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7 February 2019

Planning Team
Environment Southland

Ref: 6-VQ095.00

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Resource Consent Application - Southland District Council - Braggs Bay Landfill

To whom it may concern

Please find attached a resource consent application on behalf of the Southland District Council, for a Council operated landfill at Braggs Bay, Rakiura, Stewart Island.

In September 2018, the applicant lodged an application with the Council for this work. This application was returned under Section 88 once a site visit had been completed. The applicant has since engaged WSP Opus to draft and progress a revised application with Land and Water Science providing technical information also. WSP Opus staff then met with the processing officer of the previous application to discuss the proposal (Emily Allen). At this time, the SRC was informed of the applicant's intention to lodge an application within six months of the expiry of the existing resource consent and received confirmation that the cost code would be kept open for the lodgement of a new application. There is some uncertainty as to whether or not this cost code has been left open.

It is understood that an application will not be lodged within three-months of the expiry of this resource consent. We will assist where needed in order for a resource consent for this activity to be granted prior to the expiration of the existing consent to ensure the Rakiura community maintain the ability to responsibly dispose of cleanfill and greenwaste at the site.

Regards

Christie Robinson
Graduate Planner



Braggs Bay Landfill

Resource Consent Application

Discharge of cleanfill and greenwaste at an existing landfill



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Prepared By



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Team Leader - Planning

**APPLICATION FOR RESOURCE CONSENT
PURSUANT TO SECTION 88 OF THE RESOURCE MANAGEMENT ACT 1991**

To: Environment Southland
Private Bag 90116
INVERCARGILL 9840

From: Southland District Council
PO Box 903
Invercargill 9840

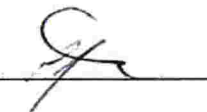
Southland District Council applies for the following resource consents:

- The type of Resource Consent sought is:

RMA Section	Resource Consent Sought	Period Sought
Section 9	Use of land for a landfill (greenwaste and cleanfill only)	10 years

- The application proposes replacement of an existing resource consent for the discharge of cleanfill and greenwaste only at an existing landfill site.
- The **owner of the land** to which the application relates is: **Southland District Council**
- The **Address** of the property to which the application relates is: 47 Braggs Bay Road, Stewart Island. The legal description for the property is Section 37 BLK I Paterson SD. There is no CFR associated with the site given the statute for the site which states the property has been vested in the Southland District Council for the purpose of use as a refuse site.
- Other resource consents:** No other resource consents are required.
- Attached in accordance with the Fourth Schedule of the Resource Management Act 1991, Site Description of the proposed activity and **an assessment of the environmental effects** the proposed activity may have on the environment.
- Included is an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.
- I attach an assessment of the proposed activity against any relevant provisions of a document referred to in Section 104(1)(b) of the Resource Management Act 1991, including the information required by Clause 2(2) of Schedule 4 of that Act.
- Nothing in this application is affected by section 165ZH(1)(c) of the Resource Management Act 1991 (which relates to marine and coastal occupation).
- The proposed activity is NOT within an area covered by a customary marine title group planning document under Section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011.
- The application is NOT for any form of subdivision under the Act.

12. Information, as required by the relevant Regional Plans is contained in the attached document.
13. Attached is **all other information required** to be included in the application by the Regional Plan, the Resource Management Act 1991 or any regulations made under that Act.
14. We request that all correspondence relating to this application be directed to our Agent.

Sign:  Date: 7/02/19

On Behalf of:
Southland District Council
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Address for Service:
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1 Introduction

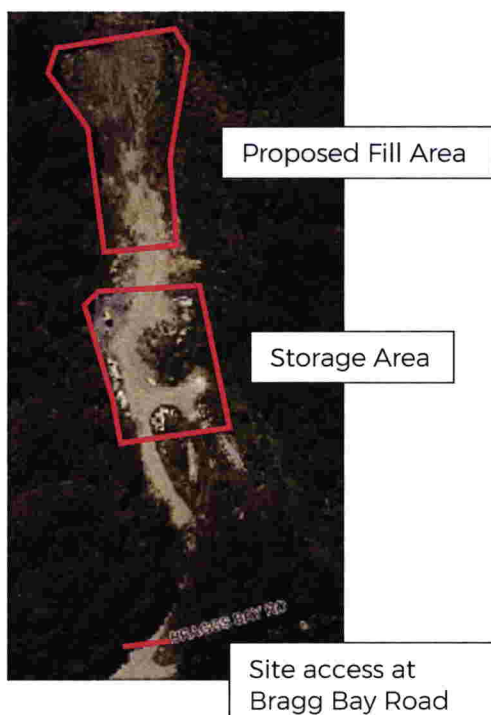
This application has been prepared in accordance with Section 88 of the Resource Management Act 1991 (RMA) and provides a description of the proposal with an assessment of the actual and potential effects on the environment and required by the Fourth Schedule of the RMA.

1.1 Proposal

The Southland District Council (the applicant) operates a landfill at 47 Braggs Bay, Rakiura Stewart Island. In recent times, the landfill has been used for the deposition of cleanfill and greenwaste only under an existing resource consent (AUTH-205877 – attached as Appendix 2). This consent expires April 2019.



The applicant seeks to replace this existing consent, so they can maintain the ability to use the site as a landfill. As under the current resource consent the applicant seeks to authorisation to discharge only cleanfill and greenwaste as part of the landfill operation. The current application relates to only part of the site. The part of the site this application relates to has already been used and developed as a landfill area. Other parts of the property have not been developed for landfill purposes. Historically the site functioned as the municipal landfill for the Island accepting a wide range of waste.



In September 2018, the applicant lodged an application with the Southland Regional Council (SRC) for this work. This application was returned under Section 88. The applicant has since engaged WSP Opus to draft and progress a revised application. WSP Opus staff then met with the processing officer of the previous application to discuss the proposal. At this time, the SRC was informed of the applicant's intention to lodge an application within six months of the expiry of the existing resource consent.

The resource consent sought by way of this application will provide a basis for which the applicant may apply for subsequent resource consents for future landfill activities.

1.2 Waste Disposal on Rakiura

Living on an island remote from the mainland limits options for waste disposal for the local community on Rakiura. General refuse is currently shipped back Bluff and transported to the Southland Regional Land Fill for disposal. Transporting waste across Foveaux Strait adds considerable cost to waste disposal. The cost of transporting cleanfill and greenwaste back to the mainland is prohibitive. As a result, there is a need to provide a suitable site on the Island for the disposal of cleanfill and greenwaste. The site this application relates to is one of the Island's original municipal landfills and has continued to function as a landfill restricted to disposal of cleanfill and greenwaste. An inability to provide a site for cleanfill and greenwaste disposal is likely to result in either storage or disposal of these wastes elsewhere on the Island and potentially other issues such as fly tipping.

1.3 Site Description

The landfill is located at 47 Braggs Bay Road and part of the site has been utilized as a landfill for a number of decades (for household and commercial waste between the 1970s and 2002. Since 2002 the landfill has only been used for the disposal of clean fill and greenwaste. The site is adjacent to Bragg Bay, with Butterfield Beach being located to the south-west of the site. The site comprises an area that has been cleared of native vegetation and is used for landfill operations. The site has been progressively built up through waste disposal, via filling the natural contour of the site. To the north of the active disposal area there is a wetland area and further north again indigenous vegetation that forms part of a large tract of native bush occupying multiple properties. A small creek runs along the eastern boundary of the site (beginning within the native bush area) and flows south towards Bragg Bay.

Access to the site is limited by a security fence and padlocked gate.

The site is designated for waste disposal purposes under the Southland District Council's District Plan (Designation 15).

1.4 Methodology

Landfill operations are undertaken on the site as follows:

- Before any material is discharged at the site prior approval must be arranged with Council staff, access to the site is then granted.
- Layers of cleanfill and greenwaste are placed over the primary landfill area (proposed fill area highlighted above). The layers are mixed as the face of the landfill moves forward and as the height of the face is raised. The discharge area is then compacted with machinery.
- The finished contour of the primary disposal area will have a maximum height of 10 metres above sea level or 8 metres above the existing ground level.

- The unnamed creek to the east of the site will not be altered in any way as a result of the works.
- Gravel, posts and other non-putrescible material are stock-piled onsite to a maximum height of 2.5 metres in the remaining area of the site.

Please refer to the Landfill Management Plan for an overview of landfill management practices implemented on the site.

On average waste is disposed at the site several times a month, with the volume disposed at the site varying greatly between each activity. It is estimated that a maximum annual volume of 300m³ will be discharged at the site.

2 Consents Required

The provisions of the both the Operative Regional Water Plan for Southland and the Proposed Southland Water and Land Plan must be considered.

As the proposal involves the disposal of both cleanfill and greenwaste, it cannot be assessed under the individual rules related to these materials. Therefore, an assessment of the proposal against the landfill rules is provided.

No other consents are required under either the Water Plans or the Regional Air Plan.

2.1 Operative Regional Water Plan for Southland

Rule 56 – Landfills: Except as provided for elsewhere in this Plan, the discharge of contaminants into or onto land at a landfill is a discretionary activity.

2.2 Proposed Southland Water and Land Plan

Rule 45 – Landfills: Except as provided for elsewhere in this Plan, the discharge of contaminants from a landfill into or onto land in circumstances where that contaminant may enter water is a discretionary activity.

3 Assessment of Environmental Effects

3.1 Effects on Water Quality

An assessment of the activity on the actual and potential effects on water quality has been undertaken by Land and Water Science and is attached as Appendix 1. The report details past monitoring results and concludes that the replacement of the resource consent will have "little obvious impact on the local water quality", which is in line with the results of the monitoring from 2009 till present.

3.2 Effects on Amenity

The site has been used as a landfill for over 40 years and is designated under the Southland District Council's District Plan for waste disposal purposes. The site is well screened and set back from any public roads or private property. The nearest dwelling located approximately 100m from the site.

Given the security at the site and restrictions placed on users, disposal activities only occur during typical working hours. Given the low frequency of disposal events, and corresponding limited noise disturbances, the proposal will not have any significant effects on amenity.

3.3 Effects on Historic Heritage and Cultural Values

The proposal does not involve any significant excavation works, with the predominant activity filling of the site with cleanfill and greenwaste. There are no known cultural archaeological sites shown on the relevant District Plan Planning Maps in the vicinity of the site. Cultural use of the coastal marine area (in regard to water quality) is assessed as part of the Land and Water Science Report and Te Ao Marama have been consulted and their written approval sought.

The effects of the proposal on historic heritage and cultural values will not be significant.

3.4 Positive Effects

The ongoing use of the site avoids the need to establish a landfill elsewhere on Rakiura Stewart Island for the disposal of greenwaste and cleanfill.

There is a need for a site for efficient and effective disposal of cleanfill and greenwaste on Rakiura Stewart Island. On request, all residents, commercial operators and contractors may utilise the landfill services provided by the applicant. This service is important after extreme weather events and during construction activities which support both residents and industries (e.g. tourism) on the Island. The landfill operation also encourages residents to dispose of waste material in a responsible manner. Much of the waste generated on the Island is removed for disposal on the mainland. Maintaining an efficient and cost-effective option on the Island for these two forms of waste creates a balanced approach for waste management across all waste streams. Efficient and effective waste disposal has positive social and economic effects.

The proposed replacement is considered to have a number of positive effects for both environmentally and for the Stewart Island community.

4 Statutory Assessment

4.1 Resource Management Act 1991

All resource consent application must be considered against Part 2 of the Resource Management Act 1991. To grant a resource consent, the consent authority must be satisfied that by granting an application, Part 2 of the RMA will be achieved.

Section 5 sets out the purpose of the RMA is to promote the sustainable management of natural and physical resource. Section 5 requires activities to be managed so to avoid, remedy or mitigate any adverse environmental effects on the environment. The proposed use of the existing landfill site is considered to provide for the sustainable management of green waste and cleanfill on Rakiura. In providing a secure and well-managed disposal site, the applicant is providing a disposal method which seeks to avoid and mitigate the effects of inappropriate disposal of these items elsewhere on the Island.

For these reasons, the proposal is considered to be consistent with Section 5.

Section 6 of the RMA lists matters of national importance which are to be recognised. The matters from Section 6 which are relevant to the proposal are: (a) preservation of the natural character of coastal environments and rivers, (d) the maintenance and enhancement of public access to and along the coastal marine area, and (e) the relationship of Māori and their culture and traditions with ancestral lands and water. The proposal is considered consistent with Section 6.

The applicant has acknowledged the relationship of Māori and their culture traditions and ancestral lands and water by seeking the local Rūnanga's written approval. The applicant seeks to use an existing landfill site in a sustainable manner. The proposal is considered consistent with this section of the Act.

Section 7 sets “Other Matters” which Council must have particular regard to, those which are relevant to the proposal are (a), (b), (c), (d), and (f). The above AEE demonstrates both the potential adverse and positive effects which will arise from the replacement of this resource consent. The applicant seeks to avoid spreading potential effects of the disposal activity to other sites on the Island and are committed to the sustainable management of the site and receiving environment. Utilising the existing site is considered to be the most effective and efficient way of maintaining the amenity values of the Island and efficient use of the natural resources. The proposal is considered consistent with Section 7.

Section 8 of the RMA requires that the principles of the Treaty of Waitangi be taken into account. through consideration of the local iwi management plan and the seeking the written approval of the local Rūnanga.

4.2 Southland Regional Policy Statement 2017

Objective WASTE.2 – Avoid, mitigate or where appropriate remedy adverse effects.

Policy WASTE.1 – Adverse environmental effects

Policy WASTE.2 – Cleanfill

Policy WASTE.3 – Collaborative Approaches

Policy WASTE.4 – Solid waste hierarchy

Policy WASTE.5 – Solid waste generation and disposal trends

Policy WASTE.7 – Appropriate minimum standards

Policy WASTE.8 – Efficient use of landfills

Comments

The applicant has applied for the continued use an existing landfill (historic) site for the discharge of cleanfill and greenwaste. The provision of an effective and efficient waste disposal service to the Rakiura Stewart Island community is needed. The ongoing use of the existing landfill site is the most economically sustainable and effective means of ongoing disposal of these types of waste. The provision of a community landfill for cleanfill and greenwaste disposal provides an appropriate approach for waste management on Stewart Island, with the applicant promoting the use of minimum standards for each waste type.

The proposal is considered to be consistent with the relevant provisions of the SRPS 2017.

4.3 Operative Regional Water Plan For Southland

Policy 46 – Discharge waste and cleanfill appropriately

Policy 47 – Assess land contaminated by a hazardous substance

Policy 48 – Manage land contamination

Comments

The proposal seeks to continue an existing landfill activity. The applicant has and will continue to use appropriate methods for discharging both cleanfill and greenwaste at the site. By utilising the existing site, the applicant seeks to provide an appropriate site for the disposal of these types of waste on the Island and avoid unauthorised disposal elsewhere on Rakiura.

The proposal is considered to be consistent with the Operative Water Plan.

4.4 Proposed Southland Water and Land Plan

Objective 2

Objective 6

Objective 13

Objective 13B

Objective 18

Policy 35 – Discharge Waste and Cleanfill Appropriately

Policy 36 – Manage Contaminated Land

Comments

The proposal seeks to provide a necessary service to the Rakiura community while limiting the environmental effect of waste disposal on the Island. Maintaining the existing site and service, results in less land around Rakiura being used for landfill activities and unauthorised waste disposal. The applicant proposes the ongoing use of best practice for the maintenance of the site and disposal of the waste.

The proposal is considered to be consistent with the Proposed Plan.

4.5 Te Tangi a Tauria – Iwi Management Plan

Te Tangi a Tauria addresses Rakiura as an off-shore island. General water policies are addressed at a regional level.

The following policies are relevant to the application

Section 3.5.10 – Policy 3

Section 3.7.1 – Policies 1 and 11.

Section 3.7.5 – Policy 1

Comments

The use of a communal site for the disposal of greenwaste and cleanfill on Rakiura is considered to be the most efficient option for reducing the environmental effects of such disposal activities. By offering the waste disposal service, the applicant is able to monitor how these materials are disposed of in an appropriate way. Without provision of this service the effects of waste disposal may be exacerbated through inappropriate disposal which in turn could, have a greater adverse effect on the environment.

The testing and further assessment provided by L&WS has shown that the effects of the previous, existing and ongoing activity has a low risk effects in terms of both surface and groundwater.

The proposal is generally considered to be consistent with Te Tangi a Tauria.

5 Alternatives

Do Nothing

The Council seeks to maintain a level of waste disposal service to their community. If the Council was to no longer provide this service, the burden of waste disposal would be further applied to the

community with the potential for inappropriate disposal methods and/or costly disposal methods involving the transfer of waste to the mainland. Having no cleanfill or greenwaste disposal services on the Island has the potential to give rise to adverse effects on the environment.

New Site

The use of a different site was deemed to be ineffective and inefficient. The Island contains limited sites where a landfill would be appropriate. Restricting the landfill to an area which has historically used as a landfill means that no further sites will be developed for waste disposal in the immediate future and the existing physical environment at the site which can be characterised as a waste disposal facility can be maintained/utilised.

6 Conditions

The applicant promotes the use of the conditions listed on the existing consent.

The applicant would be willing to discuss the addition of further monitoring conditions (e.g. relating to freshwater nutrients) but would ask that the Council supplies draft conditions prior to any decisions. The addition/change of such conditions would hopefully address both the applicant's and Council's Compliance Teams' concerns in regard to monitoring at the site.

Further to this, the applicant would also be willing to discuss the addition of a condition which addresses peak runoff control associated with the main drain of the site (to align with the conclusion of Land and Water Science's Report).

7 Consultation

For the previous consent, the application was publicly notified, one party submitted. The applicant considers Te Ao Marama to be an affected party given their association with Rakiura.

Te Ao Marama have been contacted with their written approval sought.

8 Term of Consent

A timeframe of ten (10) years is sought.

This timeframe is considered to be appropriate given the service being provided and the already long-term use and investment in the landfill site. This also provides the applicant with a level of certainty.

9 Conclusion

The applicant seeks to replace their existing consent for the ongoing use of an existing landfill site for the disposal of cleanfill and greenwaste. The ongoing use site is considered to be the most appropriate option for the disposal of these two waste materials on the Island. A number of positive effects will rise from ongoing provision of a landfill on Rakiura for the disposal of cleanfill and greenwaste and the activity will not give rise to any significant adverse environmental effects.

Appendix A
Land and Water Science Report –
Water Quality



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12th November 2018

Assessment of historical monitoring data for landfill at Braggs Bay Rd, Oban

Southland District Council (SDC) are seeking a replacement discharge permit for their landfill at Braggs Bay Road, Stewart Island from the regional authority – Environment Southland. Environment Southland has declined SDC's application to discharge cleanfill and green waste at the site in accordance with Section 88(3A) of the Resource Management Act 1991 citing a lack of information as to the actual and potential effects of the proposed activity on the environment.

Land and Water Science proposed to address the current actual effects using historical monitoring data and evaluated the potential effects of the proposed activity, by:

1. Reviewing relevant information as to the composition of the waste being landfilled and its potential impacts as it pertains to the setting (peat wetland) and receiving environment;
2. Review all historical monitoring data from the site and provide an assessment of actual effects, including undertaking trend analysis on the historical monitoring data;
3. Evaluate the potential effects of the proposed activity over water quality, ecological habitat and ecosystem health in light of historical and proposed activities.

These are presented in the following sections.

1 Background

The landfill located on Braggs Bay Road, Stewart Island (Figure 1) was operated as a landfill receiving municipal waste from Stewart Island residents between the 1970s and 2002. In 2002, the landfill was closed. On 6th April 2009, a 10-year discharge permit was granted to discharge "cleanfill, green waste and tree stumps onto and into land." SDC is seeking to renew the existing resource consent, which expires in April 2019, for discharging cleanfill and green waste at the site.

With regards to previous environmental assessments, a closed landfill risk assessment report by MWH (2012) ranks the Bragg Bay landfill as low risk in terms of groundwater, surface water and air; although a potentially high risk associated with run-off from unsecured wastes and permeable soil under high-intensity rainfall events was noted. This interpretation of risk also included consideration of an earlier Landfill Audit and Inspection completed by Golder & Associates in 2005.

As historic landfilling of municipal waste and more recent cleanfill and green waste form part of the existing environment, this report evaluates the current condition and associated risks to the environment in association with the proposed replacement resource consent.

In this report, historical monitoring data is evaluated in order to determine the current and likely future environmental impacts from cleanfill and green waste disposal. For the purposes of clarity, we note that all monitoring data up to July 2004 occurred under the historical consent for monitoring the effects associated with municipal waste disposal including 2 years of post-closure monitoring. From April 2009, all monitoring was associated with the 10-year discharge permit for landfilling of cleanfill, green waste and tree stumps onto and into land. Cleanfill and green waste landfilling have now been occurring for almost 10 years.

1.1 Site Location and Setting

The Bragg Bay landfill is located ca. 1 km north of Oban and ca. 50 m from the coastline. The site is roughly rectangular in shape and is bounded by road reserve on the south, private land to the east, west and north. The site of current cleanfill and green waste landfilling occupies what was a valley floor peat deposit that extends from the north down towards Bragg Bay. An unnamed creek runs from the marsh area to the south along the eastern boundary of the unlined landfill, entering a culvert at the Bragg Bay Road boundary and proceeds to enter the sea at Bragg Bay. The surrounding land is covered in native bush and scrub. The geology is ultra-mafic basement rock with minor groundwater likely to be restricted to fractures in the rock, flowing towards the coast. According to SDC, most stormwater is absorbed naturally into the site, with contouring of the tip-face carried out to avoid leachate being created and allowing stormwater to flow to the unnamed drain on the east side of the site.



Figure 1: Topo50 map view of the landfill (purple outline).

Importantly, the landfill's underlying and surrounding peat deposits reflect the accumulation of organic matter associated with elevated water tables and low oxygen conditions supporting the low permeability of the underlying basement rock which causes the perching of groundwater. Under low

oxygen conditions, organic matter deposited by vegetative growth is only partially decomposed resulting in the accumulation of thick deposits of organic matter or peat. Peat wetland environments across Southland are characterised by naturally low oxygen or so-called reducing redox conditions that lead to naturally elevated organic and ammoniacal nitrogen (Rissmann et al., 2012, 2018). Phosphorus, mainly as organic phosphorus, can also be naturally elevated (Rissmann et al., 2012, 2018). Nitrate is generally low due to removal under reducing (denitrification) conditions (Rissmann et al., 2012, 2018). The Awarua Wetlands and parts of the Waituna Catchment and/or Bays Water Bog of the Central Plains of Southland are broadly equivalent settings characterised by the accumulation of peat.

2 Review of data on the composition of waste

Historically, household and commercial rubbish were deposited into the landfill on Braggs Bay Rd from the 1970s up until 2002 (Golder & Associates, 2002). Once landfilled the biodegradable components of the municipal waste decomposes producing leachate rich in organic and ammoniacal nitrogen, dissolved iron and manganese (Table 1). Heavy metals are commonly low in landfill leachate due to a strong tendency to be complexed and removed from solution by naturally occurring materials in the waste pile. As summarised by Kjeldsen et al. (2002) in Table 1., typical landfill leachate compositions are provided for reference given there are no samples of concentrated landfill leachate from the site.

Table 1: Typical landfill leachate composition (Kjeldsen et al., 2002).

Parameter	Typical range
<i>General parameters</i>	
pH	4.5 - 9
Specific Conductivity [uS/cm]	2,500 - 3,500
Total Solids (TS) [mg/L]	2,000 - 60,000
<i>Organic Matter [mg/L]</i>	
Total Organic Carbon (TOC)	30 - 29,000
Biological Oxygen Demand (BOD)	20 - 57,000
Chemical Oxygen Demand (COD)	140 - 152,000
BOD ₅ /COD ratio	0.02 - 0.80
Total Organic Nitrogen (TON)	14 - 2500
<i>Inorganic Components [mg/L]</i>	
Total Phosphorus (TP)	0.1 - 23
Chloride (Cl)	150 - 4,500
Sulphate (SO ₄ ²⁻)	8 - 7,750
Hydrogen bicarbonate (HCO ₃ ⁻)	610 - 7,320
Sodium (Na)	70 - 7,700
Potassium (K)	50 - 3,700
Ammonium-N (NH ₄ -N)	50 - 2,200
Calcium (Ca)	10 - 7,200
Magnesium (Mg)	30 - 1,500
Iron (Fe(II))	3 - 5,500
Manganese (Mn(II))	0.03 - 1,400
Silica (SiO ₂)	4 - 70
<i>Heavy Metals [mg/L]</i>	
Arsenic (As)	0.01 - 1.0
Cadmium (Cd)	0.0001 - 0.4

Parameter	Typical range
Chromium (Cr)	0.02 - 1.5
Cobolt (Co)	0.005 - 1.5
Copper (Cu)	0.005 - 10
Lead (Pb)	0.001 - 5
Mercury (Hg)	0.00005 - 0.16
Nickel (Ni)	0.015 - 13
Zinc (Zn)	0.03 - 1,000

Generally, cleanfill waste is characterised as inert and should not adversely affect the environment. Green waste, on the other hand, can generate leachate characterised by elevated N and P and BOD. The amount of nitrogen and phosphorus leached from green waste is dependent upon the quality of the green waste, specifically the C:N and C:P ratios of the plant material. Foliage from native vegetation tends to have much larger C:N and C:P ratios than silage, or food wastes which commonly have small C:N and C:P ratios. Tree stumps will have even larger C:N and C:P ratios. Relevant here is that the size of the C:N and C:P ratio determines whether or not N and P are sequestered and immobilised by the microbial biomass or leached to the environment.

Similarly, Biological Oxygen Demand (BOD) is governed by how readily biodegradable the organic carbon released to the environment is. Green waste with wider C:N and C:P ratios have a lower BOD than green waste with small C:N and C:P ratios. Green wastes with small C:N and C:P ratios are more likely to produce nutrient-rich leachate that is also elevated in BOD. Accordingly, the composition of green waste is an important determinant over N, P and BOD.

Importantly, most of the green waste disposed on site is derived from garden waste including plant material, such as tree branches, hedge and lawn clippings, or composted or partly composted material. This green waste composition is likely to have a low – low moderate leachate generation risk relative to domestic waste. Cleanfill and green waste tonnages are highly variable and primarily reflect weather-driven events, such as slips, and spoil from the excavation of topsoil for new builds. A lack of waste tonnage information, although likely to be a relatively minor amount, is a critical constraint over understanding the longevity and likely impact of the site.

3 Review of historical monitoring data

3.1 Surface water

Five day Biological Oxygen Demand (BOD₅), EC, pH, and the concentrations of NH₄-N, NO₃-N, DRP, B, Cl, SO₄, Enterococci, E-Coli, and FC were collected (bi)annually from upstream of the area of historical municipal waste landfilling and downstream in a drain that runs adjacent to the unlined landfill from between 1998 and 2004. The drain is monitored at the southern end prior to discharging to Bragg Bay. It is our understanding that the location of the original upstream and downstream monitoring sites was retained for monitoring of the 2009 consent to landfill cleanfill and green waste. However, the upstream site is not considered representative according to correspondence with Environment Southland technical compliance staff due to the lack of a defined watercourse or no flow during monitoring visits.

Following the closure of the municipal landfill in 2002 two additional years of monitoring were undertaken. There appears to have been no monitoring between 2005 and 2008. Monitoring recommenced in association with a new discharge consent for cleanfill and green waste landfilling in April of 2009. Under the terms of the cleanfill and green waste consent, pH, EC, TN, NH₄-N, NO_x, TKN, TP and CBOD₅ were monitored at both upstream and downstream sites. The water quality data

available before and after the landfill closure is illustrated in Figure 2 for the downstream site and Figure 3 for the upstream site. Bacteria count data is available up until 2004 only (Figure 4). The figures suggest that the water quality parameters differ for the periods when the landfill was receiving municipal waste and more recently as a cleanfill and green waste.

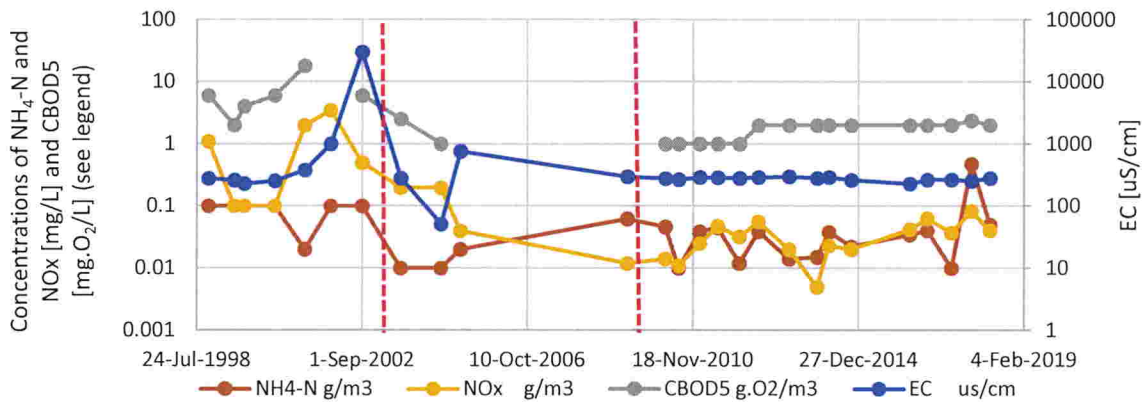


Figure 2: Time series of water quality parameters available for the drain running past the landfill at its downstream location. The two red dashed lines symbolise the times of closure of the landfill (2002) and operation as a cleanfill/green waste disposal area (2009). For simplicity, data < limit of detection (LOD) are displayed as equivalent to LOD.

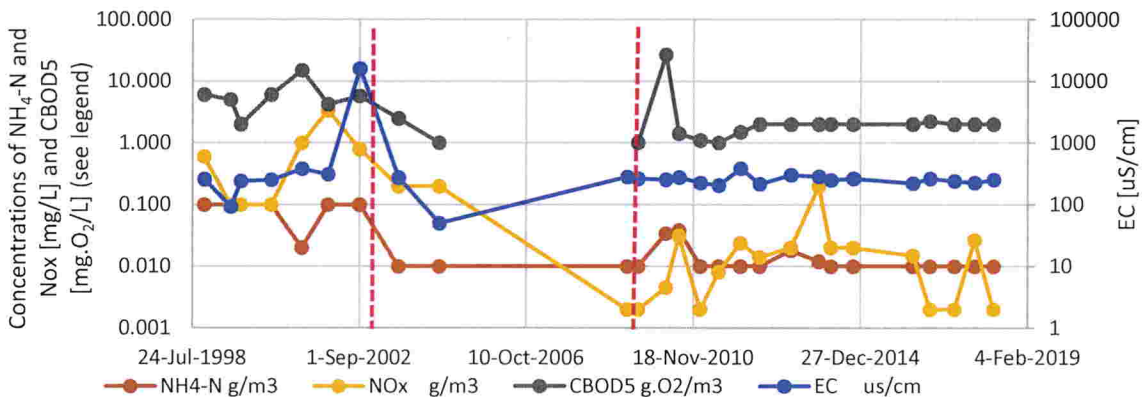


Figure 3: Time series of water quality parameters available for the drain running past the landfill at its upstream location. The two red dashed lines symbolise the times of closure of the landfill (2002) and operation as a cleanfill/green waste disposal area (2009). For simplicity, data < limit of detection (LOD) are displayed as equivalent to LOD.

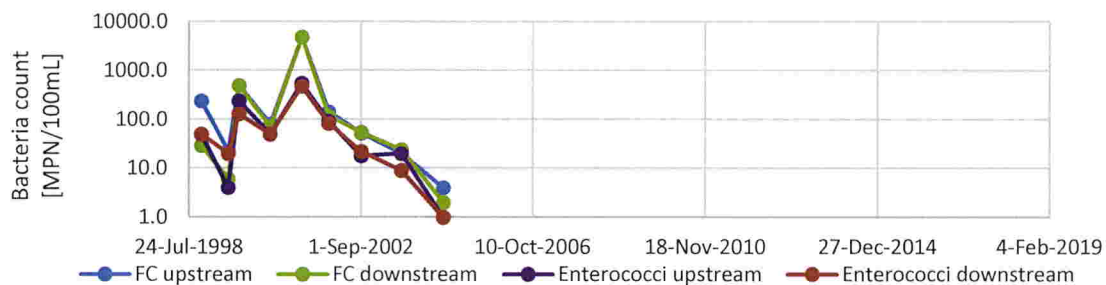


Figure 4: Time series of bacteria count available for the upstream and downstream drain site.

To assess whether the impact of the landfill on the downstream drain has changed in response to the status of the landfill changing from a municipal to a cleanfill and green waste site, a suite of t-tests

were run at the 95% significance level to test if there were meaningful differences in concentrations between the two timeframes (i.e., before and after 2009¹). Specifically, the null hypothesis states that there is no significant difference in concentration between the two time periods.

The results are summarised in Appendix 1 and illustrated in Figure 5. The analysis indicates that NO_x (NO₃-N and NO₂-N) and CBOD₅ for the downstream site and NO_x and NH₄ for the upstream site are significantly different before and after the closure of the municipal landfill and its re-consenting as a cleanfill and green waste disposal landfill. There is no statistically significant difference for NH₄-N between the two time periods for the downstream site.

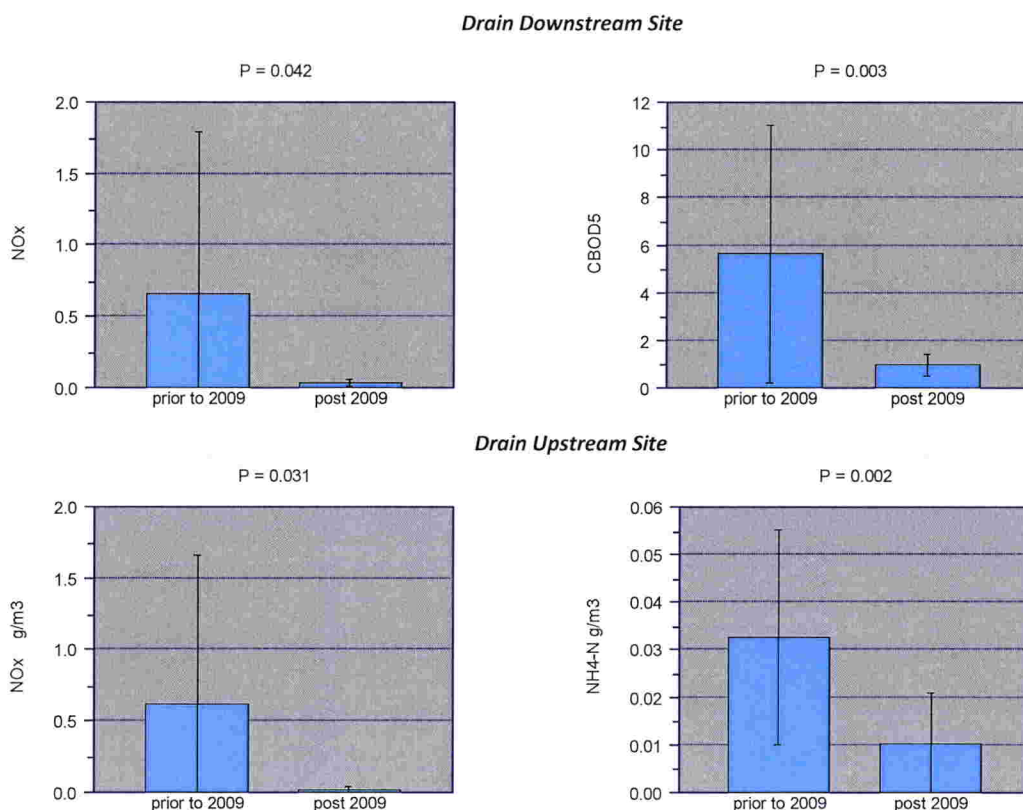


Figure 5: Boxplots of water quality parameters that were significantly different at 0.05 level for the two time periods; 1) prior to 2009 = operation of the landfill and disposal of household rubbish until 2002, and; 2) post 2009 (closure of the landfill and operation as a cleanfill/green waste disposal).

Evaluation of the downstream site water quality data pre-2009 and post-2009 suggests that water leaving the site is reverting to that more typical of a peat wetland setting. Specifically, mean EC, NO₃-N and BOD₅ is 11, 20 and 6 times lower for the post-2009 monitoring period, respectively. Mean NH₄-N shows a small increase (1.5) times but is not different at the 0.05 level. The magnitude of EC and BOD₅ decline is consistent with a significant reduction in landfill leachate contributing to discharges from the site and a more general shift towards water quality parameters typical of a peat wetland. These findings are also supported by trend analysis showing mostly increasing trends in all assessed water quality parameters prior to 2009 and decreasing trends past 2009, although due to the lack of data these trends are not statistically significant at the 0.05 level (Appendix 2).

¹ Similar results were obtained when comparing data before closure of the municipal landfill in 2002 and with that for data up till 2004.

Overall, water quality at both the upstream and the downstream drain sites appear to have improved post-closure of the municipal landfill, and on the basis of trend analysis broadly suggest that this improvement is ongoing. Therefore, on the basis of historical monitoring data, the impact from landfilling of clean fill and green waste is having significantly less impact than historical municipal landfilling.

3.1.1 Comparison with Reference Wetland Site

To assess the effect of historical cleanfill and green waste disposal on the water quality of water leaving the site, we contrast the Braggs Bay Road landfill monitoring data from 2009 with that for the Crows Creek tributary of Carran Creek within the Waituna Catchment for the same time period (Data from Environment Southland). Crows Creek contains a small amount of intensive land use but otherwise is characterised by a natural state or near natural state peat wetland complex (Pearson et al., 2018).

As the temporal variation in water quality measures at Bragg Bay are larger than those at Crows Creek we have chosen to use means and not medians as a central measure as they are more sensitive to episodic discharges of more concentrated drainage from the site. t-tests and box and whisker plots for both upstream and downstream monitoring sites at Bragg Bay landfill and Crows Creek tributary are presented in Table 4 of Appendix 1 and displayed in Figure 6 below. The analysis indicates that with the exception of $\text{NH}_4\text{-N}$, mean Total Nitrogen (TN), Total Kjeldahl Nitrogen (TKN) and Total Phosphorus (TP) are lower, although not statistically significant ($\alpha = 0.05$), at the downstream site at Bragg Bay relative to the predominantly natural state Crows Creek for the period of interest. Although mean $\text{NH}_4\text{-N}$ is higher and statistically significant ($\alpha = 0.05$), there is no significant difference in mean TN between the downstream site at Bragg Bay and the reference site of Crows Creek.

The pH and EC are both elevated at Bragg Bay relative to Crows Creek, which likely reflects the legacy of historical landfilling and/or some influence associated with more basic bedrock at Braggs Bay Road landfill. Most of the difference in EC is likely due to the higher alkalinity of drainage waters at Bragg Bay.

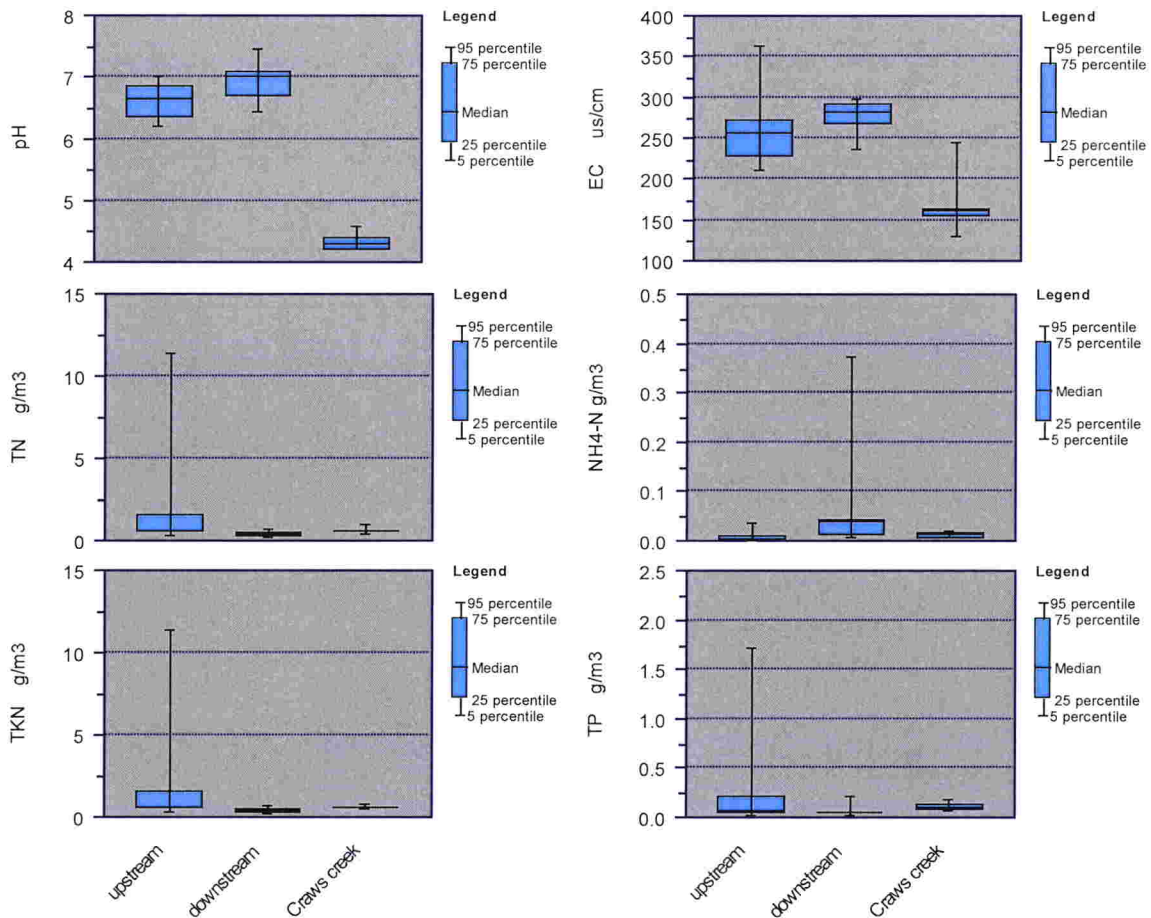


Figure 6: Comparison of nutrient species for the upstream and downstream drain sites at Braggs Bay Road landfill for 2009 – present.

3.2 Groundwater

There is a single sample for groundwater collected in 1998 from a bore that occurs near the Bragg Bay landfill. Due to the shallow nature and low permeability of the bedrock underlying the area around Bragg Bay, there is no ancillary groundwater data for evaluation.

Table 2: Water quality data available for the bore located in close proximity to the landfill. Data were collected in November 1998.

Parameter	BOD ₅ [mg/L]	EC [uS/cm]	pH	NH ₄ -N [mg/L]	NO ₃ -N [mg/L]	B [mg/L]	Cl [mg/L]	SO ₄ [g/m ³]	Entero- cocci [MPN/ 100ml]	FC [MPN/ 100ml]
Concentration	9	1070	7.65	1.85	<0.5	0.68	168	132	30	<2

This 1998 sample shows impact from landfill leachate with conductivity, BOD₅, B, Cl, SO₄ and bacteria values elevated beyond the range of natural groundwaters in peat wetland settings. The current state of groundwaters from this bore is unknown. However, drain monitoring showed improved water quality, and assuming some of the water in the drain is derived from groundwater hosted by peat subsurface geology and landfilled wastes, it is reasonable to expect improvement in groundwater quality in the monitored bore.

3.3 Shellfish

Trace metal concentrations in shellfish sampled off Bragg Bay are available for November 1999, and annually between February 2001 and December 2003 when the landfill was active (Figure 8, Data sourced from Environment Southland). Unfortunately, there are no other data available post-2003, particularly after landfill closure to assess the effect of the cleanfill and green waste landfilling on ecological habitat. However, the values reported for this period are not significantly elevated relative to the natural background with zinc (Zn) commonly elevated in wetland-derived waters. This interpretation is consistent with the relatively low heavy metal concentrations in landfill leachate due to naturally high retention rates by subsurface materials (Table 1). Accordingly, it is the mobilisation of sediment from a site that poses the greatest risk over ecosystem health.

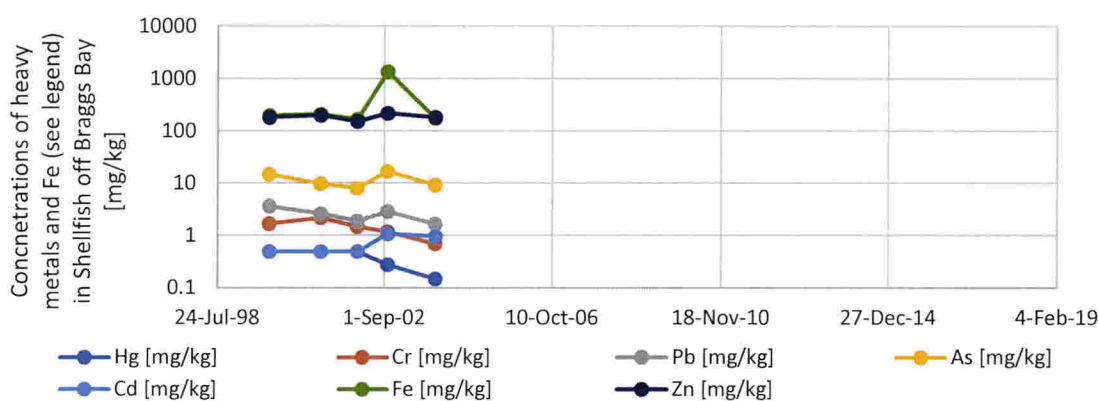


Figure 7: Time trends of heavy metal and Fe concentrations in shellfish sampled off Bragg Bay.

4 Evaluation of the potential effects of the proposed activity based on assessed data

Based on the compositional nature of the cleanfill and specifically the green waste (section 1.2), there is the potential for a low to low-moderate amounts of nitrogen and phosphorus to be leached during decomposition of green waste and for elevated Biological Oxygen Demand (BOD) to reach the drain that runs adjacent to eastern side of the landfill. However, on the basis of historical surface water monitoring data and assuming the waste composition and tonnages associated with the renewal of the cleanfill and green waste discharge permit remain of a similar magnitude, the impact on surface water and the local receiving environment is likely to be minor.

A lack of groundwater data precludes any assessment of time series patterns as they pertain to the operation of the site. However, assuming a proportion of the leachate reaching the drain is derived from groundwaters hosted by landfilled debris and peat, it is likely that there has been an improvement in quality since the closure of the municipal landfill. Renewed monitoring of the bore, if considered a representative site, would provide additional insight as to the current and any potential future impacts associated with landfilling activities.

Shellfish monitoring data collected from Bragg Bay is restricted to six repeat samples collected between February 2001 and December 2003, overlapping with the closure of the municipal landfill. The concentrations reported do not indicate significant impact as is consistent with the low heavy metal concentrations of landfill leachate. Accordingly, the heavy metal risk is more likely to be associated with sediment loss from the site.

5 Conclusion

Evaluation of historical monitoring data indicates a general improvement in surface water quality measures post-closure of the municipal landfill. Water quality improvement over the period of cleanfill and green waste landfilling and water compositional signatures suggest the site is reverting back towards signatures more consistent with a peat wetland ecosystem. Comparison of water quality measures for the unnamed Creek in Bragg Bay over the period April 2009 – April 2018 with those for the near-natural state Craws Creek (Waituna Catchment) show similar mean concentrations, although the sampling frequency at Braggs Bay Road landfill is lower.

On the basis of historical water quality monitoring data and assuming a similar waste composition and tonnages of cleanfill and green waste as has been occurring since 2009, there is the little obvious impact on the local water quality with the proposed resource consent replacement. However, given the low frequency of sampling, we suggest that peak runoff control associated with the main drain may be of value in terms of limiting contaminant (esp. sediment) release during periods of high-intensity rainfall. These findings are broadly consistent with the MWH (2012) landfill risk assessment which ranks the Braggs Bay road landfill as low risk in terms of groundwater and surface water.

Please do not hesitate to contact us if you require any further information or clarification.

Dr Monique Beyer



Senior Environmental Engineer
Land and Water Science Ltd

Reviewed by Dr Clint Rissmann



Director of Land and Water Science Ltd

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Appendix 1: T-test results

Table 3: Result summary of T-tests (95% confidence) run on water quality parameters available for the downstream and upstream sites of the drain running past the landfill. The data broadly suggests that water quality before landfill closure (before 2009) is poorer than after landfill closure and operation as a cleanfill/green waste disposal (data past 2009).

Parameter	Grouping variable	N	Means	SD	t, df (equal variance)	H ₀ : no difference	t, df (un-equal var.)	H ₀ : no difference	Test result outcome summary
downstream site									
pH	< 2009	9	7.03	0.43	0.744, 22	Fail to reject, P = 0.465	0.685, 13	Fail to reject, P = 0.505	no difference in pH
	> 2009	15	6.92	0.305					
EC	< 2009	11	3101.8	9024.7	1.21, 24	Fail to reject, P = 0.237	1.04, 10	Fail to reject, P = 0.324	no difference in EC
	> 2009	15	277.3	17.8					
NH ₄ -N	< 2009	11	0.037	0.022	0.626, 24	Fail to reject, P = 0.537	0.720, 15	Fail to reject, P = 0.481	no difference in NH ₄
	> 2009	15	0.059	0.117					
NOx	< 2009	11	0.659	1.13	2.15, 24	Reject, P = 0.042	1.84, 10	Reject, P = 0.096	difference in NOx
	> 2009	15	0.033	0.023					
CBOD ₅	< 2009	8	5.63	5.41	3.32, 21	Reject, P = 0.003	2.43, 7	Reject, P = 0.045	difference in CBOD ₅
	> 2009	15	0.95	0.449					
upstream site									
pH	< 2009	9	6.887	0.472	1.851, 23	Fail to reject, P = 0.077	1.644, 12	Fail to reject, P = 0.126	no difference in pH
	> 2009	16	6.6	0.301					
EC	< 2009	10	1835.4	5048.2	1.248, 24	Fail to reject, P = 0.224	0.987, 9	Fail to reject, P = 0.350	no difference in EC
	> 2009	16	260.19	43.03					
NH ₄ -N	< 2009	10	0.033	0.023	3.389, 24	Reject, P = 0.002	2.926, 12	Reject, P = 0.013	difference in NH ₄
	> 2009	16	0.01	0.011					
NOx	< 2009	10	0.615	1.04	2.295, 24	Reject, P = 0.031	1.814, 9	Reject, P = 0.103	difference in NOx
	> 2009	16	0.016	0.024					
CBOD ₅	< 2009	9	5.211	4.157	1.021, 23	Fail to reject, P = 0.318	1.148, 22	Fail to reject, P = 0.263	no difference in CBOD ₅
	> 2009	16	2.765	6.479					

Table 4: Result summary of T-tests (95% confidence) run on water quality parameters available for the drain at downstream/upstream sites and the reference site (Craws Creek). The data broadly suggests that water quality at the drain sites and reference site differ significantly in most assessed parameters suggesting operation of the landfill had an impact on water quality of the drain running past the landfill.

Parameter	Grouping variable	N	Means	SD	t, df (equal variance)	H ₀ : no difference	t, df (unequal variance)	H ₀ : no difference
<i>difference between downstream site and reference site (Craws Creek)</i>								
pH	downstream	15	6.9	0.31	29.02, 26	Reject, P = 0.000	30.59, 19	Reject, P = 0.000
	Craws creek	13	4.3	0.12				
EC	downstream	15	277	17.8	12.22, 26	Reject, P = 0.000	11.80, 19	Reject, P = 0.000
	Craws Creek	13	164	30.3				
TN	downstream	15	0.43	0.15	2.55, 26	Reject, P = 0.017	2.54, 25	Reject, P = 0.018
	Craws Creek	13	0.58	0.16				
NH ₄ -N	downstream	15	0.06	0.11	1.47, 26	Fail to reject, P = 0.15	1.58, 14	Fail to reject, P = 0.137
	Craws Creek	13	0.01	0.006				
TKN	downstream	15	0.40	0.14	4.54, 26	Reject, P = 0.000	4.69, 24	Reject, P = 0.000
	Craws Creek	13	0.61	0.09				
TP	downstream	15	0.06	0.06	2.41, 26	Reject, P = 0.023	2.48, 24	Reject, P = 0.021
	Craws Creek	13	0.11	0.04				
<i>difference between upstream site and reference site (Craws Creek)</i>								
pH	upstream	16	6.6	0.30	25.86, 27	Reject, P = 0.000	27.90, 20	Reject, P = 0.000
	Craws Creek	13	4.3	0.12				
EC	upstream	16	260	43.0	6.8, 27	Reject, P = 0.000	7.0, 26	Reject, P = 0.000
	Craws Creek	13	164	30.3				
TN	upstream	16	1.98	3.44	1.46, 27	Fail to reject, P = 0.156	1.62, 15	Fail to reject, P = 0.126
	Craws Creek	13	0.58	0.16				
NH ₄ -N	upstream	16	0.01	0.011	0.287, 27	Fail to reject, P = 0.777	0.304, 24	Fail to reject, P = 0.764
	Craws Creek	13	0.011	0.006				
TKN	upstream	16	1.96	3.45	1.41, 27	Fail to reject, P = 0.169	1.57, 15	Fail to reject, P = 0.138
	Craws Creek	13	0.61	0.09				
TP	upstream	16	0.27	0.53	1.102, 27	Fail to reject, P = 0.280	1.222, 15	Fail to reject, P = 0.241
	Craws Creek	13	0.11	0.039				

Appendix 2: Trend Analysis Results

Table 5: Results summary of trend analysis run on water quality parameters determined at the downstream site for time ranges prior to 2009 (operation of the landfill receiving household rubbish), and after 2009 trend analysis (closing of the landfill and operation as a cleanfill/green waste disposal).

Time range	Missing	Non-detects	Samples used	Sampling period	Mean	Maximum	Minimum	Median value	Kendall statistic	Variance	Z	P	Median Sen slope (annual)	Percent annual change	90% conf. limits slope	Trend direction	Probability	
<i>pH</i>																		
<2009	2	0	9	9/11/98-20/8/04	7.03	7.80	6.47	7.1	14	89.00	1.38	0.09	0.14	1.937	-0.040 to 0.268	Increasing	0.91	
>2009	0	0	15	18/3/10-5/4/18	6.92	7.50	6.40	7.0	-4	387.7	-0.15	0.88	0	0	-0.075 to 0.053	Indeterminate	0.5	
<i>EC [uS/cm]</i>																		
<2009	0	0	11	9/11/98-6/4/09	3,102	30,300	51.1	285	11	163.0	0.78	0.43	5.6	1.951	-39.61 to 100.1	Increasing	0.766	
>2009	0	0	15	18/3/10-5/4/18	277.3	299.0	230	282	-19	400.4	-0.9	0.37	-1.9	-0.666	-5.094 to 1.370	Decreasing	0.815	
<i>NH₄-N [mg/L]</i>																		
<2009	0	9	11	9/11/98-6/4/09	0.037	0.062	0.005	0.050	7	91.67	0.63	0.53	0	0	- to -	Indeterminate	-99998	
>2009	0	2	15	18/3/10-5/4/18	0.059	0.480	0.005	0.038	12	399.5	0.55	0.58	0.001	2.365	-0.003 to 0.008	Increasing	0.667	
<i>NOx [mg/L]</i>																		
<2009	0	6	11	9/11/98-6/4/09	0.659	3.50	0.012	0.100	-11	135.2	-0.86	0.39	-0.169	-	169.142	- to -	Decreasing	0.603
>2009	0	2	15	18/3/10-5/4/18	0.033	0.083	0.005	0.032	32	400.4	1.55	0.12	0.004	12.097	-0.001 to 0.009	Increasing	0.921	
<i>CBOD₅ [mg.O₂/L]</i>																		
<2009	3	1	8	9/11/98-20/8/04	5.63	18.00	0.50	5	-6	60.77	-0.64	0.27	0	0	-4.720 to 6.711	Indeterminate	0.5	
>2009	0	13	15	18/3/10-5/4/18	0.957	2.36	0.50	1	12	224.7	0.73	0.46	0	0	- to -	Indeterminate	-99998	

Table 6: Results summary of trend analysis run on water quality parameters determined at the upstream site for time ranges prior to 2009 (operation of the landfill receiving household rubbish), and after 2009 trend analysis (closing of the landfill and operation as a cleanfill/greenwaste disposal).

Time range	Missing	Non-detects	Samples used	Sampling period	Mean	Maximum	Minimum	Median value	Kendall statistic	Variance	Z	P	Median Sen slope (annual)	Percent annual change	90% confi. limits slope	Trend direction	Probability
<i>pH</i>																	
<2009	1	0	9	9/11/98-20/8/04	6.89	7.80	6.30	6.74	16	90.00	1.58	0.06	0.183	2.72	-0.003 to 0.269	Increasing	0.95
>2009	0	0	16	10/7/09-5/4/18	6.60	7.00	6.20	6.65	-1	469.2	0	1.00	0	0	-0.057 to 0.047	Indeterminate	0.5
<i>EC [us/cm]</i>																	
<2009	0	0	10	9/11/98-6/4/09	1835	16200	50.5	267.0	9	123.0	0.72	0.47	4.309	1.61	-20.44 to 51.49	Increasing	0.756
>2009	0	0	16	10/7/09-5/4/18	260.2	387.0	206.0	256.0	-16	485.4	-0.68	0.50	-2.257	-0.90	-9.203 to 3.860	Decreasing	0.744
<i>NH₄-N [mg/L]</i>																	
>2009	0	12	16	10/7/09-5/4/18	0.010	0.038	0.005	0.005	-28	277.5	-1.62	0.11	-0.007	-131.1	- to -	Decreasing	0.548
<i>NO_x [mg/L]</i>																	
<2009	0	6	10	9/11/98-6/4/09	0.615	3.40	0.001	0.100	-5	95.33	-0.41	0.68	0.052	52.37	- to -	Increasing	0.481
>2009	0	9	16	10/7/09-5/4/18	0.016	0.10	0.001	0.010	-4	417.0	-0.14	0.88	0.002	17.17	- to -	Increasing	0.607
<i>CBOD₅ [mg.O₂/L]</i>																	
<2009	1	1	9	9/11/98-20/8/04	5.21	15.00	0.50	5.00	-11	89.06	-1.06	0.15	-0.108	-2.164	-1.498 to 3.319	Decreasing	0.564
>2009	0	10	16	10/7/09-5/4/18	2.77	27.00	0.50	1.00	-5	359.0	-0.21	0.83	0.066	6.605	- to -	Increasing	0.525

Appendix B

Existing Consent



**environment
SOUTHLAND**

File No: S122-118

Consent: 205877

Cur North Road and Price Street
(Private Bag 90116)
Invercargill

Telephone (03) 211 5115
Fax No. (03) 211 5252
Southland Freephone No. 0800 76 88 45

Discharge Permit

Pursuant to Section 104B of the Resource Management Act 1991, a resource consent is hereby granted by the Southland Regional Council (the "Council") to Southland District Council (the "consent holder") of P O Box 903, Invercargill from 6 April 2009.

Please read this Consent carefully, and ensure that any staff or contractors carrying out activities under this Consent on your behalf are aware of all the conditions of the Consent.

Details of Permit

Purpose for which permit is granted:	To discharge cleanfill and greenwaste to land
Location	- site locality - map reference - receiving environment
	Braggs Bay Road, Stewart Island E48:394:578 Land
Legal description of land at the site:	Section 37 Block 1 Paterson Survey District
Expiry date:	6 April 2019

Schedule of Conditions

1. The term of this consent is 10 years from the date of granting.
(Note: Pursuant to Sections 123 and 124 of the Resource Management Act 1991, a new consent will be required at the expiration of this consent. The application will be considered in accordance with the plans in effect at that time, and the adverse effects of the proposed activity).
2. This consent authorises the discharge of cleanfill, green waste and tree stumps onto and into land, on property known as Section 37 Block 1 Paterson Survey District, at about map reference NZMS 260 E48:394:578.

3. This consent authorises the storage of bulky recyclable material onto land, on property known as Section 37 Block I Paterson Survey District, at about map reference NZMS 260 E48:394:578.
4. For the purposes of this consent, cleanfill is defined as material having no putrescible, pollutant, inflammable or hazardous components. A full list of acceptable and conditionally acceptable cleanfill materials is summarised in Appendix 1 of this consent.
5. Green waste is defined in the New Zealand Waste Strategy as garden waste, and includes any plant material, such as tree branches, hedge clippings, grass cuttings, and composted or partly composted material, but does not include any other type of waste.
6. There shall be no surface run-off of leachate, from the decomposition of green waste at the site, to any surface watercourse, or beyond the boundary of the site.
7. The consent holder shall ensure that:
 - (i) the delivery of material at the site is supervised at all times;
 - (ii) access to the landfilling area is restricted, to prevent discharges of unauthorised materials;
(Note: This restriction may be as simple as a locked gate. In the event that unauthorised wastes are deposited at the site the consent holder should advise the Council's Compliance Manager (phone (03) 211 5115) as soon as possible and, if necessary, take action to avoid, remedy or mitigate any immediate adverse effect on the environment.)
 - (iii) the consent holder shall take all reasonable precautions to minimise the spread of pest plants;
 - (iv) there shall not be any discharge of dust from the site that is noxious, offensive or objectionable to such an extent that it has an adverse effect on the environment, beyond the boundary of the consent holder's property;
 - (v) there shall be no discharge of odour from the decomposition of green waste that is offensive or objectionable, to such an extent that it has an adverse effect on the environment beyond the boundary of the site;
 - (vi) upon completion of each stage of the cleanfill/green waste/tree stump capping, the surface of the site shall be contoured to be consistent with the surrounding landform. No artificial mound shall be created;
 - (vii) soil shall be deposited onto the cleanfill/green waste/tree stump discharge to the appropriate standard as detailed in "A Guide for the Management of Closing and Closed Landfills in New Zealand", MFE, 2001;
 - (viii) the area is left tidy and sown in appropriate plant species; and
 - (ix) any bulk recyclable materials stored on the site shall be placed away from the landfill deposition area.
8. The consent holder shall maintain a site plan showing the cleanfill, green waste and tree stump discharge areas and shall make this plan available to the Council's Compliance Manager upon request.
9. The consent holder shall keep a record of all incoming material. This record will include:
 - (i) date of deposition;
 - (ii) name of haulage contractor;
 - (iii) source of material;
 - (iv) description of material; and
 - (v) quantity of material.

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This record shall be kept available on the site for inspection by the Council's Environmental Compliance Division.

10. The consent holder shall, by 28 February each year, forward to the Council's Compliance Manager, an outline of:
- (i) steps to reduce contaminated stormwater from the site;
 - (ii) a site plan of all stormwater ditches;
 - (iii) the volume of area still requiring infilling;
 - (iv) an estimate of the length of time to complete infilling;
 - (v) steps carried out to complete capping, including, if any, details on depth of soil, compaction and plant species; and
 - (vi) any other site operational or management details which have changed within the previous calendar year and which may adversely affect the environmental impact of the site.

This record shall also be kept available on the site for inspection by the Council's Environmental Compliance Division.

11. The consent holder shall pay an annual administration and monitoring charge to the Southland Regional Council, collected in accordance with Section 36 of the Resource Management Act 1991. This charge may include the costs of inspecting the site twice each year (or otherwise as set by the Council's Annual Plan), and of monitoring the effects of the discharge, as follows:
- (a) monitoring of watercourses may be undertaken up to two times each year;
 - (b) representative samples will be taken from the watercourse, upstream and downstream of the discharge area, at points approved by the Council's Compliance Manager.
 - (c) the samples will be analysed for:
 - pH
 - electrical conductivity
 - ammoniacal nitrogen concentration
 - total nitrogen (nitrate nitrogen and total Kjeldahl nitrogen)
 - total phosphorous concentration
 - BOD₅

12. The Southland Regional Council may serve notice of its intention to review the conditions of this consent, in accordance with the conditions of this resource consent and Sections 128 and 129 of the Resource Management Act 1991, during the period May to July each year, for the purposes of:
- (i) dealing with any adverse effect on the environment which may arise from the exercise of the consent; or
 - (ii) complying with the requirements of a regional plan.

for the **Southland Regional Council**


W J Tuckey
Director of Environmental Management

Appendix 1

Guidelines for materials that can be cleanfilled

4.2 Acceptable Cleanfill Material

4.2.1 Acceptable Materials

Table 4.1 lists materials that are acceptable for disposal in cleanfills. The reasons for acceptance of these materials are described in the table.

Table 4.1 – Cleanfills – acceptable materials

Material	Discussion
Asphalt (cured)	Weathered (cured) asphalt is acceptable. After asphalt has been exposed to the elements for some time, the initial oily surface will have gone and the asphalt is considered inert.
Bricks	Inert – will undergo no degradation.
Ceramics	Inert.
Concrete – un-reinforced	Inert material. Ensure that other attached material is removed.
Concrete – reinforced	Steel reinforcing bars will degrade. However, bars fully encased in intact concrete will be protected from corrosion by the concrete. Reinforced concrete is thus acceptable providing protruding reinforcing steel is cut off at the concrete face.
Fibre cement building products	Inert material comprising cellulose fibre, Portland cement and sand. Care needs to be taken that the product does not contain asbestos, which is unacceptable.
Glass	Inert, and poses little threat to the environment. May pose a safety risk if placed near the surface in public areas, or if later excavated. The safety risk on excavation should become immediately apparent, so glass is considered acceptable provided it is not placed immediately adjacent to the finished surface.
Road sub-base	Inert.
Soils, rock, gravel, sand, clay, etc	Acceptable if free of contamination (see 4.3.2 for definition of contaminated soil in this context).
Tiles (clay, concrete or ceramic)	Inert.

Source: "A Guide to the Management of Cleanfills" (2002), Beca Carter Hollings & Ferner Ltd, Ministry for the Environment, Wellington, Pages 21-23

Appendix C

Landfill Management Plan



Landfill Management Plan

Braggs Bay

Author: Paul Reid



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1. Introduction

This document has been prepared under Environment Southlands “Regional Water Plan for Southland, April 2010, Appendix A, Information to be submitted with resource consent application, Additional requirements for discharges to landfills, (Rule 56, condition D)”. This document is able to be updated when methods or circumstances require it.

This document details how the Braggs Bay Cleanfill and Greenwaste site is configured and is operated.

2. Fencing

Vehicle access to the Greenwaste-Cleanfill site at 47 Braggs Bay on a site owned by Southland District Council (SDC) and is controlled by having deer fencing and gates encompassing the southern side of the site. These gates are lockable and controlled by SDC staff.

The SDC staff are headquartered at the “Rakiura Resource Recovery Centre” at Horseshoe Point Road, on the south-east corner of Horseshoe Bay, and are contactable by a telephone number on the gate signage.



Photo showing the locked gates to the Greenwaste-Cleanfill site

3. Management of Stormwater – Minimisation of Leachate and Diversion of Stormwater

Most stormwater is absorbed naturally into the site, with contouring of the tip-face carried out to avoid leachate being created, and allowing the excess stormwater to flow to the un-named watercourse on the

east side of the site. The immediate area to the north of the landfill is relatively flat with minimal slope to aid stormwater disposal.



Photo showing the immediate tip face awaiting cleanfill cover

4. Minimise Uncovered Waste Area

The area of tip face is actively reduced to the minimum required to efficiently fill and layer the discharges for cover and compaction.

5. Operation of Tip Face

All loads of Greenwaste and Cleanfill are submitted, using the attached form (Appendix A) to ascertain the type and quantity of material to be landfilled to Council staff at the Rakiura recovery Centre at Horseshoe Point Road. Several products are prohibited on-site. Disposal is prearranged with Council staff and upon acceptance Council staff unlock the landfill site and whenever possible supervise the placement of all materials. All materials are checked prior to final placement. Greenwaste and cleanfill are placed adjacent to the tip face and blended to ensure layering and a solid layer prior to sowing on the finished surface.

Several other products are stored at the site such as

- Gravel
- Posts
- Pallets
- IBC's
- Power poles

These products are stored on the south side of the site, well away from the tip face.



Photo showing other products stored on-site

6. Final Cover

When the tip face has stabilised grass is oversown and native plants placed on the landfill margins to ensure a reasonable appearance is maintained with regard to amenity values.



Photo showing final recovered area of landfill

Appendix A



Braggs Bay Cleanfill Site - Disposal

NAME:	<input type="checkbox"/>		
ADDRESS:	<input type="checkbox"/>		
TELEPHONE:	<input type="checkbox"/>	(DAY): <input type="checkbox"/>	(EVENING): <input type="checkbox"/>
MOBILE:	<input type="checkbox"/>	EMAIL:	<input type="checkbox"/>
DESCRIPTION OF MATERIAL:	<input type="checkbox"/>		
QUANTITY OF MATERIAL (m ³):	<input type="checkbox"/>	SOURCE OF MATERIAL:	<input type="checkbox"/>
INTENDED DATE OF DISPOSAL:	<input type="checkbox"/>	APPROXIMATE TIME:	<input type="checkbox"/>

PLEASE NOTE:

- THIS SITE IS INTENDED FOR THE ROUTINE DISCHARGE OF CLEANFILL AND TREE STUMPS ONCE AUTHORISED (ON EACH OCCASION). ALL GREENWASTE IS TO BE DIRECTED TO THE RRRC AT HORSESHOE BAY FOR COMPOSTING.
- GREENWASTE EITHER BROUGHT TO THE STATION DIRECTLY, OR DUMPED AT BRAGGS BAY IS: CARS LOADS (SMALL) - FREE, UTE OR SMALL TRAILERS - \$14.00, TANDEM TRAILERS / HIGH SIDED TRAILERS (COULD STILL BE SINGLE AXLE) - \$30.00, TRUCK LOADS - \$30.00.
- FAILURE TO ABIDE BY THE APPROVED APPLICATION FORM AND SITE RESOURCE CONSENT CONDITIONS MAY RESULT IN ADDITIONAL COSTS TO THE APPLICANT AND PLACE IN JEOPARDY FUTURE USE OF THE SITE.

DECLARATION:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	I have read and understand the consent conditions and associated approved material list. I also understand that charges will apply with regard to Fulton Hogan's involvement (as stated above) which shall be agreed and settled with Fulton Hogan directly.
SIGNED:	<input type="checkbox"/>	<input type="checkbox"/>	DATE:	<input type="checkbox"/>	<input type="checkbox"/>	
OFFICE USE ONLY						
THIS APPLICATION HAS BEEN:	Approved: <input type="checkbox"/>		APPROVAL			
(cross out one which doesn't apply):	Declined: <input type="checkbox"/>					
FURTHER INFORMATION REQUIRED (PLEASE STATE DETAILS):	<input type="checkbox"/>					
AUTHORISED BY:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	NAME =	SIGNATURE =	DATE =			
COMMENTS:	<input type="checkbox"/>					
INSPECTED BY:	<input type="checkbox"/>	DATE OF INSPECTION:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	INSPECTION
DATE SITE USED:	<input type="checkbox"/>	TIME SITE USED:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
COMMENTS:	<input type="checkbox"/>					
INSPECTION:	Passed: <input type="checkbox"/>	Failed (please state details): <input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	
SIGNED OFF AS COMPLETE:	<input type="checkbox"/>	DATE:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
AUTHORISED BY:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	NAME =	SIGNATURE =	DATE =			
SENT TO SDC COMMUNITY ENGINEER:	<input type="checkbox"/>	<input type="checkbox"/>	DATE:	<input type="checkbox"/>	<input type="checkbox"/>	

Braggs Bay Cleanfill Site - Disposal
21.05/2018

Southland District Council
Te Rau Pūtae o Murihiku

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