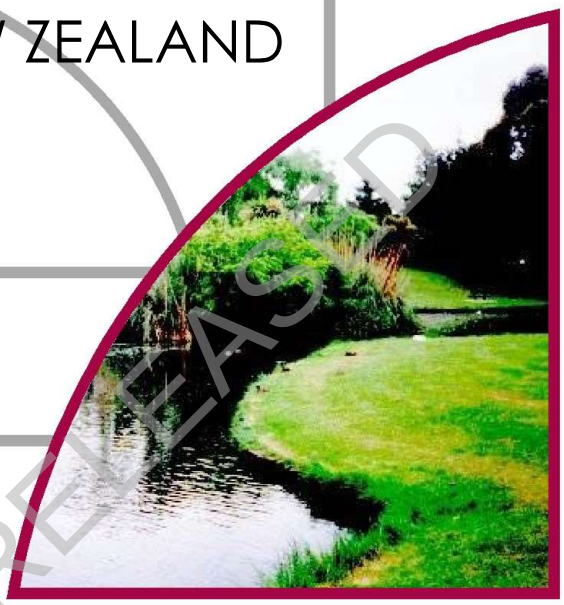
TOITŪ TE WHENUA

LAND INFORMATION NEW ZEALAND



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146 TE MAWHAI ROAD, TE AWAMUTU

FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION DISPOSAL OPTIONS ASSESSMENT REPORT

TOITŪ TE WHENUA

LAND INFORMATION NEW ZEALAND

146 TE MAWHAI ROAD
TE AWAMUTU

FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION DISPOSAL OPTIONS ASSESSMENT REPORT

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TOITŪ TE WHENUA – LAND INFORMATION NEW ZEALAND
FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION
DISPOSAL OPTIONS ASSESSMENT REPORT
EXECUTIVE SUMMARY

Introduction

The former Tokanui Hospital (the Site) is a former psychiatric hospital approximately 80 hectares (ha) in area located approximately 14km southeast of Te Awamutu, Waikato, with 74 buildings, a wastewater treatment plant, a swimming pool, eight substations, a closed landfill (also referred to as the 'existing disposal site') and substantial roading and underground infrastructure and services. The buildings on the site contain some hazardous materials, including friable asbestos and lead paint and are in varying states of disrepair.

The former Tokanui Hospital is managed by LINZ on behalf of the Crown in the Treaty Settlements Landbank. Land held in the Landbank is Crown land which has been declared surplus can be used as cultural or commercial redress in Tiriti o Waitangi Settlement claims. The Tokanui Hospital is a deferred selection property in the Ngāti Maniapoto Deed of Settlement (the Deed) and forms part of the Maniapoto Settlement Claims Act 2022, which gives effect to the Deed. The Tokanui situation is unique as no other property included in a Treaty settlement has required demolition and remediation on this scale or required a commitment to undertake remediation in a deed of settlement. Under the Deed, Maniapoto and the Crown have agreed to a standalone process within the Property Redress Schedule, Part 9: Tokanui Hospital Deferred Selection Process, for the transfer of the Site which details specific requirements for the demolition and remediation of the Site before it is available for transfer to Maniapoto. LINZ is the Government agency responsible for delivering this project.

Under this process, a decision has yet to be determined on how demolition waste will be managed – be that onsite, in a purpose-built containment cell (new disposal site), or transported offsite to a consented landfill. Four options have been shortlisted, but due to the potential significant cultural, environment, social, and economic impacts associated with this determination, approval to proceed must be obtained from the Minister of Land Information, Minister of Finance and Minister for Treaty of Waitangi Negotiations (together referred to as Ministers) and must take the views of the post settlement governance entity, Te Nehenehenui Trust, into account.

To assist this process, LINZ engaged Fraser Thomas Limited (FTL) to undertake this disposal options assessment of the four options based on the latest currently available information. This report will also be used by LINZ to meet the requirements of paragraph 9.11 of the Property Redress Schedule and the communication and engagement process (paragraphs 16 to 28) set out in the Memorandum of Understanding with Te Nehenehenui, as part of providing Te Nehenehenui with relevant information to allow an informed view to be presented to Ministers.

Objectives

The primary objective of this disposal options assessment report is to review and capture a robust analysis of the four shortlisted options set out in the *Maniapoto: Funding to remediate the Tokanui Hospital site* Cabinet paper (April 2021) to manage demolition waste generated from the demolition and remediation project. Another key project objective is to maximise materials recovery/recycling during the demolition

process, which is likely to reduce material quantities that need to be disposed to landfill. Various materials reuse, recycling/recovery opportunities are listed in this report and are the subject of further investigation.

Options considered

Selected assessment options agreed for evaluation are as per paragraph 9.9 of the Tokanui Hospital Deferred Selection Process and are summarised below. For clarity, the Crown has agreed to removal all vertical structures on the property (paragraph 9.16.3); the options therefore pertain to *where* the waste generated from the demolition will be removed to.

Option 1: Complete Site works in line with Subpart B: Demolition and Remediation Standards with waste disposed OFF-SITE:

A. Dispose of **all** contaminated and/or non-contaminated materials and horizontal infrastructure to a Class 1 and/or 2 landfill located **off** the Site.
B. Dispose of **all** contaminated and/or non-contaminated materials, to a Class 1 and/or 2 landfill located **off** the Site **but retaining some horizontal infrastructure.**

Option 2: Complete Site in line with Subpart B: Demolition and Remediation Standards with waste disposed ON-SITE:

A. Construction of a new disposal site located **on** a Tokanui Hospital deferred selection property to dispose of **all** contaminated and/or non-contaminated material and horizontal infrastructure.
B. Construction of a new disposal site located **on** a Tokanui Hospital deferred selection property to dispose of all contaminated and/or non-contaminated materials **but retaining some horizontal infrastructure**.

"Some" horizontal infrastructure in this context is currently being defined as part of a separate investigation, with a preliminary figure of 20% removed being adopted for this assessment.

Materials Quantities

Materials volumes estimated to be generated from the demolition and remediation works are summarised below. These volumes are in the process of being updated as part of ongoing investigations.

Category	Waste Materials Description	Estimated Volumes (m^3)
Non-Contaminated Materials		
Vertical building structures	General building material	**40,000**
	Sundry structures (fencing, canopies, washing lines etc)	**5,000**
Horizontal infrastructure	Crushed roading materials including concrete ducts, kerbing etc.	**55,000**
	Infrastructure services	**2,000**
Contaminated Materials (Potential and/or confirmed)		
Contaminated Building Materials	Asbestos containing materials	**6,000**
	Lead-based paint	**TBC**
Soils	Potentially contaminated soils	**45,000**
Horizontal infrastructure	Roading materials identified to contain coal tar.	**TBC**
	Infrastructure services (e.g. asbestos pipes, lagging)	**3,000**
	TOTAL	**156,000**

Note: Estimated volumes from AECOM (2019). Lead based paint material volumes and roading materials containing coal tar volumes are yet to be confirmed (TBC). Potentially contaminated soil volumes are understood to be based on "worst case" scenario calculations by AECOM and are being confirmed as part of ongoing work.

Onsite Disposal Facility Assessment

Any new onsite disposal facility (referred to as new disposal site as defined at 9.1.17) would comprise either a Class 1 or 2 landfill, as defined in the WasteMINZ Technical Disposal to Land Guidelines. It would be designed specifically to cater for waste materials from the demolition process and hence its design would be tailored to the required material volumes and characteristics. For the Tokanui Site, a Class 2 landfill would be suitable for all waste materials in terms of engineering controls, but the landfill's waste acceptance criteria may exclude acceptance of asbestos waste and possibly contaminated soils, in which case the new disposal site would have to be a Class 1 Landfill. In both cases, no putrescible materials are proposed to be deposited within the disposal facility and hence the potential for landfill gas generation is considered to be low, other than possibly as hydrogen sulphide, if significant quantities of gypsum are present. Furthermore, any onsite disposal facility would be under the control of the Crown, who are responsible to obtain and comply with all required consents and approvals to operate and maintain the new disposal site under the property redress schedule (paragraph 9.12).

Onsite disposal facility locations were initially assessed by AECOM Ltd (2019) and then revised by Fraser Thomas Ltd (2022) based primarily on engineering considerations, identifying six to seven possible onsite disposal facility locations, as well as considering extension of the closed disposal sites on the eastern side of the site. These locations were then further refined by Fraser Thomas following the completion of specialist site specific assessments, using a constraints mapping exercise, taking into account proximity to housing, geotechnical, heritage/archaeological/cultural, productive land use classification, ecology (wetlands and trees) and surface water conveyance considerations. This process reduced the number of potential options to three, of which Option 9 is subject to the least constraints. Key information for these three options is summarised below:

Site	6	9	10
Area (m^2)	33,000	38,000	33,000
Fill volume (m^3)	160,000	160,000	160,000
Visual amenity	Will create elevated feature but partly tied into existing hillside	Will create new elevated "mound"	Will create new hill feature
Constraints	OLFP diversion required; alluvial soils; possible groundwater issues; abuts land steeper than 1V:4H	Partly overlies estimated alignment of historic swamp	Areal extent limited by multiple nearby constraints. 280m to nearest houses.

The Tokanui Hospital Deferred Selection Process requires all resource consents to undertake the demolition and remediation works, including those required to construct a new disposal site, to be applied for by 24 November 2024 (no later than two years following the settlement date). A preliminary assessment has indicated 18 different investigations, assessments or supporting reports may be needed to support a resource consent application for a new onsite disposal facility. Geotechnical and hydrogeological investigations in particular take time, typically requiring hand auger and machine boreholes (testpits and

drilling) and installation of monitoring bores to provide baseline monitoring data, including capturing seasonal variations. As of May 2023, there is only 18 months to complete all of the above work, which is relatively short.

A resource consent application is likely to have limited notification (best outcome) or full public notification (more likely outcome, particularly given its non-complying status under the Waipā District Plan). It could take some years to get through the consenting process and any successful application could potentially be appealed to the Environment Court.

Overall, it is considered that any resource consent application for a new disposal site onsite is likely to take considerable time and expense, with limited time available to meet the November 2024 deadline. The chances of success are also considered low, given the overall consent status being non-complying and likely Iwi opposition to any new disposal facility onsite as stated at paragraph 9.10 of the property redress schedule and site Cultural Impact Assessment (CIA).

Offsite Disposal Facility Assessment

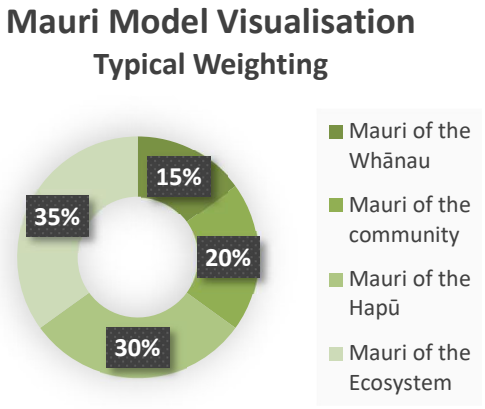
Offsite disposal means the disposal of non-recyclable waste materials to an appropriate, modern engineered, consented disposal facilities, in this case Class 1 or 2 landfills, according to the WasteMINZ Technical Land Disposal Guidelines. The main issue with offsite disposal is traffic and vehicle emissions. It is estimated that to dispose of 156,000m^3 (loose measure) of demolition and other materials would require somewhere between 6,240 to 8,670 truck and trailer movements to a suitable disposal facility (assuming 18-25m^3 per truck and trailer), which is a significant additional traffic input onto the public road network.

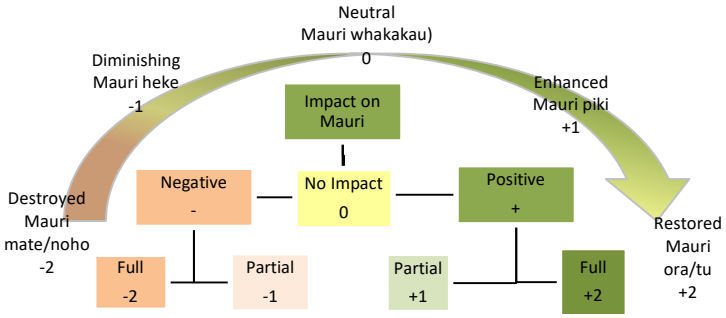
This report has assessed potential disposal options within 100km travel distance by road from the site. This process has reduced the number of potential Class 1 and 2 disposal facilities to two, as summarised below:

Available Sites	Operator	Landfill/Fill Class	Distance from Tokanui – one way (km)	Comments
North Waikato Regional Landfill, Hampton Downs	Envirowaste Services Ltd (ESL)	Class 1	99	Most modern, engineered landfill facility in region with capacity for 30,000,00m^3 over its lifetime.
1161 Rotowaro Rd, Glen Afton	GRP Ltd (Green Gorilla)	Class 2 & 4	85	Active. Limited to 208,000T/yr; WAC exclude asbestos and contaminated soils

Options Evaluation

The evaluation assessment approach was developed as a hybrid approach tailored to the Site, based on the following tools: Multi-criteria analysis (MCA), Sustainable Remediation Forum - United Kingdom (SuRF-UK), Mauri model and a range of Māori environmental assessment and performance indicator tools developed by Landcare Research. This hybrid approach was adopted to align with assessment criteria provided to the Te Nehenehenui and Joint Ministers. Ministerial support of this criteria was provided in BRF 23-169 Tokanui Hospital: Decision-making process and criteria in January 2023. The assessment was undertaken looking at environmental, social, cultural, economic criteria, with different weightings and a scoring system, consistent with the Mauri model, as explained in the following diagram. The indicative weighting was applied to support the priority order detailed in BRF 23-169 and may be updated following review of this report by Te Nehenehenui.





Within each criteria, a number of indicators were developed for evaluation, along with a number of sub-headings to help explain what each indicator[1] covered. For the cultural indicator criteria views expressed in the Deed, CIA and the cultural induction provided by mana whenua were used to inform this initial assessment. Engagement with Te Nehenehenui will further inform this scoring consideration. An additional "deliverability" assessment was also included, which involved a Yes/No/Likely/Unlikely assessment of the ability to deliver on the Crown's commitments under the Deed, taking into account the prescribed timeframes and delivery risks in terms of significant constraints and consentability. High level (budget) cost estimates were also included for each option. The results of this assessment are summarised in the following table:

Option	**1A**	**1B**	**2A**	**2B**
Horizontal Infrastructure to be removed	All	Some (20%)	All	Some (20%)
Demolition Waste Disposal	Offsite		New facility onsite	
Indicator (weighting, %): ***Indicator criteria***	**Weighted Scores**			
Environmental (35%): *Effects on land use/productivity* *Effects on surface water* *Groundwater effects* *Ecological effects* *Air emissions* *Sustainability*	76	93	-385	-344
Social (20%): *Public health and safety* *Worker health and safety* *Neighbourhood effects* *Amenity/land use*	40	20	0	10

[1] An indicator is a single characteristic that represents a potential or actual effect which can be compared across options to evaluate their relative performance. Indicators need to be measurable in some way that is sufficient to allow evaluation (adapted from SuRF-UK, 2011).

Employment opportunities *"Wellbeing" perceptions*				
Cultural (30%): *Loss of Mauri* *Destruction of wāhi tapu sites (cultural/spiritual sites)* *Kiatiakitanga (guardianship) and Whenua (land)* *Healing the land (papatūānuku)* *Restoration of water services (Wai Ora)* *Mahinga kai (garden, cultivation, food gathering places)*	460	350	-370	-350
Economic (15%): *Demolition/remedial works costs (capex)* *Ongoing maintenance costs (opex)* *Effects on land value* *Effects on potential earnings from land* *Minimisation of future liabilities*	180	155	-170	-105
Total	**756**	**618**	**-925**	**-789**
Ranking	1	2	4	3
Deliverability Assessment				
Significant Constraints	No	No	Yes	Yes
Consentability	Yes	Yes	Unlikely	Unlikely
Provisional Costs (quantities and rates to be confirmed)				
Waste Removal/Disposal Costs ($M)	[redacted]			
Ongoing Operation & management ($M) – Cumulative costs over 10 yrs				
Total				

The above table shows the preferred option in descending order of preference:

1. 1A (offsite disposal of all demolition waste and horizontal infrastructure); score = 756. The estimated cost (waste removal and disposal) is [redacted].
2. 1B (offsite disposal of all demolition waste and some horizontal infrastructure); score = 618. The estimated cost (waste removal and disposal) is [redacted], plus estimated cumulative O&M costs over a 10 year period of [redacted].
3. 2B (new onsite disposal facility with some horizontal infrastructure being left in the ground); score = -789. The estimated cost (new disposal site construction, waste transfer and disposal) is [redacted], plus estimated cumulative O&M costs over a 10 year period of [redacted], mainly relating to leachate collection and disposal.
4. 2A (new disposal site for all demolition waste and horizontal infrastructure); score = -925. The associated estimated cost (new disposal site construction, waste transfer and disposal) is [redacted], plus estimated cumulative O&M costs over a 10 year period of [redacted], again mainly relating to leachate collection and disposal.

Conclusions and Recommendations

The assessment undertaken shows that offsite disposal is preferred in comparison with onsite disposal. The selection of Option 1A over 1B as the most preferred option is primarily controlled by the cultural criteria, with the difference in scores for these two options being more significant than the other three criteria.

The assessment of onsite or offsite disposal was the objective of this assessment, with the extent of infrastructure to be removed from site subject to a separate MCA. Other considerations need to be taken into account in deciding on what horizontal infrastructure, if any, needs to be retained onsite. For example, some stormwater pipes currently convey upgradient runoff (surface water) from the adjacent rural sites through the site to the Wharekōrino Stream, while some of the existing roads could potentially be retained as farm access roads.

This report is based on the best information, currently available at the date of issuing this report. Following the Ministerial decision on the waste management options, further refinement will be completed on the selected waste management strategy as the following information becomes available:

- Revised disposal quantities based on current investigation findings and consideration of what materials can be reused/recycled.
- Revised offsite disposal facility rates.

This report is considered sufficient for Te Nehenehenui to provide an informed view (as per paragraph 9.11) and for LINZ to then obtain a decision from Ministers on the preferred disposal option as provided at paragraph 9.9.2 of the Tokanui Hospital Deferred Selection Process.

TOITŪ TE WHENUA – LAND INFORMATION NEW ZEALAND
FORMER TOKANUI PSYCHIATRIC HOSPITAL DEMOLITION AND REMEDIATION
DISPOSAL OPTIONS ASSESSMENT REPORT

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APPENDICES

GLOSSARY

CONTAMINATED MATERIALS	Hazardous building materials that pose some level of risk to human health and/or the environment, such as asbestos or lead-based paint, which potentially affects materials handling, haulage and/or disposal requirements. *Please note, management of contaminated soil as part of the demolition and remediation project follows the remedial standards process as outlined in the Tokanui Hospital Deferred Selection Process.*
DEED OF SETTLEMENT (DEED)	The Ngāti Maniapoto Deed of Settlement signed by Maniapoto and the Crown, which was signed on 11 November 2021 and given effect by the Maniapoto Settlement Claims Act 2022, which came into force on 28 September 2022.
DEFERRED SELECTION PROPERT	Is as defined in s154 of the Maniapoto Settlement Claims Act 2022. It means a property described in subpart A or C of part 4 of the property redress schedule for which the requirements for transfer under the deed of settlement have been satisfied.
DEMOLITION AND REMEDIATION WORKS*	The physical works required to carry out the demolition and remediation of each Tokanui Hospital deferred selection property (excluding any new disposal site or existing disposal site on that property) as described in paragraph 9.16
EXISTING DISPOSAL SITES*	The two existing sites (as described in the existing disposal consents) located on one of the Tokanui Hospital deferred selection properties that the Crown historically used to dispose of waste; indicated as 'Existing disposal sites' on the plan (subject to survey) 'Tokanui Hospital deferred selection properties' in part 7 of the attachments
GOVERNANCE ENTITY	The Ngāti Maniapoto post settlement governance entity, Te Nehenehenui Trust
HORIZONTAL INFRASTRUCTURE*	The roading and accessways, foundations and services that the Crown, with the consent of the relevant Ministers as required, decides must be retained on the relevant Tokanui Hospital deferred selection property, in accordance with paragraph 9.9 of the Deed. *Please note, at the date of this report, it is assumed that building foundations will be removed as part of the vertical demolition package rather than under horizontal infrastructure as stated in the Deed.*
MINISTERS*	The Minister of Finance, Minister for Land Information, and Minister for Treaty of Waitangi Negotiations
NEW DISPOSAL SITE*	A site which may be located on part of a Tokanui Hospital deferred selection property, such location to be determined in accordance with paragraph 9.9, where the Crown may, as part of the demolition and remediation works, dispose of contaminated and/or non-contaminated materials and waste in accordance with paragraph 9.12.
NON-CONTAMINATED MATERIALS	Building materials that do not contain any contaminated materials, as defined above and may be suitable for reuse and/or recycling
PURCHASED TOKANUI HOSPITAL	Means a Tokanui Hospital deferred selection property that is also a purchased deferred selection property

DEFERRED SELECTION PROPERTY*	
SETTLEMENT DATE	Is defined as s12 of the Maniapoto Settlement Claims Act 2022, being 24 November 2022.
VERTICAL BUILDING STRUCTURES*	All above-ground built structures on a Tokanui Hospital deferred selection property, excluding horizontal infrastructure

***Denotes definitions relevant to this report copied from the Tokanui Hospital Deferred Selection Process, Subpart A: Definitions.**

TOITŪ TE WHENUA – LAND INFORMATION NEW ZEALAND
FORMER TOKANUI PSYCHIATRIC HOSPITAL DEMOLITION AND REMEDIATION
DISPOSAL OPTIONS ASSESSMENT REPORT

1.0 INTRODUCTION

The former Tokanui Hospital (the Site) is a former psychiatric hospital approximately 80 hectares (ha) in area, with 74 buildings, a wastewater treatment plant, a swimming pool, eight substations, a closed landfill (also referred to as the 'existing disposal site') and substantial roading and underground infrastructure and services. The buildings on the site contain some hazardous materials, including friable asbestos and lead paint and are in varying states of disrepair. The site location and extent is shown in Figure 1, below.

Figure 1: Site location and extent showing 4 deferred selection properties (refer section 4.3.1)

The Site is currently managed by Toitū Te Whenua Land Information New Zealand (LINZ) on behalf of the Crown but has been held in the Treaty Settlements Landbank since 1999 following the hospital's closure in 1998. Land held in the Landbank is Crown land which has been declared surplus can be used as cultural or commercial redress in Tiriti o Waitangi Settlement claims.

The Ngāti Maniapoto (herein referred to as Maniapoto) Deed of Settlement (the Deed), that was initialed in December 2020, acknowledged the cultural significance of the Site and the need for demolition and remediation of the Site before it can be offered to Maniapoto. The Tokanui situation is unique as no other property included in a Treaty settlement has required demolition and remediation on this scale or required a commitment to undertake remediation in a deed of settlement. In April 2021, Cabinet agreed new operational funding for LINZ to undertake the extensive work required to enable the inclusion of the Site as a redress in the Maniapoto Treaty of Waitangi Settlement. The Deed was signed by Maniapoto and the Minister for Treaty of Waitangi Negotiations on 11 November 2021 and the Maniapoto Settlement Claims Act 2022, which gives effect to the settlement, came into force on 28 September 2022.

Under the Deed, Maniapoto and the Crown have agreed to a unique, standalone process - Schedule 9: Tokanui Hospital Deferred Selection Process (THDSP) - which forms part of the Property Redress Schedule[2]. The THDSP details specific requirements for LINZ to complete the demolition and remediation of the Site and a Memorandum of Understanding (MoU) signed by Te Nehenehenui Trust and LINZ outlines the roles, relationship, accountabilities, responsibilities and expectations for the parties in relation to the delivery of the works.

While Opus Limited (Opus) and AECOM Limited (AECOM) have undertaken several previous investigations at the Site, which are further described in Section 5 of this report, a decision has yet to be determined on how demolition waste will be managed – be that onsite, in a purpose-built containment cell (new disposal site), or transported offsite to a consented landfill (Clause 9.9). Four options were shortlisted and used to inform funding approval from Cabinet. However, due the potential significant cultural, environment, social, and economic impacts associated with this determination, approval to proceed must be obtained from the Minister of Land Information, Minister of Finance and Minister for Treaty of Waitangi Negotiations (together referred to as Ministers) and must take the views of the post settlement governance entity, Te Nehenehenui Trust, into account.

LINZ have therefore engaged Fraser Thomas Limited (FTL) to undertake this disposal options assessment, on the four options based on more thorough and up to date information obtained by LINZ following Deed signing and funding approval. This report will also be used by LINZ to meet the requirements of paragraph 9.11 of the THDSP and the communication and engagement process set out in the MoU with Te Nehenehenui, as part of providing Te Nehenehenui with relevant information to allow an informed view to be presented to Ministers. These options are summarised below and elaborated on throughout this report.

Table 1: Options Summary

Option	Horizontal infrastructure to be removed	Where should project waste be disposed of
1A	All	Offsite
1B	Some (e.g. 20%)	Offsite
2A	All	New disposal site, onsite
2B	Some (e.g. 20%)	New disposal site, onsite

[2] https://www.govt.nz/browse/history-culture-and-heritage/treaty-settlements/find-a-treaty-settlement/maniapoto/maniapoto-deed-of-settlement-documents/

It is important to note that the purpose of this report is to assess waste disposal options. The inclusion of horizontal infrastructure is purely to assess the impact of changes in the scale of the waste disposal options under the four stated options.

“Contaminated material” refers to hazardous material such as lead painted materials and asbestos containing material (ACM), as defined in the glossary.

“Some” horizontal infrastructure in this context has yet to be defined, but will likely involve some roading to maintain vehicle access to and through the Site, critical stormwater infrastructure (e.g. to convey upgradient runoff through the Site) and selected other infrastructure. This is being determined as part of the Horizontal Infrastructure Assessment (in progress at the time of this report).

2.0 OBJECTIVES

The primary objective of this disposal options assessment report is to review and capture a robust analysis of the four shortlisted options to manage demolition waste generated from the demolition and remediation project.

Specific objectives include:

- To assess onsite and offsite options for the management and disposal of demolition materials, contaminated soil and associated infrastructure from the hospital using a holistic approach taking into account environmental, social, cultural and economic factors that meet LINZ requirements and stakeholder expectations, comply with industry best practice and government sustainability and broader outcome goals.
- To meet the Crowns requirements under paragraph 9.11.1 of the THDSP and the communication and engagement process set out in the MoU, by providing the governance entity with relevant information concerning any proposed new disposal site, including any supporting advice or material relied upon to inform Ministers approval, to allow the governance entity to provide an informed view on the creation of a new disposal site on a Tokanui Hospital deferred selection property.

3.0 SCOPE

The scope of this Disposal Options Assessment includes the following:

- Review and summarise the findings of the existing waste management investigations for the Site and refine and update the options based on new information obtained by LINZ, including identifying any data gaps.
- Provide a brief overview of resource recovery options for different materials and wastes expected to be generated from the demolition and remediation project, updating previous work by Opus.
- Undertake a constraints analysis of possible onsite disposal site locations utilising further review of publicly available information and specialist investigations of the Site to provide a shortlist of possible onsite disposal site locations;
- Undertake a consentability assessment of onsite disposal, utilising publicly available information, specialist planning assessment for the Site and experience.

- Update previous assessments of possible offsite disposal locations based on the latest publicly available information, including direct liaison with Waikato Regional Council and relevant disposal facilities.
- Update cost estimates for the four shortlisted options, based on earlier estimates prepared by others and using updated rates provided by LINZ.
- Develop and undertake a multi-criteria assessment of the four shortlisted disposal options taking into account environmental, social, cultural and economic factors, leading to identification of a preferred option.

4.0 BACKGROUND INFORMATION

4.1 SITE HISTORY

The site is part of 1,194ha of Māori land taken under the Public Works Act in 1910 for the Tokanui Hospital. The hospital opened in 1912 and closed in 1998 and the Site was transferred into the Treaty Settlements Landbank (managed by the Ministry of Justice at the time) to be used as redress to settle historical claims in 1999. The Site, along with the other properties in the landbank, transferred to LINZ in 2017.

The taking of the land and subsequent history while in Crown ownership is detailed in the historical account in clauses 2.183 to 2.189 of the Deed. Further history pertaining specifically to the delivery of the demolition and remediation project is provided in the Tokanui Psychiatric Hospital Archaeological Assessment (CFH Heritage, 2022), Preliminary Site Investigation (GHD, 2023 in draft at the time of this report), and the Cultural Impact Assessment (TAR, 2021).

4.2 MANIAPOTO: FUNDING TO REMEDIATE THE TOKANUI HOSPITAL SITE

In February 2021, Cabinet noted (MCR-21-MIN-0002) that, for the redress to be inserted into the Deed and before ratification of the settlement claims bill could commence, Cabinet needed to agree to new funding for LINZ to undertake the demolition and remediation project. At the same time, Cabinet agreed that the Ministers of Finance, Treaty of Waitangi Negotiations and Land Information are required to make any final decisions on the level of remediation (i.e. whether substantial roading and access, foundations and services will be retained or removed) and whether waste from the site will be transported offsite or contained in a purpose built disposal facility onsite. Details regarding the joint-Ministerial decision are described further in section 4.3.2, below.

4.3 MANIAPOTO CLAIMS SETTLEMENT ACT 2022 REQUIREMENTS

4.3.1 Tokanui Hospital Deferred Selection Process Overview

As noted above, Maniapoto and the Crown agreed to a unique, standalone process for the demolition and remediation of the Site as set out in Part 9 of the Property Redress Schedule, which forms part of the Deed. The Deed was signed by Maniapoto and the Minister for Treaty of Waitangi Negotiations on 11 November 2021 and the Maniapoto Settlement Claims Act 2022, which gives effect to the settlement, received royal assent on 27 September 2022. This Act binds the Crown to meeting the requirements of the Tokanui Hospital Deferred Selection Process.

The following summarises the Crown's obligations in carrying out the demolition and remediation works. It is not intended to provide a full account of the requirement nor replace/override the terms

of the Tokanui Hospital Deferred Selection Process. The Crown will:

- No later than two years following the settlement date, apply for all necessary consents required for the demolition and remediation works, and if relevant, the existing and/or new disposal sites. For clarity, the deadline to apply for consents is 24 November 2024.
- Comply with all necessary consents and approvals for the demolition and remediation works.
- Remediate the land in accordance with the applicable remediation standard as referred to in paragraphs 9.3 and 9.7 of the THDSP.
- Remove all vertical building structures from the property.
- Determine the extent of horizontal infrastructure to be removed, subject to Ministerial decisions described in 9.9 of the THDSP and outlined below in section 4.2.2; and,
- Ensure that, where the land has been damaged by the impact of the demolition and remediation works, it is left free of building debris, and is stabilised by grassing.

It is also worth noting that:

- The site has been divided into four deferred selection properties (refer Figure 1) allowing for staged transfer of each property to the PSGE as demolition and remediation works are completed.
- The Crown will transfer management of the on-site wastewater pump stations and associated infrastructure to either the PSGE or to the Waipā District Council, noting that LINZ completed decommissioning of the wastewater treatment plants and associated infrastructure in 2021.
- The Crown is not required to remediate the existing disposal sites or any new disposal site constructed on any of the four deferred selection properties but must maintain valid consents for any ongoing monitoring of these sites.
- The Crown must enter a MoU with the PSGE, setting out relationship principles and provides a process for communication in relation to the demolition and remediation works. Noting this was completed on 4 March 2022.

4.3.2 Ministerial Decision of Final Scope

As noted above, Cabinet agreed the requirement for joint Ministers to make final decisions affecting the scale and approach of the demolition and remediation works. The THDSP and the MoU outline the process for decision making, and specifies that the two matters for Ministerial decision are:

- whether demolition waste from the site, including hazardous materials, will be transported offsite for disposal, or contained in a new purpose-built containment cell (new disposal site); and/or,
- the extent of horizontal infrastructure, including roading and underground services, that will be retained onsite.

The THDSP requires that, before LINZ obtains the Ministers approval for the disposal options and horizontal infrastructure, LINZ will:

- provide the PSGE with relevant information concerning any horizontal infrastructure proposed to be retained, and any proposed new disposal site to allow the PSGE to provide an informed view, including any supporting advice or material relied upon to inform the

joint Ministers' approval;

- consult with and take into account the views of the PSGE; and
- ensure the PSGE's views are presented to the Ministers.

The THDSP also records Maniapoto's preference as opposing the creation of any new disposal site on any Tokanui Hospital deferred selection property.

4.3.3 Memorandum of Understanding

In May 2021, LINZ, representing the Crown, and the Maniapoto Māori Trust Board, as part of negotiating the terms of the Deed, agreed the terms of the "MoU in Relation to Remediation and Demolition of the Former Tokanui Hospital Site." The MoU was then signed by LINZ and the trustees of Te Nehenehenui, the PSGE of Maniapoto (together, the Parties) on 4 March 2022. The MoU outlines the roles, relationship, accountabilities, responsibilities and expectations of the Parties.

Of notable relevance to this assessment is the communication and engagement process between the Parties. The MoU outlines five stages in which information regarding any proposed new disposal site will be shared with Te Nehenehenui and how Te Nehenehenui will provide LINZ with its views on such a proposal and how these views will be provided to joint Ministers for decision on the final scope of works.

4.4 TOKANUI HOSPITAL: DECISION-MAKING PROCESS AND CRITERIA (BRF 23-169)

In December 2022, the Minister of Land Information agreed the criteria that will be used to assess and inform this disposal options assessment (BRF 23-169). The choice of criteria is important as it will ensure LINZ considers the right information as part of this options analysis. The briefing was forwarded to the Offices of the Minister of Finance and Minister for Treaty of Waitangi Negotiations and to Te Nehenehenui Trust.

The following criteria are unweighted and listed in order of priority and have been used as the basis of the options assessment undertaken in section 11 of this report.

Table 2: Disposal Options Assessment Criteria agreed to by Ministers

Criteria	Key Considerations
Strategic alignment	• Assessment of ability to deliver on the Crown's commitments under the Deed, taking into account timeframes and delivery risks • Government Procurement Rules (Rule 16: Broader Outcomes Framework)
Crown-Iwi Relationship	• Alignment with formal feedback from the PSGE, representing the views of all Maniapoto iwi, hapu and whanau
Social and environmental effects	• Assessment of effects of works on cultural, archaeological, sustainability and other environmental values, and health and safety of suppliers • Condition of horizontal infrastructure
Value for money	• Cost to deliver project works • Future liabilities associated with the site are minimised

5.0 BUILDING, DEMOLITION, SOIL CONTAMINATION AND INFRASTRUCTURE INVESTIGATIONS

5.1 OVERVIEW

In 2018, LINZ undertook preliminary financial analysis on the treatment of horizontal infrastructure and disposal of project waste under three primary options. While now dated, the analysis remains indicative of the spectrum of options available and differences in delivery costs. As described above, the Tokanui situation is unique as no other property included in a Treaty settlement has required demolition and remediation on this scale or required a commitment to undertake remediation in a deed of settlement.

This section provides a brief summary of relevant building, demolition, contamination and infrastructure investigations that have been undertaken, or are in progress at the time of this assessment, that have been reviewed as part of this disposal options assessment. The investigations undertaken prior to 2021 were used to inform Cabinet's approval of new operational funding for LINZ to undertake the demolition and remediation project and uphold the Crown's commitment in the THDSP.

These investigations are listed below:

- Opus Ltd (May 2015) – Tokanui Hospital Demolition Waste Management Plan
- AECOM Ltd (Oct 2018) – Tokanui Hospital Site Remediation: Options Description and Cost Estimation
- AECOM Ltd (Apr 2019) - Tokanui Hospital Site Remediation: Onsite Land Disposal Feasibility Study
- AECOM Ltd (Aug 2019) – Tokanui Hospital: Detailed Site Investigation (draft)
- AECOM Ltd (Aug 2019) – Tokanui Hospital Site Remediation – (refined) Detailed Options Assessment
- 4Sight Consulting Ltd (2023) – Asbestos and Lead Paint Building Investigations
- Fraser Thomas Ltd (2023) – Tokanui Hospital Horizontal Infrastructure Investigation (works in progress, final report not yet available)
- GHD Ltd (2023) – Preliminary Site Investigation (works in progress, final report not yet available)

Please note, this is not an exhaustive list of investigations undertaken on the Site, only those that pertain to this disposal options assessment.

Further complementary specialist investigations used in constraints mapping for onsite disposal site locations are reviewed separately in section 8 of this report.

5.2 OPUS (MAY 2015) – TOKANUI HOSPITAL DEMOLITION WASTE MANAGEMENT PLAN

Opus undertook a Preliminary Site Investigation (PSI) of the Site in March 2015, the findings of which are referred to in this Waste Management Plan. The PSI identified a number of potential sources (the origin of a hazard) of contamination that will influence how different hazardous building materials can be managed safely. In addition, they identified there will be a large quantity of general (non-hazardous) demolition materials for disposal or which may be suitable for material recovery (such as reuse or recycling). Opus estimated the quantity of general demolition materials to be 42,000m^3, contaminated soil to be 9,300m^3, and external paving and concrete to be 25,000m^3. No details or supporting information is included in their report explaining how they determined these quantities.

The Waste Management Plan provided a summary of potential opportunities for materials recovery and disposal, including potential disposal sites and associated constraints and limitations.

5.3 AECOM (OCT 2018) – TOKANUI HOSPITAL SITE REMEDIATION: OPTIONS DESCRIPTION AND COST ESTIMATION

LINZ engaged AECOM to develop a series of demolition options as part of a business case to understand the potential range of future costs associated to prepare the Site for a future Treaty settlement. This options description and cost estimation report carried out a review of existing site information and a site visit. The report noted that there were several gaps in the available information and therefore uncertainty with regards to the viability, scope and cost estimates for the options outlined. It was recommended that further work be completed to fill these data gaps, assess the feasibility of the options and refine the costs.

The AECOM report provided three primary options that were developed to an appropriate level to describe the actions required to return the Site to rural land use. These options were:

1. **Do-Minimum:**
    a. Maintain the site in its current condition for 10 years.
    b. Maintain the site in its current condition for 30 years.

2. **Complete Site Remediation to Rural Landuse with waste disposed offsite:**
    a. Demolish and dispose of all structures and material off site.
    b. Demolish and dispose of all structures and material off site using [redacted] per year with 1.5% escalation.
    c. Retain doctors' flats, demolish remaining structures and dispose offsite.
    d. Demolish and dispose of all structures offsite, but leave 80% of the roading and below ground services.

3. **Complete Site Remediation to Rural Landuse with waste disposed onsite**
    a. Demolish and dispose of all structures and material to a purpose-built onsite landfill.
    b. Retain doctors' flats, demolish remaining structures and dispose of material to a purpose-built onsite landfill.
    c. Demolish and remove all structures and to a purpose-built onsite landfill, but leave 80% of the roading and below ground services.

The report then completed a high-level analysis of the advantages and disadvantages of the outlined options based on several assumptions and limitations.

5.4 AECOM (APRIL 2019) – TOKANUI HOSPITAL SITE REMEDIATION – ONSITE LAND DISPOSAL FEASIBILITY STUDY

AECOM undertook an onsite land disposal feasibility study in support of the proposed demolition of the former Tokanui Hospital. The purpose of this study was to identify if there are any areas onsite that would be suitable for the disposal of demolition waste materials and if there are any major regulatory issues associated with such a development.

This investigation provided a summary of anticipated waste volumes to be generated from the demolition works, amounting to a total volume of 156,000m^3 (loose measure). This information is included in Section 6.1 of this report. They advised that removal of this volume of materials from the

Site would be costly and result in the generation of approximately 6,240 additional truck and trailer movements to a suitable disposal facility in the region, based on 25m^3 per truck and trailer. Hence, this investigation assessed the potential for at least some of these materials to be disposed of at the Site in an engineered disposal area, such as a purpose-built containment cell. For the purposes of their assessment, AECOM assumed that any onsite disposal facility would require a minimum volume of 80,000m^3 to be viable.

They advised of the following factors that could influence the required volume of the onsite disposal facility:

- Volume of material recovered or diverted during the Site clearance (i.e. metal to scrap dealers, bricks recovered for reuse), which was yet to be determined.
- Extent and nature of contaminated soils on the Site, which was yet to be determined.
- Resource consent requirements, with respect to any conditions imposed relating to waste acceptance criteria (WAC). For example, there may be some waste streams which would be excluded from onsite disposal (e.g. refrigerants, polychlorinated biphenyls (PCBs), bulk chemicals, green wastes, odorous wastes, hazardous wastes). These waste streams would instead require offsite disposal, likely to a Class 1 landfill or a specialist waste processing/disposal facility.

They advised that pre-determining the WAC is required prior to the design of a disposal facility to ensure that any potential adverse effects from the construction of a new disposal site are addressed through the design process. The WAC adopted for design would be included in the resource consent application. They advised that the WAC for this project will need to cover the bulk of the waste to be generated from the Site clearance, as the benefit of having an onsite disposal location comes from reduced haulage and disposal fees, as well as a more efficient and timely handling of demolition waste.

They advised that it is important that the extent of materials unable to be disposed of at the Site are reduced as far as practical while balancing the increased cost of engineering controls that accepting some hazardous waste streams may require. They proposed the following materials-based WAC for an onsite disposal facility, based on their knowledge at that time of materials present at the Site. This information is presented in Table 3 below.

Table 3: Summary of Preliminary Materials Based Waste Acceptance Criteria (WAC) for Onsite Disposal Facility (from AECOM (2019 report)

Materials Proposed for Acceptance for Onsite Disposal	
• Plaster board • Concrete, concrete blocks and bricks • Soils, clays, rocks and tree stumps • Roofing products, corrugated iron, steel, clay tiles • Fibreglass • Wallpaper, lining paper and building paper • Formica, Laminex, parquet • Treated and untreated timber • Asbestos and lead contaminated soils • Flooring products, carpet and underlay, vinyl	• Textiles, curtains • Soft board, hard board, particle board, plywood • Glass • Roading materials • Steel, copper and aluminium fittings • Asbestos (fibrous and asbestos containing materials) • Plastics associated with construction and demolition activities (guttering, pipes, building wrap)

The AECOM feasibility study was based on a combination of desktop analysis and a site walkover. It identified five viable locations, along with associated opportunities and challenges, for further consideration (e.g. topography, proximity to dwellings, visibility, overland flowpaths). These five sites were labelled A to E and their location is shown in Figure 2 below. The study does not include any information on the area or capacity (volume) of each disposal site, although the former can be determined from Figure 2. It is also important to note that this study did not take into account cultural or archaeological sites of significance or some other constraints (e.g. wetlands), which have since been identified through further assessments undertaken by LINZ.

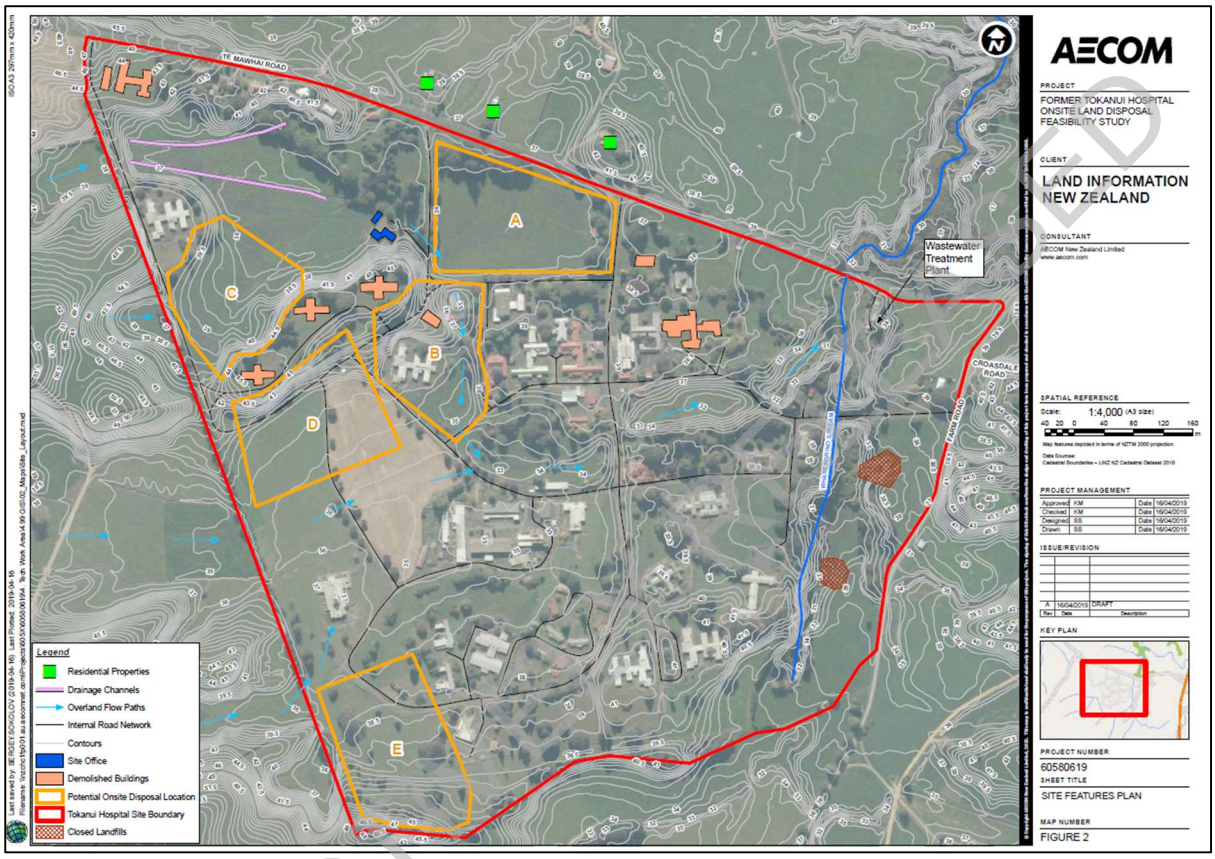


Figure 2: Potential Onsite Disposal Site Locations identified by AECOM (2019)

5.5 AECOM (AUGUST 2019) – DETAILED SITE INVESTIGATION (DRAFT)

AECOM undertook a Detailed Site Investigation (DSI) of the Site, the purpose of which was to assess the soil and contaminant conditions at the Site and the associated risk to human health and the environment, based on a proposed future agricultural land use, in line with district plan zoning.

The DSI involved a desktop review of existing information, site walkover and soil sampling comprising a combination of shallow manual sampling and machine test pits at identified locations of concern, including both "green space" and "commercial" areas and around existing and former buildings. While the DSI identified other potential sources of soil contamination, the primary focus of the soil sampling that was completed was to get a preliminary understanding of the horizontal and vertical extent of soil contamination as a result of hazardous building materials as this will have an impact on the volume of material that may need to be managed as part of the demolition and remediation works.

The DSI refers to their site works finding that the Site soils were generally observed to comprise topsoil up to 300mm depth, underlain by clays and clayey sandy silts. Fill material was observed in the commercial area to approximately 700mm depth. The DSI identified the main contaminants of concern

to be asbestos from degradation of asbestos roofing and lead from lead-based paint applied to buildings.

5.6 AECOM (AUGUST 2019) - TOKANUI HOSPITAL SITE REMEDIATION: DETAILED OPTIONS ASSESSMENT

In 2019, AECOM refined the 2018 Detailed Options Assessment to provide a higher level of cost certainty based on further information that had been obtained. As noted above, the 2018 report highlighted data gaps in the information reviewed resulting in a significant degree of uncertainty with regards to the viability, scope and cost of each option. This assessment included incorporating the findings from AECOM's DSI for the Site, a review of the existing Site Asbestos Register and materials quantity assessment to achieve the assessment objectives.

The assessment refined the demolition and remediation options to the following:

1. Do-Minimum: maintain the site in its current condition for 10 years
2. Complete site remediation to rural land use with waste disposed offsite:
    a. Demolish and dispose of all structures and material off site;
    b. Demolish and dispose of all structures offsite, but leave 80% of the roading and below ground services.
3. Complete site remediation to rural land use with waste disposed onsite:
    a. Demolish and dispose of all structures and material to a purpose-built onsite disposal facility;
    b. Demolish and remove all structures and to a purpose-built onsite disposal facility, but leave 80% of the roading and below ground services.

The assessment was based a timeline that assumed a demolition start date of mid-2021 with offsite disposal based on a 24-month programme and onsite disposal based on 30-month programme. It was also noted that the demolition programme duration was likely to vary anywhere from two to three years.

Costing spreadsheets were also developed for each option on a "measure and value" approach, breaking down the works into various tasks expressed as line items and calculating line item costs as quantity x rate = cost for each item. This assessment was compiled by measuring and pricing approximate bulk quantities, utilising several sources as outlined in the report. Cost estimates were developed by AECOM through approaching a number of North Island demolition contractors who provided indicative elemental rates based on indicative quantities to improve cost certainty. Two detailed responses and one summarised response were received with the variance between the lowest and highest being 110%. These costs were compared with AECOM's earlier 2018 work and were generally consistent.

5.7 4SIGHT (DECEMBER 2022) - ASBESTOS AND LEAD-BASED PAINT DEMOLITION SURVEYS

4Sight have undertaken a comprehensive assessment of all buildings at the Site for ACM and lead-based paint to better quantify the location, extent and magnitude of hazardous building materials across the site. The surveys specifically identify asbestos within the structures so it can be removed safely prior to demolition commencing and identify lead-based paint within the structures to inform waste characterisation and handling requirements.

Due to the extensive scale of the works, the surveys were provided across four separate reports, relating to four separate areas, with these areas being established for reporting purposes only. As part of the surveys, 4Sight have produced plans of individual buildings showing their findings, along with supporting spreadsheets.

5.8 FTL (2023) - HORIZONTAL INFRASTRUCTURE ASSESSMENT

FTL are currently undertaking an investigation of the condition and extent of all existing "horizontal infrastructure" on the site, comprising:

- All roading and associated paved areas;
- Retaining walls (1);
- Water, stormwater and wastewater reticulation;
- Building heating system, comprising an underground concrete ducting system, with steam and condensate pipes that were formerly used to heat the Site buildings; and,
- Utilities – power and telecom.

This investigation has involved a desktop review of available information, comprehensive site investigations including site walkovers, pavement test pits and deflection measurements, CCTV and underground services detection, hydro excavation and topographical survey, followed by compiling updated horizontal infrastructure plans and assessment of materials quantities.

This information will then be used to inform decisions on the extent of the horizontal infrastructure to be removed or retained, both above and below the ground, and to support decisions on waste management.

All initial field investigations have been completed and the data collected is currently being reviewed. Some additional site investigations are currently in progress to fill in "data gaps", while continuing analysis of the data captured to date.

5.9 GHD (2023) - PRELIMINARY SITE INVESTIGATION

GHD Limited (GHD) have been engaged by LINZ to undertake a PSI to supplement the available information and data from existing reports provided by LINZ, identify and close any data gaps and to identify all potential sources of contamination on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL activities) which may have occurred at the Site for the purposes of change of land use under the NESCS[3] and compliance with the terms of the THDSP.

This PSI will also refine the conceptual site model prepared by AECOM in 2019 as part of the draft DSI and inform the design of the subsequent detailed site investigation, assessment of remedial options and remedial action plan, to be undertaken by GHD and HAIL Environmental Ltd as part of the demolition and remediation project.

These investigations are currently underway and will be provided to the Crown as part of informing the remediation standards set out in paragraphs 9.2 to 9.7 of the THDSP. As some contaminated soil may need to be managed as a hazardous waste, the findings of the contaminated land investigations are relevant to this disposal options assessment.

[3] Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations, 2011.

6.0 DISPOSAL MATERIALS

6.1 DISPOSAL VOLUMES AND DESCRIPTION

Disposal quantities are broken down into the categories shown in Table 4. While some of the terms referred to in this table have been defined in the Deed, some additional terms have been defined for added clarity and are included in the Glossary to this report.

Table 4 provides a summary of anticipated materials volumes to be generated as part of the demolition works, in terms of the quantities estimated by AECOM (2019). These volumes will be updated once results become available from the ongoing 4Sight/GHD/FTL 2023 investigations.

Table 4: Tokanui Hospital Site Remediation: Estimated Demolition Waste Volumes (loose measure)

Category	Waste Materials Description	Estimated Volumes (m^3) (AECOM, 2019)
Non-Contaminated Materials		
Vertical building structures	General building material	**40,000**
	Sundry structures (fencing, canopies, washing lines etc)	**5,000**
Horizontal infrastructure	Crushed roading materials including concrete ducts, kerbing etc.	**55,000**
	Infrastructure services	**2,000**
Contaminated Materials (Potential and/or confirmed)		
Contaminated Building Materials	Asbestos containing materials	**6,000**
	Lead-based paint	**To be confirmed**
Soils	Potentially contaminated soils	**45,000**
Horizontal infrastructure	Roading materials identified to contain coal tar.	**To be confirmed**
	Infrastructure services (e.g. asbestos pipes, lagging)	**3,000**
	TOTAL	**156,000**

Note: Lead based paint material volumes and roading materials containing coal tar volumes are yet to be confirmed. Potentially contaminated soil volumes are understood to be based on "worst case" scenario calculations by AECOM and are being confirmed as part of ongoing work.

6.2 POTENTIAL AND/OR CONFIRMED HAZARDOUS MATERIALS

From our desktop review of information available to date, the following key points are raised:

- The materials breakdown in Table 4 does not yet include the quantity of building materials containing lead paint, which are understood to be significant, whilst lead-based paint concentrations vary significantly between different materials based on 4Sight's materials testing results.
- The materials breakdown does not specifically refer to the quantities or types of hazardous materials present on the Site, some of which may require pre-treatment prior to disposal to an approved landfill or disposal to a specialist waste treatment/disposal facility. Potential and/or

confirmed hazardous materials are listed in Table 5 below, together with their current known status.

Table 5: Potential and/or Confirmed Hazardous Materials Present Onsite and Current Status

Source	Status
Wastewater treatment plant sludge	LINZ have confirmed sludge was removed at the time of the WWTP decommissioning.
Water treatment plant	May contain sludge or stored chemicals
At least four boilers on-site	May still contain coal ash
Former petrol station and garages/workshops with two fuel pumps, leaded petrol and probably diesel; and at least two tanks.	AECOM managed the underground petroleum storage system (UPSS) removal in 2018, but unclear what infrastructure, if any, may still remain
Incinerator in shed 8	May still contain ash
4,500L of chemicals in swimming pool shed (from AECOM building hazard register (2018)	Unknown if these chemicals (chlorine and hydrochloric acid) have been removed from the site. This information will be determined as part of the GHD PSI.
Fly tipping and whiteware are referred to as being present at three different locations across the Site (including ashes and ACM).	Relatively small volumes; some items may be recyclable; expect residual materials can be disposed to Class 1 landfill but needs confirming.
Potential hazardous waste generated from Building D8 (dental surgery), B74 (laundry (drycleaning?)), workshops and pharmacy	Historic site practices unknown as to how waste materials were disposed of (e.g. any mercury from dental surgery disposed to onsite landfill, tipped down drain, or other). This information will be determined as part of the GHD PSI.
8 electricity substations – transformers	May still contain PCBs.

LINZ will continue work, as part of other investigations, to confirm the type, extent and contamination status of associated hazardous materials risks and appropriate management/disposal measures.

7.0 MATERIALS RESOURCE RECOVERY VS DISPOSAL ASSESSMENT

7.1 OVERVIEW

This section provides an overview of possible resource recovery versus disposal options for different materials present on the Site that will be encountered during demolition works. It is based on the Opus (2015) assessment, updated to the present day.

7.2 DISPOSAL FACILITY CLASSIFICATIONS

The WasteMINZ Technical Guidelines for Disposal to Land, Revision 3 (October 2022) provide technical guidance relating to the siting, design, operation and monitoring of landfills/fills in New Zealand, based

on local and international experience. They classify landfills and fills into five distinct types. These facility types are defined in the following table, together with a description of the types of waste/materials that can be accepted by each facility. These landfill/fill classifications are referred to in the resource recovery versus disposal assessment in Table 6.

Table 6: Landfill/Fill Classification and Waste Acceptance

Class	Name	Waste Materials Accepted
1	Landfill	Accepts municipal solid waste, including demolition waste, contaminated soils and Asbestos containing material (ACM) compliant with the individual landfill's waste acceptance criteria (WAC).
2	C&D Landfill	Accepts non-putrescible wastes including C&D (construction and demolition) wastes, managed fill material, controlled fill and clean fill material.
3	Managed Fill	Accepts predominantly clean fill and controlled fill, which may also contain material with contaminant concentrations in excess of controlled fill limits.
4	Controlled Fill	Accepts predominantly natural soil, inert C&D materials and clean fill. Soils may have chemical contaminants at concentrations greater than local natural background concentrations, but with specified maximum total concentrations.
5	Cleanfill	Accepts VENM (virgin excavated natural material), such as clay, soil and rock that are free of combustible, putrescible, degradable or leachable components.

7.3 RESOURCE RECOVERY VERSUS DISPOSAL

The potential for resource recovery (e.g. reuse/recycling) of various materials that will be encountered during site demolition and remediation works is assessed in Table 7, along with associated disposal options, if resource recovery cannot be achieved.

LINZ notes that in the current economic environment, any potential cost savings may be offset by price inflation across many aspects of project delivery, including waste disposal. The intention is to maximise resource recovery as much as practical, regardless of whether the waste is disposed of onsite or offsite. The determination by Ministers regarding on/offsite disposal will enable LINZ to undertake further investigations around how to further minimise waste to landfill and how to manage the various waste streams accordingly.

Table 7: Landfill/Fill Classification and Waste Acceptance (adapted and updated from Opus (2015))

Category	Materials	Opportunities for Recovery & Reuse	Disposal Facility Classification (if not reused/recycled)	Further Information required	Constraints and limitations
Timber	Untreated	Older buildings may have significant quantities of native timber which is valuable and could be recovered. Possible use as biofuel.	Demolition contractors	Check quantities once known to assess if viable	Cost of stripping materials vs likely returns Possible lead paint contamination) ACM (e.g. vinyl) overlays
	Treated (CCA or Boric); framing or external decking and fencing	Some reuse, but probably minimal (other than possible use as biofuel)	Class 1 landfill; some Class 2 landfills may accept boric treated timber	Check C&D landfill WAC	Limited, if any material recovery opportunities
Cladding	Internal Wallboard products	Gypsum based plaster board is recoverable	Class 1 or 2 landfill	None	Paint on surfaces Difficulty of extracting
	External claddings of non-asbestos containing fibre cement boards	None known, but check if EDL can also process non-asbestos containing fibre cement boards (see next item)	Class 1 or 2 landfill	Check EDL as noted	Some claddings include ACM
ACM	ACM (Asbestos containing materials)	EDL is promoting MCD (mechanochemical degradation) for processing of ACM, eliminating carcinogenic effects of fibrous asbestos by grinding it into an ultrafine amorphous powder, which can be used as a high grade cement additive	Class 1 landfill	Meeting with EDL to investigate viability of this option.	Handling to comply with Asbestos regulations

Category	Materials	Opportunities for Recovery & Reuse	Disposal Facility Classification (if not reused/recycled)	Further Information required	Constraints and limitations
Concrete	Concrete from buildings and foundations	Crushing to GAP 40 or drainage aggregate should be viable for quantity involved.	Class 2 or 4 Fill	Confirm consenting requirements for crushing onsite as part of demolition	Need to ensure free of ACM for any path other than Class 1 landfill Rebar will need separating out
	External concrete slabs and paving				
Brick and tile	Brick and tile	Include with concrete for crushing Bricks for recycling	Class 2 or 4 Fill	As above	As above
Roading/ paving	Asphalt, chip seal & basecourse/subbase materials	Possible reuse of some roading materials in roading/paving applications	Class 1 or 2 landfill	Check quantities to assess if viable	Practicality/cost of recovering roading/paving aggregates Council/NZTA buyin/ approvals
	Coal tar	Unlikely	Class 1 Landfill	Extent of coal tar impacted roading (being assessed)	PAH contamination but bound within paving
Soils	General from excavation of building platforms	Screening to remove demolition fragments feasible; contamination testing likely required to confirm suitability for reuse as backfill material onsite	Class 2-5 Fill	Investigation by GHD Ltd and HAIL Environmental Ltd in progress	Please refer to the Assessment of Remedial Options report (once available)
	All other potential contaminants in soil	Please refer to the Assessment of Remedial Options report (once available)			
Ashes	From incinerators,	None	Class 1 landfill	Testing for heavy metals,	Burning process

Category	Materials	Opportunities for Recovery & Reuse	Disposal Facility Classification (if not reused/recycled)	Further Information required	Constraints and limitations
	boilers or open air burn sites			PAHs and boron and check against WAC	concentrates contaminants
Electrical wiring	Electrical wiring	Scrap metal recycling (especially Copper wiring)	Class 1 or 2 landfill	N/A	Some wiring may be asbestos wrapped due to age and will be disposed of accordingly
Pipes	Plastic	See below	Class 1 or 2 landfill	See below	See below
	Metal	See below	Class 1 or 2 landfill (second choice)	See below	See below
	Concrete	Aggregate recovery with other concrete	Class 2 landfill	Need to inspect to ensure not AC (asbestos cement)	If ACM used, it will need to be disposed of accordingly
	Asbestos cement	As above for ACM	Class 1 or 2 landfill	Check WAC to confirm disposal facility	As above for ACM
Metals	Corrugated iron from walls and roofing	Scrap metal	Class 1 or 2 landfill (second choice)	Specific evaluation on individual basis	May have to deal with asbestos lagging UPSS and transformers have specific requirements
	Galvanised metal fixtures				
	Miscellaneous plant items from boilers, incinerators, etc				
	Fencing wire				

Category	Materials	Opportunities for Recovery & Reuse	Disposal Facility Classification (if not reused/recycled)	Further Information required	Constraints and limitations
Glass	Windows	Crush and reuse in glass manufacture or as drainage/roading aggregate	Class 1 landfill	Confirm consenting requirements for crushing onsite as part of demolition	Separating from timber frame and sorting required
Plastics	Guttering Downpipes Inground pipes Building wrap	Future Post (futurepost.co.nz) in Waiuku recycles domestic and commercial mixed grade waste plastic including Types 2, 4, 5, 6 and 7 of all colours into premium 100% recycled, UV fence posts	Class 1 landfill	Liaise with Future Post to check their plastic acceptance criteria and if they accept PVC	Some Site plastics may be in poor condition (soiled, stained) possibly limiting recycling
General	General site clean up from building platforms	None	Class 1 or 2 landfill	Testing may be needed to confirm contaminant status and management/ disposal options	May contain low level contamination from ACM and metals such as lead (paint)

8.0 NEW ONSITE DISPOSAL FACILITY FEASIBILITY ASSESSMENT

8.1 ONSITE DISPOSAL FACILITY REQUIREMENTS

Any new onsite disposal facility ('new disposal site' as per paragraph 9.1.17 of the THDSP) would comprise either a Class 1 or 2 landfill, as defined in the WasteMINZ Technical Disposal to Land Guidelines. It would be designed specifically to cater for waste materials from the demolition process and hence its design would be tailored to the required material volumes and characteristics.

8.1.1 Class 1 Landfill

A **Class 1 Landfill** is a site that accepts Municipal Solid Waste (MSW) as defined in Table 6. A Class 1 Landfill generally also accepts C&D waste, some industrial wastes and contaminated soils. Class 1 Landfills often use managed fill and clean fill materials they accept as daily cover. Class 1 Landfills require:

- a rigorous assessment of siting constraints, considering all factors, but with achieving a high level of containment as a key aim;
- engineered environmental protection by way of a liner and leachate collection system, and an appropriate cap, all with appropriate redundancy; and
- landfill gas management.

A rigorous monitoring and reporting regime is required, along with stringent operational controls. Monitoring of accepted waste materials is required, as is monitoring of sediment runoff, surface water and groundwater quality, leachate quality and quantity, and landfill gas.

8.1.2 Class 2 Landfill

A **Class 2 C&D Landfill** is a site that accepts non-putrescible wastes including C&D wastes, managed fill material, controlled fill and clean fill material. C&D waste can contain biodegradable and leachable components which can result in the production of leachate (although usually much weaker than Class 1 leachate), thus requiring an increased level of environmental protection.

Class 2 C&D Landfills should be sited in areas of appropriate geology, hydrogeology and surface hydrology. A site environmental assessment is required, as are an engineered liner, a leachate collection system, and groundwater and surface water monitoring. Additional engineered features such as leachate treatment may also be required.

Depending on the types and proportions of C&D wastes accepted, Class 2 C&D Landfills may generate minor to significant volumes of landfill gas and/or hydrogen sulphide (from gypsum). The necessity for a landfill gas collection system needs assessing.

Operational controls are required, as are monitoring of accepted waste materials, monitoring of sediment runoff, surface water and groundwater quality, and monitoring of leachate quality and quantity.

8.1.3 Site Specific Disposal Facility Considerations

For the Tokanui Site, a Class 2 landfill would be suitable for all waste materials in terms of engineering controls, but the landfill's waste acceptance criteria may exclude acceptance of asbestos waste and possibly contaminated soils, in which case the onsite facility would have to be a Class 1 Landfill. In

both cases, no putrescible materials are proposed to be deposited within the disposal facility and hence the potential for landfill gas generation is considered to be low, other than possibly as hydrogen sulphide, if significant quantities of gypsum are present and anoxic (reducing) conditions are allowed to develop. Furthermore, any onsite disposal facility would be under the control of the Crown, who are responsible to obtain and comply with all required consents and approvals to operate and maintain the new disposal site under the THDSP (paragraph 9.12).

Figure 3 provides a schematic illustration of what an onsite disposal site would typically look like, showing the fill profile, indicative leachate collection system (based on pumping) and typical landfill base liner and landfill cap/cover requirements. A capped landfill can have many uses long into the future, such as some agricultural uses or recreational, depending on the construction of the cap.

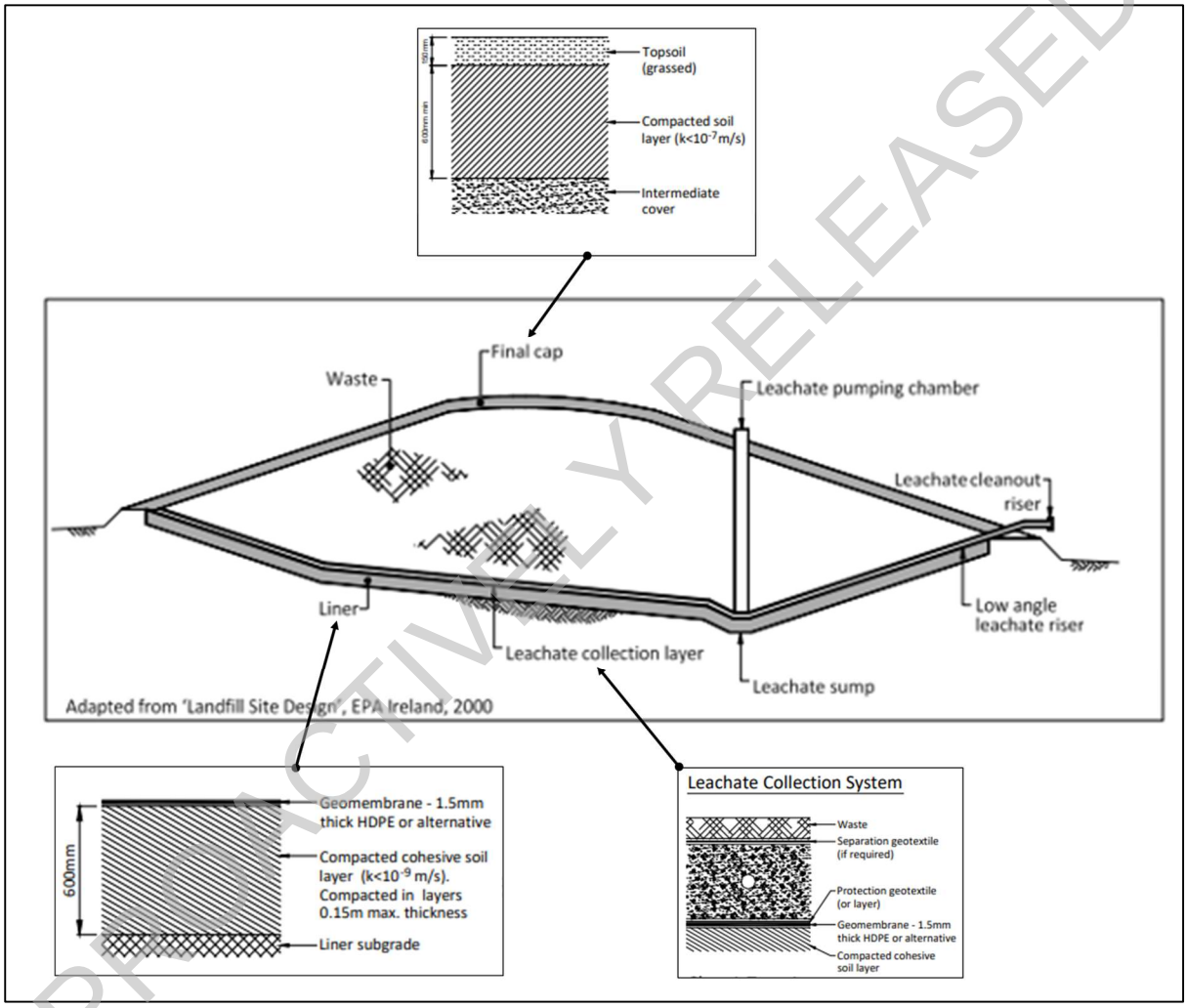


Figure 3: Typical Class 1 & 2 Landfill Profile showing Base Liner, Leachate Collection and Final Cap Systems (adapted from WasteMINZ Technical Disposal to Land Guidelines, Oct 2022)

8.2 SELECTION PROCESS

Onsite disposal facility locations were assessed by the following process:

(a) Initial determination by AECOM, as set out in their 2019 report and summarised in Section 5.4 and Figure 2 of this report.

(b) Review of AECOM site locations by FTL, with revised preliminary locations shown in drawing 33097/101. The FTL assessment also considered potential to source suitable landfill capping and cover material from within the site.
(c) Further revision of site locations by FTL following the completion of specialist site specific assessments, using a constraints mapping process, as explained further in Sections 8.3-8.5 below and shown on drawings 33097/102-106.

The first two stages were preliminary and essentially determined a starting list of potential new disposal sites. The third stage was broader and made possible by the completion of the various specialist reports referred to in Section 8.3. It also included assessing the potential to utilise the existing disposal site (or closed landfill, located in Area 1) for disposal of the demolition waste materials. It has produced a potential short list of new disposal facility locations onsite.

8.3 CONSTRAINTS ANALYSIS

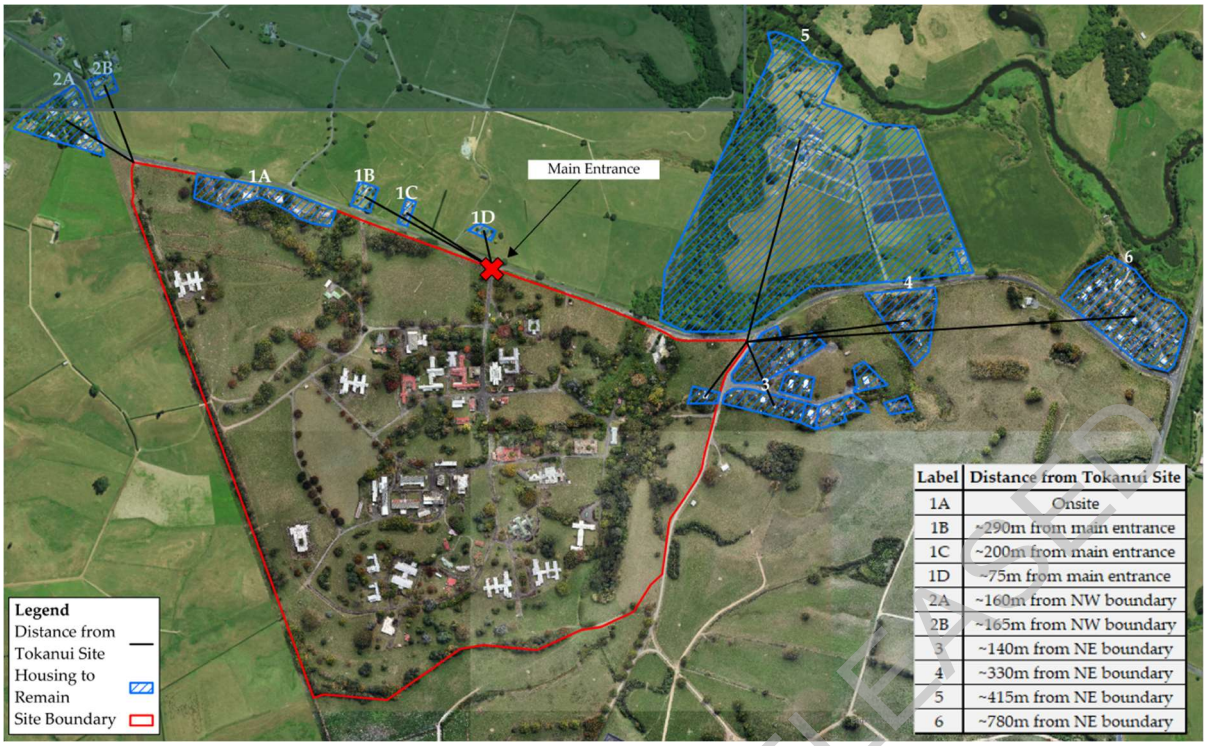
Constraints mapping for a new onsite disposal facility was undertaken for the following matters:

- Proximity to existing residential dwellings that are to remain;
- Geotechnical – geology, groundwater and slope stability;
- Heritage, archaeological and cultural significance;
- Productive land classification;
- Ecology; and
- Surface water conveyance.

8.3.1 Proximity to Residential Dwellings that are to Remain

Demolition works will remove all existing buildings within the Site, including former residential buildings. Residential dwellings that will remain in relatively close proximity of the site include those located along Te Mawhai Road to the north of the site, a cluster of houses at the Cruickshank/Te Mawhai Rd intersection to the north west of the Site, and another cluster of houses along Croasdale and Symonds Rd to the east of the Site. The Mangatoatoa Marae is also located approximately 400m from the north-eastern corner of the Site. These residential dwellings are shown on Figure 4.

The distance from potential new disposal site locations to the nearest residential dwelling has been assessed as a potential constraint to the siting of a new disposal site.



Label	Distance from Tokanui Site
1A	Onsite
1B	~290m from main entrance
1C	~200m from main entrance
1D	~75m from main entrance
2A	~160m from NW boundary
2B	~165m from NW boundary
3	~140m from NE boundary
4	~330m from NE boundary
5	~415m from NE boundary
6	~780m from NE boundary

Figure 4: Residential dwellings that are to remain within close proximity of the Site and the Marae land (feature 5)

8.3.2 Geotechnical

FTL geotechnical engineers have undertaken a desktop review of available information to help inform potential new disposal site locations at the Site. This involved review of the New Zealand Geotechnical Database (NZGD) and the Institute of Geological and Nuclear Sciences (GNS) Geological Map, scale 1:250,000, Geology of the Waikato area, in tandem with information obtained during previous investigations located on the eastern and south-eastern areas of the site conducted by FTL in October/November 2022 and April 2023.

Anticipated Ground Conditions

The 1:250,000 geology map, Geology of the Waikato area, indicates that the site is underlain by Tauranga Group deposits comprising swamp deposits, consisting of soft, dark brown to black, organic rich mud, muddy peat and woody peat of the Piako Subgroup overlying pumiceous silt, sand and gravel interbedded peat and rhyolitic pumice, including non-welded ignimbrite, tephra and alluvial pumice deposits of the Walton Subgroup. The gully features within the Site along the southern and eastern boundaries are shown to be underlain by inferred recent alluvial deposits (refer Figure 5 below).

Data obtained by FTL from the NZGD database as part of a review of publicly available information was combined with a review of recent investigations by FTL and others. The hand augered borehole and machine excavated test pit logs from previous investigations within and near the subject site undertaken by HD Geo Ltd (dated February 2021) and recently by FTL, indicate that the subject site is underlain by material comprising Hamilton Ash and Tauranga Group alluvial sediments.

Topsoil thickness within the previous investigation areas ranged between depths of approximately 0.2-0.6m below the ground surface.

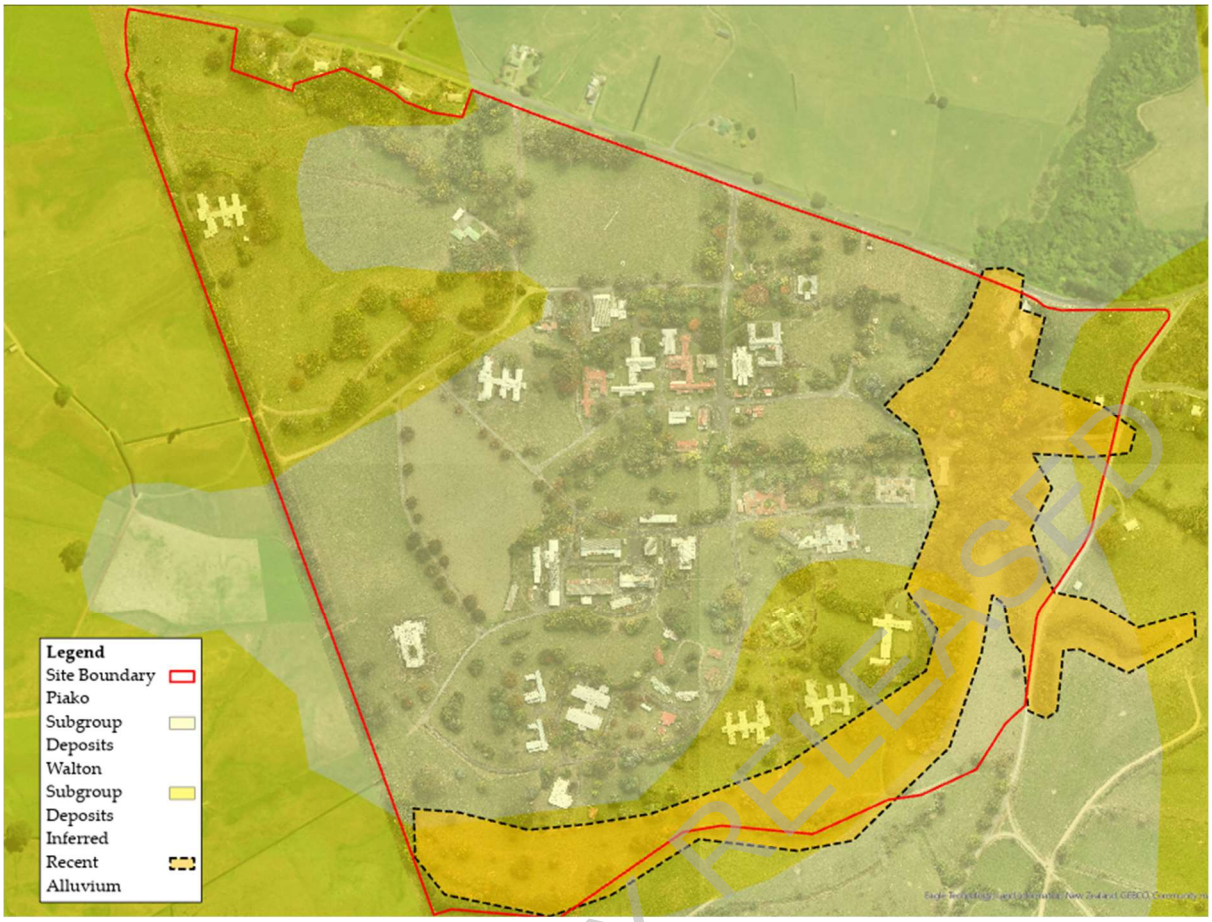


Figure 5: Annotated geological map of Tokanui Hospital site

In situ undrained shear strength values measured in the Hamilton Ash and Tauranga Group alluvial sediments ranged between 31 kPa and 214 kPa, corresponding to a firm to hard consistency. The natural soils in the upper 3.0m of the soil profile generally have an undrained shear strength of greater than 50 kPa, corresponding to a stiff consistency.

It is considered that recent alluvial deposits generally comprising compressible clays, silts and organic material may be present within isolated low-lying areas adjacent to streams and gully features in the eastern and southern parts of the site (refer Figure 5). It is anticipated that, prior to undertaking any disposal operations, undercutting of recent alluvial soils will be required.

Groundwater depths are likely variable across the subject site. Higher groundwater depths are to be expected within low-lying areas and lower depths anticipated within more elevated areas. It is anticipated that, in low lying areas, the groundwater depth may be near the surface in winter.

Suitability of Natural Soils for Use as Cap/Cover

The natural soils encountered in the previous investigations appear to generally comprise silts, clayey silts, sandy silts, sands and silty clays. Clayey soils, which may be suitable for landfill capping material, are generally encountered from a depth of 2m below the ground surface.

A review of the historic aerial photographs of the site indicate that natural soils may have been borrowed from areas within the Tokanui Hospital property and used as landfill capping material on the now closed disposal sites on the eastern side of the Wharekōrino Stream. This is supported by the recent FTL investigation of these areas, which found that the natural soils encountered at the site are

similar to the landfill cap material within the closed landfill area. This shows that material suitable for landfill capping use may potentially be sourced from within the Site. It is however recommended that laboratory testing including Proctor NZ Heavy Compaction testing and permeability testing be undertaken to verify this.

Slope Stability

From the FTL site walkovers and visual assessment conducted during the October/November 2022 investigations, evidence of shallow soil creep, including terracettes and hummocky topography, were observed in areas where the site topography sloped at, or was steeper than, 14° to the horizontal (1V:4H).

It is recommended that, for any proposed disposal sites located on or within close proximity to slopes at or steeper than 14° to the horizontal (1V:4H), additional geotechnical investigation and slope stability appraisals be undertaken to assess any potential impacts that proposed disposal sites may have on the surrounding slopes and conversely to assess potential impacts of any surrounding steep slopes on proposed disposal sites.

Conclusion

It is our opinion that, on the basis of this desktop appraisal, a new onsite disposal facility can be located within the Site from a geotechnical perspective, provided appropriate further investigation, appraisal and reporting is completed to assess the underlying ground conditions, suitability of borrow soils for capping material and potential impact any disposal sites may have on the surrounding slopes and conversely the potential impacts of any surrounding steep slopes on any proposed disposal sites.

8.3.3 Heritage, Archaeology & Cultural Significance

The 4Sight Preliminary Legislative/Consenting Review (April 2022) advises that the Waipā District Plan does not list any of the Site's buildings as heritage items. There are also no buildings within the Site listed on the New Zealand Heritage List/Rārangi Kōrero. However, there are two sites listed in close proximity to the hospital site including the Tokanui Historic Area (list number 6723) and the Tokanui Pā.

The CFG Heritage Limited (CFG) Archaeological Assessment (February 2023) states that there are no recorded archaeological sites in the project area, and there are no records of archaeological work undertaken either in or near the vicinity of the project area. However, it is located near the southern banks of the Pūniu River, which was central to the pre-European Māori settlement of the area, adjacent to major battles during the Waikato War, and would become the southern boundary of Te Rohe Pōtae (the King country), all of which suggests previously unrecorded archaeological material may be present.

CFG advise that the area around Tokanui Hospital itself has not been well surveyed, with archaeological field work tending to be focused on developed settlements or constrained by development plans. Six archaeological sites are recorded within 2km of the hospital grounds, all of which are pre-European Māori pā.

CFG refer to how in 1923 concerns were raised by Raureti Te Huia regarding two urupā (cemeteries or burial sites) which the Government had failed to protect as promised. One of these has been identified as the nearby Pukekawakawa burial reserve, which is outside the project area. The exact

location of the second is unknown, although it is believed to be within the hospital grounds (Te Muraahi & Maniapoto 2021: 48).

CFG undertook a hillshade LiDAR model analysis of the site and identified the following areas of potential archaeological interest:

- This comprises a hill that extends through the centre of the former Tokanui Hospital in the form of a headland, bordered by a stream (large pink area, western side in Figure 6). Although there is evidence of ground modification for roading and structures across the hill, there is potential for previously unrecorded archaeological sites being present here based on its position as a high point surrounded by historic wetlands, in an area which historic sources and oral traditions indicate was used by Māori pre-1900.
- This is a small hill on which the former Tokanui Hospital morgue stands and comprises a headland resting at the intersection of, and overlooking, two small streams (small pink triangular area, eastern side in Figure 6). The hill is covered in exotic trees, with native undergrowth and has a stepped eastern slope.

CFG and Iwi have also identified a number of other areas as culturally significant to mana whenua. These are shown in blue on Figure 6.

Figure 6: Tokanui Hospital Site – Heritage, Archaeological and Cultural Areas of Interest

All archaeological sites, based on evidence of pre-1900 human occupation, whether recorded or not, are protected by the provisions of the Heritage New Zealand Pouhere Taonga (NZHPT) Act 2014 and may not be destroyed, damaged or modified without an authority issued by Heritage New Zealand Pouhere Taonga.

It is understood that the Archaeological Authority requirement does not exclude a particular area from disturbance associated with any redevelopment, demolition or remedial works, but introduces a further process that has to be gone through before any works are undertaken in such areas, with the potential risk that archaeological features may be found, triggering further investigations and protection/relocation/management measures.

8.3.4 Highly Productive Land Use Classification

The National Policy Statement for Highly Productive Land came into force in October 2022 and places restrictions on rezoning, subdivision and land use proposals on land that meets the transitional definition of Highly Productive Land (HPL) – Land Use Capability (LUC) Classes 1-3, with some exceptions. This transitional definition applies until each relevant territorial authority provides a regional policy statement containing HPL maps for their region and this policy statement is operative.

The site is zoned 'Rural Zone' (Waipā District Plan, 2019 – Map 12), while LUC maps indicate that most of the site (refer Figure 7) falls under LUC Class 2 which is defined as "*very good multiple-use land, slight limitations, suitable for cropping, viticulture, berry fruit, pastoralism, tree crops and forestry*". Hence, the Site would be classified as HPL Class 2 under the NPS-HPL.

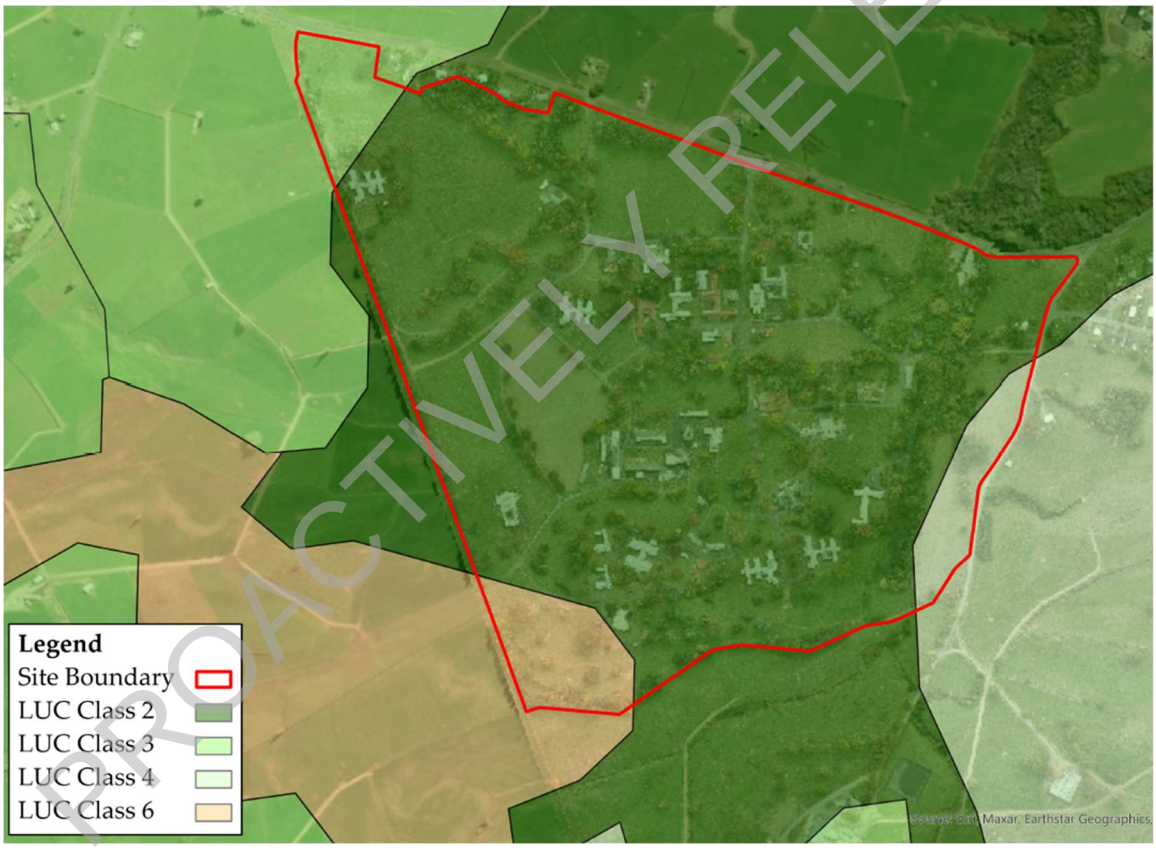


Figure 7: Tokanui Hospital Site – HPL Class 1 and 2 Overlay

However, Soil and LUC Consultant, Dr Scott Fraser, has advised that the LUC maps do not accurately reflect what was on the Tokanui village land in the 1980s, which needs to be considered when planning site restoration works. He further advises that a new disposal site could potentially be developed onsite without impacting existing HPL (highly productive land) if it was constructed on land occupied by existing infrastructure which would not be currently considered HPL. When the potential new disposal site construction was completed if a cap of no less than 60cm of good quality soil was

reinstated this land could also be restored as HPL. However, subsoil drainage and compaction would need to be carefully managed.

Taking Dr Fraser's comments into account, the HPL classification of the Site is likely to make it more difficult to obtain consent for construction of a new disposal site onsite, if constructed on land not currently occupied by existing infrastructure. It may still be difficult to construct on other HPL land where there is existing infrastructure, as the HPL National Policy Statement is relatively new and hence largely untested, so local and regional council would need to be consulted with to check if they agree with Dr Fraser's opinion set out above, that areas of the Site occupied by existing infrastructure would not currently be considered HPL.

Landfills can be designed and constructed so as to ensure the productive land use of any new disposal site is maintained post-landfilling, through the provision of an appropriate "agricultural cap" over the landfill cap. Dr Fraser sets out minimum requirements above, based on 60cm of good quality soil and careful management of subsoil drainage and compaction.

8.3.5 Ecology

4Sight (February 2023) undertook an ecological opportunities, constraints, and mapping investigation to provide information on the sites ecological state and to identify any potential constraints arising from the demolition works that may trigger additional consenting requirements. This comprised a desktop review and site investigation to identify any ecological features, potential fauna habitat and species within the Site boundary. Wetland delineation was undertaken in accordance with the wetland delineation methods set out in the National Policy Statement for Freshwater Management (NPSFM).

Natural Wetlands

Their investigation identified three natural wetlands within the Site.

1. Wetland 1 is located within a large depression area that is understood to function as a flood detention basin, with water temporarily stored in the basin discharging through a culvert at the eastern end of this basin into the Wharekōrino Stream.
2. Wetland 2 is located downstream of this and comprises an area with a channelised water flow and with surface water bordering the riparian zone, with hydrophytic vegetation present within the riparian margins.
3. Wetland 3 is a modified natural wetland. Drainage channels with wetland indicative vegetation run through the area and were historically created to allow for grazing of the area. The area was wet underfoot during the site visit.

Images 1-3 from the 4Sight Memorandum are reproduced below showing each of these wetlands in Figure 8, while the mapped wetland extents are shown in Figure 9, also reproduced from the 4Sight Memorandum.

Image 1: Looking down to wetland 1.

Image 2: Looking across wetland 2.

Image 3: Looking across a section of Wetland 3.

Figure 8: Tokanui Hospital Site – Wetland Images from 4Sight Ecological Assessment (2023)

The 4Sight Legislative/Consenting Review (April 2022) advises that the National Environmental Standards for Freshwater (NES-FW) sets out requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems. This includes regulations for carrying out earthworks outside of, but within a 100m setback from, a natural wetland and a regulation which states it is prohibited to undertake earthworks within a natural wetland if this results in, or is likely to result, in the complete or partial drainage of all or part of a natural wetland.

Under Section 3.22 of the NES-FW, every regional council must include the following policy (or words to the same effect in its regional plan:

(f) the regional council is satisfied that:

(i) the activity is necessary for the purpose of constructing or operating a new or existing landfill or cleanfill area; and

(ii) the landfill or cleanfill area:

(A) will provide significant national or regional benefits; or

(B) is required to support urban development as referred to in paragraph (c);

(C) is required to support the extraction of aggregates as referred to in paragraph (d); or

(D) is required to support the extraction of minerals as referred to in paragraph (e); and

(iii) there is either no practicable alternative location in the region, or every other practicable alternative location in the region would have equal or greater adverse effects on a natural inland wetland; and

(iv) the effects of the activity will be managed through applying the effects management hierarchy."

In our opinion, any new landfill on the Site located within or adjacent to a natural wetland would not pass this test.

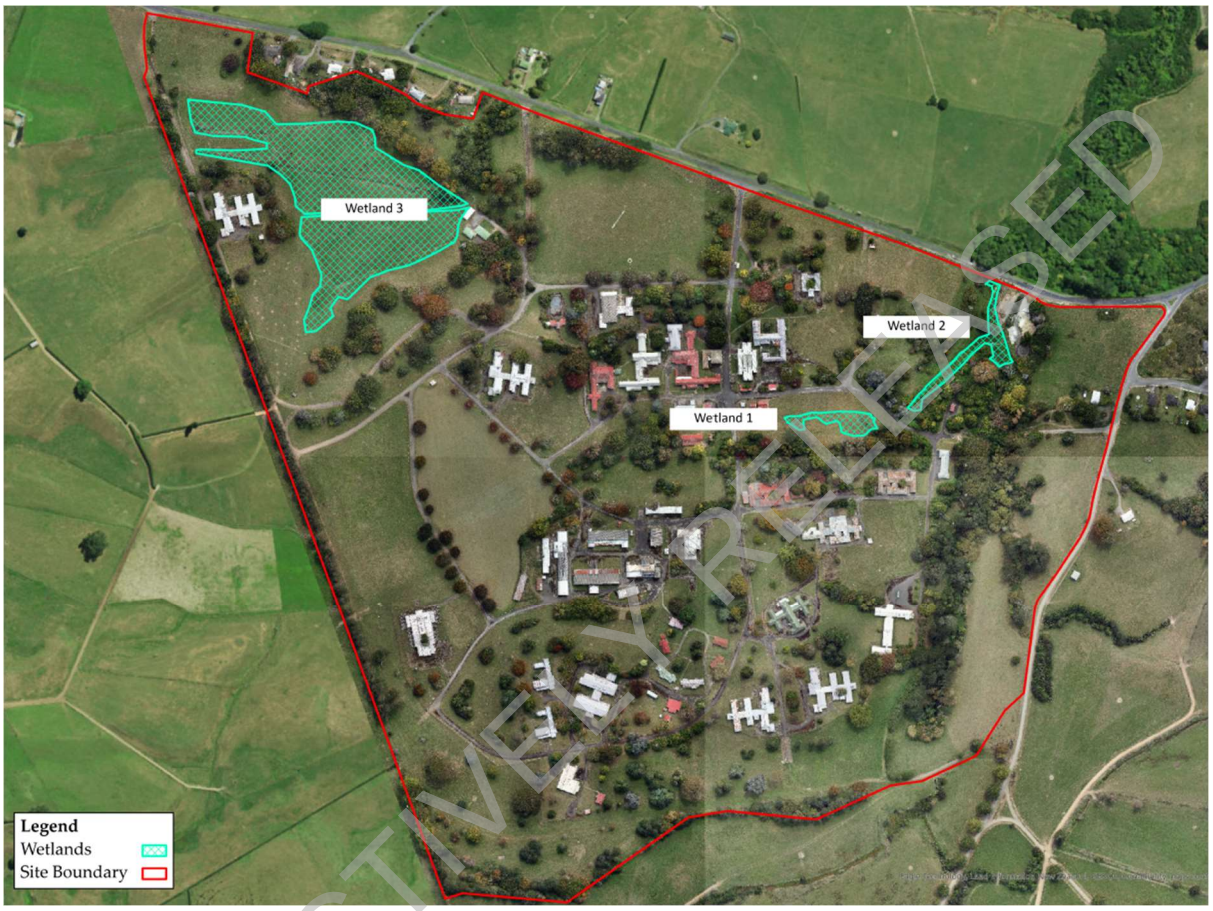


Figure 9: Tokanui Hospital Site – Natural Wetland Extents from 4Sight Ecological Assessment

Terrestrial Features - Trees, Bats and Native Birds

Terrestrial vegetation types within the site included large exotic trees, ornamental trees, and large native trees. Large trees (≥15+ m) were scattered throughout the site. Native trees identified on site include Totara, Rimu and Kauri.

The ecological assessment recommends that all large trees (native and exotic) on Site are retained to avoid adverse effects on bats and native birds and to retain amenity values within a highly modified district. If removal of large trees is required, native tree species should be avoided where possible.

Removal of some large trees will likely be required for any new onsite disposal facility, and may have adverse effects on bats and native birds. Management plans and/or appropriate mitigation measures will need to be put in place to minimise potential ecological impacts (e.g. Bat Management Plan, Avifauna Management Plan, tree felling protocols). An Arborist may also need to be engaged to ensure the protection of the trees that are to be retained.

8.3.6 Surface Water Conveyance

CFG (February 2023) refer to the hospital site being located at the junction of three waterways, noted in ML 6748 drawn in 1889 as Makaroa, Tarutahi and Wharekōrino Swamps as shown in Figure 10. Of these swamps, the Wharekōrino Stream is still present and includes swamp like features, while the Tarutahi Swamp appears to be part of the Wharekōrino Stream above the site, and the Makaroa Swamp is no longer present.

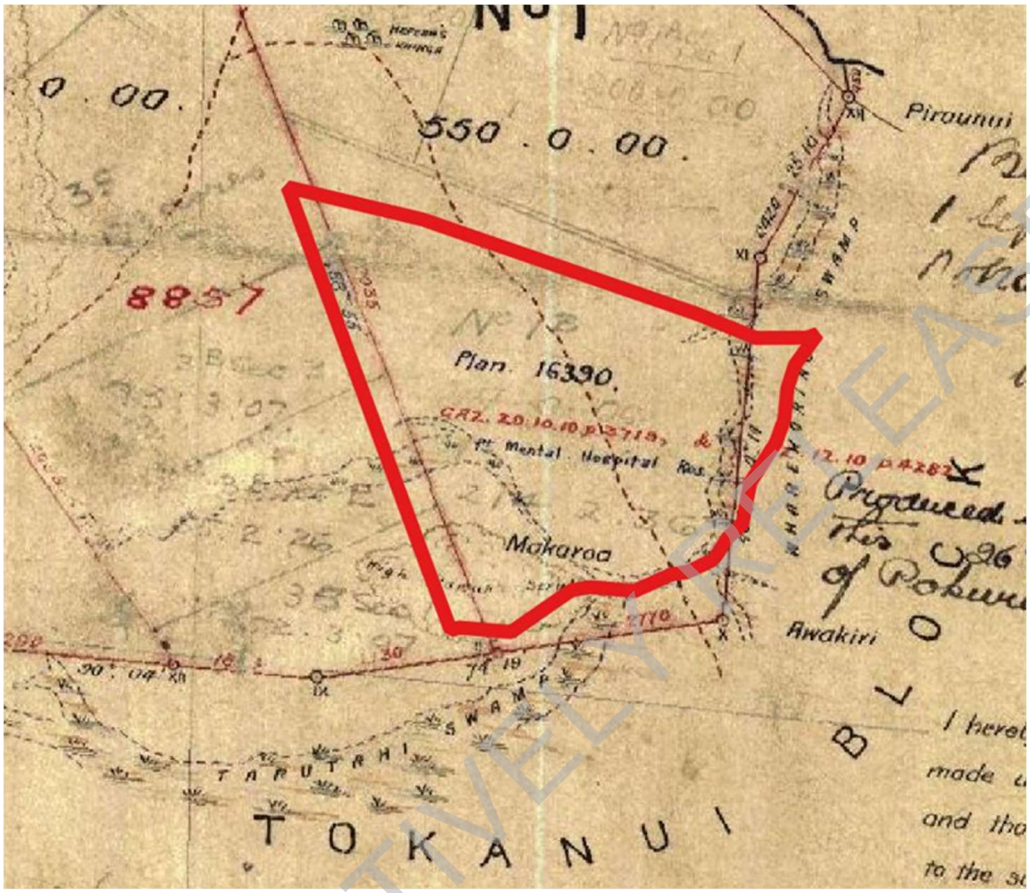


Figure 10: Tokanui Hospital Site – Historical Plan showing former swamps (from CFG, 2023)

Investigation of the Site's stormwater system has found that runoff from upgradient farmland to the west of the site has been piped through the site as shown in Figure 11 below, meaning these historical watercourses have been infilled and also realigned as the stormwater pipe system alignment differs from the historical swamp/watercourse alignment.

CCTV investigation has shown that these stormwater pipes are in relatively poor condition. Under common law, a downgradient property cannot restrict the passage of upgradient surface runoff through it. This means that the existing stormwater pipe "trunk main" drainage system will either need to be repaired, replaced or removed and a stream reinstated along its current alignment or the historic alignment (this practice is known as "stream daylighting").

It is preferable that any new onsite disposal facility is not located over the trunk main stormwater drainage system or in close proximity to any reinstated watercourse.

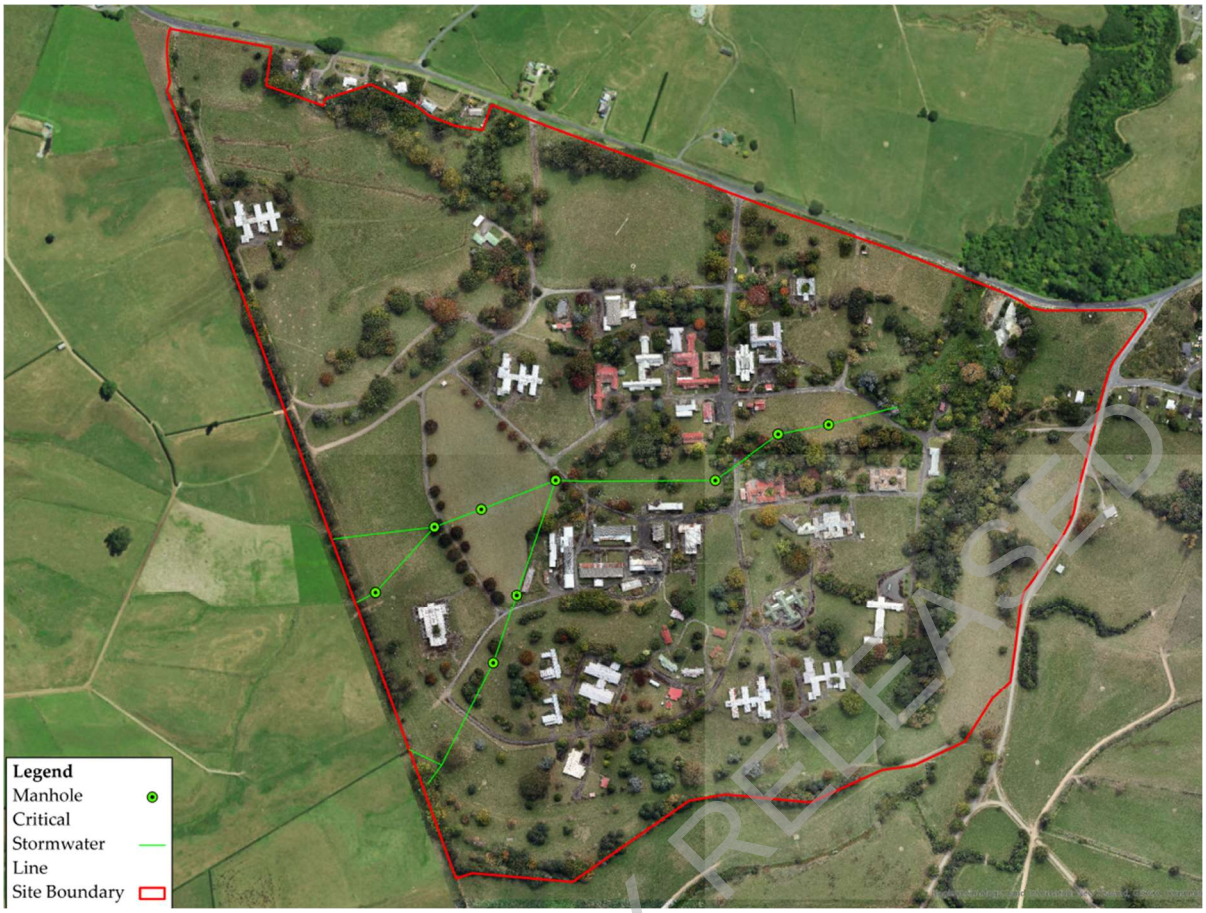


Figure 11: Tokanui Hospital Site – Current Trunk Stormwater Reticulation conveying upgradient runoff through Site

8.4 CONSTRAINTS MAPPING

The different constraints referred to in Section 8.3 of this report are overlain on Drawings 33097/102-104, together with the preliminary disposal site locations determined by Fraser Thomas. This constraints mapping process is summarised on drawing 33097/103 and shows:

(a) Site 1A is no longer considered suitable due to partially being located within a wetland and abutting an archaeological authority area (hill feature), while it is also only 135m away from the nearest residential dwelling.

(b) Sites 1B, 2 and 3 would all require an Archaeological Authority to proceed, relating to a hill feature, while it is 275m away from the nearest residential dwelling.

(c) Site 4 is no longer considered suitable due to being located in an engineered flood detention structure and prone to flooding, critical trunk stormwater reticulation running under it, and a natural wetland being located within it.

(d) Site 5 needs to either be reshaped or relocated, or further investigation to determine the significance of a cultural feature of interest located within its south-eastern corner.

(e) Site 6 is potentially suitable, but is underlain by alluvial materials and would require geotechnical investigation to check the extent and depth of alluvial materials and hence the amount of undercutting that might be required, as well as checking the groundwater table in this area.

(f) Sites 7 and 8 are based on expanding the existing disposal sites on the eastern side of the Wharekōrino Stream. Site 7 is based on two potential footprints - a minimum available footprint

(7A), keeping the landfill outside the estimated floodplain extent of the Wharekōrino Stream for the 100 year storm with allowance for climate change (allowing for partial culvert blockage) in accordance with Waikato regional requirements and existing stream/culvert conditions; and a maximum footprint (7B) assuming an existing crossing of the stream for what is now a redundant eastern road entrance into the site is removed, which would significantly reduce the floodplain extent. Option 8 is based on expanding the northern disposal site outside of the floodplain extent. Issues with these options are summarised below:

- The existing fill volumes and composition has been separately investigated and reported on by FTL. The estimated existing fill volume is 22,800m^3 over an area of 1.34ha in the southern area and 7,600m^3 over an area of 0.42ha in the northern area. Utilisation of these areas for placement of up to an additional 156,000m^3 of demolition materials represents a significant increase in landfill scale.
- Extension of the southern area is not possible due to a significant portion of this disposal site being located within the floodplain of the Wharekōrino Stream. For Area 7A, the available fill area is 0.24ha and potential additional fill volume is 2600m^3. Corresponding values for Area 7B are 0.93ha and 24,000m^3 respectively.
- For the northern area, extension is limited by the Wharekōrino stream floodplain to the west and south, a gully feature to the north and Farm Road and an existing residential dwelling cluster to the east and north-east respectively. The available area and potential volume are 0.98ha and 19,000m^3.
- Separately and cumulatively, these areas are insufficient to satisfy the total demolition waste volume demand.
- Furthermore, landfilling on top of an existing disposal site would require either all the existing waste materials to be excavated and stockpiled followed by construction of a modern, engineering landfill and replacement of the same materials, along with the demolition waste; OR a "piggy back" liner on top of the existing waste materials. Both options would significantly increase landfill design and construction costs. The former would have by far the larger construction cost increase but would result in all waste materials being safely contained, while the latter would not address any of the issues with the existing site, which include boron contamination of groundwater. The overfilling of existing waste materials can also induce secondary settlement of the underlying waste materials, which may potentially damage the landfill liner for the piggy back option.
- Both options are potentially subject to geotechnical stability issues and OLFPs while Option 8 is located within 65m of a cluster of existing residential dwellings outside the Site.

For these reasons, these Options are not considered viable.

8.5 REVISED DISPOSAL SITE LOCATIONS

Revised new disposal site locations are shown on Drawing 33097/105. Three potential sites are still considered suitable, comprising:

(a) Site 6 (3.3ha, 160,000m^3 capacity) is unchanged from the preliminary assessment and requires further geotechnical investigation to confirm its viability. Undercut alluvial materials from this area are unlikely to be suitable for capping and may require offsite disposal.

(b) Site 7 (3.8ha, 160,000m^3 capacity) is typical of a large stockpile being placed on the site, which would create a mound feature. It is subject to limited constraints, the main one being that part

of it overlies a likely historic swamp. This can be managed through appropriate geotechnical investigation of this area and engineering design. It is also located on the former commercial area of the Site, which has potential benefits in minimising the impact on HPL land and addressing possible soil contamination issues in this area.

(c) Site 8 (3.3ha, 160,000m^3 capacity) is essentially Site 1B, shifted further southeast to avoid the Archaeological Authority hill feature. Its location and extent is still limited by an overland flowpath (OLFP) to the east and stormwater reticulation to the south, where an OLFP is a conveyance pathway for surface runoff. It is 280m away from the nearest residential dwelling.

(d) All three sites involve mound rather than gully fills so may be visually obtrusive. Drawing 33097/106 provides typical landfill cross-sections for each disposal site at specific locations.

(e) All three sites would require suitable clay and topsoil material to be sourced for capping and final cover. Sufficient topsoil may likely be obtained by stripping topsoil from the fill area, temporary stockpiling and then respreading on the completion of filling and capping. The desktop geotechnical assessment indicates that clayey soils, which may be suitable for landfill capping material, are generally encountered from a depth of 2m below the ground surface, but further investigation and testing is required to verify this. There is potential to excavate out Areas 9 and 10 first, creating a cavity with any suitable clay capping material being stockpiled, followed by filling the disposal area and then replacing the stockpiled clay to cap the fill, following be retopsoiling. This would reduce the finished height of the landfill mound and hence visual effects of both these sites.

In summary, there is no ideal location for a new disposal site onsite. The three shortlisted sites have sufficient capacity to take all estimated demolition volumes, while Option 9 is subject to the least constraints. Capping material may either need to be imported or may potentially be sourced on-site, or alternative synthetic capping solution considered.

Table 8: Potential Shortlisted Onsite Disposal Locations

Site	6	9	10
Area (m^2)	33,000	38,000	33,000
Fill volume (m^3)	160,000	160,000	160,000
Visual amenity	Will create elevated feature but partly tied into existing hillside	Will create new elevated “mound”	Will create new hill feature
Constraints	OLFP diversion required; alluvial soils; possible groundwater issues; abuts land steeper than 1V:4H	Partly overlies estimated alignment of historic swamp	Areal extent limited by multiple nearby constraints. 280m to nearest houses.

Notes:

1. All potential new disposal site areas and heights allow for provision of 600mm landfill cap and 150mm topsoil.
2. Geotechnical investigation required to investigate possible onsite clay capping sources. If site specific investigations show site won material is not suitable, a synthetic cap or imported clay cap would be required.

8.6 CONSENTABILITY

This section provides an assessment of the likelihood of consentablity of any new disposal site onsite, based on 4Sight's Legislative/Planning Assessment (2022), AECOM (2019) and FTL's own experience.

8.6.1 4Sight Legislative/Planning Assessment

The 4Sight Legislative/Planning Assessment (2022) provided a preliminary assessment of consenting requirements for any new onsite disposal facility. This assessment is summarised below. It indicates that any new disposal site onsite would be a **non-complying activity** under the Waipā District Plan and a **discretionary activity** under the Waikato Regional Plan.

Table 9: Preliminary Consenting Requirements for new onsite Disposal Facility

Plan/Standard	Preliminary Assessment of Consenting Requirements
NESCS	Consent will be required for disturbance of soil and possibly changing land use, irrespective of which remediation option is chosen. Consent status to be determined.
NES - Freshwater	Consent would be required for any earthworks located within a 100m setback from a natural wetland. Consent status to be determined.
Waikato Regional Plan	Rule 5.2.7.1 – Discharges into or onto land and any subsequent discharge of contaminants into water or air as part of the operation of a landfill is a **Discretionary Activity.** Rule 5.3.4.8 – Any discharges arising from the remediation of contaminated land that does not comply with the permitted or controlled activity rules is a **Discretionary Activity.** Rule 5.1.4.13 – Soil Disturbance – **Discretionary Activity**
Waipā District Plan	Rule 4.4.2.75 – Earthworks in the Rural Zone – **Discretionary Activity** Rule 26.4.2.1 – Setback of Earthworks from lakes and water bodies – **Restricted Discretionary Activity** Activity Status Table – Lists the demolition and removal of buildings as a **Permitted Activity** (except those listed in Appendix N1 - Heritage Items*) Rule 4.4.1.5(b) – Landfills are not listed within the activity status tables and therefore default to a **Non-Complying Activity**
HNZPTA	**Archaeological Authority** Required for two locations on the Site (refer section 8.3.3).

* None of the buildings are listed in district plan Appendix N1 as Heritage Items.

4Sight advise that they have not considered the implications of the following legislation:

- Natural and Built Environments Act (NBA) to provide for land use and environmental regulation (this would be the primary replacement for the RMA. LINZ have confirmed it will be considered as required but is dependent on project timeframes and status of the NBA);
- Strategic Planning Act (SPA) to integrate with other legislation relevant to development, and require long-term regional spatial strategies;
- Climate Change Adaptation Act (CAA) to address complex issues associated with managed retreat and funding and financing adaptation.

However, they state that "*Given the timing of this project, the likely delays (which could be many years) for the development and introduction of a new combined plan for the Waikato Region, we consider it most likely that consent will be required and considered under the existing plan provisions and the RMA.*"

8.6.2 Consenting Investigation/Assessment Requirements

Table 10 provides a summary of likely investigation and assessment requirements to support any resource consent application for a new onsite disposal facility, along with comparative requirements for building demolition, contaminated soil remediation and infrastructure removal.

Table 10: Investigation/Assessment Requirements for Resource Consent Application

Investigation/Assessment	Building demolition, contaminated soil remediation, infrastructure removal	New on-site Disposal Facility	Status
Cultural Impact Assessment	Yes	Yes (opposed)	Completed – supports disposal of all hazardous materials and waste off-site
Archaeological assessment	Yes	Yes	Completed, but archaeological authority may be required for new disposal site depending on location
Contaminated Land Assessments – PSI & DSI	Yes	Yes	In progress
Material Quantities Assessment	Yes	Yes	In progress
Geotechnical assessment	Possibly (minor)	Yes	Not started
Hydrogeology assessment	No	Yes	Not started
Ecology	Yes	Yes	Memorandum completed
Arborist (Trees)	Possibly	Yes	Tree assessment included in ecological assessment
Stormwater assessment	Yes	Yes	In progress
Engineering design	Earthworks, demolition and site restoration plans	Landfill design	Not started
Engineering assessment	Yes	Yes	Assessment of existing infrastructure in progress
Landscape and Visual Assessment	No	Yes	Not started

Investigation/Assessment	Building demolition, contaminated soil remediation, infrastructure removal	New on-site Disposal Facility	Status
Traffic assessment	Yes	Yes	Not started
Noise Assessment	Construction noise	Construction and operation noise	Not started
Air emissions assessment	No (provided air emissions from vehicle movements covered under traffic)	Yes	Not started
Construction Management Plan	Yes, including Erosion Sediment Control Plan (ESCP)	Yes, including ESCP	Not started
Operations Management Plan	No	Yes	Not started
Aftercare Plan	No	Yes	Not started

The THDSP requires consents to be applied for by November 2024. Geotechnical and hydrogeological investigations in particular take time, typically requiring hand auger and machine boreholes (testpits and drilling) and installation of monitoring bores to provide baseline monitoring data, including capturing seasonal variations. As of May 2023, there is only 18 months to complete all of the above work, which is relatively short.

A resource consent application is likely to have limited notification (best outcome) or full notification (more likely outcome, particularly given its non-complying status under the Waipā District Plan). It could take some years to get through the consenting process and any successful application could potentially be appealed to the Environment Court.

Overall, it is considered that any resource consent application for a new disposal site onsite is likely to take considerable time and expense, with limited time available to meet the 24 November 2024 deadline. The chances of success are also considered low, given the overall consent status being non-complying and the THDSP as well as the CIA's opposition to any new disposal facility onsite.

9.0 OFF-SITE DISPOSAL OPTIONS

9.1 OVERVIEW

Offsite disposal means the disposal of non-recyclable waste materials to appropriate, modern engineered, consented disposal facilities, in this case Class 1 or 2 landfills as defined in Section 8.1 of this report, according to the WasteMINZ Technical Land Disposal Guidelines.

The main issue with offsite disposal is traffic and vehicle emissions. AECOM estimated that to dispose of 156,000m^3 (loose measure) of demolition and other materials would require 6,240 truck and trailer movements (each way) to a suitable disposal facility, based on 25m^3 per truck and trailer. Adopting a

more conservative estimate based on 18m^3 for a 7 axle truck and trailer, gives approximately 8670 vehicle movements.

9.2 DISPOSAL FACILITY SELECTION PROCESS

The WSP (2015) Waste Management Plan included an assessment of potential disposal sites for a wide range of materials expected to be produced from the site demolition and remediation process.

AECOM adopted a simplified approach in assessing offsite disposal options and costs, by conservatively assuming that all waste materials would be disposed of at the North Waikato Regional Landfill at Hampton Downs, a Class 1 landfill, located approximately 99km from the site.

In this report, disposal facility options have been re-assessed within a 100km radius of the site, as shown in drawing 33097/201. This assessment has been made through liaison with Waikato Regional Council to obtain current fill/landfill facility details within the region and through contacting various fill facility operators.

Other options considered included checking other potential disposal sites (e.g. old quarries near end of productive life) in the local area. However, it was considered unlikely that this approach would be viable, as it is considered that there is insufficient time to prepare and lodge a resource consent application for a new landfill in a nearby quarry by the THDSP deadline of 24 November 2024, as such an application would involve multiple specialist investigations, with a particular focus of geology and hydrogeology issues, which are complex and time consuming investigations (refer section 8.6 of this report), while other issues such as land ownership and traffic would also require assessment.

9.3 DISPOSAL FACILITY OPTIONS AND CONSTRAINTS

Disposal facility options and possible constraints are summarised in Table 11 below, using a colour coding system, with green indicating acceptable sites, orange sites that may potentially be applicable or possibly considered and red sites that are not suitable due to various site constraints. Table 11 shows that only two sites meet the adopted criteria, with the North Waikato Regional Landfill considered the most appropriate site, being the only Class 1 landfill with available capacity, albeit just within the 100km trip criteria, and the GRP Class 2 site at Glen Afton (former Puke Coal site) being suitable for C&D materials.

In terms of potential (orange) facilities, there is a newly consented site at Riverview Rd, Huntly, which is currently going through a consent appeal and hence its starting date is uncertain while it can only accept controlled wastes (Class 4). The Ridge Rd and Envirofill South facilities are slightly outside the 100km limit and are also only Class 4 facilities but may be able to accept low level contaminated soils.

Table 11: Potential Offsite Disposal Facilities

Available Sites	Operator	Landfill/Fill Class	Distance from Tokanui – one way (km)	Comments
North Waikato Regional Landfill, Hampton Downs	Envirowaste Services Ltd (ESL)	Class 1	99	Most modern, engineered landfill facility in region with capacity for 30,000,00m^3 over its lifetime.
Tirohia Landfill, Paeroa	Waste Management NZ	Class 1	96	Not currently accepting new customers – extension of landfill appealed to Environment Court
Rangitoto Landfill, Te Kuiti	Waitomo District Council (DC)	Class 1	45	Waste from outside Waitomo district needs prior approval; limited to 80T/d and only accepts waste 3d/wk; unseparated C&D wastes not accepted
Tokoroa Landfill, Tokoroa	South Waikato DC	Class 1	70	Closed
Taupo	Taupo DC	Class 1	134	Active, but likely cannot receive required volume due to annual 50,000m^3 volume limit and ~134km from site
1161 Rotowaro Rd, Glen Afton	GRP Ltd (Green Gorilla)	Class 2 & 4	85	Active. Limited to 208,000T/yr; WAC exclude asbestos and contaminated soils
205 Bedford Rd, Te Kowhai	IH Wedding & Sons (Waikato) Ltd	Class 2 & 4	50	Active, but can only accept 300m^3/d. While consent allows for accepting C&D waste, site is only accepting cleanfill now.
Riverview Rd, Huntly	Gleeson Quarries	Class 3 & 4	40	Going through consent appeal; may not be operational by mid-2024
225 Ridge Rd, Bombay	Ridge Road Quarry Limited	Class 3 & 4	114	Active
Ridge Rd, Bombay (Envirofill South)	ESL	Class 3 & 4	114	Active

10.0 COSTS

Costs for off-site disposal (Option 1) are included in Appendix A and were estimated using the following:

- Materials quantities (volumes) and densities from AECOM (2019). For Option 1B (some horizontal infrastructure removed), it was assumed that only 20% of roading materials and horizontal infrastructure services were removed.
- Average rates from LINZ for different construction/demolition activities, plant and personnel and disposal facility rates, updated by LINZ to May 2023.
- Estimation of loading, haulage and disposal costs for different waste materials. Factors were applied to some material categories on the base loading and haulage rates to reflect these materials have stricter handling and transport requirements (e.g. asbestos).
- Haulage was based on a worst-case scenario of all materials being disposed to Hampton Downs Landfill, being the furthest from the site (99km).
- Loading and haulage times were estimated from consideration of travel distance and time, other similar projects and experience.
- Allowance for contractor Preliminary and General (P&G) costs of 10%.
- Allowance for consultants and other professional fees of 7.5%.
- Allowance for escalation costs of 6%, based on the works being started in mid-2024.

Costs for on-site disposal (Option 2) were estimated using the following:

- The same approach as Option 1 except for the following.
- Haulage costs allowed for an average return trip of 1km within the site.
- Estimation of costs for a new 160,000m^3 capacity, Class 1 or 2, disposal facility covering construction, filling, capping and site restoration costs, based on a dual HDPE/clay base liner, groundwater underdrainage, leachate collection system, clay and topsoil cap and regrassing to enable productive land use. It was assumed the landfill would be a mound feature with a perimeter toe bund on all sides (most conservative approach). Access roading and a turning circle area, erosion/sediment controls and stormwater drainage were also allowed for.
- Assumed resource consenting costs of [redacted] (as adopted by Aecom).
- Allowance for Preliminary and General (P&G) of 10%.
- Allowance for consultants and other professional fees of 10.5%, to incorporate landfill design costs.

In both cases, no allowance was made for:

- Actual building and infrastructure demolition costs, as these are common to all options.
- Importing of cleanfill (mainly topsoil) to backfill areas where contaminated soils have been removed from, as it is assumed this would be included under site demolition costs.

Ongoing operation and maintenance costs were estimated based on the following:

- No ongoing O&M costs for removal and disposal of all structures and materials, as the site would be clean (Option 1A).
- Ongoing O&M costs for leaving 80% of horizontal infrastructure in the ground (Options 1B and 2B), for:

  - No allowance for internal road maintenance, as this would be left in place at the landowner's request to provide internal access within the site and hence assumed it would be maintained by them.
  - No allowance for maintenance of the stormwater pipe reticulation serving the upgradient land, which needs to remain in place, as this is a requirement for all options.
  - Allowance for unscheduled events; e.g. collapsed redundant pipe causing localised subsidence that need to be remedied.
- Ongoing O&M costs for maintenance and monitoring of the onsite disposal facility involving:
  - Consent compliance checks – visual inspections on assumed quarterly basis.
  - Leachate haulage and disposal to offsite wastewater treatment plant (main cost). This has been estimated from Te Awamutu average annual rainfall of 1310mm, an infiltration rate through the landfill cap of 3% and the landfill area (3.8ha), giving an annual average leachate volume of 683m^3/year, and haulage and offsite disposal costs provided by a local supplier.
  - Leachate system maintenance – pumps (if present), pipe flushing, etc.
  - Any leachate, surface water, groundwater monitoring required under the consent – assumed sampling required at 3-6 month intervals.
  - Routine maintenance – e.g. reinstating cap/topsoil cover, fixing any scour/erosion, etc.
- Estimation of total O&M costs over a 10yr period based on an average inflation rate of 2.1%, compounded over the 10 year period.

These costs are summarised below in Table 12 and illustrated in Figures 12 and 13. They clearly show that "disposal" is the dominant cost component, so it is important to reduce the volume of material that requires disposal to a Class 1 or 2 landfill either onsite or offsite, as much as possible.

It has been assumed that any new onsite disposal site would be a non-commercial operation and not subject to the national landfill levy. This needs clarifying as if the landfill levy were to apply, this will be increased to [redacted] equating to a worst case increase in cost for onsite disposal of [redacted].

For onsite disposal, the main cost component is for the offsite disposal of leachate (average annual volume of 683m^3/yr) to a Wastewater Treatment Plant. These costs are relatively expensive and consideration should be given to an alternative option of pumping any leachate via a shallow rising main into the recently constructed wastewater line along Te Mawhai Road, subject to the receiving Wastewater Treatment Plant confirming acceptability.

Table 12: Disposal Options Cost Comparison

Option	Horizontal infrastructure to be removed	Disposal location	Materials removal / disposal costs (Capex)	Ongoing O&M costs (10yr total)	Combined Total	Rank (highest to lowest)
1A	All	Offsite	[redacted]	[redacted]	[redacted]	1
1B	Some (e.g. 20%)	Offsite	[redacted]	[redacted]	[redacted]	2
2A	All	Onsite	[redacted]	[redacted]	[redacted]	3
2B	Some (e.g. 20%)	Onsite	[redacted]	[redacted]	[redacted]	4

Figure 12: Tokanui Disposal Options Cost Comparison – Capex (i.e. actual demolition materials removal and disposal costs, excluding actual demolition costs)

Figure 13: Tokanui Disposal Options Cost Comparison – Cumulative O&M Costs over 10 Year Period

11.0 OPTIONS ASSESSMENT

This section explains the options assessed in accordance with the Deed, the assessment process and preliminary outcome.

11.1 SELECTED OPTIONS

Selected assessment options come from the Deed settlement process. These are:

Option 1: Complete Site works in line with Subpart B: Demolition and Remediation Standards with waste disposed OFF-SITE:

A. Dispose of **all** contaminated and/or non-contaminated materials and horizontal infrastructure to a Class 1 and/or 2 landfill located **off** the Site.
B. Dispose of **all** contaminated and/or non-contaminated materials, to a Class 1 and/or 2 landfill located **off** the Site **but retaining some horizontal infrastructure.**

Option 2: Complete Site in line with Subpart B: Demolition and Remediation Standards with waste disposed ON-SITE:

A. Construction of a new disposal site located **on** a Tokanui Hospital deferred selection property to dispose of **all** contaminated and/or non-contaminated material and horizontal infrastructure.
B. Construction of a new disposal site located **on** a Tokanui Hospital deferred selection property to dispose of all contaminated and/or non-contaminated materials **but retaining some horizontal infrastructure**.

It is important to note that the purpose of this report is to assess waste disposal options. The inclusion of horizontal infrastructure is purely to assess the impact of changes in the scale of the waste disposal options under the four stated options.

"Contaminated material" refers to hazardous material such as lead painted materials and ACM, as defined in the glossary.

"Some" horizontal infrastructure in this context has yet to be defined, but will likely involve some roading to maintain vehicle access to and through the Site, critical stormwater infrastructure (e.g. to convey upgradient runoff through the Site) and selected other infrastructure. This is being determined as part of the Horizontal Infrastructure Assessment.

This evaluation does not include:

- Assessing the impacts of vertical infrastructure demolition/removal on the site, as this is common to the options considered;
- Assessing the impact of reuse/recycling, as this will be promoted across all options;
- Assessment of how contaminated soil will be managed as part of the overarching project (this scope of work is being undertaken in line with the remediation standards set out in the THDSP).
- Assessment in respect of the existing disposal sites, as per Part 9.13 of the Deed.

11.2 ASSESSMENT APPROACH

11.2.1 Process Overview

The evaluation assessment approach was developed as a hybrid approach tailored to the Site, based on the following tools:

(a) Multi-criteria analysis (MCA): This can be used to assess multiple criteria, both quantitative and qualitative relating to a proposed project. MCA can be used to compare different alternatives and options and assist with conversations between the project proponent and stakeholders to help inform decision making.

(b) Framework for Assessing the Sustainability of Soil and Groundwater Remediation (CL:AIRE, 2010): This is a framework by the Sustainable Remediation Forum – United Kingdom (SuRF-UK) for sustainable remediation involving consideration of a range of environmental, economic and social indicators, as listed below:

Environmental	Economic	Social
ENV1: Emissions to air	ECON1: Direct economic costs and benefits	SOC1: Human health and safety
ENV2: Soil and ground conditions	ECON2: Indirect economic costs and benefits	SOC2: Ethics and equity
ENV3: Groundwater and surface water	ECON3: Employment and employment capital	SOC3: Neighbourhoods and locality
ENV4: Ecology	ECON4: Induced economic costs and benefits	SOC4: Communities and community involvement
ENV5: Natural resources and waste	ECON5: Project lifespan and flexibility	SOC5: Uncertainty and evidence

Figure 14: SuRF-UK SR2 Indicators

The current Surf-UK SR2 Indicators appendix was reviewed as a starting point to look at how it might be adapted to this project. The SR2 indicators were considered overly complicated for this Site and particular application, but relevant indicators from SR2 were incorporated into this assessment.

(c) Mauri model: The Mauri Model Decision Making Framework was developed in New Zealand and is unique in its approach to the management of water resources as the framework offers a transparent and inclusive approach to considering the environmental, economic, social and cultural aspects of the decisions being contemplated. It is consistent with the RMA sustainability framework and incorporates both western scientific and indigenous world views. It has been adapted to waste management by D Hikuroa.

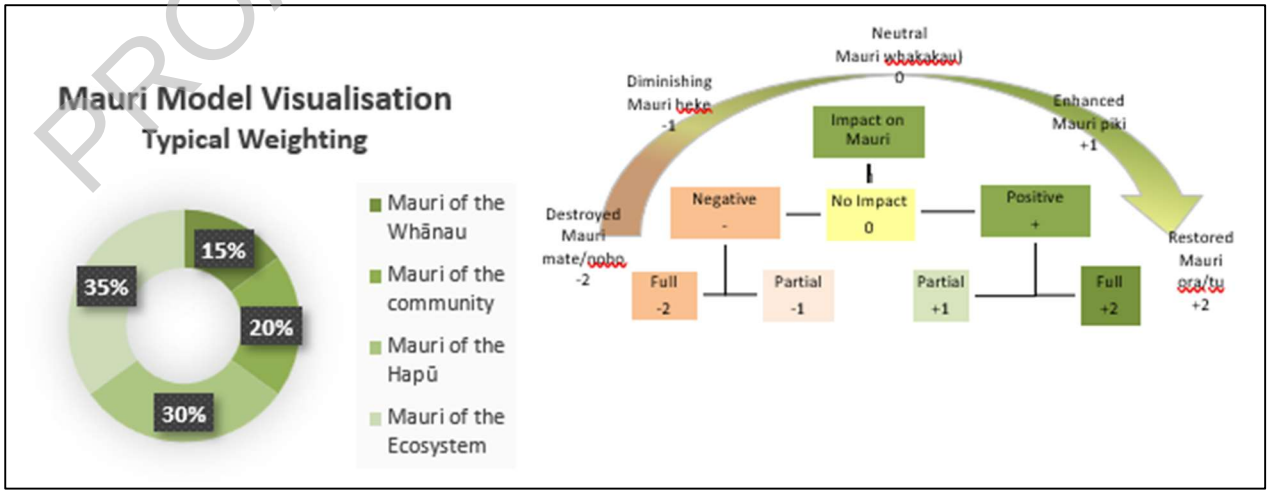


Figure 15: Mauri Model Visualisation (source: adapted from Morgan TKKB and Fa'aui TN (Sept 2014))

(d) Landcare Research has developed a range of Māori environmental assessment and performance indicator tools, primarily in relation to freshwater resources.

11.2.2 Assessment Criteria and Indicators

The assessment was undertaken looking at environmental, social, cultural, economic criteria consistent with the Mauri model and taking into account the criteria agreed to by the Crown to assess and inform the disposal options assessment (refer section 4.4 of this report). The choice of criteria is important as it will ensure LINZ considers the right information as part of this options analysis. Within each criteria, a number of indicators[4] were developed for evaluation, along with a number of sub-headings to help explain what each indicator covered. These

Table 13: Assessment Criteria, Indicators and Sub-headings

Criteria	Indicator	Sub-heading
Environmental	Effects on land use/ productivity	Contamination of the land Associated effects on land use/productivity
	Effects on surface water	Quantity – peak flows/volumes Quality Silt/sediment Scour/erosion
	Groundwater effects	Groundwater table effects (groundwater levels) Quality Use
	Ecological effects	Plants/trees/birds and other fauna Aquatic species
	Air emissions	Dust/odour Particulate/volatile gases Greenhouse gases (carbon dioxide, methane)
	Sustainability	Reuse/recycling Resilience (e.g. ability to cope with climate change effects) Legacy (future generation) issues
Social	Public health and safety	Physical injury Contaminant effects on human health Traffic impacts
	Worker health and safety	Physical injury Contaminant effects on human health Traffic impacts

[4] An indicator is a single characteristic that represents a potential or actual effect which can be compared across options to evaluate their relative performance. Indicators need to be measurable in some way that is sufficient to allow evaluation (adapted from SuRF-UK, 2011).

	Neighbourhood effects	Dust, noise, odour, vibration, traffic Changes to surface runoff flow patterns
	Amenity/land use	Nuisance Visual effects Land use limitations
	Employment opportunities	Short term during works Long term – ongoing maintenance
	"Wellbeing" perceptions	Dislike of having landfill in local area Personal associations with site history
Cultural	Loss of mauri	Loss of a "health and spirit" which permeates through all living and non-living things - plants, animals, water and soil
	Destruction of wāhi tapu (cultural/spiritual) sites	Ancestral burial sites Loss of cultural heritage Disruption of cultural connectivity Damage Iwi relationships Impact on land and resources
	Kiatiakitanga (guardianship) and Whenua (land)	Extent of Māori active involvement in control, management and protection of land Restrictions on land use (physical, contamination, etc.) causing loss of resources/ opportunities for economic development
	Healing the land (Papatūānuku)	Soil health
	Restoration of water services (Wai Ora)	Water quality Ecology
	Mahinga kai (garden, cultivation, food gathering places)	Garden, cultivation, food gathering places Collecting plants for various (e.g. medicine, weaving) purposes (e.g. toetoe, raupo, harakeke, paopao)
Economic	Demolition/remedial works costs (capex)	Capex cost scores were made on a qualitative, judgement basis
	Ongoing maintenance costs (opex)	Opex cost scores were made on a qualitative, judgement basis
	Effects on land value	Impact of demolition/remedial works on land value
	Effects on potential earnings from land	Extent and productivity/health of land area available for use
	Minimisation of future liabilities	Legacy effects of residual infrastructure/contamination left in place or deposited in landfill onsite

An additional "deliverability" assessment was also included, which involved a Yes/No/Likely/Unlikely assessment of the ability to deliver on the Crown's commitments under the THDSP, taking into account the prescribed timeframes and delivery risks in terms of:

- Significant constraints
- Consentability

11.2.3 Scoring Considerations

Under each criteria indicator, notes were added to the evaluation spreadsheet, summarising relevant scoring considerations. One example for each criteria are given below, while the complete notes can be viewed in the spreadsheet in Appendix B. For the cultural scoring consideration, wording from the Deed, Cultural Impact Assessment and the cultural induction provided by mana whenua were used to inform initial assessment. Engagement with Te Nehenehenui will further inform this scoring consideration.

Table 14: Example of Scoring Considerations for Specific Indicators for each Criteria

Criteria, Indicator and Sub-headings	Scoring Considerations
ENVIRONMENTAL **Surface water effects:** ***Quantity peak flows/volumes*** ***Quality Silt/sediment,*** ***Scour/erosion***	**Onsite disposal:** • Needs to maintain existing drainage patterns or provide alternative means of draining surface runoff. • Construction and filling of the landfill will generate silt/sediment and require appropriate erosion/sediment controls to be in place during works. • Will increase vehicle movements on road network within the site or may require temporary access roads, with potential to impact surface water quality from contaminant deposition onto roadway from vehicle wear & tear (e.g. brake pads, tyres, etc.). • Long term management of landfill required to avoid surface water effects. • Contaminated soil management will reduce contaminant loads in silt/sediment in surface water runoff from scour/erosion. **Offsite disposal:** • Will increase vehicle movements on public road network, with potential to impact surface water quality from contaminant deposition onto roadway from vehicle wear & tear (e.g. brake pads, tyres, etc.). • Offsite disposal facility would be Class 1 or 2 landfill with rigorous stormwater management systems and procedures in place and associated resource consent compliance requirements.
SOCIAL **Neighbourhood effects:** ***Dust, noise, odour, vibration, traffic*** ***Changes to surface runoff flowpaths***	**Onsite disposal:** • Vehicle movement during works and for ongoing maintenance/ monitoring (minor). • need to retain entry and exit points of surface runoff through the site, to avoid water being diverted or flooding neighbouring properties. **Offsite disposal:**

	• Significant vehicle movement on Te Mawhai Road during demolition works. **Both:** • Will generate some dust, noise, vibration, but will be managed/mitigated in accordance with resource consent requirements.
CULTURAL **Healing papatūānuku (Healing the land):** ***Soil health***	**Onsite disposal:** will help heal part of the land, with waste materials concentrated into one area. **Offsite disposal:** • Will start process of healing the land at Tokanui. • Will shift the "problem" to another Iwi's rohe (home territory).
ECONOMIC **Minimisation of future liabilities:** ***Legacy effects of residual infrastructure/contamination left in place or deposited in landfill onsite***	**Onsite disposal:** Creation of new disposal site onsite creates a long term liability on the Site. **Offsite disposal:** should eliminate long term liabilities on the Site.

11.2.4 Weightings

Evaluation spreadsheet weightings for environmental, social, cultural and economic criteria were adopted from typical weightings used in the Mauri model.The adopted weightings were applied to support the priority order detailed in BRF 23-169 and may be updated following review of this report by Te Nehenehenui. These weightings can be adjusted by the participants involved in the evaluation or alternatively sensitivity testing can be done with different weightings to check the effect this has on the ranking of different options.

Table 15: Criteria Weightings

Criteria	No of Indicators	Selected Weighting	Actual weighting taking into account number of indicators for each criteria
Environmental	6	35%	35.9%
Social	6	20%	20.5%
Cultural	6	30%	30.8%
Economic	5	15%	12.8%
Total	23	100%	100%

11.2.5 Scoring

The adopted scoring system was again based on the Mauri model, with five scoring options, ranging from -2 (full negative) through 0 (no impact) to +2 (fully positive). The five scores are listed below.

Table 16: Evaluation Scoring System

Score				
-2	-1	0	1	2
Fully negative	Partly negative	No impact	Partly positive	Fully positive

Scores for each criteria are obtained by summing up the scores of individual indicators and then multiplying those scores by the criteria weighting. As the economic criteria has only five indicators and the others criteria have six, this effectively means the economic criteria has a slightly lower actual weighting than 15% (i.e. 12.8%) and the weightings of the other criteria are slightly higher, as summarised above. No adjustment for this minor discrepancy was made to the weightings in this assessment.

The overall score for each option is then obtained by summing up the weighted criteria scores, with the options then ranked.

11.2.6 Interpreting Results

With evaluation processes of this nature, it is important not to use the evaluation spreadsheet as a black box, ***it is a process to aid the decision making process NOT to replace it***. Therefore, one of the most important steps after completing the scoring/ranking process is to look at the results and see if they 'make sense'. If it can not be explained why one option ranks higher or lower than another, then the individual scores for each criteria should be checked. Often it may simply be an error (putting the wrong number in the wrong box) or a realisation that the score given the first time was not quite right; or by reviewing the individual criteria scores, it becomes clearer why the option ranked the way it did.

The way the results are reported is also important. The rankings are generated automatically by the excel formula. When reporting these rankings it is important to approximate the rankings by giving options that score within 10 to 25 points of each other as an equal ranking. The MCA process is not an 'exact science' and so the reporting of the results should also reflect the approximate nature of the process. For example, if the option had the following 'Total Score', the ranking would be reported as follows:

Total Score	655	633	775	789	702
Ranking	4th=	4th=	1st=	1st =	3rd

11.3 ASSESSMENT RESULTS

Preliminary assessment results of the waste management options, based on LINZ and FTL inputs, are summarised in Table 17, with details in Appendix B. These show:

- The preferred option is 1A (offsite removal of all demolition waste and horizontal infrastructure) with a total score of 756.
- The second preferred option is 1B (offsite removal of all demolition waste and some horizontal infrastructure) with a total score of 618.
- The third preferred option is 2B (new onsite disposal facility with some horizontal infrastructure being left in the ground), with a score of -789.

- The fourth and less preferred option is 2A (new onsite disposal facility for all demolition waste and horizontal infrastructure), with a score of -925.

Clearly, offsite disposal is preferred in comparison with onsite disposal.

The selection of 1A over 1B as the most preferred option is primarily controlled by the cultural criteria, with the different in scores for these two options being more significant than the other three criteria.

Table 17: Preliminary Evaluation Scores

Criteria	1A	1B	2A	2B
Horizontal Infrastructure to be removed	All	Some (20%)	All	Some (20%)
Demolition Waste Disposal	Offsite	Offsite	Onsite	Onsite
	Weighted Scores			
Environmental	76	93	-385	-344
Social	40	20	0	10
Cultural	460	350	-370	-350
Economic	180	155	-170	-105
Total	**756**	**618**	**-925**	**-789**
Ranking	1	2	4	3
Deliverability Assessment				
Significant Constraints	No	No	Yes	Yes
Consentability	Yes	Yes	Unlikely	Unlikely

12.0 SUMMARY AND CONCLUSIONS

The assessment undertaken shows that offsite disposal is preferred in comparison with onsite disposal. The selection of Option 1A over 1B as the most preferred option is primarily controlled by the cultural criteria, with the difference in scores for these two options being more significant than the other three criteria.

The assessment of onsite or offsite disposal was the objective of this assessment, with the extent of infrastructure to be removed from site subject to a separate MCA. Other considerations need to be taken into account in deciding on what horizontal infrastructure, if any, needs to be retained onsite. For example, some stormwater pipes currently convey upgradient runoff (surface water) from the adjacent rural sites through the site to the Wharekōrino Stream, while some of the existing roads could potentially be retained as farm access roads.

This report is based on the best information, currently available at the date of issuing this report. Following the Ministerial decision on the waste management options, further refinement will be completed on the selected waste management strategy as the following information becomes available:

- Revised disposal quantities based on current investigation findings and consideration of what materials can be reused/recycled.
- Revised offsite disposal facility rates.

This report is considered sufficient for Te Nehenehenui to provide an informed view (as per paragraph 9.11) and for LINZ to then obtain a decision from Ministers on the preferred disposal option as provided at paragraph 9.9.2 of the Tokanui Hospital Deferred Selection Process.

13.0 LIMITATIONS

The professional opinion expressed herein has been prepared solely for, and is furnished to our client, Toitū Te Whenua – Land Information New Zealand, on the express condition that it will only be used for the purpose for which it is intended.

No liability is accepted by this firm or by any Principal, or Director, or any servant or agent of this firm, in respect of its use by any other person, and any other person who relies upon any matter contained in this report does so entirely at its own risk. This disclaimer shall apply notwithstanding that this report may be made available to any person by any person in connection with any application for permission or approval, or pursuant to any requirement of law.

We do not assume any liability for misrepresentation or items not visible, accessible or present at the subject site during the time of the site inspection; or for the validity or accuracy of any information provided by our client or third parties that have been utilised in the preparation of this report.

14.0 REFERENCES

AECOM New Zealand Ltd (Oct 2018) – Tokanui Hospital Site Remediation: Options Description and Cost Estimation

AECOM New Zealand Ltd (April 2019) - Tokanui Hospital Site Remediation: Onsite Land Disposal Feasibility Study

AECOM New Zealand Ltd (August 2019) – Tokanui Hospital: Detailed Site Investigation (draft)

AECOM New Zealand Ltd (August 2019) – Tokanui Hospital Site Remediation – Details Options Assessment

CFG Heritage Ltd (February 2023): "Tokanui Psychiatric Hospital, Site Investigation: Archaeological Assessment"

Hikuroa D, Slade A and Gravley D , MAI Review (2011 (3)): "Implementing Māori Indigenous knowledge (mātauranga) in a scientific paradigm: Restoring the mauri to Te Kete Poutama"

Landcare Research/Manaaki Whenua Policy Brief (June 2017): "Wai Ora Wai Māori - a kaupapa Māori assessment tool"

Landcare Research/Manaaki Whenua "Wai Ora Wai Māori – a kaupapa Māori assessment tool for Ngati Tahu-Ngati Whaoa" (undated)

Ministry for the Environment (March 2023): "National Policy Statement for Highly Productive Land – Guide to Implementation"

Morgan TKKB & Fa'aui TN, First International Conference on Hydroinformatics (September 2014): "Decision Support Systems and Promoting Socially Just Environmental Management"

Morgan TKKB & Fa'aui TN, European Journal of Operational Research 000 (2017) 1-12: "Empowering indigenous voices in disaster response: Applying the Mauri Model to New Zealand's worst environmental maritime disaster"

Opus Ltd (2015) – Tokanui Hospital Demolition Waste Management Plan

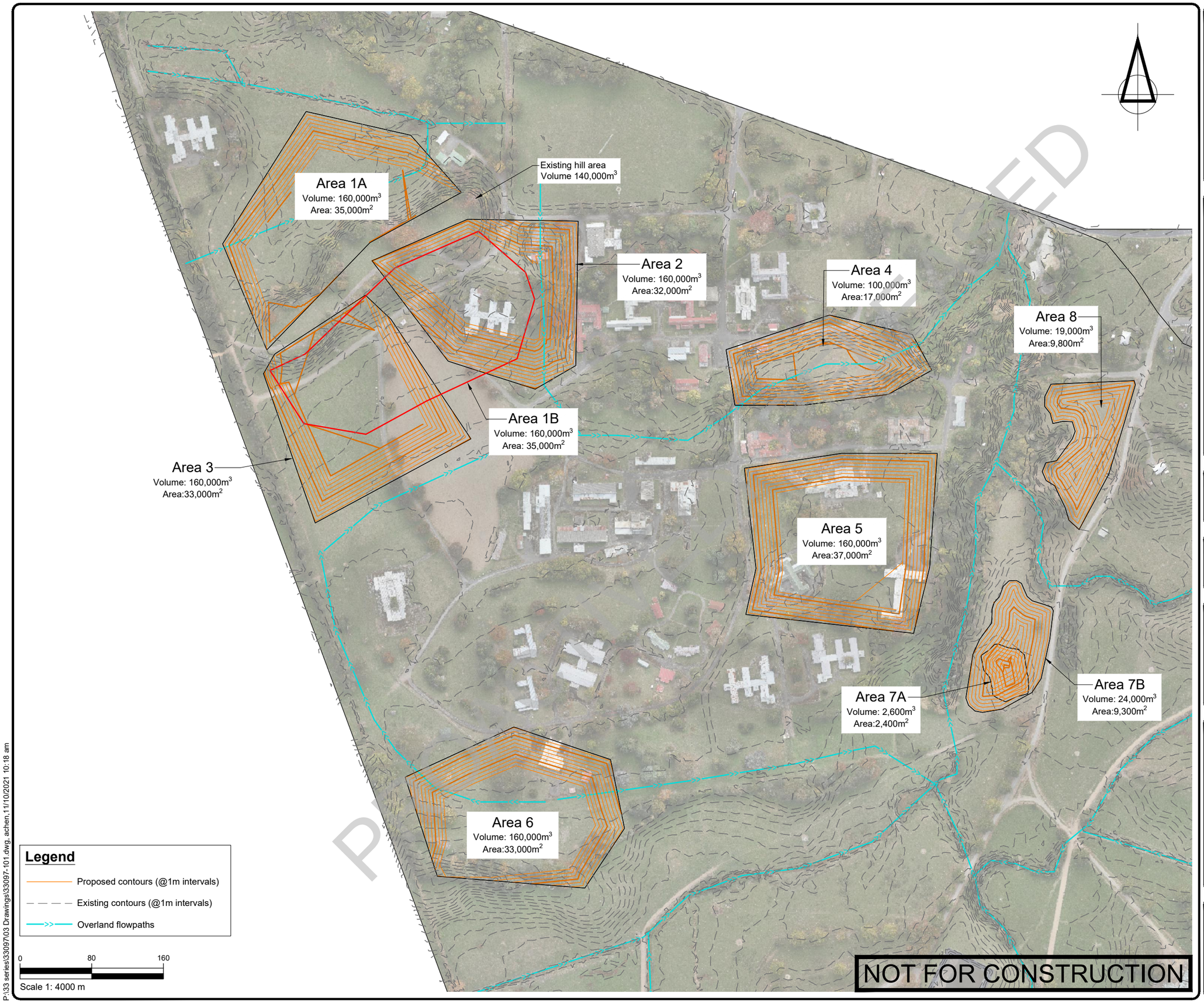
Te Muraahi K and Maniapoto M (December 2021): "Cultural Impact Assessment: Pokuru B – Former Tokanui Hospital Campus"

4Sight Consulting Ltd (April 2022): "Tokanui Hospital – Preliminary Legislative and Consenting Review"

4Sight Consulting Ltd (February 2023): "Memorandum – Tokanui Psychiatric Hospital – Ecological Constrains and Opportunities"

4Sight Consulting Ltd (2023) – "Asbestos and Lead Paint Building Investigations"

Drawings



SURVEYED			APPROVED DATE
DESIGNED	TB	20/12/22	SF 11/05/23
DRAWN			
CHECKED	SF	11/05/23	

REVISION	CHANGES	CHECKED	DATE
A	DWG NAME REVISION	SF	11/05/23

NOTES

1. Disposal volumes are based on 156,000m^3 of fill material.
2. Area profiles allow for an additional 600mm clay and 150mm topsoil cover.

CLIENT

TOITŪ TE WHENUA LAND INFORMATION NEW ZEALAND

PROJECT

FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION PROJECT

TITLE

POTENTIAL DISPOSAL SITE LOCATIONS - PRELIMINARY ASSESSMENT

Fraser Thomas

ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND	09 278 7078
HAWKE'S BAY	06 211 2766
CHRISTCHURCH	03 358 5936
BLENHEIM	03 428 3292
NELSON	03 222 1132

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SCALE 1:4000 (A3)

DRAWING No 33097/101

REVISION A

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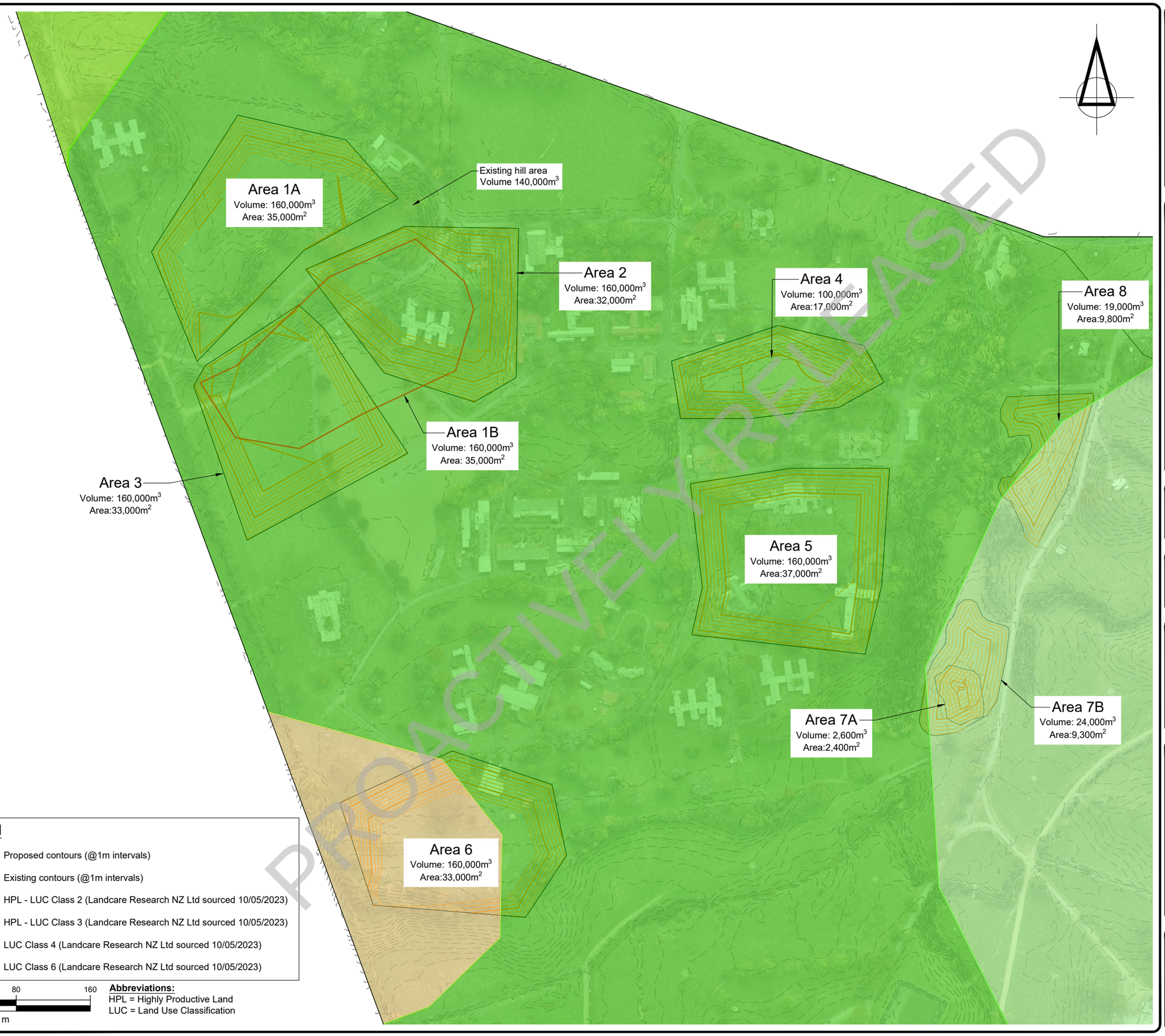

SURVEYED			APPROVED DATE
DESIGNED			SF 11/05/23
DRAWN	AC	09/05/23	
CHECKED	SF	11/05/23	

REVISION	CHANGES	CHECKED	DATE

NOTES

1. This plan shows preliminary disposal site locations prior to constraint mapping.

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TOITŪ TE WHENUA LAND INFORMATION NEW ZEALAND

PROJECT

FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION PROJECT

TITLE

POTENTIAL DISPOSAL SITE LOCATIONS - CONSTRAINTS MAPPING (HPL/LUC ONLY)

Fraser Thomas

ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND 09 278 7078
HAWKE'S BAY 06 211 2766
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SCALE 1:4000 (A3)

DRAWING No 33097/102 REVISION -

P:\33 series\33097\03 Drawings\33097-102.dwg, achen,11/10/2021 10:18 am

	Disposal Area									
Constraints	**1A**	**1B**	**2**	**3**	**4**	**5**	**6**	**7A**	**7B**	**8**
Proximity to residential dwellings	135m	275m	232m	315m	300m	300m	790m	385m	320m	65m
HPL - LUC Class 2 + within existing infrastructure area	No	Yes*	Yes	No	No	Yes	Yes*	No	Yes#	Yes*#
HPL - LUC Class 2 + outside existing infrastructure area	Yes	Yes*	No	Yes	Yes	No	Yes*	No	No	Yes*
Overland Flow Path	Yes	No	Yes	No	Yes	No	Yes	No	No	No
Floodplain	Likely	No	No	No	Yes	No	No	Adjacent	Yes	Adjacent
Recent Alluvial Deposits	No	No	No	No	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*
Slopes > 1:4	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*	Yes*	No	No	Yes*
Archaeological Authority Required Areas	Yes*	Yes*	Yes*	Yes*	No	No	No	No	No	No
Culturally Significant Areas	Yes*	No	Yes*	No	No	Yes*	No	No	No	No
Wetlands	Yes*	No	No	No	Yes*	No	No	No	No	No
Historic Swamps	No	Yes*	No	Yes*	No	No	No	Yes*	Yes*	Yes*
Stormwater reticulation servicing upgradient runoff	Possibly	No	No	Yes*	Yes*	No	No	No	No	No
** = partially subject to constraint*										
# = within closed disposal site area										

Existing hill area
Volume 140,000m^3

Area 1A
Volume: 160,000m^3
Area: 35,000m^2

Area 2
Volume: 160,000m^3
Area:32,000m^2

Area 1B
Volume: 160,000m^3
Area: 35,000m^2

Area 3
Volume: 160,000m^3
Area:33,000m^2

Area 4
Volume: 100,000m^3
Area:17,000m^2

Area 8
Volume: 19,000m^3
Area:9,800m^2

Area 5
Volume: 160,000m^3
Area:37,000m^2

Area 7A
Volume: 2,600m^3
Area:2,400m^2

Area 7B
Volume: 24,000m^3
Area:9,300m^2

Area 6
Volume: 160,000m^3
Area:33,000m^2

Legend

- Proposed contours (@1m intervals)
- Existing contours (@1m intervals)
- Overland flowpaths
- Recent alluvial deposits (FTL Geotechnical Report Job Ref #65547 - Figure 1)
- Slopes > 1V:4H (Assessed from LiDAR)
- Archaeological authority required areas (CFG 2023)
- Culturally significant areas (CFG 2023)
- Wetlands (4Sight Ecological Assessment, 2023)
- Historic swamps (CF6 (2023) - Historic Survey Plan ML6748 (1889)
- Stormwater reticulation servicing upgradient runoff (Topographical & CCTV survey)

0 80 160

Scale 1: 4000 m

SURVEYED			APPROVED DATE
DESIGNED			SF 11/05/23
DRAWN	AC	09/05/23	
CHECKED	SF	11/05/23	

REVISION	CHANGES	CHECKED	DATE

NOTES

1. This plan shows preliminary disposal site locations prior to constraint mapping.
2. HPL/LUC and floodplain overlays are shown on drawings 102 and 104 respecitvely, and not included here for clarity (i.e. avoiding too many overlays).

CLIENT
TOITŪ TE WHENUA LAND INFORMATION NEW ZEALAND

PROJECT
FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION PROJECT

TITLE
POTENTIAL DISPOSAL SITE LOCATIONS - CONSTRAINTS MAPPING

Fraser Thomas
ENGINEERS • RESOURCE MANAGERS • SURVEYORS
AUCKLAND 09 278 7078
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CHRISTCHURCH 03 358 5936
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SCALE 1:4000 (A3)

DRAWING No 33097/103 REVISION -

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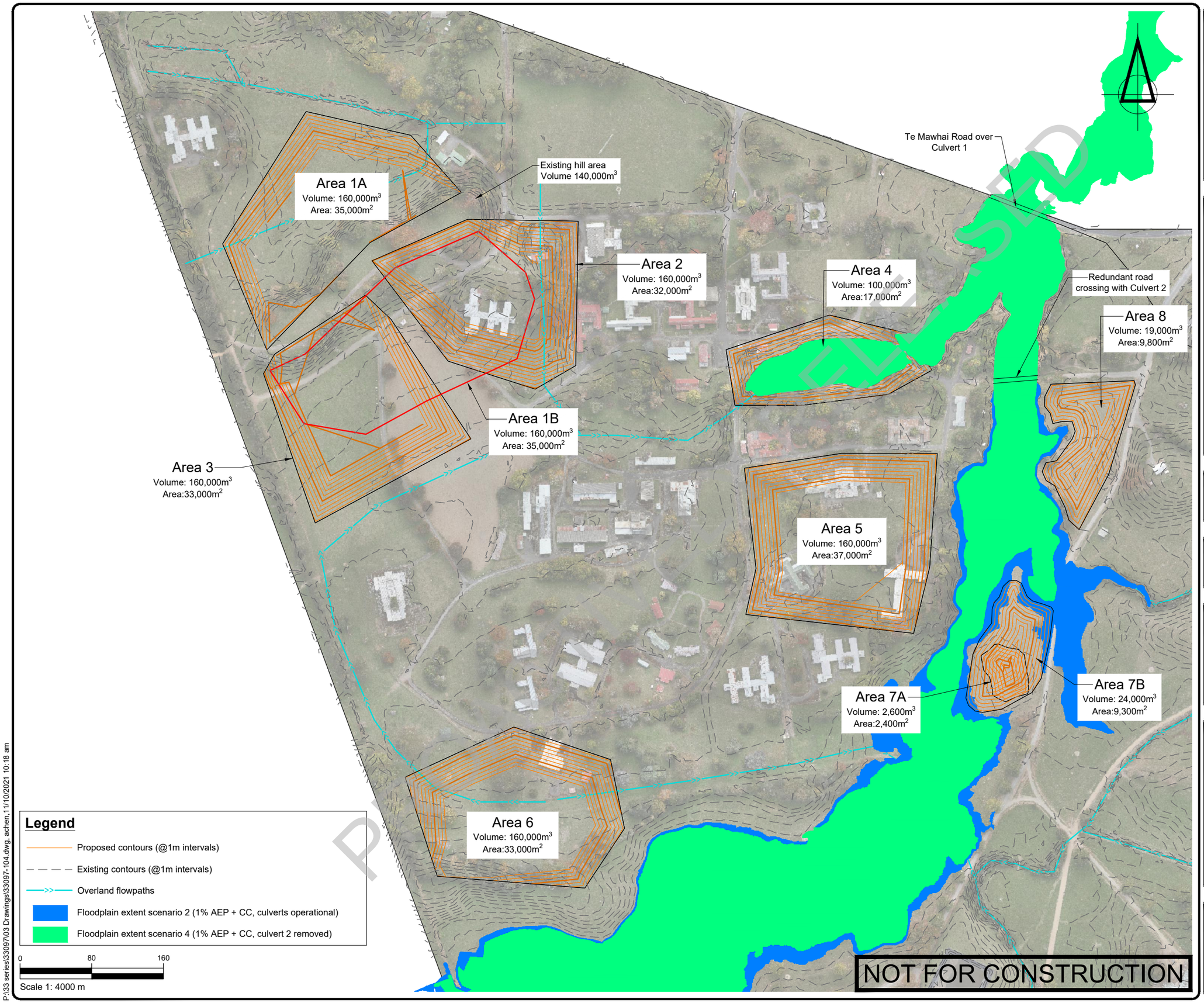

			APPROVED	DATE
SURVEYED			SF	
DESIGNED				
DRAWN	AC	09/05/23		
CHECKED	SF	11/05/23	11/05/23	

REVISION	CHANGES	CHECKED	DATE

NOTES

1. Disposal volumes are based on 156,000m^3 of fill material.
2. Area profiles allow for an additional 600mm clay and 150mm topsoil cover.
3. Floodplain modelling from FTL 2D HEC RAS model.
4. Area 7A is based on being outside the worst case flood extent allowing for partial culvert blockage.

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PROJECT

FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION PROJECT

TITLE

POTENTIAL DISPOSAL SITE LOCATIONS - CONSTRAINTS MAPPING (FLOODPLAINS ONLY)

Fraser Thomas

ENGINEERS • RESOURCE MANAGERS • SURVEYORS

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SCALE 1:4000 (A3)

DRAWING No 33097/104

REVISION -

P:\33 series\33097\03 Drawings\33097-104.dwg, achen,11/10/2021 10:18 am

Constraints	Disposal Area 6	9	10
Proximity to residential dwellings	790m	460m	280m
HPL - LUC Class 2 + within existing infrastructure area	Yes*	Yes	Yes*
HPL - LUC Class 2 + outside existing infrastructure area	Yes*	No	Yes*
Overland Flow Path	Yes	No	No
Recent Alluvial Deposits	Yes*	No	No
Slopes > 1:4	Yes*	No	Yes*
Archaeological Authority Required Areas	No	No	No
Culturally Significant Areas	No	No	No
Wetlands	No	No	No
Historic Swamps	No	Yes*	Yes*
Stormwater reticulation servicing upgradient runoff	No	No	No
** = partially subject to constraint*			

Area 10
Volume: 160,000m^3
Area:33,000m^2

Area 9
Volume: 160,000m^3
Area:38,000m^2

Area 6
Volume: 160,000m^3
Area:33,000m^2

Legend

- Proposed contours (@1m intervals)
- Existing contours (@1m intervals)
- Overland flowpaths
- Recent alluvial deposits (FTL Geotechnical Report Job Ref #65547 - Figure 1)
- Slopes > 1V:4H (Assessed from LiDAR)
- Archaeological authority required areas (CFG 2023)
- Culturally significant areas (CFG 2023)
- Wetlands (4Sight Ecological Assessment, 2023)
- Historic swamps (CF6 (2023) - Historic Survey Plan ML6748 (1889)
- Stormwater reticulation servicing upgradient runoff (Topographical & CCTV survey)

0 80 160
Scale 1: 4000 m

SURVEYED			APPROVED DATE
DESIGNED			SF 11/05/23
DRAWN	AC	09/05/23	
CHECKED	SF	11/05/23	

REVISION	CHANGES	CHECKED	DATE

NOTES

1. Disposal volumes are based on 156,000m^3 of fill material.
2. Area profiles allow for an additional 600mm clay and 150mm topsoil cover.
3. HPL/LUC overlays are shown on drawing 102 and not included here for clarity (i.e. avoiding too many overlays).

CLIENT
TOITŪ TE WHENUA LAND INFORMATION NEW ZEALAND

PROJECT
FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION PROJECT

TITLE
REVISED DISPOSAL SITE LOCATIONS , POST CONSTRAINTS MAPPING

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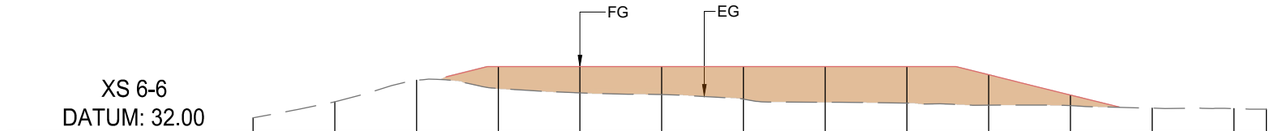
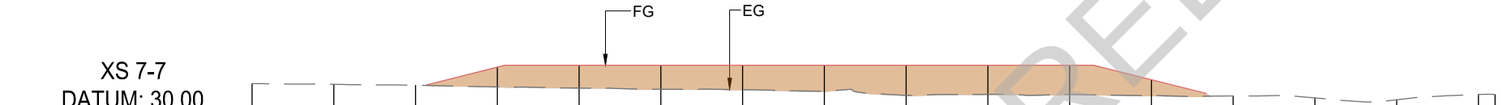


XS 6-6
DATUM: 32.00

CUT/FILL DEPTHS			5.35	6.42	6.81	7.94	8.71	8.92	7.42	2.58			
DESIGN LEVELS			48.00	48.00	48.00	48.00	48.00	48.00	46.00	41.06			
EXISTING LEVELS	35.48	39.40	44.69	42.65	41.58	41.19	40.06	39.29	39.08	38.58	38.48	37.85	37.76	37.59
CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	248

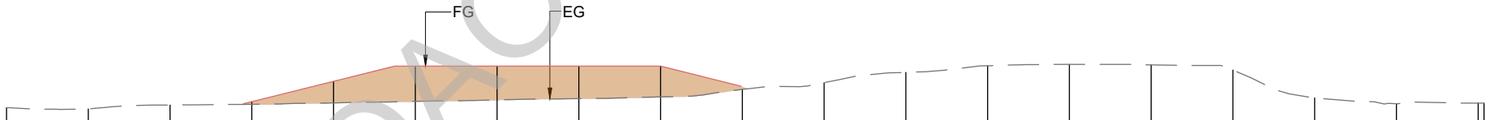
DISPOSAL SITE LOCATION 6 - CROSS SECTION
SCALE 1:1500



XS 7-7
DATUM: 30.00

CUT/FILL DEPTHS			4.84	5.59	5.89	6.01	6.38	7.35	7.13	7.15	3.87					
DESIGN LEVELS			41.51	42.00	42.00	42.00	42.00	42.00	42.00	42.00	38.44					
EXISTING LEVELS	37.50	37.30	37.07	36.68	36.41	36.11	35.99	35.62	34.65	34.87	34.85	34.57	34.48	33.99	33.52	34.82	34.94
CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	304

DISPOSAL SITE LOCATION 9 - CROSS SECTION
SCALE 1:1500



XS 8-8
DATUM: 30.00

CUT/FILL DEPTHS			0.65	5.26	8.60	8.23	7.94	7.51									
DESIGN LEVELS			35.83	40.79	44.50	44.50	44.50	44.50									
EXISTING LEVELS	34.34	34.05	35.02	35.18	35.53	35.90	36.27	36.56	36.99	38.80	40.46	42.99	44.63	44.95	44.85	43.56	36.72	35.32	35.48	35.48
CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	364

DISPOSAL SITE LOCATION 10 - CROSS SECTION
SCALE 1:1500

0 30 60
Scale 1: 1500 m

NOT FOR CONSTRUCTION

SURVEYED			APPROVED DATE
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REVISION	CHANGES	CHECKED	DATE

NOTES

LEGEND

Disposal site fill profile

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TOITU TE WHENUA LAND INFORMATION NEW ZEALAND

PROJECT
FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION PROJECT

TITLE
REVISED DISPOSAL SITE LOCATIONS , POST CONSTRAINTS MAPPING - CROSS SECTIONS

Fraser Thomas
ENGINEERS • RESOURCE MANAGERS • SURVEYORS
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SCALE AS SHOWN (A3)

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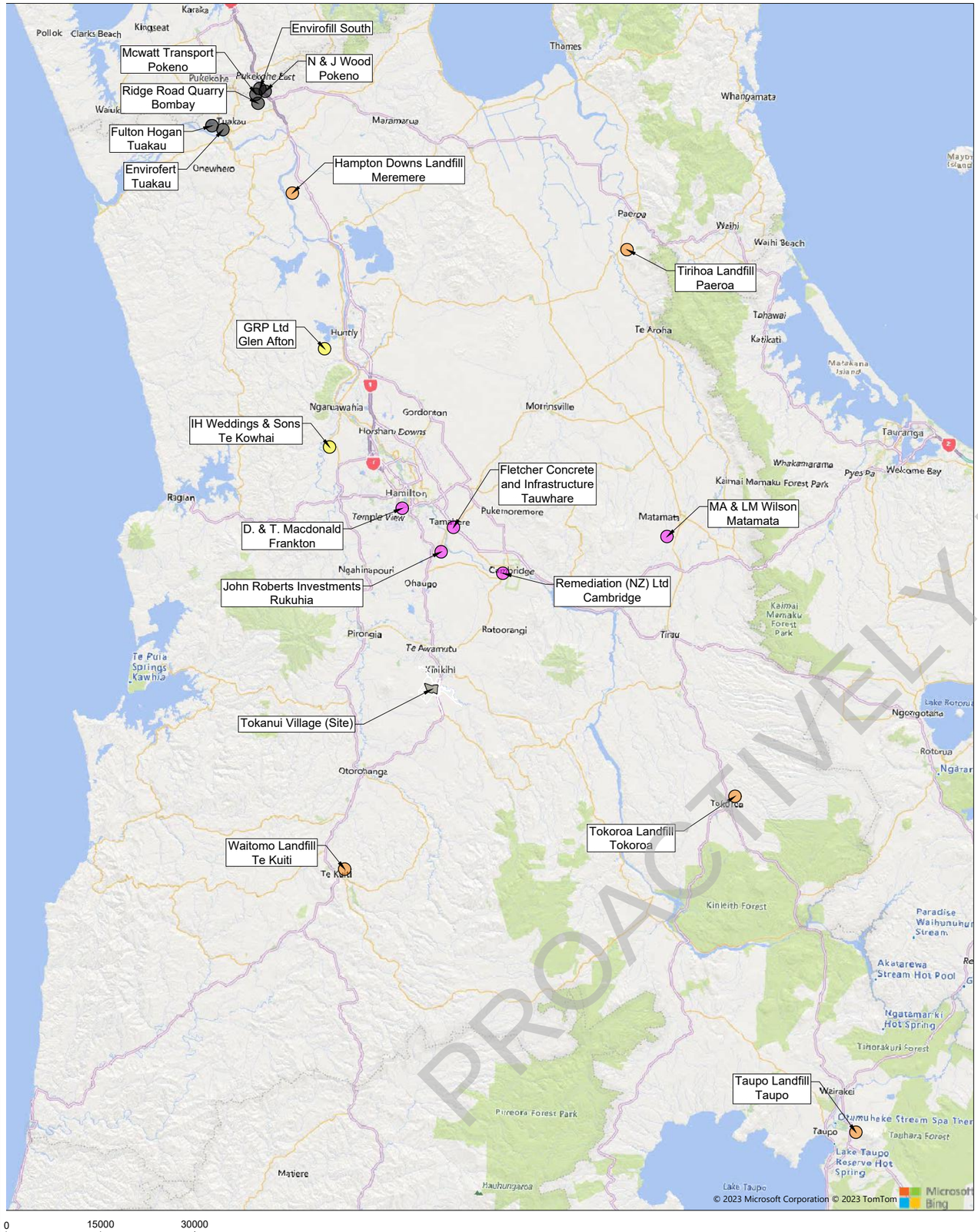

Available Sites	Operator	Landfill/Fill Class	Distance from Tokanui by road – one way (km)	Comments
North Waikato Regional Landfill, Hampton Downs	Envirowaste Services Ltd (ESL)	Class 1	99	Most modern, engineered landfill facility in region with capacity for 30,000,00m^3 over its lifetime
Tirohia Landfill, Paeroa	Waste Management NZ	Class 1	96	Not currently accepting new customers – extension of landfill appealed to Environment Court
Rangitoto Landfill, Te Kuiti	Waitomo District Council (DC)	Class 1	45	Waste from outside Waitomo district needs prior approval; limited to 80T/d and only accepts waste 3d/wk; unseparated C&D wastes not accepted
Tokoroa Landfill, Tokoroa	South Waikato DC	Class 1	70	Closed
Taupo Landfill, Tokoroa	Taupo DC	Class 1	134	Active, but likely cannot receive required volume due to annual 50,000m^3 volume limit ~134km from site
1161 Rotowaro Rd, Glen Afton	GRP Ltd (Green Gorilla)	Class 2 & 4	85	Active. Limited to 208,000T/yr; WAC exclude asbestos and contaminated soils
205 Bedford Rd, Te Kowhai	IH Wedding & Sons (Waikato) Ltd	Class 2 & 4	50	Active, but can only accept 300m^3/d. While consent allows for accepting C&D waste, site is only accepting cleanfill now

NOT FOR CONSTRUCTION

			APPROVED	DATE
SURVEYED			SF	
DESIGNED				11/05/23
DRAWN	AC	09/05/23		
CHECKED	SF	11/05/23		

REVISION	CHANGES	CHECKED	DATE

NOTES

LEGEND

- Class 1 - MSW Landfill
- Class 2 - C&D Landfill
- Class 3 - Managed Fill
- Class 4 - Controlled Fill

CLIENT

TOITU TE WHENUA LAND INFORMATION NEW ZEALAND

PROJECT

FORMER TOKANUI HOSPITAL DEMOLITION AND REMEDIATION PROJECT

TITLE

POTENTIAL OFFSITE DISPOSAL LOCATIONS WITHIN 100KM DISTANCE OF SITE

Fraser Thomas

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SCALE 1:750000 (A3)

DRAWING No 33097/201

REVISION -

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Appendix A

Disposal Options Costs

TOKANUI - Waste Disposal Costs Summary **Rounded to neares** [redacted]

Option	Horizontal infrastructure to be removed	Disposal location	Waste removal costs (Capex)	Ongoing O&M costs (10yr total)	Combined Total	Rank (highest to lowest)
1A	All	Offsite	[redacted]			1
1B	Some (e.g. 20%)					2
2A	All	New disposal facility onsite				3
2B	Some (e.g. 20%)					4

Note: Combined total = waste removal costs (capex) + cumulative O&M over 10yrs

Capex costs breakdown

[redacted]

O&M Costs breakdown

[redacted]

[redacted]

[redacted]

Option 1A - Complete Site Remediation to Rural Landuse with waste disposed offsite - Demolish and dispose of all structures and material off site

[redacted]

Assumed included in contractor's rates

Assumed start date mid-2024; consumer price index forecasts for 2023 range from 3.5-4.5%; assumed 6% construction cost increase from May 2023 to mid-2024, based on construction costs continuing to increase above CPI, but softening from late 2023 into 2024 according to industry forecasts

Ref	Description	Qty	Unit	Rate	Total

[redacted]

Option 1B - Complete Site Remediation to Rural Landuse with waste disposed offsite - Demolish and dispose of all structures offsite, but leave 80% of the roading and below ground services

[redacted]

Ref	Description	Qty	Unit	Rate	Total

[redacted]

[redacted]

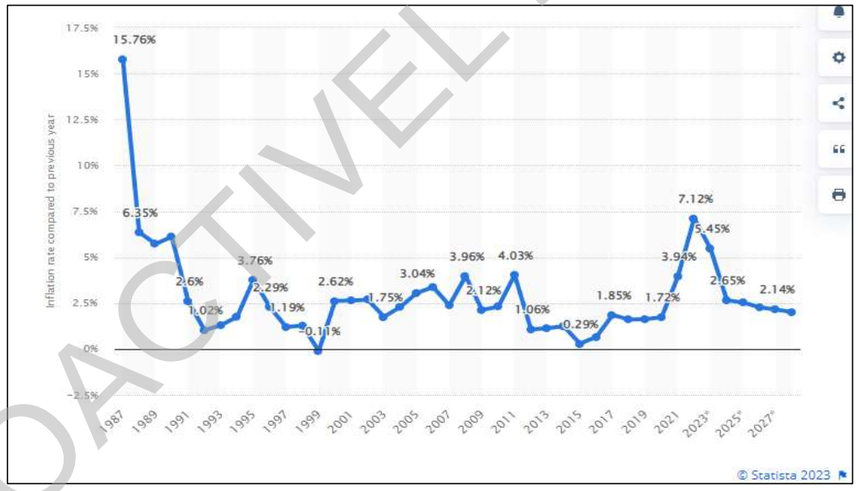
Ongoing maintenance

Ref	Description	Qty	Unit	Rate	Total
[redacted]					

2022 7.12% from Statista.com Statista.com

Macrotrends.net

Year	Inflation Rate (%)	Annual Change
2021	3.94%	2.23%
2020	1.71%	0.10%
2019	1.62%	0.02%
2018	1.60%	-0.25%
2017	1.85%	1.20%
2016	0.65%	0.35%
2015	0.29%	-0.93%
2014	1.23%	0.09%
2013	1.13%	0.07%
2012	1.06%	-2.97%



Average inflation rate last 10yrs = 2.1 %
Assume represents average inflation over next 10yrs

Option 2A - Complete Site Remediation to Rural Landuse with waste disposed to new onsite disposal facility - Demolish and dispose of all structures and material onsite					
[redacted]					

Ref	Description	Qty	Unit	Rate	Total
[redacted]					

[redacted]

Ongoing maintenance

Ref	Description	Qty	Unit	Rate	Total

[redacted]

Option 2B - Complete Site Remediation to Rural Landuse with waste disposed to new onsite disposal facility - Demolish and dispose of all structures offsite, but leave 80% of the roading and below ground services

[redacted]

Ref	Description	Qty	Unit	Rate	Total

[redacted]

[redacted]

Ongoing maintenance

Ref	Description	Qty	Unit	Rate	Total

[redacted]

Appendix B

Options Evaluation

Options Assessment Matrix

Project	Tokanui Former Psychiatric Hospital Demolition and Remediation	
Description	The former Tokanui Psychiatric Hospital (site) is a Treaty Settlement Landbank property administered by LINZ located approximately 14km southeast of Te Awamutu, Waikato. It is approximately 80ha in size and comprises 74 buildings, a wastewater treatment plant, swimming pool, eight electrical substations, a closed landfill and substantial roading and underground infrastructure and services. The hospital closed in 1998 and, the site was transferred into the Landbank to be used as redress to settle historical claims in 1999. The buildings on the site contaIn some hazardous materials, including friable asbestos and lead paint and are in varying states of disrepair. As part of the Deed of Settelment with Ngati Maniapato, the Crown has committed to undertaking the demolition and associated waste management due to the volume of demolition waste that may be generated before the Site is made available for transfer under the Property Redress Schedule. Mainapoto and the Crown have agreed to the completion standards for the works as well as the process that will be followed to regarding decision making and completing the demolition; this process is set out under Part 9: Tokanui Hospital Deferred Selection Process of the Deed of Settelement, Property Redress Schedule. In addition to this process, LINZ, on behalf of the Crown, have signed a Memorandum of Understanding with Te Nehenehenui Trust (the post settlement governance entity representing Maniapoto). Because of the significant volume of waste that potentially could be generated from the demolition, it has been determined that a decision is required by joint Ministers as to whether to manage the demolition waste in a fit for purpose engineered new disposal site or to dispose of all waste to a suitable landfill, offsite. This option assesssment matrix has been used to undertake robust assessment of the four options and the cultural, environmental, social, and economic impact construction of a new disposal site within the Tokanui hospital boundary compared to disposal of the material to an existing consented landfill offsite. *Please note: this assessment is focused specifically on waste generated from the demolition of structures and other services. While soil contamination has been identified across some areas of the site, the risk from contamination to human health and the environment and how they will be managed are provided under a separate investigation with different remediation standards than the demolition waste. For the purposes of this assessment, it has been assumed that minor amounts of contaminated soil may either be disposed of to a new onsite disposal facility or transported for offsite disposal to a suitable landfill.*	
Objectives	To assess four demolition waste management options from the hospital using a holistic approach, taking into account potential environmental, social, cultural and economic effects, that meet LINZ requirements and stakeholder expectations, comply with industry best practice and government sustainability and broader outcome framework goals.	
Scope	Comparison of onsite vs offsite disposal of: 1. All vertical infrastructure (i.e. above ground built structures) 2. Contaminated soil sent for disposal (excluding other management options - e.g. treatment) 3. Horizontal infrastructure sent for disposal (excluding other management options) Item 1 defines minimum disposal quantities; Items 1+2+3 define potential maximum quantities, depending on how these other waste streams are managed	
Estimated Quantities	> Non-contaminated materials: vertical building structures, crushed roading materials, infrastructure services: 102,000m^3 (including materials that may be recycled) > Contaminated materials: building materials, soils and horizontal infrastructure: 54,000m^3	
Exclusions	This evaluation does not include: 1. Assessing the impacts of vertical infrastructure demolition/removal on the site, as this is common to the options considered; 2. Assessing the impact of reuse/recycling, as this will be promoted across all options; 3. Assessment of how contaminated soil will be managed as part of the overarching project. 4. Assessment in respect of the existing disposal sites, as per Part 9.13.	

Weighting		1A	1B	2A	2B	Waste Disposal - Scoring Considerations	Comments
	Extent of Horizontal Infrastructure to be removed	**All**	**Some (20%)**	**All**	**Some (20%)**		
	Disposal location of demolition waste	**Offsite**	**Offsite**	**New landfill onsite**	**New landfill onsite**		
	Environmental						
	Effects on land use/productivity: > Contamination of the land > Associated effects on land use/productivity					**Onsite landfill:** > Will disrupt land use during construction and operation, but can be used for some agricultural purposes on capping and restoration. > Will safely contain waste materials, including contaminants, likely for many generations (subject to technological developments). > May restrict future use (e.g. cropping, farming) but noting that new onsite landfill can be designed with appropriate "agricultural cap" so as to restore land post-landfilling to similar or better productive land use classification as existing land. However, any structures built on it may require specific design to address geotechnical issues. **Offsite disposal:** > will be to appropriate consented landfill with a defined footprint and closure/aftercare plans, not resulting in any additional land area being impacted elsewhere.	> Virtually entire site comprises Highly productive land (Class 2) = "very good multiple-use land, slight limitations, suitable for cropping, viticulture, berry fruit, pastoralism, tree crops and forestry".
	LINZ	1.67	1.00	-1.33	-1.00		
	FTL	2	1	-1	-1		

Surface water effects: > Quantity - peak flows/volumes > Quality > Silt/sediment > Scour/erosion					**Onsite disposal:** > Needs to maintain existing drainage patterns or provide alternative means of draining surface runoff. > Construction and filling of the landfill will generate silt/sediment and require appropriate erosion/sediment controls to be in place during works. > Will increase vehicle movements on road network within the site or may require temporary access roads, with potential to impact surface water quality from contaminant deposition onto roadway from vehicle wear & tear (e.g. brake pads, tyres, etc.). > Long term management of landfill required to avoid surface water effects. > Contaminated soil management will reduce contaminant loads in silt/sediment in surface water runoff from scour/erosion. **Offsite disposal:** > will increase vehicle movements on public road network, with potential to impact surface water quality from contaminant deposition onto roadway from vehicle wear & tear (e.g. brake pads, tyres, etc.). > Offsite disposal facility would be Class 1 or 2 landfill with rigorous stormwater management systems and procedures in place and associated resource consent compliance requirements.	
LINZ	0.33	0.67	-1.33	-1.50		
FTL	0	0	-1	-1		
Groundwater effects: > Groundwater table effects (groundwater levels) > Quality > Use					**Onsite disposal:** > Contaminated soil management will likely reduce contaminant leaching to groundwater. > Any new onsite landfill will have base and side liner to protect groundwater. It may require groundwater underdrainage system to manage elevated groundwater levels, if applicable. > Any new landfill should be engineered to not affect potential use of groundwater for livestock, irrigation or potable use. **Offsite disposal:** > Offsite disposal facility would be Class 1 or 2 landfill with rigorous groundwater management systems and procedures in place and associated resource consent compliance requirements.	Env-Waikato search of their groundwater bore database found there are six groundwater bores within 1km of the site, of which only one is located downgradient (north) of the site. This bore (Bore 72, Station 10906) is at the marae and uses water for nursery irrigation. There is one further downgradient bore just outside the 1km limit - Bore 72, Station 4997 – which takes water for household supply and stock watering purposes.
LINZ	0.33	0.67	-0.67	-0.33		
FTL	0	0	0	0		
Ecological effects: > Plants/Trees/Birds & other Fauna > Aquatic species					**Onsite disposal:** > Removal of contaminant sources will benefit land/pasture health and likely watercourse aquatic species and plants. > Removal of some large trees will likely be required, and may have adverse effects on bats and native birds. Management plans and/or appropriate mitigation measures will need to be put in place to minimise potential ecological impacts (e.g. Bat Management Plan, tree felling protocols). **Offsite disposal:** > Offsite disposal facility would be Class 1 or 2 landfill where ecological impacts would have been assessed during consenting process and appropriate management/mitigation measures put in place during landfill lifetime, including aftercare period.	
LINZ	0.67	1.33	-1.67	-1.50		
FTL	1	1	-1	-1		
Air emissions: > Dust/odour > Particulates/volatile gases > Greenhouse gases (carbon dioxide, methane)					**Onsite disposal:** > Construction of new disposal site onsite will involve use of heavy machinery and vehicle movements to transfer waste materials to disposal site, which will contribute to dust, particulate and greenhouse gas emissions (short term effect). **Offsite disposal:** > Transport of waste materials for recycling/disposal will contribute to dust, particulate and greenhouse gas emissions (short term effect). **Both:** > Demolition material has low potential to produce landfill gas, due to lack of biodegradable material, except gypsum present in building materials can decompose producing hydrogen sulphide under certain conditions.	
LINZ	-1.33	-1.00	-1.00	-1.00		
FTL	-1	-1	-1	-1		

	Sustainability: > Reuse/recycling > Resilience (e.g. ability to cope with climate change effects) > Legacy (future generation) issues					**Onsite disposal:** > would reduce transport related air emissions compared with offsite disposal. > will create a long term legacy issue, that needs ongoing maintenance to be resilient and avoid potential environmental effects in the long term future. **Offsite Landfill:** > Will contribute to a long term legacy issue, that needs ongoing maintenance to be resilient and avoid potential environmental effects in the long term future. > Will take up valuable landfill space, filling up landifl more quickly than anticipated, reducing landfill lifetime.	Reuse/recycling is already factored into all options and hence is not evaluated under this criteria, as common to all.
	LINZ	-1.50	-1.00	0.00	0.50		
	FTL	0	0	-1	-1		
	Sub-total: Environmental						
	LINZ	0.17	1.67	-6.00	-4.83		
	FTL	2.00	1.00	-5.00	-5.00		
35	Total	2.17	2.67	-11.00	-9.83		
	Social						
	Public health and safety: > Physical injury > Contaminant effects on human health > Traffic impacts					**Onsite disposal:** > Creation of new onsite disposal facility will result in demolition materials/contaminated soil being encapsulated onsite in a safe manner. > Public access will be restricted during construction, filling, capping and restoration. **Offsite disposal:** > Risk of accident on public roads from trucks carrying waste materials to offsite disposal facility. > Offsite disposal facilities would be Class 1 or 2 landfills run by private operators with no public access allowed.	
	LINZ	-1.67	-1.00	1.33	1.67		
	FTL	-1	-1	1	1		
	Worker health and safety: > Physical injury > Contaminant effects on human health > Traffic impacts					**Onsite disposal:** > Landfill construction risks, albeit in a controlled environment (i.e. under control of a suitably qualified and experienced contractor with no public access). **Both:** > Driver safety (less control), due to risk of accident, particularly for **offsite disposal**.	
	LINZ	-2.00	-1.00	1.00	1.00		
	FTL	-2	-1	1	1		
	Neighbourhood effects: > Dust, noise, odour, vibration, traffic > Changes to surface runoff flowpaths					**Onsite disposal:** > Vehicle movement during works and for ongoing maintenance/ monitoring (minor). > need to retain entry and exit points of surface runoff through the site, to avoid water being diverted or flooding neighbouring properties. **Offsite disposal:** > Significant vehicle movement on Te Mawhai Road during demolition works. **Both:** > Will generate some dust, noise, vibration, but will be managed/mitigated in accordance with resource consent requirements. > Odour unlikely due to nature of material being disposed of and capping).	
	LINZ	-1.00	-0.67	0.33	0.33		
	FTL	-1	-1	-1	-1		
	Amenity/land use: > Nuisance > Visual effects > Land use limitations					**Onsite disposal:** > Visual effects during construction and post-construction due to altered landscape, but can be mitigated through bunding/planting. > Potential land use limitations on or near any onsite landfill. **Offsite disposal:** > Nuisance associated with increased traffic on public road network during offsite removal. > Offsite landfill (Class 1 or 2) will have plans in place to mitigate amenity/land use effects in accordance with resource consdent requirements	
	LINZ	2.00	1.00	-2.00	-1.50		
	FTL	2	1	-1	-1		

	Employment opportunities: > Short term during works > Long term - ongoing maintenance					**Onsite disposal:** > Workers needed for construction, filling, capping and restoration for onsite landfill and ongoing maintenance/monitoring, post-filling. **Offsite disposal:** > Drivers needed for trucks removing waste materials offsite. > No long term new employment opportunities created. **Both:** > Works awarded by tender process through LINZ - potential to utilise local companies and employ locals (subject to LINZ H&S requirements), if additional workers needed. > Potential training/upskilling of contractor staff to satisfy project requirements.	
	LINZ	1.67	1.00	1.67	1.00		
	FTL	1	1	1	1		
	"Wellbeing" perceptions/fears: > Dislike of having "landfill" in local areas > Personal associations with site history					**Onsite disposal:** > New landfill onsite unlikely to be popular with locals. **Both:** > Reaction of people who have some association with site's history to onsite vs offsite disposal - could be both positive and negative.	
	LINZ	2.00	1.67	-1.33	-1.00		
	FTL	2	1	-2	-2		
	Sub-total: Social						
	LINZ	1.00	1.00	1.00	1.50		
	FTL	1.00	0.00	-1.00	-1.00		
20	Total	2.00	1.00	0.00	0.50		
	Cultural						
	Loss of mauri: > Loss of a "health and spirit" which permeates through all living and non-living things - plants, animals, water and soil					**Onsite disposal:** > Creation of new disposal site onsite likely to increase loss of Mauri, as piercing earth to contain waste, affects the relationship of Iwi to papatūānuku, putting them at odds with their role as kaitiaki to protect mother earth. **Offsite disposal:** > Removal of all waste materials offsite should reduce loss of Mauri.	
	LINZ	1.33	0.67	-1.67	-1.33		
	FTL	2	1	-2	-2		
	Destruction of wāhi tapu (cultural/spiritual sites): > ancestral burial sites > loss of cultural heritage > disruption of cultural connectivity > damage Iwi relationships > impact on land and resources					**Onsite disposal:** > Any new onsite disposal site needs to avoid wāhi tapu areas. **Offsite disposal:** > Wāhi tapu issues should have been addressed during consenting of the offsite disposal facilities being considered	Wāhi tapu sites often located on land important for traditional uses such as gathering food and other resources - the destruction of these sites can have a negative impact on the ability of Māori communities to use this land and its resources.
	LINZ	0.67	0.33	-1.00	-1.00		
	FTL	0	0	0	0		
	Kiatiakitanga (guardianship) and Whenua (land): > Extent of Maori active involvement in control, management and protection of land > Restrictions on land use (physical, contamination, etc.) causing loss of resources/opportunities for economic development					**Onsite disposal:** > Creation of new disposal site onsite restricts Mori involvement in control, managment and protection of that portion of the site > Creation of new disposal site onsite limits future uses of the affected land and buffer area around it physically and through causing feelings of disrespect/disregard for the land and the spiritual beliefs of Māori. **Offsite disposal:** > Improves Māori active involvement in control, management and protection of land > Improves economic development opportunities through removal of demolition materials	
	LINZ	2.00	1.67	-1.33	-1.00		
	FTL	2	2	-1	-1		

	Healing papatūānuku (Healing the land): > Soil health					**Onsite disposal:** > will help heal part of the land, but not the location of the new onsite disposal facility and immediate surrounds, which will affect Iwi and hapū for many generations, affecting their ability to act as kaitiaki in protecting their land **Offsite disposal:** > will start process of healing the land at Tokanui. > will shift the "problem" to another Iwi's rohe (home territory).	
	LINZ	2.00	1.33	-1.67	-1.67		
	FTL	2	1	-1	-1		
	Wai Ora: Restoration of water services: > Water quality > Ecology					**Onsite disposal:** > will involve vegetation removal, soil disturbance for earthworks, open areas during filling and post-filling capping and site restoration, all of which have potential to impact water services. **Offsite disposal:** > will remove all waste materials from site. > has potential to affect water services at location of offsite facility, but such facilities have rigorous water management systems and processes in place and ongoing compliance monitoring	
	LINZ	0.67	1.00	-0.33	-0.33		
	FTL	1	1	-1	-1		
	Mahinga kai restoration: > Garden, cultivation, food gathering places; collecting plants for various (e.g. medicine, weaving) purposes (e.g. toetoe, raupo, harakeke, paopao)					**Onsite disposal:** > May limit some mahinga kai options (primarily trees) in vicinity of landfill location. **Offsite disposal:** > should assist with mahinga kai restoration	CIA refers to this as customary food and resource species and biodiversity
	LINZ	0.67	0.67	-0.33	-0.33		
	FTL	1	1	-1	-1		
	Sub-total: cultural						
	LINZ	7.33	5.67	-6.33	-5.67		
	FTL	8.00	6.00	-6.00	-6.00		
30	Total	15.33	11.67	-12.33	-11.67		
	Economic						
	Demolition/remedial work waste disposal costs (capex)					Cost scores made on qualitative basis	
	LINZ	-2.00	-1.00	1.00	2.00		
	FTL	-2	-1	1	2		
	Ongoing maintenance costs (opex)					Cost scores made on qualitative basis	
	FTL	2	1	-1	-1		
	Effects on land value: > impact of demolition/remedial works on land value					**Onsite disposal:** > Likely decrease in land value on area subject to any new disposal site and immediate surrounds, but increase in land value across rest of site. **Offsite disposal:** > Likely more significant increase in land value.	
	LINZ	2.00	1.67	-2.00	-1.33		
	FTL	2	1	-2	-2		
	Effects on potential earnings from land: > Extent and productivity/health of land area available for use					**Onsite disposal:** > Increased potential except for area to be used for new disposal site. > Loss in ability to earn money from land used for new disposal site onsite during construction and operation, until capping and landscaping complete. > New onsite landfill can be designed with appropriate "agricultural cap" so as to restore land post-landfilling to similar or better productive land use classification as existing land. **Offsite disposal:** > increased potential due to removal of all waste offsite.	
	LINZ	2.00	1.67	-1.33	-1.00		
	FTL	2	2	-1	-1		

	Minimisation of future liabilities: > Legacy effects of residual infrastructure/contamination left in place or deposited in landfill onsite					**Onsite disposal:** > Creation of new disposal site onsite creates significant long term liability on the Site. **Offsite disposal:** > offsite disposal should eliminate long term liabilities on the Site.	
	LINZ	2.00	2.00	-2.00	-1.67		
	FTL	2	1	-2	-2		
	Sub-total: economic						
	LINZ	6.00	6.33	-6.33	-3.00		
	FTL	6.00	4.00	-5.00	-4.00		
15	Total	12.00	10.33	-11.33	-7.00		
	Weighted Scores						
	Environmental	76	93	-385	-344		
	Social	40	20	0	10		
	Cultural	460	350	-370	-350		
	Economic	180	155	-170	-105		
100	**Total Score**	**756**	**618**	**-925**	**-789**		
	Rank	**1**	**2**	**4**	**3**		
	Deliverability assessment						
	Significant Constraints	No	No	Yes	Yes	**Onsite disposal constraints:** > geotechnical, hydrogeology, archaeological, cultural, wetlands, trees and existing pipes or restoring watercourses for conveying upgradient runoff through site, which collectively significantly restrict potential location options. **Offsite disposal constraints:** > largely limited to receiving landfill capacity limits and compliance with their waste acceptance criteria, both of which are achievable.	Assessment of ability to deliver on Crown's commitments under the Deed of Settlement, taking into account timeframes and delivery risks
	Consentability	Yes	Yes	Unlikely	Unlikely	**Onsite disposal:** > Very tight timeframe to undertake all required investigations (geotech, hydrogeology, etc.) for new landfill onsite. > Possibility that consents would not be granted due to entire site being located on HPL Class 2 land. > if consent was granted, possible appeal by opponents to Env Court. **Offsite disposal:** > Disposal would be to existing consented facility - not applicable	

SCORING	
-2	Fully negative
-1	Partly negative
0	No impact
1	Partly positive
2	Fully positive