ORC NOTIFICATION RECOMMENDATION REPORT

ID Ref:	A1526051
Application No:	RM20.280
Prepared for:	Independent Commissioner
Prepared by:	Hilary Lennox, Consultant Planner
Date:	13 September 2021

Subject: **Application RM20.280 by the Dunedin City Council for various activities for the purpose of the construction and operation of the Smooth Hill Landfill**

1. Purpose

To report and make recommendations under sections 95A-G of the Resource Management Act 1991 (RMA) on the notification decision for the above application.

2. Background Information

Applicant: Dunedin City Council

Applicant's Agent: Anderson Lloyd Ltd

Site address or location: Corner of Big Stone Road and McLaren Gully Road, Brighton

Legal descriptions of the landfill site: Lots 1 & 2 DP 457417, Sec 1-2 SO Plan 547235 (several other properties will be affected by the access road realignment)

Property owner: Dunedin City Council

Map reference: NZTM2000 1385764E 4905608N

Consents sought:

- Discharge Permit to discharge waste and leachate onto land, and discharge landfill gas, flared exhaust gases, dust and odour to air, and to discharge water and contaminants from an Attenuation Basin and sediment retention ponds to water and land, for the purpose of the construction and operation of a Class 1 landfill.
- Water Permit to take of up to 87 m^3/day of groundwater, and use of up to 50 m^3/day of groundwater, for the purpose of managing groundwater collected beneath a Class 1 landfill.
- Water Permit to divert surface water within the Ōtokia Creek catchment for the purpose of the construction and operation of a Class 1 landfill and associated road realignment works.
- Water Permit to dam water within an Attenuation Basin for the purpose of the construction and operation of a Class 1 landfill.
- Land Use Consent to alter, reclaim, and place structures on, the bed of waterbodies and wetlands for the purpose of road realignment works.

Consent term sought: 35 years

Purpose: For the purpose of the construction and operation of the Smooth Hill Landfill

3. Description of Activity

3.1 General

The Dunedin City Council (the applicant) is applying for various consents associated with the construction and operation of a new landfill site near Brighton. The site has been designated for landfilling and associated refuse processing operations and activities since the 1990s. However, this designation does not preclude the need for resource consent from the ORC. An application for resource consent was originally lodged with the ORC in August 2020. Significant revisions to the application were submitted in May 2021. The proposal now includes the following key components:

- Staged construction, operation, and aftercare of a Class 1 landfill to accept municipal solid waste and hazardous waste.
- Gross waste capacity of 3.3 Mm^3 and net waste capacity[1] of approximately 2.94 Mm^3 (equivalent to approximately 2.35 M tonnes).
- Life of approximately 40 years based on predicted disposal rates (60,000 t/yr);
- Landfill footprint area of 18.6 ha;
- Infrastructure to safely contain, collect, manage, and dispose of leachate, landfill gas, groundwater, stormwater and surface water runoff;
- Facilities supporting the operation of the landfill, including staff and maintenance facilities;
- Environmental monitoring systems;
- Landscape and ecological mitigation/offsetting, including planting;
- Upgrades to McLaren Gully Road (including its intersection with State Highway 1) and Big Stone Road, to facilitate vehicle access to the site.

The final form of the project is expected to generally accord with that conceptually described in the application, however a broad development envelope is sought through the resource consents (and their conditions) to provide flexibility for detailed design of the landfill.

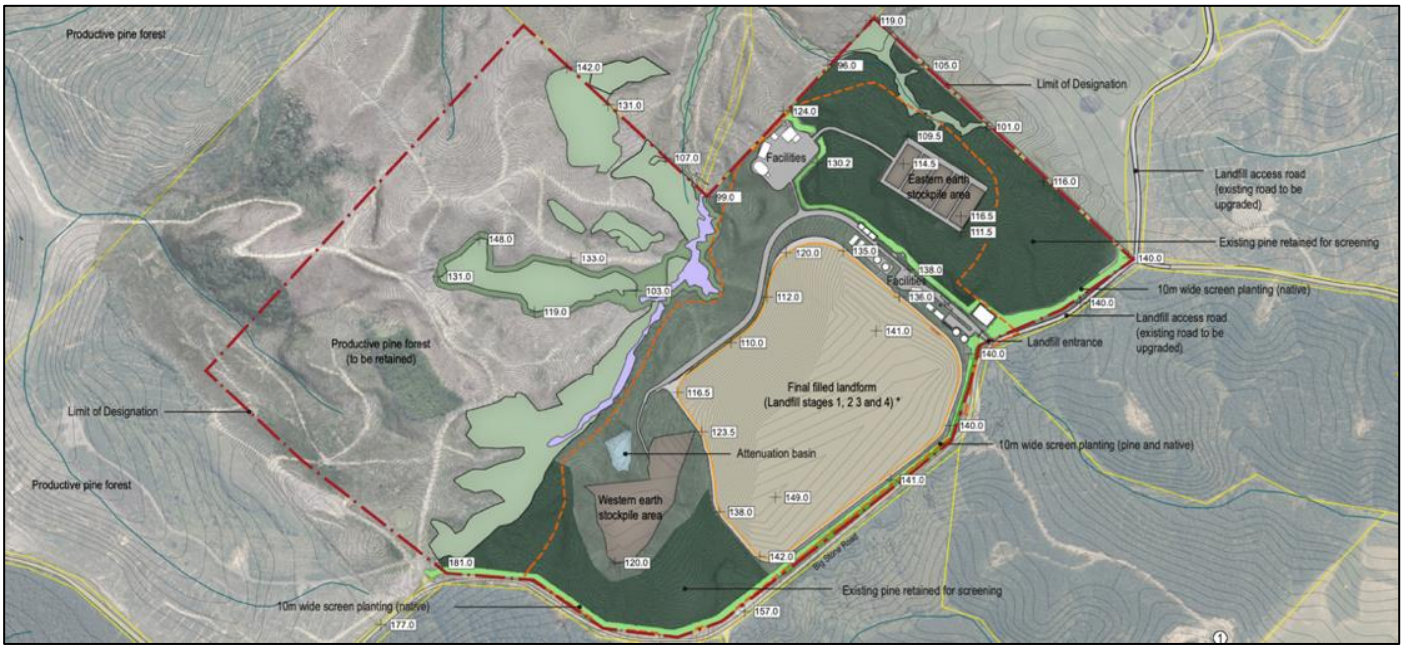

Figure 1: General Arrangement of the Landfill

[1] Net waste capacity takes into account the volume occupied by drainage infrastructure plus intermediate and final capping.

According to the applicant, the concept has been designed to meet the following objectives:

- Provide capacity such that the lifespan of the landfill meets Council's waste management strategy requirements while also allowing for unexpected events that may increase waste volumes in the future, or the potential for a significant reduction in waste volumes allowing for the landfill footprint to be reduced.
- Contain waste and leachate to the standards required of a Class 1 landfill.
- Avoid contamination of groundwater and downstream surface water.
- Avoid or minimise migration of landfill gas (LFG) from the site.
- Minimise amenity effects for surrounding rural-residential activities.
- Retain existing areas of native vegetation/habitats, and archaeological values where practicable to do so.
- Construct a free draining final landform where ponding of surface water is avoided through grading towards the perimeter swale drains.
- Ensure slope stability in construction and following closure.
- Provide access for maintenance, rehabilitation or monitoring purposes.
- Develop an economically viable refuse placement capacity through optimisation of the footprint and height of the resultant landform.
- Provide a final landform suitable for future light stock grazing and shallow rooted vegetation.

The necessary authorisations are being sought in two stages. The first stage comprises this application for resource consent from the ORC (and the DCC). The second stage will comprise submitting an outline plan to the DCC's consenting authority arm. This outline plan will be submitted following the completion of detailed landfill design. The detailed design and outline plan will be developed so as to align with the conditions of any approved resource consents and meet the requirements of the landfill operator.

3.2 Landfill Formation

The landfill will be buttressed against existing hill sides on three sides, with the northern low end of the landfill being supported by a 10 m high toe embankment constructed from engineered fill, which facilitates placement and retention of waste and containment of leachate. The embankment will be constructed in its entirety across the base of the landfill as part of the initial landfill development works.

Construction of each stage of the landfill will require cutting into the existing valley to remove compressible/problematic soils. This includes removal of all loess and organic soils and some of the underlying weathered and unweathered breccia rock. Excavated material (other than unsuitable organic soils) will be used to form the landfill base grade. All other material will be stockpiled for future use as engineered fill, daily waste cover, intermediate cover, or final cap.

Stockpiles will be established within the landfill footprint or at the two dedicated stockpile areas (Eastern Stockpile and Western Stockpile). Sediment control measures including stabilisation, temporary and permanent cover such as grass, silt fences, sediment retention ponds, and cut off drains will be established in the stockpile areas to ensure sediment is retained and does not run off into the downstream environment. Indicative overall earthworks volumes associated with the landfill and sources of additional material required are discussed in the application.

The base of the landfill be graded at slopes ranging from 4% for the flatter base and up to 25% for the inclined liner faces. The inclined faces will have 10 m wide benches at 10 m vertical intervals, which will provide interim vehicle access routes and surface water runoff diversion prior to their infilling. Before filling, the benches will be re-graded with at least 10% crossfall to facilitate leachate flow.

Following the construction of the base grade of each stage, the groundwater collection pipework will be installed, followed by the liner subgrade, and low permeability liner system. Installation of the landfill liner over winter will not occur as it will not achieve the required quality. Following engineering acceptance of the landfill liner, the leachate collection pipework will be installed on the base of the landfill and drainage media applied over the base liner. A non-woven geofabric will then be overlaid. Leachate pump risers, pumps, delivery pipes, storage and loading facilities will be installed and made operational prior to placement of waste in the landfill.

The final cap will be progressively established as filling is completed. The lower part of the landfill cap will slope at a grade of 1V:5H with provision for contour drains to be positioned up the slope to provide a break in surface water runoff flow-paths on this steep capping surface and to provide long-term maintenance access. The upper portion of the landfill cap will slope more gently at a grade of 1V:20H, ultimately rising to a ridge that is approximately 5 m above the elevation of Big Stone Road to the south.

3.3 Landfilling Activity

Landfill operational activities will include:

- Waste filling.
- Placement of daily cover, and intermediate cover as required.
- Surface water runoff/stormwater management and maintenance works.
- Management and maintenance of LFG and leachate systems.
- Environmental monitoring, and response as required.

The landfill will only receive waste from commercial waste companies or bulk loads and will not be open to the public. The proposed opening hour for waste deliveries are:

- Monday to Saturday 8.00am - 5.30pm.
- Sunday 9.00am - 5.30pm.
- Closed Easter Friday, Christmas Day, New Year's Day, and the morning of Anzac Day.

The landfill operator may commence operations 1 hour before and up to 1.5 hours after the opening hours to prepare for waste delivery in the morning and to close off the works at the end of the day. Staff or contractors may be on-site outside these hours for required work, monitoring or maintenance.

The landfill will accept municipal solid waste as well as hazardous waste that meets the leachability limits in the Ministry for the Environment (MfE) guidelines for Class A landfills[2]. Contaminated soils and special wastes that meet these criteria will also be accepted, including biosolids from the Green Island Waste Water Treatment Plant. Generally, cleanfill (such as

[2] MfE, 2004, Module 2: Hazardous Waste Guidelines Landfill Waste Acceptance Criteria and Landfill Classification, Ministry for the Environment

demolition waste) and organic bulk green waste will be diverted from the waste stream and managed at facilities closer to Dunedin, although some may be intermingled with other waste.

Initial layers of waste laid on the prepared liner and leachate collection system will be bagged waste or selected waste that has no protrusions that could penetrate the liner. Landfill machinery will not be permitted to traffic over the leachate blanket unless there is at least 1 m thickness of waste. Compaction will not commence until the waste is greater than 2 m thick. Daily cover will be applied at the end of each day's waste placement such that there are no uncovered areas of waste while the site is not operating. Daily cover will be 150 mm of stockpiled or imported soils or alternative equivalent cover. These will include contaminated soils that are non-odorous and meet the landfill waste acceptance criteria, or construction and demolition waste. The operating cell of the landfill will be limited to around 300 m^2 to provide for not less than 1 m compacted depth of waste to be placed to avoid an excessive percentage of cover soils to waste.

Intermediate cover will be placed where waste will not be overlaid with fresh waste for more than 3 months. This will include most of Stage 1 upon completion. The cover soils will be low permeability loess stripped from subsequent landfill stages or stockpiles and placed in compacted layers not less than 300 mm thick and hydroseed applied. The cover will be graded to the stormwater/surface water runoff management system to reduce leachate generation. Intermediate cover will be stripped before placement of fresh waste.

Construction, filling, and final capping of the completed landfill will occur progressively in four stages supported by a 10 m high toe embankment constructed at the northern end of the site. Stage 1 involves filling behind the toe embankment. Stages 2 to 4 will then progress in a clockwise fashion from northeast to west filling over Stage 1 and buttressed against the surrounding gully. Each stage will in turn be developed and filled sequentially in a number of sub-stages. As filling of each stage progresses, incoming waste will first be covered with daily cover, followed by placement of intermediate cover, and then the final cap.

While the landfill has an expected life of 40 years based on a disposal rate of 60,000 t/yr, those rates may not be sustained over the course of the landfill's life. Actual waste disposal rates will be influenced by the success of waste minimisation efforts, population and economic growth, and future unforeseen events which drives increased demand (e.g. natural disasters). The design capacity of the landfill and staging therefore provides flexibility and resilience in response to fluctuating waste demands.

3.4 Leachate Containment and Management

The landfill concept has been designed to both minimise the volume of leachate produced, and contain and collect any leachate to prevent it from the entering the underlying soils, groundwater, or downstream receiving environment.

The volume of leachate generated will be managed through the following measures:

- Preventing clean upslope surface water from entering the placed waste mass and leachate collection system;
- Minimising the size of the active waste tipping area where waste is exposed to rainfall; and

- Covering areas with intermediate cover or final capping as soon as is practicable so that as much water as possible is diverted to surface water runoff collection systems and to further prevent water ingress into placed waste.

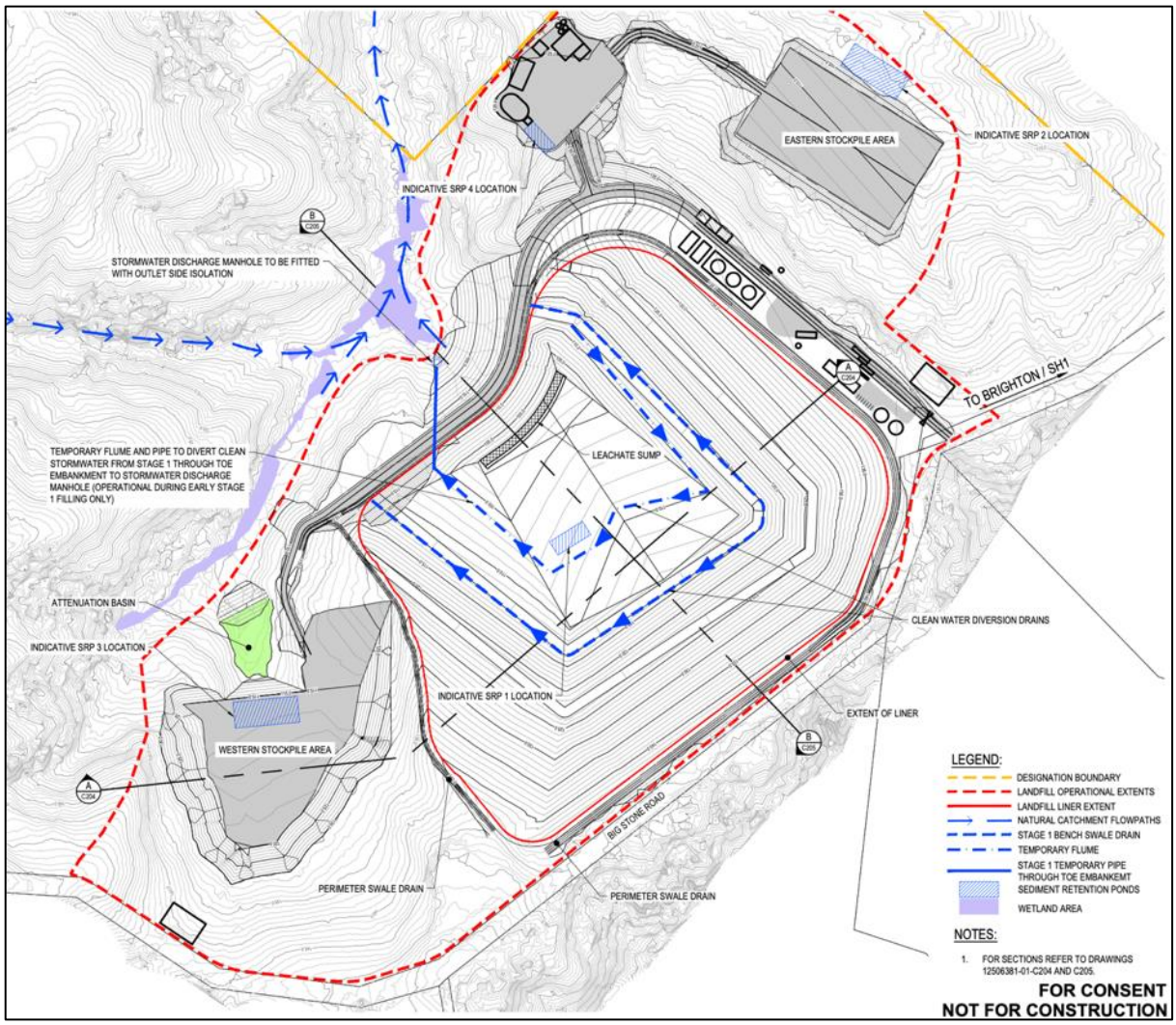

Figure 2: Landfill Liner Plan

A low permeability liner system placed on the landfill base grade will be constructed progressively as the landfill stages are developed to contain leachate within the landfill and prevent it from entering the underlying soils or groundwater. WasteMINZ guidelines[3] prescribe the use of two different liner options for Class 1 landfills:

- Type 1 lining system. This comprises leachate drainage material with an underlying cushion geotextile to protect the geomembrane, which is underlain by a synthetic flexible geomembrane liner (typically 1.5mm HPDE), which is underlain by 600 mm of compacted cohesive soil (permeability not exceeding 1 x 10^{-9} m/s).
- Type 2 lining system. This comprises leachate drainage material with an underlying cushion geotextile to protect the geomembrane, which is underlain by a synthetic flexible geomembrane liner (typically 1.5mm HPDE), which is underlain by a geosynthetic clay liner of minimum 5 mm thickness (permeability not exceeding 1 x 10^{-11} m/s) comprising 600 mm of compacted cohesive soil with permeability not exceeding

[3] WasteMINZ, 2018, Technical Guidelines for Disposal to Land, Waste Management Institute New Zealand

1 x 10^{-8} m/s or 300 mm of compacted cohesive soil with permeability not exceeding 1 x 10^{-9} m/s.

The concept design has been based on adopting a Type 2 lining system. However, both liner options provide an equivalent level of containment, and either option may ultimately be utilised for the proposed landfill.

Under either system, leachate contained by the liner will flow to a leachate collection system at the base of the landfill toe embankment from where it will be removed off site for treatment and disposal. The proposed leachate collection system comprises:

- 300 mm thickness of granular drainage media overlying the landfill liner, overlaid by a geofabric.
- 200 mm perforated pipework near the base of the drainage media to effectively drain leachate into the drainage sump located at the lowest point of the landfill liner. This will be designed to withstand the proposed waste load.
- Leachate sumps located at the base of the toe embankment containing highly porous media capable of attenuating peak leachate inflows that may be caused by excessively heavy or long duration rainfall events.
- Multiple inclined leachate pumps and risers laid down the internal face of the toe embankment and into the leachate sumps. Four pumps will be installed in the leachate sump, with 3 pumps capable of removing the accumulated leachate. The fourth pump provides redundancy to allow maintenance and additional capacity in emergencies.
- Leachate riser pipes conveying leachate from the submersible leachate pumps to above ground leachate storage tanks.
- Emergency power supply in the form of a 300kVA diesel generator, to power the leachate pump system in the event of the loss of network supply.

Leachate storage tanks will be located in the upper landfill facilities area will and provide 48-hour storage capacity. These will be bunded to fully contain the contents of one failed tank.

Leachate volumes will be relatively low during the initial period of landfill development and will be transported by tanker to the Dunedin City Waste Water Treatment Plan (WWTP) for disposal. Ultimately the applicant proposes to install a pipeline from the site along public roads to the nearest connection into the WWTP system at Brighton, approximately 7.5 km to the north east of the site. Based on assumed filling rates, this will be approximately during the ninth year of landfill operation. Consents for the pipeline are not being sought as part of the current applications.

Downgradient monitoring wells will be installed between the landfill toe embankment and northern site boundary to provide advance warning of any leachate leakage that may affect the downstream receiving environment.

3.5 Stormwater and Surface Water Runoff Management

Stormwater[4] and surface water runoff management and control will be required across the landfill construction, operation, and aftercare phases. Consistent with the WasteMINZ

[4] Stormwater is defined in the RPW as the water running off from any impervious surface such as roads, carparks, roofs, and sealed runways. Surface water from pervious surface is not, therefore, classed as stormwater.

guidelines, permanent systems will be designed to accommodate a 1% AEP storm event, and temporary systems will be designed to accommodate a 10% AEP storm event. The systems will divert and enable separation of all surface runoff from areas where waste is placed. They will also enable monitoring of runoff from areas of intermediate cover or final cover and provide the ability to redirect contaminated runoff to the leachate system.

The proposed stormwater/surface water runoff management systems include:

- For Stage 1 only, outlet pipes through the toe bund for the discharge of surface water runoff directly to the downstream tributary. This is because the base of the landfill is at a lower elevation than the perimeter swale drain and gravity drainage to the swale drain is not possible. Once Stage 1 is complete, the pipes through the bund will be permanently sealed, and runoff from the completed Stage 1 surface will be directed to the swale drain and Attenuation Basin.
- A permanent perimeter swale drain constructed progressively as the landfill stages to intercept upslope flows and divert them around the landfill to the Attenuation Basin to the west of the landfill. The drain will be constructed to accommodate a 1% AEP storm event (plus 300 mm freeboard), and consist of a mix of grass channel, reinforced earth (grass root matting), and rock rip-rap to provide scour protection where flows exceed 0.8 m/s. As there is no significant external catchment, this drain will primarily collect runoff from the interim and final landfill surfaces. The swale drain will remain in operation following closure of the landfill.
- A permanent Attenuation Basin, receiving stormwater and surface water runoff from 35.4 ha of the landfill site, including from: gullies; the perimeter swale drain; pre-construction areas; construction areas; landfill operational areas not subject to waste contamination; the upper facilities areas; and the final cap. Stormwater and surface water runoff will first enter an unlined “wet” forebay to provide initial treatment and for soakage to recharge the downstream groundwater system. Higher flows that exceed the capacity of the forebay will pass through a waioro filter consisting of gabion baskets, and enter a second unlined “dry” basin for infiltration or discharge via a low flow outlet to the downstream tributary of Ōtokia Creek. The second basin will have a retaining structure with a spillway, and will contain up to 5,000 m^3 in a 1% AEP storm event. Flows exceeding this will pass over the stabilised spillway downstream. This second basin will otherwise typically be dry and will be planted with appropriate wetland type plant species. The low flow outlet pipe from the Attenuation Basin will also be provided with an emergency shut off value that can be closed in the event that leachate contaminated stormwater/surface water runoff enters the basin. This will enable containment and removal of the contaminated water off site. The Attenuation Basin will remain in operation following closure of the landfill.
- Sediment retention ponds (SRPs) constructed to collect and provide primary treatment of stormwater and surface water runoff from the Eastern Stockpile, Western Stockpile, and lower facilities area prior to discharge. SRPs will also be constructed at the immediate base of the excavation for each stage of the landfill. Stormwater and surface water runoff from the SRPs will be discharged either to the Attenuation Basin or downstream watercourses.

- Temporary drains and grades on the landfill operational surfaces to divert all surface water runoff to the landfill perimeter drain. This is except runoff that has come into contact with waste, which will be diverted to the leachate collection system
- Grading of the final cap to flow to the perimeter swale drain. Where final cap slopes exceed 1V:5H, permanent contour drains discharging to the perimeter swale drains will be installed upslope to control flows.
- Stormwater generated by the upgraded roads outside the site will continue to discharge either via roadside swales, or directly to watercourses and wetlands as currently occurs.

Design and implementation of sediment control measures will take into account site specific conditions, and be in accordance with best practice guidelines, including Auckland Council and Environment Canterbury's guidelines[5].

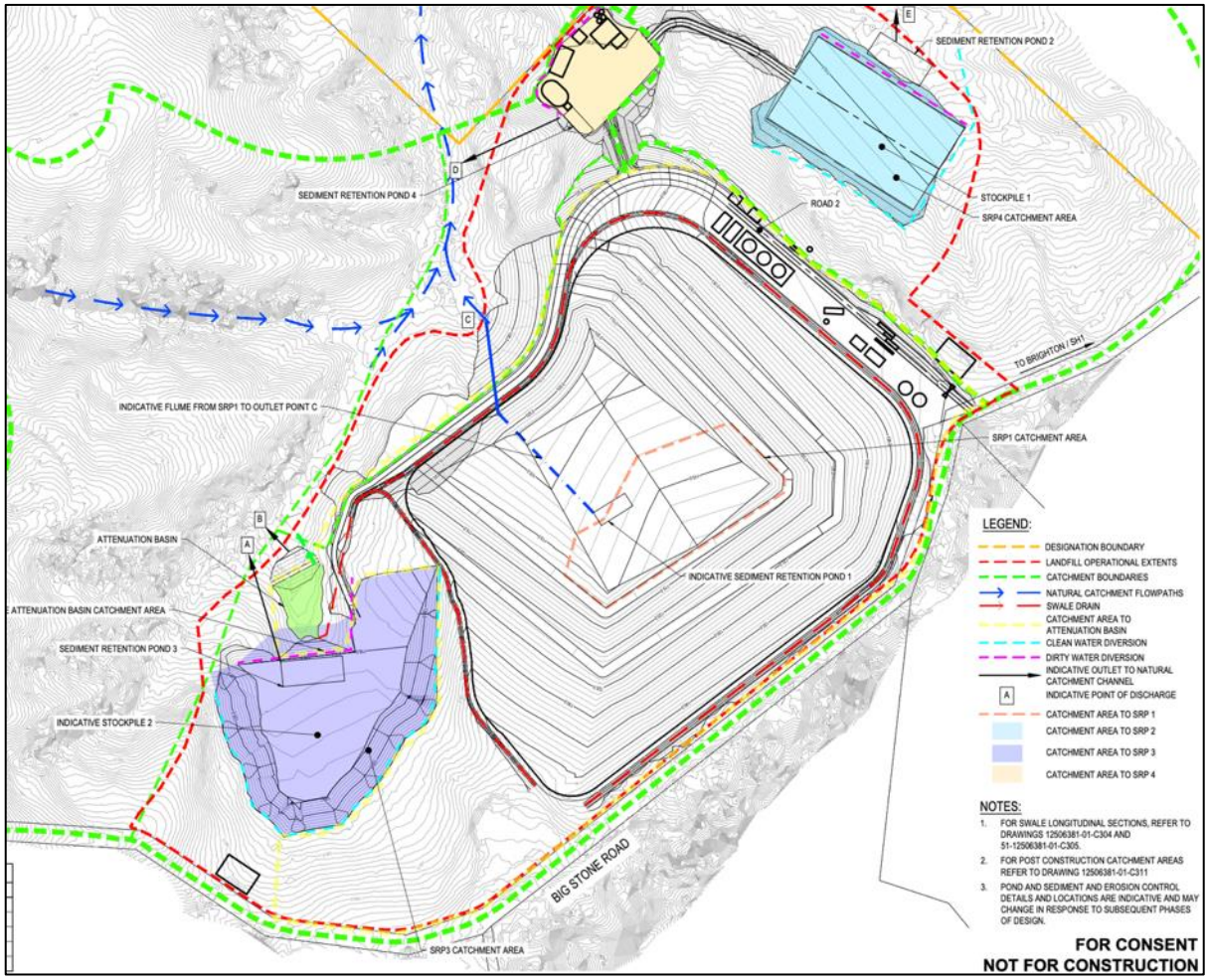

Figure 3: Construction Stage Catchments (note that the SRP2 catchment is incorrectly labelled as SRP4)

3.6 Groundwater Management

Excavation to create the landfill base may expose groundwater seepages and so control and drainage will be required beneath the liner system to avoid the creation of uplift pressures and risks of localised failure of the liner. This will be achieved by constructing a network of subsoil

[5] Auckland Council, 2016, GD05 - Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region, and Environment Canterbury Erosion and Sediment Control Toolbox

drains below the upslope toe of the bund and low permeability liner system. These drains will consist of perforated pipework, encased in graded aggregates and filter fabric to prevent soil particles entering the drains. In the very unlikely event that leachate seeps through the liner system, these drains also provide a collection system for leachate seepage.

Collected groundwater will gravitate to the low end of the landfill from where it will be collected and discharged to a tributary of Ōtokia Creek to the north of the toe embankment, or pumped to non-potable water supply storage tanks in the facilities area where it will be used for firefighting supply, dust suppression, and operation of the wheel wash and machinery wash bay. Groundwater collected by the system will be continuously monitored for leachate contamination. In the highly unlikely event of leachate contamination, collected groundwater will instead be directed to the leachate collection system for disposal.

Groundwater levels are expected to fall below the elevation of the drains in response to the loss of recharge caused by progressive landfill liner construction. It is, therefore, anticipated that only minor volumes of groundwater will be abstracted through the subsoil drainage system over the life of the landfill, with the greatest rates of dewatering (max. estimated discharge ~87 m^3/d or 1 L/s) occurring when the dewatering systems are initially installed.

3.7 Landfill Gas Collection and Management

The National Environmental Standards for Air Quality (NESAQ)[6], requires the collection and destruction of landfill gas (LFG) in a landfill that will exceed 1M tonnes of waste, and that the system be in operation before 200,000 tonnes of waste is placed. Based on the predicted waste stream of 60,000 tonnes / year, a LFG collection and destruction system will be installed and commissioned approximately 3 – 4 years after the commencement of landfilling at the site. The LFG collection system will comprise:

- Lining and capping systems that will retain LFG within the landfill.
- A network of collection wells and pipework.
- LFG destruction flares.
- Emergency power supply in the form of a 300kVA diesel generator, to power the LFG flare system in the event of the loss of network supply.
- LFG monitoring bores outside the waste boundary.

During landfill development, LFG extraction pipes/wells will be installed and connected to the gas extraction system. Collected gas will be pumped through surface pipework to gas flares located in the lower facilities area for destruction by combustion.

A network of LFG monitoring bores will be installed around the perimeter of the landfill to confirm the effectiveness of the LFG collection system and to enable detection of any LFG escape that may present a hazard or nuisance to sensitive receptors.

The opportunity also exists to use LFG to generate electricity once quantities are sufficient. Consents for this are not being sought as part of the current applications, however, space has been reserved in the facilities area for a potential generation plant in the future.

[6] Resource Management (National Environmental Standards for Air Quality) Regulations 2004

3.8 Landscape Mitigation

Perimeter tree planting is proposed to provide visual screening and interception of site generated dust. All trees will be planted as part of the initial landfill development works and will consist of the following:

- Along the central boundary of the site adjoining Big Stone Road, a 10 m wide strip comprising two rows of fast-growing exotic pine, combined with native kānuka and tōtara behind. The pine trees will be progressively removed once the kānuka and tōtara are semi-mature and have formed an effective screen to the site (in approximately 30 years). Additional kānuka and tōtara will be planted in place of the felled pines to reinforce the mature native trees to maintain an effective long term vegetative screen.
- For the remainder of the landfill site adjacent to Big Stone Road, a 10 m wide strip of kānuka and tōtara. This planting will occur adjacent to land within the site that will continue to be used for plantation forestry and which will act as a vegetative screen until which time the kānuka and tōtara are semi-mature.

A final planting plan will be developed as part of the submission of the outline plan of works application following detailed design.

The landfill cap will be progressively established with pasture as each stage of the landfill is completed. The remainder of the site outside of the landfill operational footprint is expected to continue to be used for plantation forestry, except where areas of indigenous vegetation and wetlands are to be retained, or enhanced, as part of the finalised ecological mitigation and offsetting for the project. This is discussed later in this report.

3.9 Other Site Infrastructure

Traffic will access the site from Big Stone Road from a new access located approximately 350 m from the intersection of McLaren Gully Road and Big Stone Road. The access will be used by all operational staff, construction traffic, and waste and leachate trucks. No public access will be allowed. Stormwater from the access will be collected and discharged to the landfill perimeter drain and Attenuation Basin.

Access arrangements within the landfill include:

- Internal roads constructed from aggregate providing access from the upper facilities area to the landfill operational area, lower facilities area, and soil stockpile areas. Stormwater from these roads will be directed to the Attenuation Basin.
- Temporary roads constructed from aggregate on the landfill operational area to provide passage of the waste delivery trucks. These temporary access roads will be amended regularly as each cell is progressively filled.
- Perimeter access track constructed from aggregate to enable access around the site for environmental monitoring and maintenance purposes. The track will be constructed in its entirety as part of the initial construction works.

Outside of the site, several upgrades and alterations to the existing roading network are being proposed. Consent is not required from the ORC for these activities other than where the road realignment works will impact on wetlands and/or tributaries of Ōtokia Creek.

Various site facilities are proposed to support the operation of the landfill. The majority of these are intended to be located within a facilities area on a high platform located to the east of the

landfill and accessed from the site access from Big Stone Road (upper facilities area). Other facilities will be located on a lower platform to the north of the landfill and accessed from an unsealed access from the main facilities area (the lower facilities area). The main facilities proposed and their respective locations are:

- Vehicle weighbridge and staff kiosk (upper area).
- Landfill gas destruction flares (lower area). Space has also been reserved in this area for a future LFG electricity generation plant.
- Site office and associated car parking (upper area).
- Leachate storage tanks and leachate load out bay (upper area) including containment systems installed to capture and retain any leachate spillage.
- Workshop (lower area) for plant and general maintenance, along with associated storage, and staff amenities, including toilets and showers. A concrete vehicle wash bay with oil/sediment traps will be located near the workshop. Vehicle refuelling will also occur at a dedicated location in the workshop compound.
- Emergency power supply in the form of a 300kVA diesel generator to power the leachate pump system and LFG flare system in the event of the loss of network supply.
- Wheel wash (upper area) for cleaning the wheels of all waste vehicles leaving the site. Dirty water will be captured in coarse sediment traps and further treated in flocculation ponds before being recycled back to the wheel wash. Discharges of excess water from the wheel wash recycle system are expected to be minimal and only occur during periods of heavy rainfall. Excess water will flow to the landfill stormwater system and pass through the Attenuation Basin for treatment prior to discharge downstream.

Around 47 m^3/day of non-potable water will be required to provide firefighting supply, dust suppression, and operation of the wheel wash and machinery wash bay. Some of this will be sourced from the water collected in the groundwater collection system and the rest will be supplemented by water tanker deliveries. Ultimately the applicant proposes to install a water main to the site at the same time as installing the leachate pipeline, which will be approximately 9 years after the landfill operation commences. Water will be stored in tanks in the upper or lower facilities area providing 200 m^3 (4 days' supply). A separate firefighting supply tank of at least 100 m^3 will also be provided. Potable water suitable for the staff facilities will be tankered or ultimately piped to the site and stored in separate potable water supply tanks. Wastewater from the staff facilities will be connected to the leachate collection system for disposal off site.

3.10 Landfill Closure and Aftercare

Closure activities will include placing the final capping layer on completion of each stage, establishing any final landscaping, removing any infrastructure that is not required during the aftercare period, or modifying such infrastructure for the aftercare period. The final cap will meet the WasteMINZ guidelines and include not less than 150 mm of topsoil, over not less than 300 mm growth media layer, followed by at least 600 mm (and up to 1000 mm) of compacted cohesive soils with a permeability less than $1x10^{-7}$ m/s. Surface contour drains will be established on the cap to intercept and direct surface water runoff to the perimeter drainage system. Grass or shallow rooted vegetation will then be established.

Aftercare activities will include:

- Ongoing operation and maintenance of the LFG collection and destruction (or future electricity generation) systems.
- Ongoing operation and maintenance of the leachate collection, treatment and disposal system.
- Maintenance of the permanent site stormwater/surface water runoff systems, including the perimeter swale drain, and Attenuation Basin.
- Maintenance of the landfill cap, including filling any areas that may have been subject to differential settlement, repair of any surface erosion, and maintenance of vegetation as required.
- Maintenance of any remaining site infrastructure, including fences, and buildings not removed following closure.
- Ongoing environmental monitoring, reporting, and event response, as required by resource consents and the Landfill Management Plan.

3.11 Landfill Management Plan

The applicant states that the construction, operation, maintenance, and aftercare of the landfill will occur in accordance with a comprehensive Landfill Management Plan (LMP) prepared in accordance with the WasteMINZ guidelines. Clause 7.6.11 of the Otago Regional Plan: Waste (RPWaste) requires the preparation of a landfill development and management plan in the form prescribed in Appendix 2 of that plan. Plan Change 1 to the Waste Plan, which has recently been notified by the Environmental Protection Authority, amends the clause, and requires a site specific management plan be prepared in accordance with the WasteMINZ guidelines.

A LMP will be prepared as part of the detailed design of the landfill, and before construction commences. This enables the LMP procedures to align with the detailed design, landfill developer/operator needs and facilitate compliance with the conditions of approved resource consents. The LMP is a living document, and will be regularly reviewed and updated over the life of the landfill to ensure that management practices result in compliance with the conditions of resource consent. Review will also respond as necessary to changes in waste demands, best practice design and management, regulatory requirements, and any environmental changes.

A draft LMP framework has been prepared and submitted with the consent application. The structure of the draft LMP includes provision for the following:

- **Introduction:** the plan purpose; requirements, structure; schedule of resource consents held and designation; relevant documents and guidelines; and procedures for plan review.
- **Site management:** description of the site; landfill management roles and responsibilities; training requirements for specialist roles; health and safety requirements; and procedures for communication with the community, and receiving and responding to complaints.
- **Landfill construction:** general description of the design; and the parameters and procedures for detailed design and construction of the landfill that achieves the LMP objectives, and resource consent conditions
- **Landfill operation:** daily procedures for operation of the landfill, including for waste acceptance, that achieves the LMP objectives, and resource consent conditions.

- **Landfill closure and aftercare:** procedures for site closure, rehabilitation and ongoing aftercare, that achieves the LMP objectives, and resource consent conditions.

This structure also references and incorporates elements of more detailed bird management, ecological, and landscape management plans attached as appendices to the LMP. Those detailed plans form part of the overall suite of procedures for the management of the landfill in the LMP.

The draft LMP provides a starting point for full completion of the final plan as part of detailed design, and before construction commences. A greater level of detail has been provided for those matters which were specifically raised in the ORC section 92 request for further information as requiring draft management plans to be prepared, for example in relation to bird and ecological management, and odour. A lesser level of detail has been provided for those sections which are more contingent on detailed landfill design, and the specific needs of a landfill developer/operator. More detail on these sections will be added as part of the preparation of the final LMP.

The applicant has stated that final LMP and plans that sit underneath it will be developed in consultation with Te Rūnanga o Ōtākou.

4. Description of the Environment

4.1 Site Visit

Two site visits have been undertaken. The first was on 9 June 2020 before the application was lodged. Myself, Hilary Lennox (Consultant Planner), attended on behalf of the ORC and various attendees were present on behalf of the applicant. The purpose of this site visit was to have a cursory view of the site and its surrounds.

The second site visit was undertaken on 6 October 2020. Myself, Martin King (Principal Compliance Specialist) and Mike Lake (Freshwater Ecologist, Tonkin & Taylor) attended on behalf of the ORC. Various attendees were present on behalf of the applicant. One of the key objectives of this site visit was to determine whether the two ephemeral gullies onsite (see photos below) should be classed as 'rivers' under the RMA.

Figure 4: Ephemeral gullies within landfill footprint, October 2020

It was agreed onsite that the two ephemeral gullies that coalesce at the swamp wetland should not be classed as 'rivers', but that the swamp wetland and downstream tributary of Ōtokia Creek to the north of the site did meet the definition of a 'wetland' and a 'river' respectively. There were no other features within the footprint of the landfill that needed defining. Parts of McLaren Gully Road were also walked and adjacent tributaries of Ōtokia Creek observed.

4.2 General

The site is located approximately 28 km southwest of Dunedin in the hills between the Taieri Basin and the South Island east coast. Access to the site is primarily from State Highway 1 (SH1), McLaren Gully Road and Big Stone Road to an existing vehicle entrance located on the south-eastern boundary of the site.

The figure below shows the extent of the existing District Plan designation. Until recently, the designation fell over two separate land parcels bisected by an unformed paper road that ran through the site. The road was formally declared as being stopped in July 2020 and the DCC issued a decision formally altering the designation accordingly in March 2021.

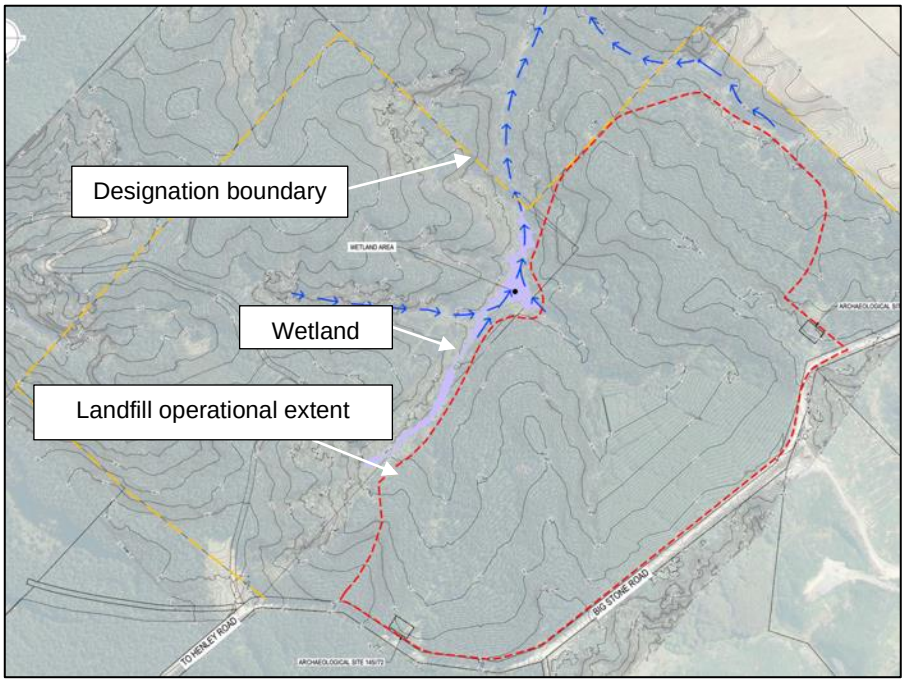

Figure 5: Extent of landfill operation within the designation

Until recently, the majority of the site was covered by a mature pine forest plantation. Following harvesting in 2017, the site now comprises of a mixture of scrub, bare earth, forestry waste, and newly planted pine seedlings. Several forestry access tracks are present across the site. Areas of remnant indigenous vegetation are present in some gullies.

Surrounding land use consists predominantly of commercial plantation forestry on large landholdings. Some localised areas of pastoral farming exist, notably adjacent to the sites north eastern boundary, and land at the bottom end of McLaren Gully Road.

Rural residential activity exists in isolated pockets and at low densities. Two houses are located along McLaren Gully, approximately 1 km from the SH1 intersection, and approximately 1.7 km from the site. Direct views of the site from these locations are curtailed by intervening landforms. Two further houses are located in the hills between Big Stone Road and the coast, approximately 380 m and 605 m southeast of the site respectively. Both houses are encircled by forestry plantations which restricts views towards the site. Other houses are located at distances beyond 1 km along Big Stone Road in the direction of Brighton.

The site lies in a natural amphitheatre bisected by a series of ridges and gullies trending in a south to north direction. The base elevation of the site commences at RL 100 m adjacent to the northern boundary, and rises up to the ridgeline on Big Stone Road, which typically sits at RL 140 m to RL 150 m, and up to RL 180 m in the southwest corner of the site. The landform typically has side slopes of 20%.

The applicant determined a climate station in Musselburgh to be reasonably representative of onsite conditions. On this basis, mean annual rainfall is expected to be around 738 mm/yr, mean potential evapotranspiration is expected to be around 856 mm/yr, and mean daily maximum/minimum temperatures are expected to be 11.6 - 18.9 degrees Celsius in January and 3.1 - 10.0 degrees Celsius in July.

In lieu of generating sufficient records on-site, predicted wind patterns have been modelled. This process used the most recent available surface observations from the Dunedin Airport Automatic Weather Station. The subsequent wind rose generated for the site generally aligns with predominant west-southwest and east-northeast flows, however, the ridgeline location of the site causes predicted wind patterns to contain a slightly greater westerly component than those observed at Dunedin Airport.

4.3 Geology

The geology underlying the site has been confirmed by extensive geotechnical and hydrogeological investigation works undertaken by the applicant. Five distinct layers were identified across the site (in order from the land surface):

- **Topsoil** was encountered at depths of up to 0.25 m below ground level (bgl) across most of the site.
- **Areas of Instability** were encountered in localised areas across the site at the surface and extended to depths ranging between 0.4 m to 2.7 m bgl. Observations suggest that these comprise of surface materials (i.e. loess) with no obvious evidence of deeper seated slips.
- **Alluvium** was encountered in the base of the gullies in the northern area of the site to depths of up to 2.7 m bgl.
- **Loess** was encountered across most of the site to depths between 1.25 to 4.1 m bgl.
- **Henley Breccia Formation** underlies the site. Assessed strengths were variable and range from extremely weak to very weak in completely to highly weathered material to moderately strong in unweathered sandstones and breccia. Few defects were identified.

Published data indicates there are no faults underlying the site, and none have been identified on the site during geotechnical investigations. There are, however, a number of faults within 100 km of the site, including the Titri Fault located approximately 3 km north west of the site, which separates the elevated topography in the vicinity of the site from the Lower Taieri Basin. These faults however are geologically not active, as defined by GNS Science, as they have a recurrence interval >2000 years. The closest known geologically active fault to the landfill site, is the Alpine Fault, which is located 240 km to the northwest.

Further detail regarding the site's geological features is provided in the application and s92 responses.

4.4 Hydrology

The majority of the site falls within the Ōtokia Creek catchment. A series of ephemeral gullies run through the landfill site in a south to north direction. These gullies, which have no clearly defined bed and a general absence of natural bed substrates, merge at the northern edge of the site where standing water exists associated with diffuse seepage, forming a swamp wetland.

The swamp wetland connects via an unnamed tributary to Ōtokia Creek beyond the northern boundary of the site. This tributary appears to have surface water present all or most of the year. However, during dry periods such as that over the 2020/2021 summer, surface water flow ceases in places.

The tributary and the valley floor form part of a valley floor marsh wetland system. Beyond McLaren Gully Road, the tributary ultimately joins the main stem of the Ōtokia Creek. Ōtokia Creek flows to the coast near Brighton, approximately 10 km south-east of the landfill site.

The remaining western part of the landfill site is located within the Taieri catchment. The upper reaches of the Palmer Stream fall within the landfill site, which ultimately flows to the Taieri River approximately 3.4 km north of the site. Similar wetland habitats to that found at the bottom of the site exist in gullies in the upper parts of the catchment within the application site, but outside the designation.

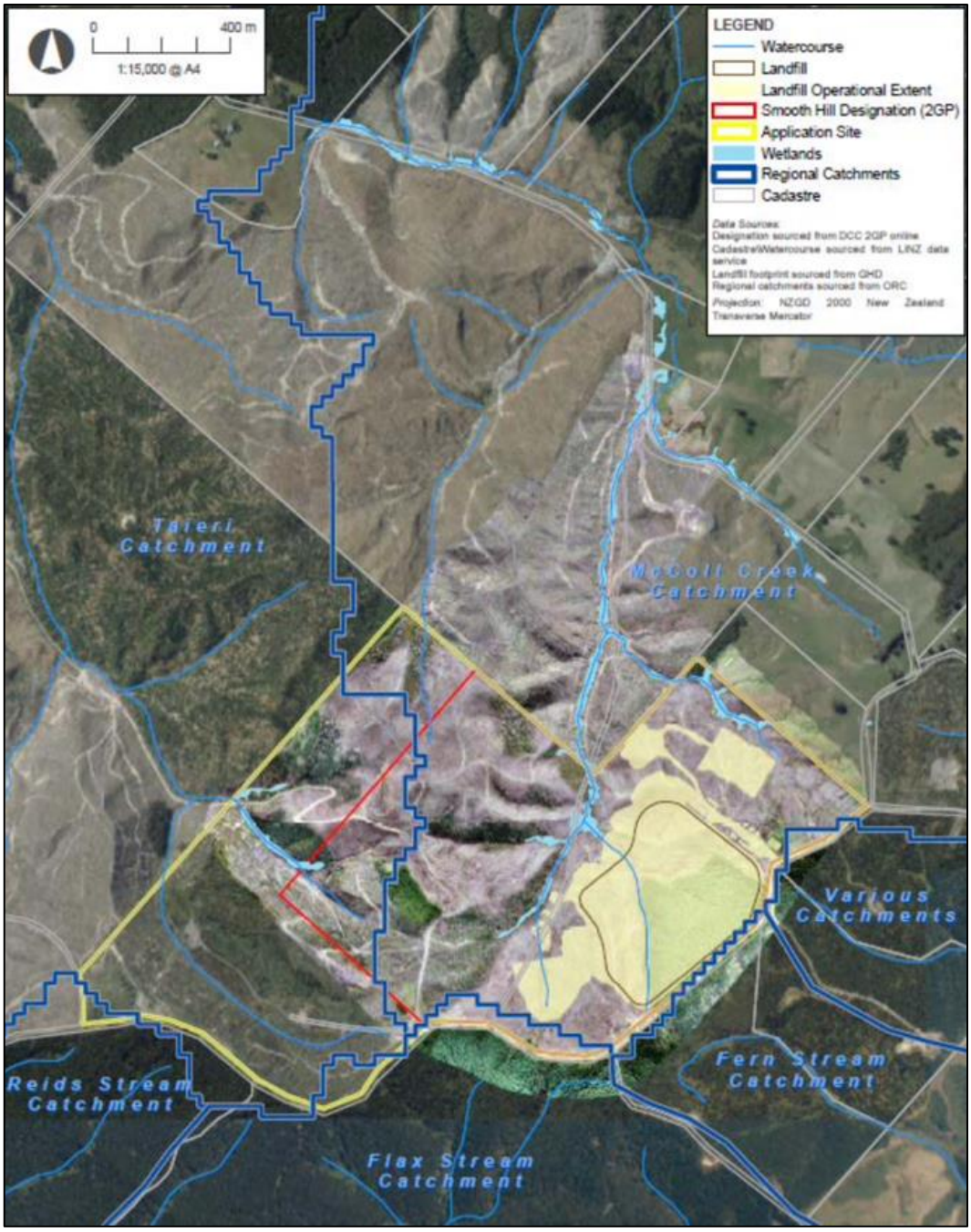

Figure 6: Surface Water Hydrology

4.5 Hydrogeology

Site investigation work undertaken by the applicant identified the presence of both shallow and deep groundwater systems beneath the site, separated by an intermittent semi-confining fine-grained low permeability layer within the Henley Breccia. Low rates of seepage from the shallow system to the deeper system occurs.

The shallow groundwater system is located within the bottom of the gullies of the site, and comprises relatively permeable alluvium/colluvium and shallow weathered Henley Breccia materials. This system receives recharge directly from rainfall, runoff over the low permeability loess soils, and groundwater from the shallow Henley Breccia.

Horizontal flow through the shallow groundwater system is predicted to be less than 1% of the total rainfall over the catchment area. Groundwater flows in the shallow system follow topography north towards the valley floor. Groundwater levels are near the surface in the valley bottom, and the shallow system contributes baseflow to the valley floor marsh wetland system and tributary of Ōtokia Creek. This tributary is also likely to receive runoff during rainfall events, which has the potential to transport a substantial sediment load given the steep topography and recent harvesting of forestry at the site.

The deep groundwater system is located within the Henley Breccia. Some minor rainfall recharge occurs, however, it is constrained by the low permeability loess materials that overlie the breccia. Given recharge to the more permeable shallow groundwater system is predicted to be less than 1% of total rainfall, recharge to the deep system is likely to be no greater than this. The deep groundwater system has very low permeability due to the presence of unweathered to slightly weathered breccia and conglomerate units.

There are no recorded active groundwater takes from the Henley Breccia. The nearest recorded borehole is greater than 1.5 km west of the site (I45/0001), and no recorded bores or consents are recorded located south east of the site.

4.6 Water Quality

Surface water sampling was undertaken in the tributary of Ōtokia Creek downstream of the site in July 2020. Further sampling was scheduled in March 2021, however, samples were not collected as the majority of the stream was dry during this time, with only stagnant isolated pools of water present. The limited collected data indicates surface water quality complies with ANZ Guidelines (ANZG)[7] criteria, with the exception of copper in one sample. However, given the intermittent nature of flows it is likely that water quality varies significantly during different flow events. Variables such as initial flushing immediately following high rainfall events, and groundwater inflows (baseflow) as the groundwater level rises and falls in response to rainfall, will impact surface water quality.

Groundwater quality was investigated in November 2019 and March 2021 and the results compared against the ANZG and the Regional Plan Water (RPW) Schedule 16A thresholds. Nitrate-N and ammoniacal-N concentrations in excess of the RPW thresholds were detected. The applicant has speculated that these exceedances indicate groundwater quality underlying the site may have been impacted by fertiliser use during forestry operations. Elevated

[7] Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2018

concentrations of copper, nickel, zinc and cadmium in excess of the ANZG criteria were also detected. The applicant has speculated that this is likely a result of reducing groundwater conditions observed at these locations and sourced from the minerals in the rock material.

4.7 Terrestrial Flora

The site sits within the Tokomairiro Ecological District (ED). In terms of the Threatened Environment Classification[8], the area is entirely within a Category 2 (previously called 'Chronically Threatened') land environment (Q4.3c), where 10-20% indigenous vegetation remains on this land environment, nationally. Some valley floor areas adjacent to McLaren Gully Road immediately below Gledknowe Hill are within a Category 3 land environment (Q4.3a), where 20-30% indigenous vegetation remains nationally.

The original vegetation of the Tokomairiro ED prior to the arrival of humans comprised of kahikatea, matai, totara, narrow-leaved lacebark, tī kōuka and kōwhai forest on the hills of East Otago. These vegetation communities are now present only as remnants in deep gullies that survived fire, logging, and clearance for farming.

The vegetation types currently present across the site range from highly modified plantation forestry areas of negligible ecological value, to degraded wetland habitats of moderate ecological value and regenerating / secondary indigenous forest habitat of high ecological value. With the exception of kānuka, no At-Risk, Threatened, or locally uncommon or important plant species have been found on the site.

The vegetation communities and their ecological value, identified within the landfill site, downstream receiving environment, and adjacent to McLaren Gully/Big Stone Road, are summarised in the application and their spatial extent shown in the figure below.

[8] The Threatened Environment Classification is a combination of three national databases: Land Environments of New Zealand, Land Cover Database (Version 2) and the Protected Areas Network. The Threatened Environment Classification shows how much indigenous vegetation remains within land environments, how much is legally protected, and how the past vegetation loss and legal protection are distributed across New Zealand's landscape.

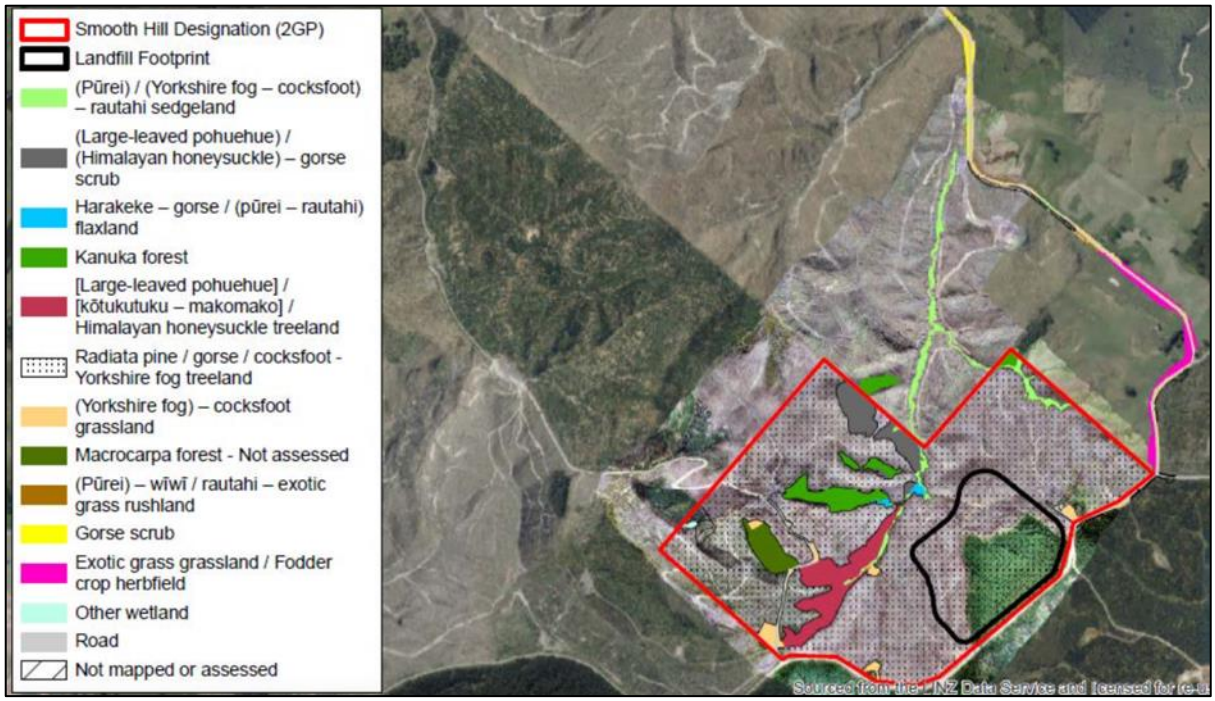

Figure 7: Vegetation types across the site

The ecological value of these communities has been assessed as follows:

- (Pūrei) / (Yorkshire fog - cocksfoot) - rautahi sedgeland = **moderate**
- [Large-leafed pohuehue] / (Himalayan honeysuckle) = **moderate**
- Harakeke - gorse / (pūrei - rautahi) flaxland = **moderate**
- Kānuka forest = **high**
- [Large-leafed pohuehue] / [kotukutuku - makomako] / Himlayan honeysuckle = **low**
- Radiata pine / gorse / cocksfoot - Yorkshire fog treeland = **negligible**
- (Yorkshire fog) - cocksfoot - grassland = **moderate**
- [Pūrei] - wīwī / rautahi - exotic grass rushland = **moderate**
- Gorse scrub and exotic grassland / fodder crops = **negligible**

All identified wetland areas meet the NPSFM 2020[9] definition of 'natural inland wetland.' The wetland boundaries are shown as the light green ((pūrei) / (Yorkshire fog – cocksfoot) – rautahi sedgeland) and light blue (harakeke – gorse / (pūrei – rautahi) flaxland) areas on the map above. Areas along McLaren Gully Road are likewise natural inland wetlands that have formed at the base of tributary gullies and valleys of Ōtokia Creek and in the vicinity of road culverts.

Three areas have been mapped as 'significant indigenous vegetation' or 'significant habitat' using Partially Operative Regional Policy Statement and the DCC's 2GP criteria.

[9] MfE, 2020, National Policy Statement for Freshwater Management, Ministry for the Environment

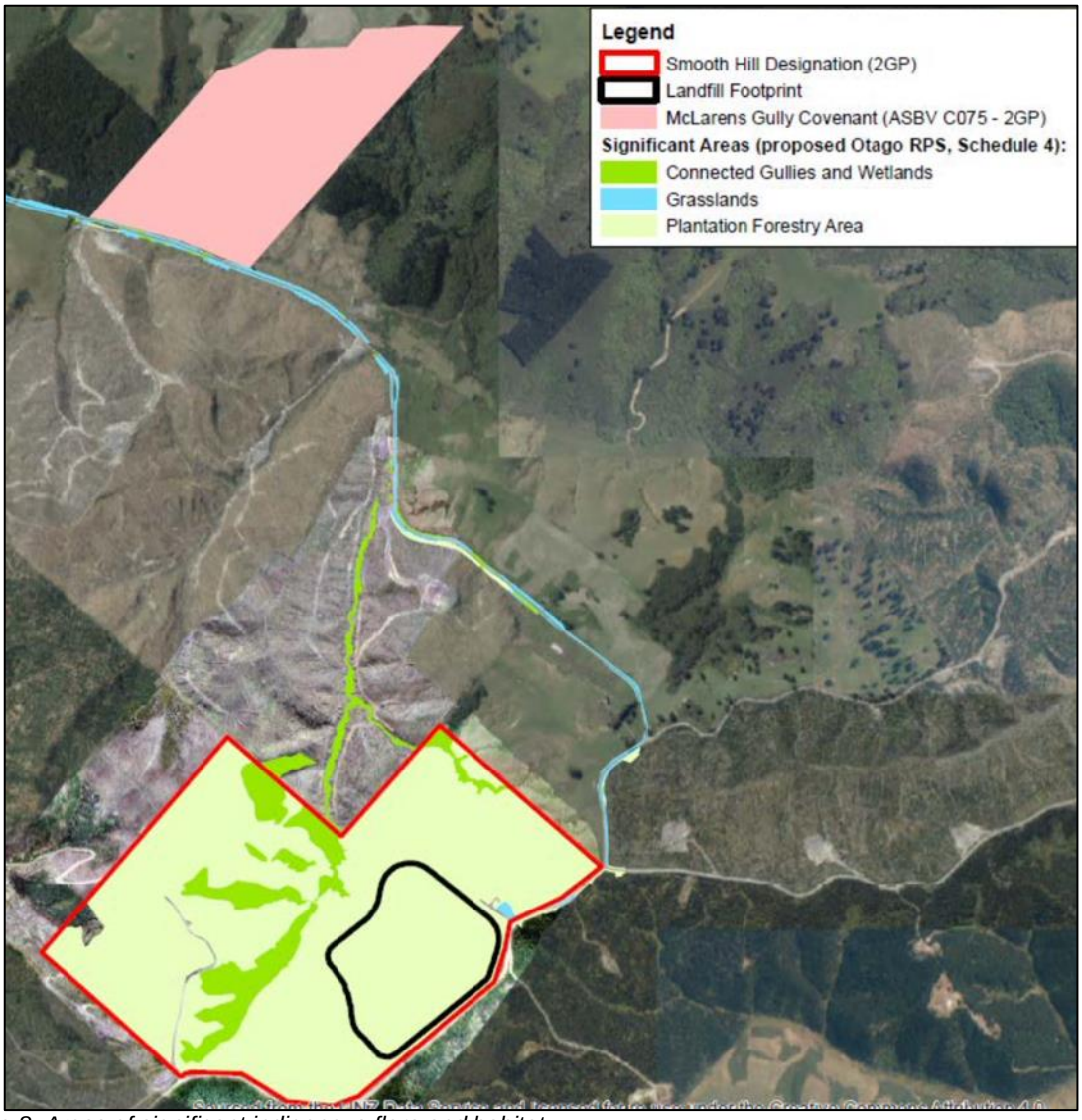

Figure 8: Areas of significant indigenous flora and habitat

The connected gullies and wetland habitat are comprised largely of indigenous vegetation types, whereas the plantation forestry and grasslands have been mapped because they provide habitat supporting the native eastern falcon and southern grass skink.

4.8 Avifauna

According to the applicant, Ornithological Society of New Zealand (OSNZ) data has recorded 69 bird species across this landscape, including 21 exotic species, and 48 native species. Within the site itself, bird habitat includes the recently replanted radiata pine forest, exotic grasslands, weeds and scrub, four native forest gullies, and swamp wetland.

During surveys conducted in preparing the consent application, 22 bird species were observed, of which 14 were native and eight were introduced. One At Risk species, the eastern falcon, was observed on site. Seventy-three percent of the observations were of exotic birds and 27% of native birds.

No Threatened species were recorded on the landfill site, nor are any likely to utilise the site according to the applicant. Eastern falcon was the only species recorded on the site that has

an At Risk classification. According to the EIANZ[10] guidelines, this species is considered to be of **moderate** ecological value. In addition, all the native Not Threatened and introduced species recorded on site are considered to have **low** and **negligible** ecological value.

4.9 Herpetofauna

The existing environment consists of variable, low to high quality habitat for native lizards. Habitat types that lizards often persist in are considered to be low value ecologically, such as rank grasslands, weed fields and regenerating scrub. Such habitats are present within the landfill site and along roadsides.

Based on the habitat types present on site, records held within the DOC Bioweb database, and survey results, the applicant has identified five lizard species potentially present on the site and along roadsides. These are Southern grass skink (At Risk - Declining), McCann's skink (Not Threatened), Jewelled gecko (At Risk - Declining), Cryptic skink (At Risk - Declining) and Korero gecko (At Risk - Declining).

According to the EIANZ guidelines, the Southern grass skink is considered to be of **high** ecological value. McCann's skink is considered to be of **low** ecological value. Jewelled gecko is considered of **high** ecological value. According to the applicant, there is a very low likelihood that Cryptic skink and Korero gecko are present.

4.10 Freshwater Ecology

The series of south to north ephemeral gullies passing through the site contain flowing water only after persistent rainfall. These watercourses have no clearly defined bed and a general absence of natural bed substrates, and do not provide any habitat for freshwater macroinvertebrate or fish fauna.

The swamp wetland at the northern edge of the site and the tributary of Ōtokia Creek to the north of the site may contain some surface water throughout the year. However, according to the applicant, it's unlikely that there is sufficient water depth or permanence to support indigenous fish populations within the designation site.

The macroinvertebrate community, which provides a good indication of stream or ecosystem health, is dominated by "soft-bottom taxa" that tend to be more tolerant of slow-flowing waterways and / or degraded conditions. The macroinvertebrate community index (MCI), and its variant (SQMCI), indicate that the tributary has "poor" stream health and water quality.

During freshwater surveys, one longfin eel (*Anguilla dieffenbachii*) and two shortfin eel (*Anguilla australis*) were captured in a large pond located approximately 300 m downstream of the site. Longfin eel has a conservation status of "At risk, declining"; shortfin eel is "Not threatened".

The New Zealand Freshwater Fish Database records show the Ōtokia Creek catchment supports indigenous fish species including kōaro, banded kōkopu, longfin eel, and giant kōkopu and inanga in the lower catchment. However, according to the applicant, it is likely

[10] EIANZ, 2018, Ecological Impact Assessment Guidelines, Environment Institute of Australia and New Zealand

that the tributary between the designation site and McLaren Gully Road provides limited habitat for freshwater fish species other than eels.

The RPW outlines the natural and human use values of various watercourses throughout the Otago Region. Ōtokia Creek is identified for the following natural and ecosystem values:

- Access within the main stem of the catchment through to the sea or lake unimpeded by artificial means such as weirs and culverts.
- Absence of aquatic pest plants identified in the Pest Plant Management Strategy for the Otago Region.
- Presence of significant fish spawning areas.
- Presence of significant areas for development of juvenile fish.
- Presence of indigenous fish species threatened with extinction.
- Significant habitat for banded kōkopu.

Overall, the freshwater ecological values of the tributary between the designation site and McLaren Gully Road are defined by the applicant as **moderate.**

The Lower Ōtokia Creek Marsh is located towards the bottom of the catchment, approximately 7.6 km north east of the site. Schedule 9 of the RPW identifies this as a regionally significant wetland.

4.11 Landscape and Natural Character

The landscape in this area forms rolling to steep hill country, within which the site is contained within folded gullies and ridges and largely concealed from view. The site and immediate vicinity are not identified in the 2GP as being in the coastal environment or as part of any outstanding natural feature or landscape, or highly valued for their contribution to the amenity values or the quality of the environment. The existing wetlands form part of a modified rural landscape which includes a predominant cover of exotic forestry and exhibit limited levels of natural character.

4.12 Archaeology

Several archaeological sites have been identified in the area where the proposed works (landfill plus road realignment) will take place. Two of these, I45/71 and I45/72, are within the existing designation. Archaeological sites (I45/71 and I45/72) have been assessed to have **medium** archaeological values given the presence of archaeological structural remains, which although in poor condition, have the potential to contribute to understanding of the development of farming by individual families and the wider district.

4.13 Cultural Values

The applicant commenced engagement with Aukaha on the Waste Futures programme, including Smooth Hill, in mid-2019, resulting in a series of briefing meetings, hui, and a site visit. The applicant then engaged Aukaha to prepare a Cultural Impact Assessment (CIA) for the project. The CIA describes the cultural values identified by mana whenua relevant to the proposal, including cultural values with regard to waste management. It also assesses the proposal against these values, based on the relevant objectives and policies of the Kāi Tahu ki Otago Natural Resources Management Plan 2005 (NRMP).

Smooth Hill is part of a wider cultural landscape which is imbued with the lived experiences of mana whenua tūpuna. These experiences and the values passed down through the generations inform mana whenua and Kāi Tahu Whānui identity, cultural practices and approaches to environmental management.

Mana, mauri and whakapapa are core values which underpin the Kāi Tahu worldview with respect to this project. These values are interconnected and the degradation of one value can affect other values. Other cultural values identified by mana whenua as relevant to the project and Kāi Tahu ki Otago NRMP are summarised as follows:

- **Mana**, which means the 'authority' or 'prestige' that mana whenua hold over their respective regions. The possession of mana means that mana whenua have the 'authority' to make decisions over the land and sea within their takiwā. All development projects that occur within tribal territories are expected to recognise and uphold the mana of mana whenua. Mana whenua are Council's Treaty Partner. The test of partnership is the ability to influence critical decisions.
- **Mauri,** which is the 'life force' or 'life principle' of a place or thing. Mana whenua believe that there is an active phenomena within everything and thus, whether living or inanimate, all things possess mauri. Mauri is often used as a benchmark when measuring the health of the environment. Assessing cultural effects involves examining effect of mauri in the short and long term.
- **Whakapapa**, which is often referred to as 'genealogy' and is at the core of how mana whenua express their identity. The notion of whakapapa extends beyond familial relationships and ties amongst people. From the stories of creation, to how mana whenua introduce themselves through their pepeha (introduction), to all parts of the natural and spiritual environment, everything in existence is acknowledged and connected through whakapapa. Whakapapa gives the mana whenua over the project area to Te Rūnanga o Ōtākou. Whakapapa establishes the ancestral rights which give mana whenua the mana and kaitiaki responsibilities over their takiwā. A key way in which whakapapa can be understood in the context of projects is by recognising and respecting ancestral landscapes, associations and place names. It can also be applied to understanding and regenerating biodiversity with whakapapa to an area.
- **Ki Uta Ki Tai**, which means 'from the mountains to the sea' and emphasises interconnectedness. It is a concept that emphasises holistic management of the interrelated elements within and between catchments, from the air and atmosphere to the land and the coastal environment, whereby implementation will require a collaborative approach.
- **Kaitiakitaka**, which is the intergenerational and inherited responsibility to support and protect people, the environment, knowledge, culture, language and all resources on behalf of future generations. It is often translated to include the concepts of 'guardianship' or 'stewardship'. For Kāi Tahu ki Otago, kaitiakitaka is not only about the physical resources, it is about being mana whenua and maintaining a relationship to the spiritual dimension and influences of wairua and tapu.
- **Mahika kai**, which is the gathering of foods and other resources, the places where they are gathered and the practices used in doing so. Mahika kai is an intrinsic part of Kāi Tahu identity. It has formed the basis of the Kāi Tahu economy for hundreds of years, and remains at the core of tribal economic development today. Mahika kai relates not only to the ability to feed whānau, but to also feed visitors and show the

highest level of hospitality (manaakitaka). Mahika kai heavily relies on a healthy functioning ecosystem including access to these sites and areas. A good resource is an indicator of a healthy ecosystem. Historically, mana whenua would travel great distances following seasonal food routes. Kā rūnaka treasure the ability to gather these foods and resources in the same places as their tūpuna (ancestors).

- **Wai Māori**, or water, which is central to Te Ao Māori (the Māori worldview). There can be no life without water, as expressed through the whakataukī (proverb) Ko te wai te ora o ngā mea katoa - water is the life giver of all things. All waterways sustain some form of life and are valued as sources of mahika kai, mana whenua creation stories, settlement and as access or travel routes. Mana whenua consider water a taoka (treasure) left to them by their tūpuna and seek to protect waterways for future generations. Protecting and enhancing the wellbeing of all bodies of water is directly related to mana whenua's role as kaitiaki. The degradation of water bodies through land use activities is considered to have resulted in 'material and cultural deprivation.
- **Hau**, which refers to maintaining healthy air quality and refraining from activities that have immediate and prolonged negative impacts on the quality of air. This is also an important part of kaitiakitaka and the holistic approach to resource management highlighted by 'Ki Uta ki Tai'.
- **Manaakitaka,** which is the acknowledgment of the mana of others through the expression of aroha, hospitality, generosity, and mutual respect. Mana whenua express manaakitaka when they practice their duties as kaitiaki and act in the interests of others, including future generations. Proposals can enable manaakitaka through ensuring that social and environmental outcomes, communities and future generations are considered properly in the decision-making process.
- **Haere Whakamua,** or future focus, which emphasises the need for activities or projects to focus on how future generations might be affected. Mana whenua have the obligation to advocate for the needs of future generations as well as the protection of the natural environment into the future. This is crucial when considering the intensification of climate change and the potential for it to exacerbate the adverse impacts of projects on their receiving environments.
- **Utu,** which highlights the importance of reciprocity and the opportunity to restore imbalances in both the physical and spiritual realm. In practical terms, some land use activities may cause degradation to the mauri of the natural world, so there would be a corresponding need to address any imbalances. The concept of utu can also be explored through regenerative practices of ecosystem restoration and enhanced native planting.
- **Tikaka,** which refers to the correct method or appropriateness of carrying out an activity. In this context tikaka should be considered to ensure that short term gains do not override the consideration of potential adverse effects on both people and the environment that could accumulate over time. Tikaka is often linked to customary practices that have been sustained throughout generations. In generic terms it translates to undertaking the most appropriate actions.

Schedule 1D of the RPW identifies the spiritual and cultural beliefs, values and uses associated with water bodies of significance to Kāi Tahu. Ōtokia Creek is identified as having the following values:

- **Kaitiakitanga:** the exercise of guardianship by Kāi Tahu, including the ethic of stewardship.
- **Mauri:** life force.
- **Waahi tapu and/or Waiwhakaheke:** sacred places; sites, areas and values of spiritual values of importance to Kāi Tahu.
- **Waahi taoka:** treasured resource; values, sites and resources that are valued.
- **Mahika kai:** places where food is procured or produced.
- **Kohanga:** important nursery/spawning areas for native fisheries and/or breeding grounds for birds.
- **Trails:** sites and water bodies which formed part of traditional routes, including tauraka waka (landing place for canoes);
- **Cultural materials:** water bodies that are sources of traditional weaving materials (such as raupo and paru) and rongoa (medicines).

5. Consideration of Alternatives

An extensive site selection process was completed by BECA in the early 1990s to identify a landfill site to replace the Green Island landfill at the end of its life. The applicant investigated thirty-two possible sites against the following criteria:

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

The site evaluation process ultimately led to the applicant confirming in 1993 that the life of the Green Island landfill would be extended, and that the Smooth Hill site would be secured to provide a future long-term solution. The Green Island landfill is expected to reach the end of its functional life sometime between 2023 – 2028.

The applicant initiated a Programme Business Case (PBC) process in 2018 to identify a preferred medium to long-term waste and diverted material system for Dunedin. As part of the PBC process, an evaluation of options and alternatives for waste was undertaken. A list of 57 possible interventions was developed, including 11 interventions for waste disposal including exporting waste from the city, developing a waste to energy (WTE) facility and seeking a supply contract to dispose of ash, as well as the option of developing the Smooth Hill Landfill. No other potential landfill sites in Dunedin were included in this list as the designation at Smooth Hill had already been secured.

Nine potential programmes were developed incorporating elements of the 57 possible interventions, and tested through multi-criteria analysis, and workshops and discussions with stakeholders. Five of the programmes included development of Smooth Hill for waste disposal, whereas three options involved waste export/private disposal, and one option involved WTE disposal.

Key outcomes from the testing of the nine potential programmes were:

- Council withdrawal from all waste services, with or without regulation to achieve waste minimisation, would not achieve objectives for increased Council influence, change in waste behaviours, and increased waste diversion/reduction of waste to landfill. This was in contrast to programmes that provided for greater Council control of waste and community building to achieve waste minimisation and diversion, including quality control to protect the value of diverted materials, whilst still providing for the development of Smooth Hill for future waste disposal.
- Export of waste would mean reliance on other landfills to accept waste. Whilst indicative capital costs were likely to be relatively low, operating costs might be relatively high due to waste disposal at a combination of existing out-of-district facilities. Concerns were raised, including by mana whenua, over the export of waste out-of-district. This option also presented other risks and uncertainties including the capacity, waste acceptance criteria, and resource consent constraints on receiving

landfills. Furthermore, export of waste would incur transport charges and may be impacted by future national levies and waste / CO2 charges.

- WTE had high indicative capital and operating costs and was reliant on securing large proportions of combustible waste (including from out of district) to be viable, and unlikely to change behaviour with respect to reducing waste production. Ash (~20% quantity of incoming waste) would still require disposal to landfill.

A preferred programme and next phase of work was confirmed with the Council Steering Group in 2018. Following these directions, the applicant reviewed the Waste Minimisation and Management Plan, with the new plan (adopted in 2020) designed to reduce and divert waste from landfill. This has led to a proposal that has been adopted by the applicant to establish a new kerbside collection service from 2023. This will provide for the separation of waste into a "four bins plus one" service for collection, comprising a:

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

The applicant engaged consulting engineers Stantec to assess the costs and risks associated with developing the designated Smooth Hill site for a landfill. The work concluded that Smooth Hill has the capacity to accommodate current waste quantities to 2063 and beyond. The work also confirmed the technical feasibility of the site to be developed and operated as a landfill and didn't highlight any fundamental reasons to not proceed with the consenting process, thereby effectively confirming the 1992 evaluation findings. However, it was recognised that additional characterisation and monitoring would need to be undertaken to support any consent application.

The subsequent concept and updated design process has involved technical input from a range of experts to more fully understand the baseline environment, minimise adverse environmental, social, and cultural effects to the extent possible. Through this process, several adjustments have been made to the landfill footprint and final form including relocating stockpiles to avoid indigenous vegetation, limiting the elevation of the final landfill cap, adjustment of the footprint to allow landscape planting to screen visual effects, and significant amendments to the footprint and maximum capacity of the landfill to avoid wetlands located in the gullies to the north and west.

In conclusion, the applicant considered several other alternative locations for waste disposal in the early 1990s and again in 2018, and has considered multiple alternative ways in which to dispose of waste.

Despite a commitment to waste minimisation and the Council's target of zero waste, it is anticipated that uncertainty will remain regarding the city's waste disposal needs. A conservative approach that retains the existing 60,000 tonnes per year as an average disposal rate but also allows for higher disposal rates is, therefore, appropriate provided that the maximum consented volume is not exceeded.

6. Status of the Application

The Otago Regional Council administers the following applicable statutory instruments:

- Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NESFW)
- Regional Plan: Waste for Otago (RPWaste)
- Regional Plan: Water for Otago (RPW)
- Regional Plan: Air for Otago Air (RPA)

Plan Change 1 (PC1) to the Waste Plan, and Plan Changes 7 (PC7) and 8 (PC8) to the Water Plan were called in and notified by the Environmental Protection Authority on the 6 July 2020 and had immediate legal effect from that date. The plan changes are largely irrelevant to this application, however, PC7 does introduce policy 10A.2.2 requiring any new consents for the take and use of water to be granted for a duration of no more than six years, whereas a term of 35 years is currently sought for the take and use of groundwater (see below). At the time of writing this report, the plan changes were currently being heard and considered by the Environment Court.

For the purposes of the NESFW regulations 37 – 54 the swamp wetland within the site, wetlands within the road upgrade footprint, and other wetlands along tributaries of Ōtokia Creek are considered to be "natural wetlands".

For the purposes of the NESFW and RPW, it is considered that the two ephemeral gullies that run through the proposed landfill footprint are not 'rivers' as defined by the RMA, NESFW, or RPW. Accordingly, the NESFW regulation 57, and Chapter 13 rules of the RPW for activities in the beds of 'rivers' do not apply. This was confirmed during the site visit on 6 October 2020. The swamp wetland at the bottom of the site and the tributary of Ōtokia Creek to the north of the site do come within the definitions for "wetland" and "river" respectively.

6.1 Regional Plan Requirements

The following consents are required under the relevant regional plans.

Activity	Relevant Plan and Rule	Notes
Discharge of waste and hazardous waste onto land, discharge of leachate onto land, discharge of LFG, flared exhaust gases, dust and odour to air.	RPWaste - Rule 6.6.1 The discharge of any contaminant into or on to land; or the discharge of any contaminant into water; the discharge of any contaminant into air; or the discharge of water into water, in the course of, or as a result of, the treatment or disposal of hazardous wastes is a **discretionary activity.** RPWaste - Rule 7.6.1 The discharge of any contaminant into or onto land; or the discharge of any contaminant or water into water; or the discharge of any contaminant into air, as a result of the operation of any landfill are **discretionary activities.**	Rule 6.6.1 is triggered as some "hazardous wastes" will be accepted e.g. contaminated soils.

Taking of up to 87 m^3/day of groundwater from the landfill groundwater collection system, and use of up to 50 m^3/day of this groundwater for non-potable water supply for the landfill facilities.	RPW - Rule 12.2.4 The taking and use of groundwater is a **discretionary activity**.	Permitted activity rule 12.2.2.2 cannot be met because the volume exceeds 25m^3/day and is within 100 m of a wetland.
Diversion of surface water within the Ōtokia Creek catchment.	RPW - Rule 12.3.4 The damming or diversion of water is a **discretionary activity**.	Permitted activity rule 12.3.2.1 cannot be met because the size of the upstream catchment exceeds 50 ha.
Damming of water in the Attenuation Basin.	RPW - Rule 12.3.4 The damming or diversion of water is a **discretionary activity**.	Permitted activity rule 12.3.2.1 cannot be met because the water immediately upstream of the dam is more than 3 metres deep.
Discharge of surface water runoff, collected groundwater, and contaminants from the Attenuation Basin and sediment retention ponds to a tributary of Ōtokia Creek.	RPW - Rule 12.B.4.1 The discharge of water (excluding stormwater) or any contaminant from an industrial or trade premises or a consented dam to water or to land is a **discretionary activity**.	The discharge of surface water runoff will include a residual discharge of sediment even following implementation of treatment measures.
Upgrades to McLaren Gully Road within wetlands and the bed of tributaries of Ōtokia Creek.	RPW - Rule 13.2.3.1 The erection or placement of any structure fixed in, on, under, or over the bed of any lake or river, or any Regionally Significant Wetland, is a **discretionary activity.** RPW - Rule 13.5.3.1 The alteration of the bed of any lake or river is a **discretionary activity.**	The use of the roading structures is permitted under Rule 13.1.1.1. These activities will largely affect wetlands but there may also be some work in the tributaries of Ōtokia Creek.

Permitted Activities

The applicant has stated that the following activities will be undertaken in accordance with the relevant permitted activity criteria:

- Discharge of stormwater from McLaren Gully Road, Big Stone Road, and State Highway 1 during construction and once completed (RPW - Rule 12.B.1.9). Note that clause 12.B.1.9(b) provides explicitly for discharges that occur while a road is subject to works.

- Discharge of exhaust gases from the backup diesel electricity generator to power the leachate collection pumps and LFG flare system (RPA - Rule 16.3.4.2).
- Discharges of dust to air during construction of the upgrade of McLaren Gully Road, Big Stone Road, and State Highway 1 (RPA - Rule 16.3.14.1).
- Introduction of any plant to or on the bed of any land or river for the purposes of restoring or enhancing habitat (RPW - Rule 13.6.2.1).
- Drilling of land to install groundwater monitoring bores and the LFG monitoring and collection system (RPW - Rule 14.2.1.1).

6.2 NESFW Requirements

The NESFW came into force on the 3 September 2020, which was after the date of the lodgement of this application. The following provisions of the NESFW are relevant to the proposal, however, where the rules of the NESFW results in a more stringent activity status for some activities than under the RPW, section 88A of the RMA provides that status of the activities remains unchanged from what they were when the applications were made.

Activity	Regulation	Activity Status at time of Lodgement
Vegetation clearance within, or within 10 m of, wetlands for wetland restoration	*Regulation 39* Vegetation clearance within, or within a 10 m setback from, a natural wetland is a **restricted discretionary** activity if it is for the purpose of natural wetland restoration does not comply with either of the conditions in regulation 38(4).	The alteration of the bed of any river associated with vegetation clearance is a **discretionary activity** under Rule 13.5.3.1 of the RPW.
The following activities will occur outside, but within 100 m of, a natural wetland: • The taking of groundwater from the landfill groundwater collection system; • The diversion of surface runoff; • Damming of water in the Attenuation Basin; and • Earthworks associated with landfill construction.	*Regulation 52* Earthworks, or the taking, use, damming or diversion of water outside, but within a 100 m setback from, a natural wetland is a **non-complying activity** if it results, or is likely to result, in the complete or partial drainage of all or part of a natural wetland. *Note: This regulation applies where the activity **is** likely to result in the complete or partial drainage of all or part of a natural wetland.*	The taking and use of groundwater is a **discretionary activity** under Rule 12.2.4 of the RPW. The damming and diversion of water is a **discretionary activity** under Rule 12.3.4 of the RPW. The alteration of the bed of any lake or river (including reclamation) is a **discretionary activity** under Rule 13.5.3.1 of the RPW.

Earthworks and the diversion of water within natural wetlands during the upgrade of McLaren Gully Road	*Regulation 53* Earthworks, or the diversion of water, within a natural wetland is a **prohibited activity** if it results, or is likely to result, in the complete or partial drainage of all or part of a natural wetland.	The alteration of the bed of any lake or river (including reclamation) is a **discretionary activity** under Rule 13.5.3.1 of the RPW. The diversion of water is a **discretionary activity** under Rule 12.3.4 of the RPW.
The discharge of water from the Attenuation Basin and SRPs General vegetation clearance	*Regulation 54* Vegetation clearance within, or within a 10 m setback from, a natural wetland; or The discharge of water within, or within a 100 m setback from, a natural wetland; is a **non-complying activity.** *Note: This regulation applies where the activity **is not** likely to result in the complete or partial drainage of all or part of a natural wetland.*	The discharge of water is a **discretionary activity** under Rule 12.B.4.1. Vegetation clearance outside of, but within 10 m of, the bed of a river or wetland is a **permitted activity**. The alteration of the bed of any river associated with vegetation clearance is a **discretionary activity** under Rule 13.5.3.1 of the RPW.
The reclamation of the bed of a tributary of Ōtokia Creek for the upgrade of McLaren Road	*Regulation 57* Reclamation of the bed of any river is a **discretionary activity**.	The alteration of the bed of any lake or river (including reclamation) is a **discretionary activity** under Rule 13.5.3.1 of the RPW.

6.3 Conclusion

Based on the above assessment, the various resource consent applications are to be bundled, and considered as a **discretionary activity** under the relevant Regional Plans.

7. Assessment of Adverse Environmental Effects

7.1 Overview

The following discussion regarding potential adverse environmental effects seeks to highlight key issues, but does not attempt to repeat all of the detail that is presented in the application documents, responses to requests for further information, and commentary from the ORC's peer reviewers. Instead, the discussion provides an outline of the review process to date (which should assist the reader with understanding the purpose of the various documents that accompany the application), an overview of key adverse effects, and pertinent concerns of the ORC's peer reviewers.

For ease of reference, this discussion seeks to follow a similar order as the questions raised in the s92 requests for further information dated 13 October 2020 and further questions dated 21 June 2021. The document titled 'Smooth Hill Landfill Final ORC s92 Response' is referred to often as it provides an overview of key questions raised by the expert reviewers along with the applicant's responses. Please note that some of the questions raised in October 2020 may not have been relevant following significant revision of the design of the landfill in early 2021, or were simply points for clarification that were addressed easily, and so no longer appear in this document.

It should be noted that adverse effects of the proposed activities are the primary concern of this notification assessment (s95 of the RMA). Positive effects will be considered later when making a decision on whether or not any consent should be granted (s104 of the RMA).

7.2 Process to date

Pre-lodgement

Prior to the lodgement of the application, both ORC staff and myself (on behalf of the ORC) entered into discussions with the applicant regarding what consents would be required for the proposed activities. Tonkin & Taylor Ltd (T+T) was also engaged by the ORC to undertake a high level review of draft versions of several technical reports on behalf of the ORC to determine whether they were satisfactory in terms of s88 of the RMA.

August 2020

The application was lodged on 27 August 2029. T+T was engaged to provide a review of the following reports on behalf of the ORC to determine whether further information was required:

- Landfill Concept Design Report
- Geotechnical Interpretive Report
- Geotechnical Factual Report
- Groundwater Report
- Surface Water Assessment Report
- Air Quality Report
- Ecological Impact Assessment Report
- Acoustic Assessment Report

Vivian Espie Ltd (Vivian Espie) was engaged to review the Landscape and Visual Assessment Report. A General Arrangement Plan, Concept Design Report, Concept Design Plans, Cultural Impact Assessment, Draft Bird Management Plan, Integrated Traffic Assessment, Archaeological Assessment Report, Economic Impact Assessment and Draft Conditions were

also submitted with the application. These were referred to by myself, T+T and Vivian Espie as required.

October 2020

A request for further information that contained questions from both myself and T+T was sent to the applicant on 13 October 2020. Vivian Espie did not have any questions. During summer 2020/21, various online meetings were held between myself and T+T's expert peer reviewers and the various technical experts acting on behalf of the applicant. The purpose of these meetings was to ensure that the request for information was thoroughly understood by the applicant's technical experts so that they may respond appropriately.

May 2021

A response to the ORC's request for further information was submitted on 31 May 2021. This included:

- A cover letter;
- Significant revisions to the design of the landfill to reduce the size and volume, and updated technical reports and consent conditions to reflect this;
- Tables for each discipline addressing the questions or explaining how the questions had been addressed;
- A copy of the site selection assessment undertaken in 1992; and
- A draft Landfill Management Plan framework.

The initial s92 response generated further questions from both myself and T+T. These questions were presented to the applicant on 21 June 2021. The applicant's technical experts were invited to contact T+T's expert peer reviewers to address points of clarification.

August 2021

A response to the ORC's further questions was submitted on 5 August 2021. This included:

- A cover letter;
- A table addressing the questions, or explaining how the questions had been addressed;
- Revised consent conditions;
- An updated Alternatives Assessment to replace Section 6 of the AEE; and
- Further technical memos and supplementary technical information.

T+T was asked to confirm whether they concur with the applicant's conclusions. This is discussed in the following sections of this report.

7.3 General Considerations

Peer Reviewer Comments

As the Consultant Planner engaged to consider this application, my review of the application material was focussed on the Assessment of Environmental Effects, plus several of the appendices. I have relied on T+T to undertake detailed peer reviews of other technical appendices and provide advice accordingly.

Following my review I raised a suite of questions covering a range of topics. Key points and the applicant's responses are summarised as follows:

- Whether the correct consents been applied for. The applicant confirmed that some activities could be undertaken in accordance with the permitted activity rules, and that some of the water permits sought were in fact diversions.
- Whether the assessment of alternatives undertaken in the 1990s was still relevant. The applicant explained the assessment criteria that was undertaken in the 1990s, and also provided details of investigations into alternative waste management options that have been undertaken more recently. These investigations included alternative methods for managing waste and transportation of waste for disposal outside of the district. The applicant has undertaken an adequate assessment of alternative methods of discharge, including discharge into other receiving environments.
- The 60,000 t/yr average disposal rate used did not seem to reflect the waste reduction targets specified in the WMMP. The applicant explained that annual waste disposal rate will fluctuate based on population changes, changes to waste diversion, and other events such as natural disaster, or all of the city's commercial operators choosing to dispose at Smooth Hill (it is understood that many commercial operators do not currently dispose at the Green Island landfill).
- Whether a 5-year rolling average maximum disposal rate was necessary to ensure that the activity undertaken is consistent with that described in the consent application. Following further discussion with the applicant and T+T, this was deemed unnecessary.
- Whether the proposed bird scaring activities have been included in the noise assessment. This has since been addressed through the specialist peer review of the Acoustic Assessment Report (see below).

I also asked what conditions are applied to the site through the designation. The applicant confirmed that these are:

1. *This designation shall lapse on the 40th anniversary of the date on which this designation becomes operative.*
2. *A landscape plan showing proposed initial planting, final landform and final planting shall be prepared by the Requiring Authority under the direction of a qualified landscape architect prior to the commencement of landfilling operations. Development of the site shall be in accordance with this landscape plan.*
3. *Noise generated by any activity on the site shall comply with the following standards within 50 metres of the nearest house existing at the date on which the designation becomes operative - 55Dt/40Nt dBA. (NB These levels are subject to an adjustment of minus 5dBA for noise emissions having special audible characteristics).*

Conclusions

All of the questions asked were addressed adequately and no further information is required on these topics to help inform a decision on notification.

7.4 Landfill Concept Design Report

Peer Reviewer Comments

The Landfill Concept Design Report was reviewed by Tony Bryce, Technical Director, Environmental Engineering, at T+T. The key points raised by T+T are discussed in the following documents:

- Smooth Hill Landfill Final ORC s92 Response; and

- Technical Review to Inform Notification Decision: Smooth Hill Landfill - Appendix 3 - Landfill Concept Design

And summarised as follows:

- Overall stability of the landfill at all stages of development will need to be demonstrated during detailed design, with emphasis on a potential translational failure plane at the liner interface level. However, in general terms, T+T consider that the landfill as proposed can be designed to be stable.
- T+T considers that the lining system proposed is robust and contains appropriate redundancy, being a multi-barrier composite liner approach.
- Calculations will need to be provided with the detailed design to demonstrate that the appropriate head can be achieved for the aggregate to be used, the drainage slope and the collector pipe spacing. This includes on the intermediate benches where currently no leachate collection pipes are shown. Furthermore, the applicant has provided some redundancy in the leachate collection system by showing two collection pipes at the toe of each side of the landfill. Provision should be made to be able to clean these pipes, and this could be readily achieved with a pipe laid up the slope of the toe bund to clean-out ports located at the surface of the landfill. These two matters (design leachate head and the provision of adequate redundancy/cleaning ability) can be covered by appropriate consent conditions.
- The applicant proposes that leachate will be pumped from the landfill into storage tanks sized to contain 48 hours storage. The adequacy of the storage capacity will need to be reviewed as part of the detailed design.
- T+T considers that the stormwater management system is appropriate for the landfill.
- T+T considers the proposed capping system appropriate for the proposed landfill.
- T+T considers that the LFG collection and treatment system proposed is appropriate for a landfill of this nature.
- A high quality of construction is required, verified by Construction Quality Assurance (CQA), to provide the level of environmental protection proposed. It is critical that an appropriate level of review of the detailed designs and CQA documentation for each stage of landfill development is provided by or on behalf of the Regional Council. The approach adopted for a number of landfill consents in NZ is to appoint a Peer Review Panel (PRP) to review the design, construction and operation of the landfill. The PRP would comprise two or three members with specific landfill or related expertise. The PRP is appointed by the owner, and approved by the Regional Council, and they report back to the Regional Council. All costs are borne by the consent holder. It is usual for the Regional Council to then “accept” the designs, construction, commissioning, etc,. of a cell based on the recommendation of the PRP.
- T+T has recommended that Draft Conditions 4 and 5 be deleted and that the following conditions be added to require the appointment of a PRP.

  4. The Consent Holder shall establish and retain at its own cost, an independent Peer Review Panel to review the design, construction and operation of all stages of the landfill and to assess whether or not the work has been undertaken by appropriately qualified personnel in accordance with the consents and good practice. The independent Peer Review Panel shall comprise at least two persons who together shall be:

- *Independent of the Consent Holder;*
- *Independent of the planning design, construction, management and monitoring of the site.*
- *Experienced in landfill design, construction and management.*
- *Experienced in geotechnical, groundwater and surface water aspects of landfill design, construction and operation.*
- *Recognised by their peers as having such experience, knowledge and skill.*
- *Approved in writing by Otago Regional Council.*

5. Prior to commencing the construction of a new landfill stage, the Consent Holder shall submit a design report and design drawings of the relevant stage to the Peer Review Panel for certification that it meets the requirements of the consent. The Peer Review Panel shall communicate this certification to Otago Regional Council.

6. The Peer Review Panel shall prepare an annual report to be submitted to Otago Regional Council prior to 1 March each year, on the adequacy of the following matters in relation to meeting requirements of the consents:

- *Any management or monitoring plans reviewed during the year.*
- *Any designs reviewed during the year.*
- *Construction activities undertaken including:*
  - *Site preparation.*
  - *Liner construction.*
  - *Leachate collection system installation.*
  - *Landfill gas collection system installation.*
- *Landfill operation including:*
  - *Water control, including stormwater and leachate management.*
  - *Waste compaction.*
  - *Waste acceptance.*
  - *Daily and intermediate cover placement.*
  - *Leachate system.*
  - *Landfill gas system.*
- *Monitoring and records.*
- *Capping and rehabilitation.*

This report shall be based on:

- *A review of the landfill annual monitoring report.*
- *Review of designs submitted during the year.*
- *Review of construction CQA reports.*
- *Any further enquiries and inspections required by the Peer Review Panel to allow them to carry out their duties.*

- T+T has also recommended that the following should be inserted after Condition 13:

  The installation of the lining system shall be subject to independent construction quality assurance (CQA), to include the soil and geosynthetic components of the lining system. On completion of each stage of lining system construction a CQA report shall be prepared and shall include all of the test results, a description of the observations

undertaken and certification that the lining system has been installed in accordance with the specification. This report shall be submitted to the PRP.

Conclusions

Based on the advice from T+T, it is considered that the information provided by the applicant describes concepts that are in general accordance with current industry best practice, and that the landfill can be expected to perform and manage environmental risks to the high standards of modern landfills. At the time of writing this report, the applicant had not been approached to confirm whether they are agreeable with T+T's recommended conditions, and so this conclusion is based only what the applicant has provided.

7.5 Landfill Stability

The construction and operation of the landfill and road upgrades will involve significant earthworks, engineered cut and fill slopes, and waste disposal to land. Potential land stability effects are generally associated with seismic risk, subsidence, landslides, differential settlement, groundwater seepages and resulting uplift pressures affecting the landfill lining system, and inappropriate stability of engineered cut and fill slopes and waste placement.

The table below, which has been paraphrased from the applicant's AEE, provides a brief summary of these potential adverse effects.

Potential Adverse Effect	Discussion
Mapped fault lines within 100 km of the site present potential seismic risk, although the majority of the existing faults are not considered geologically active. Earthquakes can cause waste to be displaced, damage the landfill liner, and cause landslips.	Whilst landfills are not specifically referenced in NZS 1170.5 2004 (procedures for the determination of earthquake actions on structures in New Zealand), the landfill has been designed based on an Importance Level of 3 to resist earthquake loadings with return periods of 1000 and 2500 years respectively. At detailed design stage, a site specific probabilistic seismic hazard assessment (SSSHA) could be completed if seismic shaking is deemed a risk that cannot be mitigated through liner design and leachate management practices. However, the applicant considers that a SSSHA is not currently required.
Shallow soil instability features exist around the site e.g. shallow ground movement in the loess cover or weathered rock mass, which can affect the stability of the landfill.	The depth of these features is typically < 1-2 m and is likely to be a result of soil saturation after heavy rainfall. They will be fully excavated and removed, or stabilised, as part of the development works.
Some of the soil types onsite have the potential to be compressible, affecting the stability of the landfill.	These soils will be removed from the landfill footprint and from beneath areas on which engineered fill is to be placed, including the landfill toe embankment.

Springs/seepages remaining beneath the lining system could result in uplift pressures and have the potential to cause a local failure of the lining system.	Groundwater will be managed by the placement of drainage material and a groundwater collection system beneath the landfill liner to direct groundwater to the base of the landfill for discharge into the downstream watercourse or for abstraction and use onsite, as described earlier in this report.
Inappropriate form and design of the cut and fill slopes, toe embankment, and inappropriate placement of waste has the potential to affect the long term stability of the landfill.	All temporary landfill slopes will be cut at a grade that generally matches the existing slopes onsite and will be cut into favourably dipping rock. As a result, it is considered unlikely that slope instability would occur. Further targeted assessments will be completed during detailed design. Slope stability analyses of critical cross sections has been analysed using Slope/W limit equilibrium software for three scenarios (one static stability scenario and two earthquake loading scenarios). All results met or exceeded the required factor of safety and indicate appropriate stability of the permanent landfill slopes, including the toe bund, with full waste placement. Waste will be placed against the toe embankment at a stable slope. Specification of placement techniques to ensure waste stability during filling will be addressed during detailed design. Engineered protections against the risk of failure at the waste-liner interface will be addressed in the final liner system design for the site.

Peer Reviewer Comments

The Geotechnical Interpretive Report and Geotechnical Factual Report was reviewed by Andrew Stiles, Geotechnical Consultant at T+T. The key points raised by T+T and the applicant's responses are discussed in the following documents:

- Smooth Hill Landfill Final ORC s92 Response; and
- Technical Review to Inform Notification Decision: Smooth Hill Landfill Appendix 5 - Geotechnical Interpretative Report Appendix 6 - Geotechnical Factual Report

And summarised as follows:

- Insufficient investigations had been proposed for the area in the south-east, which was not able to be investigated previously, and now comprises about 50% of the overall landfill footprint. The applicant provided details of further investigations proposed and T+T recommended that a condition of consent be included to ensure this is done.

- The Geotechnical Interpretative Report assumed the proposed landfill to have an Importance Level 2 (IL2) for the purposes of seismic design. Following questions from T+T, the applicant revised the Importance Level rating to IL3.
- It was unclear whether a site-specific seismic hazard assessment (SSSHA) is intended. The applicant has confirmed that a SSSHA would be carried out at the detailed design stage to confirm appropriate seismic design parameters are being used. T+T recommended that a condition of consent be included to ensure this is done.
- Clarification was sought to justify the design parameters used. The applicant provided justification.
- Following questions from T+T, the applicant confirmed that existing shallow slope failures and potentially compressible soils within the landfill footprint would be removed.
- T+T questioned the appropriateness of the some of the slope stability analyses that was been undertaken. Following provision of further information by the applicant, T+T agreed with the applicant's proposed approach provided that the cut and fill slope stability assessment is reviewed, and revised as necessary, during Detailed Design. Conditions of consent have now been proposed by the applicant to ensure this is done.

Conclusion

Based on the advice from T+T, is it considered that potential effects of the landfill development can be appropriately managed through the applicant's proposed conditions of consent, and the further investigative and detailed design work proposed by the applicant. Accordingly, potential geotechnical adverse effects from construction and operation of the landfill will be no more than minor.

7.6 Effects on Groundwater and Surface Water Quantity

The construction, operation, and aftercare of the landfill will modify groundwater and surface water flows and levels within the site and the downstream receiving environment. The applicant has used Hydrologic Evaluation of Landfill Performance (HELP) software to predict effects on the catchment water balance. A total of 69.2 ha of the designation site is within the catchment of the Ōtokia Creek. The landfill footprint will occupy 18.6 ha of this, and the remaining 50.6 ha will continue to contribute groundwater recharge and surface runoff at the same rate as it does currently. The greatest effects on the catchment water balance reduction will occur in the final stage of development when the landfill footprint is fully occupied.

The table below, which has been paraphrased from the applicant's AEE, provides a brief summary of these potential adverse effects.

Potential Adverse Effect	Discussion
The presence of the landfill will reduce surface water infiltration and subsequent recharge of the shallow groundwater system. Groundwater levels in the shallow groundwater system could drop by up to 1 m. This could reduce baseflow	This will be mitigated by the contribution of groundwater from the wider catchment downstream of the Attenuation Basin. The Attenuation Basin has been designed with no lining in the base, which will allow infiltration of around 3,000 m^3/yr of stormwater/surface water run-off to the

recharge to the Ōtokia Creek catchment by approximately 27%, and reduce groundwater flow through the valley floor from approx. 3,000 m^3/yr to approx. 2,200 m^3/yr. The location where the downstream tributary transitions to perennial could move by up to 45 m further downstream from its current location, and potentially impact on water levels in nearby wetlands.	underlying groundwater system. This is expected to provide a net increase in groundwater flow through the valley floor. While the catchment is expected to see changes in where groundwater recharge occurs, infiltration through the base of the Attenuation Basin may be beneficial overall to groundwater flows through the valley floor towards Ōtokia Creek.
The groundwater collection system landfill will intercept groundwater and abstract it for non-potable water supply in the facilities area. This will affect levels, flows, and gradients within the shallow groundwater system, and result in decreased baseflow to Ōtokia Creek.	The groundwater collection system is not expected to intercept groundwater in the southern part of the landfill, but will intercept groundwater in the northern part of the landfill. Significant volumes of groundwater are not anticipated to be abstracted (max. 87 m^3/day).
There will be a loss of recharge to the deep groundwater system.	Any change in groundwater levels due to reduced recharge will have a negligible impact on the deep groundwater system, which does not support any groundwater takes or provide baseflow to any streams.
Surface runoff will be intercepted by areas of the exposed landfill liner and open waste, with subsequent infiltration reporting to the leachate collection system. There will be greater evapotranspiration over the landfill cap due to a relative increase in water infiltration, soil moisture retention in surface soils, and good grass cover. There will also be an increased rate of surface flows across the less permeable landfill cap and attenuation of flows by the Attenuation Basin. This will all result in reduced surface runoff and changes in flows in Ōtokia Creek and may affect water levels in downstream wetlands.	The site is located at the head of the catchment and surface runoff only occurs during and immediately after periods of high or persistent rainfall. The worst case scenario for reduced surface runoff will occur during Stage 4 where the 18.6 ha landfill footprint is fully occupied, but sections of exposed liner and open waste are still present and runoff reports to the leachate collection system. Under this scenario, there is expected to be a 20% reduction in the amount of daily surface water runoff from the site. While there will be an overall reduction in surface water flows to the Ōtokia Creek, the site is estimated to currently contribute no more than 1.6% of flood flows to the wider catchment, and consequently adverse effects on flows and levels in the wider catchment beyond the immediate vicinity of the site will be no more than minor.

	Although total runoff is predicted to reduce, infiltration of stormwater/surface water runoff from the Attenuation Basin and recharge the shallow groundwater system will provide a more consistent source of baseflow for the Ōtokia Creek, as well as providing surface water discharges to the Ōtokia Creek during high rainfall. The Lower Ōtokia Creek Marsh is located towards the bottom of the catchment. At this location the contribution to surface flows from the landfill site is very small, and any adverse effect associated with creek hydrology at this location will be no more than minor.

Peer Reviewer Comments

The Groundwater Report was reviewed by Sally Lochhead, Senior Hydrogeologist at T+T. The Surface Water Report, plus other information submitted by the applicant, was reviewed by Peter Cochrane, Principal Environmental Scientist at T+T. Mr Cochrane has 30 years' experience in sustainable water management.

The key points raised by T+T in relation to groundwater and surface quantity, and the applicant's responses, are discussed in the following documents:

- Smooth Hill Landfill Final ORC s92 Response;
- Technical Review to Inform Notification Decision: Smooth Hill Landfill - Appendix 8 - Groundwater Report;
- Technical Review to Inform Notification Decision: Smooth Hill Landfill - Appendix 9 - Surface Water Assessment

And summarised below.

Groundwater:

- Site investigations with the drilling of boreholes have been undertaken to identify the geological and hydrogeological conditions at the site. Following discussions with T+T, the applicant has advised that another borehole is currently being drilled mid-way between two existing bores to further inform the geotechnical investigation within the proposed landfill footprint.
- Two groundwater systems (shallow and deep) are reported to exist at the site. The applicant has identified that the shallow groundwater system is limited to within the alluvium, colluvial deposits and the shallow Henley Breccia in the valley setting and does not extend toward the ridgelines or fully overlie the deeper groundwater system. The receiving groundwater system from the potential landfill discharges (leachate) has been identified predominantly as the shallow groundwater system.
- Shallow groundwater is inferred to flow toward the northwest and provide baseflows to Ōtokia Creek.

- The deeper groundwater flow direction has been assessed by the applicant to flow southeast toward the Pacific Ocean. The information gained by the drilling of an additional bore is required to demonstrate this flow direction.
- Slow groundwater travel times will occur within the deeper groundwater system.
- Overall, T+T agree with the Groundwater Report description of the receiving environment and hydrogeological setting.
- The depth to groundwater is shown to vary significantly across the proposed landfill footprint. Groundwater levels in the ridgeline bores are at depths greater than 40 m below top of casing (btoc). Some shallow depth bores in the valley are shown to record artesian conditions, whereby the groundwater level is above the ground surface. Other bores on the lower valley slopes record groundwater depths at approximately 4 m to 5 m btoc.
- The conceptual groundwater model figures of the shallow groundwater system at the proposed landfill toe shows the fine-grained low permeability layer (brown silt layer) to act as an aquitard for the shallow groundwater system. The lateral extent and effectiveness of this aquitard is not fully understood.
- It has been acknowledged by the applicant that the extent of the shallow aquifer cannot be well defined. It is expected that the additional site investigations as described above will provide additional information on the groundwater systems in the centre of the landfill footprint.
- T+T disagree with the applicant's statement "that a more detailed quantification of recharge to the deep groundwater system is not considered to add value to the assessment as the risks associated with this flow path are minimal relative to those of shallow groundwater". This uncertainty can be addressed through a consent condition to monitor the deeper groundwater at the toe of the landfill (as discussed below).
- T+T are generally satisfied with the conceptual model. However, further information needs to be provided through groundwater level monitoring to support the conceptual groundwater model, and to provide baseline levels before landfill construction commences.

Surface Water:

- Recharge to the shallow groundwater system will be reduced as a result of the placement of the landfill. T+T agrees with the applicant's conclusions that these effects will be relatively minor, but notes that there is some residual uncertainty. T+T expects further information gained from the additional investigation bore to be provided by the applicant to support the conceptual groundwater model before the substantive decision on the application is made.
- The point at which the watercourse downstream of the designation site transitions to perennial is difficult to define due to the wetlands occupying the valley floors and the fact that this boundary may shift from year to year in response to climate variability. The applicant has, however, indicated that the perennial flows of Ōtokia Creek occur approximately 1 km downstream of the toe of the proposed landfill. The Groundwater Report assesses this downslope movement of the perennial stream flows to be in the order of 45 m, which in T+T's view is a reasonable assessment.
- The Surface Water Report concludes that overall, effects on surface water hydrology will be less than minor. However, this assessment is made in the context of the catchment as a whole and in the context of forestry operations having a potentially

more significant effect on hydrology (and water quality). In other words, the magnitude of effect is assessed as minor, when compared to forestry as a neighbouring land use, and because the landfill comprises only a small part of the catchment overall.

- T+T agrees with the applicant's conclusion that the change in land use will have a less than minor effect on flood flows at McLaren Gully Road and further downstream.

Wetlands:

- Landfill construction earthworks and operation will encroach well within 100 m of the swamp wetland. This is likely to lead to an alteration in water supply to the swamp wetland and potentially to the downstream valley floor marsh wetland. These hydrological changes have been summarised as:
    - Temporarily increased runoff in areas where the landfill liner is initially exposed;
    - Permanently reduced groundwater recharge from beneath the landfill footprint;
    - Permanently increased groundwater recharge from areas outside the landfill footprint, due to groundwater infiltration from the Attenuation Basin; and
    - Permanently reduced runoff from the landfill footprint due to increased evapotranspiration (when the cap is ultimately grassed).
- This may have indirect effects on wetlands throughout the landfill lifespan and the hydrological changes will largely persist even following landfill closure.
- Some of these effects (potentially reduced groundwater discharge to the swamp wetland) have been quantified in the Groundwater Report, whereas others (such as the degree of hydrological change in the wetlands themselves) are difficult to quantify.
- T+T agrees that there are potential adverse effects on wetland hydrology, but were unable to conclude the magnitude of these affects for the following reasons:
    - The magnitude of effects on the hydrology of the wetlands has not been quantified or evaluated;
    - The extent to which soakage from the base of the Attenuation Basin will mitigate these effects has not been quantified and there are no details on how the Attenuation Basin would achieve this and maintain recharge the long-term; and
    - The way in which the discharge from the Attenuation Basin's low-level outlet will affect wetland hydrology is not fully understood.

Conclusion

Whilst there are still gaps in the understanding of the shallow and deeper groundwater systems, based on the current level of information T+T considers that the differences in groundwater volumes (associated with the groundwater flows) will be minor.

Significant uncertainty remains regarding the magnitude of potential adverse effects on the hydrology of the swamp wetland and valley floor marsh wetlands. Both the applicant and T&T have noted that these effects are difficult to quantify. The implications of these potential effects on wetlands need to be considered in the context of both the Regional Plan and particularly Policy 6 the NESFW, which states, "There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted" (my emphasis).

While there are similar uncertainties regarding effects on surface water hydrology, these effects are, from a hydrological perspective, likely to be minor affecting only a small reach downstream of the landfill site.

7.7 Effects on Groundwater and Surface Water Quality

The construction, operation, and aftercare of the landfill will result in the generation of leachate, stormwater containing sediment, and other contaminant runoff which has the potential to enter the downstream receiving environment. Construction works associate with the road upgrades will also generate run-off containing sediment that has the potential to enter adjacent waterways. Note that the applicant has stated that stormwater from the road can be discharged in accordance with the relevant permitted activity rule.

The table below, which has been paraphrased from the applicant's AEE, provides a brief summary of these potential adverse effects.

Potential Adverse Effect	Discussion
Leachate is generated within landfills when infiltrating water interacts with the waste. It can have varying quality, dependent upon the relative proportion of different waste types, landfill design, age of the landfill and local environmental setting. The worst case scenario for leachate generation will be during Stage 4 where the 18.6 ha landfill footprint is fully occupied, but sections of exposed liner and open waste are still present and runoff reports to the leachate collection system. During Stage 4, 46,310 m^3/yr of leachate generation is predicted. This is predicted to drop to 38,584 m^3/yr following closure. Leachate head within the landfill will be limited to 300 mm above the liner by pumping during normal operational conditions. In-cell leachate sumps will provide storage for 10% AEP rain events. Additional storage for 1% AEP weather events will be provided in the waste itself. Under such conditions, leachate head will be limited to 1 m above the	The proposed leachate containment and management system is described earlier in this report and in several of the application documents. The volume of waste generated will be minimised by preventing 'clean' surface water runoff from coming into contact with waste, and by minimising the size of the active waste tipping area that is exposed to rain. Critical leachate flow events occur when the liner of a cell extension is installed and before waste is placed over this liner to attenuate flows. To help manage this, the storage tank farm will be constructed in its entirety at commencement of the landfill operation. The landfill liner will extend to the level of the landfill toe embankment, which will practically eliminate the risk of direct leachate loss to surface water as leachate would need to saturate the waste for a depth of 10 m before overtopping the embankment. Predicted long term leachate leakage through the liner of 0.26 m^3/yr is expected to reflect the only recharge to groundwater across the landfill footprint area. Widely distributed infiltration, low leakage rates and a significant thickness of unsaturated material below the liner is expected to significantly retard the rate of leachate percolation

liner to allow for short term emergency storage. The maximum predicted potential leachate leakage through the landfill liner is 0.26 m^3/yr (Stage 4 and after closure). The applicant has predicted effects on the shallow groundwater system. For the majority of parameters, contaminant flux is predicted to reduce significantly following construction of the landfill due to reduced groundwater flows and the small amount of leachate leakage anticipated. However, increases in contaminant flux are predicted for iron, lead, dissolved reactive phosphorus and ammoniacal nitrogen. The applicant has predicted concentrations of contaminants in the shallow groundwater system and compared this against water quality criteria.	to groundwater, providing the opportunity for significant attenuation of contaminants. On reaching and mixing with the shallow groundwater, migration of contaminants will occur with groundwater flow. The rate of flow through the shallow groundwater system is expected to be low, and potential for further attenuation of contaminants exists prior to contaminated groundwater moving beyond the landfill site. Mixing with groundwater down gradient of the landfill footprint is expected to provide greater than 1000-fold dilution. Discharge from the Attenuation Basin is expected to provide further dilution by approximately 3-fold. According to the applicant, predicted effects on groundwater and connected surface water quality in the immediate vicinity of the site are expected to be negligible.
Run-off of surface water that has come into contact with waste has the potential effect on water quality in the receiving environment.	Proposed measures for managing stormwater and surface water runoff are described earlier in this report and in several of the application documents. In summary: • Runoff from open sections of the landfill will be separated from surface runoff/stormwater from the remainder of the landfill footprint and diverted to the landfill leachate collection system. • Temporary stormwater drains and grades will divert upgradient 'clean' runoff away from these areas and into the perimeter drain instead. • Intermediate cover will be placed in areas where fresh waste will not be placed for more than 3 months. This cover will be graded to the landfill perimeter drain to allow runoff of uncontaminated water and reduction in leachate generation. • The final landfill cap will be similarly graded to the land perimeter drain.

Accidental spillage of leachate from conveyance, storage, and load out facilities has the potential to affect water quality in the receiving environment. A sudden leachate discharge to the environment could occur as the result of a number of events: • Failure of the leachate rising main between the landfill and the storage tanks. • A leachate tank and bunding failure. • Spillage from a tanker during filling or transport through the site.	Measures for managing fugitive leachate are discussed elsewhere in this report and the application documents but key points are repeated here. The leachate riser pipes will be butt-welded PE and are resilient to movement and impact. The leachate storage tanks will be contained in a lined depression to accommodate 150% volume of a ruptured tank and provide additional storage for a 1% AEP storm event. The leachate loading bay will be provided with emergency containment to accommodate the storage capacity of a tanker. Any spills that occurs from a tanker on the site access or public roads will be managed through environmental spill response procedures. Any accidental spillage of leachate would ultimately enter the Attenuation Basin. The outlet from the basin will be fitted with stop valves to allow containment, monitoring, and diversion of contaminated water to the leachate management system for disposal.
Used water from the wheel wash and vehicle wash bay in the facilities area may contain sediment and oil residues that has the potential to affect water quality in the receiving environment.	Measures for managing wastewater from wheel wash and vehicle wash bay, which are discussed elsewhere in this report, include: • The vehicle wash bay will have a concrete pad directing water to sumps with oil and sediment traps. This will then be directed via the lower facilities area SRP prior to discharge. • Dirty water from the wheel wash will pass through coarse sediment traps and be further treated in flocculation ponds to remove contaminants before being recycled back to the wheel wash. Excess water, which is only expected to occur during periods of heavy rainfall, will be directed to the Attenuation Basin for further treatment prior to discharge.
Surface runoff during construction of the landfill and road upgrades has the potential to result in erosion and sedimentation.	Proposed measures for managing stormwater and surface water runoff are described earlier in this report and in several of the application documents. Erosion and sedimentation during landfill

Surface runoff over unsealed and sealed areas during operation of the landfill, and the final landfill cap has the potential to result in erosion and sedimentation. The applicant has stated that the discharge of stormwater from McLaren Gully Road, Big Stone Road, and State Highway 1 (once completed) will meet the relevant permitted activity provisions and so has not been considered any further.	construction works and operation will be minimised by: • Minimising the area of soil surfaces exposed at any one time. • Installing temporary cut-off drains upslope of exposed soil surfaces to minimise surface runoff flowing over exposed soil. • Directing all runoff from exposed soil surfaces within each landfill stage to sediment SRPs constructed at the commencement of that stage. • Directing treated water from the SRPs to the Attenuation Basin for additional water polishing prior to discharge. • Installing temporary measures such as silt fences and sediment traps. • Stabilising earthworked areas with vegetation or other means as soon as practicable. • Incorporation of control measures into stockpiles to ensure sediment is retained. • Undertaking road upgrade works in a way that minimises the areas of exposed soil surfaces and utilises localised sediment control measures such as filter socks, and temporary silt dams in channels. • Grading the final cap to flow to the perimeter drain. Where final cap slopes exceed 1V:5H, permanent contour drains discharging to the perimeter swale drains will be installed upslope to control flows. Grass and other shallow rooted vegetation will then be established.
Monitoring of groundwater, the discharge from the groundwater drainage system, and surface water discharges will need to be undertaken before, and during operation and aftercare of the landfill. This will enable the existing baseline environment to be further characterised, and for potential water quality impacts from the landfill to be monitored. In particular, it will enable monitoring for leachate leakage and detection of any more significant failure of the landfill liner, confirm leachate is not mixing with	Six groundwater monitoring bores will be installed downgradient of the proposed landfill. Section 8.6.3 of the applicant's AEE details how often these will be sampled and parameters to be monitored. This includes: • Continuous monitoring of conductivity, pH and ammonia in the sub-liner groundwater collection system to enable early detection of leachate. • Monthly/quarterly of other bores to test for a wider range of leachate-related contaminants. Conductivity, pH and ammonia in sediment retentions ponds within Stage 1 will be monitoredcontinuously to enable early detection of

surface waters, and confirm the effectiveness of sediment management measures.	leachate prior to discharge the tributary of Ōtokia Creek. Seven surface water monitoring locations will be established and monitored weekly for a wider range of leachate-related contaminants, plus flow rate, suspended solids and turbidity. Water clarity and colour in tributary of the Ōtokia Creek immediately downstream of the landfill northern site boundary will be monitored visually daily (when flow occurs). Groundwater monitoring will commence at least 18 months prior to waste being accepted, and surface water monitoring will commence at least 36 months prior to construction. This will inform development of specific trigger levels for each of the parameters, and contingency actions to be implemented where those trigger levels are exceeded.

Peer Reviewer Comments

The Groundwater Report was reviewed by Sally Lochhead, Senior Hydrogeologist at T+T, and the Surface Water Report was reviewed by Peter Cochrane, Principal Environmental Scientist at T+T. The key points raised by T+T in relation to groundwater and surface water quality, and the applicant's responses, are discussed in the following documents:

- Smooth Hill Landfill Final ORC s92 Response;
- Technical Review to Inform Notification Decision: Smooth Hill Landfill - Appendix 8 - Groundwater Report; and
- Technical Review to Inform Notification Decision: Smooth Hill Landfill - Appendix 9 - Surface Water Assessment

And summarised below.

Baseline Data:

- The applicant has undertaken a very limited programme of investigations to document existing groundwater and surface water quality. Further water monitoring needs to be completed to establish the baseline data prior to commencement of construction works. The applicant proposes further groundwater monitoring once every three months over a period of 18 months, and monthly surface water monitoring over a longer period of 36 months. Quarterly monitoring of groundwater for 18 months is likely to be inadequate to understand groundwater quality and variability.
- T+T recommends that Condition 17 be amended to allow for a more comprehensive period of groundwater quality monitoring to establish baseline levels, from which trigger levels will be derived: *"Groundwater monitoring to collect groundwater level and groundwater quality data, shall commence at least 18 months prior to construction of the landfill at monitoring bores GW1 – GW6....."* and *".....Sampling of groundwater*

and surface water shall occur every month for the 18 month monitoring period for the parameters set out in Attachment 1 for those locations".

- The surface water report recommends the establishment of trigger levels to respond to changes in water quality and take action if necessary, and suggests some metrics (95th percentile) as trigger levels. While T+T agrees with the approach to gather data and develop a suite of trigger levels, it is premature to establish those levels in the absence of a suitable baseline dataset. A further consent condition should be added that requires the applicant to submit a report that assesses the baseline monitoring data and proposes trigger levels for key parameters that are protective of water quality.

Groundwater:

- Greatest volumes of leachate are predicted to be generated during Stage 4 of the operations and after landfill closure. The predicted leachate leakage rate through the landfill liner during this period is 0.26 m^3/yr. Levels of lead dissolved reactive phosphorus (DRP), ammoniacal-N and iron in the shallow groundwater system are expected to increase as a result of the potential leachate leakage but not exceed the water quality criteria adopted by the applicant.
- No design details of the monitoring bores are provided and these need to be provided by the applicant to show the target depths and which groundwater system they are monitoring. For example, one monitoring well (GW1) is proposed immediately upgradient of the landfill footprint. No detail has been provided on this monitoring well depth, but it needs to be deep enough to capture groundwater flows in the deep groundwater system.
- T&T recommends that Condition 68i be more appropriately worded to bring it in line with NZS 4411 Environmental Standards as follows, which include the protection of the bore headworks: *"Monitoring bores shall be constructed in accordance with NZS 4411 and shall be protected to ensure that physical damage to the* bore headworks *does not occur".*
- T&T recommend that the following condition is added: *"The Landfill Monitoring Management Plan shall describe, with justification, the target depths and design details for monitoring bores GW1 to GW6".*

Surface Water:

- T+T agrees with the applicant's proposed erosion and sediment control measures, with specific measures to be adopted through the design and construction phases. T+T also agrees with the development, implementation and regular updating of an erosion and sediment control plan and monitoring, as proposed by the applicant.
- SRP 4 drains an area of the site where the LFG plant and refuelling areas are located. T+T was unable to determine whether this area will become paved or remain unsealed. If it is paved then T+T recommends the construction of a sediment retention pond (or another device) to drain this area. This is an area of uncertainty that would benefit from clarification.
- T+T agrees that continuous monitoring of water quality in the Attenuation Basin and fitting the low-level outlet with a shut-off valve is an appropriate way of managing the risk of leachate contamination in the Attenuation Basin. However, the Surface Water Report and draft consent conditions are silent as to how this would be implemented. Monitoring of this nature should consider setting-up of automatic alarms to warn the

landfill operator of situations of potential contamination and include response processes to act to immediately stop any discharge and to take the necessary remedial steps. These are important procedures that require a lot of detail to be worked through and are appropriately specified through a detailed monitoring plan and contingency plan.

- Proposed surface water monitoring sites provide a reasonable coverage downstream of key discharge points and off-site.

General Comments on Monitoring:

- The intent of Condition 18 is to develop trigger levels at each monitoring location is supported. However, the stated purpose of the trigger levels "to detect any leachate in advance of waste being accepted" is not supported as the trigger levels are predicated on detecting leachate, rather than avoiding potential adverse effects on surface water quality.
- Condition 19 in its current form, along with the parameters set out in Attachment 1, is insufficient to provide certainty that monitoring data will be collected in a consistent manner that is sufficiently comprehensive to enable identification of effects on surface water quality to be confidently undertaken to appropriate quality assurance standards. In other words, it is not clear how the monitoring data will inform the Consent Authority and others about the effects of the landfill surface water quality. Additional information on this matter should be provided by the applicant as part of the ongoing communication, in an amended condition, or in evidence should the application be heard.

Conclusion

The applicant's proposal to collect further baseline data to assess the potential effects of contaminant is supported as it will enable the development of a robust picture of groundwater and surface water quality and enable the development of trigger levels that are protective of water quality.

The current level of information indicates that potential adverse effects on groundwater quality in the shallow groundwater system will be minor, and less than minor in the deeper groundwater system.

However, the draft consent conditions are not (at this point) sufficiently developed to ensure that data collected will be fit for purpose, or that it will adequately manage potential effects on surface water.

At the time of writing this report, the applicant had not been approached to confirm whether they were agreeable with T+T's proposed conditions, and so this conclusion is based only what the applicant has provided.

7.8 Effects on Air Quality

The construction, operation, and aftercare of the landfill will result in the generation of odour, dust, landfill gas, and combustion emissions from the flaring of landfill gas, which have the potential to affect air quality in the receiving environment. The applicant has advised that the

diesel-fired generator can be operated in accordance with the relevant permitted activity rule and so its discharges haven't been considered.

The application provides a description of the receiving environment and prevailing wind conditions on the site, indicating that the prevailing winds are from the west-southwest and that light winds (which are of most importance for odour propagation) tend to occur from the west and east. The application also discusses background air quality around the landfill site, and describes there being no significant odorous activities. Furthermore, it describes the site as having air quality that is "excellent" – i.e. background air contaminant concentrations will be low and consistent with the site's rural location.

There are several existing sensitive receptors located in the area, as shown on the figure below. R1, R2 and R3 are commercial activities and the rest are residential activities, with P1 and P2 being potential residential activities (activities that could establish as a permitted activity under the 2GP district plan rural zoning).

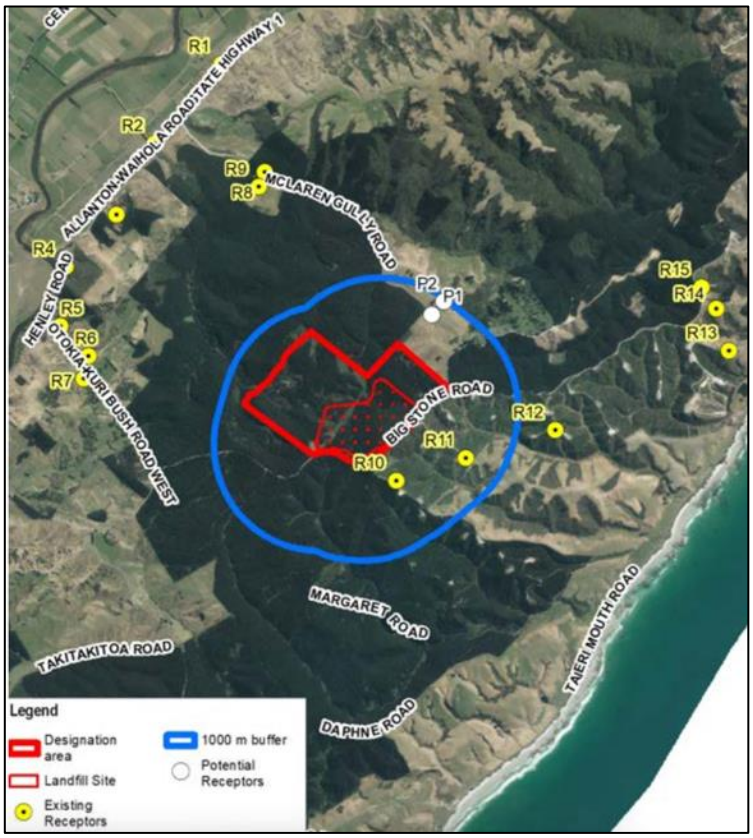

Figure 9: Location of sensitive receptors

The table below, which has been paraphrased from the applicant's AEE, provides a brief summary of these potential adverse effects.

Potential Adverse Effect	Discussion
Odours associated with landfill operations (refuse, leachate and LFG) are generally	The following measures will be incorporated within the final LMP and implemented at the landfill: • No composting activity to occur onsite and bulk greenwaste will not be accepted.

accepted by the majority of the population to be unpleasant.	• Protocols to forewarn of the arrival of odorous wastes (e.g. biosolids and offal) so that preparations can be made to cover waste as soon as it's placed. • Transporting refuse to site in sealed truck and trailer units or bins. • Treating wastewater biosolids prior to arriving at site. • Training weighbridge staff to identify and hold unexpected highly odorous deliveries until such time as measures are in place to place and cover the waste. • Good housekeeping standards on the site. • Keeping the size of the landfill working face to a minimum. • Locating the refuse tip head close to the refuse placement area to avoid pushing the refuse a long distance. • Landfill cells filled from the base of the valley. • Covering waste at the end of each working day. • Mowing landfill surfaces that are grassed to allow effective surface emission monitoring. • Undertaking instantaneous surface monitoring (ISM) regularly to identify any areas of capping that need to be remediated. • Scheduling activities such as extensive excavations into old waste (only undertaken under exceptional circumstances) to days when wind direction is away from sensitive receptors. • Conducting regular walk-over inspections to identify any damage to the cover system and to monitor the effectiveness of the mitigation measures. • Systems for identifying areas for improvement and recording corrective actions. • Additional measures such as using odour neutralising sprays, and implementing additional procedures for highly odorous wastes. • Refusing to receive particularly problematic wastes until it can be demonstrated that the level of odour from the waste has been reduced. • Maintaining a log of all odour complaints, identifying the source, actions taken to minimise odour emissions, and feedback to the complainant.
Dust emissions from the construction and operation of the site are expected to predominantly consist of coarse particles, which are	The following mitigation measures will be incorporated in the final LMP and implemented at the landfill: *Construction*

typically greater than 20 microns in diameter. The most common concerns relating to coarse dust discharges are impacts on amenity, visibility and effects on structures (nuisance).	• Visual dust inspections on a regular basis throughout the day. • Using watercarts or fixed sprinklers to control dust from haul roads. • Increasing the intensity of dust control measures (e.g. increased suppression watering rate) where visual inspections find dust leaving the site. • Delaying/reducing the rate of works and/or further increase the rate of watering during high-wind speeds (wind speeds above 5 m/s). Data collected by the on-site AWS will be used to inform site staff if wind speeds are above 5 m/s. • Onsite speed limits (<15 km/hour) to reduce wheel generated dust emissions. • Keeping paved areas (especially at the site entrance) clean and free from waste and dust through regular sweeping and/or hosing down. • Placing excavated material directly into trucks where possible. • Where material being excavated is very dry, using water sprays to increase surface moisture. • Where material is placed in temporary stockpiles, using water in dry windy conditions to control dust, or cover if practicable. • Limiting the height of uncovered stockpiles to reduce wind entrainment. • Covering long term stockpiles. • Taking account of daily weather forecast wind speed, wind direction and spoil conditions before commencing dust generating activities. *Operation* • Onsite speed limit of 30 km/hr in all areas of the site. • Use of the wheel wash to prevent mud/dirt from being tracked along the access road on to public roads. • Using water-carts on both sealed and unsealed roads as required during. • Properly maintaining and grading temporary roads. • Treating dust generating wastes as a special waste, requiring customers to dampen down the load prior to delivery to site, and implementing special controls at the disposal point, e.g. water sprays, waste pit, etc.
LFG can cause health, safety, amenity and environmental impacts due to the gases it contains. The landfill is	A range of LFG management measures will be implemented at the site to manage the LFG generated. These are described in the application and earlier in this report, and include active LFG management (i.e.

expected to start generating LFG in 2028 and will continue to do so for many years after landfilling of waste has ceased. This could impact upon on-site workers and visitors, impact upon on-site buildings and structures, and impact upon future on-site subsurface services. Offsite risks are considered to be of a lower significance.	collection and combustion), regular monitoring, and appropriate waste covering and containment systems. A concept design for the LFG monitoring bore network has been provided and will be finalised at the detailed design stage along with a detailed LFG Risk Assessment. The LFG monitoring bore network will be installed prior to the commencement of landfilling to obtain background ground gas data. Monitoring will confirm the effectiveness of the LFG collection system and enable detection of any LFG escape that may present a hazard or nuisance.
The combustion of LFG in the flares will emit various air pollutants including NO2, CO, SO2, PM10 and PM2.5 and small amounts of volatile organic compounds (VOC).	The results of modelling identified that the concentrations of NO2, CO, SO2, PM10, and SO2, in combination with existing background concentrations, are predicted to be well below the relevant health-effect based assessment criteria at all off-site locations. Consequently, there is limited potential for adverse off-site air quality effects associated with the flare discharges.

Peer Review Comments

The Air Quality Report was reviewed by Richard Chilton, Principal Air Quality Scientist at T+T. The key points raised by T+T and the applicant's responses are discussed in the following documents:

- Smooth Hill Landfill Final ORC s92 Response; and
- Technical Review to Inform Notification Decision: Smooth Hill Landfill Appendix 5 - Geotechnical Interpretative Report Appendix 6 - Geotechnical Factual Report

And summarised as follows:

- T+T largely agrees with the applicant's assessment that potential odour effects associated with the routine receipt of waste that is not highly odorous will be acceptable (i.e. not offensive or objectionable) at sensitive receptor locations beyond the site boundary.
- T+T considers the key risk in terms of the potential for offensive or objectionable odour relates to the receipt of highly odorous wastes or exposure to LFG that has migrated beyond the site boundary.
- Draft conditions proposed by the applicant to manage the receipt and handling of highly odorous waste are considered by T+T to be generally appropriate (subject to some refinement as discussed below) and will significantly reduce the potential frequency, duration, and intensity of possible odour impacts.
- Given that the proposed landfill will be of a modern design, with modern LFG extraction and treatment an integral part of the design, T+T agree with the Air Quality Report and the GHD technical memo that odour associated with landfill gas should not be a significant issue in the same way that it has been for the Green Island Landfill.

- The Air Quality Report has assessed the effects of emissions from a ground flare that is 8 m tall and 2.5 m in diameter and information has been provided on how the flare will conform to the requirements of the NESAQ. T+T sought clarification on several inputs used in the applicant's dispersion modelling and these queries have been addressed.
- T+T considers the Air Quality Report has reasonably canvased potential sources of dust emissions typically associated with the construction and operation of a municipal landfill. In T+T's experience, dust impacts are seldom a reported air quality issue from the operation a landfill implementing good practice dust control measures.
- T+T noted that the assessment of odour effects in the Air Quality Report relies heavily on the adoption of best practice odour control measures. T+T considers that a more complete and comprehensive Landfill Management Plan addressing the control of odour, and particularly the receipt and management of highly odorous wastes, should be provided before the substantive decision on the application is made.
- T+T considers additional consent conditions would be appropriate that:
  - Limit the time of day when highly odorous loads can be received to avoid early mornings when winds can be very light or calm which is a worst case for odour dispersion.
  - Include a definition of what constitutes highly odorous wastes.
  - Require the management plan to include specific procedures for the pre-acceptance, handling and placement of highly odorous wastes, including contingency measures in the event of an unexpected odorous load.
  - Specify the key requirements of the procedures for the receipt of highly odorous wastes (for example immediate burial, availability of odour suppressant sprays, etc.).
- T+T recommends that Condition 34 would be more appropriately worded in line with MfE guidance[11] which is set out in italic text below. This text relates to an offensive or objectionable 'effect':
  There shall be no noxious, dangerous, offensive or objectionable odour or dust to the extent that it causes an adverse effect at or beyond the boundary of the site.

Conclusion

T+T considers the applicant's proposed conditions to be broadly appropriate, apart from those proposed to manage the receipt and handling of highly odorous waste, which would benefit from some refinement. Overall, T+T considers it reasonable to conclude the potential odour effects on dwellings within 500 m of the Smooth Hill Landfill will be 'minor', but not 'less than minor'.

T+T considers the potential air quality effects associated with LFG combustion, and the potential for offensive or objectionable effects from dust to be 'less than minor'.

7.9 Effects on Ecological Values

The construction, operation, and aftercare of the landfill and road upgrades will modify the existing terrestrial and freshwater habitats within the site and the downstream receiving environment. The applicant's assessment of effects on ecological values has been undertaken

[11] MfE, 2016, Good Practice Guide for Assessing and Managing Odour. Ministry for the Environment

in accordance with the EIANZ[12] Guidelines, with the magnitude of effects being described on a scale of very high – very low effects, or net gain for positive effects. The assessed level of effect has then guided the extent and nature of measures required to avoid, remedy, mitigate, offset, or compensate for the loss of ecology values.

The table below, which has been paraphrased from the applicant's AEE, provides a brief summary of these potential adverse effects.

Potential Adverse Effect	**Discussion**
Construction of the landfill and road upgrades will result in a total of 38.18 ha of vegetation removal or disturbance and result in loss of threatened flora species. Vegetation clearance and earthworks may create further opportunities for weed invasion, and other potentially problematic weeds could be accidentally introduced on machinery, material or waste brought to site.	The vegetation communities and habitats that will be cleared range from highly modified communities with no or few indigenous species (lower value) to less modified indigenous-dominated communities (higher value). This includes the following areas of **moderate** ecological value: • 13.8 m^2 of (Pūrei) / (Yorkshire fog – cocksfoot) – rautahi sedgeland along the McLaren Gully Road • 3.15 ha of (Yorkshire fog) - cocksfoot grassland located within the site, and along McLaren Gully Road • 2.7 m^2 of [Pūrei] – wīwī / rautahi – exotic grass rushland located along McLaren Gully Road The applicant has assessed the loss of these vegetation communities as having a very low level of ecological effect. All other areas to be cleared comprise vegetation communities of negligible ecological value. It is probable that a small number of kānuka seedlings or low stature kānuka occur in areas affected by the proposal. Kānuka is however an extremely common species at the level of the ED and nationwide. In the context of the existing level of modification, the potential magnitude of ecological effect on all vegetation types not subject to clearance at the site due to weed encroachment or weed introduction has been assessed as very low.
Construction of the landfill will result in the permanent loss of habitat for avifauna, including regenerating native treeland, macrocarpa forest, and re-planted radiata pine plantation, which provides habitats	None of the native gully habitat on site will be lost, the lost re-planted radiata pine habitat type is abundant in the surrounding landscape, and falcon are highly mobile species. Other native Not Threatened birds will also be able to disperse and utilise the areas of native habitat that will

[12] EIANZ, 2018, Ecological Impact Assessment Guidelines, Environment Institute of Australia and New Zealand

variously used by the At Risk eastern falcon.	remain on site as well as native gully habitats present in the surrounding environment.
The noise and activities associated with construction and operation of the landfill, and road upgrades, may disturb foraging, roosting and nesting activities of local birds and potentially displace them from the site and nearby areas. Increased rodent populations may result in increased bird mortality.	Construction activities occurring during the falcon breeding season (i.e. between the start of September and the end of February) when birds are nesting on the site, could disturb and displace nesting adults and compromise the survival of eggs and/or chicks. This risk can be managed by avoiding construction activities during the falcon breeding season, or conducting a pre-construction nesting falcon survey and establishing construction-free exclusion zones around nests until nesting activities are completed. Outside of the falcon breeding season (i.e. between the start of June and end of July), it is expected that At Risk eastern falcon, which are a highly mobile species, will disperse and utilise other areas of their extensive home ranges. Vermin numbers can be controlled by prompt compaction and application of cover soil, and trapping and poisoning.
Operation of the landfill will attract increased abundances of birds, and potentially result in strike with aircraft within the Dunedin airport approach/departure circuit. Gull species, especially black-backed gulls, are of particular concern in New Zealand. Black-backed gulls are the species most attracted to landfills and because they are large birds that often soar at high elevations where they are at risk from aircraft strike. Waterfowl and shags are also present in high abundances in the wider landscape, and may be attracted to areas of open water in the site. These species are also at risk of strike with aircraft.	Good landfill operational practises are crucial and if effectively maintained can keep bird numbers at low levels. The most effective operational practise to prevent birds from establishing at a landfill is to exclude or reduce as much as possible putrescible (organic) waste from the waste stream as this denies birds a food source. Other important operational practises include: • Good litter control; • Separating putrescible and general waste streams (if possible); • Transporting waste to the landfill in sealed containerised trucks (if possible); • Minimising the uncovered working face; • Prompt and thorough compaction of waste; • Covering waste at the end of the day; • Special handling of highly organic waste; and • Minimising areas of exposed earthworks and related shallow pools and puddles of water. • Maintaining long grass cover at the site. • Deterrence and bird management methods, including scaring (using gas guns), and shooting non-protected species. The Attenuation Basin will at times hold water following rain events, however it will typically be dry, and will be planted so open water will not be present. It is, therefore, not expected that bird strike risk from waterfowl will

	increase relative to the risk in the wider area that already exists from the extensive number of waterfowl utilising the Taieri Plain wetland complex.
Construction of the landfill and road upgrades will result in the loss of habitat for lizards, and disturbance and displacement of lizards into unsuitable habitat, or result in lizard mortality. At Risk lizard species may be present within the site with **High** ecological value, and all native lizards are protected under the Wildlife Act.	Where practicable, clearance of areas of lizard habitat (particularly areas of (Yorkshire fog) - cocksfoot grassland (within or surrounding radiata pine – gorse / (cocksfoot – Yorkshire fog) shrubland) should be avoided. Where the removal of lizard habitat cannot be avoided, risks to lizards can be managed by the pre-construction salvage and relocation of lizards and implementing measures for incidental discovery of lizards during construction. Revegetation within the designation site which incorporates a species mix can also provide habitat and food resources (e.g. *Muehlenbeckia complexa*). Wooden debris can also be included, providing suitable refugia for lizards (as well as invertebrates).
The landfill is likely to lead to a worst case 20% reduction in surface water flows to the downstream valley floor marsh wetland. Groundwater levels in the shallow groundwater system are predicted to reduce by approximately 1 m. A reduction in water supply may lead to a slightly altered composition of wetland vegetation in the swamp wetland and the valley floor marsh wetland. The change in annual runoff could lead to a “down-valley” shift in the perennial flow transition in the tributary of Ōtokia Creek.	Groundwater infiltration from the proposed stormwater attenuation basin is anticipated to mitigate the loss of groundwater recharge. Only a slight change in downstream water flows is expected as a result. Based on these slight changes, it is expected that the swamp wetland and valley floor marsh wetland will persist as wetland features. At worst, some individual obligate wetland plants may disappear from some areas, being most likely nearest the designation site. The main obligate wetland species that are most vulnerable to an altered (reduced) water supply, in terms of cover, are exotic species (sweetgrass and watercress) and as such are not considered to have intrinsic ecological value in terms of ecological effects assessment. Pūrei, which could also reduce in extent, is a Not Threatened indigenous species that is extremely common in the surrounding area and at the level of the ED. The wetland features within and below the designation site have a number of hydrological influences that will alter with time irrespective of the landfill proposal. These include climate change effects, and land use changes in other tributaries, i.e. ongoing maturation of adjacent pine forest and regeneration of native forest in gullies). Such factors render it difficult to assess the likelihood or extent of possible wetland changes.

	No hydrological effects of the landfill on the wetland vegetation at the base of West Gully 3 and 4 upstream of the swamp wetland are expected because of the non-existent and insignificant contribution (respectively) of the proposed landfill footprint to the catchment for this narrow area.
The landfill construction and operation could result in the disturbance and mobilisation of sediment into the downstream receiving environment. Elevated turbidity can adversely affect the growth of aquatic plants and algae. Feeding activity and foraging success for macroinvertebrates can be reduced by elevated turbidity, and, it can limit the ability of visually foraging fish to feed (e.g. trout) and result in avoidance behaviour of indigenous species such as banded kōkopu. High loads of suspended sediments can also damage fish gills and make them more susceptible to disease, or even result in mortality.	The proposed stormwater management system should capture any sediment laden water and ensure that fine materials are not discharged downstream. The tributary currently receives runoff and stormwater from the pine plantation. Based on the proposed management system, there could be an overall positive effect, or only a very slight change from the existing baseline condition due to the landfill proposal. Discharge of leachate to the receiving environment would likely be toxic and may kill freshwater flora and fauna. The proposed leachate management system will intercept and collect potential leachate to avoid it leaking/discharging into the downstream receiving environment. Down gradient monitoring wells are also proposed to be installed, to provide advance warning of any leachate leakage before it reaches the downstream receiving environment. There is predicted to be a reduction in contaminant flux downstream as a consequence of the landfill. It cannot be predicted with confidence what effect an overall reduced contaminant flux will have on downstream wetland vegetation, however, overall changes to surface water quality due to the landfill proposal are most likely to be an overall positive effect.

The policy framework of the PRPS and 2GP require that adverse effects on wetlands and other significant indigenous vegetation types are to be avoided; and if avoidance is not practicable, the applicant must ensure that there is ‘no net loss’ and preferably a net gain in the indigenous biodiversity values of the area. Consequently, vegetation types/habitats (including wetlands) that have been identified as significant that are to be cleared or otherwise negatively affected are required to be avoided, remedied, mitigated, offset, or compensated for to ensure that there is no net loss of the significant ecological values.

The following table, which has been paraphrased from the AEE, explains how the applicant plans to achieve this. It is worth noting the distinction between which measures are mitigation

(reducing the level of adverse effect) and which are offsets or compensation (contributing to positive effects).

Effect	Management Measures
Loss of at least 0.0017 ha of wetland (sedgeland and rushland) habitat adjacent to roadsides.	*Offsetting* A Vegetation Restoration Management Plan, which outlines steps to enhance wetland habitat in a nearby wetland area, will be prepared and implemented. This Plan will include fencing, planting, weed control, and monitoring. Enhancement of wetland will occur in an area of existing wetland vegetation within the landfill site at the base of West Gully 3, and West Gully 4 (comprising 0.49 ha in total).
Altered groundwater and runoff from the landfill footprint may affect the 0.47ha swamp wetland.	*Offsetting* A Vegetation Restoration Management Plan, which outlines steps to enhance and improve the integrity of the swamp wetland will be prepared and implemented. This Plan will include fencing, planting, weed control, and monitoring. Enhancement would occur within the swamp wetland itself.
Disturbance, displacement and mortality of falcon during the breeding season (during construction).	*Mitigation* A Falcon Management Plan will be prepared and implemented. This plan will include details regarding the time of year to avoid construction during the falcon breeding season, and if this is not practicable, measures to minimise effects on potentially nesting birds (e.g. pre- construction falcon surveys and establishing construction exclusion zones around any identified nests until nesting activities are completed.
Indigenous lizard species may be present in the landfill site. 3.15ha of grassland vegetation that is proposed to be cleared for landfill construction and road upgrades represent typical low quality habitat for Southern grass skink (At Risk – Declining).	*Offsetting* A Lizard Management Plan will be prepared and implemented. This plan will manage effects on lizards primarily by salvage and translocation away from the site of impact, and through predator control efforts as part of the plant and animal pest controls detailed in the LMP. It will also outline a range of measures to enhance and protect a potential lizard release site via fencing and planting. The Vegetation Restoration Management Plan includes a range of measures to enhance and protect a potential lizard release site at West Gully 2 across an area of approximately 5.8 ha.
A reduction in groundwater and surface water / runoff from the designation site may reduce the perennial extent of the	*Mitigation* Impact measures such as best practice erosion and sediment control measures, implementation of the Attenuation Basin, etc. are already assumed. *Offsetting*

downstream tributary of Ōtokia Creek.	The Vegetation Restoration Management Plan is required to manage the potential changes to the 0.47 ha swamp wetland which sits within the tributary.

A draft of the Vegetation Restoration Management Plan, Falcon Management Plan, Lizard Management, and Bird Management Plan have been prepared and is contained within the draft LMP. The Plant and Animal Pest Control Programme is yet to be developed in any detail.

Peer Review Comments

The Ecological Impact Assessment Report was reviewed by Mike Lake, Senior Freshwater Ecologist, and Dr Liz Curry, (Terrestrial Ecologist, at T+T). The key points raised by T+T and the applicant's responses are discussed in the following documents:

- Smooth Hill Landfill Final ORC s92 Response; and
- Technical Review to Inform Notification Decision: Smooth Hill Landfill - Appendix 11 - Ecology Assessment

And summarised as follows:

- The distinction between ephemeral, intermittent and perennial watercourses is relevant because it helps determine when a watercourse meets the definition of a river under the Resource Management Act and provides an indication of when a watercourse can support aquatic communities. The applicant has used the following classifications:
    - Permanent: The continually-flowing reaches of any river or stream.
    - Intermitted: Stream reaches that cease to flow for some periods of the year because the bed can be above the water table at some times.
    - Ephemeral: Stream reaches with a bed above the water table at all times, with water only flowing during and shortly after rain events.

  However, this classification seems to have been inconsistently applied within the Ecological Impact Assessment.
- The ephemeral – intermittent watercourse transition point is likely to be difficult to define due to the wetland occupying the valley floors and may shift from year to year in response to climate variability. At some point downstream of McLaren Gully Road the watercourse will transition from an intermittent to perennial (continuously flowing) watercourse, but that point was not identified in the Ecology Report.
- In T+T's opinion, the macroinvertebrate and habitat assessments undertaken were adequate for characterising freshwater values, and the ecological surveys conducted in watercourses within the designation and in the Ōtokia Stream tributary upstream of McLaren Gully Road were sufficient for identifying fish values present.
- T+T agrees with the applicant's approach of not assessing the values of the ephemeral gullies within the designation on the basis that they do not provide any stream habitat.
- T+T agrees with the applicant's assessment that the section of the Ōtokia Stream tributary between the designation and McLaren Gully Road has moderate ecological value.

- The proposal has the potential to result in the loss of stream habitat as a consequence of reduced groundwater contribution to surface flows in the intermittent and perennial watercourses.
- It is T+T's opinion that changes to intermittent reaches of watercourses should be avoided, whereas the applicant has focussed on avoiding changes to the perennial reaches. T+T has suggested that if the loss of habitat in intermittent reaches cannot be avoided, then that effect should be managed through adherence to the effects management hierarchy.
- Ecological Impact Assessment concludes that there will be very low level of effects with respect to the loss of freshwater habitat. While T+T agrees that there may be a very low level of effects on surface water flow, it notes that there is considerable uncertainty as to how surface water flows may respond to the establishment of the landfill. Given this level of uncertainty T+T is of the view that appropriate surface water hydrology monitoring should be established to ensure that the actual magnitude of effects is negligible or low. Wetlands are particularly sensitive to changes in hydrology, and it would therefore be appropriate to monitor changes in wetland extent as well. If the magnitude of effects is moderate or higher then additional effects management will need to be triggered. T+T notes that Table D1 of the Groundwater Report refers to wetland monitoring but this has not been carried through to conditions, and it is not clear whether the one site recommended is sufficient to monitor all of the wetlands present.
- T+T agrees with the applicant's assessment that overall effects on water quality are likely to be very low, but notes that no ecological monitoring is proposed to ensure that the actual effects will be as low as predicted T+T recommends that freshwater ecological monitoring be included in the Landfill Management Plan.
- T+T is satisfied that managing effects of road construction on fish passage through adherence to the NES for Freshwater (or separate consents if necessary) would result in a very low level of adverse effect on fish passage.
- The ecological effects assessment and subsequent s92 responses have not been clear, resulting in confusion regarding the magnitude of effects. The applicant has acknowledged this confusion but the further information provided is brief and doesn't provide the clarity needed to assess this application.
- The applicant acknowledges that the landfill has the potential to significantly alter hydraulic input into the swamp wetland and valley floor wetland, which could cause a decrease in wetland area and the alteration or loss of species assemblages. Further to this, a proportion of wetland along McLaren Gully Road will be reclaimed. There is not enough detail to accept the applicant's assessment. At this stage, without the requested detail, T+T considers that the level of effect may be underestimated, especially in terms of wetland reclamation, having ramifications on whether the proposed offset is enough to result in no net loss or net gain in ecological/ biodiversity value.
- Based on the detail provided, the *low or very low level of effect* on lizard populations stated by the applicant maybe underestimated. Although T+T agrees that the implementation of a Lizard Management Plan is standard practice and will reduce the level of effect, the remaining residual effect should be appropriately accounted for by offsetting.

- According to T+T, the assessed level of effect on falcon seems to be an underestimation. Although T+T agrees that the implementation of a Falcon Management Plan is standard practice and will reduce the level of effect, if they are found to be breeding onsite and available breeding habitat is restricted in the surrounding environment, then there would be a level of residual effect that would need to be accounted for by offsetting.
- Further information has been supplied to quantify the proposed offset using a Biodiversity Offset Accounting Model. Supporting benchmark data could have been supplied to support the models but was not. It is important that the model and associated data are transparent and robust at this stage, as it should be used to ascertain standards to be incorporated into proposed conditions of resource consent. These standards can then be used to develop long term ecological monitoring to determine when or if the proposed net gain in ecological/biodiversity value is achieved.
- Condition 46 is not enforceable by compliance as it refers to "to the extent possible". T+T suggest the deletion of this condition once the matters above have been addressed.
- Conditions 47 to 51 follow a logical sequence of a typical ecological measures, however the detail of these conditions are likely to change to include specific standards to be complied with based on the further detail that has been requested.
- The ecological condition set requires the ORC to 'approve' management plans. T+T recommend changing this to 'certify'.

Conclusions

With regard to freshwater ecological matters, T+T is in general agreement that the level of effects are likely to be very low provided all effects management actions are implemented. However, T+T notes that a considerable level of uncertainty exists regarding the degree of hydrological alteration that may occur. T+T recommends that this uncertainty be managed though amendments to the consent conditions to include hydrological and ecological monitoring in the receiving environment, including adaptive management responses.

In terms of terrestrial ecological matters, T+T has low confidence with regards to the applicant's magnitude and level of ecological effects conclusions. This low confidence in the level of ecological effects means that an assessment of the overall offset package is unable to be finalised, and a conclusion is unable to be reached as to whether it is appropriate and will result in no net loss and a preferable net gain in ecological/biodiversity value at this point. Well considered and detailed conditions of consent would need to be constructed and agreed to bridge the gap in knowledge and give confidence that the overall ecological effects can be appropriately managed and offset or compensated for.

7.10 Effects from Noise

The applicant originally suggested that noise effects are only relevant to the applications for consent from the DCC for the road upgrades, and not relevant to the applications for consent from the ORC for activities within the landfill designation itself. The applicant has been advised that that noise is an adverse effect that can be considered by the ORC when considering an application to discharge contaminants to land for the purpose of operating of a Class 1 landfill. Noise generated within the designation is, therefore, the primary concern of the ORC. Noise

associated with the road upgrade construction works will be controlled through the relevant DCC consent.

Certain activities associated within the project will generate noise that has the potential to adversely affect the health and amenity of local residents. This includes:

- Periodic temporary construction noise associated with landfill development activities, including the initial enabling works, and the works for developing each stage of the landfill.
- Operational noise from landfill site activities, including vehicle movements, waste filling, compaction, cover, bird deterrence, and maintenance activities.
- Temporary construction noise from upgrading works to McLaren Gully Road (including its intersection with State Highway 1), and Big Stone Road.
- Vehicle noise along McLaren Gully Road and Big Stone Road for worker transport, delivery of waste, leachate and water transport, and construction vehicles.

The applicant has noted that the following noise limits apply to the designation site under the DCC 2GP District Plan:

A1.4 Designations - D659 Proposed Smooth Hill Landfill Condition 3 - Noise generated by any activity on the site shall comply with the following standards within 50 metres of the nearest house existing at the date on which the designation becomes operative - 55Dt/40Nt dBA. (NB These levels are subject to an adjustment of minus 5 dBA for noise emissions having special audible characteristics)

There are two existing residential activities (R10 and R11) located southeast of Big Stone Road and the proposed landfill that may be particularly subject to the effects of noise generated from within the designation.

Figure 10: Closest existing residential activities to the landfill site

According to the applicant, the noise limits under designation Condition 3 need only to be met at houses that existed at the date upon which the 2GP designation became operative (December 2019), and the noise limits do not need to meet the limits at any house constructed after this date.

The table below, which has been paraphrased from the applicant's AEE, provides a brief summary of potential adverse effects associated with noise generated from within the

designation. Further detail regarding noise from the road upgrades is provided in the application.

Potential Adverse Effects	Discussion
Periodic temporary construction noise associated with landfill development activities. Work is expected to exceed 20 weeks. The noisiest combination of equipment expected to operate simultaneously in Stage 2 are two chainsaws, two excavators, two dozers and one vegetation chipper within Stage 2. The nosiest combination of equipment expected to operate simultaneously in Stage 3 are two excavators, two dozers and one motor scraper.	Designation Condition 3 requires the noise limit to be complied with at a point 50 m from the nearest house. The shortest distance between the location of potential operational activity on the landfill and the façade of the closest receiver R10 is approximately 350 m. The highest noise level from construction predicted at R10 is 55dB LAeq. Compliance with the 55dB LAeq day time noise limit in designation Condition 3 will be readily achieved at the closest existing house R10.
Operational noise from landfill site activities within the existing designation. The noisiest equipment likely to operate simultaneously are a excavator, dozer, and waste compactor.	Compliance with the 55dB LAeq day time noise limit in designation Condition 3 will be achieved approximately 215 m from the equipment, and therefore will be readily achieved at the closest existing house R10

Peer Reviewer Comments

The Acoustic Assessment Report was reviewed by Darran Humpheson, Senior Acoustics Specialist at T+T. The key points raised by T+T and the applicant's responses are discussed in the following documents:

- Smooth Hill Landfill Final ORC s92 Response; and
- Technical Review to Inform Notification Decision: Smooth Hill Landfill - Appendix 16 - Acoustics Assessment

The applicant has demonstrated that noise levels from activities within the designation will be compliant with the designation Condition 3 noise limits at the closest existing residential activity (R10). Furthermore, six noise specific conditions have been drafted for inclusion on the DCC consent to manage noise effects associated with the road upgrade works. These conditions include compliance with the standard noise limits of the DCC 2GP District Plan, restrictions on working hours, a minimum separation distance for road upgrade works, and the requirement to prepare and comply with a Construction Noise Management Plan (CNMP).

Conclusion

Based on the advice from T+T, it is considered that potential effects of the proposal can be appropriately managed through the proposed conditions of consent and, accordingly, the potential adverse effects from construction and operation of the landfill will be less than minor.

7.11 Landscape

The construction, operation, and aftercare of the landfill and road upgrades will modify the existing landscape, natural character, and visual amenity within the site and surrounding area. Effects associated within the designation site are the primary concern of the ORC. Effects associated with the road upgrade construction works will be controlled through the relevant DCC consent.

The table below, which has been paraphrased from the applicant's AEE, provides a brief summary of these potential adverse effects.

Potential Adverse Effects	Discussion
Construction of upgrades to McLaren Gully will reveal a raw work appearance, but this will not appear uncharacteristic the existing rural road network. Once completed, the upgraded road corridor will maintain part of a wider rural road network which assimilates within this undulating rural landscape. Construction and operation of the landfill will substantially modify the existing folded landform to infill a gully. Such modification will contrast with surrounding rural based activity, however will be consistent with the effects anticipated by the underlying designation. During landfill activity, movement of large machinery and earthworks will be evident and atypical of the normal day to day rural activities that currently prevail. The construction and operation of plant, soil stockpiles and drainage within the site will also generate some more distinctive rural-industrial influences, however these will have limited visibility from beyond the site. The potential to observe the proposed landfill operation is largely contained within an internal amphitheatre with the potential viewing audience predominantly limited to adjoining areas including parts of McLaren Gully and Big Stone Roads.	Once the landfill is fully completed the landform will be shaped to resemble a smoothed rounded form which will be maintained in pasture. It will remain contained in a broader productive rural landscape that can continue to be managed as productive forestry and enduring areas of indigenous vegetation, including ecological mitigation within the balance of the site. Landscape effects will be further mitigated by perimeter trees consistent with surrounding areas of forestry resulting in adverse landscape character effects remaining well contained, and external views continuing to be characterised by established areas of pine which are apparent in much of the surrounding landscape. No specific additional measures are proposed to be incorporated within the conditions and LMP objectives for the ORC consents. Other measures, which are mentioned earlier in this report, will be incorporated in the outline plan of works (to be submitted later with the detailed design): • Perimeter planning comprising dense bands of pine, kānuka and totara along the eastern ridge and the Big Stone Road boundary.

Views from dwellings are limited to long distance partial views from three dwellings which are typically concealed by intervening plantation forest within a wider working rural landscape. Any partial and transient views will entail a foreground of productive plantation forestry and typically maintain a very distant backdrop of Maungatua beyond the Taieri Plains.	• Ongoing maintenance of the above planting to ensure successful establishment, along with weed control, rubbish removal, and replacement of failed/unhealthy plants.

Peer Review Comments

The Landscape and Visual Assessment Report was reviewed by Ben Espie, RMLA Landscape Planner and Director at Vivian Espie.

Vivan Espie did not feel the need to ask the applicant for any further information, and did not find any gaps, flaws or implausibility in the applicant's assessment or conclusions. These findings are summarised in Table 6.1.5 of Landscape and Visual Assessment Report and the following statements (taken from the same report):

- Section 6.2 (in relation to natural character effects): "*It is considered that removing the small areas of wetland and providing substantial ecological planting throughout the designation site will in time result in low beneficial natural character effects*".
- Section 6.3 (in relation to visual effects from dwellings): *"Short-term transient views experienced when exiting adjoining accessways are considered to generate temporary moderate-low adverse effects, limited to within the first five years of operation. Following the establishment of landscape mitigation as proposed, adverse visual effects will reduce to low".*
- Section 6.3 (in relation to visual effects from roads): "*Overall, views from McLaren Gully Road and Big Stone Road are considered to result in temporary moderate adverse visual effects which reduce to low adverse effects once mitigation has established*".

Conclusion

Both Vivian Espie and the applicant's Landscape and Visual Assessment Report refer to a general standard that is used by landscape architects to translate terminology used to describe the degree of adverse effects to the language used in s95 of the RMA.

Table 1: Conversion of landscape/visual effects descriptions to s95 terminology

Description	very low	low	low-mod	moderate	mod-high	high	very high
s95 term	less than minor	minor		more than minor		significant	

Based on this, adverse effects on the landscape itself (its natural geomorphology and structure) will be 'more than minor' while the landfill is in operation, but these effects will be internal to the site itself and will reduce to 'minor' once the landfill is complete. Visual effects from nearby dwellings will be 'minor'. Visual effects from McLaren Gully Road and Big Stone Road will be 'more than minor' during the first five years of operation and will reduce to 'minor' once landscape mitigation planting has established. All other adverse effects have been assessed as minor.

7.12 Archaeological

The applicant has provided an Archaeological Assessment Report[13] that considers the effects of the project on archaeological sites that fall within the project area. Two of these, I45/71 and I45/72, are within the existing designation and the proposed works will impact on, or have a high likelihood of impacting on, these sites. Several other archaeological sites exist along the proposed road realignment but there is a far lower risk of these being affected by activities for which consent is required from the ORC (consent is only required from the ORC for those parts of the road realignment that will impact on surface water bodies).

The applicant has mapped 'red zones' that cover sites I45/71 and I45/72. All works within red zones will be monitored by an archaeologist and standard archaeological discovery protocols will apply. Other measures will be later incorporated in the outline plan of works. These will include:

- Undertaking a baseline archaeology survey;
- Implementing protection measures in the form of fencing during construction.
- Preserving the structures as a ruin with a protective covering approved by Heritage New Zealand (HNZ), providing public interpretation, and establishing a 10 m buffer to landfill development.
- Planting within 5 m of the structure at site 145/72 in a way that ensure root damage will not occur.

Under the Heritage New Zealand Pouhere Taonga Act 2014, HNZ is the final arbiter on whether archaeological authorities are issued, and HNZ effectively peer review every archaeological assessment submitted. There is no particular precedent for having an archaeological assessment peer reviewed by another contract archaeologist when processing an application for resource consent. The applicant has stated that there will be engagement with HNZ prior to modifying the site, and that an archaeological authority will be sought. As such, an independent review of the Archaeological Assessment Report has not been undertaken on behalf of the ORC.

7.13 Cultural Impact Assessment

The applicant has provided a Cultural Impact Assessment prepared by Aukaha Ltd on behalf of Te Rūnanga o Ōtākou. The CIA provides an account of the cultural values associated with the proposed landfill site and surrounding cultural landscape, and discusses the potential effects of the landfill on these values. The CIA also provides recommendations for mitigating effects on cultural values. These recommendations, and the applicant's initial response to these recommendations, are discussed in Section 8.11.7 of the applicant's AEE and repeated in the following table.

CIA Key Message	Applicant's Response
Mana whenua seek opportunities to exercise rakatirataka and kaitiakitaka in ongoing discussions with the DCC regarding waste minimisation and waste	The DCC acknowledge that mana whenua has a key role to play as a Treaty Partner in the delivery of the Waste Futures programme, as kaitiaki for Dunedin's natural environment and resources. The

[13] New Zealand Heritage Properties Ltd, 2020, Smooth Hill Landfill Archaeological Assessment for Site No. I45/71, I45/72, I45/67, I45/79, I45/80, I45/81, I45/82.

management strategy and implementation in Dunedin.	DCC is committed to ongoing engagement to ensure rakatirataka and kaitiakitaka are exercised.
Mana whenua recognise the need for the DCC to deal with waste in a pragmatic manner now, and as Dunedin's population grows. However, mana whenua question whether waste minimisation measures can be brought forward to reduce the need for waste to go to landfill beyond Stages 1 and 2 of the proposal.	The WMMP 2020 developed in consultation with mana whenua and the community sets achievable targets for waste minimisation and reduction of waste disposed to landfill by 2030. The success of these measures (and future measures beyond 2030) will determine the need for the use of the landfill beyond stage 2. However, it is possible there will remain a long term need for a landfill to dispose of residual waste that cannot otherwise be diverted.
Despite the mitigation measures set out to deal with surface and groundwater quality, concerns remain about the potential for leachate seepage within and beyond the site designation over the very long term. This concern extends to any impacts on the Ōtokia Creek.	Robust leachate containment and stormwater/ surface water runoff management measures, and operational and monitoring practices are proposed that will persist beyond the 40-year operational life of the landfill to ensure impacts on surface and groundwater quality and Ōtokia Creek is avoided to the fullest extent possible. These are in part detailed in the draft LMP and will be further developed prior to completion of the final LMP. The enhancement of wetland/riparian habitat is proposed in the vicinity of the landfill, recognising the existing degraded habitats that exist, and the potential impacts of the landfill on their values. The DCC will work with mana whenua following lodgement of the applications and in the long term to ensure their concerns are addressed, including to confirm landfill operational and monitoring measures in the final LMP, and identify wetland/waterway enhancement opportunities.
It is imperative that stormwater management systems are robust, actively monitored and addressed in the event of inefficiencies or failures.	
Mana whenua seek to protect and restore mahika kai values and wetlands. This includes the regionally significant wetlands of the Lower Ōtokia Creek Marsh at Brighton.	
The inherent values of the permanent and ephemeral waterways must be safeguarded and enhanced.	
The effects of climate change, including extreme rain events, on the receiving environment should be accommodated in the design.	Climate change projections, including extreme rainfall, have been adopted within the design of the landfill, and will be further addressed through detailed design to ensure the long term stability of the landfill and avoidance of effects on the receiving environment. This will be further detailed in

	the final LMP developed in collaboration with mana whenua.
Wai Maori Recommendations	**Applicant's Response**
That all practicable measures are taken to prevent discharges entering water, including preventing where possible, leachate from entering groundwater and surface water.	As noted above, robust leachate containment and stormwater/surface water runoff management measures, and operational and monitoring practices are proposed to ensure impacts on surface and groundwater quality and Ōtokia Creek are avoided to the fullest extent possible. These are in part detailed in the draft LMP and will be further developed prior to completion of the final LMP in collaboration with mana whenua.
That stormwater quality is tested. If stormwater contains high concentrations of harmful leachate or contaminants, then it should not be allowed to infiltrate to groundwater or be discharged to Ōtokia Creek.	The proposed monitoring includes monitoring of stormwater/surface water runoff prior to entry to the Attenuation Basin, within the basin itself, and downstream. In addition, specific monitoring proposals are proposed for the discharge of stormwater/surface water runoff from the Stage 1 area that bypasses the Attenuation Basin. Should leachate contamination be detected, stormwater/surface water runoff will be diverted from entering the basin and directed to the leachate collection system for disposal off site. This will be further detailed in the final LMP.
That effects on mauri and whakapapa from contaminants entering water and from altering the existing hydrology are offset by mitigation measures such as riparian planting and pest management. Proposed offsetting or mitigation management plans need to be provided to mana whenua for review and consultation prior to implementation. While these measures do not directly address the adverse effects on mauri, they will enhance the mauri of the area.	As noted above, the enhancement of wetland/riparian habitat is proposed in the vicinity of the landfill, recognising the existing degraded habitats that exist, and the potential impacts of the landfill on their value. A plant and animal pest control programme will also be implemented. This will be further detailed in the final LMP developed in collaboration with mana whenua.
That baseline monitoring is undertaken before any work can be undertaken. This will allow any effects to be identified and measured.	Extensive baseline monitoring, covering hydrogeology, water quality, ground gas, wetlands, eastern falcon, and lizards is proposed prior to landfill construction/operation. This are detailed in the draft conditions of consent and are in part detailed in the draft LMP. They will be

	further developed prior to completion of the final LMP and associated ecological management plans in collaboration with mana whenua.
That visual inspection monitoring, where proposed, forms part of an integrated water monitoring programme.	Visual inspection is just one facet of water and air quality monitoring that will also include routine water and landfill gas sampling and assessment against trigger levels to detect adverse effects. Where it is proposed, visual monitoring provides another additional safeguard. Monitoring measures are in part detailed in the draft LMP and will be further developed prior to completion of the final LMP in collaboration with mana whenua.
That additional groundwater and surface water monitoring sites are installed and monitored within the tributary of Ōtokia Creek outside of the designated site.	Groundwater and surface water monitoring sites have been selected that are suitable to detect any leachate and other contamination in the receiving environment. Monitoring measures will be further detailed in the LMP developed in collaboration with mana whenua.
Kaitiakitaka and Mauri	**Applicant's Response**
Any ecological management plans are developed prior to the granting of resource consent.	Draft ecological management plans have been developed as part of the draft LMP and will be developed prior to completion of the final LMP in collaboration with mana whenua.
That any works are undertaken outside of the kārearea breeding season.	A draft Falcon Management Plan has been developed in collaboration with mana whenua. Where kārearea have been identified as nesting on the site, works will be undertaken outside the breeding season where possible, and if not possible, exclusion zones will be established to avoid or minimise any adverse effects on nesting birds.
Ensure landfill design elements and mitigation measures are controlled and regularly monitored so that degradation of the mauri of the ecosystem within, and beyond the site is avoided or eliminated.	Robust containment measures, and operational and monitoring practices are proposed that will ensure impacts on the receiving environment will be avoided to the fullest extent possible. These are in part detailed in the draft LMP and will be further developed prior to completion of the final LMP in collaboration with mana whenua.
Best practice erosion and sediment control guidelines are adopted for all works	Best practice erosion and sediment control guidelines will be adopted for the

connected to the Smooth Hill Landfill project including design, construction maintenance, operation, and roading. Contractors undertaking the works should prepare an erosion and sediment control plan which details current best practice and confirms that the measures proposed are appropriate to the site.	construction and operation of the landfill and road upgrades. Control measures are in part detailed in the draft LMP and will be further developed prior to completion of the final LMP in collaboration with mana whenua.
Enhance water quality monitoring outside of the designated area as it relates to the tributary of Ōtokia Creek, including visual inspection where surface discharges are occurring.	As above, groundwater and surface water monitoring sites have been selected that are suitable to detect any leachate and other contamination in the receiving environment. Visual inspection is one facet of water quality monitoring. Monitoring measures are in part detailed in the draft LMP and will be further developed prior to completion of the final LMP in collaboration with mana whenua.
More information is required as to what measures are in place to mitigate mass leachate diffusion and subsequent influencing of ground and surface water in the Ōtokia Creek in the event of a natural hazard.	The site is a suitable location for a landfill in regard to land stability. Detailed design of the landfill will ensure natural hazard risks are appropriately addressed to ensure containment of waste and contaminants as a result of a hazard event. Contingency measures will be further detailed in the final LMP developed in collaboration with mana whenua.
Initiate wetlands and creek margins replanting programme.	As above, the enhancement of wetland/riparian habitat is proposed in the vicinity of the landfill.
The applicant should consider a process of resourced and ongoing engagement with mana whenua, to enable input into and the exchange of information regarding any Falcon, Lizard and Environmental Management Plans including water quality management, rehabilitation, heritage and biodiversity monitoring.	As above, the draft LMP and ecological management plans have been developed and will be further developed prior to completion of the final LMP in collaboration with mana whenua.
Recognition of Mana Whenua	**Applicant's Response**
That the DCC consider a process of resourced and ongoing engagement with Te Rūnanga o Ōtākou, with particular regard to input into, and reporting on, environmental and ecological management plans, water management, closure and rehabilitation, heritage, biodiversity and monitoring.	As above, the draft LMP and ecological management plans have been developed and will be further developed prior to completion of the final LMP in collaboration with mana whenua.

Mana whenua should be given the opportunity to review and comment on the effectiveness of Environmental Management Plans.	Te Rūnanga o Ōtākou will have the opportunity to input into annual reviews into the effectiveness of the final LMP.
Mana whenua should be given the opportunity to undertake ongoing monitoring alongside other specialists.	Mana whenua will continue to be given the opportunity to join site visits undertaken by specialists for the purposes of environment monitoring.
Any Environmental Management Plans implemented must provide for ongoing monitoring to ensure the objectives of those management plans are being met.	The draft LMP and ecological management plans include monitoring measures to enable the assessment of whether the objectives of the management plans are being met. These will be further development prior to completion of the final LMP in collaboration with mana whenua.
Haere whakamua, Tikaka, Utu	**Applicant's Response**
Mana whenua request that the applicant develops, funds and adheres to an implementation strategy to enable an efficient shift to a zero waste future. This will require forward thinking, adaptability, innovation and accountability to the community to ensure that landfill solutions are phased out.	The WWMP 2020 includes implementation pathways aimed at achieving the Council's zero waste future, and targets for waste minimisation and reduction of waste disposed to landfill by 2030. Through the implementation of the plan, the Council will work closely with mana whenua as Treaty Partner and support their kaitiaki role.
The applicant ensures that thorough analysis of alternative solutions has been undertaken, documented and disseminated to mana whenua and stakeholders.	As above, a thorough analysis of alternatives was undertaken as part of the 1992 site selection and designation process and reconfirmed through the Waste Futures programme. More information can be provided to mana whenua, and the DCC remain open to considering design and operational alternatives suggested by mana whenua.
Hau	**Applicant's Response**
Ensure mitigation measures are monitored, controlled and regularly reviewed.	As above, robust containment measures, and operational and monitoring practices are proposed that to ensure impacts on the receiving environment are avoided to the fullest extent possible. These are detailed in part in the draft LMP and will be further developed prior to completion of the final LMP in collaboration with mana whenua.
Ensure residential properties in proximity to the site are engaged with.	The DCC has engaged with, and will continue to engage with adjacent residential properties.

7.14 General Community Effects

Operation of the landfill has the potential to result in a number potential effects on surrounding amenity or public health and safety. These are summarised in the following table taken from Section 8.14 of the applicant's AEE.

Potential Adverse Effects	Discussion
Landfill fires can occur at the surface, in recently deposited waste in the landfill working face, or deep-seated fires found at depth in material deposited previously. The landfill is also at risk from surrounding forest fires. Underground landfill waste fires are typically very slow burning and by their underground nature are not a significant threat to the surrounding environs. Once started, they are however difficult to extinguish. For underground and other fires, fire prevention through good waste acceptance and site management practices that prohibit ignition sources, and first response fire attendance are important.	The following fire prevention measures are proposed to be adopted within the LMP to prevent fires: • Maintaining fire breaks around the site from surrounding forest plantations. • Prohibition on all burning activity on site. • Ensuring no smoking on site. • Supervision of the tip face. • Compaction and daily cover of the waste. The LMP will also include procedures for fire response, and management. A Fire Plan for the landfill will be maintained in conjunction with Fire and Emergency NZ (FENZ) setting out fire response measures. Fire control equipment will be present on site, including the on-site water tanker truck, which will be fitted with a pressure pump and hoses and will provide initial fire response until which time FENZ arrives on site. Operations staff will be trained in the use of such equipment and in techniques for dealing with surface fires and deep-seated fires. Fire response will also be supported by having dedicated on site fire water supply tank of least 100 m^3. The presence of on-site firefighting resources and water supply on site, will also enable fire assistance to be provided to the local community surrounding the landfill.
Uncontrolled litter can contribute to a loss of amenity experienced surrounding a landfill site.	The following measures are proposed to be adopted within the LMP to minimise litter migration beyond the site boundary: • Minimising the area of the working face. • Compaction and daily cover of waste. • Use of litter nets and fences. • Regular inspection and removal of litter from fences and areas surrounding the site. In addition to these measures, landscape mitigation planting will screen the site from view along Big Stone Road, thereby maintaining amenity from close public views.

Vermin such as mice and rats brought to site or attracted to the landfill can spread disease, cause property destruction, and contaminate food. Flies may also become a problem in summer months where eggs laid in putrescible waste hatch.	The following measures are proposed to be adopted within the LMP to minimise vermin and nuisance insects: • Compaction and daily cover of waste. • Pest control and use of insecticides. Pest control measures for rodents (rats and mice) will be undertaken in conjunction with the wider Plant and Animal Pest Control and contained within the LMP so as to minimise health, nuisance, and indigenous flora and fauna effects.
Birds attracted to landfills can transfer pathogens to drinking water supplies. The houses closest to the landfill are understood to use roofwater for drinking water supply.	The measures outlined in the draft Bird Management Plan and contained within the LMP will ensure the attractiveness of the landfill to birds is reduced, and bird numbers are kept to very low levels.

Conclusion

Provided that these potential risks are managed to the level proposed by the applicant, then any adverse effects will be no more than minor.

8. Notification

Section 95A of the RMA specifies the steps a consent authority must follow (including a prescribed order) to determine whether to publicly notify an application for resource consent. These steps, and the answers to the questions, are as follows:

Step 1: Is public notification mandatory as per questions (a) – (c) below?

(a) Has the applicant requested that the application be publicly notified? No

(b) Is public notification required by section 95C? **Yes**, section 95C asks the following questions and if any of them are 'Yes' then the application must be publicly notified:

- Has further information been requested and not been provided within the deadline set by Council? **Yes,** the applicant has provided insufficient information to demonstrate how monitoring data will inform the Consent Authority and others about the effects of the landfill on surface water quality (see Section 7.7), and insufficient information to support their conclusions regarding the magnitude and level of ecological effects on wetlands, lizards and eastern falcon (see Section 7.9).
- Has the applicant refused to provide further information? **Yes,** the magnitude and level of effects on the swamp wetland and valley floor march wetland appear to be understated without sufficient supporting information requested (see Section 7.9). Furthermore, supporting benchmark data could have been supplied to support the Biodiversity Offset Accounting Model but was not (see Section 7.9).
- Has the Council notified the applicant that it wants to commission a report but the applicant does not respond before the deadline to Council's request? No
- Has the applicant refused to agree to the Council commissioning a report? No

(c) Has the application been made jointly with an application to exchange recreation reserve land under section 15AA of the Reserves Act 1977? No

Step 2: Is public notification precluded as per questions (a) – (b) below?

(a) Is public notification precluded by a rule in the plan or a NES? No

(b) Is the application for one or more of the following activities but no other activities:

(i) A controlled activity? No

(ii) A restricted discretionary, or discretionary activity, but only if the activity is a subdivision of land or a residential activity? No

(iia) A restricted discretionary, discretionary or non-complying activity but only if the activity is a boundary activity? No

(iii) A prescribed activity (see section 360G(1)(a)(i)? No

Step 3: Does the application meet either of the criteria in (a) or (b) below?

(a) Is the application for a resource consent for one or more activities, and any of those activities is subject to a rule or national environmental standard that requires public notification? No

(b) Will the activity have or be likely to have adverse effects on the environment that are more than minor in accordance with Section 95D? **Yes,** visual effects from McLaren Gully Road and Big Stone Road will be 'more than minor' during the first five years of operation (see Section 7.11 above).

Step 4: Do special circumstances exist in relation to the application that warrant the application being publicly notified? **Yes**. There is a high degree of public concern and interest in this application. Public opinion, in this instance, is a contributing factor in this notification assessment but is not the determining factor.

Under section 95A of the RMA if any of the answers are 'Yes' then an application must be publicly notified. In this case there are three public notification criteria that are triggered, namely: 1) some of the adverse effects associated with the application are more than minor; 2) the applicant has not provided requested information within the set deadlines and refused to provide some requested information; and 3) special circumstances exist. Accordingly, public notification of this application is required under s95A of the RMA.

The following table provides details of specific persons on whom notice should be served, and the reasons for this. This assessment was provided in part by the applicant.

Affected Party	**How they are affected**
Dunedin International Airport Limited, Terminal Building, Momona, New Zealand	Risk associated with increased bird activity in the vicinity of the airport
Aukaha Limited, Level 1, 258 Stuart Street, PO Box 446, Dunedin	The applicant engaged Aukaha Ltd to prepare a cultural impact assessment on behalf of Te Rūnanga o Ōtākou, but the site also lies within the rohē of other rūnaka.
Department of Conservation, Level 1/265 Princes St, Dunedin	Effects on native biodiversity values
Graeme John Wallace Cook Allan Gibson Trustee Company Limited, 909 Allanton-Waihola Road, Mosgiel 9092	Unknown potential receptor if this property was developed for additional residential activity
Peter Karl Huemmer, and Jillian Mary Huemmer, 108 McLaren Gully Road, Mosgiel 9092	Nearest receiver to proposed roadworks
Granger Forestry and Housing Limited, PO Box 44447, Mosgiel, 9053	Nearest receptor (731 Big Stone Road) with greatest potential to be affected by odour
Big Stone Forest Limited, Sarah Ramsay, Director, Big Stone Forest Limited, 23 Thomas Burns Street, Dunedin 9016	Greatest potential (689 Big Stone Road) to be affected by odour and dust
Tortuga Trust Limited, Christian Michael Rampe and Sandra Habermann, Tortuga Trust Limited, 9 Gladstone Road South, Mosgiel 9024	Greatest potential (513 Big Stone Road) to be affected by odour and dust
George McLeod, Eunice McLeod, Russell Melville and David Brent, 748 Taieri Mouth Road, Brighton, 9091	Unknown potential receptor (Land Title OT245/105) if this property was developed for additional residential activity
Ngai Tahu Forest Estates Limited, PO Box 83, Christchurch 8140	Nearby property affected by McLaren Gully Road upgrade
Lawrence George Henderson, PO Box 3326, Bluff Point, Geraldton, Western Australia 6350, Australia	Nearby property (211 McLaren Gully Road) affected by McLaren Gully Road upgrade

Port Blakely, PO Box 13980, Christchurch 8141	Owns neighbouring properties.
Otago Estate Limited, PO Box 164, Shortland Street, Auckland 1140	Owns neighbouring properties.
Saffhill Forestry Estates Limited, 200 McLaren Gully Road and 350 Big Stone Road	Upgrades to McLaren Gully Road and Big Stone Road will directly affect this property.
Wenita Forest Products Limited, 11 Hartstonge Ave, Mosgiel, Dunedin, 9024	Wenita has a registered forestry right over the Saffhill land and is therefore considered to be affected by the upgrades to McLaren Gully Road and Big Stone Road.

If notification is required then has the applicant paid the additional notification fee? No

NOTIFICATION RECOMMENDATION:
In accordance with the notification steps set out above, it is recommended that the application is publicly notified.

Name: Hilary Lennox
Title: Consultant Planner
Date: 13 September 2021

Decision on notification

Sections 95A to 95G of the Resource Management Act 1991

Date: **13 September 2021**

Application No: **RM20.280**

Subject: ***Decision on notification of resource consent application under delegated authority***

Decision under Delegated Authority

The Otago Regional Council decides that this resource consent application is to be processed on a **publicly notified** basis in accordance with sections 95A to 95G of the Resource Management Act 1991.

The above decision adopts the recommendations and reasons outlined in the Notification Recommendation Report above in relation to this application. I have considered the information provided, reasons and recommendations in the above report. I agree with those reasons and adopt them.

This decision is made under delegated authority by:

Dr Robert Lieffering
Independent Commissioner

13 September 2021