils, compost material, as well as lower quality topsoil material.

Compacted low permeability soil, meeting the required specification, will be moderately or highly plastic fine-grained clay material at a suitable water content for compaction by conventional earth fill compaction machines.

4.11.3.3 Final Cover Thickness

Thickness will be confirmed by ground surface surveys, firstly on top of the intermediate cover and secondly on top of the low permeability layer. Any thickness shortcomings will be addressed by additional filling before scarifying and placing topsoil.

The intention of surveying the top of the low permeability layer will also be to provide a final contour that is smooth rather than following any humps and hollows on top of the intermediate cover.

To establish grass and other vegetation on the final cover the layer of topsoil may be thickened if appropriate for the intended after-use. Compost or other soil conditioners may be used to supplement topsoil.

4.11.3.4 Timing of Final Cover placement

The landfill surface will be progressively restored i.e., properly covered, and grassed as areas reach final level. The aim will be to ensure that the objectives of final cover listed above will be met promptly and in a timely manner. In this way restoration will become an integral part of the landfill operation and experience gained during the early phases would be applied to the forward planning of cover construction in subsequent areas.

The advantages of placing final cover promptly outweigh the disadvantages, so it is not proposed to wait for settlement to occur first. This means however that more frequent repairs may be required to fix areas of final cover distressed due to differential settlement.

As the landfill settles it may become necessary to remove topsoil and fill areas to avoid local ponding and restore grades on surface water drains.

Grass will be established immediately following completion of the top soiling/compost.

It is fundamental to the achievement of design objectives for the management of the site that final cover is carried out diligently in accordance with design requirements.

4.11.3.5 4. Landfill Cap Drainage

WM's LMP section 3.5.6.3.1 deals with landfill cap drainage.

Landfill cap drainage will be established by contouring the final cover to form drainage swales in appropriate locations and at appropriate grades.

All cap drainage will be inspected periodically, and drainage swales will be maintained to mitigate the observed effects of:

- Uneven settlement (requiring adjustment of swale gradient/surface).
- Localised erosion (due to uneven grass strike for example).
- Cracking (due to settlement or desiccation).

4.11.3.6 Differential Settlement

WM's LMP section 3.5.6.3.2 discusses differential settlement.

The total amount of long-term settlement is expected to at least 15 % of refuse thickness, with approximately half occurring in the first five years after waste placement. As outlined in Section 3.5.5 above, overfilling by 15% of the refuse thickness is allowed for. The settlement will not be uniform with some areas settling more than others. Factors affecting settlement include the nature of the waste, moisture, compaction, surcharging and the phasing or speed of completion up to final level.

Issues associated with differential settlement include:

- Cover cracking, leading to gas escape and air intrusion.
- Ponding, leading to leachate generation and local higher gas generation and pressure.
- Reverse falls or steep falls on bench drains, leading to washouts or erosion.
- Uneven slope profiles, leading to poor aesthetics.
- Low points in gas pipes, leading to condensate blockage.

- Mismatch between old, settled areas and newly filled areas.

Often it will be necessary to marry a newer part of the landfill (built up to design level) to an older part of the landfill (which has settled to below design level). Problems may arise with continuity of fall in bench drains (leading to either a step down or a step up) and continuity of slopes (a step in the upslope/downslope direction) and must be considered.

4.11.3.7 Placement methods

WM's LMP section 3.5.6.3.3 deals with placement methods for constructing the final cover.

All final cover material will be placed by spreading in layers and compacting using earthmoving machines. The minimum standard will be to achieve hydraulic conductivity of approximately 1 x 10^{-7} m/s. Achieving a lower permeability of final cover by heavy compaction might be difficult due to "spongy" waste underneath and might be counterproductive if the compaction method results in a layer which is either brittle or prone to seasonal desiccation. Nevertheless, site management will generally aim for a better permeability standard, but this will depend on factors at the time including nature of material, moisture content, weather conditions, machine availability, slope angle, and installations such as gas well heads to be worked around.

The low permeability soil will be placed in a minimum of two layers, using earthmoving machines for spreading and full-coverage compaction of each layer.

The top surface prior to placing topsoil will be scarified to assist bonding of the topsoil to the underlying cap fill.

There will be no programme to specifically test the permeability. Instead, the specified standard will be deemed to have been met if materials are selected as specified and if materials are placed by the methods specified. Permeability testing will also occur by DCC engineer's request.

4.11.3.8 Underground services

WM's LMP section 3.5.6.3.4 discusses the need for some underground services to be located within the final cover layer and how they are to be accommodated.

The preferred approach is to plan for known services and install them ahead of cap construction beneath the low permeability capping layer on the intermediate cap, with appropriate bedding materials. Services may include gas headers, condensate pipes, leachate re-circulation lines, control / communications cables, and irrigation pipes. Where services need to be installed after cap placement, trenching into the final cover is required. The installation trenches will be excavated and, if necessary, placed within a thickened layer of intermediate cover which is immediately below the 600mm low permeability cap layer. After installing the services, the trenches will be backfilled with compacted low-permeability soils. Any granular bedding will be interspersed with cut-offs to reduce potential gas and liquid flow.

4.11.3.9 Stockpiles

WM's LMP section 3.5.6.3.5 provides details of stockpiles.

Towards the end of the landfill's operating life, there will be a greater demand for final cover materials. The completed landfill surfaces may not provide sufficient suitable space for stockpiling these materials in advance. Therefore, provision will need to be made in advance for suitable earth material that comes available to be stockpiled on the site.

4.11.3.10 Setting out

See **WM's LMP section 3.5.6.3.6**.

The landfill operator will place refuse up to the design final levels, with an allowance for settlement and less a height to allow for the construction of final cover (see Section 3.5.5). Proper survey techniques will be used to ensure that the cover will have the required thickness beneath final surface drains and structures.

4.11.3.11 Overfilling

See **WM's LMP section 3.5.6.3.7**.

It may be necessary to overfill the final cap levels to allow for settlement back to the specified final levels, and this will be agreed with DCC as and when required.

4.11.3.12 Stability

See **WM's LMP section 3.5.6.3.8**.

The slope of the landfill cap is discussed in the "*Green Island Landfill Perimeter Bund Construction and Staging Report*" by Beca Carter Hollings and Ferner Ltd., dated August 1998. It is designed to be a maximum overall slope of 4.5 (horizontal): 1 (vertical), based on aesthetic, maintenance, and stability requirements.

Regarding stability, two types of possible landslip on the sloping cap of the landfill pile must be considered. The first type is "sheet-sliding" of the cover. This will be minimised by providing a firm, compacted clay fill as the cover material which will not become weakened by saturation because surface water will flow away down the slope and any infiltrating water will flow down into the more permeable refuse underneath. The second type is deep-seated slumping which could encompass some of the refuse. The compacted refuse is generally considered to be sufficiently strong to resist this type

of landslip, provided that weak substances (e.g., sludge) are not placed immediately under the cap. The margin of stability is described by a factor of safety which is to be greater than 1.5 for static long-term conditions, greater than 1.3 for temporary conditions and greater than 1.0 for earthquake conditions. The factor of safety is defined as the ratio of resisting forces (associated with soil strength) divided by driving forces (associated with gravity and other mobilising effects).

The Tonkin + Taylor 2021 report "*Green Island Landfill – Perimeter Bund Assessment*" is an up-to-date assessment of the stability of the landfill. This report confirms adequate factors of safety for areas of the landfill which are constructed with bunds around the perimeter containing the waste, as well as looking forward to the future in areas where a "waste to face" approach will be taken to constructing the landfill shape.

4.11.3.13 Weekly Walkovers

See WM's LMP section 3.5.6.3.9.

All areas of intermediate and final cover will be inspected by a walk-over survey conducted weekly.

Walkovers will be completed by the Environmental technician. The purpose will be to observe the condition of the cover (cracking, vegetation distress, waterlogging, ponding, differential settlement, landslip, and erosion), gas installations, and stormwater drainage system. It will involve physically walking across the landfill surface and identifying problem areas.

Issues will be identified by visual observation and assessment apart from gas emissions which will be measured using suitably calibrated gas monitoring equipment.

A schematic plan of the site will be marked up with any observations noted. The marked-up plan will be routinely reported at the weekly management meetings.

Urgent issues will be directly reported to Site Management upon discovery. Corrective action tasks and appropriate time frames will be entered into and tracked using a job action record system.

4.11.4 Bund Design and Construction

WM's LMP section 3.5.7 deals with bund design and construction.

The landfill is to be extended vertically by providing external bunds behind which refuse filling can continue. The bunds are required as a visual and physical barrier the placed refuse within the centre of the landfill and are to be constructed 2m higher than each refuse lift.

Design and construction of the perimeter bunds is discussed in the Beca report[6]. It is also outlined in the Tonkin +Taylor 'Perimeter Bund Assessment' report.

For slope stability a factor of safety of 1.5 is required for permanent works with an allowable bearing pressure of 50 kPa for the internal core and 100 kPa for the external core.

For perimeter bunds constructed with clean fill the final slopes should be constructed no steeper than 3(H): 1(V), with benches at 7m intervals vertically. Overall, the slope should be no steeper than 4.5(H): 1(V).

Alternatively, when constructing in accordance with waste-to-face methodology, this final slope of waste, with final capping, is to be no steeper than 4(H): 1(V).

4.12 Dealing with Special and/or Hazardous Waste

WM's LMP section 3.5.5 provides details of how to deal with different types of special and/or hazardous waste.

Landfill operators will be trained to identify wastes which are hazardous or unacceptable and will be made responsible for reporting incidents to site management for a decision on action.

Special and/or Hazardous Wastes shall only be disposed of where there is a specific operational procedure in place for safely and efficiently handling and disposing of that waste within the Landfill.

In a situation where a waste requiring disposal does not have a standard or generic operational procedure, a waste specific work instruction shall be prepared for that waste prior to receipt at site and handling. This is to be reviewed afterwards and lessons learned are to be documented.

Section 4.9.18 of this LDMP discusses the proposed development of a waste manifest system and describes how it would be applied.

WM's LMP section 3.5.5.1.3 requires that sampling for screen testing purposes be taken at the discretion of site management to verify that the waste is:

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[6] *"Green Island Landfill Perimeter Bund Construction and Staging Report"*, Beca Carter Hollings and Ferner Ltd, August 1998.

- Non-hazardous.
- In accordance with the description of the waste agreed in the customer contract.
- Consistent with any advice given to or by the interested authorities (e.g., DCC) about the waste.

WM's LMP section 3.5.5 documents the landfill operator's procedures and methods for handling hazardous wastes. The acceptance criteria are outlined elsewhere with primary responsibility lying with DCC.

The following types of special and hazardous wastes are disposed of at the main tip-face area by co-mingling with general waste (see **WM's LMP section 3.5.5.3**)

- Hydrocarbon containing liquid loads.
- Low odour sludges.
- IBC containers.

The landfill operator will deal these on a case-by-case basis. The general process involves putting some waste aside and when the hazardous waste is tipped off the landfill operator will cover immediately with waste and let it soak away to leachate.

WM's LMP section 3.5.5.4 deals with sludge cells.

The following types of sludges are disposed of using sludge cells:

- Known odorous wastewater treatment plant sludges.
- Animal products – (generally one big animal e.g., horse).

Sludge cells are constructed progressively and move as the landfilling tip-face area moves and progresses. A sludge cell involves building a bund out of available material on site and a ramp out of good size rock for the trucks to tip off into a small hole. The landfill operator staff on the landfill will keep an eye on the pit and when required will pick up the sludge material and place within the bund walls, this will then be covered with appropriate material. The inert soils required to build the bunds and mix with the sludges to stabilise and cover them are used at a ratio of between 2 parts soil to 1 part sludge, or at times up to 5 parts soil to 1part sludge.

This process requires the landfill operator to use a different method of filling over the top of the sludge cells as soon as possible, and to do so in a safe manner. This is done by encasing the sludge cells in a waste bund, then filling over the sludge and soaking it up through the waste. This solution also takes away the soft areas where pits have been constructed leaving an indent in the surface. Because the material is mixed with waste it firms up quickly.

WM's LMP section 3.5.5.5 describes the requirements for the dewatering pond.

The following types of special wastes are disposed of at the dewatering pond:

- Liquid loads (with some solids) from mud-tanks, roads, and industrial sites.
- Liquid loads (with some solids) from some industrial processes.

Note specifically that loads disposed of in this area cannot contain any hydrocarbon fraction as the overflow path from the pond goes directly to a pump station and hence sewer via the leachate collection system.

These wastes are classified and treated as "special" due to the nature of the product requiring de-watering and handling.

The dewatering area has been classified as a low-level asbestos contamination zone and is cordoned off by two large gates. Trucks entering this area must have two operators present, one operator is to remain in the truck while the other operator wearing a full suit, booties, and mask opens the gates and guides the truck back.

The operator inside the truck stays there for the duration while the other operator does all the required tasks for offloading the load.

WM staff have created a settlement area that requires cleaning out, this is monitored through site inspection by staff when they clean the tipping pad approximately once per week. Once WM deem the settlement area full an excavator will come in alongside the area and remove the settled silt from the pond, this is then moved and placed as required to the stockpile beside the settlement area.

WM's LMP section 3.5.5.6 deals with asbestos management

The key operational areas associated with managing asbestos are:

- Asbestos pits/asbestos trench.
- Asbestos soils procedure.
- Asbestos piles at dewatering pond.

The asbestos pile at the dewatering pond is in an area restricted by gate access and has several sprinklers installed. During dry periods the landfill operator is responsible for operation of these sprinklers and ensuring the no dust or fibres

become airborne. The material itself is inherently damp and forms a dry crust on top which the sprinklers help keep wet. Large areas of these piles have well established vegetation cover, with these areas not requiring wetting.

WM's LMP section 3.5.5.7 describes the special disposal pits required for some types of waste. This is usually due to the nature of those wastes requiring special handling, as the other methods of disposal are not appropriate. Examples are as follows:

- Material consistency being sticky or difficult to handle material consistency.
- Large items or large numbers of items such as animal carcasses.
- A waste customer specially requesting individual confidential and immediate burial.

Large quantities of animal carcases and sticky type materials require a deep hole that is constructed with the 30T excavator. The landfill operator requires at least 24 hours of notice with these types of waste. When the waste arrives on site the landfill operator will have a suitable hole constructed with a good amount of covering waste to bury the load.

Special disposal pits are constructed on a case-by-case basis. Generally, with individual confidential burials the landfill operator will use the bulldozer to create a void in the waste, the confidential material can then be tipped beside this and pushed into the void with the bulldozer, waste will then be pushed over the top of the material covering it completely. Photos can be taken of the burial on request.

WM's LMP section 3.5.5.8 deals with contaminated soils which are classified based on the following:

- Contains ACM above the guideline levels.
- Fails TC but passes TCLP – Low Level Contaminated.
- TPH exceed 200mg/L.

ACM soil shall be specifically handled and managed as outlined in **WM's LMP section 3.5.5.7**.

In all these cases above the soil material will not be used in areas of the landfill that will be exposed in the future (i.e., final cap) or outside of a bund. Use of low-level contaminated soil, or TPH containing soil within the confines of the landfill for bund construction or cover is acceptable.

4.13 Control of Nuisances

4.13.1 Spillages

Spillages from refuse vehicles which occur at any point on their approach to the landfill including the access road from Brighton Road and will be cleared up promptly by the landfill operator.

Where they result from any act of negligence or omission on the part of the driver, the landfill operator will bring this to the driver's attention.

If any is suspected to be hazardous it shall be contained, DCC shall be kept informed and subsequent operations shall be carried out as necessary.

Supplies of suitable material for containment shall always be available on site.

4.13.2 Landfill Gas

As stated in section 4.7 of this LDMP, **WM's LMP section 3.5.10.6** describes the safety requirements for dealing with LFG.

Methane is the main component in LFG and is the main potential source of harm. Personnel are not permitted to use naked flames on the landfill. Smoking is only permitted at a specific location on the leachate collection road.

4.13.3 Noise

Noise from landfill operations can contribute significantly to the loss of amenity experienced by neighbours and will be maintained at levels below the conditions stated in the designation for the site.

WM's LMP section 3.7.2 describes the measures that will be implemented to manage noise.

4.13.4 Odour

Odour emissions from the Green Island Landfill have the potential to adversely impact neighbouring communities.

WM's LMP section 3.7.3 describes the principal sources of odour and the steps to be taken to control odours, starting with the management of odorous wastes.

4.13.5 Litter

Uncontrolled litter is unsightly and impacts on the surrounding land, roads, and neighbours. It can contribute significantly to loss of amenity experienced at the landfill site and neighbouring properties.

WM's LMP section 3.7.5 describes the measures to be taken to keep the landfill and surrounding areas as litter free as possible.

4.13.6 Smoke

The burning of waste at the site is prohibited. Any accidental fire will be extinguished as quickly as possible. A water supply is provided on site for the purpose of firefighting. This is to be supplemented with cover material, a stockpile of which shall always be available on site in case there is a fire.

4.13.7 Dust

WM's LMP section 3.7.1 describes the main activities responsible for dust generation at the site and the measures to be implemented to minimise dust emissions.

4.13.8 Vermin including Rodents, Mice and Wild Cats

Vermin such as rats, mice and feral cats are often brought to the site in loads of waste or are attracted by the food source and migrate from surrounding areas. Vermin can spread disease, cause property destruction, and contaminate food, and can be difficult to eliminate once a colony is established.

WM's LMP section 3.7.8 describes the measures that will be implemented to control vermin.

4.13.9 Birds

WM's LMP section 3.7.7 describes the problems associated with birds and lists the measures that should be employed to minimise their attraction to the landfill.

It is noted that birds can become accustomed to one control method, so techniques need to be varied.

A Southern Black Back Gull management plan is being prepared and will be operational at some time during 2023.

4.13.10 Scavenging

No scavenging on the tip face shall be permitted by users. It is recognised that some materials (e.g., scrap iron) is easily removed and it is expedient to do so by the landfill operator.

Whole tyres should also be removed so that they can be cut up into suitable pieces for disposal within the landfill.

The operator may also remove items from the transfer station pit if it is safe to do so.

4.13.11 Flies

As stated in **WM's LMP section 3.7.9**, flies may become a problem over summer months. Flies are capable of transmitting salmonella and other food-borne diseases.

Prompt and good compaction of waste, and application of cover are essential to the control of flies. This eliminates food, shelter, and breeding areas. In severe cases of fly infestation, insecticide sprays will be applied.

4.13.12 Noxious Weeds

The site operator shall inspect the landfill footprint regularly for noxious weeds and shall take appropriate measures to control them.

4.13.13 Leachate Breakout

The landfill operator shall inspect the landfill for leachate break out, settlement and other adverse environmental effects at least once per month until such time as discharge of refuse to the landfill ceases.

A record shall be kept of the date, time, observations, and any remedial action because of carrying out an inspection of the landfill, as noted above. This record shall be made available to the ORC on request.

4.13.14 Visual

WM's LMP section 3.7.4 discusses visual nuisances and how the visual amenity for immediate neighbours to the landfill can be affected by the unsightly appearance of the industrial nature of landfilling activities, a visible tip face, bare ground, and litter. Measures to mitigate the effects of visual nuisance are described.

4.14 Landscaping and Planting

The final form of the landfill development is such that it will be substantially elevated above the surrounding land. For this reason, the landscape and planting design incorporates two methods of visual buffering of the site from the neighbouring residential areas.

The first of these is the use of mounded earth bunds combined with planting within the site to screen as much as possible of the operational parts of the landfill. The second is the planting on the site perimeter and elsewhere to reduce views of the site and enhance the quality of the surrounding landscape.

The site is fenced around its perimeter with substantial planting inside the fence and especially between residential areas and the operational areas of the landfill. The planting to date is proving effective in providing a visual screen.

It is not envisaged that the plantings will be strictly ‘authentic’ or accurately representative of the original native cover in the area. Instead, a practical compromise is being implemented, with the use of native tree and shrub species and introduced species.

Plantings adjacent to the Clariton Avenue residential area, along Brighton Road and around the site main entrance, are more of a more ornamental nature, with exotic trees and shrubs being used to blend the site with the surrounding landscape.

5 Environmental Monitoring

5.1 Resource Consent Requirements

Environmental monitoring requirements are specified in the resource consents issued by the ORC. DCC has appointed a separate contractor to undertake the monitoring in accordance with these consent requirements. The results and findings of the monitoring is compiled into an annual report which is submitted to DCC and the ORC by 1 October each year.

GHD prepares an Environmental Monitoring Report annually that provides details of the environmental monitoring occurring at the site for:

- Surface water quality.
- Groundwater quality.
- Leachate quality.
- Landfill gas.

5.2 Surface Water

Surface waters, of both the Abbots Creek and Kaikorai Stream, are monitored at four locations around the landfill. Two are upstream of the landfill (one in a tributary), one is adjacent to the landfill and the final location is slightly downstream of the landfill. The samples are taken on a quarterly basis and are analysed for specified parameters and isotopes. The analytical data for the upstream locations indicate that the quality of the water at these locations has been impacted by industrial and agricultural activities in the stream's catchments.

Green Island landfill has two sedimentation ponds, an Eastern and a Western Pond, that drain into the Kaikorai stream. These ponds allow sediment from over-ground flows (stormwater) that has not come into contact with waste to be deposited into the ponds. The water then discharges to the Kaikorai Stream. The water in the ponds is sampled on a quarterly basis for specified parameters.

5.3 Groundwater

Reference GHD report. The water levels in the leachate collection trench, network of ground water wells and pump stations are monitored on the monthly basis. On a quarterly basis, basic water quality parameter measurements (electrical conductivity, pH, dissolved oxygen, and temperature) are also collected at these locations.

Samples are collected from the three deep wells in the ground water monitoring network on a quarterly basis for various water quality parameters and isotopes.

The leachate collection drain was designed and installed to maintain a depression of the ground water surface level to intercept leachate that would otherwise flow from the landfill into the Kaikorai Stream. The drain is located around most of the perimeter of the landfill with the monitoring wells, series of eight lines of wells, installed perpendicular to it. The leachate and groundwater entering the drain is directed by gravity to the pump stations and pumped to the foul sewer system once the level of the sumps reach a predetermined level. The objective of the groundwater level monitoring is to assess the effectiveness of the interception trench and the pumping regime, to ensure groundwater and leachate is being intercepted.

The pump stations are monitored, with water levels, faults, flow rates and pump hours being continuously recorded. The total amount of leachate/groundwater that is captured by the interception trench is influenced by the amount of rainfall falling over the landfill and by operational activities such as the capping of portions of the landfill.

5.4 Leachate

A sample is collected from one of the pump stations, PS3, on an annual basis and analysed for a range of. The results of the analysis are compared against the DCC guidelines for trade waste as it is sent to the Wastewater Treatment Plant (WWTP) for treatment and disposal.

5.5 Air Quality and Landfill Gas

Inspections of the landfill cap are undertaken on a quarterly basis which allows for a visual assessment of the condition of the cap and can assist in identifying areas that need addition capping or have failed in some way.

In addition, an instantaneous surface monitoring (ISM) survey using a landfill gas detector instrument is undertaken on an annual basis. This survey can help to identify areas of the cap where landfill gas may be escaping and inform remediation and repair works.

The three landfill gas monitoring wells located on the eastern boundary of the site adjacent to Clariton Avenue are monitored monthly for the presence and occurrence of landfill gases.

A complaints register is kept for the site. Most of the complaints are related to odour issues and are usually associated with the receipt of sludges from WWTPs. The complaints register details the complaint and how it was addressed.

There is a network of landfill gas collection wells across much of the landfill. The configuration of this network changes as the landfill evolves. The volume of gas collected from the various wells and the concentration of the various gases are monitored. This data is used to optimise the collection system. The collected gas is piped to the WWTP and used there to generate power to run the plant.

Audits are undertaken on the quarterly basis. The audit reports outline the changes that have occurred at the site, changes to the gas collection system and any odour and dust mitigation that has occurred.

5.6 Weather Monitoring

A weather station has been supplied and installed by DCC on the site. Data from it is recorded daily at fifteen-minute intervals.

5.7 Site Records/Annual Environmental Monitoring Report

5.7.1 Overview

WM's LMP section 3.8 provides an overview of the monitoring and reporting requirements.

The weighbridge software system will record details of all vehicles and types of waste passing over the weighbridge and will keep details of all financial transactions that take place.

The landfill operator will keep site records, including as-built drawings and monitoring measurements, up to date and stored in a way that allows easy retrieval. Site records will be audited and made available to DCC, as required.

The landfill operator and DCC will be advised immediately of any emergency situations.

5.7.2 Monthly Reports

WM's LMP section 3.8.1 lists the information to be provided by the landfill operator to DCC each month, including details of:

- Complaints received.
- All emergencies that occurred, including action taken and any emergency service responders.
- Each load of waste presented at the weighbridge.
- All recyclable materials sent off-site.
- Non-hazardous waste directed elsewhere.

5.7.3 Annual Reports

WM's LMP section 3.8.2 lists the information to be reported on annually, including:

- A summary of the year's operation, identifying any management improvements and presenting various monitoring information.
- An annual plan that outlines the next year's operation.

5.7.4 Recording Forms

WM's LMP section 3.8.3 lists the recording forms that are to be filled in by the landfill operator and submitted to DCC as required, to help improve management of the landfill site.

Table 5 lists the required forms.

Table 5: Recording forms in use and frequency of recording and submitting

Recording Form Name	Frequency Recorded	Frequency submitted to DCC
Record of special disposal	For each special load disposal	Monthly
Recycle centre data recording form	Daily	From Landfill 3000
Landfill complaints form	As required	Monthly

Recording Form Name	Frequency Recorded	Frequency submitted to DCC
Leachate system water level recording sheet	As required	As required
Leachate flow rates and stormwater levels	As specified	As required

5.7.5 Nuisances

The landfill operator will record all nuisance problems and report them to ORC and DCC, as required.

5.7.6 Surveys

Quarterly topographic and aerial photo surveys are undertaken by Stantec. Volume changes are reported annually.

5.7.7 Leachate Collection System

WM's LMP section 3.8.6 describes the responsibilities of the landfill operator to record and monitor water levels in the monitoring wells and the leachate trench. This also includes recording the amount of leachate pumped at each pump station and displayed on each pump station control panel.

5.7.8 Stormwater Ponds

WM's LMP section 3.8.7 provides details of the records that are to be kept of water levels in the stormwater sedimentation ponds.

5.7.9 Health and Safety

WM's LMP section 3.8.8 provides a list of the Health and Safety information that the landfill operator will report to DCC, including:

a) All injuries requiring medical treatment and which either require the injured person to leave the site or require a medical practitioner to attend the site shall be reported to DCC within one hour of the injury occurring.

b) All injuries requiring minor first aid which do not fall into a) above will be reported monthly.

c) All near misses will be reported monthly.

d) Any development, training, improvements, etc. will be reported monthly.

5.7.10 Miscellaneous Pro-forma and Other Information

WM's LMP section 3.10 provides a list of miscellaneous pro-forma and other information that are to be used in the management and operations of the landfill site.

- Complaints Form.
- Pamphlet: Vegetation Disposal at Dunedin's Landfills.
- Pamphlet: Criteria for accepting metals for recyclable disposal.
- Contaminated Soil Petroleum Hydrocarbons: Application to dispose of at Green Island Landfill: Form.
- Special and Hazardous Waste Disposal Procedures (Guidelines).
- Special Waste Disposal Enquiry Form.
- Special Waste Disposal Instructions for Landfills.
- Record of Special Disposal.
- Leachate System Water Level Recording Sheet.
- Leachate Flow Rates and Stormwater Monitoring Sheet.
- Bund Construction Penetrometer Record Sheet.
- Recycle Centre Data Recording Sheet.
- Guidelines (and Declaration) for Visitors and Tour Organisers to Dunedin's Waste Management Facilities.
- Guidelines for Compost Quality.

5.8 Complaints Management

Complaints may be received from customers, neighbours, the DCC customer service desk or the wider community. Issues that could lead to complaints include:

- Dust, noise odour, litter, and visual impacts.
- Birds, vermin, rabbits, wild cats, rodents, and flies.
- Customer service, pricing of waste disposal.

The landfill operator is to seek to operate Green Island Landfill in a manner which will ensure that the facility is a good neighbour.

WM's LMP section 3.1.8 describes the process for dealing with complaints that are received.

6 Emergency Management

6.1 General

The landfill operator is required to train staff in emergency procedures.

Signs are provided at the site to advise the site users of what to do in the event of emergencies. The general procedures involve:

- Notifying DCC of an emergency event.
- Notifying the police and the appropriate emergency services via a “111” telephone call. The emergency service is likely to be the ambulance service in the case of injury, and the fire service in the case of other emergencies associated with waste management operation.
- In the event of a spillage, containing it and notifying DCC and the ORC.

WM’s LMP section 6.1 describes the procedures the landfill operator will adopt to manage emergencies.

A Site Emergency Management Plan (SEMP) has been developed for Green Island Landfill (see attached in Appendix C). The principal function of the SEMP is to ensure the safety of employees, contractors, visitors, and the surrounding natural environment in the event of an unplanned incident or emergency and prevent further harm or disruption to business operations.

The procedures for a range of potential emergencies are described as are additional measures to deal with emergency situations.

The following emergencies are covered in the SEMP:

- Fires.
- Hazardous waste/materials.
- Landfill gas.
- Leachate.
- Stormwater.
    - Flooding.
    - Extreme Weather.
- Access.
- Accident on Site.
- Machinery Failure.
- Power Failure.
- Earthquake.
- Stability of the Refuse Mounds.
- Emergency Disposal/Storage of Waste.

6.2 Fires

Landfill fires can cause health effects due to people being exposed to pollutant emissions from burning waste smoke. This is due to the low burning temperature and incomplete oxidation of the burning waste. In addition, landfill fires can create physical hazard risks for landfill personnel and users, such as burns, explosions, subsidence, and exposure to hazardous materials.

WM’s LMP section 3.7.6 describes the causes of fires in detail, the types of fires (surface or deep-seated) and good management practices for dealing with fires.

Once started, landfill fires can be difficult to extinguish so fire prevention is the primary objective.

6.3 Hazardous Waste/Materials

If an unidentified hazardous substance arrives at the landfill, the landfill reception booth has the right to turn it away providing there is no danger to anyone. If it appears dangerous to turn the substance away a risk assessment will be undertaken to decide the best cause of action.

Where discharge and dispersion of a hazardous material has occurred, site staff will immediately secure the area and take measures to contain the material.

Should any emergency arise with hazardous materials the site supervisor and DCC shall be contacted without delay and further assistance sought from the Emergency Services if appropriate.

6.4 Landfill Gas

Gas migration and concentration can present a danger to public health and safety. Gas can migrate considerable distances and remain a hazard.

In the event of a gas fire, the area shall be cordoned off from the public and, if necessary, the landfill closed.

In the event of gas concentration being detected, the area shall be cordoned off. The gas source shall be isolated and stopped. If needs be, the Fire Service shall be called.

6.5 Leachate

Since the landfill is unlined there is no formal leachate collection system beneath the landfill. To prevent leachate from seeping to the surrounding areas a perimeter subsoil system has been installed whereby contaminated groundwater from the landfill is captured in a perimeter drain through a series of groundwater wells installed at intervals around the landfill.

If the pump system fails or there is a break or blockage in the piped system and there is a possibility of leachate seeping to the surrounding environment, then the landfill operator shall contact DCC immediately. If leachate break occurs on the landfill bunds, then the landfill operator shall contact DCC and shall agree steps to be taken to remedy the situation.

6.6 Stormwater

6.6.1 Flooding

Under exceptional rainfall conditions the lower areas of the site will flood. The access road may be subject to flooding and should this occur access to the site may be gained from Taylor Street. This access is to be always maintained in usable conditions.

6.6.2 Extreme Weather

Extreme weather conditions such as flooding or strong winds may make it necessary to close the site. This decision will be made by the landfill operator after discussion with DCC.

6.7 Access

If for any reason vehicle access to the landfill tip face will not be available for longer than 48 hours, then the consequences could be that commercial refuse trucks and trucks carting refuse from the transfer station will need to be re-routed to an alternative landfill.

The landfill has potential to receive refuse seven days a week all year round and an all-weather road access has been established to ensure that vehicles can enter and leave the landfill safely.

Planned non-access to the landfill area can be dealt with by either holding the refuse at transfer stations or by the refuse being diverted to other landfills. This is NOT an Emergency. Equally unplanned non-access for a short period (say four hours) will cause problems but is unlikely to be termed an Emergency.

The situation that will lead to an Emergency is when there is a non-planned failure that will take more than 48 hours to restore and limits the ability of DCC and its contractors to access the landfill for both refuse disposal and the ability to respond to a fire, or any other emergency.

The most likely cause of failure will be wide-spread flooding because of very extreme and sustained rainfall. This could create roading problems usually over a wide area and therefore put an abnormal demand on DCC and their contractors. The important issue is that the regaining of access to the landfill is recognised as one of the areas that deserves a high priority.

The following actions are to be taken:

- Determine whether the access has been blocked by a failure on the landfill site or on a DCC public road.
- If possible (4-wheel drive or foot), inspect the landfill for other damage such as erosion to the landfill and check the stormwater, leachate system and stormwater ponds for stability, flooding etc. and determine if any of the other emergency situations have occurred and respond according to those emergency procedures.
- In the first instance, the landfill operator should be contacted (who will have some heavy construction equipment on site) to assess the situation.

- If the situation is beyond the capability of the landfill operator, or, if the landfill operator is not available then DCC's Landfill Engineer should be contacted who will arrange for DCC's Roading Network Maintenance Contractor to assist with the assessment and reinstatement of the access.

Note that the recording of the damage/access block by photographs and field notes are important for the Council to identify possible emergency claims and verify invoices post the emergency.

6.8 Machinery Failure

The breakdown of the spreading, compacting, and covering plant (machinery) could result in the day's refuse not being covered daily, as per the resource consent conditions.

The landfill operator is required by the operating contract to either fix the plant or bring in temporarily extra plant immediately to comply with the daily covering condition.

If for any reason this is not possible, then the contractor shall immediately:

- Contact the various refuse haulers and refuse transfer station operator and inform them of the situation who in turn shall hold refuse in containers etc. until the next day.
- Contact DCC's Landfill Engineer and inform them of the non-compliance.

6.9 Accident on Site

The site operators are required to be trained in First Aid and will render whatever assistance is possible and immediately alert the appropriate Emergency Service.

In the event of any site user or operator being contaminated with any injurious or potentially injurious substance they will be taken to the decontamination shower area for a deluge wash and the hospital as appropriate.

6.10 Power Failure

In the event of a complete power failure, the landfill operations can continue. Communication between the reception booth and the discharge face operators would be battery powered radio or cell phone. If a sustained power outage or significant planned outage occurs, a generator may be required to ensure the leachate collection system continues to work.

6.11 Earthquake

The design of the landfill has taken account of the risk of effects from earthquake. This risk is an acceptable one.

Following any notified earthquake in the region, the landfill shall be inspected for damage by DCC's Landfill Waste Engineer.

The landfill geometry has been designed to withstand the design earthquake situation.

It is possible however, that one of the other facilities at the landfill mentioned within this document e.g., leachate or stormwater system, may have been damaged.

The landfill operator shall within 24 hours of being notified of an earthquake, carry out an inspection of the key services at the landfill and if any damage is found, then determine whether the response required is an emergency as per this document.

Note, if a Civil Defence Emergency situation arises, the landfill operator shall report his findings to DCC's Civil Defence team.

6.12 Stability of the Refuse Mounds

The ongoing stability of the refuse mound is controlled by limiting the maximum gradient to 1 vertical to 3 horizontal.

6.13 Emergency Disposal/Storage of Waste

Green Island Landfill no longer provides a service where materials can be temporarily stored awaiting the test results to confirm acceptance or otherwise of the waste. If testing is required, the landowner / developer is required to do the testing prior to the material arriving at the landfill.

The reason for this is because such a s service is considered unduly risky and could potentially put landfill staff and/or site visitors at risk.

7 Closure and Reinstatement

7.1 General

The proposed final landform shape is shown in Figure 3.

7.2 Closure

Section 3.5.11.1 describes the responsibilities of the landfill operator upon closure of the landfill.

These include:

- Construction of the final cover system.
- Ongoing monitoring and maintenance.

Section 3.5.11.1.1 describes the measures to be adopted to avoid puncture of the cap protection layer, limit differential settlement which could affect the integrity of the cap and avoid nuisances such as odour emitted from special wastes placed too close to the surface of the landfill.

Section 3.5.11.1.2 describes how the closure works will be undertaken progressively as waste disposal operations are completed to final level in any part of the landfill.

Section 3.5.11.1.4 describes how plantings will be maintained, fertilised and watered.

Section 3.5.11.1.5 describes the landfill operator's responsibilities for mowing, inspecting, and maintaining the grassed areas on site, including future grassed areas on top of the landfill cap.

Section 3.5.11.1.6 describes the focus during the winter months inspection on the drainage of planted areas to ensure that ponding is not occurring. The landfill operator will undertake remedial drainage works in any areas that are consistently waterlogged.

Section 3.5.11.1.7 requires the landfill operator to regularly check all planted areas for invasive weeds. These weeds are to be removed before becoming established and the landfill operator is to develop a weed spraying programme over time.

7.3 Post Closure

Section 3.5.11.2 describes the post closure operations that the landfill operator will undertake in the first two years following cessation of landfilling activities to support the environmental management of the site.

7.4 Possible End Use

The landform which will result from the completed landfill will preclude use of the site for general industrial purpose and for formal recreation uses such as playing fields.

The transfer station and resource recovery activities are likely to remain after the landfill closure. These facilities will be upgraded to increase material diversion activity.

Both the leachate collection system and gas collection systems with be functioning for decades. Protecting these systems and keeping them functioning is essential and will be a priority over any other uses.

7.5 Aftercare

7.5.1 Overview

Completed stages of the landfill shall after final capping, continue to be monitored and maintained as required by resource consent conditions as reviewed from time to time. Such conditions shall be reviewed with consideration being given to monitoring results, aftercare requirements and landfill age.

A Closed Landfill Aftercare Management Plan will be prepared for the landfill (separate to this document) which should be read in conjunction with this LDMP.

7.5.2 Projected Aftercare Period

A minimum 30-year post closure period is recommended for a municipal landfill by the Ministry for the Environment. The aftercare period shall be extended for 30 years from the cessation of refuse disposal operations, unless DCC can prove through site monitoring that a lesser period is appropriate.

The main tasks during the aftercare period will be monitoring and maintenance of the landfill site, together with any measures that may be required for contingencies, should they arise.

7.5.3 Monitoring

Requirements for monitoring leachate, ground water, surface water and landfill gas will continue as per consent conditions. Depending on the consent conditions for the closed landfill site, the monitoring frequency may be reduced if monitoring results remain essentially unchanged for several consecutive monitoring periods.

A visual (and olfactory) inspection of the landfill should be undertaken periodically to determine if landfill gas is still being generated from the degradation of refuse. The inspection would also include a general walk-over of the landfill to determine if there are signs of vegetation die-off or gas bubbles in puddles.

Monitoring of the site will also comprise site inspections to identify:

- Damage to the landfill cap (e.g., differential settlement, fissures, soil erosion, animal burrows).
- Presence of either loose or uncovered litter.
- Damage to perimeter fences.
- Unseasonal die-off of grass.
- Signs of leachate seepage and to confirm that the leachate pipeline and pumping infrastructure is in good working order.
- Blockages to stormwater drains; sediment build-up in ponds.

Any identified damage or issues will be fixed or investigated so that the closed landfill is maintained to a high standard.

7.5.4 Maintenance and Contingency Measures

The leachate collection system should be jet-blasted periodically (annually) to get rid of encrustations of chemical precipitates and slimes.

Stormwater drains need to be checked to ensure that they are unblocked, and that flow is directed to the stormwater sedimentation ponds, as intended.

Sedimentation ponds will need to be checked regularly to determine if they need to be cleared of sediment.

The landfill cap and vegetation covering needs to be inspected regularly and maintained where there are signs of distress, as indicated above.

Fires within the landfill or on the cap area need to be extinguished as soon as possible using appropriate methods, including the use of earthmoving equipment.

Leachate breakouts need to be assessed on a case-by-case basis. Typically, they are contained by digging out the affected area and filling it with a drainage medium to ensure the leachate drains back into the waste pile. Alternatively, subsoil pipes may be constructed from the breakout to the closest leachate collector pipe. The breakout area must then be repaired by resealing the capping layer and reinstating the vegetation.

Appendices

Appendix A Resource Consents held for Green Island Landfill

Otago Regional Council

Consent No. 3839A_V1

DISCHARGE PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To discharge landfill and composting leachate to land in a manner that may enter water

For the purpose of sanitary landfill and composting facility operation

For a term expiring on: 1 October 2023

Location of activity: A 38 hectare area of the Green Island Sanitary Landfill bounded by a leachate collection drain. The Green Island Sanitary Landfill is located off Brighton Road, Green Island, Dunedin and is adjacent to the Kaikorai Stream.

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. That waters and bed sediments of the Kaikorai Stream and estuary shall be substantially free of contaminants due to activities of the Green Island landfill conducted after the first exercise of this permit, which adversely affect directly or indirectly water uses or adversely effect humans, plants, animals or aquatic life.

2. The groundwaters outside of the landfill and leachate collection system shall at all times be substantially free of contaminants, due to activities of the Green Island landfill conducted after the first exercise of this permit, which adversely affect, directly or indirectly water uses or adversely effect humans, plants, animals or aquatic life.

3. The leachate collector drain shall be installed and pumped to maintain a depression in the phreatic (zone of saturation) groundwater level surface at all times. The depression of the phreatic surface shall be sufficient to cause the drain to intercept phreatic groundwater which would ordinarily have flowed outward from the drain to adjacent groundwater and the Kaikorai Stream or associated water bodies. The presence of the depression shall be determined by measuring the slope of the phreatic groundwater level between the leachate collector drain and the Kaikorai Stream, and the leachate collector drain and the fluid level in the landfill. The slope shall be inward, towards the collector drain at all times.

4. The objectives to be met at all stages of this management is to ensure the effective long term containment, collection and monitoring of contaminated leachate and to protect the Kaikorai Stream and estuary, coastal waters and the uses and values associated with these waters, including those made by humans, plants, animals aquatic life.

5. During installation of the leachate collection trench the geology of the area surrounding the trench shall be physically assessed and logged, including an appropriate photographic record, and the Consent Authority shall be sent those records forthwith. Where necessary (due to high permeability of the ground form) appropriate additional monitoring wells and/or systems to prevent outflow of leachate from the collection trench shall be installed.

6. This consent shall be exercised in conformity with a landfill work programme prepared by the consent holder. The work programme shall be prepared within 6 months of the first exercise of this consent and shall thereafter be reviewed at least annually or at such lesser frequency as the Consent Authority may approve: The work program shall:

   (i) Review the exercise of the consent and the monitoring relating thereto (including: actions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [including toxic, biological, medical and radioactive wastes] and stormwater management and monitoring).

   (ii) Evaluate and analyse trends and any matters having, or likely to have an adverse impact on water resources or the use of those resources, resulting from the operation of the landfill.

   (iii) Present projections and intentions for landfill operations in relation to the future exercise of this consent (including: intentions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [as defined in 6(i)] and stormwater management and monitoring).

   (iv) Describe sequencing of works, procedures to be adopted during construction and filling, and the maintenance and management of facilities.

   (v) Describe measures to be taken so that the conditions of this consent will be met at all times, and that adverse effects on natural water are avoided or mitigated.

   (vi) Describe the precautionary measures that prevent unauthorised discharges or other adverse effects on natural water and present a contingency plan which will describe how any event will be managed so as to avoid or mitigate any adverse effects on natural water.

   (vii) Describe any additional monitoring necessary to identify the impacts of the exercise of this consent, and means of effective avoidance or mitigation of adverse effects both during and post closure of the landfill.

(viii) Provide for the managed recycling of leachate over the landfill where and when this is practicable and will not result in adverse environmental effects.

7. ***(A)* Monitoring Groundwater Levels**

The consent holder shall establish a network of groundwater bores at the following locations (which are to be specified once the leachate collection system is installed) and, during one day, each ~~week~~ *month, shall* measure and record the groundwater level in each of the wells;

(i) Leachate collection system: monitoring water level in each of the sumps, in the collection trench midway between each of the sumps, and at each end of the collector system.

(ii) Groundwater outside landfill and collection system: monitor both shallow and deep groundwater levels outside of the landfill and leachate collection system. One shallow well type shall be located adjacent to the collection trench and midway between each of the pumps (giving a total of 8-10 external shallow wells). The wells should be 5-20 metres distance away from the leachate collection trench. In addition, a total of three deep well types should be located at representative sites outside the landfill. One of the sites should be adjacent to the existing well W78.

(iii) If locations of high permeability (for example, gravel and coarse sand) are known, deep sampling wells shall be installed outside the leachate collection system at those locations.

(iv) Surface water outside landfill and collector system: in situations where the "outside landfill groundwater wells" are located adjacent to Kaikorai Stream, the water level in the stream adjacent to each well shall be monitored.

(v) Leachate and deep groundwater within landfill: monitor both shallow leachate and deep groundwater levels within the landfill and leachate collection system. At least one shallow well type shall be located within the landfill in such a position that it is representative of the leachate level.

(vi) In addition, there shall be at least one deep groundwater well type within the landfill and located to represent deep groundwater levels and chemistry. This well shall be constructed in the geometric centre of the landfill.

The recorded water levels will be converted to reference level and the gradient into the leachate trench will be confirmed.

~~The results of monitoring shall be forwarded to the Consent Authority at three monthly intervals and the Consent Authority shall be notified immediately if outward gradients are identified.~~

7. ***(B) Monitoring of Pump Operation***

The consent holder shall establish, operate and maintain a monitoring system of the operation of the leachate pumping system. The system shall automatically trigger an alert in the event of:

(i) *A pump fault;*

(ii) *A low water level in a pump wet well; and*

(iii) *A high water level in a pump wet well.*

The system shall be continuously monitored. In the event of an alert being raised, the cause of the alert shall be investigated within twenty four hours and appropriate remedial measures shall be implemented. The following information shall be recorded for each alert:

(i) *the date and time of the alert;*

(ii) *the nature of the alert;*

(iii) *the reason for the alert; and*

(iv) *the date, time and nature of the action taken to remedy the cause of the alert.*

The information shall be made available to the Consent Authority on request.

8. Monitoring pumped leachate/groundwater volume

The consent holder shall continuously monitor and record the flow of the pumped discharge from the combined leachate collection sumps. ~~The results shall be forwarded to the Consent Authority at three monthly intervals.~~

9. Monitoring leachate chemistry

(A) Combined leachate discharge to sewer:

(a) The consent holder shall, at least annually (and once every three months for the first year), collect a representative sample of the combined groundwater/leachate pumped from the leachate collector pumps (prior to discharge to the Green Island sewer). The sample shall be analysed for:

i) *Major cations (*calcium, magnesium, potassium *and* sodium*)*
ii) *Major anions (carbonate,* bicarbonate, chloride *and* sulphate*)*
iii) cation/anion ratio
iv) pH
v) conductivity
vi) Chemical Oxygen Demand
vii) Biological Oxygen Demand (5 day)
viii) ammonia*cal nitrogen*
ix) nitrate *nitrogen*
x) *alkalinity*
xi) *dissolved oxygen*
xii) *dissolved reactive phosphorus*
~~xiii) iron, lead, zinc~~
xiv) *Total Organic Carbon*
xv) *acid soluble metals, including: aluminium, arsenic, barium, boron, cadmium, chromium, copper, iron, lead, nickel, manganese, zinc*
xvi) *total mercury*
xvii) *total cyanide*
xviii) *sulphide*

xix) *total phenols*
xx) *faecal coliforms*
xxi) *organochlorine pesticides*
xxii) *polychlorinated biphenyls*
xxiii) *volatile fatty acids*
xxiv) *volatile organic compounds*
xxv) *semi-volatile organic compounds*

(b) The consent holder shall collect a representative sample of the combined groundwater/leachate pumped from the leachate collector pumps (prior to discharge to the Green Island sewer), at least once every three months for the purpose of isotopic analysis. Isotopic enrichment/depletion of the following isotopes shall be determined:

i) oxygen-18 in water from leachate ($\delta^{18}O$-H_2O), relative to Vienna standard mean ocean water

ii) hydrogen-2 in water from leachate (δD-H_2O), relative to Vienna standard mean ocean water

iii) carbon-13 in dissolved inorganic carbon from leachate ($\delta^{13}C$-DIC), relative to Vienna Pee Dee Belemite

iv) nitrogen-15 in ammonium from leachate ($\delta^{15}N$-NH_4^+), relative to atmospheric nitrogen.

~~(ii) On one occasion each two years the following parameters in the sample shall also be analysed:~~
- ~~"USEPA" priority pollutants~~
- ~~whole effluent toxicity screening using appropriate sensitive marine species~~

~~(iii) The results shall be forwarded to the Consent Authority at three monthly intervals for the first year and thereafter annually.~~

~~(iv)The Consent Authority may direct or agree in writing that additional sampling and analyses be undertaken if monitoring results indicate amendments are appropriate.~~

(B) Leachate collection pumps and shallow and deep groundwater/leachate wells:

(a) The consent holder shall, once every ~~week~~ *three months*, collect a representative sample of the groundwater/leachate from each of:

i) the leachate collector sumps/pumps

ii) the shallow and deep groundwater wells outside the landfill and leachate collection trench and

iii) the shallow and deep groundwater/leachate wells within the landfill

(b) The sample shall be analysed for:

i) pH
ii) conductivity

(c) On one occasion each year, during September or October, the following parameters shall also be analysed in the deep groundwater wells:

i) Biological Oxygen Demand (5 day)
ii) *Major cations (*calcium, magnesium, potassium *and* sodium*)*
iii) *Major anions (carbonate,* bicarbonate, chloride *and* sulphate*)*
iv) cation/anion ratio
v) pH
vi) conductivity
vii) ammonia*cal nitrogen*
viii) nitrate *nitrogen*
ix) *dissolved* iron
x) *dissolved* lead
xi) *dissolved* zinc
xii) *dissolved oxygen*
xiii) *Total organic carbon*

(d) The consent holder shall collect a representative sample of groundwater from the deep groundwater monitoring wells MW2D, MW4D and MW9D, at least once every three months, for the purpose of isotope analysis. Isotopic enrichment/depletion of the following isotopes shall be determined:

i) oxygen-18 in water from groundwater ($\delta^{18}O$-H_2O), relative to Vienna standard mean ocean water

ii) hydrogen-2 in water from groundwater (δD-H_2O), relative to Vienna standard mean ocean water

iii) carbon-13 in dissolved inorganic carbon from groundwater ($\delta^{13}C$-DIC), relative to Vienna Pee Dee Belemite

iv) nitrogen-15 in ammonium from groundwater ($\delta^{15}N$-NH_4^+), relative to atmospheric nitrogen.

v) nitrogen-15 in nitrate from groundwater ($\delta^{15}N$-NO_3^-), relative to atmospheric nitrogen.

~~(iv) The results shall be forwarded to the Consent Authority at 3 monthly intervals and the Consent Authority shall be notified immediately if any sudden change in chemistry is detected or if a trend of increasing concentration is indicated. The Consent Authority shall advise interested parties accordingly.~~

~~(v) The Consent Authority may direct or agree in writing that additional sampling and analysis be undertaken if monitoring results indicate amendments are appropriate.~~

10. Monitoring Kaikorai Estuary

(a) The consent holder shall, once every 3 months, collect a representative water sample from each of four sites in the Kaikorai Stream. *Sample collection shall be timed to coincide with an outgoing tide at Brighton Beach, within 3 hours of low tide, and shall not occur within 72 hours of any measurable rainfall event.*

(b) The four water monitoring sites are

i) GI 1 – Kaikorai Stream, at the first upstream bridge *on Brighton Road*;

ii) GI 2 - Abbots Creek, *at the State Highway 1 bridge at Sunnyvale*

iii) GI 3 - *Kaikorai Stream* adjacent to *the* landfill, *approximately 100 metres below the Abbots Creek confluence*

iv) GI 5 - *Kaikorai Stream d*ownstream of landfill, *adjacent to the Green Island Wastewater Treatment Plant*

(c) The samples shall be analysed for the following parameters:

i) pH
ii) conductivity
iii) chloride
iv) dissolved oxygen
v) ammonia*cal nitrogen*
vi) nitrate *nitrogen*
~~vii) iron~~
viii) *dissolved metals, including: aluminium, cadmium, chromium, copper,* lead, *and nickel.*
~~ix) zinc~~
~~x) Biological Oxygen Demand (5 day)~~
xi) total cyanide
xii) total organic carbon
xiii) isotopic enrichmen/depletion of oxygen-18 in water from samples ($\delta^{18}O$-H_2O), relative to Vienna standard mean ocean water
xiv) isotopic enrichment/depletion of hydrogen-2 in water from samples (δD-H_2O), relative to Vienna standard mean ocean water
xv) isotopic enrichment/depletion of carbon-13 in dissolved inorganic carbon from samples ($\delta^{13}C$-DIC), relative to Vienna Pee Dee Belemite
xvi) isotopic enrichment/depletion of nitrogen-15 in ammonium from samples ($\delta^{15}N$-NH_4^+), relative to atmospheric nitrogen.
xvii) isotopic enrichment/depletion of nitrogen-15 in nitrate from samples ($\delta^{15}N$-NO_3^-), relative to atmospheric nitrogen.

(d) On each occasion, the consent holder shall qualitatively estimate the flow in the Kaikorai Stream, record the water level, the tidal stage, rainfall over the past 7 days (from nearest existing recorder) and whether the estuary mouth is open or closed.

~~(v) The results of each monitoring occasion shall be forwarded to the Consent Authority within 3 months of sample collection and the Consent Authority shall be notified immediately if a trend of increasing concentration is indicated.~~

~~(vi) The consent holder shall provide an information flow diagram and explanation describing the methods by which the monitoring results shall be used and actioned.~~

~~(vii) If monitoring data indicates adverse effects on water quality directly attributable to landfill leachate entering the Kaikorai Stream, the consent holder shall institute appropriate abatement procedures to avoid or mitigate these effects.~~

~~(The Consent Authority may direct or agree in writing that additional sampling and analyses be undertaken if monitoring results indicate amendments are appropriate.~~

11. *Reporting*

(a) The consent holder shall compile the results of any monitoring undertaken to satisfy the requirements of this consent (including any leachate, groundwater and surface water physiochemical monitoring, groundwater level monitoring, alerts from the leachate pumping system and monthly records of total leachate volumes pumped from the collection trench), into tables in digital format (excel spreadsheet file or comma separated value file). One table shall be compiled for each location that monitoring is undertaken. The tables shall be regularly updated and provided to the Consent Authority within 1 month of ongoing monitoring occurring.

(b) Should the results of any leachate, groundwater and surface water physiochemical monitoring, monitoring of the leachate pumping system and groundwater level monitoring show any sudden change in chemistry, or if a trend of increasing concentration is indicated, or should groundwater level monitoring identify outward gradients, or a risk identified that the gradient into the trench may not be maintained, the Consent Authority shall be notified immediately.

(c) If monitoring data indicates adverse effects on water quality directly attributable to landfill leachate from the consent holder's landfill entering the Kaikorai Stream, the consent holder shall institute appropriate abatement procedures to avoid or mitigate these effects.

(d) The consent holder shall provide the Consent Authority with a Landfill Monitoring Report by 1 October each year. At minimum this report shall include:

i) The results obtained for all leachate, groundwater, surface water and leachate pumping system monitoring undertaken to meet the requirements of this consent for the previous year. Results shall be supplied in table format within the report, with a copy of all laboratory analytical reports appended.

ii) A description of the dates of monitoring and climatic conditions on those dates, and any other pertinent field observations.

iii) Interpretation of all the data, particularly with regard to landfill performance and development, and isotope analyses undertaken. Trends shall be identified and discussed.

12. Section 128 Review

The conditions of this permit may be reviewed annually and within six months of each anniversary of the date of this consent in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Consent Authority there is, or there is likely to be, a significant adverse impact on the environment or, if the performance of the leachate collection differs significantly from that specified in the environmental impact assessment and information accompanying the application.

The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within 3 months of each anniversary of the commencement of this consent for the purpose of amending the monitoring programme to be undertaken if the record of monitoring indicates that the monitoring programme is inappropriate.

13. Five Yearly Review

This consent is to be reviewed at five yearly intervals.

14. Bond Provisions

In the event that the landfill changes to private ownership, the consent holder shall execute and maintain in existence a performance bond in the form set out in Schedule 1 and an annual monitoring bond in the form set out in Schedule 2 (the terms of which the consent holder has already agreed), with sureties acceptable to the Consent Authority.

15. All laboratory analyses undertaken in connection with this permit *(excluding stable isotope analyses)* must be performed at a ~~Telare registered~~ laboratory *that has achieved International Standards Organisation (ISO) standard 17025 and holds current accreditation,* or otherwise as specifically approved by the Consent Authority in writing.

16. Closure Work Programme

Prior to the expiry or surrender of this consent, the consent holder shall prepare a management, monitoring and contingency plan for the future management of the landfill.

Otago Regional Council

17. Archaeological Survey

The consent holder shall carry out an archaeological survey of the site to criteria and within a time frame as agreed with the affected Runanga and provide the results of this survey to the Runanga.

Issued at Dunedin this 4th day of March 1994

Reissued at Dunedin this 5th day of July 2007, to reflect a update to the consent (originally issued as a single permit 3839 and now issued as 3839A_V1, 3839B_V1, 3839C_V1 and 3839D_V1), and to reflect a variation to the monitoring conditions 7, 8, 9, 10, 11, 12 and 15, (additions italicised, deletions struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

Consent No. 3839B_V1

WATER PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To take groundwater and leachate from groundwater bores and from a leachate collection drain located at and around the Green Island Sanitary Landfill

For the purpose of managing a sanitary landfill and composting facility leachate discharge from the Green Island Landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream.

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. *This consent shall be exercised in conjunction with discharge permit 3839A_V1.*

2. The leachate collector drain shall be installed and pumped to maintain a depression in the phreatic (zone of saturation) groundwater level surface at all times. The depression of the phreatic surface shall be sufficient to cause the drain to intercept phreatic groundwater which would, ordinarily, have flowed outward from the drain to adjacent groundwater and the Kaikorai Stream or associated water bodies. The presence of the depression shall be determined by measuring the slope of the phreatic groundwater level between the leachate collector drain and the Kaikorai Stream, and the leachate collector drain and the fluid level in the landfill. The slope shall be inward, towards the collector drain at all times.

3. This consent shall be exercised in conformity with a landfill work programme prepared by the consent holder. The work programme shall be prepared within 6 months of the first exercise of this consent and shall thereafter be reviewed at least annually or at such lesser frequency as the Consent Authority may approve: The work program shall:

(i) Review the exercise of the consent and the monitoring relating thereto (including: actions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [including toxic, biological, medical and radioactive wastes] and stormwater management and monitoring).

(ii) Evaluate and analyse trends and any matters having, or likely to have an adverse impact on water resources or the use of those resources, resulting from the operation of the landfill.

(iii) Present projections and intentions for landfill operations in relation to the future exercise of this consent (including: intentions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [as defined in 2(i)] and stormwater management and monitoring).

(iv) Describe sequencing of works, procedures to be adopted during construction and filling, and the maintenance and management of facilities.

(v) Describe measures to be taken so that the conditions of this consent will be met at all times, and that adverse effects on natural water are avoided or mitigated.

(vi) Describe the precautionary measures that prevent unauthorised discharges or other adverse effects on natural water and present a contingency plan which will describe how any event will be managed so as to avoid or mitigate any adverse effects on natural water.

(vii) Describe any additional monitoring necessary to identify the impacts of the exercise of this consent, and means of effective avoidance or mitigation of adverse effects both during and post closure of the landfill.

(viii) Provide for the managed recycling of leachate over the landfill where and when this is practicable and will not result in adverse environmental effects.

4. ***(A)*** **Monitoring Groundwater Levels**

The consent holder shall establish a network of groundwater bores at the following locations (which are to be specified once the leachate collection system is installed) and, during one day each ~~week~~ *month, shall* measure and record the groundwater level in each of the wells;

(i) Leachate collection system: monitoring water level in each of the sumps, in the collection trench midway between each of the sumps, and at each end of the collector system.

(ii) Groundwater outside landfill and collection system: monitor both shallow and deep groundwater levels outside of the landfill and leachate collection system. One shallow well type shall be located adjacent to the collection trench and midway between each of the pumps (giving a total

of 8-10 external shallow wells). The wells should be 5-20 metres distance away from the leachate collection trench. In addition, a total of three deep well types should be located at representative sites outside the landfill. One of the sites should be adjacent to the existing well W78.

(iii) If locations of high permeability (for example, gravel and coarse sand) are known, deep sampling wells shall be installed outside the leachate collection system at those locations.

(iv) Surface water outside landfill and collector system: in situations where the "outside landfill groundwater wells" are located adjacent to Kaikorai Stream, the water level in the stream adjacent to each well shall be monitored.

(v) Leachate and deep groundwater within landfill: monitor both shallow leachate and deep groundwater levels within the landfill and leachate collection system. At least one shallow well type shall be located within the landfill in such a position that it is representative of the leachate level.

(vi) In addition, there shall be at least one deep groundwater well type within the landfill and located to represent deep groundwater levels and chemistry. This well shall be constructed in the geometric centre of the landfill.

The recorded water levels will be converted to reference level and the gradient into the leachate trench will be confirmed.

~~The results shall be forwarded to the Consent Authority at three monthly intervals and the Consent Authority shall be notified immediately if outward gradients are identified.~~

4. *(B) Monitoring of Pump Operation*

The consent holder shall establish, operate and maintain a monitoring system of the operation of the leachate pumping system. The system shall automatically trigger an alert in the event of:

(i) *A pump fault;*

(ii) *A low water level in a pump wet well; and*

(iii) *A high water level in a pump wet well.*

The system shall be continuously monitored. In the event of an alert being raised, the cause of the alert shall be investigated within twenty four hours and appropriate remedial measures shall be implemented. The following information shall be recorded for each alert:

(i) *the date and time of the alert;*

(ii) *the nature of the alert;*

(iii) *the reason for the alert; and*

Otago Regional Council

(iv) *the date, time and nature of the action taken to remedy the cause of the alert.*

The information shall be made available to the Consent Authority on request.

5. Monitoring pumped leachate/groundwater volume

The consent holder shall continuously monitor and record the flow of the pumped discharge from the combined leachate collection sumps. ~~The results shall be forwarded to the Consent Authority at three monthly intervals.~~

6. *Reporting*

Reporting of the results of any monitoring undertaken to satisfy the requirements of this consent shall be undertaken in accordance with condition 11 of consent 3839A_V1.

7. Section 128 Review

The conditions of this permit may be reviewed annually and within six months of each anniversary of the date of this consent in accordance with section 128 of the Resource Management Act 1991 if in the opinion of the Consent Authority there is, or there is likely to be, a significant adverse impact on the environment or, if the performance of the leachate collection differs significantly from that specified in the environmental impact assessment and information accompanying the application.

The Consent Authority may, in accordance with sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within 3 months of each anniversary of the commencement of this consent for the purpose of amending the monitoring programme to be undertaken if the record of monitoring indicates that the monitoring programme is inappropriate.

8. Five Yearly Review

This consent is to be reviewed at 5 yearly intervals.

Issued at Dunedin this 4th day of March 1994

Reissued at Dunedin this 5th day of July 2007, to reflect a update to the consent (originally issued as a single permit 3839 and now issued as 3839A_V1, 3839B_V1, 3839C_V1 and 3839D_V1), and to reflect a variation to the monitoring conditions 4, 5, 6 and 7 (additions italicised, deletions struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

Consent No. 3839C_V1

WATER PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To divert stormwater at a landfill and composting facility within a 38 hectare area bounded by a leachate collection drain

For the purpose of control of landfill and composting facility leachate at the Green Island Landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. *This consent shall be exercised in conjunction with discharge permit 3839A_V1.*

2. This consent shall be exercised in conformity with a landfill work programme prepared by the consent holder. The work programme shall be prepared within 6 months of the first exercise of this consent and shall thereafter be reviewed at least annually or at such lesser frequency as the Consent Authority may approve: The work program shall:

   (i) Review the exercise of the consent and the monitoring relating thereto (including: actions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [including toxic, biological, medical and radioactive wastes] and stormwater management and monitoring).

   (ii) Evaluate and analyse trends and any matters having, or likely to have an adverse impact on water resources or the use of those resources, resulting from the operation of the landfill.

Otago Regional Council

(iii) Present projections and intentions for landfill operations in relation to the future exercise of this consent (including: intentions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [as defined in 1(i)] and stormwater management and monitoring).

(iv) Describe sequencing of works, procedures to be adopted during construction and filling, and the maintenance and management of facilities.

(v) Describe measures to be taken so that the conditions of this consent will be met at all times, and that adverse effects on natural water are avoided or mitigated.

(vi) Describe the precautionary measures that prevent unauthorised discharges or other adverse effects on natural water and present a contingency plan which will describe how any event will be managed so as to avoid or mitigate any adverse effects on natural water.

(vii) Describe any additional monitoring necessary to identify the impacts of the exercise of this consent, and means of effective avoidance or mitigation of adverse effects both during and post closure of the landfill.

(viii) Provide for the managed recycling of leachate over the landfill where and when this is practicable and will not result in adverse environmental effects.

3. Section 128 Review

The conditions of this permit may be reviewed annually and within six months of each anniversary of the date of this consent in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Consent Authority there is, or there is likely to be, a significant adverse impact on the environment.

4. Five Yearly Review

This consent is to be reviewed at 5 yearly intervals.

Issued at Dunedin this 4th day of March 1994

Reissued at Dunedin this 5th day of July 2007, to reflect a update to the consent (originally issued as a single permit 3839 and now issued as 3839A_V1, 3839B_V1, 3839C_V1 and 3839D_V1), (additions italicised, deletions struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

Consent No. 3839D_V1

WATER PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To take stormwater from a landfill and composting facility within a 38 hectare area bounded by a leachate collection drain

For the purpose of control of landfill and composting facility leachate at the Green Island Landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. *This consent shall be exercised in conjunction with discharge permit 3839A_V1.*

2. This consent shall be exercised in conformity with a landfill work programme prepared by the consent holder. The work programme shall be prepared within 6 months of the first exercise of this consent and shall thereafter be reviewed at least annually or at such lesser frequency as the Consent Authority may approve: The work program shall:

   (i) Review the exercise of the consent and the monitoring relating thereto (including: actions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [including toxic, biological, medical and radioactive wastes] and stormwater management and monitoring).

   (ii) Evaluate and analyse trends and any matters having, or likely to have an adverse impact on water resources or the use of those resources, resulting from the operation of the landfill.

(iii) Present projections and intentions for landfill operations in relation to the future exercise of this consent (including: intentions to minimise the working face; litter control; vermin and bird control; leachate collection, disposal and treatment; sampling and analytical protocols; management and control of hazardous waste [as defined in 1(i)] and stormwater management and monitoring).

(iv) Describe sequencing of works, procedures to be adopted during construction and filling, and the maintenance and management of facilities.

(v) Describe measures to be taken so that the conditions of this consent will be met at all times, and that adverse effects on natural water are avoided or mitigated.

(vi) Describe the precautionary measures that prevent unauthorised discharges or other adverse effects on natural water and present a contingency plan which will describe how any event will be managed so as to avoid or mitigate any adverse effects on natural water.

(vii) Describe any additional monitoring necessary to identify the impacts of the exercise of this consent, and means of effective avoidance or mitigation of adverse effects both during and post closure of the landfill.

(viii) Provide for the managed recycling of leachate over the landfill where and when this is practicable and will not result in adverse environmental effects.

3. Section 128 Review

The conditions of this permit may be reviewed annually and within six months of each anniversary of the date of this consent in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Consent Authority there is, or there is likely to be, a significant adverse impact on the environment.

4. Five Yearly Review

This consent is to be reviewed at 5 yearly intervals.

Issued at Dunedin this 4th day of March 1994

Reissued at Dunedin this 5th day of July 2007, to reflect a update to the consent (originally issued as a single permit 3839 and now issued as 3839A_V1, 3839B_V1, 3839C_V1 and 3839D_V1), (additions italicised, deletions struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

Consent No. 3840A_V1

WATER PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To divert stormwater from the non-working areas of a landfill

For the purpose of intercepting clean stormwater and silt control of stormwater at the Green Island Landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. *This consent shall be exercised in conjunction with discharge permit 3840C_V1.*

2. **Landfill Management Plan**

   This consent shall be exercised in conformity with a Landfill Work Programme prepared by the consent holder. The work programme shall be prepared within 6 months of the first exercise of this consent and shall thereafter be reviewed at least annually or at such lesser frequency as the Consent Authority may approve. The work programme shall:

   i) Review the exercise of the consent and the monitoring relating thereto (including sampling and analytical protocols).

   ii) Evaluate and analyse trends and any matters having, or likely to have an impact on water resources or the use of those resources, including a schedule of the existing condition of the Kaikorai Stream and Estuary.

   iii) Present projections and intentions for landfill operations in relation to the future exercise of this consent (including: intentions to minimise the working face, sampling and analytical protocols, and stormwater management and monitoring).

iv) Describe sequencing of works, procedures to be adopted during construction and filling, and the maintenance and management of facilities.

v) Describe measures to be taken so that the conditions of this consent will be met at all times, and that adverse effects on natural water are minimised.

vi) Describe the precautionary measures that prevent unauthorised discharges or other adverse effects on natural water and present a contingency plan which will describe how any such event wills be managed so as to minimise any adverse effects on natural water.

vii) Describe any additional monitoring necessary to identify the impacts of the exercise of this consent, and means of effective rehabilitation both during and post closure of the landfill.

3. Appropriate silt retention pond(s) shall be in place prior to the exercise of this consent.

4. All silt retention ponds shall be designed for the runoff arising from storms having a return period of 1 in 2 years with a design storm duration of 24 hours (from the control levels).

5. The consent holder shall ensure that all practicable steps are taken to prevent contamination of stormwater by suspended solids or exposed landfill material or runoff via appropriate landfill management practices. Stormwater from the composting area shall be prevented from entering the silt retention ponds by diverting this to the leachate collection system. The objective to be met at all stages of this management is to ensure effective long term rehabilitation of the landfill to the extent that stormwater generated from the area is uncontaminated.

6. Works associated with the exercise of this consent shall be designed, constructed and maintained in accordance with best engineering standards. All designs shall be submitted to the Consent Authority prior to construction.

7. The conditions of this consent may be reviewed annually and within six months of each anniversary of the date of this consent in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Consent Authority there is, or is likely to be, a significant adverse impact on the environment or, if the performance of the stormwater diversion and treatment system differs significantly from that specified in the environmental impact assessment and information accompanying the application.

8. **Five Yearly Review**

This consent is to be reviewed at 5 yearly intervals.

Otago Regional Council

9. Bond Provisions

In the event that the landfill changes to private ownership, the consent holder shall execute and maintain in existence a performance bond in the form set out in Schedule 1 and an annual monitoring bond in the form set out in Schedule 2 (the terms of which the consent holder has already agreed), with sureties acceptable to the Consent Authority.

10. Closure Work Programme

Prior to the expiry or surrender of this consent, the consent holder shall prepare a management, monitoring and contingency plan for the future management of the landfill.

11. Archaeological Survey

The grantee shall carry out an archaeological survey of the site to criteria and within a time frame as agreed with the affected Runanga and provide the results of this survey to the Runanga.

Issued at Dunedin this 4th day of March 1994

Reissued at Dunedin this 5th day of July 2007, to reflect a update to the consent (originally issued as a single permit 3840 and now issued as 3840A_V1, 3840B_V1 and 3840C_V1), (additions italicised, deletions struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

Consent No. 3840B_V1

WATER PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To take diverted stormwater from the non-working areas of a landfill

For the purpose of silt control of stormwater at the Green Island Landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. *This consent shall be exercised in conjunction with discharge permit 3840C_V1.*

2. Appropriate silt retention pond(s) shall be in place prior to the exercise of this consent.

3. All silt retention ponds shall be designed for the runoff arising from storms having a return period of 1 in 2 years with a design storm duration of 24 hours (from the control levels).

4. The conditions of this consent may be reviewed annually and within six months of each anniversary of the date of this consent in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Consent Authority there is, or is likely to be, a significant adverse impact on the environment or, if the performance of the stormwater diversion and treatment system differs significantly from that specified in the environmental impact assessment and information accompanying the application.

5. Five Yearly Review

This consent is to be reviewed at 5 yearly intervals.

Issued at Dunedin this 4th day of March 1994

Reissued at Dunedin this 5th day of July 2007, to reflect a update to the consent (originally issued as a single permit 3840 and now issued as 3840A_V1, 3840B_V1 and 3840C_V1), (additions italicised, deletions struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

Consent No. 3840C_V1

DISCHARGE PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To discharge stormwater to the Kaikorai Stream

For the purpose of disposal of stormwater from a landfill facility, after treatment in silt retention ponds at the Green Island Sanitary Landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. **Landfill Management Plan**

   This consent shall be exercised in conformity with a Landfill Work Programme prepared by the consent holder. The work programme shall be prepared within 6 months of the first exercise of this consent and shall thereafter be reviewed at least annually or at such lesser frequency as the Consent Authority may approve. The work programme shall:

   i) Review the exercise of the consent and the monitoring relating thereto (including sampling and analytical protocols).

   ii) Evaluate and analyse trends and any matters having, or likely to have an impact on water resources or the use of those resources, including a schedule of the existing condition of the Kaikorai Stream and Estuary.

   iii) Present projections and intentions for landfill operations in relation to the future exercise of this consent (including: intentions to minimise the working face, sampling and analytical protocols, and stormwater management and monitoring).

   iv) Describe sequencing of works, procedures to be adopted during construction and filling, and the maintenance and management of facilities.

v) Describe measures to be taken so that the conditions of this consent will be met at all times, and that adverse effects on natural water are minimised.

vi) Describe the precautionary measures that prevent unauthorised discharges or other adverse effects on natural water and present a contingency plan which will describe how any such event wills be managed so as to minimise any adverse effects on natural water.

vii) Describe any additional monitoring necessary to identify the impacts of the exercise of this consent, and means of effective rehabilitation both during and post closure of the landfill.

2. Appropriate silt retention pond(s) shall be in place prior to the exercise of this consent.

3. All silt retention ponds shall be designed for the runoff arising from storms having a return period of 1 in 2 years with a design storm duration of 24 hours (from the control levels).

4. The consent holder shall ensure that all practicable steps are taken to prevent contamination of stormwater by suspended solids or exposed landfill material or runoff via appropriate landfill management practices. Stormwater from the composting area shall be prevented from entering the silt retention ponds by diverting this to the leachate collection system. The objective to be met at all stages of this management is to ensure effective long term rehabilitation of the landfill to the extent that stormwater generated from the area is uncontaminated.

5. Works associated with the exercise of this consent shall be designed, constructed and maintained in accordance with best engineering standards. All designs shall be submitted to the Consent Authority prior to construction.

6. **Monitoring Silt Pond Discharge**

(i) *For the 12 months following the granting of the first variation of this consent, the consent holder shall collect a representative sample of discharge from each of the silt ponds at monthly intervals.*

(ii) *Trigger levels for stormwater discharge from these ponds shall be set for the parameters listed in condition 6(v), from the data obtained under condition 6(i). Using the data obtained under condition 6(i), these trigger levels shall be set to the value that is calculated as the mean value of the data set, plus or minus 3 standard deviations of the data set.*

(iii) *Discharge from the stormwater ponds shall not exceed the trigger levels set under condition 6(ii).*

(iv) *After the 12 months following the granting of the first variation of this consent,* The consent holder shall, once every 3 months, collect a representative sample of the discharge from each of the silt ponds.

(v) The samples *collected under condition 6(i) or 6(iv)* shall be analysed for:

- pH

- conductivity
- ~~suspended solids~~
- ~~turbidity~~
- ammonia*cal nitrogen*
- ~~5 day biological oxygen demand (BOD_5)~~
- *nitrate nitrogen*
- *alkalinity*
- *chloride*
- *potassium*
- *total organic carbon*
- *dissolved oxygen*
- *dissolved chromium*
- *dissolved copper*
- *dissolved lead*
- *dissolved nickel*
- *dissolved zinc*

~~(vi) The results shall be forwarded to the Consent Authority within 3 months of sample collection, and the Consent Authority shall be notified immediately if any sudden change in chemistry is detected or if a trend of increasing concentration is indicated.~~

~~(vii) The Consent Authority may direct or agree in writing that additional sampling and analyses be undertaken if monitoring results indicate amendments are appropriate.~~

7. All laboratory analyses undertaken in connection with this permit must be performed at a ~~Telare registered~~ laboratory *that has achieved International Standards Organisation (ISO) standard 17025 and holds current accreditation,* or otherwise as specifically approved by the Consent Authority in writing.

8. The conditions of this consent may be reviewed annually and within six months of each anniversary of the date of this consent in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Consent Authority there is, or is likely to be, a significant adverse impact on the environment or, if the performance of the stormwater diversion and treatment system differs significantly from that specified in the environmental impact assessment and information accompanying the application.

9. Reporting

(a) The consent holder shall compile the results of the silt pond discharge monitoring undertaken to satisfy the requirements of this consent into tables in digital format (excel spreadsheet file or comma separated value file). One table shall be complied for each location that monitoring is undertaken. The tables shall be regularly updated and provided to the Consent Authority within 1 month of ongoing monitoring occurring.

(b) Should the results of any monitoring show any sudden change in chemistry, or if a trend of increasing concentration is indicated, the Consent Authority shall be notified immediately.

(c) *If monitoring data indicates adverse effects on water quality directly attributable to landfill leachate from the consent holder's landfill entering the Kaikorai Stream, the consent holder shall institute appropriate abatement procedures to avoid or mitigate these effects.*

(d) *The consent holder shall provide the Consent Authority with a Landfill Monitoring Report by 1 October each year. At minimum this report shall include:*

i) The results obtained for all stormwater monitoring undertaken to meet the requirements of this consent for the previous year. Results shall be supplied in table format within the report, with a copy of all laboratory analytical reports appended.

ii) A description of the dates of monitoring and climatic conditions on those dates, and any other pertinent field observations

iii) Interpretation of all the data, particularly with regard to the success of stormwater management at the site. Trends shall be identified and discussed.

10. Five Yearly Review

This consent is to be reviewed at 5 yearly intervals.

11. Bond Provisions

In the event that the landfill changes to private ownership, the consent holder shall execute and maintain in existence a performance bond in the form set out in Schedule 1 and an annual monitoring bond in the form set out in Schedule 2 (the terms of which the consent holder has already agreed), with sureties acceptable to the Consent Authority.

12. Closure Work Programme

Prior to the expiry or surrender of this consent, the consent holder shall prepare a management, monitoring and contingency plan for the future management of the landfill.

13. Archaeological Survey

The grantee shall carry out an archaeological survey of the site to criteria and within a time frame as agreed with the affected Runanga and provide the results of this survey to the Runanga.

Issued at Dunedin this 4th day of March 1994

Reissued at Dunedin this 5th day of July 2007, to reflect a update to the consent (originally issued as a single permit 3840 and now issued as 3840A_V1, 3840B_V1 and 3840C_V1), and to reflect a variation to the monitoring required under conditions 6, 7 and 9 of this consent. Changes italicised, deletions struck out).

Christopher P Shaw
Manager Consents
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ISO9001
Certified

Otago Regional Council

Consent No. 4139_V1

WATER PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To take groundwater (originating from the Kaikorai Stream) through a landfill leachate collection drain

For the purpose of maintaining groundwater levels within the contained landfill area at a lower level than within surrounding ground at the Green Island Landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. The rate of taking shall be nominally 23,400 litres per hour and shall not exceed 72,000 litres per hour.

2. **Landfill Work Programme**

   This consent shall be exercised in conformity with a Landfill Work Programme prepared by the consent holder. The work programme shall be prepared within six months of the first exercise of this consent and shall thereafter be reviewed at least annually or at such lesser frequency as the Consent Authority may approve. The work programme shall:

   (i) Review the exercise of the consent and the monitoring relating thereto (including sampling and analytical protocols).

   (ii) Evaluate and analyse trends and any matters having, or likely to have an impact on water resources or the use of those resources.

   (iii) Present projections and intentions for landfill operations in relation to the future exercise of this consent (including leachate collection, disposal and treatment and sampling and analytical protocols).

(iv) Describe sequencing of works, procedures to be adopted during construction and filling, and the maintenance and management of facilities.

(v) Describe measures to be taken so that the conditions of this consent will be met at all times, and that adverse effects on natural water are minimised.

(vi) Describe the precautionary measures that prevent unauthorised discharges or other adverse effects on natural water and present a contingency plan which will describe how any such event will be managed so as to minimise any adverse effects on natural water.

(vii) Describe any additional monitoring necessary to identify the impacts of the exercise of this consent, and means of effective rehabilitation both during and post closure of the landfill.

3. **Monitoring Pumped Leachate/Groundwater Volume**

The consent holder shall continuously monitor and record the flow of the pumped discharge from the combined landfill leachate collection sumps undertaken pursuant to ~~special~~ condition 3 of *discharge* permit 3839*A_V1, condition 2 of water permit 3839B_V1*. The results shall be forwarded to the Consent Authority at 3 monthly intervals.

4. **Five Yearly Review**

This consent is to be reviewed at five yearly intervals.

5. The conditions of this consent may be reviewed annually and within six months of each anniversary of the date of this consent in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Consent Authority there is or is likely to be significant adverse effect on the environment or, if the performance of the leachate collection system differs significantly from that specified in the environmental impact assessment and information accompanying the application.

6. **Closure Management Plan**

Prior to the expiry or surrender of this consent, the consent holder shall prepare a management, monitoring and contingency plan for the future management of the landfill.

7. The objectives to be met at all stages of this management is to ensure the effective long term containment, collection and monitoring of contaminated leachate and to protect the Kaikorai Stream, coastal waters and the uses and values associated with these waters.

8. **Archaeological Survey**

The grantee shall carry out an archaeological survey of the site to criteria and within a time frame as agreed with the affected Runanga and provide the results of this survey to the Runanga.

Issued at Dunedin this 4th day of March 1994

Reissued at Dunedin this 5th day of July 2007, to reflect a variation to the consent numbers referred to in condition 3 of this consent, and a correction to the legal description and map reference. (Variations italicised or struck out).

Christopher P Shaw
Manager Consents
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ISO9001
Certified

Otago Regional Council

Consent No. 94524_V1

DISCHARGE PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To discharge to air landfill gas, dust and odour generated from landfilling up to 100,000 cubic metres a year of compacted municipal, domestic, hazardous and industrial waste, and including a composting operation

For the purpose of operating a sanitary landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. The Consent Authority may, in accordance with section 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within two months of each anniversary of the commencement of this consent for the purposes of determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage.

2. This consent shall be exercised in conjunction with consent numbers 3839*A_V1, 3839B_V1, 3839C_V1, 3839D_V1*, 3840*A_V1, 3840B_V1, 3840C_V1*, 4139*_V1*, 4140, 4185, 94262*_V1* and 94693*_V1*.

3. This consent shall be exercised in conformity with the landfill work programme prepared by the consent holder for consent numbers 3839*A_V1, 3839B_V1, 3839C_V1, 3839D_V1*, 3840*A_V1, 3840B_V1, 3840C_V1*, 4139*_V1*, and 94262*_V1*. The work programme shall be reviewed at least annually or as at such lesser frequency as the Consent Authority may approve, and submitted as soon as practicable to the Consent Authority for approval.

4. The consent holder shall adopt the best practicable option to avoid and/or mitigate any adverse effect on the environment resulting from the discharge of contaminants to air. This shall require that the consent holder operate, supervise and maintain the landfill and monitor the discharge so as to ensure that any adverse effect on the environment is avoided or mitigated.

5. The consent holders shall take all practicable steps to collect the landfill gas generated from refuse less than 12 years old at the commencement of this consent and to minimise the emission of landfill gas to atmosphere.

6. Beyond the boundary of the consent holders site there shall be no odour caused by discharges from the site, which, in the opinion of an enforcement officer of the Consent Authority is objectionable or offensive.

7. Dust emissions shall be kept to a practicable minimum. The consent holder shall ensure that dust emissions from the site do not create conditions beyond the boundary which, in the opinion of an enforcement officer of the Consent Authority are objectionable or offensive.

8. The intentional burning of rubbish is not allowed. Any unintentional fires must be extinguished as soon as possible. Fires lit on the landfill site specifically for training exercises will be allowed so long as all precautions are taken to avoid the fire spreading to the refuse and the amount of smoke generated is minimised.

9. Any hazardous waste accepted for disposal must be managed in accordance with the requirement of the landfill management plan provided in support of the application, including the deposition in an appropriate manner to prevent any adverse environmental effect due to discharges to air.

10. A log shall be kept recording any complaints due to discharges to air from the landfill. The log shall be available at all times for inspection by the Consent Authority.

11. Monitoring for methane and carbon dioxide and oxygen shall be undertaken monthly using portable gas detectors at the site identified in the application documents as gas tube 1 situated near to Clariton Avenue. The results of the monitoring shall be reported every 6 months to the Consent Authority.

12. All laboratory analysis undertaken in connection with this consent must be performed at a ~~Telarc registered~~ laboratory *that has achieved International Standards Organisation (ISO) standard 17025 and holds current accreditation,* or otherwise as specifically approved by the Consent Authority in writing.

13. The consent holder shall undertake regular monthly inspections of the landfill for evidence of landfill gas such as odours, gas bubbling in puddles, or fissures in the landfill cover. The inspection shall comprise a minimum of walking around the perimeter and traversing the top of the landfill and where potential problems are identified, the consent holder shall investigate and remedy or mitigate the problem. Such actions may include where appropriate conducting gas tests and repairing any fissures in the landfill cover.

14. Any excavations carried out in the landfill shall be done in such a manner as to minimise the generation of odour. In the event of offensive odour being generated or a complaint of odour from the public being received during an excavation procedure the excavations much cease and the exposed refuse recovered until such time as the wind conditions are more favourable.

15. Only vegetation shall be included in the waste to be composted.

16. The composting operation shall be managed so as to minimise the production of odour by ensuring aerobic conditions are maintained at all times within the windrows.

Issued at Dunedin this 27th day of November 1995

Reissued at Dunedin this 5th day of July 2007, to reflect a variation to the consent numbers referred to in conditions 2 and 3, to update laboratory standards referred to in condition 12, and to reflect a correction to the legal description and map reference. (Variations italicised or struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

Consent No. 94693_V1

DISCHARGE PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To discharge up to 270 cubic metres per day of municipal, domestic, hazardous and industrial waste, including a composting operation, to land in circumstances which may result in contaminants entering natural water.

For the purpose of operating a sanitary landfill

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. This consent shall be exercised in conjunction with consent numbers 3839*A_V1, 3839B_V1, 3839C_V1, 3839D_V1*, 3840*A_V1, 3840B_V1, 3840C_V1*, 4139*_V1*, 4140, 4185 and 94262*_V1*.

2. The consent holder shall take appropriate measures to prevent landfilled material from moving off site.

3. The consent holder shall ensure that the placement of material pursuant to this consent shall not impair the flow of any natural watercourse on this site.

4. This consent shall be exercised in conformity with the landfill work programme prepared by the consent holder for consent numbers 3839*A_V1, 3839B_V1, 3839C_V1, 3839D_V1*, 3840*A_V1, 3840B_V1, 3840C_V1* and 4139*_V1*. The work programme shall be reviewed at least annually or at such lesser frequency as the Consent Authority may approve.

5. Any hazardous waste accepted for safe disposal (special protection) must be managed in accordance with the requirements of the landfill management plan provided in support of the application, including its deposition in an appropriate manner to prevent any adverse environmental effect.

6. The disposal location and date of the deposit of hazardous waste accepted for safe disposal (special protection) must be recorded and available for inspection by the Consent Authority.

7. In accordance with section 128 of the Resource Management Act 1991, the conditions of this consent may be reviewed on and in the period within 3 months upon each fifth anniversary of the date of this consent, if on reasonable grounds the Consent Authority finds that:
   (a) there is or is likely to be an adverse environmental effect as a result of the exercise of this consent, which was unforeseen when the consent was granted;
   (b) monitoring of the exercise of the consent has revealed that there is or is likely to be an adverse environmental effect on the environment;
   (c) there has been a change in circumstances such that the conditions of the consent are no longer appropriate in terms of the above Act.

Issued at Dunedin this 25th day of May 1995

Reissued at Dunedin this 5th day of July 2007, to reflect a variation to the consent numbers referred to in conditions 1 and 4 of this consent, and to correct the legal descriptions and map reference given. (Variations italicised or struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

Consent No. 94262_V1

DISCHARGE PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: Civic Centre, 50 The Octagon, Dunedin

To discharge up to 270 cubic metres per day of municipal, domestic, hazardous, industrial waste and organic waste to land

For the purpose of operating a sanitary landfill and composting operation

For a term expiring on: 1 October 2023

Location of activity: The Green Island Sanitary Landfill, located off Brighton Road, Green Island, and adjacent to the Kaikorai Stream

Legal description of land: Secs 46, 47 Green Island Bush SD, Pt Secs 44 and 45 Green Island Bush SD, Secs 54, 63, 81 Blk VII Dunedin & East Taieri SD, Lot 1 DP 20582

Map Reference: centred on NZMS 260 I44:090-745

Conditions

1. This consent shall be exercised in conjunction with consent numbers 3839*A_V1, 3839B_V1, 3839C_V1, 3839D_V1*, 3840*A_V1, 3840B_V1, 3840C_V1*, 4139*_V1*, 4140, 4185 and 94693*_V1*.

2. The consent holder shall take appropriate measures to prevent landfilled material from moving off site.

3. The consent holder shall ensure that the placement of material pursuant to this consent shall not impair the flow of any natural watercourse on this site.

4. This consent shall be exercised in conformity with the landfill work programme prepared by the consent holder for consent numbers 3839*A_V1, 3839B_V1, 3839C_V1, 3839D_V1*, 3840*A_V1, 3840B_V1, 3840C_V1* and 4139*_V1*. The work programme shall be reviewed at least annually or at such lesser frequency as the Consent Authority may approve.

5. Any hazardous waste accepted for safe disposal (special protection) must be managed in accordance with the requirements of the landfill management plan provided in support of the application, including its deposition in an appropriate manner to prevent any adverse environmental effect.

6. The disposal location and date of the deposit of hazardous waste accepted for safe disposal (special protection) must be recorded and available for inspection by the Consent Authority.

7. The consent holder shall not dispose of any material in the landfill by burning it. Should any fire arise in the landfill it shall be extinguished immediately upon being detected.

8. In accordance with section 128 of the Resource Management Act 1991, the conditions of this consent may be reviewed on and in the period within 3 months upon each fifth anniversary of the date of this consent, if on reasonable grounds the Consent Authority finds that:

   (a) there is or is likely to be an adverse environmental effect as a result of the exercise of this consent, which was unforeseen when the consent was granted;

   (b) monitoring of the exercise of the consent has revealed that there is or is likely to be an adverse environmental effect on the environment;

   (c) there has been a change in circumstances such that the conditions of the consent are no longer appropriate in terms of the above Act.

Issued at Dunedin this 25th day of May 1995

Reissued at Dunedin this 5th day of July 2007, to reflect a variation to the consent numbers referred to in conditions 1 and 4 of this consent and to reflect a correction to the legal description and map reference. (Variations italicised or struck out).

Christopher P Shaw
Manager Consents
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Otago Regional Council

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No. Ø4140

ORIGINAL

WATER PERMIT

Pursuant to Section 105of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: P O Box 5045, Dunedin

to divert the Kaikorai Stream for the purpose of realignment of this natural watercourse to allow for the installation of the Green Island landfill leachate collection drain and sumps

for a term expiring on 1 October 2023

Legal description of land at site of realignment: CT 11C/1275 and CT 13A/566 Part sections 53, 100 and 101 of Block VII Dunedin and East Taieri SD

SPECIAL CONDITIONS

1. The grantee shall ensure all practicable steps are taken to prevent contamination of water by suspended solids during construction of all works. The new channel shall be excavated dry with both ends closed until the final work is completed.

2. Works associated with the exercise of this consent shall be designed, constructed and maintained in accordance with best practicable means to the satisfaction of the Regional Council.

3. The final channel and bank form shall approximate that of the existing channel and bank forms and provide sufficient depth (nominally 1 metre depth at low tide) to ensure fish passage and continued fish habitat.

4. The banks of the new channel shall be battered (to a 1:4 slope if practicable).

5. The margins of the new channel shall be planted in appropriate grass and native species along the guidelines proposed by Mr Peter Johnson of Landcorp, and additional stabilisation works shall be undertaken if required by the ORC.

6. The design of the diversion shall be such that in the long term, a corridor useable by the public shall be created in the vicinity.

7. The Regional Council and interested parties shall be consulted over the exercise of this permit.

8. The conditions of this permit may be reviewed in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Regional Council there is or there is likely to be a significant adverse impact on the environment.

Issued at Dunedin this 28 October 1993.

R W Scott
Director Corporate Services
Any enquiries concerning this permit or the provisions of the Resource Management Act 1991 should be made to the office of the Council, 70 Stafford Street (Private Bag), Dunedin.

Otago Regional Council

No. Ø4185

ORIGINAL

WATER PERMIT

Pursuant to Section 105 of the Resource Management Act 1991, the Otago Regional Council hereby grants consent to:

Name: Dunedin City Council

Address: P O Box 5045, Dunedin

to divert the existing Brighton Road Stream for the purpose of realignment of this watercourse to allow for the installation of the Green Island landfill leachate collection drain and sumps

for a term expiring on 1 October 2023

Legal description of land at site of realignment: CT 11b/1241 Section 63 of Block VII Dunedin and East Taieri SD

SPECIAL CONDITIONS

1. The grantee shall ensure all practicable steps are taken to prevent contamination of water by suspended solids during construction of all works.

2. Works associated with the exercise of this consent shall be designed, constructed and maintained in accordance with best engineering standards to the satisfaction of the Regional Council. The grantee shall provide the Regional Council with details of the design of the culvert and open channel before construction proceeds.

3. The grantee shall carry out rehabilitation and enhancement of the wetland upstream of the diversion in consultation with the Regional Council and interested parties.

4. The grantee shall carry out revegetation of the Kaikorai Stream margin adjacent to the landfill in consultation with the Regional Council and interested parties.

5. The grantee shall consult with the Regional Council and interested parties over land fill management aspects to ensure activities are compatible and complementary to the estuarine wetland.

6. There shall be provision for a low flow channel (nominally 0.5 metres depth) with flattened batters above the low flow channel (to a 1:4 slope if practicable).

7. The margins of the new channel shall be planted in appropriate grass and native species.

8. The conditions of this permit may be reviewed in accordance with Section 128 of the Resource Management Act 1991 if in the opinion of the Regional Council there is or there is likely to be a significant adverse impact on the environment.

Issued at Dunedin this 28 October 1993.

R W Scott
Director Corporate Services

Any enquiries concerning this permit or the provisions of the Resource Management Act 1991 should be made to the office of the Council, 70 Stafford Street (Private Bag), Dunedin.

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Appendix B WMNZL Health and Safety Plan

WASTE MANAGEMENT NZ LTD

Landfill and Recovery Park
Contract Number 6856

HEALTH AND SAFETY MANAGEMENT PLAN

Version	Prepared By	Approved By	Date
1			
2			
3			

Contents

Appendices

1. Health Safety, Environmental and Quality Policies
2. WM Dunedin HSEQ Plan FY 2021

DISCLAIMER

1. Introduction

Waste Management NZ Limited (WMNZ), has a comprehensive Health, Safety, Environmental, and Quality (HSEQ) Management System which is implemented across all its operations. The company is committed to preventing harm and ensuring the health, safety and welfare of its employees, contractor's, visitors and the public. Health and Safety, Environmental and Quality policies (**Appendix 1**) and practices are firmly integrated into Waste Management's modus operandi and delivered under its HSEQ Management System. Operational procedures and plans for the safety of employees and the public specific to the risks associated with this contract are included in the Quality Plans outlined above.

1.1 Contract Description

This health and safety plan has been developed by WMNZ for the management and operation of the Dunedin City Council (DCC) contract Number 6856

1.2 Summary of Activities

The scope of work under the contract between DCC and WMNZ is as follows:

Facilities

- Public Place Recycling Drop-Off Stations (both Rural and Urban)
- Transfer Stations – Middlemarch and Waikouaiti
- Site Management and operations
- Hazardous Material Collection and Disposal
- Rummage Shop Operation
- Resource Recovery Park – General services

1.3 Contract Responsibilities and Accountabilities

It is the responsibility of a Company Officer to:

- Acquire and keep up to date knowledge of work health and safety matters
- Gain an understanding of the nature of the operations including the hazards and risks associated with those operations
- Ensure that the person conducting a business or undertaking (PCBU) has the appropriate resources and processes to enable hazards associated with the operations to be identified and risks eliminated or minimised
- Ensure that the PCBU has appropriate processes for receiving and considering information regarding incidents, hazards and risks and responding to these in a timely manner
- Ensure that the PCBU implements the necessary processes for complying with the company's duties and obligations under the contract
- Verify all of the above.

1.4 Executive Management Team

It is the responsibility of the Executive Management Team to:

- Take reasonable steps to acquire and keep up–to-date knowledge of work health and safety matters
- Gain an understanding of the hazards and risks associated with the nature of operations
- Ensure that the Company has appropriate resources and processes to enable hazards to be identified and risks eliminated or minimised
- Ensure that the Company has appropriate processes for receiving and considering information about incidents, hazards and risks and responding in a timely way
- Ensure that the Company implements processes for complying with its duties and obligations

- Promote and foster open lines of communication and consultation with workers
- Ensure internal incident notification system/procedures comply with work health and safety legislation.

1.5 Contract Manager / Operations Manager

It is the responsibility of the Contract Manager/Operations Manager to:

- understand, promote and comply with all Company health and safety policies, and procedures and work instructions
- engage with workers in an open honest and meaningful way to ensure they understand what safety standards are expected of them
- encourage feedback and communication channels between you and your workers and you and your senior leaders
- ensure that HSEQ managers, coordinators and senior leaders are made aware of issues or concerns on health and safety, especially where you or your workers identify hazards or limitations in any operational procedures
- demonstrate your commitment to health and safety and model safe work practices to your workers
- put into practice what you expect workers to follow, the standard you set is the one they will follow
- ensure that safety is included in all meeting agendas as a set agenda item
- be accountable for involving and assisting workers in any change management processes
- ensure that health and safety is integrated into team planning and does not get downgraded based on competing priorities, budgetary constraints, or lack of resources
- promote and encourage open discussions on health and safety at all levels of the business to ensure that workers can achieve outcomes based on open communication, consultation, negotiation and agreement
- establish and promote fair and equitable issue resolution processes
- initiate HSEQ activity within their area of control, including toolbox talks, risk assessments, inspections and Key Risk Observations
- promote the reporting of hazards, and actively engage in day-to-day safety discussion with workers under their control (Safety Interactions)
- support and monitor the timely close-out of corrective actions within their area of control

1.6 HSEQ Business Partners and Compliance Coordinators

It is the responsibility of the Head of Safety and Risk/HSEQ Partners and Compliance Coordinators to:

- provide technical advice and support to Branch Managers in the establishment of HSEQ objectives, targets and strategies
- provide technical advice and support to Managers/Supervisors and workers in the identification, assessment and control of workplace risks, including purchasing decisions and plant modifications
- provide a central point of contact for HSEQ Legislation, standards and statutory requirements applicable to their region
- monitor and communicate legislative changes and best practice initiatives to management and workers
- advise on regional compliance with HSEQ Legislation
- assist in the development of internal and external HSEQ audit action plans to address identified deficiencies

- assist in the identification, development and implementation of safety related training programs for workers and management
- monitor, facilitate and lead when required in incident reporting and investigation processes, including the conduct of investigations for serious incidents
- assist workers with individual health concerns/issues
- work with safety, environment and quality committees
- support HSR's and employee representatives
- assist in reviewing and updating Company policies, procedures and work instructions

1.7 All Workers

It is the responsibility of all workers to:

- take ownership of their own health and safety for those matters within their control or ability to influence
- work with colleagues to promote health and safety, environment and quality and ensure that it becomes a part of everyday business
- contribute to providing quality information that enables the establishment of baseline compliance levels and the measurement of changes in compliance over time. This information provides a reference point for targeting prevention and better practice initiatives
- be accountable as an individual to enhance and promote a "safety-first" culture within the business
- ensure duty of care obligations are met as required under the relevant Health, Safety, Environment and Quality legislation
- immediately cease, and report, any workplace activity (including that of other persons) which presents an immediate risk to safety, health, property or environment
- immediately report all hazards, incidents and injuries to their Supervisor
- participate in all HSEQ related activities (toolbox talks, risk assessments, inspections) or training as directed by their Manager/Supervisor

Workers must take reasonable care for their own health and safety while at work and take reasonable care that their acts or omissions do not adversely affect the health and safety of other persons. This duty is subject to a consideration of what is reasonable and what is necessarily proportionate to the control a worker is able to exercise over their work activities and work environment. Any known hazards and safety requirements at the DCC Transfer Stations, Recycle plant or collection operations will be communicated to WMNZ staff during the induction process.

Workers must also:

- comply, so far as they are reasonably able, with any reasonable instruction given by the person conducting a business or undertaking that allows it to comply with the HSWA Legislation
- co-operate with any reasonable policy or procedure of the business or undertaking that relates to work health or safety, that has been notified to workers.

1.8 Visitors

Whilst at a WMNZ facility all Visitors have a responsibility to:

- register their attendance and departure to and from the Company site

- abide by all safety rules and instructions provided by the Company representative
- ensure they remain under the supervision of a Company representative at all times
- unless a full site induction is completed, ensure they are accompanied by a Company representative at all times with operational areas (e.g. workshops, processing areas, vehicle yard)
- immediately report hazards and incidents to the Company representative

2. HSEQ Management System

The Waste Management Health, Safety, Environmental and Quality (HSEQ) Management System has been built through a structure featuring Elements and HSEQ Standards. The pillars of the HSEQ System are the Elements. The system has been built on 6 Elements

• Leadership
• Operation
• Planning
• Performance Evaluation
• Support
• Improvement

Each Element may have one or several HSEQ Management Standards developed to achieve the goals of the HSEQ Management System. Underpinning these Standards are a range of Key Requirements. These Key Requirements are aligned closely with the risk profile of the Branch.

The relationship between these Elements and Management Standards is illustrated below:

The WM Dunedin Business unit annual HSEQ Management Plan *(**Appendix 2**)* is the key local document for ensuring compliance with Waste Management's Health and Safety Policy and Systems, this plan includes:

2.1 Leadership & Commitment

- HSEQ is a line management responsibility. Leaders at all levels are responsible for gaining commitment, engaging and leading the work force. Policies relating to Health and Safety, Environment and Quality shall be communicated and clearly displayed as a sign of this commitment;

- Management shall demonstrate leadership and commitment to HSEQ principles and practices through proactive behaviour, promoting and communicating initiatives, resources and processes which will facilitate all works in adopting and maintaining strong HSEQ work ethics and practices;
- Managers are accountable for the performance of their Branch, the implementation of, and meeting the 'Branch Key Requirements' of the HSEQ Management System;
- Managers shall display their annual Health and Safety Management Arrangements on appropriate notice boards within the Branch;
- Managers shall implement the appropriate level of reward and recognition in line with company Reward and Recognition Guidelines.

2.2 Legal Requirements

- The Company shall utilise all media types to assist in the identification of relevant legal and other requirements applicable to the Company. All identified statutory requirements shall be recorded in Legal and Other References Register.
- The relevant Senior Manager and/or Branch Manager shall review all changes, amendments, updates and additions to legislation, standards and codes, received to determine the potential aspects/hazards and impacts/risks to the Branch and shall implement appropriate action if applicable.
- Appropriate action shall include documented consultation and communication with all relevant personnel in the Branch.

2.3 Risk Framework

- The Branch shall implement and maintain a task based 'Risk Register' within an established system. The Register shall identify and provide controls around all foreseeable risks and potential impacts that relate to the tasks undertaken by the Branch; including Health and Safety, Environmental, and Quality (HSEQ) aspects and impacts;
- Site based documentation shall be established to support Branch operational processes, functions and site based activities; this shall include but is not limited to, risk assessments, work instructions and flowcharts;
- Appropriate risk management training shall be conducted at each Branch for personnel involved with the risk management process.
- Risk Management and Risk Awareness training are core training requirements for all personnel to be conducted with 3 months of employment;
- Managing HSEQ risks is an ongoing process that is triggered when any changes affect work activities. The Risk Management process needs to be followed for any change management activity listed below (as a minimum):
    - As required by the WHS regulations for specific hazards
    - Responding to concerns raised by workers, health and safety representatives or others at the workplace
    - Responding to workplace incidents (even if they have caused no injury);
    - When new information about workplace risks becomes available;
    - Changing work practices, procedures or the work environment;
    - For all significant environmental risks (must document criteria, procedure, training, competency, monitoring and records);
    - Purchasing new or used equipment or using new substances;

- Starting a new business or purchasing a business;
- Planning to improve productivity or reduce costs;

- Appropriate stakeholders shall be consulted when assessing the impact of change;
- Changes should be approved at a level of authority appropriate to the scale and/or risk of change;
- Branch Risk Management HSEQ related risk management at a Branch level involves identifying hazards and analysing risks through a task-based approach. This is summarised in 7 Steps.

    - Step 1: Develop a list of tasks undertaken at the Branch and document this on the Branch Risk Register template from the HSEQ Management System.
    - Step 2: Undertake a Risk Assessment for each of these tasks ensuring consultation with the workers involved in undertaking the tasks.
    - Step 3: Implement control measures that were identified as part of the risk assessment to ensure all risks are kept as low as reasonably practicable (ALARP). Document these measures on the Branch Risk Register.
    - Step 4: Develop Work Instructions for each task, based on the outcomes of the risk assessment. Work instructions will include a description of each step and how to undertake the step using the identified control measures.
    - Step 5: Educate/train workers in the developed work instruction.
    - Step 6: Review work instructions when the task process changes due to an update in equipment or process, change to legislation or at least annually. Ensure workers are consulted during the review process.
    - Step 7: Re-train/educate workers in revised work instruction.

Hazard identification is an ongoing daily process and the hazard identification tools used daily are described below.

2.3.1 Business Unit Risk Register

The Branch shall implement and maintain a task based 'Risk Register' within an established system. The Register shall identify and provide controls around all foreseeable risks and potential impacts that relate to the tasks undertaken by the Branch; including Health and Safety, Environmental, and Quality (HSEQ) aspects and impacts.

The monitor and review process must be commensurate to the level of risk however; an annual review of the Risk Register is required.

2.3.2 Risk Assessment

A Risk Assessment involves considering the uncontrolled and controlled factors that influence the consequences or impact of a hazard happening and the likelihood, or probability that those consequences will occur. This involves identifying all realistic potential consequences of a hazard, determining the realistic potential severity of those consequences and the likelihood that each particular event will occur, and then identifying controls to reduce the risk to an acceptable level. A Risk Assessment is required for all generic work activities. One off activities are covered by using a Job Safety and Environmental Analysis (JSEA).

- Appropriately detailed risk assessments shall be undertaken for tasks identified on the 'Risk Register' to enable all hazards to be identified, evaluated and controlled;

- Stakeholders with relevant knowledge and experience shall be consulted in the risk assessment process.

2.3.4 Control Methods (Hierarchy of Control)

- Risk Treatment and Control (Management) Risk treatment is the process used to modify risk. Risk treatment can involve:
    - Avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk;
    - Taking or increasing risk in order to pursue an opportunity;
    - Removing the risk source;
    - Changing the likelihood;
    - Sharing the risk with another party or parties; and,
    - Retaining the risk by informed decision.

- Control is “a measure that modifies the risk”. Controls include any process, policy device, practice or other actions which modify risk. Controls may not always exert the intended or assumed modifying effect. It is essential to consider controls and barriers in the terms of their order of greatest effectiveness. This order is known as the hierarchy of controls.

- Controlling the risk is the process by which the risks associated with each of the hazards present in the workplace are controlled. It is the process of: • Identifying a range of options for controlling risks; • Assessing their respective efficiency and effectiveness; • Preparing control plans; and • Implementing control plans. The aim is to eliminate the hazard giving rise to the risk, thereby eliminating the risk. Where this is not possible, risk control seeks to minimise risks by modifying or controlling the hazard based on the hierarchy of controls (Eliminate, Substitute, Isolate, Engineer, Administration, and PPE). Each risk should be examined against the hierarchy of controls to determine first if the hazard can be eliminated or to find the most effective control method for each risk.

- When determining control measures or considering changes to existing controls, consideration shall be given to the following hierarchy of controls;

- Control measures that have been identified in risk assessments will be periodically assessed and reviewed to ensure their effectiveness and identify whether additional hazards have been introduced.

2.3.4 Uncontrolled or Raw risk rating and Residual risk

Uncontrolled or raw risk rating is the risk exposure with no current controls in place. The residual risk rating is the risk exposure after the corrective controls are implemented. It is the potential for a hazard to cause an adverse effect after control methods have been implemented. This should be lower than the raw risk rating.

When all the selected control methods are determined, establish the potential consequence and likelihood of the incident occurring with the suggestive corrective action/s established.

2.3.5 Job Safety and Environment Analysis (JSEA)

A Job Safety Environmental Analysis (JSEA) will be used for those tasks that are non-routine or “one off” will require at a minimum a Job Safety Environmental Analysis (JSEA) and a Stop, Look, Assess, Manage approach (SLAM) to confirm whether the worker has identified all potential hazards.

The JSEA is completed first and should identify the hazards and control measures associated with each step of the task. A SLAM is undertaken as a final check.

JSEAs are required as part of issuing a Work Permit associated with high risk activities: Hot Work; Confined Space Entry; and Working at Height. Personnel issuing and receiving work permits must have completed appropriate training.

2.3.6 Standard Operating Procedures (SOP)

Standard operating procedures (SOP) are a set of step-by-step instructions compiled by an organization to help workers carry out routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations. Waste Management primarily uses Work Instructions to support Risk Assessments associated with repeated routine site based tasks.

2.3.7 Work Instructions

Work Instructions is a document that has been developed that directly relates to specific activities to ensure compliance to operational or administrative procedures and guidelines. Planned/Routine Tasks Work Instructions are a documented assessment of each step of the task and the method used to control the risks associated with each step of the task.

Before a task is undertaken (and where a work instruction has been developed) a Stop, Look, Assess, Manage (SLAM) tool is completed. The purpose of a SLAM is to stop for a couple of minutes and think about the task the worker is about to undertake. The hazards associated with the task should be identified.

No person is to undertake a task or operate plant and equipment without having been first trained on Work Instruction and Risk Assessments and understands the requirements.

Work Instructions will be reviewed at least annually by suitably qualified WMNZ staff members.

2.3.8 Personal Protective Equipment (PPE)

The minimum PPE requirements will be, or have been, determined from the risk assessments undertaken for the tasks and outlined in work instructions. The minimum PPE will be:

- Hi Vis Vest or clothing
- Long sleeve shirts
- Approved trousers (Long) or overalls
- Steel capped lace up work boots
- Gloves, Safety Glasses, Dust Masks

2.4 Hazardous Substances

2.4.1 Chemical - Safety Data Sheets

Safety Data Sheets (SDS's) for each hazardous chemical and dangerous good shall be readily accessible to all workers (including first aid staff and medical and emergency personnel) involved in the transportation, storage, handling, use and disposal of hazardous chemicals. All SDS’s shall be within their 5 years validity period and contain relevant emergency contact information;

All workers and visitors shall be provided with the appropriate information, training and instruction regarding hazardous chemicals and dangerous goods and relevant emergency preparedness.

2.4.2 Approved Handlers

All workers involved with the handling, identification, storage and segregation of hazardous substances dropped at the transfer station drop off point are to be trained as certified handlers.

2.5 Health & Wellbeing

2.5.1 Pre-employment medicals and drug and alcohol testing

Medical assessments shall be conducted for all workers at regular intervals including, pre-employment medical assessments to ensure fitness for work;
Fitness for work shall include but not be limited to; fatigue management, medical conditions, drug and alcohol use, work related and non-work related illness;
Preventive and corrective action shall be established and implemented to manage risks associated with fitness for work;
Fitness for work assessments shall be conducted by a qualified medical practitioner or other qualified health practitioner;
Fitness for work records shall be kept in a manner which complies with relevant legislative requirements.

2.5.2 Annual Health Surveillance Medicals

Systems are in place for the identification of hazards and occupational health exposures associated with the working environment, including:

- Biological;
- Physical;
- Chemical;
- Psychosocial;
- Ergonomic;
- Geographic location.

Where occupational health exposures and hazards are identified or prescribed under regulation (for example, noise), they are risk assessed and documented. Where defined exposure standards are prescribed, they shall not be exceeded;

Where actual/potential exposures are identified base-line measurements occur and ongoing programs put in place for monitoring;

All workers shall participate in health surveillance where tasks identified require health surveillance to be undertaken;

Health surveillance programs shall be conducted by a qualified medical practitioner or other qualified health practitioner;

Health surveillance records shall be kept in a manner which complies with relevant legislation, regulations and/or codes of practice;

The results of hygiene monitoring are formally reviewed and communicated to affected work groups on a regular basis and where required, appropriate actions are taken.

2.5.3 Rehabilitation & Injury Management

Waste Management is accredited under the ACC Partnership programme (ACCPP) to Tertiary Level, assessed on an annual basis. Waste Management under the ACCPP is responsible for the management and costs associated with all company employee work related injuries with the assistance of a third-party administrator "Gallagher Bassett".

A rehabilitation and injury management process is established where optimum return to work results are achieved, in terms of timeliness and safe and durable return to work for workers following workplace injuries. Responsibilities of the Branch in the Rehabilitation and Injury Management Process

- Ensure that incidents are reported in a timely manner to ensure early treatment of injuries;
- Investigate the circumstances surrounding injuries and ensure prevention strategies are implemented;
- Arrange an appointment with a medical practitioner to ensure an assessment is undertaken of an injured worker's capability to undertake a rehabilitation program;
- Determine, where the rehabilitation assessment indicates the employee/worker to be capable, that the employee undertake a rehabilitation program;
- Design and develop a rehabilitation program for an injured worker providing suitable or restricted duties where necessary;
- Make the necessary modifications to the workplace, where possible, so that there is no further aggravation of any injury or disease that the employee/worker may still have, or minimise the chance of any further injuries or incidents;
- When expected outcomes outlined in the rehabilitation program are not met and ensure appropriate action is put in place to promote optimal recovery and return to work outcomes;
- Ensure that the injured worker is performing duties in accordance with the rehabilitation program;
- Ensure all workers compensation claim documents are completed and sent to appropriate parties.

2.6 Communication and Consultation

2.6.1 Toolbox meetings

Health and safety toolbox meetings will take place at a minimum frequency of one meeting per month. At least one compulsory corporate and/or branch toolbox talk(s) associated with health and safety, health and wellbeing or environment are to be conducted monthly. All hazard and safety alerts will be communicated via email and copies displayed on the health and safety noticeboards on site.

Minutes from the health and safety and Toolbox meetings will be displayed on the health and safety noticeboards on site.

2.6.2 HSEQ Notice Boards

Safety Notice Boards will contain:

- Annual HSEQ Plan
- Policy updates
- Hazard, Safety, Improvement and Information Alert Notifications
- Monthly Health & Safety toolbox minutes & Topics

- Tag It Technical Bulletins
- Incident investigation and reporting statistics
- Memorandums
- Health and Wellbeing information
- Environmental information

2.6.3 Site Specific Safety Plans Board

Safety Specific safety plans will contain:

- Site emergency information
- Site PPE requirements
- Site Critical Risk
- Site specific Hazards
- Security information
- Location of site documentation
- Site induction information
- WM Critical Risk cards
- WM Emergency Procedure for sites
- Emergency response team contacts

2.7 Emergency Management

Waste Management is committed to maintaining a safe and healthy working environment for its workers and others, while also minimising both potential and actual environmental harm and events that could affect business continuity.

2.7.1 Site Emergency Management Plans (SEMP / SBCP)

The principal function of the ***Site Emergency Management Plan (SEMP***) is to ensure the safety of employees, contractors, visitors and surrounding natural environment. All personnel onsite shall strictly follow the procedures contained in the plan, and as instructed by authorised personnel. The SEMP shall be displayed at prominent and accessible locations within the Branch so that all workers, contractors and visitors, have access to information and procedures outlined.

Emergency drills are to be conducted at least 6 monthly, recorded and entered into VAULT. Emergency drills are to reflect the various types of emergencies associated with site operations.

The Site Business Continuity Plan (SBCP) is a planning process that is designed to reduce the risk that disruptive failures or events could seriously harm the business. It is designed to safeguard the Company by ensuring the continuity of a minimum service level with a set of business functions, allowing a smooth return to normal operating conditions once the crisis is over. The aim is to give all stakeholders assurance that the Company is able to prepare, mitigate, plan and recover from an interruption to normal Branch activities.

The purpose of both plans is to:

- Address a range of potential emergencies or crises that may occur within the site;
- Outline the procedures to be followed;
- Assign responsibilities for specific action;
- Contain and control a major incident, so as to minimise the effects on people, property and the built

- and natural environment;
- Ensure the safety and well-being of all personnel on the premises at the time of an emergency or crisis; and,

Ensure safe, efficient and orderly evacuation of all persons if deemed necessary.

2.7.2 First Aid

The Branch must undertake a risk assessment to evaluate first aid requirements and determine the appropriate work instructions, first aid equipment, facilities and first aiders needed in various workplaces, taking into consideration:

- The number and composition of the workers at the workplace;
- The nature of the work being carried out;
- The nature of the hazards;
- The size and location of the workplace.

The Branch must ensure that an adequate number of workers are trained to administer first aid at the workplace or that workers have access to an adequate number of other people who have been trained to administer first aid;

A record of any first aid treatment given should be kept by the first aider, recorded in an appropriate system (**VAULT**) and reported to managers on a regular basis to assist reviewing first aid arrangements. First aid treatment records are subject to requirements under Health Records legislation.

2.8 Reporting

Health, Safety, Environmental, and Quality incidents including near misses, customer complaints and nonconformities shall be reported, investigated and analysed. Corrective and preventive actions shall be implemented with learning's shared.

VAULT is the system used to effectively record and manage incidents, near misses, customer complaints and non-conformities which include tracking of corrective actions. Incidents, near misses and non-conformities shall be reported as soon as reasonably practicable, documented and appropriately communicated (including to regulators and other external authorities).

2.8.1 Incident Non Conformance Reporting Process

Incidents, near misses, customer complaints and non-conformities shall be reported through and investigated in the appropriate system. Notifications shall be in accordance with Internal Notification Matrix. External notifications shall be approved by the HSE Manager.

When someone has an injury that requires medical treatment, DCC should know within an hour. All other incidents/near miss events must be in the monthly report to DCC. Incidents involving public or subcontractors should be notified to the DCC within 2 hrs if considered serious.

All incidents shall be investigated in accordance with the information supplied in the Quick Reference Guide – Incident Reporting and Investigations. Responsibilities for completion of corrective actions are assigned, tracked, and monitored through the appropriate system.

2.8.2 Accident Reporting

Every workplace accident must be reported to the employee's Supervisor immediately. When someone has any serious harm accident, DCC Engineer should be notified within an hour. An Incident Report Form and Section One (1) of the Claims Administrator Accident Claim Form (ACF) must be completed.

By recording all incidents and accidents the Company can investigate potential hazards so that they can be minimised or eliminated and injury to other employees prevented.

2.8.2.1 DCC Health and Safety Reporting Requirements

The Contractor shall use their own procedure to record, report and investigate incidents, furthermore the Contractor will be responsible for any reporting and timeframes as required by WorkSafe. The Contractor shall provide a monthly work health and safety report as a component of their Monthly Report. This report shall include the following as a minimum:

1. Accidents, incidents and near misses with the definitions as below
2. Investigation of any accidents or near miss incidents
3. A record of tool box talks held
4. New hazards identified
5. Improvements and corrective actions
6. Results of investigation communicated to company employees and sub-contractors
7. Details of any audits undertaken
8. Details of any training completed.

Safety reporting descriptor	Definition
Accident	An unsafe event that results in direct harm (injury or illness) to an individual.
Incident	An unsafe event that doesn't harm anybody but results in some form of damage or disruption. Incidents often include occurrences of property or environmental damage.
Near-miss	An unsafe event that does not result in any harm or damage but could have under slightly different circumstances, timing or conditions. Near-Misses often go unnoticed until it's too late and an accident or incident has occurred.
Report Only (RO)	Any work-related minor injury that can be treated with basic first aid or does not impact on the employees' ability to continue working in their normal capacity.

Lost Time Injury (LTI)	A work related injury which results in the person losing one normal working shift or day after the date of the injury.
Restricted Work Injury (RWI)	A work related injury which results in an employee being placed on selected or restricted duties and is unable to carry out their regular job for one or more working shifts / days, however, is able to attend the workplace in a support function.
Medical Treatment Injury (MTI)	A work related injury that requires treatment from a medical specialist.

The Contractor shall notify the Engineer or their representative of all accidents and near misses that occur in relation to any of the Services being carried out under this Contract, within the following response times:

1. Any serious harm incident – as soon as possible within 4 hours.
2. In the event of a serious harm accident, notification shall be provided within twenty-four (24) hours of the incident with a written report detailing initial investigation of the incident.
3. Any Lost Time Injury – as soon as possible within 4 hours.
4. Any incident or near miss that had the potential to result in serious harm - within twenty-four (24) hours.
5. Any other incident or near miss – in monthly reporting.

The Contractor shall notify the Engineer by way of a written report of any new identified risk and measures to control the risk within three (3) Working Days, an update to the Health and Safety Risk Register will be provided with the report.

2.8.3 Reporting to Regulatory Authorities

Compliance shall be maintained with the applicable legislative requirements related to incidents, including reporting to the regulatory authorities, documentation and record keeping. External notifications shall be approved by WM National HSE Manager.

2.9 Management Reporting Systems

2.9.1 HSEQ Monthly Compliance Reports

HSEQ monthly Compliance Reports shall be completed by the 1st working day of each month;

3.0 Training and Development

Training programs and/or information shall be systematically reviewed and provided whenever a Branch and/or operation is impacted by change, including circumstances such as new equipment, processes and obligations;

Where a license and/or mandatory training is a requirement for a task (including high risk work licences), only suitably trained and/or licensed employees will perform that task and will be maintained in the licensing and competency record system. Licences must be readily available;

Where appropriate an ITO will be engaged in accordance with company requirements;

A process to ensure worker training, licensing and competencies are kept current through established systems.

3.1 Training Needs Analysis

A training plan shall be established to ensure employees receive relevant and timely training for the role and tasks they are expected to perform through a training needs analysis. A Branch based training needs analysis, must also address regulatory training requirements and client requirements where applicable.

Considerations for an employee's site based Training Needs Analysis (TNA) in the various businesses, divisions and branches of WMNZ, are identified and developed through analysis of the job description in relation to the specific position within the branch, suite of work instructions required to perform the work/tasks required (For example a technician in one position may require specialised Working @ Height or Confined Space for the role). This TNA plan should be viewed in conjunction with the full suite of training available at NZ Training (NZT) in each training stream listed below and based on the risks to the individual employee identified by the branch.

3.1.1 Compliance / Core Training Requirements

Several core training courses are prescribed by corporate and are required to be completed by all employees *regardless of their position title and associated job description*. This core training is reviewed on a regular basis where new modules may be added or removed based on risk mitigation and/or changes within the services provided.

Core training (C), is training that an employee must complete under current employment conditions. An employee who has not completed their core training has not fulfilled their engagement with the business. Core training includes:

- Company Induction
- Site Induction
- Injury Management (ACCPP Gallagher Bassett)
- Risk Management Awareness
- Event Report Pad

3.1.2 Operational Training Requirements

Workers operational training will be task based and aligned with identified work instructions and risk assessments. Workers will remain under supervision or work with a buddy until competency assessed.

3.1.3 Competency Based Assessment

Competency based training developed and delivered at the Branch level shall be reviewed in line with company requirements;

A verification of competency process will be implemented for high risk tasks, plant and/or work environments and be maintained in the licensing and competency record system;

4.0 Performance Evaluation

4.1 Monitoring and Review

4.1.1 Critical Risk Observations

Critical Risk Observation (CRO) is used to monitor and review current control measures for site based Top 13 Risks identified. The site is to select one Critical Risk per month for review and review the Risk Assessment and Work Instruction against that risk. The Critical Risk Observation form provides a prompt of the items to look for when checking that the current control measures are appropriate. Any actions identified from this form need to be communicated and discussed

with appropriate Supervisor/Manager and agreed actions recorded in Vault for appropriate tracking and close out. The above process can also be used for general Risk Assessment and Work Instruction reviews against other work activities. CRO's will assist in identifying:

- Whether standard safety, quality and environmentally sound work practices are being applied and implemented
- Unsafe work practices
- Whether risk controls are effective in managing risk
- How effective procedures are in the performance of the task
- Identifies whether Refresher training is required
- Suggestions for improving the safety, quality and environmental considerations of the task.

4.1.2 Safety Interactions/Observations

(Proactive or Reactive) – Phone or Web App is used to monitor and record the following:

- **Safety Interactions** are conversations held with a worker/s in Proactive or Reactive manner in regards to an activity been undertaken. These can be in regards to a general discussion around positive safety behaviour or when a minor breach of a safety process has occurred. An example of this could be, reminding a worker to do their Hi-Viz vest up or, reminding someone to do their boot laces up, etc.

- Any new hazards identified through Safety Interactions will be updated in appropriate work instructions, risk assessments and risk register.

- **Safety Observations** are when a worker/s have been observed either performing well or breaching a safety process and the person that has witnessed the behaviour is not in a position to personally discuss the observation with the individual and has needed to report it to the worker/s manager/supervisor.

4.1.3 Workplace Inspections

Workplace Inspection Form or Phone App: Is used to monitor and review conditions in and around the workplace. The Workplace Inspection Form should only be used for a walk around the site to establish whether anything requires attention – it is not to be used as an audit form. The workplace inspection team shall consult with the workplace Supervisor and access the relevant procedures to ensure that plant, equipment and workplace meet the required standards. The results of the inspection shall be discussed with the Supervisor/Manager and worker to recommend any corrective actions.

4.1.4 Auditing

Prepare for and participate in external surveillance audits as scheduled and develop corrective actions as appropriate;

Participate in the monthly Monitor and Review program(s) established by the relevant HSEQ Manager and action as appropriate;

Appropriate and relevant personnel shall be engaged to participate in the monthly Monitor and Review program;

Legal compliance at the Branch level shall be evaluated through;

- Annual review of the legislative references documentation;

- Relevant legislative changes by internal and external stakeholders;
- Changes to Industry standards or best practice.

Corrective actions shall be prepared, executed, tracked and their status regularly reported through the appropriate system. Corrective actions must have allocated time for completion and responsibility for each corrective action;

Consultation and feedback on the HSEQ Management System shall be part of the monthly Monitor and Review program to determine the continuing suitability adequacy and effectiveness of the HSEQ Management System.

4.1.5 Statistical Information

Waste Management NZ has a systematic approach for measuring and monitoring its HSEQ performance on a regular basis, as an integral part of its overall management system. Monitoring involves collecting information, such as measurements or observations, over time, using equipment or techniques that have been confirmed as being fit-for-purpose. Measurements can be either quantitative or qualitative.
Company wide Lead and Lag Key Performance Indicators (KPI's) are established annually, and monitored by the Executive Management Team through monthly business unit compliance reports.
Business units compile monthly statistical data associated with the KPI's looking at incidents, injuries and near miss events identifying trends and key risk areas requiring corrective action. Worker engagement is through monthly Health and safety and toolbox meetings.

5.0 Document / Records Management

5.1 Document Control

Creation and modification of all documents shall be performed by content experts, i.e. those having the relevant education, experience and work related skills specific to the topic or task. HSEQ level documentation shall be created and modified by the HSE Team.

New or additional HSEQ documentation shall be determined by the needs of the organisation and /or business operation and shall be based on;

- Risk Assessment(s)
- Consultation with employees i.e. HSEQ System Improvement Form
- Legislative requirements
- Industry / organisational best practice

5.2 Site Documentation

Site based documentation shall be created to support the relevant HSEQ 'Business Requirements'. All site based documentation shall be created, completed, approved, controlled and maintained in accordance with these ***HSEQ System Document and Control Guide***.

The Compliance Coordinator shall be responsible for maintaining the Branch HSEQ Document Register and specific documentation relating to the HSEQ framework. The register shall define as a minimum:

- Document identification;
- Document title;
- Type of document;
- Revision number;
- Content Owner/Content Expert;
- Authorised by;

- Issue/Review date;
- Status;
- Review Period.

All controlled documents shall be identified by its electronic version. Documents will be stored electronically in pdf format or password protected as appropriate. Once a document has been printed, it shall be deemed uncontrolled.

The printed uncontrolled document shall be reviewed against the controlled electronic version for currency. Branch Managers shall maintain specific documentation for their site on the ***Site Document Register Template***.

5.3 Document Review

Existing documentation shall be reviewed periodically; requirements for review and document update are determined by the following:

- The review period as defined by this document; or
- Review period assigned to specific documents
- Changes or new legislative requirements
- Change in work process
- Hazard Alerts or Incident Investigations
- Industry and organisational best practice
- Consultative arrangements

The review process shall involve appropriate personnel to ensure documentation is adequate for their purpose.

The HSE Systems Coordinator shall manage the distribution of revised copies to all controlled copy holders. Controlled documents are located on the HSEQ Management System.

The HSE Systems Coordinator shall update the HSEQ Management System whenever a variation occurs to a document and shall provide awareness of the specific update through the HSEQ monthly notification process. This shall occur in accordance with the **HSEQ System Improvement Form Process.**

All HSEQ Elements shall be reviewed upon any changes to Quick Reference Guides to ensure relevance to organisational requirements and currency and compliance to legislation, standards or codes of practice.

Associated documentation such as ‘Quick Reference Guides, forms etc. shall be reviewed at least every 3 years to ensure relevant to organisational requirements, legislative compliance, codes of practice and operational correctness.

All site based documents shall be reviewed for content and correctness at least every 3 years and shall be reviewed against Company HSEQ Elements and associated documentation.

APPENDIX 1: POLICIES

Waste Management®

Health and Safety Policy

1.0 Objectives

As a Person Conducting a Business or Undertaking, (PCBU), Waste Management NZ Limited and its subsidiaries ("WM"), are committed to the safety, health and wellbeing of our workers. We believe that all workplace related incidents, injuries and illnesses are preventable and aspire to achieve our aim of "Zero Harm" by making health and safety the first priority in all our business activities. We also believe that attaining the highest standards in health and safety is paramount to the success and sustainability of our business.

2.0 Waste Management achieves these objectives by:

a) Expecting all workers and contractors to cease work if they feel unsafe, or are exposed to health risks;

b) Consulting with workers and relevant stakeholders in the decision-making processes impacting on workplace health and safety;

c) Complying with all legal requirements in accordance with The Health and Safety at Work Act 2015, codes of practice and standards applicable to our activities;

d) Ensuring our systems and processes effectively support the business and our workers to work in a healthy and safe environment;

e) Demonstrating visible safety leadership through our supervisors, managers, and Directors;

f) Identifying and understanding the hazards and risks relevant to the activities we undertake and provide effective controls to assess, and manage them accordingly;

g) Providing appropriate training and support to our workers and contractors to enable them to understand our vision of "Zero Harm", and to allow them to perform their roles competently in line with the health and safety expectations,

h) Setting objectives, targets and key performance indicators which continually drive us to improve our health and safety performance;

i) Learning from our performance and continuously improving our processes and work practices; and sharing lessons learnt with others;

j) Ensuring that all incidents are investigated fully - specifically identifying the causal and contributing factors so that appropriate corrective actions are taken;

k) Identifying Critical Risks and ensuring these are actively managed;

l) Regularly undertaking audits and inspections of our operations; and

m) Communicating this Policy to workers and interested stakeholders; and reporting on our health and safety performance openly and transparently.

3.0 All Officers (Executive Management Team) are required to:

a) know about workplace health and safety matters and keep up-to –date;

b) gain an understanding of the operations of the organisation and the hazards and risks generally associated with those operations;

c) ensure the PCBU has appropriate resources and processes to eliminate or minimise those risks;

d) ensure the PCBU has appropriate processes for receiving information about incidents, hazards and risks, and for responding to that information;

e) ensure there are processes for complying with any duty, and that these are implemented;

f) verify that these resources and processes are in place and being used.

4.0 All Persons in control of a workplace (Regional Manager, Branch Manager, Supervisor) are required to:

a) Take all practicable steps to ensure the health and safety of all workers while at work;

b) Ensure that all workers are trained and competent to perform their tasks in line with the company's health and safety processes, procedures, and expectations;

c) Ensure all HSEQ systems are implemented and followed at all times;

d) Ensure all workers are able to perform their duties in a health and safe manner (e.g., access to appropriate resources, well maintained plant and equipment, and Personal Protective Equipment ("PPE") relevant to the task; and

e) Support WM in achieving its objectives set out in Section 2 of this Policy

f) have a clear understanding or risk and change management and risk identification.

g) support workers in their understand and application of risk management

5.0 All Workers and Contractors are required to:

a) Carry out their work in accordance with WM's safety policies, processes and procedures;

b) Be accountable for their own health and safety, that of others, and ensure their actions or inactions do not create health and safety risks to others;

c) "SLAM" – Stop, Look, Assess and Manage the hazards and risks inherent to the activities they undertake;

d) Comply, so far as reasonably able, with any reasonable instruction that is given to them by the PCBU to allow the PCBU to comply with the law;

e) Stop work if they feel unsafe or exposed to health risks; and

f) Immediately report any hazards or identified risks and all incidents which cause actual or potential injury, health related issues or damage.

6.0 Worker Health and Wellbeing

a) Employed workers will be offered and encouraged to have an annual health assessment at WM's cost which may include health monitoring in relation to identified work risks and a general health assessment for the Employee's benefit.

b) The employed worker will receive all health assessment results. WM will not receive any personal information relating to individual health assessment results, with the exception of health monitoring of work-related hazards.

c) Non-permanent workers will be assessed, dependant on the task they are completing for WM. Where the task has a potential risk to a worker's health and wellbeing, this will be discussed and reviewed accordingly.

7.0 Children in the Workplace

a) Due to the nature of our work and risks involved, children under the age of 15 are not allowed to be brought into the workplace under any circumstances. Children over the age of 15 can attend a place of work if enrolled in a recognised work experience programme.

b) Where workers are required to look after a child / children due to unforeseen circumstances during work hours, carers leave or annual leave are provided as an option, or workers may be allowed to work from home only with approval from a Level 3 manager.

c) If a worker is on parental leave and would like to attend a workplace to introduce their child to fellow

workers, this must be approved by their reporting manager first. The parent or child must not enter operational areas due to risk.

d) Open days or pre-arranged site visits that may involve children attending, must be approved by the relevant divisional General Manager who will nominate a worker/s to be responsible for the safe management of the open day or site visit and ensure safety requirements are met.

8.0 Application

This Policy applies to all workers, contractors and joint venture partners engaged in activities under WM's operational control.

9.0 Breaches of policy

Any breach of this Policy, including breaches of local procedures, may result in disciplinary action, with potential of formal outcomes up to and including instant dismissal.

This Policy will be reviewed annually.

Approved by the Managing Director

Date: 14 November 2022

8.0 Application

This Policy applies to all workers, contractors and joint venture partners engaged in activities under WM's operational control.

9.0 Breaches of policy

Any breach of this Policy, including breaches of local procedures, may result in disciplinary action, with potential of formal outcomes up to and including instant dismissal.

This Policy will be reviewed annually.

Approved by the Managing Director

Date: 5 / 10 / 20

Waste Management

Environmental Policy

1.0 Objectives

At Waste Management NZ Limited and its subsidiaries ("**WM**") we are dedicated to providing environmentally beneficial and sustainable services, products and solutions to customers and the community that result in reduction, resource recovery, recycling and reuse of waste materials; efficient use of our own resources and conversion of waste to energy.

We are committed to achieving our aim of "Zero Harm" to the environment, and to continually improve our environmental standards for the benefit of the environment, our workers, stakeholders and the community.

We believe that the highest standards in environmental performance are crucial to the success and sustainability of our business.

2.0 WM Achieves these Objectives by:

a) Developing ways to reduce, recover, recycle, or re-use waste in all aspects of our business, including considering and integrating environmental factors in our decision making process;

b) Identifying opportunities for the prevention and reduction of pollution, including climate-modifying emissions, and implementing energy efficiency programs throughout the business;

c) Providing resources to implement and maintain an effective system of environmental management;

d) Identifying and understanding the environmental hazards inherent to the activities we undertake and effectively assessing, controlling and managing those risks;

e) Complying with all legal requirements and standards applicable to our activities; and where adequate regulation does not exist, adopting practices that reflect our commitment to environmental compliance;

f) Setting objectives, targets and key performance indicators which continually drive us to improve our environmental performance;

g) Providing workers with training and information necessary for them to understand what the impacts of their activities are; and to enable them to work in an environmentally responsible and competent manner;

h) Liaising, consulting and building relationships with our workers, regulators, local community and other key stakeholders to develop mutual respect for one another and the environment;

i) Ensuring that incidents are investigated, specifically identifying the causal and contributing factors, so that remedial actions may be taken;

j) Regularly undertaking audits and inspections of our operations;

k) Communicating this Policy to workers and interested stakeholders; and reporting on our environmental performance openly and transparently;

3.0 All Workers are required to:

a) Carry out their work in accordance with WM's environmental policies, processes and procedures;

b) Assess and manage the environmental hazards and risks associated with the activities they are undertaking; and

c) Report any incident which generates any actual or potential harm to the environment.

4.0 Application

This Policy applies to all workers and joint venture partners engaged in activities under WM's operational control.

This Policy will be reviewed annually.

Approved by the Managing Director
Date: 2/10/20

ENVIRONMENTAL POLICY

WM-HSE-P-03 - Version 1 Reviewed - Rev Date: 30.11.2021 Uncontrolled document when Printed Page 1 of 1

Quality Policy

Waste Management NZ Limited and its subsidiaries (**"WM"**), has adopted an integrated approach to document and manage the Quality, Safety and Environmental aspects of our activities, products, services and operations. Our system provides the platform and integrated framework for the management of quality within the business.

As part of our quality management processes, we are committed to:

a) Implementing and maintaining the required processes to ensure compliance with AS/NZS ISO 9001, AS/NZS ISO 14001 and ISO 45001.

b) Determining and understanding the requirements and needs of our customers and other stakeholders.

c) Focusing on customer expectations by providing quality products, responsive service, timely supply, and establishing positive supplier relationships.

d) Complying with all applicable laws, standards and customer requirements; and where requirements differ ensuring the highest standard is implemented.

e) Providing and managing adequate resources, information, responsibilities and training programs necessary to enhance our skills in the selection of equipment, materials and methods to satisfy customer requirements and to deliver on quality objectives.

f) Identifying and implementing corrective and preventative control measures to eliminate the cause of actual or potential non-conforming activities, products or services.

g) Continuously improving quality management processes through monitoring, auditing, analysis and review.

h) Communicating this Policy to all our workers and interested stakeholders; and reporting on our quality performance openly and transparently.

i) Complying with the requirements of this Policy and to reviewing it periodically to ensure continued relevance to our activities.

This Policy will be reviewed annually.

Approved by the Managing Director

Date: / / 10 / 20

QUALITY POLICY

WM-HSE-P-06 - Version 2 reviewed - Rev Date: 20.11.2021 Uncontrolled document when printed Page 1 of 1

APPENDIX 2: WM Dunedin HSEQ Plan FY 20##

Appendix C WMNZL Site Emergency Plan

WASTE MANAGEMENT NZ LIMITED

GREEN ISLAND LANDFILL
DUNEDIN

EMERGENCY MANAGEMENT PLAN

ADDRESS: Green Island Landfill
Green Island, DUNEDIN

TELEPHONE: 03 488 4741 (Kiosk Weighbridge)
03 488 2467 (Rummage)

Operations Manager: Paul Withers

TELEPHONE: 021 734 907

REGIONAL MANAGER: GREG NEL

TELEPHONE: 03 477 1700, or Mob: 027 613 2350

Incident controller will be identified by wearing Pink Vest and Red hard hat

Prepared by: Paul Withers,Catherine Maclean, John Varga, Joy Parhi, Ryan Olsen

Date: July 2022

Review due: 1/8/2023

Section 1 – Details and Communication

Branch Activities

Activities undertaken at the Branch	• Refuse Transfer Station • Chemical materials storage • Green Waste Collection & processing • Weighbridge and Office facilities • Landfill Operations • Special waste disposal • Landfill gas collection & piping system • Leachate collection & piping system
Property Size (total)	• 38 hectares
Number of personnel	• Up to 20 staff + Public + Visitors
Number and description of buildings	• 1 x Weighbridge Kiosk, 1 x Transfer Station Building, 2 x Office, 1 x Re-use Store, 1 x Chemical drop off, 2 x Chemical storage facilities,1 x Deodourising system facility, 1 x Staff room, 1 x Shed
Location of site chemical manifest	• Weighbridge & SDS , Rummage store waste register

Neighbouring Facilities

Neighbouring Facility	Contact Person & Number	Mechanism for raising alarm	Circumstance for raising alarm
DCC Waste water treatment plant	Gary Baskett GI Plant Area Supervisor M:021 940 630 P:(03) 488 4045	Phone call	Emergency that affects leachate / gas supply systems
OJI	Brent Griffiths - 0275677951	Phone call	Emergency that affects leachate / gas supply systems, Hazardous substances, Fire, if in wind direction
Envirowaste	**Vaughn Adams** Branch Manger 0274 908 788 **Steve McKenzie** Operations Supervisor 027 504 3707	Phone call	
Clearwaters	034882922	Phone call	
Intergroup	**Tom Layland -** 021801614, 0800665 644 **Gary Olsen** 0275 665 644 /0800 665 644	Phone call	
Hall Bros	**Mike Clearwater** 03 4771141, 0276349807	Phone call	
Total Span	03 4885637	Phone call	
Firth Dunedin	**Aaron Charteris,** 03 4882159, 0274812175	Phone call	
Otago Scrap Metals	03 4884555	Phone call	
Community Liason	Contact DCC Waste Dept	Phone call	

Site Emergency Response Team Contact List

Position	Name	Contact	
		Site	After Hours/Mobile
Regional Manager	**Greg Nel**	**03 477 1700**	**027 613 2350**
Emergency Warden Operations Manager	**Paul Withers**	**021 734 907**	**021 734 907**
Team Leader Landfill	**Ryan Olsen**	**021 316 392**	**021 316 392**
Emergency Warden RTS Supervisor	**Catherine Maclean**	**021 538 337**	**021 538 337**
Emergency Warden	**Jo Webby**	**RT**	**N/A**
Emergency Warden			
Emergency Warden	**Ryan Olsen**		**021316392**
Emergency Warden	**John Varga**	**RT**	**N/A**
Emergency Warden	**Conor Mulcahey**	**RT**	**021592584**
First Aider	**John Varga**	**RT**	**(03) 488 2467**
First Aider	**Ryan Olsen**	**RT**	**021316392**
First Aider	**Tony McManus**	**RT**	**(03) 488 2467**
First Aider	**Catherine Maclean**	**RT**	**021 538 337**
First Aider	**Richard Dunphey**	**RT**	**N/A**
First Aider	**John Varga**	**RT**	**(03) 488 2467**
Operations Manager	**Paul Withers**	**021 734 907**	**021734907**
General Manager	**Greg Slaughter**	**027 507 1586**	**027 507 1586**
HSE Advisor	**Peter Martin**	**0274 473293**	**0274 473293**
Compliance Coordinator	**Joy Parhi**	**021 877 085**	**021 877 085**
Dunedin City Council	**Andy de Bruin**	**03 474 3827**	**027 456 2230**
	Megan Bedford	**03 474 3447**	**0274 562 230**
	Lincoln Coe	**03 474 3829**	**021539872**

External Emergency Contacts

Service Provider	Name	Work Number
Crisis Counsellor	**RAISE**	**0800 735 353**
Company Medical Practitioners	**Broadway Medical Centre**	**03 477 4335**
WHS Regulatory Authority	**WORKSAFE NZ**	**0800 209 020**
Environmental Regulatory Authority	**Otago Regional Council**	**0800 800 033**
Police / Fire / Ambulance	**Telephone 111 Fixed line and Mobile telephones**	
Poisons Information Centre	**New Zealand**	**0800 764 766**
Electrical Authority	**Ross Whitburn Electrical – 0274 323 509** **Delta – 10 Halsey St – 0800 433 582**	
Water Services Authority	**Dunedin City Council – 03 477 4000**	
Gas Services Authority	**Dunedin City Council – 03 477 4000**	
Local Regulatory Council/s	**Dunedin City Council – 03 477 4000**	
Civil Defense	**Dunedin City Council – 03 477 4000**	
Other		
Dunedin Police Station – Great King St	**(03) 471 4800**	
Green Island Police	**(03) 488 0642**	
SGC Services (Vegetation)	**Laurie Flaws –** 0274783453, 0800 783453	
Mechanic/Electrician	**Truck Stops –** (03) 455 3116 **Transdiesel – Andrew Mallock –** 0272731085, 034884005	
Engineering	**Transales Engineering: Murray Matheson** 0272738714, 034894286 **LB Engineering: Warren Tisdall -** 021488527, 034885277	
Hydraulics	**PIRTEK- Glen Michelle-** 03 777 3176 – 021 295 0084	
Hazardous Waste	**Colin Berkett Technical Services-** (03) 376 4196 Mobile: 027 574 4427	
Cranes 20-50 tonne	**Fulton Hogan subout (WAE Cranes) Kevin Walter** 0272906206, 034788269	
Earth Moving Equip etc.	**Porter Hire – Trevor** 027601317 **Porter Hire – Wayne Cunningham** – 03 4882051, 0272853 506 **KJ Mac Contracting – Kevin Mcleod –** 0274542023, 034811200 **AdvanceQuip – Jerry McLean** 0212201148	
Tow Trucks/Transporters/Haulage	**Fulton Hogan – Kevin Walter –** 0272906206, 034788269	
Forklift	**AB Equip –** 03 4552651/0294552651	
Sucker Truck Service	**Intergroup – Tom Layland -** 021801614, 0800 665 644 **Intergroup – Gary Olsen** 0275 665 644 /0800 665 644 **Vaccum Tank Services – Chris Irwin -** 03 4894795,	
Site Fuel Supply – Mini Tankers	**Waihola Contracting, Brent Goodsir –** 0274359100	

Emergency supplies:	**Chubb – Jaidyn Knott (Extinguishers)** 0278520013, 03 4555079
Absorption Material Emergency Equipment	**Alsco –** 0272745087, 03 4792591 **Blackwood NZ Safety –** 0800 660660 Dunedin@NZSafetyblackwoods.co.nz
Plumbers	**Barry Dell Plumbing – Michael Carstairs** 0274343441
Pumps	**Switchbuild – Craig Pollock –** 034664281, **0272299905** **Switchbuild – Glyn Howell** 0273449626 **Fulton Hogan – Warren Stevens** 0274326942, 034788200
Stock on Site	**John Bain –** 0272174707
Security	**CHUBB – Rex Johnston -** 0272219101, 034778655
Pest Control	**Rentokil – Damian Edwards -** 0274060453
SPCA	**1 Torridon St, Opoho –** (03) 473 8252

Section 2: Emergency Equipment Register

Response Equipment	Type of Part	Location	Signage	Last Inspection/Test
Fire Fighting				
Extinguisher	Dry Powder	Rummage shop & office (Total 2)	Yes	Dec 2019
Extinguisher	Dry Powder	Staff Cafeteria	Yes	Dec 2019
Extinguisher	CO2	Weighbridge	Yes	Dec 2019
Extinguisher	Dry Powder	Maintenance Workshop	Yes	Dec 2019
Extinguisher	Dry Powder	Hazardous Substances Store	Yes	Dec 2019
Extinguisher	Foam	Hazardous Substances Store	Yes	Dec 2019
Hose/Water	Hose Reel(not fire)	DG Drop off	Yes	Monthly WP inspection
Hose/Water	Hose Reel(not fire)	Compost Bund wall	Yes	Monthly WP inspection
Hose/Water	Hose Reel(not fire)	Either side of Transfer station	Yes	Monthly WP inspection
Hose/Water	Hose Reel(not fire)	Rummage	Yes	Monthly WP inspection
Extinguisher	Dry Powder	Transfer Station Head wall Both Sides x2	Yes	Dec 2019
Extinguisher	Dry Powder	All company vehicles	Yes	Dec 2019
Extinguisher	Dry Powder	Security Shed	Yes	Dec 2019
Water Cart	Mobile water supply	Onsite	No	On use VCR
First Aid	First Aid Kit	All company vehicles	Yes	Monthly WP inspection
	First Aid Station	Rummage shop Office	Yes	Monthly WP inspection
	First Aid Station	Staff Cafeteria	Yes	Monthly WP inspection
	First Aid Station	Maintenance Workshop	Yes	Monthly WP inspection
	First Aid Kit	Weighbridge	Yes	Monthly WP inspection
	Defribulator	Rummage shop Office	Yes	2018 (Install)
Emergency Showers	Shower	Hazardous Substances compound	Yes	Monthly WP inspection
	Shower	Staff Cafeteria	Yes	Monthly WP inspection
	Eyewash bottle stations	Maintenance Workshop	Yes	Monthly WP inspection
	Eyewash bottle stations	Security Shed	Yes	Monthly WP inspection
	Eyewash bottle stations	Public DG Drop Off	Yes	Monthly WP inspection
	Eyewash bottle stations	Hazardous Substances Store	Yes	Monthly WP inspection

Spill Response	Spill Kits	All company trucks	Yes	Monthly WP inspection
	Spill Kit	Transfer Station	Yes	Monthly WP inspection
	Spill Kit	Oil store	Yes	Monthly WP inspection
	Spill Kit	Hazardous Substances Store	Yes	Monthly WP inspection

Section 3: Emergency Preparedness & Response

Identify Emergency Type and Risk Rating

On Site	Emergency Type	Likelihood	Consequence	Rating
	Vehicle Accident	Possible	Major	High
	Fire and/or Explosion	Rare	Major	High
	Spill/Release of hazardous Substance Plant and machinery	Possible	Minor	Medium
	Medical Emergency	Possible	Moderate	Medium
	Robbery	Rare	Minor	Low
Off Site	Spill/Release of Haz subs from Truck	Possible	Minor	Medium

*For each emergency identified above, prepare a response plan for each and attach as Appendix 1.

Section 4: Training

All personnel shall be provided with general Emergency Awareness Training as part of the induction process and within 6 months of their employment, and will cover at a minimum;

- Location of all emergency equipment and training in its use (if required);
- Provide awareness of the types of emergencies that may occur at this site and appropriate response plans for these.

Personnel who have assigned emergency team responsibilities shall be provided with additional Emergency response training specific to their roles and responsibilities. This must be included in the Training needs analysis and on the training matrix.

Section 5: Raising the Alarm

In the event of an emergency at this site the following range of communications systems shall be utilised, as appropriate:

- Alarm system which is located at
  - Rummage shop entrance doorway, Waste oil bund entrance doorway, Weighbridge, Transfer Station; and
  - Verbal communication, cellphone, R/T.

Section 6: Testing and Recording Drills

The implementation of this plan shall be physically tested on a minimum 6 monthly basis.

All implementation tests (or drills) shall include, but not be limited to, the following aspects;

- Activation of the emergency alarm/s;
- Evacuation of all areas on site, including timing of evacuation times
- Include a variety of scenarios applicable to this site i.e spills, threats, explosion etc.

Drills are conducted and then evaluated using ***Emergency Drill Debrief Form***. A record shall be kept at site and date and time of Drill recorded in the Vault (Risk Management Module, Emergency Management, Checks and Registers, Facility/Site Evacuation).

Appendix 1: Emergency Response Guidance

FIRE/ EXPLOSION Response

All attempts to respond to an emergency situation should at all times ensure personal safety and only be attempted if within the capabilities of the individual.

Upon discovering a Fire, the First Responder should:

- Raise the alarm
- Alert and evacuate nearby personnel located in the vicinity of the affected area.
- Immediately notify Operations Manager/Emergency Controller and emergency services (dial **111**) (if required).
    - When contacting emergency services, state the following:
    - Your name
    - Company name
    - Type of incident
    - Address of incident and nearest cross street, state and suburb
    - Types of injuries
    - Any other relevant information
- Where safe, shutdown plant as per shutdown procedure.
- Where safe, isolate power source and ignition sources.
- Stay in communication until told otherwise.
- Attempt to contain, control and extinguish the fire (if safe and you are trained to do so).
- The Site Emergency Controller/ Chief Warden will raise the alarm and proceed with evacuation if necessary.
- Ensure the safety and well-being of personnel and attend to the injured.
- Secure the scene and assist external emergency services.
- Institute a roll-call of personnel, contractors and visitors.
- Operations Manager to contact WM Crisis Management Team if local emergency services unable to control

Terminating Emergency:

- After all clear is given from emergency services and Chief Warden.
- Chief Warden in conjunction with site management to debrief staff.
- Controlled / Orderly return to work.
- Damaged and affected areas to be barricaded or locked out until repairs are carried out.
- Ensure preservation of evidence and provide cooperation with statutory investigations.
- Notify local authorities including EPA, Local Council, Health Department, MBIE (where required).

TRUCK FIRES

A. FIRE IN BODY

Extend the packer plate to compact the load TIGHTLY. (Ensure hopper doors are down). Do not attempt to open lid doors to assess fire.

2. Call Waste Base on R.T. and advise situation (how badly is the fire burning) and location.

3. Determine quickly with Waste Base the best action:

    i) Stop in a clear position and await arrival of fire engine.

        - Do not stop under overhead power lines.

        - If on motorway, pull off on next available off ramp.

    ii) Proceed to Landfill and eject the load. Must be in position as directed by landfill staff and well away from face.

    iii) If a significant fire is imminent and you are unable to safely reach a landfill, find a vacant section or clear road space and eject load.

Note If unable to contact Waste Base on R.T., advise another mobile of details or have a passer-by ring the Fire Brigade and Waste Management for help.

Remember: Driver safety - do not climb on top of a body with a fire inside.

- Do not get too close to flames and risk getting burnt.

B. FIRE ON CHASSIS

1. Pull over to kerb and call Waste Base on R.T.; advise the situation and location.

2. Apply parking brake, shut down engine and get out of cab with fire extinguisher

3. Shut off battery isolator switch, and if possible, close main valve on hydraulic suction line.

4. Fight fire with extinguisher.

Note Always aim the extinguisher at the base of the fire.

C. TYRE FIRE

1. Stop the vehicle and advise Waste Base.

2. Do not attempt to fight fire if actively flaming.

3. Stand well clear in case of an explosion.

Correct Extinguishers for Classes of fires

	Water / Hose Reel	Dry Powder	Foam	CO_2	Wet Chemical / Fire Blanket
Class A Solids	✓✓ Best	✓	✓	✓	✓
Class B Liquids	✗ No	✓	✓✓ Best	✓	✗ No
Class C Gases	Cooling only	✓ Only to reach valve and **turn Gas off**	Cooling only	Cooling only	✗ No
Class D Metals	✗ No	✓	✗ No	✓	✗ No
Class E Electrical	✗ No	✓	✗ No	✓✓ Best	✗ No
Class F Fats & Waxes	✗ No	✓	✗ No	✓	✓✓ Best

MEDICAL EMERGENCY

All attempts to respond to an emergency situation should at all times ensure personal safety and only be attempted if within the capabilities of the individual.

- Check for threatening situation and remove persons from danger if required.
- Remain with the casualty and provide support.
- Immediately call the Emergency Response Team (specifically First Aid Personnel) for assistance.
- Where required, call emergency services (dial **111**).
- When contacting emergency services, state the following:
  - Your name
  - Company name
  - Type of incident
  - Address of incident and nearest cross street, state and suburb
  - Types of injuries
  - Any other relevant information
- Stay in communication until told otherwise
- If conscious, try to ascertain what condition the affected person is suffering.

Cardio-pulmonary resuscitation (CPR)

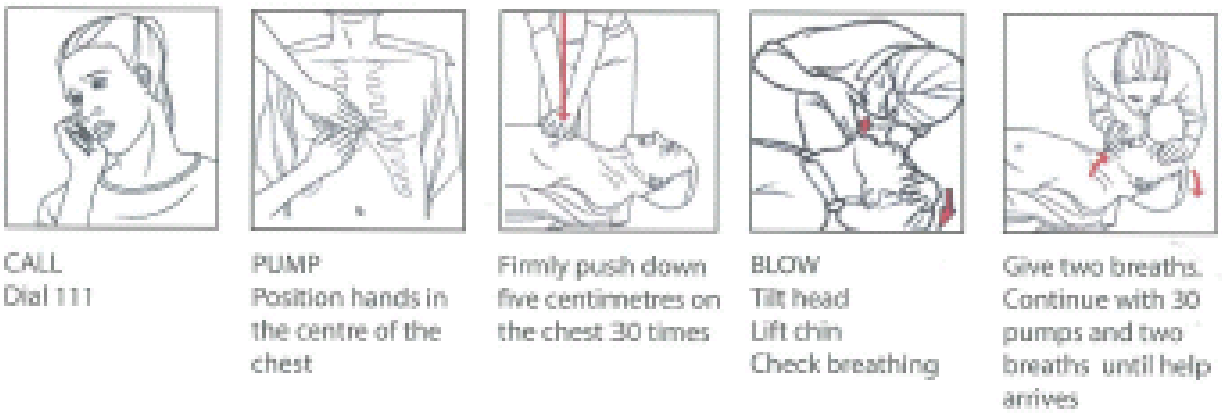
Danger:	Check for the safety of yourself, the patient and bystanders
Response:	Check for response, tap the patient, gently shake and shout
Send for Help:	Phone **111** and ask for ambulance
Airway:	Open airway, tilt head back
Breathing:	If not breathing normally, start CPR
CPR:	Start CPR, 30 chest compressions, two breaths
Defribrillate:	If you have a defibrillator and been trained in its use, attach an AED and follow the machine prompts (**Defibrillator located in MRF Rummage store)**

To check for normal breathing

1. Tilt head back and raise chin forward
2. Checking for normal breathing
   a. Look for movement
   b. Listen for breathing
   c. Feel for breath on your cheek
   d. If patient is not breathing normally, turn on back, start CPR

3. CPR
   First – Position hands in centre of chest, push down firmly and quickly 30 times
   a. Breathing: With head tilted back, pinch nose and seal your mouth over patient's mouth. Blow twice into patient's mouth.
   Take care if poisoning is suspected. Make sure there is no residual poison in the mouth, consider mouth to nose resuscitation
   b. Chest compressions: Push down on chest firmly and quickly 30 times
   Continue with two breaths and 30 pumps until help arrives

Call, pump, blow



If reluctant to give mouth to mouth, continue with chest compressions
CPR is needed if a patient has collapsed, is not responsive and is not breathing normally
Casualties who have collapsed should be carefully assessed to decide what emergency care is needed
Chest compressions are the most important part of CPR
If for any reason you cannot give rescue breaths to a patient, DO attempt chest compressions

EMERGENCY FIRST AID

Have the product label or safety data sheet available and read the instruction on what to do in an emergency

Control of bleeding 1. Apply direct pressure to wound – use your hand(s) (wear gloves) 2. Elevate (raise) the limb 3. Apply a pad and firm bandage 4. If necessary, use clean rags or clothing **REMEMBER** • Always check circulation below the bandage • If there is tingling, numbness or blueness, loosen the bandage.	**Poisoning** 1. Seek medical advice or call an ambulance **Poison Centre:** **0800 POISON / 0800 764 766** **REMEMBER** • **DO NOT** make the person vomit without advice from a medical professional • **DO NOT** give fluids without advice from a medical professional
Foreign bodies in the eye(s) 1. Wash the eye(s) with clean cool water 2. If the foreign body is stuck to the eye surface, **DO NOT** attempt to remove it 3. Place a covering over both eyes and send for, or take the person to, medical aid	**Chemicals in the eye(s)** 1. Wash the eye(s) with clean cool water for at least 15 minutes 2. Wash from near the nose outwards and always wash under the upper eyelid 3. Send for, or take the person to, medical aid **(Refer Safety Data Sheet for chemical)**

Management of minor wounds 1. Clean the wound with soap and water 2. Cover lightly with clean dressing 3. Seek medical help, if necessary	**Breathing difficulties** 1. If a person is breathing but unconscious, turn them onto their side 2. Clear airway of obstructions, such as tongue or vomit 3. Seek medical help, if necessary
Management of burns 1. Cool the burnt area with cool water for 10-15 minutes 2. If necessary, cover the burn with a clean dressing or plastic wrap before removing person to medical aid **REMEMBER** • Do not burst blisters • Do not remove clothing that is stuck • Do not apply creams	**Management of chemical burns** 1. Protect yourself from the substance 2. Avoid skin and eye contact 3. Brush off dry chemicals, flush liquids from the skin using cool running water for 15 minutes or more 4. Remove any contaminated clothing 5. Treat for shock if faint, pale, shallow, rapid breathing 6. Wrap area with a dry sterile dressing or clean cloth 7. Protect from pressure and friction 8. If the skin has blisters or if there is any overall body reaction, get medical help immediately

Personal Threat

In the event of a civil disturbance:

- Ensure your Chief Warden is notified immediately
- Notify the Police by dialing "**111**" and request assistance
- Do not say or do anything that may encourage irrational behaviour
- Remove any objects in accessible locations that could be used as weapons or missiles by aggressive trespassers
- Alert other personnel in your vicinity of the threat
- Evacuation should be considered (if safe to do so)

External Emergency impacting on Premises

All attempts to respond to an emergency situation should at all times ensure personal safety and only be attempted if within the capabilities of the individual.

- Make the area safe.
- Contact Emergency Services if necessary;
- When contacting Emergency Services, state the following:
    - Your name
    - Company name
    - Type of incident
    - Address of incident and nearest cross street, suburb, town/city.
    - Types of injuries, property damage or environmental harm sustained
    - Any other relevant information
- Stay in communication until told otherwise.
- Implement any other applicable emergency procedure.

Terminating Emergency:

- After all clear is given from emergency services and Chief Warden
- Chief Warden in conjunction with site management to debrief staff
- Controlled / Orderly return to work
- Damaged and affected areas to be barricaded or locked out until repairs are carried out
- Ensure preservation of evidence and provide cooperation with statutory investigations.

Bomb / Substance Threat

Any person who receives a bomb / substance threat should remain calm and take the following steps:

Ask the following questions

- Where did you put the bomb/substance?
- When is the bomb going to explode?
- When did you put it there?
- What does the bomb/substance look like?
- What kind of bomb/substance is it?
- What will make the bomb explode?
- Did you place the bomb/substance?
- Why did you place the bomb/substance?
- Is the substance a liquid, powder or gas?
- What is your name?
- Where are you now?
- What is your address?

Try to record the exact wording of the threat.

Try to keep the caller talking and complete the ***Bomb Threat Checklist*** (do not hang up because the call may be traced).

In the event of a Product Spill or Environmental incident

1. Incident Identified

It is the responsibility of each worker to be vigilant in the recognition of potential environmental conditions that may lead to environmental incidents. On identification contact the Emergency Response Team.

2. Can the Incident be contained locally?

In determining whether the incident can be contained locally, employees involved must consider the risks to personal health and safety, protection of plant and property and protection of the environment including blocking drains, covering pits and stopping any product entering the sediment ponds. If there is any doubt as to local containment, the appropriate Emergency Services must be called.

3. Call Emergency Services

In the event of an incident that is beyond local containment capability, notify the emergency services. If required by legislation, WM (through relevant National HSE Manager and Environmental Manager) will notify the relevant government authorities of the incident, including how the incident occurred, measures that have been undertaken to rectify the situation and any impacts that the incident has had on the environment. Government Authorities to be notified are:

- EPA (Environmental Protection Authority)
- Local Council
- Health Department
- Fire and Rescue
- MBIE (Ministry of Business, Innovation and Employment)

4. Employ Containment Procedures

Once an incident has been identified, all efforts must be undertaken to contain and minimise the effect of the incident on the environment. This can be achieved by isolating the cause and erecting suitable barriers to prevent the spread or flow of the particular incident.
In most cases there are actions to isolate or eliminate the cause:

- In the case of punctured drum it can be rolled over so that the puncture is on the top
- In the case of fallen drum leaking from the top it can be stood back up
- Move the drum/container to a restricted area to prevent spill entering stormwater
- Broken/damaged pipe may be stopped by closing up-stream valve or shutting down a pump.

Protect the stormwater system/ sediment ponds wherever possible. Should a product reach the stormwater system, go to the next drain in the sequence and check if the spilt product has reached it. If it has, go to the next drain in the sequence until there is no evidence of the spilt product. Block the outlet of this drain and clean the contaminated stormwater.

5. Notify the Operations Manager

Every environmental incident must be reported to the Operations Manager as soon as is practically feasible; no matter how insignificant the incident may appear. The Branch
Manager is required to contact & liaise with the nominated Environmental Specialist.

6. *Instigate Clean-up and Rehabilitation*

The Operations Manager has the responsibility of co-ordinating the clean-up and rehabilitation of the affected site to an acceptable standard. All waste shall be segregated where possible and stored and disposed as per the Waste Management Plan.

For external spills – please complete the ***External Spill Response Checklist***

7 STEPS to follow in case of spill
1. Be safe (SLAM)
2. Stop the source
3. Protect the storm water
4. Clean up
5. Notify
6. Dispose responsibly
7. Re-stock & Review

- Your first consideration is the immediate safety of all people present.
- Call emergency services (dial **111**) (if required).
- Contain the spill, but only if it is safe to do so.
- If help is available, give responsibilities to others to create a competent emergency team to deal with the spill.

Spill checklist	Precautions
1. Raise the alarm. 2. Evacuate people, if necessary. 3. Call emergency services (**dial 111**). 4. Close the valve, plug the leak or turn the container upright, if it is safe to do so. 5. Use safety equipment to contain the spill. 6. Call on specialist advice. 7. Clean up the spill. 8. Recover the product or dispose of the waste safely. 9. Restock and Review	➢ **DO NOT endanger yourself.** ➢ **Wear personal protective equipment appropriate for the spilled substance.** ➢ **Do not leave the area unattended if there is risk of a further spill.** ➢ **If the spill is likely to enter a waterway then notify the local council.** ➢ **Advise your supervisor of the incident**

HAZARDOUS SUBSTANCE SPILLS

- **Raise the alarm** by (for example: switching on the fire alarm, shouting):
- Evacuate, if necessary.
- Consider wind direction and impact of the direction of wind (Check Wind socks)
- Identify the nature of the spilled substance.
- Put on personal protective equipment (for example: overalls, boots, gloves, eye protection).
- Close off the source of the spill, if it is safe to do so.
- Remove sources of ignition if a flammable substance is present.
- Identify dangers posed by the spill – only respond if it is safe to do so.
- Refer to the safety data sheet or call an approved handler or other specialist for advice.

Safety data sheets can be found: **In Weighbridge.**
Waste register in Rummage store

- If necessary, call emergency services (**dial 111**) and advise the local council.
- Use your spill kit. Contain the spill if it is safe to do so by using a drip tray, oversized container or an absorbent to soak up a small spill.
- Dispose of waste safely as set out in the safety data sheet

AFTER THE EVENT

- Replenish your spill kit.
- Complete an incident report.
- Review the effectiveness of the emergency plan.

ASBESTOS WASTE DISPOSAL

Asbestos shall be wrapped and sealed in polythene prior to acceptance into the landfill, in accordance with the acceptance criteria.

- When asbestos or ACM waste arrives, visually inspect the load to verify that the load is covered and wrapped.
- If the load is unacceptable, the following courses of action shall be taken:
- If not wrapped or covered send the truck away.
- If load is not on a tipping truck or bin send truck away.
- If the truck arrives outside acceptance time, contact Landfill Supervisor and only let on site if agreement is reached.
- An Event Report is to be completed and passed on to the Landfill Supervisor.

BUILDING CONTAINING ASBESTOS

When identifying damage to asbestos containing materials (ACM)

- Report damage to asbestos product to Supervisor immediately
- Isolate the area
- Contact a Certified Asbestos Contractor (Asbestos removal or maintenance should only be undertaken by a Certified Asbestos Contractor – Refer Worksafe NZ website)

TRANSFER STATION

Unauthorised or improper disposal of Asbestos – containing material (ACM)

When identifying ACM in waste dropped off at transfer stations

- Isolate the area immediately
- Report to Supervisor
- Staff to wear: disposable coveralls, dust masks, safety glasses, gloves and gumboots
- Dampen asbestos material to avoid dust
- Push material to safe area and cover
- Dispose of PPE in plastic bag and seal
- Contact a Certified Asbestos Contractor in your area (Asbestos removal or maintenance should only be undertaken by a Certified Asbestos Contractor – Refer Worksafe NZ website).

MOBILE PLANT STRIKES A POWER LINE OR ELECTRICITY CABLE

ASSUME ALL WIRES ARE LIVE

WHEN IT IS SUSPECTED THAT THE VEHICLE HAS MADE CONTACT WITH AN OVERHEAD WIRE OF ANY TYPE THE DRIVER AND ANY OTHER OCCUPANTS ARE TO REMAIN INSIDE THE CABIN

If a power line or cable strike occurs when using mobile plant, act very cautiously and deliberately to minimise adverse effects from the occurrence. Key actions include:

- **Warn others** in the area to move away at least 10metres from the vehicle and not to touch any part of vehicle; (Those who are close should jump with feet together).
- **Driver/operator** should stay in the cab or on the platform if they are there when the contact occurs, otherwise they must not approach the plant.
- **DO NOT** step from the mobile plant to ground, to avoid risk of electrocution.
- **DO NOT** attempt to move or disentangle the vehicle from the overhead wire; If possible, and it can be achieved without causing further damage, move/drive the plant well clear of the power line.
- If it becomes necessary to leave the mobile plant leap well clear, keep both feet together as you leap (like a kangaroo) away from the plant. **DO NOT** touch the vehicle and the ground at the same time.
- Staff in an elevated bucket, or on the mobile plant, remain there until the power line owner advises it is safe to descend to ground level.
- All ground staff should remain well clear of the plant, or if standing on a conductive mat, remain there, until the power line owner advises that the hazard has been removed from the worksite.
- Contact the power line owner immediately and advise them about the strike.

Emergency Services dial (**111**)

- **Contact your Supervisor / Manager immediately;**
- **Prior to driving the vehicle from the incident site, a mechanic must deem the vehicle is roadworthy and in a safe condition to drive.**

Notification of Accidents and Incidents:

- Any occurrences of serious harm to a worker or member of the public, or any crane damage incident, must be notified to the MBIE (Labour Group) phone 0800 29 90 20;
- Any occurrence resulting in property damage, for example from contact with a power line, must be notified to MBIE (Energy Safety) – 0800 104 477.

Vehicle Breakdown

- Driver to contact Base
- Base to contact Mechanic and Supervisor
- Driver to implement Traffic Management per TMP carried in vehicle
- If on State Highway, Supervisor to notify NZTA
- Supervisor and Mechanic to liaise on Traffic Management requirements and vehicle repair / recovery as necessary.

Vehicle Accident

The driver must report the accident to base/Supervisor and emergency services. The following procedures should be followed:

- Stop immediately
- Take steps to prevent another accident at the scene
- Contact Base/Supervisor to:
    - Call a emergency services (**dial 111**) doctor or ambulance, if necessary and Notify police
    - Escalate the accident through Manager to GM and HSE Advisor
- Provide first aid assistance to injured parties
- Do not sign any paper or make any statement as to who was at fault (except later to your supervisor)
- Get name and address of each witness
- Provide the other involved parties with your name, address, place of employment, and the name of your supervisor; upon request, show your operator's license, vehicle registration, and insurance card
- Secure the following information:
    - Registration information for other vehicle(s) (owner's name, license plate number, expiration date and state, vehicle serial number)
    - Information on other driver(s) (name, address, operator's license number and expiration date)
    - Name and address of the company insuring other vehicle(s)
    - Name and address of each person involved and extent of injury, if any
    - General information such as location, time, road condition, weather, property damage, and estimated damage to other vehicles
- If the vehicle is unsafe to operate, after contacting Mechanic/Transportation Services, have it towed to the nearest workshop; after hours, call Supervisor, for connection with the appropriate person
- In consultation with Supervisor complete the insurance paperwork.

Gas Leakage

In the event of a Gas Leak:

- Isolate the Gas supply at the source (if safe to do so)
- Notify the Emergency Services by dialling "**111**"
- Shutdown the air conditioning to prevent the spread of any flammable or toxic gases
- Remove any ignition sources (if safe to do so)
- Evacuate to safe area and contact the Operations Manager
- Await advise from emergency services
- If the Operations Manager is not on site, advise the Regional Manager of outcome.

Natural Events

In the event of a flood, severe storm, earthquake, bushfire:

- If safe to do so shut down plant as per shutdown procedure and isolate any other power, gas, water sources.
- Contact Emergency Services if necessary;
- When contacting Emergency Services, state the following:
  - Your name
  - Company name
  - Type of incident
  - Address of incident and nearest cross street, state and suburb
  - Types of injuries, property damage or environmental harm sustained
  - Any other relevant information
- Stay in communication until told otherwise.
- Implement any other applicable emergency procedure.

When the natural event occur outside hours, where safe to do so the Chief Warden or their representative should visit the site to isolate any power, gas and water sources and provide access to emergency services where required

EARTHQUAKE

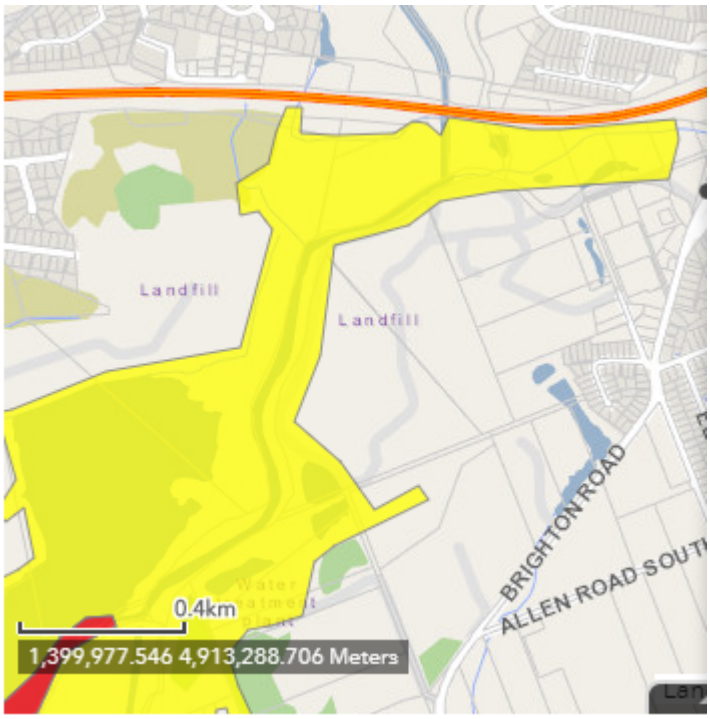
IF YOU ARE INDOORS

- Stay where you are until the shaking stops. Do not run outside. Do not get in a doorway as this does not provide protection from falling or flying objects, and you may not be able to remain standing.
- **DROP** down onto your hands and knees so the earthquake doesn't knock you down. Drop to the ground (before the earthquake drops you down.
- **COVER** your head and neck with your arms to protect yourself from falling debris. If you are in danger from falling objects, and you can move safely, crawl for additional cover under a sturdy desk or table.
- If there is low furniture or an interior wall or corner nearby, and the path is clear, these may also provide some additional cover.
- Stay away from glass, windows, outside doors and walls, and anything that could fall, such as light fixtures or furniture.
- **HOLD** on to any sturdy covering so you can move with it until the shaking stops. Stay where you are until the shaking stops.

IF YOU ARE OUTDOORS

- Move away from buildings, streetlights, and overhead wires.
- Once in the open **"DROP, COVER, and HOLD On".**
- Stay there until the shaking stops.
- This may not be possible in a city, so you may need to duck inside a building to avoid falling debris.

TSUNAMI



Tsunami Evacuation Zones

- Red: Evacuate if you feel a long or strong earthquake or after an official warning for a beach and marine threat with wave height of 0.2 metres and above.
- Orange: Evacuate if you feel a long or strong earthquake or after an official warning for a wave height 1-3 metres
- Yellow: Evacuate after an official warning for a wave height more than 3 metres.

FLOODING

- **TURN AROUND, DON'T DROWN**
- Avoid walking or driving through flood waters (*just 6 inches of moving water can knock you down, 2 feet of water can sweep your vehicle away*)
- Ops Manager or Site Supervisors - Close the site if roadways flooded (advice DCC)
- Vehicles - Pull over where safe to do so
- Contact base advising of situation, seek guidance
- Proceed when safe to do so

LANDSLIDES

- Remain vigilant for signs of ground movement – Small slips, rock falls and subsidence at the bottom of slopes;
- Be alert when driving especially where there are embankments along roadsides. Watch the road for collapsed pavements, mud and fallen rocks;

IF YOU THINK A LANDSLIDE IS ABOUT TO HAPPEN

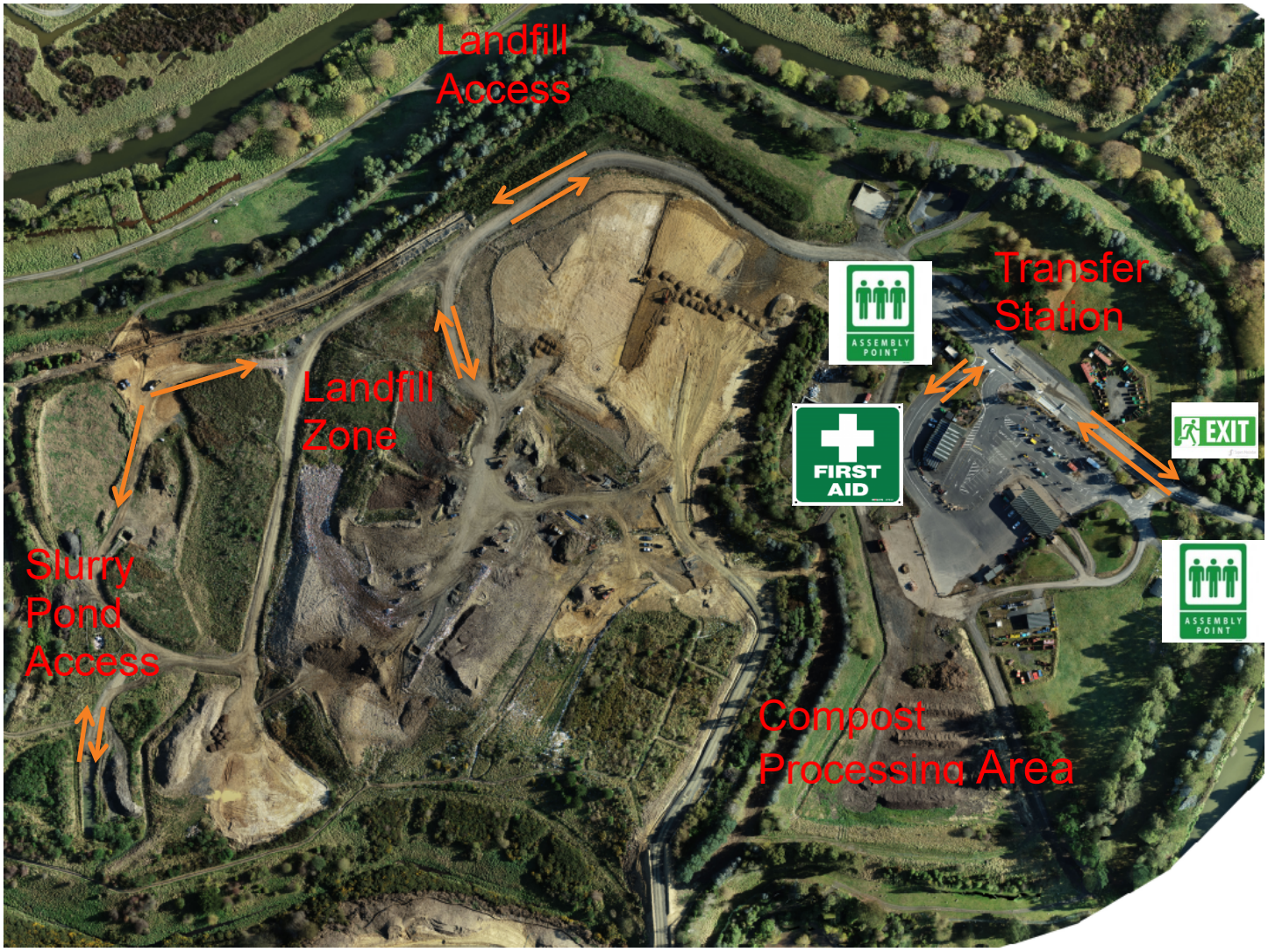
- Act quickly getting out of the path of a landslide
- Pull over where safe to do so warning approaching traffic of danger, look for and report broken utility lines to appropriate authorities
- Contact base advising of location and situation requesting that they contact emergency services and local council advising of hazard

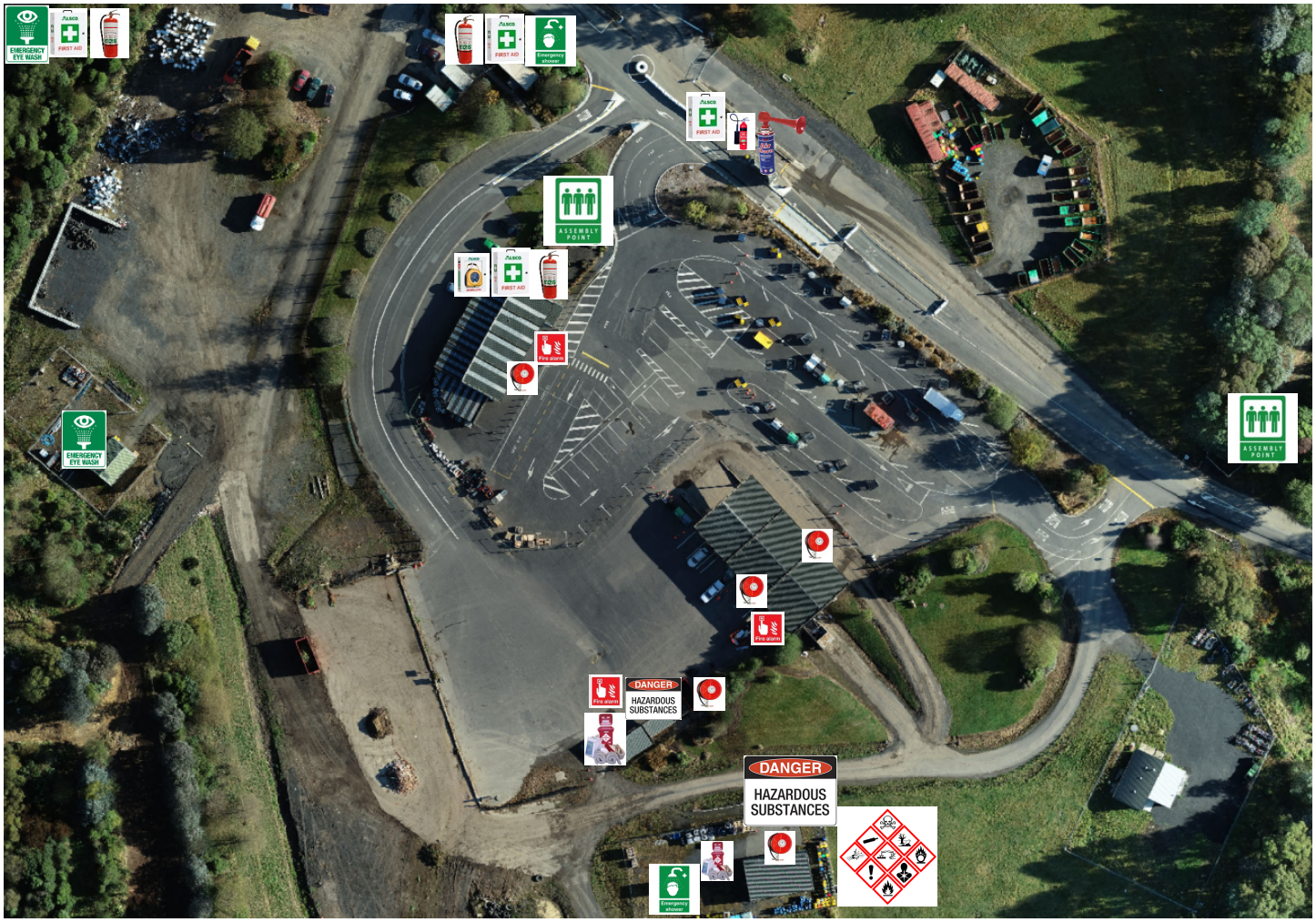
AFTER A LANDSLIDE

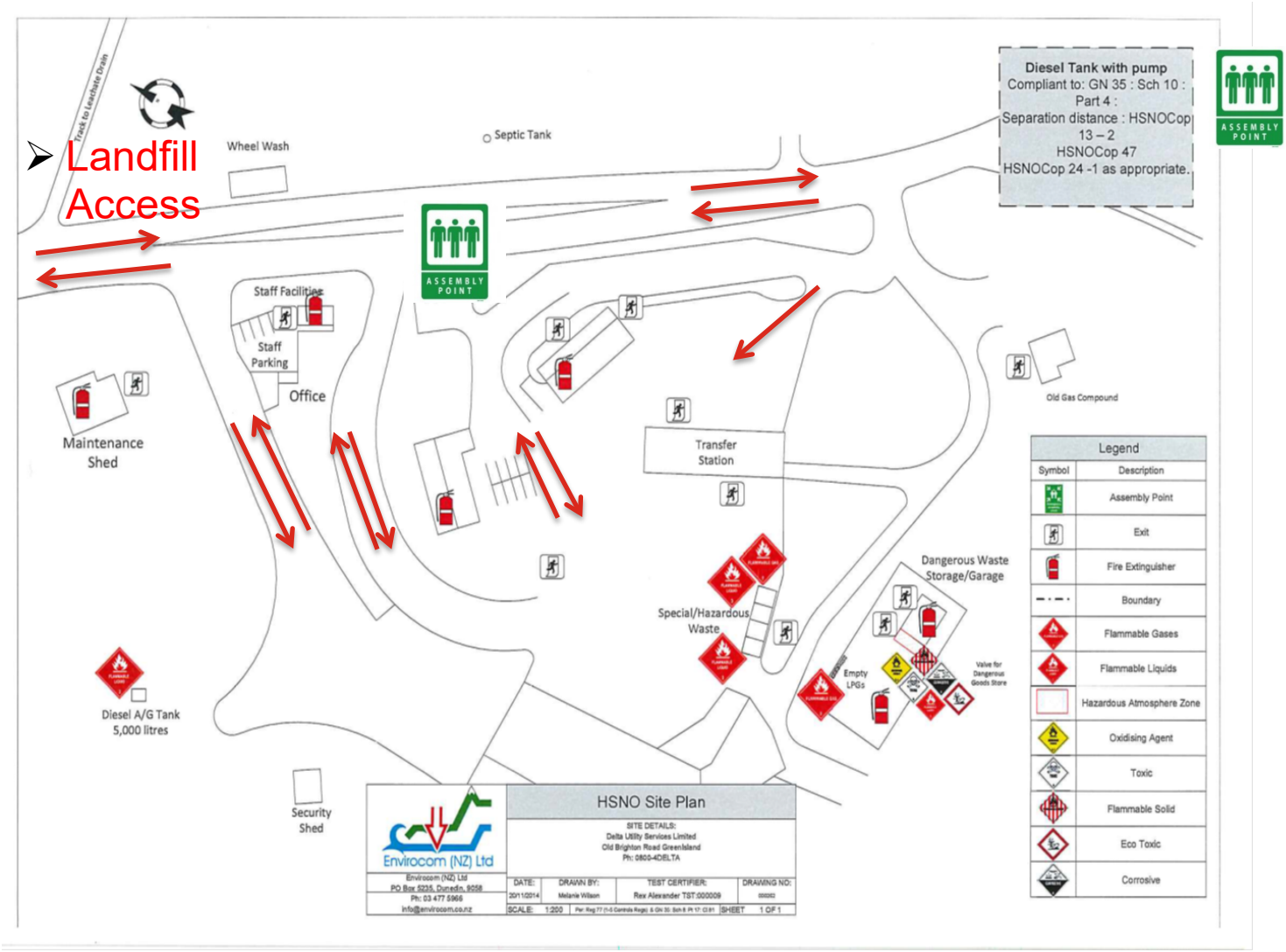
- Keep in mind that further landslides may occur
- Stay away from affected sites until it has been properly inspected and authorities give the all-clear
- Contact Base advising of location, situation and assistance

Section 7: Evacuation Plan

The site evacuation plan details all buildings, plant, utilities mains, exit points, evacuation assembly area(s), first aid facilities, emergency alarm locations and fire extinguisher equipment location.




EMERGENCY EYE WASH
FIRST AID
ASSEMBLY POINT
DANGER
HAZARDOUS SUBSTANCES
Emergency shower


Landfill Access
Track to Leachate Drain
Wheel Wash
Septic Tank
Diesel Tank with pump
Compliant to: GN 35 : Sch 10 : Part 4 :
Separation distance : HSNOCop 13 – 2
HSNOCop 47
HSNOCop 24 -1 as appropriate.
ASSEMBLY POINT
Staff Facilities
Staff Parking
Office
Maintenance Shed
Transfer Station
Old Gas Compound
Dangerous Waste Storage/Garage
Special/Hazardous Waste
Empty LPGs
Valve for Dangerous Goods Store
Diesel A/G Tank 5,000 litres
Security Shed
Legend
Symbol
Description
Assembly Point
Exit
Fire Extinguisher
Boundary
Flammable Gases
Flammable Liquids
Hazardous Atmosphere Zone
Oxidising Agent
Toxic
Flammable Solid
Eco Toxic
Corrosive
Envirocom (NZ) Ltd
HSNO Site Plan
SITE DETAILS:
Delta Utility Services Limited
Old Brighton Road Greenisland
Ph: 0800-4DELTA
DATE:
DRAWN BY:
TEST CERTIFIER:
DRAWING NO:
SCALE: 1:200
SHEET 1 OF 1

Appendix D Legal Description of Green Island Landfill Site

Table D: Certificates for land encompassing the Green Island Landfill site

Certificate of Title	Cadastral Reference	Comment
CT 11B/1241	Part Section 45 and Section 46,47, Green Island Bush Survey District Section 54,63, Block VII Dunedin and East Taieri Survey District	Designated Landfill Area Part of Landfill Operation Area
CT 11B/1241	Section 119, Block VII Dunedin and East Taieri Survey District	Designated Landfill Area Outside Landfill Operation Area
CT 11C/1275	Section 120 and Part Section 53, Block VII Dunedin and East Taieri Survey District Closed Road intersecting Part Section 86, 87, 98, 102, 103, Block V Lower Kaikorai Survey District	Designated Landfill Area Outside Landfill Operation Area
CT 16D/1194	Part Section 86, 87, 98, 99, 100, 101 and Section 102, 103, Block V Lower Kaikorai District	Designated Landfill Area Outside Landfill Operation Area
CT 12D/571	Lot 1 DP 20826	Designated Landfill Area Outside Landfill Operation Area
CT 15C/1017	Sec 1 SO 24040	Designated Landfill Area Outside Landfill Operation Area
CT 7C/934	Part Section 44, 156, Green Island Bush Survey District	Designated Landfill Area Landfill Operation Area
CT 7C/934	Part Section 38, 39, 40, Green Island Bush Survey District	Designated Landfill Area Outside Landfill Operation Area
CT 12C/261	Part Lot 4 DP 4550	Designated Landfill Area Outside Landfill Operation Area
CT 12C/262	Lot 1 DP 20582	Designated Landfill Area Landfill Operation Area
CT 15A/266	Section 81, Block VII Dunedin and East Taieri Survey District	Designated Landfill Area Landfill Operation Area
CT 15C/1016	Section 1, SO 24047	Designated Landfill Area Landfill Operation Area
CT 368/19	Part Sec 45, Green Island Bush District	Designated Landfill Area Landfill Operation Area
CT 11B/1241	Section 55, 65	Not Designated Landfill Area Landfill Operation Area

Appendix E Examples of Hazard Identification Sheets

Table E: Hazard Identification and Control Measures to taken

Hazards	Risk	Risk Rank	Controls
Travelling to Site	Traffic accident.	Med	• Motor vehicle to be insured and roadworthy. • All drivers to hold a current driver's License. • ALWAYS wear seatbelts. • Observe all speed limits and road signage and signalling. • DO NOT use hand-held mobile phone whilst driving. • Notify the Contractor of intention to visit the site. In the event of an accident, notify the contractor.
Hazardous, toxic, dangerous goods	Contact with hazardous, toxic or dangerous goods.	Low	• Do not touch or handle any hazardous, toxic, or dangerous goods at the site. • If exposed to hazardous, toxic, or dangerous goods read available health and safety information (e.g., Materials Safety Data Sheets, etc) and where necessary proceed according to the treatment recommendations.
Biological	Contact with leachate and refuse products	Med	• All open wounds should be covered. • Do not touch raw leachate. Always keep hands away from mouth, eyes, and nose. • Gloves and PPE must be worn if contact with leachate is likely e.g., sampling. • Always wash hands with disinfectant after inspection and before leaving the Site. • Wash hands prior to eating or smoking off site. • Ensure washing facilities are available. Where facilities are not available, carry a supply of water and soap or other appropriate cleaning materials such as industrial grade wet wipes. • Wash all equipment after contact with leachate. • If an open cut is sustained or leachate contacts an existing wound, seek medical advice. The doctor should be clearly advised that you have contacted with leachate. • Do not eat on-site apart from in approved areas.
Moving Machinery and Traffic – Walking around the site	Accident involving a vehicle on the site.	High	• Report to the contractor and state your intended movements. • Always wear appropriate enclosed footwear. • Where there are designated walkways, stay within the marked lines or handrails. • Be alert for moving machinery and motor vehicles and not to place themselves in positions of risk. • Keep off carriageways unless necessary for the work. • Be aware of mobile machinery, watch for flashing and reversing lights and listen for reversing beepers.

Hazards	Risk	Risk Rank	Controls
			• Stay clear of the moving machinery, give the operators room to move and not place themselves in a position of danger.
Moving Machinery and Traffic – driving on the site	Accident involving a vehicle on the site.	High	• Always drive within the specified site speed limit. • Be aware of pedestrians and other traffic. • Do not park vehicles across access ways and obey ALL signage and instruction from the site production officers.
Slips, trips and falls	Injury – cuts, bruising, breaks	High	• Proceed carefully around the site. • Be alert to dangerous and slippery surfaces and proceed carefully on all stairs and steps. • Remain within dedicated and marked walkways. • Be aware of roped or barricaded areas. • DO NOT enter roped off or barricaded areas. • Wear appropriate footwear with non-slip soles in and around the administration building. • Safety boots to be worn around the site.
Sun	Excessive exposure to sun leading to sunburn or skin cancer	High	• Protect yourself from excessive sunlight exposure by wearing a hat and covering or applying sunscreen with high SPF factor to exposed skin areas at regular intervals.
Accessible water bodies – working over, near water	Falling into water with possible drowning, contact with biological material.	High	• Stay beyond 2 metres of a body of water with no barrier or with a slope. • If it becomes necessary to undertake work within 2 metres of a body of water with no barrier or with a slope, appropriate controls shall be put in place. A second person must be present whilst the work is conducted. A lanyard shall be used, and a life jacket shall be worn if no other controls are available.
Sampling	Contact with hazardous toxic and/or biological agents.	High	• Cover existing cuts with sterile plaster. • Wear protective glove (special gloves will be required for some contaminated soils). • Ensure that Hep A, B and tetanus immunisations are up to date.

Appendix F Site Layout Plan

NOTES

1. DRONE SURVEY UNDERTAKEN ON 4th NOVEMBER 2022 BY STANTEC CERTIFIED DRONE PILOTS

FOR INFORMATION ONLY

REV	DATE	DRN	DESCRIPTION

DCC WASTE FUTURES 2023

GREEN ISLAND LANDFILL

SITE LAYOUT PLAN

CLIENT LOGO: DUNEDIN CITY COUNCIL

Stantec

SCALE:	NTS
DRAWN:	Brent James
DATE:	12.03.20
DESIGN:	Phil Landmark

FIG 1

OF B

C:\pwworkdir\ap_projects01\dms99265\Figure 1 - Site Layout Plan.dwg

DESIGN WITH COMMUNITY IN MIND

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise, to appreciate nuances and envision what's never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Stantec trades on the TSX and the NYSE under the symbol STN.
Visit us at stantec.com or find us on social media.

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