REPORT

Tonkin+Taylor

Onekawa Aquatic Centre - Contaminated Land Assessment

Prepared for
Napier City Council
Prepared by
Tonkin & Taylor Ltd
Date
March 2021
Job Number
1009171.v1

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Document Control

Title: Onekawa Aquatic Centre - Contaminated Land Assessment					
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05/03/2020	1	Contaminated Land Assessment Report	M Robyns Z Frame	S Schiess M Morely	M Thomas

Distribution:

Napier City Council	1 PDF copy
Tonkin & Taylor Ltd (FILE)	1 PDF copy

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1 Introduction

Tonkin & Taylor Ltd (T+T) was engaged by Napier City Council (NCC) to conduct a contaminated land assessment at the Onekawa Aquatic Centre, Napier. The purpose of the assessment was to assess the suitability of four different locations around the site for a potential redevelopment of the aquatic centre. Also considered in our assessment was one location for carparking and one location for an extension to the existing gym complex. We understand the outcomes from this report will be used to support preliminary master planning and feasibility assessments of any potential redevelopment or extension works.

T+T has also provided a separate Geotechnical Assessment Report for this site, dated March 2021.

Contaminated land services were provided in accordance with our proposal dated 29 October 2020[1] and the variation dated 24 November 2020[2] and included the following objectives and scope of work:

The objectives:

- Report on the contaminated land related ground conditions beneath the potential development areas (see Figure 1 and 2, Appendix A); and
- Discuss ground contamination related implications to the development with respect to:
  - disturbance and offsite disposal of potentially contaminated materials that are surplus to the development.
  - contaminated land related health and safety considerations for constructions workers; and
  - identifying outline requirement for resource consents under local and regional plans etc.

The scope of work:

- Review NCC property files;
- Review of a "Site Contamination Enquiry" from Hawkes Bay Regional Council;
- Review of selected on-line historical aerial photographs;
- A property walkover to observe and record salient conditions;
- Review of ground contamination related environmental regulations and planning documents to identify relevant resource consent requirements;
- Soil sampling and analytical testing at a laboratory comprising:
  - Collection of soil samples from 8 boreholes, 22 test pits and 10 hand augers located across the proposed redevelopment areas; and
  - Laboratory analysis of 71 soil samples for metals and polycyclic aromatic hydrocarbons (PAHs), and 68 soil samples for semi-quantitative asbestos in soil.
- Assessment of the laboratory results against relevant soil contaminant standards in accordance with New Zealand's contaminated land regulatory framework to assess risk to human health and environment, as well as waste acceptance criteria to assess offsite disposal options for surplus materials from the development.

[1] Tonkin & Taylor Ltd (29 October 2020), Offer of Geotechnical and Contamination Assessment – Revision 3. *Onekawa Aquatic Centre – Possible Redevelopment.* Job Ref: 1009171.
[2] Tonkin & Taylor Ltd (24 November 2020), Variation Order 1. *Onekawa Aquatic Centre – Geotechnical and Contaminated Land.* Job Ref: 1009171.

2 Project background

2.1 Property walkover

A T+T contaminated land specialist completed a walkover across the property on 25 November 2020. Relevant observations made at the time are summarised below. Selected photographs are included as Photographs 1-8, Appendix C.

The property is currently used as an aquatic and recreation centre and contains the following features:

- Buildings and other assets within the property include an aquatic centre, Plunket, playground, netball courts and grassed park areas.
- The property is generally flat with minor undulations. These undulations could be to be man-made as part of landscaping (refer to Photograph 1).
- Fragments of ceramics, concrete, glass, and metal were exposed in surface soil at several locations around the property (refer to Photograph 2).
- There are eight buildings within the property of varying age and construction materials. These include timber, cement block, corrugated and long-run iron/steel and brick. Several buildings also have soffits and/or cladding constructed out of cement board that may be an asbestos containing material (ACM). These cladding and soffit materials are in a moderately good condition with some areas of flaking paint and cracking noted (refer to Photographs 3-6).
- A store containing chlorine is present within proposed redevelopment area Option 3; no indications of leakages were observed from the exterior (refer to Photograph 7).
- Three small electrical transformers are present on the property, one adjacent to proposed development are Option 5. The transformers are in good condition with no indications of leakages observed (refer to Photograph 8).
- Approximately half the property is grassed, with the remainder paved with asphalt for carparking and netball courts. Pavements are generally in good condition with a few cracks locally. Grass and other vegetation including bushes and trees on the property appeared to be generally healthy, although small brown patches were noted in some areas (refer to Photograph 1).
- Surface water drains to the stormwater network via curb drains. It was raining heavily during the walkover and no significant surface flooding was noted.
- There are several sensitive environmental receptors on the property or nearby including the recreation facilities and Plunket as well as adjacent residential properties.

2.2 Surrounding land use

The land uses in the area surrounding the property include:

- North – Flanders Ave and residential properties with Gallipoli Road beyond.
- South – residential properties with Maadi and Menin Roads beyond.
- East – residential properties with Menin Road beyond.
- West – residential properties and retail outlets with Flanders Road beyond.

2.3 Summary of site history

Historical information relating to the property was collected from a variety of sources. The information presented documents activities undertaken across the property, except for the aerial

photograph review where comments are also provided on readily observable surrounding land uses too. A detailed review of the available information is included in Appendix D.

Historical aerial images and council property files indicate that a municipal landfill operated across a large portion of Onekawa Park from the 1930s until the late 1950s. Landfilling activities initially comprised filling up natural depressions across the property before disposing of material in long trenches across certain portions of the property. Construction of an Olympic size swimming pool commenced in 1964 with the property since used for recreational and community facilities (including a kindergarten and sports pavilion). The swimming complex was infilled in 2012.

Several intrusive investigations[3] [4] for ground contamination have been undertaken across the property previously, which have identified the following:

- The presence of shallow landfill material with minimal cover;
- Suspected landfill materials were observed in 60% of the test pit locations around the property;
- The landfill material generally comprised hardfill and non-putrescible waste (e.g. glass, charcoal); and
- Approximately half of the samples analysed contained concentrations of one or more metal above the expected background levels for the area and/or detectable PAHs. The PDP investigation undertaken in 2012 states that six samples were also analysed for asbestos although it provides no further details on this (e.g. locations, laboratory reports, absence/presence, condition) (see Appendix D for further details).

A contaminated site enquiry lodged with HBRC showed that the property is listed on the Listed Land Use Register (LLUR) as 'Verified HAIL (Hazardous Activities and Industries List)' for the historical operation as a municipal landfill, which operated from pre-1932 until the later 1950s. The LLUR enquiry states that the property is categorised as 'managed for land use'. One resource consent exists for the site in order to discharge contaminants (being leachate and other products arising from the decomposition of municipal refuse) into or onto land in circumstances which may results in the contaminant entering water.

[3] PDP Ltd, Phase 2 Site Investigation at the Former Taradale Road Landfill, January 2011
[4] PDP Ltd, Former Landfill, Onekawa: Residential Property Investigation, June 2012

3 Site characterisation

This section characterises the likely and potential contamination status of the site based on the available information as presented in Section 2.3 of this report.

3.1 Potential for contamination

Desk study information has identified that HAIL activities were (or are likely to have been) undertaken at the site. The activities, their potential contaminants of concern and an assessment of the likelihood, potential magnitude and possible extent of contamination are presented in Table 3.1 below.

Table 3.1: Potential for contamination

Land use/activity	Potential contaminants	Likelihood, magnitude and possible extent of contamination	HAIL reference
Hazardous chemical store	Chlorine	If spills have occurred in the past contamination is most likely to be limited to the surface soils in the immediate vicinity of the store shed.	A2: Chemical manufacture, formulation or bulk storage
Electrical transformers	Depending on the year of installation, contaminants may include PCBs, hydrocarbons, and metals.	If spills have occurred in the past contamination is most likely to be limited to the surface soils in the immediate vicinity of the transformers.	Activity B2: Electrical transformers.
Historic municipal landfilling	A broad range of contaminants including, but not limited to metals and PAH and asbestos.	The exact lateral and vertical extent of landfilling is unknown, however based on previous intrusive investigations it is likely that landfilling activities may have extended over the majority of the site.	G3: Landfill sites

3.2 Preliminary conceptual site model

A conceptual site model as defined by the Ministry for the Environment (MfE) [5][6], sets out for a site/development the known and potential sources of contamination, the exposure pathways, and potential receptors. For there to be an effect there has to be a complete linkage between the source, pathway and receptor.

A preliminary conceptual site model has been developed for the proposed site/development that takes into account the available information about the site, and our understanding of the potential effects on human health and the environment by the development. The model is presented in Table 3.2 on the following page.

[5] Ministry for the Environment, updated 2011, *Contaminated Land Management Guidelines No. 5 Site Investigation and Analysis of Soils (CLMG No. 05)*

[6] URS New Zealand Limited, 2012. *User's Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.* Prepared for the Ministry for the Environment by URS New Zealand Limited.

Table 3.2: Preliminary conceptual site model – All options

Source	Pathway	Receptor	Pathway Assessment
Soil contamination as a result of historic municipal landfilling.	Dermal contact	Future site users	Incomplete: Given that under the proposed redevelopment the site will be completely sealed.
	Ingestion of soil		
	Inhalation of dust		
	Inhalation of vapours and/or landfill gas(es) (LFG)	Future site users	Potentially complete: Given the age of the landfill it is likely that volatile compounds and/or landfill gases have broken down over time to innocuous substance and, therefore, will not pose a risk to future site users and/or buildings. However, a landfill gas assessment would be required to confirm if the hazard is present and what risks it poses, if any.
	Dermal contact	Maintenance/excavation workers	Complete: Should contamination exist within the underlying soils, a risk may be present to excavation and maintenance workers.
	Ingestion of soil		
	Inhalation of dust		
	Inhalation of vapours		
Soil contamination as a result of historic spills from the electrical transformers	Dermal contact	Future site users	Incomplete: Given that under the proposed redevelopment the site will likely be completely sealed.
	Ingestion of soil		
	Inhalation of dust		
	Dermal contact	Maintenance/excavation workers	Potentially complete: Should contamination exist within the underlying soils, a risk may be present to sub-surface maintenance workers.
	Ingestion of soil		
	Inhalation of dust		
Soil contamination as a result of historic spills from the hazardous chemical store	Dermal contact	Future site users	Incomplete: Given that under the proposed redevelopment the site will likely be completely sealed.
	Ingestion of soil		
	Inhalation of dust		
	Dermal contact	Maintenance/excavation workers	Unlikely to be complete: chlorine concentrations are unlikely to be at a level which would impact maintenance/excavation workers.
	Ingestion of soil		
	Inhalation of dust		
	Discharge to groundwater	Environmental receptors	Incomplete: Unlikely to be in sufficient volumes to create a risk to environmental receptors.

4 Intrusive investigation

4.1.1 Investigation rationale and methodology

An intrusive investigation was undertaken on 23 November and 4 December 2020, and 11 January 2021. The aim of the investigation was to record field observations and collect soil samples to assess the potential for contamination in the fill material and soils over the site.

The intrusive investigation comprised the excavation of:

- 8 boreholes to a maximum depth of 19.95 m bgl;
- 22 test pits to a maximum depth of 3.0 m bgl.; and
- 10 hand augers to a maximum depth of 1.8 m bgl.

Investigation locations were selected by T+T based on the location of the proposed redevelopment works, access across the site and the presence of buried services (see Figure 1, Appendix A for investigation locations). The locations were roughly gridded across the proposed redevelopment areas/options and with the aim of providing a *preliminary assessment* of ground conditions associated with the former landfilling. The sampling density does not meet the requirements of CLMG No. 5 and therefore once a preferred redevelopment option(s) is (are) chosen, additional investigative works may be required.

In addition, given the presence of hardstand by the existing transformers, no sample locations were targeted to these locations nor the hazardous chemical shed. Additional investigation will be required to be undertaken into these activities at a later date.

The investigation for the presence and assessment of landfill gas was out of scope for this investigation. This will be required to be undertaken at a later date when a preferred redevelopment option(s) is (are) confirmed.

4.1.2 Soil sampling

Soil samples were collected in general accordance with MfE CLMG No. 05 and Asbestos in Soil Guidelines[7]:

- Soil samples were collected directly from the drill core, excavator bucket and hand auger head with freshly-gloved hands and were placed directly into laboratory-prepared sample jars. The jars were stored under chilled conditions prior to being sent via courier to an accredited laboratory.
- The hand auger was decontaminated between samples using clean water and Decon90 (a phosphate-free detergent) followed by a clean water rinse.
- Soil samples were obtained at a depth of 0.1 m bgl and/or where changes in lithology were observed, or at approximate 0.3 – 0.5 m bgl intervals.
- The materials encountered were logged in general accordance with the NZ Geotechnical Society guidance and were assessed for odour and evidence of contamination (e.g. staining, discoloured soil, oily sheen).
- Additional samples were held cold at the laboratory for further analysis if required.

[7] BRANZ, 2017, New Zealand Guidelines for Assessing and Managing Asbestos in Soil

4.1.2.1 Field observations

The ground conditions observed during the investigation are discussed in Section 4.2. The following relates to contamination observations made during the investigation.

- Trace ash/charcoal was identified in test pit TP05 at a depth of 0.2 – 0.5 m bgl;
- Ceramic, and rubble fragments were identified at depth ranging between 0.2 – 0.9 m bgl in test pits TP06, TP08, TP09, TP13, TP15, TP21 and TP22 and hand augers HA03, HA04, HA05 and HA07. Metal, brick and glass fragments were observed in test pits TP16 and TP17 at a depth of 0.2 – 1.5 m bgl;
- Rapid infiltration of groundwater occurred at TP16 at a depth of 1.5 m bgl and the groundwater was observed to bubble extensively; and
- No sheen or film was observed floating on groundwater.

4.1.3 Laboratory analysis

Samples were kept chilled and shipped to IANZ accredited Hill Laboratories Ltd under chain of custody documentation. As per the proposed sampling and analysis plan issued to NCC November 2020[8], the scheduled analysis included:

- 71 samples for metals and PAHs; and
- 68 samples for semi-quantitative asbestos in soil content.

4.1.4 Summary of analytical results

A summary of analytical results of samples analysed during the investigation is presented below. Appendix E includes a more in-depth review, including the evaluation criteria for the results. Analytical results are presented in Tables H1 – H6 Appendix E, along with their assessment to the selected criteria. Laboratory transcripts are included in Appendix G.

In summary the assessment of the laboratory data, by each Redevelopment Option (see Figure 1) indicates:

Option 1

- All samples complied with the SCS for commercial/industrial/outdoor worker and recreational land use.
- Asbestos was not detected in the samples analysed.
- One soil sample returned lead and zinc concentrations which exceed the Class A landfill criteria. However, on average, concentrations for Option 1 fall below the relevant criteria and therefore, subject to the approval of the facility operator, material from this area may be suitable for disposal at a Class A landfill. Alternatively, toxicity characteristic leaching procedure (TCLP) analysis will be required to be undertaken on this sample to ensure landfill acceptance.

Option 2

- One sample returned a lead concentration which exceeds the recreational land use standard.
- All heavy metal concentrations complied for commercial/industrial/outdoor worker.
- Asbestos was not detected in the samples analysed.

[8] Email to Drew Brown, NCC 18 November 2020

- Two soil samples returned copper, lead and zinc concentrations which exceed the Class A landfill screening criteria. TCLP analysis will be required to be undertaken on these samples to ensure landfill acceptance of this material.

Option 3

- One soil sample returned a lead concentration which exceeds the recreational land standard. All other soil samples returned heavy metal concentrations which complied with the commercial/industrial/outdoor worker and recreational land use criteria/standards.
- Asbestos was not detected in the samples analysed.
- Two soil samples returned copper/lead and or zinc concentrations which exceed the Class A landfill screening criteria. Consequently, TCLP analysis will be required to be undertaken on these samples to ensure landfill acceptance of this material.

Option 4

- One soil sample returned a lead concentration which exceeds the recreational land use standard.
- Asbestos (chrysotile fibres) was detected in three soil samples.
- Four samples (returned lead and/or zinc concentrations which exceeded the Class A landfill criteria. Consequently, TCLP analysis will be required to be undertaken on these samples to ensure landfill acceptance of this material. Due to the presence of elevated heavy metal concentrations and asbestos in some samples, material excavated from this area will be required to be disposed of a licensed landfill authorised to receive such waste.

Option 5 & 6

- All soil samples returned heavy metal and PAH concentrations which complied with the for commercial/industrial/outdoor worker and recreational land use criteria/standards.
- Asbestos was not detected in the samples analysed.
- On average, concentrations fall below expected background concentrations and therefore, subject to the approval of the operator, material may be suitable for disposal at a licensed clean fill. Alternatively, material is acceptable for disposal at a Class A landfill.

5 Development implications

5.1 Regulatory

The rules relating to contaminated land, its use, disturbance etc in the Napier are managed in the following legislation:

- NES Soil;
- The Hawkes Bay Regional Resource Management Plan (the Regional Plan);
- NCC District Plan; and
- Health and Safety at Work (Asbestos) Regulations (2016).

The NES Soil and District Plan consider issues relating to land use and the protection of human health, while the Regional Plan has regard to issues relating to the protection of the general environment, including ecological receptors. The Regional Plan also covers rules associated with the disposal of cleanfill. The need, or otherwise, for contamination related resource consents for the proposed redevelopment has been evaluated against these regulatory requirements.

5.2 NES Soil

Based on the HAIL area, considered to be the entirety of the property (approximately 85,000 m^2) the permitted soil disturbance and disposal thresholds (per year) under the NES Soil are interpreted to be:

- Soil disturbance – 4,250 m^3.
- Offsite soil disposal – 850 m^3.

Ground disturbance or excavation works exceeding either of these thresholds will require consent under the NES Soil regulations.

5.3 Hawkes Bay Regional Resource Management Plan

Given the development is currently still in the preliminary design phase, it is suggested that the requirements of Rules 52 and 48 of the HBRRMP are closely assessed when more detailed earthworks plans are available. These rules relate to the discharge of contaminants to land, into water, provision of erosion and sediment controls etc.

5.4 District Plan applicability

The NCC District Plan became operative on 21 November 2011. It does not include any rules more restrictive than those set out in the NES Soil thus District Plan provisions have not been considered further.

5.5 Health and Safety at Work (Asbestos) Regulations

The Health and Safety at Work (Asbestos) Regulations (2016) was enacted on 1 April 2016. The regulations set out requirements for manufacturing, supplying, transporting, storing, removing, using, installing, handling, treating, disposing of, or disturbing asbestos or ACM. WorkSafe New Zealand has prepared an Approved Code of Practice: Management and Removal of Asbestos (ACoP; November 2016) which includes preliminary provisions related to asbestos in soils.

The key requirements of the regulations and ACoP are that works involving asbestos contaminated soils must be undertaken with appropriate asbestos controls in place and that contaminated soil removed from site must be taken to an approved disposal site. The standards that apply to asbestos-

in-soils are subject to further guidance which was released November 2017 (The New Zealand Asbestos Guidelines[9]).

The asbestos regulations will apply to future excavation works or redevelopment if asbestos is present in soils at the site at the time of the works. The New Zealand Asbestos Guidelines define the level of oversight and controls (including personal protective equipment, decontamination etc.) that are required to be implemented dependent on the concentration of asbestos fibres/fines or fragments that are present in the soils.

5.6 Additional development considerations

Table 5.1 provides a summary of the qualitative assessment of the risk and implications for each of the redevelopment options that the landfill materials present in terms of human health, offsite disposal requirements for excess soil displaced by redevelopment and what future soil investigations may be required in order to meet regulatory requirements.

Additional to the table below, a landfill gas investigation and risk assessment will be required for the chosen redevelopment option(s) to assess the presence of any landfill gases and how this may affect development. Such an investigation will require the drilling of a number of suitable boreholes with the installation of landfill gas monitoring standpipes and to provide a robust data set, it is recommended that monitoring be undertaken at least 6 times over a 12-month period to support the assessment and the conclusions drawn.

[9] New Zealand Guidelines for Assessing and Managing Asbestos in Soil, prepared by BRANZ Ltd, November 2017

Table 5.1: Additional Development Considerations

Redevelopment Option	Human Health Risk Assessment	Waste Disposal	Further Work Required
Option 1: New aquatic centre and relocation of netball courts	All samples complied with the SCS for commercial/industrial/outdoor worker and recreational land use and therefore the risk to future human health is considered acceptably low. Asbestos was not detected in any of the samples analysed.	One soil sample returned lead and zinc concentrations which exceeded the Class A landfill criteria. However, on average, concentrations fall below the relevant criteria and therefore, subject to the approval of the facility operator, material from this area *may* be suitable for disposal at a Class A landfill. Alternatively, TCLP analysis for lead and zinc will be required to be undertaken on sample TP09-1.0m to determine an appropriate disposal location.	Additional grid-based sampling will be required to be undertaken across areas of current handstand (i.e. the current netball courts). Prior to redevelopment works a site management plan would be required to be produced stipulating soil handling requirements and health and safety procedures required for the redevelopment works.
Option 2: Redevelopment of existing aquatic centre facility at current location Option 3: Demolition of minor structures for development of new aquatic centre in a similar location	One soil sample returned a lead concentration which exceeds the SCS for recreational land use. Given that the proposed redevelopment will result in the area being sealed it is considered that the risk to future human health is considered acceptably low. All samples complied with the SCS for commercial/industrial/outdoor worker land use and therefore the risk to excavation workers during the redevelopment works is considered to be acceptably low. Asbestos was not detected in any of the samples analysed.	Two samples returned copper, lead and/or zinc concentrations which exceed the Class A landfill screening criteria. Consequently, TCLP analysis will be required to be undertaken on these samples to ensure landfill acceptance of this material.	Due to limited access during the intrusive investigation only limited sampling has been undertaken to date and therefore additional grid-based sampling will be required to be undertaken in areas of hardstand. Prior to redevelopment works a site management plan would be required to be produced stipulating soil handling requirements and health and safety procedures required for the redevelopment works.

Redevelopment Option	Human Health Risk Assessment	Waste Disposal	Further Work Required
Option 4: New aquatic centre (south-western corner)	One soil sample returned a lead concentration which exceeds the SCS for recreational land use. Given that the proposed redevelopment will result in the area being sealed it is considered that the risk to future human health is considered acceptably low. Asbestos was detected in three soil samples with one sample exceeding the applicable standard for both recreation and commercial/industrial land use. Additional soil sampling and asbestos analysis will be required to be undertaken to determine what asbestos health and safety protocols need to be implemented during redevelopment works in this portion of the site.	Four samples returned lead and/or zinc concentrations which exceeded the Class A landfill criteria. Consequently, TCLP analysis will be required to be undertaken on these samples to ensure landfill acceptance of this material. Due to the presence of elevated heavy metal concentrations and asbestos in some samples, material excavated from this area will be required to be disposed of a licensed landfill authorised to receive such waste.	In order to meet the minimum sampling density recommended by the MfE CLMG No. 5 an additional five sample locations will be required to be excavated across this proposed development area. Prior to redevelopment works a site management plan would be required to be produced stipulating soil handling requirements and health and safety procedures required for the redevelopment works. Due to the presence of asbestos, the SMP will be required to include procedures relating to asbestos in soils. Alternatively, a separate asbestos management could be produced.
Option 5: Car parking for the new aquatic centre Option 6: Extension to the Omni Gymnasium Centre	All samples complied with the SCS for commercial/industrial/outdoor worker and recreational land use and therefore the risk to future human health is considered acceptably low. Asbestos was not detected in any of the samples analysed.	On average, concentrations fall below expected background concentrations and therefore, subject to the approval of the operator, material may be suitable for disposal at a licensed clean fill. Alternatively, material is acceptable for disposal at a Class A landfill.	In order to meet the minimum sampling density recommended by the MfE CLMG No. 5 additional sample locations will be required to be excavated across this proposed development areas. Prior to redevelopment works a site management plan would be required to be produced stipulating soil handling requirements and health and safety procedures required for the redevelopment works.

6 Conclusion and recommendations

Contaminated land investigations and reporting have been completed to support the preliminary design and optioneering of a new aquatic centre facility, gym extension and carparking area in the Onekawa Park, Napier. The conclusions and recommendations of the contamination assessment have been summarised below:

1 Intrusive investigations were complete at the site, this included:
   - 8 boreholes to a maximum depth of 19.95 m bgl.
   - 22 test pits to a maximum depth of 3.0 m bgl.
   - 10 hand augers to a maximum depth of 1.8 m bgl.

2 Laboratory testing was complete on samples collected from the intrusive investigations. The samples tested included:
   - 71 samples for metals and PAHs; and
   - 68 samples for semi-quantitative asbestos in soil content.

3 Refer to Section 4.1.4 for the results of the laboratory analysis. Asbestos was detected in several samples within the Option 4 area on the southern portion of the site. Heavy metals exceedances, comprising lead, zinc and copper were identified in some areas of the site;

4 The rules relating to contaminated land, its use, disturbance etc in the Napier are managed in the following legislation: NES Soil, The Hawkes Bay Regional Resource Management Plan (the Regional Plan), NCC District Plan; and Health and Safety at Work (Asbestos) Regulations (2016). Refer to Section 5 to specific guidance around this legislation;

5 Given landfill materials were identified at the site; Table 5.1 presents a summary of the risk and implications of the materials to human health, offsite soil disposal requirements and future work to meet regulatory requirements; and

6 A landfill gas assessment is required for the chosen redevelopment options to understand if any landfill gases are present (and if so, their potential implications on the development).

7 Applicability

This report has been prepared for the exclusive use of our client Napier City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on our visual inspection and sampling of material within the proposed works area. The nature and continuity of subsoil away from the investigations and sampling locations is inferred and it must be appreciated that actual conditions may vary from the assumed model.

Tonkin & Taylor Ltd

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Project Director

Reviewed by:

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Senior Contaminated Land Consultant

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Appendix A: Figures

- Figure 1 – Site Plan.
- Figure 2 - Engineering Geology Plan.

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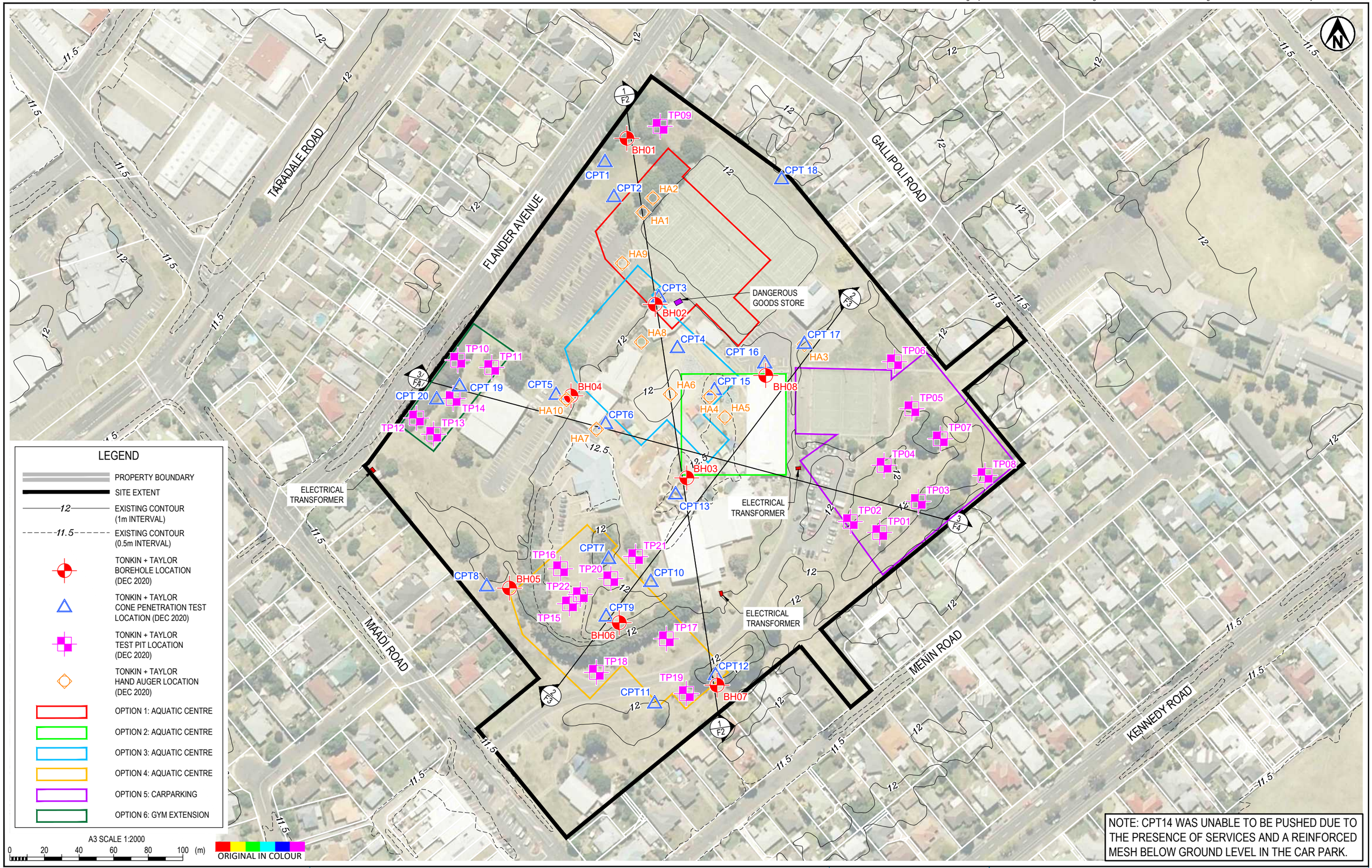


LEGEND

- PROPERTY BOUNDARY
- SITE EXTENT
- 12 — EXISTING CONTOUR (1m INTERVAL)
- 11.5 — EXISTING CONTOUR (0.5m INTERVAL)
- TONKIN + TAYLOR BOREHOLE LOCATION (DEC 2020)
- TONKIN + TAYLOR CONE PENETRATION TEST LOCATION (DEC 2020)
- TONKIN + TAYLOR TEST PIT LOCATION (DEC 2020)
- TONKIN + TAYLOR HAND AUGER LOCATION (DEC 2020)
- OPTION 1: AQUATIC CENTRE
- OPTION 2: AQUATIC CENTRE
- OPTION 3: AQUATIC CENTRE
- OPTION 4: AQUATIC CENTRE
- OPTION 5: CARPARKING
- OPTION 6: GYM EXTENSION

A3 SCALE 1:2000

0 20 40 60 80 100 (m)

ORIGINAL IN COLOUR

NOTE: CPT14 WAS UNABLE TO BE PUSHED DUE TO THE PRESENCE OF SERVICES AND A REINFORCED MESH BELOW GROUND LEVEL IN THE CAR PARK.

NOTES.

1. AERIAL PHOTO SOURCED FROM LINZ DATA SERVICE <https://data.linz.govt.nz/layer/53401-hawkes-bay-03m-rural-aerial-photos-2014-2015/ , LICENSED BY LINZ FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE (CC BY 4.0). ACCESSED 21/12/2020.
2. PROPERTY BOUNDARY SOURCED FROM LINZ DATA SERVICE <https://data.linz.govt.nz/layer/51571-nz-parcels/> , LICENSED BY LINZ FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE (CC BY 4.0). ACCESSED 09/12/2020.
3. EXISTING CONTOUR COPIED FROM NAPIER CITY COUNCIL GIS <http://www.gis.napier.govt.nz/IntraMaps80/?project=NCC> DATED 09 DEC 2020.
4. COORDINATE DATUM: NZGD2000, NEW ZEALAND TRANSVERSE MERCATOR (NZTM2000).
5. LEVEL DATUM: LINZ (MSL) NAPIER VERTICAL DATUM 1962

Tonkin+Taylor

Exceptional thinking together www.tonkintaylor.co.nz

PROJECT No.	1009171	
DESIGNED	ZAFR	Mar.21
DRAWN	JC	Mar.21
CHECKED	WC	Jan.21
	JWY	25/01/2021
	APPROVED	DATE

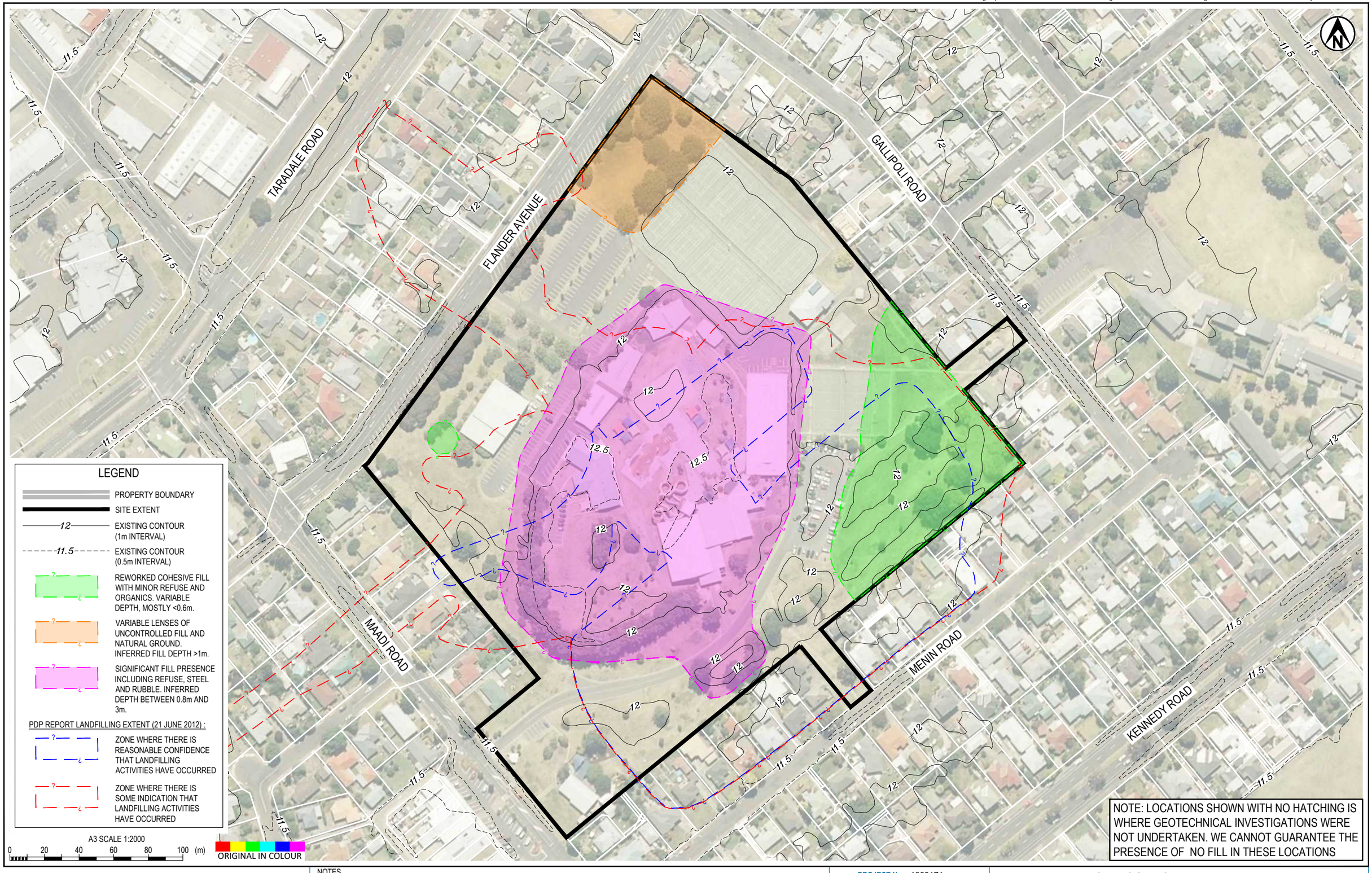
CLIENT **NAPIER CITY COUNCIL**

PROJECT **ONEKAWA AQUATIC CENTRE**

TITLE GEOTECHNICAL INVESTIGATION
SITE INVESTIGATION PLAN

SCALE (A3) 1:2000 FIG No. FIGURE 1 REV 1

\\ttgroup.local\infrastructure\CAD\1009171\WorkingMaterial\CAD\FIG\1009171-F5.dwg 2021-Jan-25 11:39:45 AM Plotted By: JONALD CASTRO



NOTES.

1. AERIAL PHOTO SOURCED FROM LINZ DATA SERVICE <https://data.linz.govt.nz/layer/53401-hawkes-bay-03m-rural-aerial-photos-2014-2015/ , LICENSED BY LINZ FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE (CC BY 4.0). ACCESSED 21/12/2020.
2. PROPERTY BOUNDARY SOURCED FROM LINZ DATA SERVICE <https://data.linz.govt.nz/layer/51571-nz-parcels/> , LICENSED BY LINZ FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE (CC BY 4.0). ACCESSED 09/12/2020.
3. EXISTING CONTOURS COPIED FROM NAPIER CITY COUNCIL GIS <http://www.gis.napier.govt.nz/IntraMaps80/?project=NCC> DATED 09 DEC 2020.
4. COORDINATE DATUM: NZGD2000, NEW ZEALAND TRANSVERSE MERCATOR (NZTM2000).
5. LEVEL DATUM: LINZ (MSL) NAPIER VERTICAL DATUM 1962

Tonkin+Taylor

Exceptional thinking together www.tonkintaylor.co.nz

PROJECT No.	1009171	
DESIGNED	ZAFR	Jan.21
DRAWN	JC	Jan.21
CHECKED	WC	Jan.21
JWY		25/01/2021
APPROVED		DATE

CLIENT **NAPIER CITY COUNCIL**

PROJECT **ONEKAWA AQUATIC CENTRE**

TITLE GEOTECHNICAL/CONTAMINATION INVESTIGATION ENGINEERING GEOLOGY PLAN

SCALE (A3) 1:2000 FIG No. FIGURE 2 REV 1

Appendix B: Intrusive investigations

- Hand Augered Borehole Logs.
- Machine Borehole Logs.
- Test Pit Logs.

HAND AUGER LOG

HOLE Id: **HA01**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.887928995541 (WGS84) -39.5049309983664	DRILL TYPE: Hand auger	HOLE STARTED: 25/11/2020
	DRILL METHOD: HA	HOLE FINISHED: 25/11/2020
R.L.: 12.00m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ICHW CHECKED: JWY

GEOLOGICAL											ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m) / DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill					A+M @ 0.10m				M	S-F		SILT, some sand, trace gravel and clay; greyish brown. Soft to firm, moist, low plasticity; sand, fine; gravel fine to coarse, includes sub-angular, sandstone and concrete. Contains rootlets.
Holocene Estuarine		100	HA		A+M @ 0.60m		0.5					Sandy SILT, trace clay and rootlets; brownish grey, minor orange brown flecks. Soft to firm, moist, low plasticity. Trace shell fragments, <2mm diameter.
Box 1, 0.0-1.0m										L		Fine to medium SAND, trace silt; greyish brown. Loosely packed, moist, uniformly graded. 0.9m: sand becomes medium, less silt towards base of hole.
							1.0					1m: END OF BOREHOLE
							1.5					

COMMENTS: Target depth reached.

Hole Depth 1m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA01**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (WGS84)	176.887928995541 -39.5049309983664	DRILL TYPE: Hand auger	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: HA	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: T+T
			LOGGED BY: ICHW CHECKED: JWY

0.00-1.00m

HAND AUGER LOG

HOLE Id: **HA02**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.887992017615 (WGS84) -39.5048540428627	DRILL TYPE: Hand auger	HOLE STARTED: 25/11/2020
	DRILL METHOD: HA	HOLE FINISHED: 25/11/2020
R.L.: 12.00m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ICHW CHECKED: JWY

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m) / DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Top Soil								TS	M	F		Organic SILT, minor sand, trace rootlets; dark brown. Firm, moist.
										S-F		SILT, some sand, trace gravel; greyish brown. Soft to firm, moist, low plasticity; gravel, fine to medium, sandstone.
					A+M @ 0.20m							
Holocene Estuarine		100	HA				0.5					Sandy SILT, trace clay and rootlets; brownish grey. Soft to firm, moist, low plasticity. Trace shell fragments, <2mm diameter.
					A+M @ 0.70m					L		Fine to medium SAND, trace silt; greyish brown. Loosely packed, moist, uniformly graded.
Box 1, 0.0-1.0m							1:1 1.0					1m: END OF INVESTIGATION
							1.5					

COMMENTS: Target depth reached.

Hole Depth 1m

Scale 1:10

Rev.: A

CORE PHOTOS

BOREHOLE No.: **HA02**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (WGS84)	176.887992017615 -39.5048540428627	DRILL TYPE: Hand auger DRILL METHOD: HA	HOLE STARTED: 25/11/2020 HOLE FINISHED: 25/11/2020 DRILLED BY: T+T
R.L.:	12.00m		
DATUM:	NAPIHT1962		LOGGED BY: ICHW CHECKED: JWY

0.00-1.00m

HAND AUGER LOG

HOLE Id: **HA03**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.88904997339 (WGS84) -39.505580021635	DRILL TYPE: Hand auger	HOLE STARTED: 25/11/2020
		HOLE FINISHED: 25/11/2020
R.L.: 12.00m	DRILL METHOD: HA	DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ICHW CHECKED: JWY

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Topsoil									TS TS	M	F		Sandy SILT; dark brown. Firm, moist.
Fill		100	HA		A+M @ 0.20m						S-F		Sandy SILT, trace gravel; brownish grey. Soft to firm, moist. low plasticity; gravel, fine to coarse, sandstone. Contains ceramics and glass fragments, asphalt and ash.
								0.5					Fine SAND, some silt; brownish grey. Tightly packed, moist, uniformly graded. Contains ceramic fragments and ash.
					A+M @ 0.60m						S-F		SILT, some sand, trace clay; brownish grey. Soft to firm, moist, medium plasticity. Contains ceramic fragments.
							11	1.0					Fine SAND, some silt, minor gravel; reddish brown. Tightly packed, moist, uniformly graded. Contains glass and ceramic fragments and ash.
Box 1, 0.0-1.2m					A+M @ 1.10m								
								1.5					1.2m: END OF INVESTIGATION

COMMENTS: Target depth reached.

Hole Depth 1.2m

Scale 1:10

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA03**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (WGS84)	176.88904997339 -39.505580021635	DRILL TYPE: Hand auger	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: HA	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: T+T
			LOGGED BY: ICHW CHECKED: JWY

0.00-1.20m

HAND AUGER LOG

HOLE Id: **HA04**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.888431 (WGS84) -39.505873	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
	DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.: 12.50m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA		A+M @ 0.05m		12	0.5		D	D		Silty, fine SAND, trace gravel; light brown. Tightly packed, dry, well graded. Gravel; fine to coarse. Contains glass, brick and ceramic fragments.
					A+M @ 0.50m					M			0.8m: Becomes, dark brown. Moist.
					A+M @ 1.00m		11	1.0					1m: END OF INVESTIGATION
								1.5					

Box 1, 0.0-1.0m

COMMENTS: Refusal at 1 m.

Hole Depth 1m

Scale 1:10

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA04**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (WGS84)	176.888431 -39.505873	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
		DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.:	12.50m		DRILLED BY: T+T
DATUM:	NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

0.00-1.00m

HAND AUGER LOG

HOLE Id: **HA05**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.888538 (WGS84) -39.505976	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
	DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.: 12.50m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

GEOLOGICAL													ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA		A+M @ 0.05m		12	0.5		D	L		Silty, fine SAND, minor gravel; light grey. Loosely packed, dry, well graded. Gravel; fine to medium. Contains shell glass and brick fragments.
					A+M @ 0.50m					M			0.7 - 1.5m: bitumen present at 0.7m. Becomes dark brown, mottled orange. Moist.
								1.0					
Holocene Estuarine	11/01/2021 ▼				A+M @ 1.20m		11	1.5			F		Sandy SILT; brown. Firm, moist, low plasticity. Sand; fine.
Box 1, 0.0-1.8m					A+M @ 1.70m								1.8m: END OF INVESTIGATION

COMMENTS: Hand auger terminated as target depth reached.

Hole Depth 1.8m

Scale 1:10

Rev.: A

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CORE PHOTOS

BOREHOLE No.: **HA05**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (WGS84)	176.888538 -39.505976	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
R.L.:	12.50m	DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
DATUM:	NAPIHT1962		DRILLED BY: T+T
			LOGGED BY: ZAFR CHECKED: JWY

0.00-1.80m

HAND AUGER LOG

HOLE Id: **HA06**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.888166 WGS84 -39.505869	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
	DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.: 12.00m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA		A+M @ 0.20m					D	D		Fine SAND, some silt, minor gravel; light brown. Tightly packed, dry, well graded. Gravel; fine to coarse.
					A+M @ 0.50m			0.5		M			Fine SAND, some silt, minor gravel and cobbles; greyish brown. Tightly packed, moist, gap graded; gravel, fine to coarse. Cobbles; fine.
					A+M @ 1.00m		1:1	1.0					1m: END OF INVESTIGATION
								1.5					

Box 1, 0.0-1.0m

COMMENTS: Refusal at 1 m.

Hole Depth 1m

Scale 1:10

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA06**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (WGS84)	176.888166 -39.505869	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
		DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.:	12.00m		DRILLED BY: T+T
DATUM:	NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

0.00-1.00m

HAND AUGER LOG

HOLE Id: **HA07**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.887680 WGS84 -39.506068	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
	DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.: 12.50m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

GEOLOGICAL												ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA		A+M @ 0.20m					D	D		Fine SAND some silt, minor gravel; light brown. Tightly packed, dry, gap graded. Contains minor glass fragments.
							12	0.5					0.3m: END OF INVESTIGATION
								1.0					
							11	1.5					

COMMENTS: No core photo taken as only shallow surface hand auger.Refusal at 0.3 m.

Hole Depth 0.3m

Scale 1:10

Rev.: A

HAND AUGER LOG

HOLE Id: **HA08**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.887956416958 WGS84 -39.5056045022811	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
	DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.: 12.00m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

GEOLOGICAL										ENGINEERING DESCRIPTION				
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA		Glass & ACM @ 0.20m					D	D		Fine SAND, some silt and gravel; light brown. Tightly packed, dry, gap graded. Gravel; fine to coarse.
							11	0.5 1.0 1.5					0.3m: END OF INVESTIGATION

COMMENTS: No core photo taken as only shallow surface hand auger.Refusal at 0.3 m.

Hole Depth 0.3m

Scale 1:10

Rev.: A

HAND AUGER LOG

HOLE Id: **HA09**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.887806002406 (WGS84) -39.5052000013893	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
	DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.: 12.00m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

GEOLOGICAL										ENGINEERING DESCRIPTION				
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill					A+M @ 0.20m					D	D		Silty, fine SAND, minor gravel; light brown. Tightly packed, dry, well graded. Gravel, fine.
Holocene Estuarine		100	HA		A+M @ 0.50m			0.5		M	L		Fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded.
Box 1, 0.0-1.2m	11/01/2021				A+M @ 1.00m		11	1.0			S		SILT; grey. Soft, moist, low plasticity.
								1.5					1.15m: END OF INVESTIGATION

COMMENTS: Refusal at 1.15 m.

Hole Depth 1.15m

Scale 1:10

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **HA09**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.887806002406 (WGS84) -39.5052000013893 R.L.: 12.00m DATUM: NAPIHT1962	DRILL TYPE: Hand auger DRILL METHOD: HA	HOLE STARTED: 11/01/2021 HOLE FINISHED: 11/01/2021 DRILLED BY: T+T LOGGED BY: ZAFR CHECKED: JWY

0.00-1.15m

HAND AUGER LOG

HOLE Id: **HA10**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 176.887470997194 (WGS84) -39.5059200391896	DRILL TYPE: Hand auger	HOLE STARTED: 11/01/2021
	DRILL METHOD: HA	HOLE FINISHED: 11/01/2021
R.L.: 12.00m		DRILLED BY: T+T
DATUM: NAPIHT1962		LOGGED BY: ZAFR CHECKED: JWY

GEOLOGICAL									ENGINEERING DESCRIPTION				
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MATERIAL COMPOSITION.	WATER	CORE RECOVERY (%)	METHOD	SCALA PENETROMETER (Blows/100mm) 0 1 2 3 4 5 6 7 8 9	TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	Description and Additional Observations
Fill		100	HA		A+M @ 0.20m					M	D		Silty, fine SAND, trace gravel; light brown. Tightly packed, moist, gap graded. Gravel, fine to coarse.
							11	0.5					0.35m: END OF INVESTIGATION
								1.0					
								1.5					

COMMENTS: No core photo taken as only shallow surface hand auger.Refusal at 0.35 m.

Hole Depth 0.35m

Scale 1:10

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH01

SHEET: 1 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5620009.42 mN, 1934296.78 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 27/11/2020
FINISH DATE: 27/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, LW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
	0.0-1.5m: NO RECOVERY - hydrovac. Refer to nearby test pit/hand auger logs for shallow subsoil information.			HVAC	0		11	0.5 1.0							27/11/2020			
Holocene Estuarine	Fine to medium SAND; brown. Very loose, wet, uniformly graded.			SPT	30	0/0 0/0 0/0 **N=0**		1.5										
	SILT, trace sand; grey. Very soft, moist, non-plastic; sand, fine.			SNC	100		10	2.0					*1.95m:* Glass jar and asbestos sample					
	SILT, trace clay; grey. Very soft, moist, low to moderate plasticity.			SPT	100	0/1 0/0 0/0 **N=0**	9	2.5 3.0										
	Sandy SILT, trace shell fragments; grey. Very soft, moist, low plasticity. Sand; fine.			SNC	100			3.5					*3.45m:* Glass jar sample only					
	SILT, trace clay; grey. Very soft, moist, low plasticity. *4.00m:* Becomes moderate plasticity.			SPT	100	0/0 0/0 0/1 **N=1**	8	4.0 4.5									Box 1, 0.0-4.3m	

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH01

SHEET: 2 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5620009.42 mN, 1934296.78 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 27/11/2020
FINISH DATE: 27/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Sandy SILT, trace shell fragments; grey. Very soft, moist, low plasticity; sand, fine.			SNC	100		6	5.5										
	Silty, fine SAND; grey. Very loose, moist, uniformly graded. Minor shell inclusions.																	
	Fine SAND, minor silt; grey. Medium dense, moist, uniformly graded. Minor shell inclusions.			SPT	100	2/3 4/4 3/6 **N=17**		6.0										
	6.45m: Becomes wet.			SNC	100		5	6.5										Box 2, 4.3-7.0m
	7.00m: Becomes moist, slightly dilatant.							7.0										
	7.50m: Becomes very loose to loose.			SPT	60	1/1 1/0 1/1 **N=3**		7.5										
	SILT, trace fine sand and shell fragments; grey. Soft, moist, non-plastic to low plasticity.			SNC	100		4	8.0										
	Silty, fine SAND; grey. Very loose, moist, uniformly grade. Minor shell fragments.			SPT	80	0/0 0/0 1/1 **N=2**	3	9.0										
				SNC	100			9.5										Box 3, 7.0-10.0m
							2											

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH01

SHEET: 3 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5620009.42 mN, 1934296.78 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 27/11/2020
FINISH DATE: 27/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)
Holocene Estuarine	SILT, minor sand; grey. Very soft, moist, low to medium plasticity.	SNC	100			10.5
	Sandy SILT; grey. Firm, moist, non-plastic; sand, fine.					
	10.5-10.95m: Push tube.	PT	100	Push tube @ 10.50m		
	Silty, fine SAND; grey. Loose, moist, poorly graded.	SNC	100		1	11.0
	SILT; grey. Soft, moist, low plasticity.					11.5
	Fine SAND, some silt; grey. Loose, moist, uniformly graded.	SPT	100	1/1 2/1 1/1 **N=5**	0	12.0
	Sandy SILT; grey. Firm to stiff, moist, low plasticity; sand, fine.	SNC	100		-1	12.5 13.0
		SPT	100	2/0 1/3 4/2 **N=10**		13.5
	Silty, fine SAND; grey. Medium dense, moist, uniformly graded.	SNC	100		-2	14.0
	SILT, trace sand; grey. Firm to stiff, non-plastic. Sand; fine.					14.5
	Fine SAND; grey. Medium dense, moist, uniformly graded. Minor shell inclusions.				-3	

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) (2000, 600, 200, 60, 20); RQD (%); Description & Additional Observations

Rock Weathering: UW, EW, HW, MW, HW, CW
Rock Strength: ES, VS, S, MS, M, W, VW, EW

Graphic Log

Fluid Loss (%): 25, 50, 75

Water Level

Casing

Installation: Box 4, 10.0-13.0m

Core Box No

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

General Log - 20/01/2021 12:04:06 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH01

SHEET: 4 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5620009.42 mN, 1934296.78 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 27/11/2020
FINISH DATE: 27/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Fine SAND, some silt; dark grey. Medium dense, moist, uniformly graded. Minor shell inclusions.			SPT	100	3/3 5/5 7/10 **N=27**												
	15.45m: Grades to minor silt.			SNC	100		-4	15.5 16.0										Box 5, 13.0-16.0m
	Fine SAND, minor silt; grey. Medium dense, moist, uniformly graded.																	
	Silty, sandy, fine GRAVEL; grey. Medium dense, moist, well graded. Gravel, greywacke, rounded to subrounded. Sand fine to medium.			SPT	100	0/7 6/5 5/9 **N=25**		16.5										
	16.95m: Grades to gravel, fine to medium.			SNC	100		-5	17.0 17.5										
	Fine SAND; grey. Medium dense, moist, uniformly graded.																	
	Sandy, fine GRAVEL; grey. Medium dense, moist, uniformly graded; sand, fine to medium.			SPT	100	7/9 8/6 4/4 **N=22**	-6	18.0										
	SILT, trace sand; grey. Very stiff, moist, non-plastic to low plasticity; sand, fine.			SNC	100			18.5										Box 6, 16.0-19.0m
	SILT; grey. Very stiff, moist, non-plastic to low plasticity.						-7	19.0										
	19.50m: becomes stiff.			SPT	100	0/1 2/5 3/4 **N=14**		19.5										Box 7, 19.0-20.0m
	19.95m: END OF BOREHOLE																	

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH01**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5620009.42 mN 1934296.78 mE	DRILL TYPE:	HOLE STARTED: 27/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 27/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

0.00-4.30m

4.30-7.00m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH01**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5620009.42 mN 1934296.78 mE	DRILL TYPE:	HOLE STARTED: 27/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 27/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

7.00-10.00m

10.00-13.00m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH01**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5620009.42 mN 1934296.78 mE	DRILL TYPE:	HOLE STARTED: 27/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 27/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

13.00-16.00m

16.00-19.00m

CORE PHOTOS

BOREHOLE No.: **BH01**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5620009.42 mN 1934296.78 mE	DRILL TYPE:	HOLE STARTED: 27/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 27/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

19.00-19.95m

BOREHOLE LOG

BOREHOLE No.: BH02

SHEET: 1 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619921.89 mN, 1934314.54 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 27/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Description & Additional Observations
	0.0-1.5m: NO RECOVERY - hydrovac. Refer to nearby test pit/hand auger logs for shallow subsoil information.	HVAC	0		11	0.5 1.0	
Holocene Estuarine	Fine to medium SAND; greyish brown. Medium dense, moist, uniformly graded.	SPT	100	1/1 3/4 3/3 **N=13**		1.5	
	Silty, fine to medium SAND; grey. Medium dense, moist, uniformly graded.				10	2.0	*1.95m:* Glass jar and asbestos sample
	SILT, minor clay; grey. Very soft to soft, moist, moderate plasticity. *3.00m:* Becomes very soft.	SNC	100			2.5	
		SPT	100	0/0 0/0 0/0 **N=0**	9	3.0	
	Sandy SILT; grey. Very soft, moist, non-plastic; sand, fine to medium. Some shell inclusions.					3.5	*3.45m:* Glass jar sample only
	SILT, minor clay; grey. Very soft, moist, moderate plasticity.	SNC	100		8	4.0	
	SILT, trace sand; grey. Very soft, moist, non-plastic; sand, fine.						
	Fine SAND; grey. Medium dense, moist, uniformly graded.	SPT	100	1/2 3/2 3/4 **N=12**		4.5	

ROCK DEFECTS: Defect Log; Fracture Spacing (mm); RQD (%)

Fluid Loss (%)

Water Level: 25/11/2020

Casing

Installation: Box 1, 0.0-4.3m

Core Box No

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH02

SHEET: 2 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619921.89 mN, 1934314.54 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 27/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Fine to coarse SAND; grey. Medium dense, moist, well graded. Minor shell inclusions.			SNC	100			5.5										
	Silty, fine SAND; grey. Medium dense, moist, uniformly graded. Minor shell inclusions.			SPT	100	1/2 3/4 5/6 N=18	6	6.0										
				SNC	100			6.5										
	7.50m: Becomes loose.			SPT	100	0/1 0/1 3/4 N=8	5	7.0										Box 2, 4.3-7.2m
	Sandy SILT; grey. Firm, moist, non-plastic; sand, fine. Minor shell inclusions.			SNC	100			7.5										
	SILT, some fine sand; grey. Soft, moist, low plasticity.			SPT	100	0/0 0/1 1/0 N=2	4	8.0										
				SNC	100			8.5										
							3	9.0										
								9.5										Box 3, 7.2-10.0m
							2											

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH02

SHEET: 3 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619921.89 mN, 1934314.54 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 27/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	[CONT] SILT, some fine sand; grey. Soft, moist, low plasticity.			SNC	100			10.5										
	10.5-10.95m: Push tube (Unable to recover sample).			PT	0													
	Sandy SILT; grey. Soft to firm, moist, non-plastic. Sand; fine.			SNC	100		1	11.0										
								11.5										
	SILT; grey. Soft to firm, moist, low plasticity.						0	12.0										
	12.0-12.45m: Push tube.			PT	100													
	Fine SAND, trace silt; grey. Medium dense, moist, uniformly graded.			SNC	100			12.5										Box 4, 10.0-12.8m
	Sandy SILT; grey. Soft to firm, moist, low plasticity; sand, fine.						-1	13.0										
	Fine SAND, trace silt; grey. Medium dense, moist, uniformly graded.			SPT	100	4/3 3/4 4/11 **N=22**		13.5										
	Silty, fine SAND; grey. Medium dense, moist, uniformly graded.			SNC	100		-2	14.0										
	SILT; grey. Stiff to very stiff, moist, low plasticity.							14.5										
							-3											

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

General Log - 20/01/2021 12:04:39 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

BOREHOLE No.: BH02

SHEET: 4 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619921.89 mN, 1934314.54 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 27/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Fine SAND, minor silt; dark grey. Medium dense, moist, uniformly graded. Minor shell fragments.			SPT	100	3/4 6/3 4/5 **N=18**		15.5										Box 5, 12.8-15.8m
				SNC	100		-4	16.0										
	16.50m: Becomes loose.			SPT	100	0/0 0/1 2/3 **N=6**		16.5										
				SNC	100		-5	17.0										
	Silty, sandy, fine to medium GRAVEL; dark grey. Dense, well graded; sand, fine to medium. Minor shell fragments.							17.5										
				SPT	100	3/5 9/11 10/7 **N=37**	-6	18.0										
								18.5										Box 6, 15.8-18.8m
	Sandy SILT; grey. Firm to stiff, moist, low plasticity; sand, fine.			SNC	100		-7	19.0										
				SPT	100	1/0 1/0 1/3 **N=5**		19.5										Box 7, 18.8-20.0m
	19.95m: END OF BOREHOLE																	

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

CORE PHOTOS

BOREHOLE No.: **BH02**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619921.89 mN 1934314.54 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 27/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

0.00-4.30m

4.30-7.15m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH02**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619921.89 mN 1934314.54 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 27/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

7.15-10.00m

10.00-12.80m

CORE PHOTOS

BOREHOLE No.: **BH02**

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 5619921.89 mN (NZTM2000) 1934314.54 mE R.L.: 12.00m DATUM: NAPIHT1962	DRILL TYPE: DRILL METHOD: RC	HOLE STARTED: 25/11/2020 HOLE FINISHED: 27/11/2020 DRILLED BY: Geotech Drilling Ltd LOGGED BY: ZAFR CHECKED: JWY

12.80-15.75m

15.75-18.80m

CORE PHOTOS

BOREHOLE No.: **BH02**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619921.89 mN 1934314.54 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 27/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

18.80-19.95m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH03

SHEET: 1 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619813.26 mN, 1934331.39 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 30/11/2020
FINISH DATE: 30/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW)	Rock Strength (ES VS S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
	0.0-1.5m: NO RECOVERY - hydrovac. Refer to nearby test pit/hand auger logs for shallow subsoil information.			HVAC	0		11	0.5 1.0										
Holocene Estuarine	Fine SAND, some silt; brown, mottled grey. Loose, moist, uniformly graded.			SPT	100	1/1 1/2 2/2 **N=7**		1.5										
	SILT, minor sand; brown. Firm, moist, low plasticity. Sand; fine. *2.00m:* rusted metal fragments.			SNC	100		10	2.0					*1.95m:* Glass jar and asbestos sample					
	Sandy SILT; brown. Firm, moist, non-plastic. Sand; fine.							2.5										
	Fine SAND; brown. Loose, moist, uniformly graded. *2.80m:* becomes grey.																	
	3.0-3.45m: Push tube.			PT	100	Push tube @ 3.00m	9	3.0										
	SILT, minor clay; grey. Very soft, moist, moderately plastic.			SNC	100		8	3.5 4.0					*3.45m:* Glass jar and asbestos sample					Box 1, 0.0-4.0m
				SPT	100	1/1 0/1 0/0 **N=1**		4.5										

COMMENTS:

Hole Depth 15.45m

Scale 1:25

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH03

SHEET: 2 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619813.26 mN, 1934331.39 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 30/11/2020
FINISH DATE: 30/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, SW, DW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Silty, fine SAND; grey. Loose, moist, uniformly graded. Minor shell inclusions.			SNC	100			5.5										
	6.00m: Becomes medium dense.			SPT	100	0/1 1/3 3/4 **N=11**	6	6.0										
				SNC	100		5	6.5										
				SPT	100	1/2 2/2 3/3 **N=10**		7.0										Box 2, 4.0-7.5m
				SNC	100		4	7.5										
	9.00m: Becomes loose.			SPT	100	1/1 2/1 2/1 **N=6**		8.0										
				SNC	100		3	8.5										Box 3, 7.5-9.5m
								9.0										
								9.5										

COMMENTS:

Hole Depth 15.45m

Scale 1:25

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH03

SHEET: 3 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619813.26 mN, 1934331.39 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 30/11/2020
FINISH DATE: 30/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)
Holocene Estuarine	SILT; grey. Soft, moist, low plasticity.	SNC	100			10.5
	SILT, trace sand; grey. Very soft, moist, low plasticity.	SPT	100	0/0 0/0 0/1 **N=1**		11.0
	SILT, some sand; grey. Soft to firm, moist, non-plastic.	SNC	100		1	11.5
	Sandy SILT; grey. Stiff, moist, non-plastic; sand, fine. Trace shell fragments.	SPT	100	1/1 2/1 3/4 **N=10**	0	12.0
	SILT, minor sand; grey. Stiff, moist, low plasticity. Sand; fine.	SNC	100			12.5
	SILT, some sand; grey. Firm, moist, low plasticity. Sand; fine.	SPT	100	1/1 0/3 4/3 **N=10**	-1	13.0
	Fine SAND, minor silt; grey. Medium dense, wet, uniformly graded. Minor shell fragments.	SNC	100			13.5
					-2	14.0
						14.5

Rock Weathering: UW, SW, MW, HW, CW
Rock Strength: ES, VS, S, MS, W, VW, EW

ROCK DEFECTS: Defect Log; Fracture Spacing (mm): 2000, 600, 200, 60, 20; RQD (%); Description & Additional Observations

Fluid Loss (%): 25, 50, 75

Water Level

Casing

Installation: Box 4, 9.5-12.0m; Box 5, 12.0-14.8m

Core Box No

COMMENTS:

Hole Depth 15.45m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH03

SHEET: 4 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619813.26 mN, 1934331.39 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 30/11/2020
FINISH DATE: 30/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW SW MW HW CW)	Rock Strength (ES VS S MS W VW EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000 600 200 60 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25 50 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	[CONT] Fine SAND, minor silt; grey. Very loose, wet, uniformly graded. Minor shell fragments.			SPT	100	0/0 0/2 0/0 **N=2**	-4	16.0										Box 6, 14.8-15.5m
	15.45m: END OF BOREHOLE						-5	17.0										
							-6	18.0										
							-7	19.0										

RL (m): 15.5, 16.5, 17.5, 18.5, 19.5

COMMENTS:

Hole Depth 15.45m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH03**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619813.26 mN 1934331.39 mE	DRILL TYPE:	HOLE STARTED: 30/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 30/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

0.00-4.00m

4.00-7.50m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH03**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619813.26 mN 1934331.39 mE	DRILL TYPE:	HOLE STARTED: 30/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 30/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

7.50-9.45m

9.45-12.00m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH03**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619813.26 mN 1934331.39 mE	DRILL TYPE:	HOLE STARTED: 30/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 30/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

12.00-14.80m

14.80-15.45m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH04

SHEET: 1 OF 3

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619857.32 mN, 1934264.36 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 01/12/2020
FINISH DATE: 01/12/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Description & Additional Observations
	0.0-1.5m: NO RECOVERY - hydrovac. Refer to nearby test pit/hand auger logs for shallow subsoil information.	HVAC	0		11	0.5 1.0	
Holocene Estuarine	Fine SAND; brownish grey. Very loose, wet, uniformly graded. Minor shell inclusions.	SPT	50	0/0 1/0 1/0 **N=2**		1.5	
	Fine SAND, minor clay; grey. Very loose, wet, uniformly graded. Minor shell inclusions.	SNC	100		10	2.0	*1.95m:* Glass jar + asbestos
	SILT, trace sand; grey. Very soft, moist, non-plastic. Minor shell inclusions.					2.5	
	3.0-3.45m: Push tube sample.	PT	0	Push tube @ 3.00m	9	3.0	*3.00m:* Glass jar + asbestos
	SILT, minor clay; grey. Very soft, moist, low to moderate plasticity. Minor shell inclusions.	SNC	100			3.5	*3.45m:* Glass jar
	Sandy SILT; grey. Very soft, moist, non-plastic; sand, fine. Minor shell inclusions.				8	4.0	
	SILT, minor clay; grey. Very soft, moist, low to moderate plasticity.	SPT	100	0/0 0/0 0/0 **N=0**		4.5	

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) (2000, 600, 200, 60, 20); RQD (%)

Fluid Loss (%) (25, 50, 75)

Water Level: 01/12/2020

Casing

Installation: Box 1, 0.0-4.5m

Core Box No

COMMENTS:

Hole Depth 12.45m

Scale 1:25

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH04

SHEET: 2 OF 3

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619857.32 mN, 1934264.36 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 01/12/2020
FINISH DATE: 01/12/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	[CONT] SILT, minor clay; grey. Very soft, moist, low to moderate plasticity.			SNC	100			5.5										
	6.00m: Becomes soft.			SPT	100	0/0 1/0 1/1 **N=3**	6	6.0										
	Sandy SILT; grey. Soft to firm, moist, non-plastic; sand, fine. Minor shell inclusions.			SNC	100			6.5										
	7.50m: Becomes stiff.			SPT	100	1/0 3/2 2/2 **N=9**	5	7.0										Box 2, 4.5-7.0m
	Fine SAND, some silt; dark grey. Loose, moist, uniformly graded. Minor shell inclusions.			SNC	100			7.5										
	8.50m: organics present.						4	8.0										
	9.00m: Becomes very loose.			SPT	100	0/0 0/0 0/2 **N=2**		8.5										
	Sandy SILT; dark grey. Soft, moist, non-plastic. Sand; fine.			SNC	100		3	9.0										
								9.5										Box 3, 7.0-10.0m
							2											

COMMENTS:

Hole Depth 12.45m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH04

SHEET: 3 OF 3

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619857.32 mN, 1934264.36 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 01/12/2020
FINISH DATE: 01/12/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	SILT, some sand; dark grey. Very soft, moist, non-plastic; sand, fine.			SNC	100			10.5										
	10.50m: Becomes soft to firm.			SPT	100	2/1 0/1 1/2 **N=4**												
	Silty, fine SAND; dark grey. Loose, moist, uniformly graded.			SNC	100		1	11.0										
	12.00m: Becomes medium dense.			SPT	100	1/0 2/6 7/8 **N=23**	0	12.0										Box 4, 10.0-12.5m
	12.45m: END OF BOREHOLE						-1	12.5 13.0										
								13.5										
							-2	14.0										
								14.5										

COMMENTS:

Hole Depth 12.45m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH04**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619857.32 mN 1934264.36 mE	DRILL TYPE:	HOLE STARTED: 01/12/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 01/12/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

0.00-4.50m

4.50-7.00m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH04**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619857.32 mN 1934264.36 mE	DRILL TYPE:	HOLE STARTED: 01/12/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 01/12/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

7.00-10.00m

10.00-12.45m

BOREHOLE LOG

BOREHOLE No.: BH05

SHEET: 1 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619749.61 mN, 1934228.94 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 24/11/2020
FINISH DATE: 24/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Description & Additional Observations
Holocene Estuarine	0.0-1.5m: NO RECOVERY - hydrovac. Refer to nearby test pit/hand auger logs for shallow subsoil information.	HVAC	0		11	0.5 1.0	*0.50m:* Glass jar and asbestos sample *1.00m:* Glass jar and asbestos sample
	Silty, fine to medium SAND; greyish brown. Very loose, moist, uniformly graded.	SPT	100	0/1 0/1 0/0 **N=1**	10	1.5 2.0	*1.50m:* Glass jar only *1.95 - 2.50m:* Glass jar and asbestos sample
	2.5-3.0m: CORE LOSS.	SNC	52			2.5	
	Fine to medium SAND, some silt; brown. Very loose, saturated, uniformly graded.	SPT	100	0/0 0/0 0/0 **N=0**	9	3.0	
	SILT, minor clay and sand; grey. Very soft, moist, low to moderate plasticity; sand, fine.	SNC	100		8	3.5 4.0	*3.45 - 4.50m:* Glass jar and asbestos sample
	4.5-5.0m: Push tube.	PT	100	Push tube @ 4.50m		4.5	

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) (2000, 600, 200, 60, 20); RQD (%)

Rock Weathering: UW, SW, MW, HW, EW
Rock Strength: ES, VS, S, MS, M, W, VW, EW

Fluid Loss (%): 25, 50, 75

Water Level: 24/11/2020

Casing; Installation; Core Box No

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05

SHEET: 2 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619749.61 mN, 1934228.94 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 24/11/2020
FINISH DATE: 24/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)
Holocene Estuarine	SILT, some clay; grey. Very soft, moist, moderate plasticity. Some shell fragments.	SNC	100		6	5.5
	Interbedded SILT and SAND; grey. Very soft (Silt) and very loose (Sand), moist, low plasticity/uniformly graded.	SPT	100	0/0 0/0 0/1 **N=1**		6.0
	SILT, some clay; grey. Very soft, moist, low to moderate plasticity.	SNC	100		5	6.5
	Interbedded SILT and SAND; grey. Very soft (Silt) and very loose (Sand), moist, low plasticity/uniformly graded.					
	Fine SAND, trace silt; greyey brown streaked orange. Very loose, moist, uniformly graded.					7.0
	Silty, fine to medium SAND; grey. Very loose, moist, uniformly graded.	SPT	100	1/1 2/0 0/0 **N=2**		7.5
	Silty, fine to medium SAND; grey. Very loose, moist, uniformly graded.	SNC	100		4	8.0
	Fine to medium SAND, some silt; grey. Loose, uniformly graded. Some shell fragments.	SPT	100	1/1 1/1 2/2 **N=6**	3	8.5 9.0
	SILT, trace clay, minor sand; grey. Firm, moist, low to medium plasticity; sand, fine.	SNC	100			9.5
					2	

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) (2000, 600, 200, 60, 20); RQD (%); Description & Additional Observations

Fluid Loss (%) (25, 50, 75); Water Level; Casing; Installation; Core Box No

Installation: Box 1, 0.0-5.3m; Box 2, 5.3-8.0m

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

General Log - 20/01/2021 12:06:40 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05

SHEET: 3 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619749.61 mN, 1934228.94 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 24/11/2020
FINISH DATE: 24/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)
Holocene Estuarine	[CONT] SILT, minor sand; grey. Firm, moist, low plasticity; sand, fine.	SNC	100			
Holocene Estuarine	Fine to medium SAND, minor silt; grey. Very loose, moist, uniformly graded.	SPT	100	0/0 0/0 0/1 **N=1**		10.5
Holocene Estuarine	Silty, fine to medium SAND; grey. Very loose, moist, uniformly graded.	SNC	100		1	11.0
						11.5
Holocene Estuarine	Silty, fine SAND; grey. Dense, moist, uniformly graded.	SPT	100	3/4 6/9 9/9 **N=33**	0	12.0
Holocene Estuarine	Medium SAND; grey. Dense, moist, uniformly graded. Minor shell fragments.	SNC	100			12.5
Holocene Estuarine	Fine SAND, minor silt; grey. Dense, moist, uniformly graded. Minor shell fragments.					
Holocene Estuarine	Silty, fine SAND; grey Medium dense, moist, uniformly graded. Minor shell fragments.				-1	13.0
Holocene Estuarine	Medium SAND; grey. Medium dense, moist, uniformly graded.	SPT	100	1/1 1/7 8/8 **N=24**		13.5
Holocene Estuarine	Medium SAND, trace silt; grey. Medium dense, moist, uniformly graded. Minor shell fragments.	SNC	100		-2	14.0
						14.5
					-3	

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) (2000, 600, 200, 60, 20); RQD (%); Description & Additional Observations

Fluid Loss (%) (25, 50, 75); Water Level; Casing; Installation; Core Box No

Box 3, 8.0-10.5m

Box 4, 10.5-13.4m

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

General Log - 20/01/2021 12:06:40 pm - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH05

SHEET: 4 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619749.61 mN, 1934228.94 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 24/11/2020
FINISH DATE: 24/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Fine SAND, trace silt; grey. Medium dense, moist, uniformly graded.			SPT	100	1/2 4/6 6/10 **N=26**		15.5										
				SNC	100		-4	16.0										Box 5, 13.4-16.2m
	Fine to medium SAND, trace silt; grey. Medium dense to dense, moist, uniformly graded.			SPT	100	3/4 6/7 9/11 **N=33**		16.5										
	Fine SAND, some silt; grey. Dense, moist, uniformly graded.			SNC	100		-5	17.0										
								17.5										
	Fine to coarse SAND, some gravel; grey. Dense, moist, well graded; gravel, fine, greywacke. subrounded. Some shell fragments.			SPT	100	10/11 13/15 15/7 **N>=50**	-6	18.0										
	SILT; grey. Stiff, moist, low plasticity.			SNC	100			18.5										Box 6, 16.2-18.9m
	SILT, minor clay; grey. Stiff, moist, medium plasticity.						-7	19.0										
	SILT, minor clay, trace sand; grey. Firm, moist, medium plasticity.			SPT	100	0/0 0/0 2/3 **N=5**		19.5										Box 7, 18.9-20.0m
	19.95m: END OF BOREHOLE																	

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

General Log - 20/01/2021 12:06:40 pm - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH05**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619749.61 mN 1934228.94 mE	DRILL TYPE:	HOLE STARTED: 24/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 24/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

0.00-5.25m

5.25-7.95m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH05**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619749.61 mN 1934228.94 mE	DRILL TYPE:	HOLE STARTED: 24/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 24/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

7.95-10.50m

10.50-13.35m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH05**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619749.61 mN 1934228.94 mE	DRILL TYPE:	HOLE STARTED: 24/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 24/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

13.35-16.20m

16.20-18.90m

CORE PHOTOS

BOREHOLE No.: **BH05**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619749.61 mN 1934228.94 mE	DRILL TYPE:	HOLE STARTED: 24/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 24/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

18.90-19.95m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH06

SHEET: 1 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619729.63 mN, 1934292.36 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 25/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Description & Additional Observations
	0.0-1.5m: NO RECOVERY - hydrovac. Refer to nearby test pit/hand auger logs for shallow subsoil information.	HVAC	0		11	0.5 1.0	*0.10m:* Glass jar and asbestos sample *0.50m:* Glass jar and asbestos sample *1.00m:* Glass jar and asbestos sample
Holocene Estuarine	Fine SAND; greyish brown. Very loose, moist, uniformly graded. Minor shell fragments.	SPT	100	0/0 1/0 0/1 **N=2**	10	1.5 2.0	*1.50m:* Glass jar and asbestos sample *1.95m:* Glass jar and asbestos sample
	SILT, minor clay; grey. Very soft, moist, moderate plasticity. Minor shell fragments. *2.80m:* becomes light grey.	SNC	100		9	2.5 3.0	
		SPT	100	0/0 0/0 0/0 **N=0**			*3.00m:* Glass jar and asbestos sample
	SILT, trace clay; light grey. Very soft, moist, moderate plasticity. Some shell fragments.	SNC	100		8	3.5 4.0	*3.45m:* Glass jar sample
	4.5-5.0m: Push tube.	PT	0	Push tube @ 4.50m		4.5	

ROCK DEFECTS: Defect Log; Fracture Spacing (mm) (2000, 600, 200, 60, 20); RQD (%)

Fluid Loss (%) (25, 50, 75)

Water Level: 25/11/2020

Casing

Installation: Box 1, 0.0-4.2m

Core Box No

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH06

SHEET: 2 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619729.63 mN, 1934292.36 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 25/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Silty, fine SAND; grey. Very loose, wet, uniformly graded, dilatant. Minor shell fragments.			SNC	100		6	5.5										
	Fine SAND, minor silt; grey. Very loose, moist, uniformly graded.			SPT	100	0/0 0/1 2/0 **N=3**		6.0										
	Silty, fine SAND; grey. Very loose, wet, uniformly graded. Some shell fragments.			SNC	100			6.5										
	Fine SAND, trace silt; grey. Very loose, wet, uniformly graded. Minor shell fragments.						5	7.0										Box 2, 4.2-7.2m
	Fine SAND, some silt; grey. Very loose, moist, uniformly graded. Minor shell fragments.			SPT	100	0/0 0/0 0/1 **N=1**		7.5										
	Silty, fine SAND; grey. Very loose, moist, uniformly graded. Minor shell fragments.			SNC	100		4	8.0										
	9.00m: Becomes loose.			SPT	100	0/1 2/1 1/1 **N=5**	3	9.0										
	SILT, trace clay; grey. Firm, moist, low plasticity.			SNC	100			9.5										Box 3, 7.2-9.9m
							2											

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH06

SHEET: 3 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619729.63 mN, 1934292.36 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 25/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	SILT; grey. Firm, moist, low plasticity. Some shell fragments.			SNC	100			10.5										
	SILT, some sand; grey. Stiff, moist, low plasticity; sand, fine. Some shell fragments.			SPT	100	1/0 1/3 3/5 **N=12**												
	Silty, fine SAND; grey. Medium dense, moist, uniformly graded. Trace shell fragments.			SNC	100		1	11.0										
	11.90m: organics.							11.5										
	Fine to medium SAND; dark grey. Medium dense, wet, uniformly graded. Minor shell fragments.			SPT	100	1/3 5/6 6/7 **N=24**	0	12.0										
								12.5										Box 4, 9.9-12.8m
	Fine SAND, trace silt; dark grey. Medium dense, wet, uniformly graded. Minor shell fragments.			SNC	100		-1	13.0										
	SILT; grey. Stiff to very stiff, moist, non-plastic. Minor shell fragments.							13.5										
	Fine to medium SAND, some silt; grey. Medium dense, wet, uniformly graded. Minor shell fragments.			SPT	100	2/5 6/5 3/3 **N=17**	-2	14.0										
				SNC	100			14.5										
	14.80m: Medium SAND; dark grey.						-3											

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH06

SHEET: 4 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619729.63 mN, 1934292.36 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 25/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, SW, DW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Fine SAND, minor silt; grey. Medium dense, moist, uniformly graded. Some shell fragments.			SPT	100	1/2 5/5 5/4 **N=19**		15.5										Box 5, 12.8-15.6m
	Fine to medium SAND, minor silt. Medium dense, moist, uniformly graded. Some shell fragments.			SNC	100		-4	16.0										
	Fine to medium SAND, some silt. Loose, moist, uniformly graded. Some shell fragments.			SPT	100	1/1 1/1 3/4 **N=9**		16.5										
				SNC	100		-5	17.0										
	Silty, fine to medium SAND. Loose, moist, uniformly graded. Some shell fragments.							17.5										Box 6, 15.6-18.0m
	SILT; grey. Stiff, moist, low to medium plasticity.																	
	Gravelly, fine to medium SAND; dark grey. Medium dense, moist; sand, well graded; gravel, fine. Some shell fragments.			SPT	100	4/7 6/7 5/6 **N=24**	-6	18.0										
	SILT; grey. Stiff to very stiff, moist, low to medium plasticity.			SNC	100			18.5										
	Medium SAND; grey. Medium dense, moist, uniformly graded.						-7	19.0										
	Sandy SILT; grey. Soft, moist, non-plastic; sand, fine. *19.50m:* very soft.			SPT	100	1/1 0/0 0/0 **N=0**		19.5										Box 7, 18.0-20.0m
	19.95m: END OF BOREHOLE																	

COMMENTS:

Hole Depth 19.95m

Scale 1:25

Rev.: A

General Log - 20/01/2021 12:07:07 pm - Produced with Core-GS by GeRoc

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619729.63 mN 1934292.36 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

0.00-4.20m

4.20-7.20m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619729.63 mN 1934292.36 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

7.20-9.90m

9.90-12.80m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619729.63 mN 1934292.36 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

12.80-15.60m

15.60-18.00m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH06**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619729.63 mN 1934292.36 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

18.00-19.95m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH07

SHEET: 1 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619693.59 mN, 1934348.88 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.50m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 23/11/2020
FINISH DATE: 23/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	0.0-1.5m: NO RECOVERY - hydrovac. Refer to nearby test pit/hand auger logs for shallow subsoil information.			HVAC	0		12	0.5					*0.10m:* Glass jar and asbestos sample *0.50m:* Glass jar and asbestos sample *1.00m:* Glass jar and asbestos sample					
	1.5-1.95m: CORE LOSS.			SPT	0	0/0 0/0 0/0 **N=0**	11	1.5										
	Silty, fine to medium SAND; brown to dark brown, mottled orange. Very loose, moist, uniformly graded.			SNC	100			2.0					*1.95m:* Glass jar and asbestos sample		25/11/2020: on completion			
Holocene Estuarine	Fine to medium SAND, some silt; brown to dark brown, mottled orange. Very loose, moist, uniformly graded.						10	2.5					*2.70m:* Glass jar and asbestos sample					
	Sandy SILT, trace clay; grey. Very soft, moist, low to medium plasticity. Sand; fine to medium. Minor shell fragments present.			SPT	100	0/0 0/0 0/0 **N=0**		3.0										
	SILT, minor sand, trace clay; grey. Very soft, moist, low to medium plasticity. Sand; fine to medium. Minor shell fragments present.			SNC	100		9	3.5					*3.45m:* Glass Jar sample					
	4.5-5.0m: Push tube.			PT	60	Push tube @ 4.50m	8	4.5										Box 1, 0.0-4.5m

COMMENTS:

Hole Depth 16.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH07

SHEET: 2 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619693.59 mN, 1934348.88 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.50m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 23/11/2020
FINISH DATE: 23/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Fine to medium SAND; grey. Very loose, saturated, uniformly graded. Some shell fragments present. *5.30m:* Becomes moist to wet.			SNC	100		7	5.5										
				SPT	100	0/0 1/0 0/1 **N=2**		6.0										
	Silty, fine to medium SAND; grey. Very loose, moist, uniformly graded. Some shell fragments present.						6	6.5										
	Fine to medium SAND, trace silt; grey. Very loose, moist, uniformly graded. Some shell fragments present. *7.50m:* Becomes loose to medium dense.			SNC	100			7.0										
				SPT	100	2/2 2/2 2/3 **N=9**	5	7.5										Box 2, 4.5-8.0m
	Fine to medium SAND, minor silt and organics; grey. Loose, moist, uniformly graded. Some shell fragments present. *7.95m:* 5mm thick organic layer.			SNC	100			8.0										
							4	8.5										
	9.00m: Becomes medium dense.			SPT	100	0/0 2/4 3/4 **N=13**		9.0										
	Fine to medium SAND, some silt, minor organics; grey. Medium dense, moist, uniformly graded. Some shell fragments present.						3	9.5										
				SNC	100													

COMMENTS:

Hole Depth 16.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH07

SHEET: 3 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619693.59 mN, 1934348.88 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.50m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 23/11/2020
FINISH DATE: 23/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, HW, MW, HW, CW)	Rock Strength (FS, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	[CONT] Fine to medium SAND, some silt, minor organics; grey. Medium dense, moist, uniformly graded. Some shell fragments present.			SNC	100													
	SILT, trace sand; grey. Soft, moist, low plasticity; sand, fine. Some shell fragments.																	Box 3, 8.0-10.5m
	SILT, minor sand; grey. Very soft, moist, low plasticity; sand, fine. Some shell fragments.			SPT	100	2/0 0/0 0/0 **N=0**	2	10.5										
				SNC	100		1	11.0 11.5										
	Silty, fine SAND; grey. Medium dense, moist, uniformly graded. Some shell fragments.			SPT	100	0/2 1/3 3/3 **N=10**	0	12.0 12.5										
	SILT, some sand; grey, streaked dark grey. Stiff, moist, medium plasticity. Sand; fine to medium. Some shell fragments.			SNC	100			13.0										Box 4, 10.5-13.2m
	Sandy SILT; grey. Stiff, moist, medium plasticity. Sand; fine to medium. Some shell fragments.																	
	Fine to medium SAND; grey. Medium dense, moist, uniformly graded.			SPT	100	2/5 6/6 8/8 **N=28**	-1	13.5 14.0										
				SNC	100		-2	14.5										
	Silty fine to medium SAND; grey. Medium dense, moist, uniformly graded. Some shell fragments.																	

COMMENTS:

Hole Depth 16.95m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH07

SHEET: 4 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619693.59 mN, 1934348.88 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.50m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 23/11/2020
FINISH DATE: 23/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, EW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Fine SAND, minor silt; grey. Medium dense, moist to wet, uniformly graded, Minor shell fragments present.			SPT	100	0/1 2/4 6/8 **N=20**	-3	15.5										
	Fine to medium SAND, minor silt; grey. Medium dense, moist to wet, uniformly graded, Minor shell fragments present.			SNC	100			16.0										Box 5, 13.2-16.1m
				SPT	100	2/3 5/6 6/8 **N=25**	-4	16.5										Box 6, 16.1-17.0m
	16.95m: END OF BOREHOLE						-5	17.0 17.5										
							-6	18.0 18.5										
							-7	19.0 19.5										

COMMENTS:

Hole Depth 16.95m

Scale 1:25

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH07**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619693.59 mN 1934348.88 mE	DRILL TYPE:	HOLE STARTED: 23/11/2020
R.L.:	12.50m	DRILL METHOD: RC	HOLE FINISHED: 23/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

0.00-4.50m

4.50-7.95m

CORE PHOTOS

BOREHOLE No.: **BH07**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619693.59 mN 1934348.88 mE	DRILL TYPE:	HOLE STARTED: 23/11/2020
R.L.:	12.50m	DRILL METHOD: RC	HOLE FINISHED: 23/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

7.95-10.45m

10.45-13.20m

CORE PHOTOS

BOREHOLE No.: **BH07**

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: 5619693.59 mN (NZTM2000) 1934348.88 mE	DRILL TYPE:	HOLE STARTED: 23/11/2020
R.L.: 12.50m	DRILL METHOD: RC	HOLE FINISHED: 23/11/2020
DATUM: NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
		LOGGED BY: ZAFR CHECKED: JWY

13.20-16.05m

16.05-16.95m

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH08

SHEET: 1 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619875.47 mN, 1934377.03 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 25/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Fill	0.0-1.5m: NO RECOVERY - hydrovac. Refer to nearby test pit/hand auger logs for shallow subsoil information.			HVAC	0		11	0.5 1.0					*0.50m:* Glass jar and asbestos sample *1.10m:* Glass jar and asbestos sample					
Fill	Gravelly, fine to coarse SAND; dark grey. Medium dense, moist, uniformly graded. Some pumice fragments.			SPT	100	0/0 2/3 4/3 **N=12**		1.5										
Holocene Estuarine	Fine to medium SAND; grey. Medium dense, moist, uniformly graded. Minor shell fragments.						10	2.0					*1.95m:* Glass jar and asbestos sample		25/11/2020			
Holocene Estuarine	2.4-3.0m: CORE LOSS.			SNC	42			2.5										
Holocene Estuarine	3.0-3.45m: Push tube.			PT	100	Push tube @ 3.00m	9	3.0										
Holocene Estuarine	SILT; grey. Soft, moist, low to moderate plasticity. Minor shell fragments.							3.5					*3.45m:* Glass jar and asbestos sample					
Holocene Estuarine	Sandy SILT; grey. Soft, moist, low plasticity; sand, fine. Some shell fragments.			SNC	100		8	4.0										
Holocene Estuarine	Fine SAND; grey. Loose, moist to wet, uniformly graded.																	
Holocene Estuarine	Medium SAND; grey. Very loose, moist to wet, uniformly graded. Some shell fragments.			SPT	100	1/0 0/0 1/1 **N=2**		4.5										

COMMENTS:

Hole Depth 15.45m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH08

SHEET: 2 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619875.47 mN, 1934377.03 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 25/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, SW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, M, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	[CONT] Medium SAND; grey. Very loose, moist to wet, uniformly graded. Some shell fragments.			SNC	100			5.5					*5.00 - 10.00m:* Sulphuric odour					Box 1, 0.0-5.3m
	Fine to medium SAND; grey. Very loose, moist to wet, uniformly graded. Some shell fragments.						6	6.0										
	Fine SAND; grey. Medium dense, moist to wet, uniformly graded. Some shell fragments.			SPT	100	1/2 2/3 3/2 **N=10**		6.5										
	Silty, fine SAND; grey. Medium dense, uniformly graded. Some shell fragments.			SNC	100		5	7.0										
	7.50m: Becomes medium dense.			SPT	100	2/2 2/6 8/7 **N=23**		7.5										Box 2, 5.3-8.0m
	Sandy SILT; grey. Soft, low plasticity. Sand; fine. Some shell fragments.			SNC	100		4	8.0										
	SILT, minor sand; grey. Very soft, moist, low to medium plasticity. Sand; fine. Minor shell fragments.			SPT	100	0/0 0/0 0/0 **N=0**		8.5										
				SNC	100		3	9.0										
								9.5										

COMMENTS:

Hole Depth 15.45m

Scale 1:25

Rev.: A

General Log - 5/02/2021 10:09:04 am - Produced with Core-GS by GeRoc

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH08

SHEET: 3 OF 4

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619875.47 mN, 1934377.03 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 25/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm)	RQD (%)	Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	SILT, minor sand; grey. Soft to firm, moist, low to medium plasticity. Sand; fine. Minor shell fragments.			SNC	100													
				SPT	100	0/0 0/1 1/2 **N=4**		10.5										
	Sandy SILT; grey. Soft to firm, moist, low plasticity; sand, fine. Minor shell fragments.						1											Box 3, 8.0-11.0m
				SNC	100			11.0										
	12.00m: Becomes firm.							11.5										
				SPT	100	0/0 1/0 1/3 **N=5**	0	12.0										
	Medium SAND, minor silt. Loose, moist, uniformly graded. Minor shell fragments.							12.5										
				SNC	100													
	Fine SAND, some silt. Loose, moist, uniformly graded. Minor shell fragments.						-1	13.0										
								13.5										
	Fine SAND, minor silt. Medium dense, moist, uniformly graded. Minor shell fragments.			SPT	100	1/2 3/3 3/3 **N=12**												Box 4, 11.0-14.0m
							-2	14.0										
	Interbedded SILT and SAND; grey. Stiff (Silt), medium dense (sand), moist, low plasticity, uniformly graded.			SNC	100													
								14.5										
	SILT, trace clay; grey. Stiff, moist, medium plasticity.																	

COMMENTS:

Hole Depth 15.45m

Scale 1:25

Rev.: A

BOREHOLE LOG

BOREHOLE No.: BH08

SHEET: 4 OF 4

Tonkin+Taylor

PROJECT: Napier Aquatic Centre
JOB No.: 1009171.0000
LOCATION: Maadi Road, Onekawa

CO-ORDINATES: 5619875.47 mN, 1934377.03 mE (NZTM2000)
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 12.00m
R.L. COLLAR:
DATUM: NAPIHT1962
SURVEY: Handheld GPS

DRILLED BY: Drew
LOGGED BY: ZAFR
CHECKED: JWY
START DATE: 25/11/2020
FINISH DATE: 25/11/2020
CONTRACTOR: Geotech Drilling Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering (UW, SW, MW, HW, CW)	Rock Strength (ES, VS, S, MS, W, VW, EW)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	Fracture Spacing (mm) (2000, 600, 200, 60, 20)	RQD (%)	Description & Additional Observations	Fluid Loss (%) (25, 50, 75)	Water Level	Casing	Installation	Core Box No
Holocene Estuarine	Fine to medium SAND, minor silt; grey. Medium dense, moist, uniformly graded. Some shell fragments.			SPT	100	1/1 0/4 10/0 **N=14**												Box 5, 14.0-15.5m
	15.45m: END OF BOREHOLE						-4 -5 -6 -7	15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5										

COMMENTS:

Hole Depth 15.45m

Scale 1:25

Rev.: A

General Log - 5/02/2021 10:09:04 am - Produced with Core-GS by GeRoc

CORE PHOTOS

BOREHOLE No.: **BH08**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619875.47 mN 1934377.03 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

0.00-5.25m

5.25-7.95m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH08**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619875.47 mN 1934377.03 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

7.95-10.95m

10.95-13.95m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH08**

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (NZTM2000)	5619875.47 mN 1934377.03 mE	DRILL TYPE:	HOLE STARTED: 25/11/2020
R.L.:	12.00m	DRILL METHOD: RC	HOLE FINISHED: 25/11/2020
DATUM:	NAPIHT1962		DRILLED BY: Geotech Drilling Ltd
			LOGGED BY: ZAFR CHECKED: JWY

13.95-15.45m

EXCAVATION LOG

Excavation Id.: **TP01**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre		LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000
CO-ORDINATES: (WGS84)	176.889614 -39.506536	EXPOSURE METHOD: TP	EXCAV. STARTED: 26/11/2020
		EQUIPMENT: 12T Excavator	EXCAV. FINISHED: 26/11/2020
R.L.:	12.00m	OPERATOR: Burkett Earthmovers	LOGGED BY: ZAFR
DATUM:	NAPIHT1962	DIMENSIONS: 3m by 2m	CHECKED BY: JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3			● 71/23 kPa				TS	SILT, some sand, trace gravel and rootlets; dark brown. Firm, dry. Gravel, fine to coarse. Contains minor shell fragments.	D	F	10 25 50 100 200		Top
						0.5		Silty fine SAND, trace gravel; greyish brown. Loosely packed, moist, uniformly graded. Includes fragments of ceramics, brick and shell.	M	L		*0.2m:* A+M *0.5m:* A+M	
					11	1.0		Sandy SILT, trace gravel; greyish brown. Firm, moist. Sand; fine. Contains trace brick, ceramics and shell fragments.		F			Fill
		26/11/2020	● 26/19 kPa ● 23/16 kPa			1.5		1.8m: becomes dark grey. Soft to Firm.				*1.5m:* A+M	
					10	2.0		1.9m: Target depth				*1.9m:* A+M	
					9	2.5							
						3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth
1.9m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP02**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.889411 -39.506494	EXPOSURE METHOD:	TP	EXCAV. STARTED:	26/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	26/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3			89/23 kPa 78/29 kPa				TS	SILT, some sand, trace gravel and rootlets; dark brown. Firm, dry. Gravel, fine to coarse. Sand; fine. Contains ceramics, glass fragments and shell fragments.	D	F			Top
								Mix of sandy SILT and SAND, some silt; greyish brown, flecked and mottled orange brown. Firm silt, Sand-loosely packed, moist. Sand; fine. Contains shell fragments and trace ceramics.	M	L		*0.2m:* A+M *0.6m:* A+M	
			26/13 kPa 23/15 kPa		11	0.5 1.0								Fill
		26/11/2020 ▼				1.5		Silty fine SAND; greyish brown, flecked and stained orange brown. Loosely packed, moist uniformly graded. Sand; fine. Contains shell fragments. 1.7m: becomes bluish grey.						
					10	2.0 2.5		1.7m: Collapse due to groundwater ingress.						
					9	3.0 3.5								

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.7m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP03**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.889864 -39.506371	EXPOSURE METHOD:	TP	EXCAV. STARTED:	26/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	26/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3							TS	SILT, some sand, trace gravel and rootlets; dark brown. Firm, dry. Gravel, fine to coarse. Sand; fine.	D	F	10 25 50 100 200		Top Soil
			● 91/21 kPa ● 94/26 kPa			0.5		SILT, some sand, trace clay and gravel; greyish brown. Stiff, moist, low plasticity. Sand; fine. Contains trace white flecks and charcoal.	M			*0.3m:* A+M	Fill
			● 58/39 kPa ● 62/26 kPa		11	1.0		SILT, some sand, trace clay; greyish brown. Firm, moist, low plasticity. Sand; fine. Layering/bedding visible.				*0.6m:* A+M	Holocene Estuarine
		26/11/2020				1.5		Fine SAND; greyish brown. Loosely packed, moist, uniformly graded.		L			
					10	2.0		Fine SAND, some silt; bluish grey. Loosely packed, saturated, uniformly graded.	S			*2.0m:* A+M	
								2.2m: Collapse					
					9	2.5 3.0 3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth
2.2m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP04**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88962 -39.50619	EXPOSURE METHOD:	TP	EXCAV. STARTED:	26/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	26/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3			● 55/16 kPa ● 88/19 kPa				TS	SILT, some sand, trace gravel and rootlets; dark brown. Firm, dry. Gravel, fine to coarse. Sand; fine.	D				Top Soil
								SILT, some sand; greyish brown, streaked orange brown. Firm, moist, low plasticity. Contains shell fragments and trace ash/charcoal.	M			*0.2m:* A+M	Fill
		26/11/2020 ▼				0.5						*0.5m:* A+M	
					11	1.0		Silty fine SAND, trace silt; greyish brown. Loosely packed, wet to saturated, uniformly graded.	W-S				Holocene Estuarine
						1.5							
					10	2.0		Silty fine sand, bluish grey, Loosely packed, wet, uniformly graded.					
								2.2m: Collapse					
						2.5							
					9	3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth
2.2m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP05**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88979 -39.50589	EXPOSURE METHOD:	TP	EXCAV. STARTED:	26/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	26/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3											10 25 50 100 200		
			110/23 kPa 114/41 kPa			0.0	TS	SILT, some sand, trace gravel and rootlets; dark brown. Firm, dry. Gravel, fine to coarse. Sand; fine.	D	F			Top Soil
								SILT, some sand; greyish brown, streaked orange brown. Firm, moist. Contains shell fragments and trace ash/charcoal.	M			*0.2m:* Glass jar and asbestos sample	Fill
						0.5		Interbedded sandy SILT and SAND, some silt; greyish brown, flecked and mottled orange brown. Loosely packed, moist. Sand; fine. Contains shell fragments.		L		*0.5m:* Glass jar and asbestos sample	Holocene Estuarine
		26/11/2020 Groundwater seepage			11	1.0							
						1.5							
			26/19 kPa 19/16 kPa					Silty fine sand, bluish grey, Loosely packed, wet, uniformly graded.					
					10	2.0		1.9m: END OF BOREHOLE					
						2.5							
					9	3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.9m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP06**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88966 -39.50565	EXPOSURE METHOD:	TP	EXCAV. STARTED:	26/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	26/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3											10 25 50 100 200		
			● 65/19 kPa ● 49/16 kPa			0.0	TS	Sandy SILT; brown. Firm, dry, non-plastic. Sand; fine. Contains ceramics and brick fragments.	D	F			Top Soil
								Mix of sandy SILT and SAND, some silt; brown, flecked and stained orange brown. Loosely packed, moist. Sand; fine. Contains ceramics and brick pieces.	M	L		*0.2m:* Glass jar and asbestos sample	Fill
					11	0.5		Silty SAND; bluish grey. Loosely packed, moist, uniformly graded. Sand; fine.				*0.5m:* Glass jar and asbestos sample	Holocene Estuarine
						1.0						*0.9m:* Glass jar and asbestos sample	
		26/11/2020 ▼				1.5							
					10	2.0		Fine SAND; bluish grey. Loosely packed, wet, uniformly graded.	W				
								Clayey SILT, light brown. Soft, moist, low to medium plasticity.					
						2.5		Fine SAND; bluish grey. Loosely packed, wet, uniformly graded.					
								2.6m: Target depth					
					9	3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 2.6m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP07**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88999 -39.50604	EXPOSURE METHOD:	TP	EXCAV. STARTED:	26/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	26/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3			● 127/32 kPa ● 32/16 kPa				TS	SILT, some sand, trace gravel and rootlets; dark brown. Firm, dry. Gravel, fine to medium. Sand; fine.	M	F	10 25 50 100 200		Top Soil
								Sandy SILT, trace gravel; brown. Firm, moist. Sand; fine. Gravel, fine to medium.	D			*0.2m:* Glass jar and asbestos sample	Fill
						0.5		Silty SAND, some silt; grey, mottled brown. Loosely packed, moist, uniformly graded. Sand; fine. Contains shell fragments.	M	L		*0.4m:* Glass jar and asbestos sample	Holocene Estuarine
					11	1.0						*0.8m:* Glass jar and asbestos sample	
						1.5							
								SILT; grey. Very soft to soft, moist, low plasticity.					
					10	2.0		1.9m: Collapse					
						2.5							
					9	3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS: Groundwater not encountered in this hole.

Hole Depth 1.9m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP08**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.89030 -39.50622	EXPOSURE METHOD:	TP	EXCAV. STARTED:	26/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	26/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3											10 25 50 100 200		
			110/29 kPa 114/32 kPa				TS	SILT, some sand, trace gravel and rootlets; dark brown. Firm, dry. Gravel, fine to medium. Sand; fine.	D	F			Top
								Sandy SILT; grey, mottled brown. Firm, dry. Sand; fine. Contains ash and ceramics.	M			*0.2m:* Glass jar and asbestos sample	Fill
						0.5		Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded. Sand; fine. Contains shell fragments.		L		*0.4m:* Glass jar and asbestos sample	
		26/11/2020			11	1.0						*0.8m:* Glass jar and asbestos sample	Estuarine
						1.5							
								Fine SAND; bluish grey. Loosely packed, wet, uniformly graded.	W				
					10	2.0		2m: Target depth					
						2.5							
					9	3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth
2m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP09**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88802 -39.50448	EXPOSURE METHOD:	TP	EXCAV. STARTED:	27/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	27/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3											10 25 50 100 200		
		27/11/2020	● 130/32 kPa ● 114/49 kPa			0.5	TS	SILT, some sand, trace gravel and rootlets; dark brown. Firm, dry. Gravel, fine to medium. Sand; fine. Contains brick and ash inclusions.	D	F			Top
								SILT, some sand, trace gravel and rootlets; dark brown. Very stiff, dry, low plasticity. Gravel, fine to medium. Sand; fine. Contains brick and ash inclusions.	M	VSt		*0.3m:* Glass jar and asbestos sample	
								Silty fine SAND; brown. Loosely packed, moist, uniformly graded. Contains brick inclusions.		L		*0.6m:* Glass jar and asbestos sample	Fill
					11	1.0		1.0m: Collapse due to groundwater ingress.				*1.0m:* Glass jar and asbestos sample	
						1.5							
					10	2.0							
						2.5							
					9	3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP10**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88673 -39.50574	EXPOSURE METHOD:	TP	EXCAV. STARTED:	27/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	27/11/2020
R.L.:	11.50m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3											10 25 50 100 200		
					11	0.5	TS	SILT, some rootlets; dark brown. Firm, dry.	D				Top
								Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded.	M	L		*0.1m:* Glass jar and asbestos sample *0.35m:* Glass jar and asbestos sample *0.8m:* Glass jar and asbestos sample	
		27/11/2020	● 32/16 kPa			1.0		SILT; light brown. Soft, moist, low plasticity.		S			Estuarine
					10	1.5		Silty fine SAND; grey. Loosely packed, moist, uniformly graded.		L			
								1.60m: Collapse due to groundwater ingress.					
						2.0							
					9	2.5							
						3.0							
					8	3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.6m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP11**

SHEET: 1 OF 1

Tonkin+Taylor

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa		JOB No.: 1009171.0000
CO-ORDINATES: 176.88696 (WGS84) -39.50577	EXPOSURE METHOD: TP	EXCAV. STARTED:	27/11/2020
	EQUIPMENT: 12T Excavator	EXCAV. FINISHED:	27/11/2020
R.L.: 11.50m	OPERATOR: Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM: NAPIHT1962	DIMENSIONS: 3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3							TS	SILT, some rootlets; dark brown. Firm, dry.	D		F	10 25 50 100 200	*0.15m:* Glass jar and asbestos sample	Top Soil
		27/11/2020 ▼			11	0.5		Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded.	M		L		*0.4m:* Glass jar and asbestos sample	Holocene Estuarine
						1.0							*0.9m:* Glass jar and asbestos sample	
					10	1.5		SILT; light brown. Soft, moist, non plastic.			S			
								Silty fine SAND; grey. Loosely packed, moist, poorly graded. 1.7m: END OF INVESTIGATION			L			
						2.0								
					9	2.5								
						3.0								
					8	3.5								

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.7m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP12**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre | LOCATION: Maadi Road, Onekawa | JOB No.: 1009171.0000

CO-ORDINATES: 176.88647 (WGS84) -39.50605
R.L.: 11.50m
DATUM: NAPIHT1962

EXPOSURE METHOD: TP
EQUIPMENT: 12T Excavator
OPERATOR: Burkett Earthmovers
DIMENSIONS: 3m by 2m

EXCAV. STARTED: 27/11/2020
EXCAV. FINISHED: 27/11/2020
LOGGED BY: ZAFR
CHECKED BY: JWY

EXCAVATION TESTS					ENGINEERING DESCRIPTION				GEOLOGICAL	
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
							TS	SILT, some rootlets; dark brown. Firm, dry.	D	F			TSoil
					11	0.5		Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded.	M	L		*0.3m:* Glass jar and asbestos sample *0.6m:* Glass jar and asbestos sample	Estuarine
		27/11/2020	16/7 kPa 19/10 kPa			1.0		SILT; light brown, mottled orange. Soft, moist, non plastic.		S		*0.9m:* Glass jar and asbestos sample	
								Fine to medium SAND; grey. Loosely packed, moist, uniformly graded.		L			
					10	1.5		1.5m: END OF INVESTIGATION					
						2.0							
					9	2.5							
						3.0							
					8	3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.5m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP13**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre | LOCATION: Maadi Road, Onekawa | JOB No.: 1009171.0000

CO-ORDINATES: (WGS84) 176.88659, -39.50613
R.L.: 11.50m
DATUM: NAPIHT1962

EXPOSURE METHOD: TP
EQUIPMENT: 12T Excavator
OPERATOR: Burkett Earthmovers
DIMENSIONS: 3m by 2m

EXCAV. STARTED: 27/11/2020
EXCAV. FINISHED: 27/11/2020
LOGGED BY: ZAFR
CHECKED BY: JWY

EXCAVATION TESTS					ENGINEERING DESCRIPTION					GEOLOGICAL
PENETRATION (-1 -2 -3)	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE \ WEATHERING CONDITION	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) (10 25 50 100 200)	DEFECTS, STRUCTURE, COMMENTS	UNIT
		27/11/2020	19/13 kPa 16/13 kPa		11	0.5	TS	SILT, some rootlets; dark brown. Firm, dry.	D	F		*0.15m:* Glass jar and asbestos sample	Top Soil
								Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded. Contains fragments of brick and ceramics.	M	L		*0.6m:* Glass jar and asbestos sample	Fill
						1.0		SILT; light brown, mottled orange. Soft, moist, non plastic.		S		*0.9m:* Glass jar and asbestos sample	Holocene Estuarine
					10	1.5		Fine to medium SAND; grey. Loosely packed, wet, uniformly graded.	W	L			
								1.60m: Collapse due to groundwater ingress.					
						2.0							
					9	2.5							
						3.0							
					8	3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.6m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP14**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre | LOCATION: Maadi Road, Onekawa | JOB No.: 1009171.0000

CO-ORDINATES: (WGS84) 176.886709989225, -39.5059400273149
R.L.: 11.50m
DATUM: NAPIHT1962

EXPOSURE METHOD: TP
EQUIPMENT: 12T Excavator
OPERATOR: Burkett Earthmovers
DIMENSIONS: 3m by 2m

EXCAV. STARTED: 27/11/2020
EXCAV. FINISHED: 27/11/2020
LOGGED BY: ZAFR
CHECKED BY: JWY

EXCAVATION TESTS					ENGINEERING DESCRIPTION					GEOLOGICAL
PENETRATION -1 -2 -3	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m) / DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE \ WEATHERING CONDITION	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa) 10 25 50 100 200	DEFECTS, STRUCTURE, COMMENTS	UNIT
		27/11/2020			11 0.5	TS	SILT, some rootlets; dark brown. Firm, dry.	D	F		*0.1m:* Glass jar and asbestos sample	TSoil
							Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded.	M	L		*0.4m:* Glass jar and asbestos sample	Estuarine
					1.0		SILT; light brown, mottled orange. Soft to firm, moist, non plastic.		S-F		*0.9m:* Glass jar and asbestos sample	
					10 1.5		Fine to medium SAND; grey. Loosely packed, moist, uniformly graded.		L			
							1.60m: Collapse due to groundwater ingress.					
					2.0							
					9 2.5							
					3.0							
					8 3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.6m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP15**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88755 -39.50698	EXPOSURE METHOD:	TP	EXCAV. STARTED:	27/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	27/11/2020
R.L.:	12.50m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3		27/11/2020 ▼			12	0.5	TS	SILT, trace rootlets; dark brown. Firm, dry.	D	F	10 25 50 100 200	*0.15m:* Glass jar and asbestos sample	Top Soil
								Silty fine SAND; brown. Tightly packed, dry, uniformly graded. Contains broken ceramics, gravel and pieces of rubble.				*0.5m:* Glass jar and asbestos sample	Fill
						1.0						*1.0m:* Glass jar and asbestos sample	
							TS	Buried TOPSOIL layer; brown. Firm to stiff, moist, non-plastic.	M				Top Soil
					11	1.5		Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded.		L			Holocene Estuarine
						2.0							
					10	2.5							
						3.0		Fine SAND; grey. Loosely packed, wet, uniformly graded.	W				
					9	3.5		3.3m: END OF INVESTIGATION					

SKETCH / PHOTO:

COMMENTS:

Hole Depth 3.3m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP16**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88748 -39.50680	EXPOSURE METHOD:	TP	EXCAV. STARTED:	27/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	27/11/2020
R.L.:	12.50m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3											10 25 50 100 200		
			● 187/49 kPa ● 162/52 kPa		12	0.5	TS	SILT, trace rootlets; dark brown. Firm, dry.	D	F		*0.1m:* Glass jar and asbestos sample	Top
								Sandy SILT; brown, mottled grey. Very stiff, moist, non plastic. Sand; fine. Contains charcoal fragments, brick, glass, ceramics, metal and ash.	M	VSt		*0.3m:* Glass jar and asbestos sample	
						1.0						*0.6m:* Glass jar and asbestos sample	Fill
		27/11/2020	● 130/45 kPa ● 166/45 kPa									*0.8m:* Glass jar and asbestos sample	
								1.4m: Becomes entirely rusted metal fragments, ash and rubble.					
					11	1.5		1.5m: Test pit terminated due to significant groundwater ingress.				*1.5m:* Glass jar and asbestos sample	
						2.0							
					10	2.5							
						3.0							
					9	3.5							

SKETCH / PHOTO:

COMMENTS: Groundwater rapidly ran into the hole at 1.3 m. Lots of gas bubbles coming through the groundwater. Backfilled test pit and covered with a truck load of top soil. Significant portions of fill in this test pit.

Hole Depth
1.5m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP17**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88821 -39.50714	EXPOSURE METHOD:	TP	EXCAV. STARTED:	30/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	30/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
			● 62/24 kPa ● 65/19 kPa			0.5	TS	SILT, trace sand and rootlets; dark brown. Firm, dry. Sand; fine.	D			*0.1m:* Glass jar and asbestos sample	
		30/11/2020 ▼	● 138/49 kPa ● 122/32 kPa ● >227 kPa		11	1.0		Sandy SILT; brown. Stiff, dry, non plastic. Sand; fine. Contains metal fragments, ceramics, ash, and brick. 0.8m: Becomes hard. 1.1m: Becomes very stiff. 1.4m: Contains glass bottles, ash, bitumen, rubble.	M	St H VSt	10 25 50 100 200	*0.4m:* Glass jar and asbestos sample *0.9m:* Glass jar and asbestos sample	Fill
					10	1.5 2.0		1.4m: Test pit terminated due to significant groundwater ingress.					
					9	2.5 3.0 3.5							

SKETCH / PHOTO:

COMMENTS: Groundwater rapidly ran into the hole at 1.2 m. Some gas bubbles coming through the groundwater. Smells like chlorine - suspected chlorine leak from the pools nearby. Significant portions of fill in this test pit.

Hole Depth 1.4m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP18**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88775 -39.50733	EXPOSURE METHOD:	TP	EXCAV. STARTED:	30/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	30/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION \ WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3											10 25 50 100 200		
						0.0	TS	SILT, trace rootlets; dark brown. Firm, dry.	D	F		*0.2m:* Glass jar and asbestos sample	Top Soil
			● 110/24 kPa ● 114/32 kPa			0.5		Sandy SILT; grey, mottled brown. Firm, moist, non plastic. Sand; fine.	M			*0.6m:* Glass jar and asbestos sample	Holocene Estuarine
			● 49/16 kPa ● 45/19 kPa		11	1.0							
		30/11/2020 ▼	● 65/24 kPa			1.5		Fine SAND; grey. Loosely packed, moist, uniformly graded.		L			
					10	2.0		Collapse due to groundwater ingress.				*2.0m:* Glass jar and asbestos sample	
						2.5							
					9	3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 2m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP19**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88836 -39.50742	EXPOSURE METHOD:	TP	EXCAV. STARTED:	30/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	30/11/2020
R.L.:	11.75m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3			● 143/49 kPa ● 140/45 kPa ● 162/49 kPa ● 154/41 kPa ● 68/41 kPa ● 73/23 kPa ● 65/19 kPa		11 10 9 8	0.5 1.0 1.5 2.0 2.5 3.0 3.5		SILT, trace rootlets; dark brown. Firm, dry. Contains ceramics. Sandy SILT; grey, mottled brown. Very stiff, moist. Sand; fine. Silty fine SAND; bluish grey. Loosely packed, moist, uniformly graded. 1.8m: END OF INVESTIGATION	D M	F L	10 25 50 100 200	*0.1m:* Glass jar and asbestos sample *0.7m:* Glass jar and asbestos sample *1.6m:* Glass jar and asbestos sample	Fill Estuarine

30/11/2020

SKETCH / PHOTO:

COMMENTS:

Hole Depth 1.8m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP20**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.8878 -39.50681	EXPOSURE METHOD:	TP	EXCAV. STARTED:	30/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	30/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3			● 65/49 kPa ● 65/16 kPa			0.0		SILT, some gravel, trace rootlets; dark brown. Firm, dry. Gravel; fine to medium.	D	F	10 25 50 100 200		Fill
						0.5		Sandy SILT; brownish yellow. Stiff, moist, non plastic. Sand; fine.	M	St		*0.15m:* Glass jar and asbestos sample *0.55m:* Glass jar and asbestos sample	
		▼ 30/11/2020	● 73/24 kPa ● 49/16 kPa		11	1.0		Sandy SILT; brownish grey. Stiff, moist. Sand; fine.				*0.85m:* Glass jar and asbestos sample	Holocene Estuarine
					10	2.0		Fine to medium SAND; light grey. Loosely packed, wet, uniformly graded.	W	L		*2.0m:* Glass jar and asbestos sample	
					9	3.0		2.6m: Collapse due to groundwater ingress.					
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth
2.6m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP21**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88798 -39.50672	EXPOSURE METHOD:	TP	EXCAV. STARTED:	30/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	30/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
-1 -2 -3			● 185/39 kPa ● 117/23 kPa ● >227 kPa ● >227 kPa			0.0		SILT, trace rootlets; dark brown. Firm, dry. Contains broken ceramics and glass.	D	F	10 25 50 100 200	*0.1m:* Glass jar and asbestos sample	Top Soil
						0.5		Sandy SILT; grey, mottled brown. Hard, moist, low plasticity. Sand, fine. Contains brick, ash and ceramics.	M	H		*0.7m:* Glass jar and asbestos sample	Fill
			● 203/49 kPa ● 114/32 kPa		11	1.0		Sandy SILT; brownish grey. Very stiff to hard, moist, low plasticity. Sand; fine. Contains shell fragments.		VSt-H			Holocene Estuarine
		30/11/2020 ▼	● 73/24 kPa ● 49/16 kPa			1.5						*1.3m:* Glass jar and asbestos sample	
					10	2.0		Fine to medium SAND; light grey. Loosely packed, moist, uniformly graded.		L			
								2.2m: Collapse due to groundwater ingress.					
						2.5							
					9	3.0							
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 2.2m

Scale 1:33

Rev.: A

EXCAVATION LOG

Excavation Id.: **TP22**

SHEET: 1 OF 1

PROJECT: Napier Aquatic Centre	LOCATION: Maadi Road, Onekawa	JOB No.: 1009171.0000

CO-ORDINATES: (WGS84)	176.88766 -39.50691	EXPOSURE METHOD:	TP	EXCAV. STARTED:	30/11/2020
		EQUIPMENT:	12T Excavator	EXCAV. FINISHED:	30/11/2020
R.L.:	12.00m	OPERATOR:	Burkett Earthmovers	LOGGED BY:	ZAFR
DATUM:	NAPIHT1962	DIMENSIONS:	3m by 2m	CHECKED BY:	JWY

EXCAVATION TESTS | ENGINEERING DESCRIPTION | GEOLOGICAL

PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	ESTIMATED SHEAR STRENGTH (kPa)	DEFECTS, STRUCTURE, COMMENTS	UNIT
						0.0	TS	SILT, trace rootlets; dark brown. Firm, dry.	D	F			Top Soil
						0.5		Silty fine SAND; brown, mottled orange. Tightly packed, moist, uniformly graded. Contains glass, gravel and brick.	M			*0.2m:* Glass jar and asbestos sample	Fill
					11	1.0	TS	Buried top soil layer, brown				*0.9m:* Glass jar and asbestos sample	Top Soil
						1.5		Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded. Contains brick fragments.		L			Holocene Estuarine
					10	2.0		Silty fine SAND; grey, mottled brown. Loosely packed, moist, uniformly graded.				*1.8m:* Glass jar and asbestos sample	
		30/11/2020 ▼				2.5							
					9	3.0		2.8m: Collapse due to groundwater ingress.					
						3.5							

SKETCH / PHOTO:

COMMENTS:

Hole Depth 2.8m

Scale 1:33

Rev.: A

Appendix C: Site photographs

Photograph 1: Photograph showing the general topography of the site.

Photograph 2: Example of ceramics, concrete, glass and metal observed in surface soil at the property.

Photograph 3: Photograph showing the construction materials of onsite buildings.

Photograph 4: Photograph showing the construction materials of onsite buildings.

Photograph 5: Photograph showing the construction materials of onsite buildings.

Photograph 6: Photograph showing the construction materials of onsite buildings.

Photograph 7: Hazardous storage shed.

Photograph 8: An example of the electrical transformers observed onsite.

Appendix D: Site history information

D1 Historical aerial photographs

Historical aerial photographs from the T+T library and other sources have been reviewed as stated in Table D.1. Relevant features of the site and surrounding land are summarised from each aerial photograph in Table D.1.

Table D.1: Summary of aerial photograph review

Date, run number and source	Key site features	Surrounding land features
1936 NCC	The 1936 aerial image is of poor resolution. An access track is present, running from Flanders Avenue into the centre of the site. Surface scarring is present in the centre of the site. The site does not appear to be completely flat with what appears to be minor depressions across the site. In some areas, rectangular scarring is present.	The surrounding area appears to be vacant and/or used for pastoral purposes.
1949 Retrolens	What appears to be three landfilling trenches are present in the north-eastern corner of the site. Numerous stockpiles are present in the north-western corner of the site. Surface scarring is present across the remainder of the site however this does not appear to currently be in use.	Residential development has occurred to the north of Riverbend Road. The remainder of the land bordering the site appears to be used for pastoral purposes.
1951 Retrolens	Extensive surface scarring is present across the northern portion of the site with minor surface scarring also present in the site's southwestern corner. Stockpiled material is present in numerous locations across the site.	Residential development has occurred to the south of Gallipoli Road. Landfilling trenches are present between Kennedy and Menin Roads.
1964 Retrolens	Construction of the Olympic swimming pool in the centre of the site is underway. Two buildings appear to be undergoing construction to the immediate northwest and west of the swimming pool. Large areas of stockpiled material and vehicles can be seen across the remainder of the site.	Residential properties are present in the wider vicinity of the site. The current day road layout surround the site is also present.
1969 Retrolens	Construction of the swimming pool and associated buildings appears complete. Tennis courts are now present to the north of the pool. An access road links Flanders Avenue and pool carparking situated to the west of the pool buildings. Surface scarring is present along the eastern half of the site. The remainder of the site is grassed.	Additional residential development has occurred in the wider vicinity of the site.

Date, run number and source	Key site features	Surrounding land features
1974 Retrolens	Construction of the present day car parks situated to the east and west of the pool appears to be taking place with surface scarring present in these areas. A large rectangular building is now present to the northeast of the pool.	No significant changes observed from the previous aerial image.
1976 Alexander Turnbull Library	The 1976 aerial image is an oblique aerial image looking southwest over the site. The north western corner of the site is grassed with netball/tennis courts located immediately adjacent to this area. The central portion of the site comprises two swimming pools with four buildings bordering the northern, eastern and western sides of the swimming complex. An access way links Flanders Avenue to the complex, with car parking present in the western portion of the site. A second access way runs from Maadi Road to the northern portion of the site. Car parking is present in the north-eastern corner of the site. The remainder of the site is grassed with some trees present.	No significant changes observed from the previous aerial image.
1988 Retrolens	Additional courts are now present in the site's north-eastern corner. Two small rectangular buildings and a hydro slide are now present to the east and southeast of the swimming pool. Surface scarring is present to the southwest of the pool. What appears to be heavy machinery and/or materials is present to the south of the pool.	No significant changes observed from the previous image.
1999 NCC	Two large rectangular buildings are now present to the east and southeast of the swimming pool. Additional pool facilities are now present to the southwest of the pool where surface scarring was previously identified. The machinery/materials identified to the south of the pool are no longer present. This area is now grassed although minor surface scarring is present.	No significant changes observed from the previous image.
2003 Google Earth Pro	Minor surface scarring is present to the southeast of the swimming complex.	No significant changes observed from the previous image.

Date, run number and source	Key site features	Surrounding land features
	Additional construction has been undertaken at the swimming complex and a hydro slide is now present	
2004 NCC	A large rectangular building is now situated between Flanders Avenue and the southwestern.	No significant changes observed from the previous image.
2005 Google Earth Pro	No other significant changes observed from the previous image.	
2009 Google Earth Pro	No other significant changes observed from the previous image.	No significant changes observed from the previous image.
2012 Google Earth Pro	The pools previously present in the centre of the site have been removed. Large areas of surface scarring are present in the centre of the site and extends south to the tree break. A large semi-rectangular building is now situated to the east of the car park accessed off Flanders Avenue.	No significant changes observed from the previous image.
2013 Google Earth Pro	The scarring previously identified in the central portion is the site is now sealed with what looks like a court and playground present. The scarring previously identified in the southern portion of the site is now grassed. No other significant changes observed from the previous image.	No significant changes observed from the previous image.
2019 Google Earth Pro	No significant changes observed from the previous image.	

D2 Previous ground investigations

New Indoor Swim/Leisure Complex Onekawa Park, Napier Geotechnical Investigation Report (T+T, 1997)[10]

T+T Ltd was engaged by NCC in 1997 to undertake a geotechnical investigation as part of the proposed construction of a new indoor swimming pool complex at Onekawa Park, Napier. The investigation comprised the excavation of eight test pits to a maximum depth of 3.2 m bgl across the proposed redevelopment area. The investigation identified the following:

- Landfill material was identified in four of the eight test pits, ranging from thin layers to 1.2 m thick.
- Sawmill waste in two test pits at depths ranging between 0.1 and 0.4 m bgl.
- Groundwater was observed at depths ranging between 2.1 and 2.4 m bgl.

[10] T+T Ltd, 1997. *New Indoor Swim/Leisure Complex Onekawa Park, Napier, Geotechnical Investigation Reprot.* Prepared for Loughan, Hall & Thompson Ltd, January 1997.

Detailed Site Investigation Proposed New Plunket Site Maadi Road Onekawa Napier (EAM – Environmental Consultants, 2011)[11]

Environmental Assessments and Monitoring Limited was engaged by Plunket Hawke's Bay in 2011 to undertake a DSI at the proposed new Plunket site at Maadi Road. The redevelopment was proposed to the southeast of the current pool complex. The intrusive investigation comprised the advancement of nine hand augered boreholes to a maximum depth of 1.5 m bgl. Landfill material was observed in all sample locations at depths ranging between 0.1 to 0.45 m bgl. Analytical analysis returned arsenic, lead and/or PAH concentrations above guideline values. The report recommended that contaminated material should be removed from site.

Phase 2 Site Investigation at the Former Taradale Road Landfill (PDP, 2011)[12]

Pattle Delamore Partners (PDP) were jointly engaged by Hawkes Bay Regional Council (HBRC) and Napier City Council (NCC) in 2011 to undertake an intrusive investigation at the former Taradale Road Landfill situated at Onekawa, Napier. The objectives of the investigation were to:

- To determine the depth of cover about waste in the park; and to
- Characterise contamination in the waste material.

Nineteen test pits were excavated across the site targeting probable and possible areas of historic landfilling. The investigation identified the following:

- Suspected landfill materials were observed in 60% of the test pits;
- The landfill material generally comprised hardfill and non-putrescible waste (e.g. glass, charcoal);
- Approximately half of the samples analysed contained heavy metal concentrations that was above expected background concentrations and/or returned PAH detects; and
- Limited asbestos was undertaken, however no asbestos was detected.

PDP undertook a preliminary risk assessment in a Phase 1 investigation which identified that risks to the surrounding environment (including groundwater and surface water) was considered low. The Phase 2 risk assessment, therefore, focussed on the risk to human health to park users and surrounding residential properties. The risk to site users of Onekawa Park was considered to be low. However, given the uncertainty of the extent of waste material present in residential properties, an unacceptable risk to residential properties could not ruled out.

Former landfill, Onekawa: Residential Property Investigation (PDP, 2012)[13]

PDP was engaged by NCC to undertake an intrusive investigation within the vicinity of the former Onekawa Landfill (including residential properties, the Onekawa Kindergarten and portions of Onekawa Park) in 2012. The objective of the investigation was to determine the extent of the landfill, to determine the presence and thickness of any landfill cap and to determine the risk to human health should a landfill cap not exist.

The report states the following:

- The site operated as a municipal landfill circa 1930s until the early 1950s.
- Landfilling initially comprised filling in natural depressions present at the site, following which trenches were excavated across portions of the site and filled in with municipal waste.

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[11] EAM – Environmental Consultants. *Detailed Site Investigation Proposed New Plunket Site Maadie Road Onekawa Napier.* Prepared for Plunket Hawke's Bay, 2011.

[12] PDP, 2011. *Phase 2 Site Investigation at the Former Taradale Road Landfill.* Prepared for Hawkes Bay Regional Council and Napier City Council, 2011.

[13] PDP, 2012. *Former landfill, Onekawa: Residential Property Investigation.* Prepared for Napier City Council

- 247 sample locations were advanced across 51 properties.
- Cover material was found to vary across the investigation area, ranging from 0.1 – 1.0 m thick.
- Analytical analysis indicated that where cover material was greater than 0.5 m, the risk to people on residential properties was considered acceptably low.

Site Works Remedial Action Plan Version 3 – Proposed Plunket Centre 62 Flanders Avenue (Eos design, 2012)[14]

Eos design prepared a Remedial Action Plan (RAP) as part of the proposed construction of a new Plunket community centre at 62 Flanders Avenue, Onekawa. The report states the 650 mm thick layer of topsoil was uncontaminated and will be reused onsite for landscaping purposes. A 250 mm layer of landfill material was identified beneath topsoil material and was isolated to two trenches running through the property. Contaminated material is to be stabilised before being disposed of beneath geotextile liner beneath the proposed car park. Excess fill material will be placed in lined trenches situated adjacent to the carpark.

D3 Council property files

The property file for the site was obtained from NCC. The documents most relevant to prior land use and potential contamination are summarised below. Selected files are included in Appendix H.

- A file, date unknown, stating that the site was partially used as a landfill with the remainder of the site used for grazing purposes. The file states that landfilling is evident with glass, bricks, stones and rubbish visible within the topsoil. The site was first used as a swimming complex in 1964 with other recreational council facilities (tennis courts etc) starting at the site in 1966.
- A hazardous site(s) file, date unknown, stating the site contains hazardous fill.
- A building consent application, dated September 1965, to construct a kindergarten at Onekawa Park. Associated plans and specifications state the following:
  - The soffits will be constructed out of asbestos.
  - The roof will be constructed out of Harvey Tyles.
  - The exterior cladding will be constructed out of fibrolite.
- A building application form, dated March 1968, to construction a pavilion at Onekawa Park to be utilised for tennis and basket ball.
- A plan, dated December 1970, for the proposed construction of an indoor pool. The plan shows the following:
  - The building will contain both a plant room and a laboratory.
  - Both interior and exterior cladding will including the use of Hardiflex lining and sheeting.
  - The roof will be constructed of Dimondek roofing.
- A building consent application, dated January 1971, to construct additional swimming pools at Onekawa Park.
- A building consent application, dated December 1971, to construct a tools and lawn mower shed at Onekawa Park.
- A building consent form, dated August 1976, to construct a two-storey sports pavilion building at Onekawa Park. An associated building specification states that asbestos-cement sheeting is to be used in construction.

[14] Eos design, 2012. *Site Works Remedial Action Plan Version 3 – Proposed Plunket Centre 62 Flanders Avenue Napier.* Prepared for the Royal New Zealand Plunket Society, Hawkes Bay.

- A building consent, dated January 1998, to construct an indoor swimming and leisure complex at 25 Maadi Rd, Napier.
- A building consent application, dated April 1998, to construct a public toilet at Onekawa Park. Associated plans show the ceiling to be constructed of Hardies Villaboard.
- A building consent application, dated August 1999, to remove asbestos cladding from the Netball pavilion at Onekawa Park.
- A building consent application, dated October 2002, to construction an addition to the gymnasium at the Onekawa Pool Complex.
- A building consent application, dated April 2004, to erect a gymnasium at 58 Flanders Avenue, Onekawa. An associated geotechnical investigation into the proposed redevelopment area noted the following:
  - The geology observed comprised dry silt overlying silt/clay to 1.3 m bgl.
  - No fill material was observed in any of the eight hand auger holes excavated to 1.3 m bgl.
  - Groundwater was observed at 1.7 m bgl.
- A letter to site users from NCC, dated March 2011, stating that a municipal landfill operated at Onekawa Park from circa 1932 to 1960. The letter also states that risk to site users or excavations workers is not likely to be significant.
- Building consent, dated October 2011, for the construction of a new community Plunket Building at 62 Flanders Avenue. An associated plan shows the presence of two landfill trenches situated in the location of the proposed building.
- A letter, dated June 2012, regarding site remediation of the Plunket site at 60 Flanders Avenue. The letter states that fill material was disposed of between geotextile matting and cleanfill material in an area adjacent to the volleyball court. In addition, the letter states that additional surplus material (up to 900 m^3) is permitted to be disposed of in trenches adjacent to the Plunket car parks.

D4 Council contamination enquiry

A contamination enquiry was placed with Hawkes Bay Regional Council, the information provided is included in Appendix I and states that the site falls within the HBRC Listed Land Use Register (LLUR) given its former operation as a municipal landfill from circa 1932 until the late 1950s.

A resource consent exists for the site in order to discharge contaminants (being leachate and other products arising from the decomposition of municipal refuse) into or onto land in circumstances which may results in the contaminant entering water.

Appendix E: Analytical results

E1 Evaluation criteria

To assess the potential impacts on human health and the environment, laboratory test results have been compared to soil contamination standards for the protection of human health for commercial/industrial and recreational land use in accordance with the NES Soil. This included guideline values contained in MfE's *Methodology for Deriving Standards for Contaminants in Soil*[15] , the *NEPC Assessment of Site Contamination Measure*[16], MfE's petroleum guidelines[17] and the Asbestos in Soil Guidelines[18]. IN the context of the development, results have been assessed with respect to recreational (i.e. areas of landscaping around a development) and commercial/industrial (i.e. construction worker) land use scenarios that mirror the site's future use.

The laboratory test results were also compared against screening criteria from the MfE guidelines for disposal of hazardous waste[19] to assess options for the offsite disposal of materials displaced by the development. We have used soil background levels for the region[20] as a conservative means of evaluating cleanfill suitability.

E2 Analytical results

A summary of analytical results of samples analysed during the investigation are presented in Tables G1 – G6 Appendix C, along with their assessment to the selected criteria. Laboratory transcripts are included in Appendix G. In summary the assessment of the laboratory data indicates:

Option 1

- Soil sample TP09-1.0 returned arsenic, copper, lead and zinc concentrations elevated above expected background conditions. Soil sample HA1-0.1 returned a copper concentration slightly elevated above expected background concentrations. All other samples returned heavy metal concentrations below expected background levels.
- PAH concentrations marginally above the laboratory level of detection were present in four of the samples analysed (HA1-0.1, HA9-0.2, HA9-0.5 and TP09-0.6). In addition, soil sample TP09-1.0 returned elevated benzo(a)pyrene equivalent and pyrene concentrations of 8.9 and 11.2 mg/kg.
- All samples complied with the SCS for commercial/industrial/outdoor worker and recreational land use.
- Asbestos was not detected in any of the samples analysed.
- Soil sample TP09-1.0m returned lead and zinc concentrations which exceed the Class A landfill criteria. However, on average, concentrations for Option 1 fall below the relevant criteria and therefore, subject to the approval of the facility operator, material from this area may be suitable for disposal at a Class A landfill. Alternatively, TCLP analysis will be required to be undertaken on this sample to ensure landfill acceptance.

[15] MfE, 2011. *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health.*
[16] NEPC, 2013. *National Environmental Protection (Assessment of Site Contamination) Measure 1999.*
[17] MfE, 2011. *Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in New Zealand (revised 2011)*
[18] New Zealand Guidelines for Assessing and Managing Asbestos in Soil, prepared by BRANZ Ltd, November 2017
[19] MfE, 2004. *Landfill Waste Acceptance Criteria and Landfill Classification.*
[20] Landcare Research, 2003. *Hawke's Bay Region: Background soil concentrations for managing soil quality.* Report number RM14-03, HBRC Plan number 4611. Prepared by Jo-Anne Cavanagh, Landcare Research.

Option 2

- Four samples returned heavy metal concentrations elevated above expected background concentrations (HA5-0.5, HA5-1.7m, BH03 1.95, BH08-0.5m). In addition, soil sample HA5-0.5, returned a lead concentration which exceeded the SCS for recreational land use.
- All heavy metal concentrations complied for commercial/industrial/outdoor worker.
- PAH concentrations above the laboratory level of detection were present in four of the samples analysed (HA5-0.5, HA5-1.7m, BH03 1.95, BH08-0.5m).
- Asbestos was not detected in any of the samples analysed.
- Soil samples HA5-0.5m and BH03 1.95m returned copper, lead and zinc concentrations which exceed the Class A landfill screening criteria. Consequently, TCLP analysis will be required to be undertaken on these samples to ensure landfill acceptance of this material.

Option 3

- Two samples returned heavy metal concentrations elevated above expected background concentrations (HA4-0.5m and HA4-1m). In addition, soil sample HA4-1m returned a lead concentration which exceeded the SCS for recreational land use. All other soil samples returned heavy metal concentrations which complied with the SCS for commercial/industrial/outdoor worker and recreational land use.
- PAH concentrations above the laboratory level of detection were present in six samples (HA4-0.5m, HA4-1m, HA6-0.2, HA6-0.5m, HA7-0.2m and HA10-0.2m).
- Asbestos was not detected in any of the samples analysed.
- Soil samples HA4 – 0.5m and HA4-1, returned copper/lead and or zinc concentrations which exceed the Class A landfill screening criteria. Consequently, TCLP analysis will be required to be undertaken on these samples to ensure landfill acceptance of this material.

Option 4

- Ten soil samples returned heavy metal concentrations elevated above expected background concentrations (TP15-0.15m, TP15-1m, TP16-0.6m, TP16-1.5m, TP17-0.40m, TP19-0.7m, TP20-0.55m, TP21-0.7m, TP22-0.2m, BH7-0.5m). In addition, soil sample TP16-1.5m returned a lead concentration which exceeded the SCS for recreational land use. All soil samples returned heavy metal concentrations below the SCS for commercial/industrial/outdoor worker land use.
- PAH concentrations elevated above the laboratory level of detection were present in 10 soil samples (TP15-0.15m, TP15-1m, TP16-0.6m, TP16-1.5m, TP17-0.40m, TP20-0.55m, TP20-0.85m, TP21-0.7m, TP22-0.2m and BH7-0.5m).
- Asbestos (chrysotile fibres) was detected in three soil samples (TP16-1.5, TP17-0.40m and TP21-0.7m).
- Four samples (TP16-0.6m, TP16-1.5m, TP21-0.7 and BH07-0.5m) returned lead and/or zinc concentrations which exceeded the Class A landfill criteria. Consequently, TCLP analysis will be required to be undertaken on these samples to ensure landfill acceptance of this material. Due to the presence of elevated heavy metal concentrations and asbestos in some samples, material excavated from this area will be required to be disposed of a licensed landfill authorised to receive such waste.

Option 5

- Four soil samples returned heavy metals elevated above expected background levels (TP02-0.2m, TP02-0.6m, TP04-0.5m and HA3-0.2m). All samples returned heavy metal

concentrations which complied with the SCS for commercial/industrial/outdoor worker and recreational land use.

- PAH concentrations elevated above the laboratory level of detection were present in seven soil samples (TP01-0.5, TP02-0.2m, TP03-0.3m, TP04-0.2m, TP06-0.5m, TP07-0.4m and HA3-0.2m).
- Asbestos was not detected in any of the samples analysed.
- On average, concentrations fall below expected background concentrations and therefore, subject to the approval of the operator, material may be suitable for disposal at a licensed clean fill. Alternatively, material is acceptable for disposal at a Class A landfill.

Option 6

- Soil samples TP10-0.35m returned arsenic and lead concentrations elevated above expected background levels. All soil samples returned heavy metal concentrations which complied with the SCS for commercial/industrial/outdoor worker and recreational land use.
- Soil sample TP12-0.3m returned PAH concentrations slightly above expected background concentrations. All other samples returned PAH concentrations below the laboratory level of detection.
- Asbestos was not detected in any of the samples analysed.
- On average, concentrations fall below expected background concentrations and therefore, subject to the approval of the operator, material may be suitable for disposal at a licensed clean fill. Alternatively, material is acceptable for disposal at a Class A landfill.

Appendix F: Historical aerial photographs

Historical Aerial Image 1: 1936, sourced from NCC.

Historical Aerial Image 2: 1949, sourced from Retrolens.

Historical Aerial Image 3: 1951, sourced from Retrolens.

Historical Aerial Image 4: 1964, sourced from Retrolens.

Historical Aerial Image 5: 1969, sourced from Retrolens.

Historical Aerial Image 6: 1974, sourced from Retrolens.

Historical Aerial Image 7: 1976, sourced from Alexander Turnbull Library.

Historical Aerial Image 8: 1988, sourced from Retrolens.

Historical Aerial Image 9: 1999, sourced from NCC.

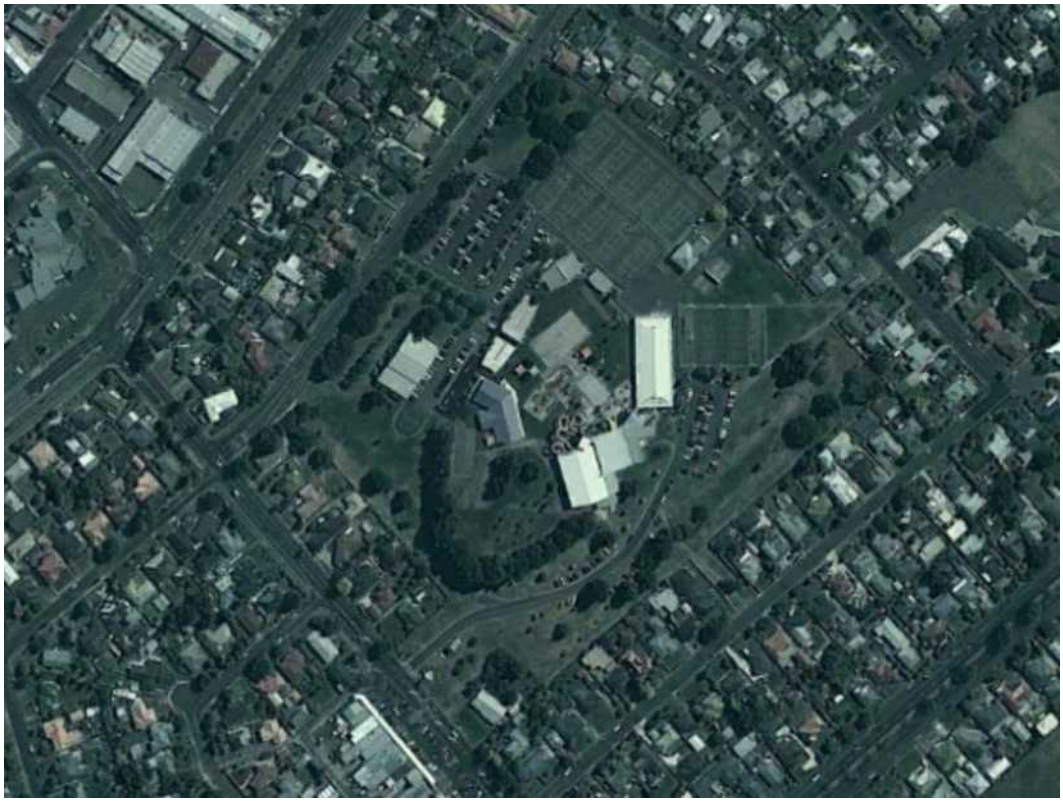
Historical Aerial Image 10: 2003, sourced from Google Earth.

Historical Aerial Image 11: 2004, sourced from NCC.

Historical Aerial Image 12: 2005, sourced from Google Earth.

Historical Aerial Image 13: 2009, sourced from Google Earth.

Historical Aerial Image 14: 2012, sourced from Google Earth.



Historical Aerial Image 15: 2013, sourced from Google Earth.

Historical Aerial Image 16: 2019, sourced from Google Earth.

Appendix G: Laboratory testing results

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2487795 SPv2
Contact:	Melody Robyns C/- Tonkin & Taylor PO Box 2083 Wellington 6140	**Date Received:**	05-Dec-2020
		Date Reported:	14-Jan-2021 **(Amended)**
		Quote No:	80842
		Order No:	1009171
		Client Reference:	Project 1009171
		Submitted By:	Melody Robyns

Sample Type: Soil

Sample Name:		TP05-0.5m 26-Nov-2020	TP06-0.5m 26-Nov-2020	TP06-0.9m 26-Nov-2020	TP07-0.4m 26-Nov-2020	TP07-0.8m 26-Nov-2020
Lab Number:		2487795.2	2487795.4	2487795.5	2487795.7	2487795.8
Individual Tests						
Dry Matter	g/100g as rcvd	67	74	78	75	72
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	5	< 2	6	3
Total Recoverable Cadmium	mg/kg dry wt	0.12	< 0.10	< 0.10	0.12	< 0.10
Total Recoverable Chromium	mg/kg dry wt	19	14	9	18	11
Total Recoverable Copper	mg/kg dry wt	11	8	3	10	3
Total Recoverable Lead	mg/kg dry wt	18.9	26	4.7	16.9	5.6
Total Recoverable Nickel	mg/kg dry wt	15	11	7	15	9
Total Recoverable Zinc	mg/kg dry wt	64	58	29	63	35
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	0.6	< 0.4	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014
2-Methylnaphthalene	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014
Acenaphthylene	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014
Acenaphthene	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014
Anthracene	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014
Benzo[a]anthracene	mg/kg dry wt	< 0.015	0.053	< 0.013	< 0.014	< 0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.015	0.068	< 0.013	< 0.014	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	0.10	< 0.04	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	0.10	< 0.04	< 0.04	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.015	0.074	< 0.013	< 0.014	< 0.014
Benzo[e]pyrene	mg/kg dry wt	< 0.015	0.045	< 0.013	< 0.014	< 0.014
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.015	0.047	< 0.013	< 0.014	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	< 0.015	0.031	< 0.013	< 0.014	< 0.014
Chrysene	mg/kg dry wt	< 0.015	0.047	< 0.013	< 0.014	< 0.014
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014
Fluoranthene	mg/kg dry wt	< 0.015	0.063	< 0.013	0.017	< 0.014
Fluorene	mg/kg dry wt	< 0.015	< 0.014	< 0.013	< 0.014	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.015	0.047	< 0.013	< 0.014	< 0.014
Naphthalene	mg/kg dry wt	< 0.08	< 0.07	< 0.07	< 0.07	< 0.07
Perylene	mg/kg dry wt	< 0.015	0.017	< 0.013	< 0.014	< 0.014
Phenanthrene	mg/kg dry wt	< 0.015	0.014	< 0.013	< 0.014	< 0.014
Pyrene	mg/kg dry wt	< 0.015	0.069	< 0.013	0.016	< 0.014

Sample Type: Soil						
	Sample Name:	TP08-0.4m 26-Nov-2020	TP08-0.8m 26-Nov-2020	TP09-0.6m 27-Nov-2020	TP09-1.0m 27-Nov-2020	TP10-0.35m 27-Nov-2020
	Lab Number:	2487795.10	2487795.11	2487795.13	2487795.14	2487795.16
Individual Tests						
Dry Matter	g/100g as rcvd	83	77	87	75	74
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	3	4	10	14
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.36	< 0.10
Total Recoverable Chromium	mg/kg dry wt	13	12	14	11	21
Total Recoverable Copper	mg/kg dry wt	5	3	12	74	13
Total Recoverable Lead	mg/kg dry wt	10.0	6.3	16.1	200	39
Total Recoverable Nickel	mg/kg dry wt	10	9	10	10	14
Total Recoverable Zinc	mg/kg dry wt	42	37	53	340	72
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.4	0.6	70	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	0.096	< 0.014
2-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	0.071	< 0.014
Acenaphthylene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	0.32	< 0.014
Acenaphthene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	0.198	< 0.014
Anthracene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	1.15	< 0.014
Benzo[a]anthracene	mg/kg dry wt	< 0.012	< 0.013	0.035	5.4	< 0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.012	< 0.013	0.070	6.2	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.03	< 0.04	0.10	8.9	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.03	< 0.04	0.10	8.8	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.012	< 0.013	0.080	6.7	< 0.014
Benzo[e]pyrene	mg/kg dry wt	< 0.012	< 0.013	0.050	4.0	< 0.014
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.012	< 0.013	0.069	4.1	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	< 0.012	< 0.013	0.027	2.6	< 0.014
Chrysene	mg/kg dry wt	< 0.012	< 0.013	0.040	5.4	< 0.014
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	0.67	< 0.014
Fluoranthene	mg/kg dry wt	0.013	< 0.013	0.063	10.7	< 0.014
Fluorene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	0.32	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.012	< 0.013	0.060	4.2	< 0.014
Naphthalene	mg/kg dry wt	< 0.06	< 0.07	< 0.06	0.14	< 0.07
Perylene	mg/kg dry wt	< 0.012	< 0.013	0.024	1.28	< 0.014
Phenanthrene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	5.3	< 0.014
Pyrene	mg/kg dry wt	< 0.012	< 0.013	0.062	11.2	< 0.014

	Sample Name:	TP10-0.80m 27-Nov-2020	TP11-0.40m 27-Nov-2020	TP11-0.85m 27-Nov-2020	TP12-0.3m 27-Nov-2020	TP13-0.6m 27-Nov-2020
	Lab Number:	2487795.17	2487795.19	2487795.20	2487795.21	2487795.25
Individual Tests						
Dry Matter	g/100g as rcvd	77	73	76	80	77
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	3	3	4	2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	11	13	14	11
Total Recoverable Copper	mg/kg dry wt	3	5	5	10	3
Total Recoverable Lead	mg/kg dry wt	4.5	9.6	9.9	12.8	5.8
Total Recoverable Nickel	mg/kg dry wt	8	9	11	11	10
Total Recoverable Zinc	mg/kg dry wt	31	40	52	47	37
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
Acenaphthene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013

Sample Type: Soil						
Sample Name:		TP10-0.80m 27-Nov-2020	TP11-0.40m 27-Nov-2020	TP11-0.85m 27-Nov-2020	TP12-0.3m 27-Nov-2020	TP13-0.6m 27-Nov-2020
Lab Number:		2487795.17	2487795.19	2487795.20	2487795.21	2487795.25
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.021	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.023	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	0.03	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	0.03	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.034	< 0.013
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.020	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.017	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
Chrysene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.020	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
Fluoranthene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.043	< 0.013
Fluorene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.017	< 0.013
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Perylene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
Phenanthrene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013
Pyrene	mg/kg dry wt	< 0.013	< 0.014	< 0.013	0.038	< 0.013

Sample Name:		TP14-0.4m 27-Nov-2020	TP15-0.15m 27-Nov-2020	TP15-1m 27-Nov-2020	TP16-0.6m 27-Nov-2020	TP16-1.5m 27-Nov-2020
Lab Number:		2487795.28	2487795.30	2487795.32	2487795.35	2487795.37
Individual Tests						
Dry Matter	g/100g as rcvd	81	86	84	81	66
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	4	4	4	43
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.28	12.1
Total Recoverable Chromium	mg/kg dry wt	13	13	13	14	37
Total Recoverable Copper	mg/kg dry wt	5	15	13	37	360
Total Recoverable Lead	mg/kg dry wt	8.3	43	31	220	2,200
Total Recoverable Nickel	mg/kg dry wt	10	9	10	13	70
Total Recoverable Zinc	mg/kg dry wt	40	78	73	240	8,300
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	< 0.3	0.3	2.5
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	< 0.015
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	< 0.015
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	< 0.015
Acenaphthene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	< 0.015
Anthracene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	0.044
Benzo[a]anthracene	mg/kg dry wt	< 0.013	0.024	0.017	0.030	0.199
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	0.031	0.022	0.034	0.23
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.03	0.04	0.03	0.05	0.35
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.03	0.04	0.03	0.04	0.35
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	0.037	0.026	0.040	0.27
Benzo[e]pyrene	mg/kg dry wt	< 0.013	0.024	0.017	0.026	0.179
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	0.022	0.015	0.024	0.184
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	0.014	< 0.012	0.014	0.103
Chrysene	mg/kg dry wt	< 0.013	0.021	0.014	0.028	0.197
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	0.041
Fluoranthene	mg/kg dry wt	< 0.013	0.030	0.022	0.059	0.31
Fluorene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	< 0.015

Sample Type: Soil						
Sample Name:		TP14-0.4m 27-Nov-2020	TP15-0.15m 27-Nov-2020	TP15-1m 27-Nov-2020	TP16-0.6m 27-Nov-2020	TP16-1.5m 27-Nov-2020
Lab Number:		2487795.28	2487795.30	2487795.32	2487795.35	2487795.37
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	0.023	0.016	0.024	0.168
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.06	< 0.06	< 0.08
Perylene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	0.049
Phenanthrene	mg/kg dry wt	< 0.013	< 0.012	< 0.012	< 0.012	0.154
Pyrene	mg/kg dry wt	< 0.013	0.034	0.026	0.058	0.31

Sample Name:		TP17-0.40m 30-Nov-2020	TP17-0.90m 30-Nov-2020	TP18-0.6m 30-Nov-2020	TP18-2m 30-Nov-2020	TP19-0.7m 30-Nov-2020
Lab Number:		2487795.39	2487795.40	2487795.42	2487795.43	2487795.44
Individual Tests						
Dry Matter	g/100g as rcvd	82	78	79	69	69
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	12	4	7	3	9
Total Recoverable Cadmium	mg/kg dry wt	0.10	< 0.10	< 0.10	< 0.10	0.11
Total Recoverable Chromium	mg/kg dry wt	19	14	17	14	25
Total Recoverable Copper	mg/kg dry wt	29	7	9	7	14
Total Recoverable Lead	mg/kg dry wt	38	12.3	16.2	9.6	22
Total Recoverable Nickel	mg/kg dry wt	11	10	13	12	22
Total Recoverable Zinc	mg/kg dry wt	77	49	63	47	89
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	0.9	< 0.3	< 0.3	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.014
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.014
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.014
Acenaphthene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.014
Anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.014
Benzo[a]anthracene	mg/kg dry wt	0.057	< 0.013	< 0.013	< 0.015	< 0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.102	< 0.013	< 0.013	< 0.015	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.15	< 0.03	< 0.03	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.15	< 0.03	< 0.03	< 0.04	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.119	< 0.013	< 0.013	< 0.015	< 0.014
Benzo[e]pyrene	mg/kg dry wt	0.073	< 0.013	< 0.013	< 0.015	< 0.014
Benzo[g,h,i]perylene	mg/kg dry wt	0.074	< 0.013	< 0.013	< 0.015	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	0.048	< 0.013	< 0.013	< 0.015	< 0.014
Chrysene	mg/kg dry wt	0.069	< 0.013	< 0.013	< 0.015	< 0.014
Dibenzo[a,h]anthracene	mg/kg dry wt	0.016	< 0.013	< 0.013	< 0.015	< 0.014
Fluoranthene	mg/kg dry wt	0.100	< 0.013	< 0.013	< 0.015	< 0.014
Fluorene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.074	< 0.013	< 0.013	< 0.015	< 0.014
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.08	< 0.07
Perylene	mg/kg dry wt	0.023	< 0.013	< 0.013	0.034	< 0.014
Phenanthrene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.014
Pyrene	mg/kg dry wt	0.109	< 0.013	< 0.013	< 0.015	< 0.014

Sample Name:		TP19-1.6m 30-Nov-2020	TP20-0.55m 30-Nov-2020	TP20-0.85m 30-Nov-2020	TP21-0.7m 30-Nov-2020	TP21-1.3m 30-Nov-2020
Lab Number:		2487795.45	2487795.47	2487795.48	2487795.51	2487795.52
Individual Tests						
Dry Matter	g/100g as rcvd	75	86	74	74	70
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	4	4	7	7
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.20	< 0.10
Total Recoverable Chromium	mg/kg dry wt	12	11	13	18	19
Total Recoverable Copper	mg/kg dry wt	4	10	6	34	12

Sample Type: Soil						
Sample Name:		TP19-1.6m 30-Nov-2020	TP20-0.55m 30-Nov-2020	TP20-0.85m 30-Nov-2020	TP21-0.7m 30-Nov-2020	TP21-1.3m 30-Nov-2020
Lab Number:		2487795.45	2487795.47	2487795.48	2487795.51	2487795.52
Heavy Metals, Screen Level						
Total Recoverable Lead	mg/kg dry wt	7.1	28	12.4	176	21
Total Recoverable Nickel	mg/kg dry wt	10	6	10	15	14
Total Recoverable Zinc	mg/kg dry wt	40	45	51	194	90
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	2.2	0.6	3.1	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.012	< 0.014	< 0.014	< 0.015
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.012	< 0.014	< 0.014	< 0.015
Acenaphthylene	mg/kg dry wt	< 0.014	0.026	< 0.014	0.017	< 0.015
Acenaphthene	mg/kg dry wt	< 0.014	< 0.012	< 0.014	< 0.014	< 0.015
Anthracene	mg/kg dry wt	< 0.014	0.024	< 0.014	0.039	< 0.015
Benzo[a]anthracene	mg/kg dry wt	< 0.014	0.146	0.036	0.29	< 0.015
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	0.24	0.053	0.33	< 0.015
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	0.35	0.08	0.49	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	0.35	0.08	0.49	< 0.04
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.014	0.24	0.056	0.37	< 0.015
Benzo[e]pyrene	mg/kg dry wt	< 0.014	0.180	0.034	0.22	< 0.015
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	0.23	0.031	0.22	< 0.015
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	0.097	0.023	0.139	< 0.015
Chrysene	mg/kg dry wt	< 0.014	0.164	0.046	0.31	< 0.015
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	0.036	< 0.014	0.047	< 0.015
Fluoranthene	mg/kg dry wt	< 0.014	0.23	0.103	0.30	< 0.015
Fluorene	mg/kg dry wt	< 0.014	< 0.012	< 0.014	< 0.014	< 0.015
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	0.194	0.030	0.22	< 0.015
Naphthalene	mg/kg dry wt	< 0.07	< 0.06	< 0.07	< 0.07	< 0.08
Perylene	mg/kg dry wt	< 0.014	0.053	< 0.014	0.096	< 0.015
Phenanthrene	mg/kg dry wt	< 0.014	0.064	0.027	0.139	< 0.015
Pyrene	mg/kg dry wt	< 0.014	0.29	0.103	0.37	< 0.015

Sample Name:		TP22-0.2m 30-Nov-2020	TP22-1.8m 30-Nov-2020	TP01-0.5m 26-Nov-2020	TP01-1.9m 26-Nov-2020	TP02-0.2m 26-Nov-2020
Lab Number:		2487795.53	2487795.55	2487795.57	2487795.59	2487795.60
Individual Tests						
Dry Matter	g/100g as rcvd	79	77	81	76	84
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	2	6	4	7
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.17
Total Recoverable Chromium	mg/kg dry wt	13	13	16	13	15
Total Recoverable Copper	mg/kg dry wt	12	5	26	5	21
Total Recoverable Lead	mg/kg dry wt	29	8.6	18.7	8.7	73
Total Recoverable Nickel	mg/kg dry wt	10	11	13	10	12
Total Recoverable Zinc	mg/kg dry wt	69	47	63	41	153
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.4	< 0.3	< 0.4	1.2
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	< 0.012
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	< 0.012
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	< 0.012
Acenaphthene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	< 0.012
Anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	0.012
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.013	0.014	< 0.013	0.099
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.017	< 0.013	0.021	< 0.013	0.111
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.03	< 0.04	0.03	< 0.04	0.17
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.03	< 0.04	0.03	< 0.04	0.16

Sample Type: Soil						
Sample Name:		TP22-0.2m 30-Nov-2020	TP22-1.8m 30-Nov-2020	TP01-0.5m 26-Nov-2020	TP01-1.9m 26-Nov-2020	TP02-0.2m 26-Nov-2020
Lab Number:		2487795.53	2487795.55	2487795.57	2487795.59	2487795.60
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.018	< 0.013	0.024	< 0.013	0.136
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.013	0.014	< 0.013	0.073
Benzo[g,h,i]perylene	mg/kg dry wt	0.015	< 0.013	0.014	< 0.013	0.079
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	0.053
Chrysene	mg/kg dry wt	< 0.013	< 0.013	0.014	< 0.013	0.100
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	0.015
Fluoranthene	mg/kg dry wt	0.020	< 0.013	0.037	< 0.013	0.167
Fluorene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.013	0.013	< 0.013	0.081
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.06	< 0.07	< 0.06
Perylene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	0.028
Phenanthrene	mg/kg dry wt	< 0.013	< 0.013	< 0.012	< 0.013	0.045
Pyrene	mg/kg dry wt	0.020	< 0.013	0.034	< 0.013	0.174

Sample Name:		TP02-0.6m 26-Nov-2020	TP03-0.3m 26-Nov-2020	TP03-0.6m 26-Nov-2020	TP04-0.2m 26-Nov-2020	TP04-0.5m 26-Nov-2020
Lab Number:		2487795.61	2487795.62	2487795.63	2487795.65	2487795.66
Individual Tests						
Dry Matter	g/100g as rcvd	70	76	72	76	73
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	10	6	7	7	10
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.12	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	20	19	20	16	20
Total Recoverable Copper	mg/kg dry wt	11	10	11	13	11
Total Recoverable Lead	mg/kg dry wt	18.9	20	18.6	37	17.4
Total Recoverable Nickel	mg/kg dry wt	16	14	15	12	15
Total Recoverable Zinc	mg/kg dry wt	70	66	67	80	64
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Acenaphthene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Anthracene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Benzo[a]anthracene	mg/kg dry wt	< 0.014	0.017	< 0.014	0.021	< 0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	0.023	< 0.014	0.031	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	0.04	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.014	0.027	< 0.014	0.034	< 0.014
Benzo[e]pyrene	mg/kg dry wt	< 0.014	0.016	< 0.014	0.022	< 0.014
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	0.014	< 0.014	0.020	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Chrysene	mg/kg dry wt	< 0.014	0.020	< 0.014	0.019	< 0.014
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Fluoranthene	mg/kg dry wt	< 0.014	0.044	< 0.014	0.040	< 0.014
Fluorene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	0.014	< 0.014	0.018	< 0.014
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Perylene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Phenanthrene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.013	< 0.014
Pyrene	mg/kg dry wt	< 0.014	0.043	< 0.014	0.039	< 0.014

Sample Type: Soil						
Sample Name:		HA1-0.1m 25-Nov-2020	HA1-0.6m 25-Nov-2020	HA2-0.7m 25-Nov-2020	HA3-0.2m 25-Nov-2020	HA3-0.6m 25-Nov-2020
Lab Number:		2487795.67	2487795.68	2487795.70	2487795.71	2487795.72
Individual Tests						
Dry Matter	g/100g as rcvd	84	78	77	76	77
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	3	2	7	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.15	< 0.10
Total Recoverable Chromium	mg/kg dry wt	15	13	11	15	13
Total Recoverable Copper	mg/kg dry wt	9	5	4	19	7
Total Recoverable Lead	mg/kg dry wt	30	8.7	6.8	94	15.5
Total Recoverable Nickel	mg/kg dry wt	12	10	9	12	11
Total Recoverable Zinc	mg/kg dry wt	68	42	36	135	55
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	0.4	< 0.4	< 0.4	0.6	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	< 0.014	< 0.013
2-Methylnaphthalene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	< 0.014	< 0.013
Acenaphthylene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	< 0.014	< 0.013
Acenaphthene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	< 0.014	< 0.013
Anthracene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	< 0.014	< 0.013
Benzo[a]anthracene	mg/kg dry wt	0.026	< 0.013	< 0.013	0.053	< 0.013
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.043	< 0.013	< 0.013	0.061	< 0.013
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.07	< 0.04	< 0.04	0.09	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.06	< 0.04	< 0.04	0.09	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.053	< 0.013	< 0.013	0.060	< 0.013
Benzo[e]pyrene	mg/kg dry wt	0.032	< 0.013	< 0.013	0.038	< 0.013
Benzo[g,h,i]perylene	mg/kg dry wt	0.031	< 0.013	< 0.013	0.035	< 0.013
Benzo[k]fluoranthene	mg/kg dry wt	0.020	< 0.013	< 0.013	0.024	< 0.013
Chrysene	mg/kg dry wt	0.030	< 0.013	< 0.013	0.050	< 0.013
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	< 0.014	< 0.013
Fluoranthene	mg/kg dry wt	0.055	< 0.013	< 0.013	0.090	< 0.013
Fluorene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	< 0.014	< 0.013
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.030	< 0.013	< 0.013	0.035	< 0.013
Naphthalene	mg/kg dry wt	< 0.06	< 0.07	< 0.07	< 0.07	< 0.07
Perylene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	< 0.014	< 0.013
Phenanthrene	mg/kg dry wt	< 0.012	< 0.013	< 0.013	0.015	< 0.013
Pyrene	mg/kg dry wt	0.059	< 0.013	< 0.013	0.094	< 0.013

Sample Name:		BH7-0.5m 24-Nov-2020 10:40 am	BH7-1.95m 30-Nov-2020	BH06-0.5m 24-Nov-2020 2:00 pm	BH06-1.5m 24-Nov-2020 2:45 pm	BH08-0.5m 25-Nov-2020 3:00 pm
Lab Number:		2487795.75	2487795.77	2487795.84	2487795.86	2487795.87
Individual Tests						
Dry Matter	g/100g as rcvd	82	75	70	79	69
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	6	5	6	< 2	3
Total Recoverable Cadmium	mg/kg dry wt	0.12	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	16	15	19	9	15
Total Recoverable Copper	mg/kg dry wt	38	9	10	2	19
Total Recoverable Lead	mg/kg dry wt	58	21	19.8	3.7	35
Total Recoverable Nickel	mg/kg dry wt	13	12	16	7	13
Total Recoverable Zinc	mg/kg dry wt	106	70	78	27	182
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	0.9	< 0.4	< 0.4	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.014	< 0.015	< 0.013	< 0.015
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.014	< 0.015	< 0.013	< 0.015
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.014	< 0.015	< 0.013	< 0.015
Acenaphthene	mg/kg dry wt	< 0.013	< 0.014	< 0.015	< 0.013	< 0.015

Sample Type: Soil						
Sample Name:		BH7-0.5m 24-Nov-2020 10:40 am	BH7-1.95m 30-Nov-2020	BH06-0.5m 24-Nov-2020 2:00 pm	BH06-1.5m 24-Nov-2020 2:45 pm	BH08-0.5m 25-Nov-2020 3:00 pm
Lab Number:		2487795.75	2487795.77	2487795.84	2487795.86	2487795.87
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.015	< 0.013	< 0.015
Benzo[a]anthracene	mg/kg dry wt	0.066	< 0.014	< 0.015	< 0.013	< 0.015
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.082	< 0.014	< 0.015	< 0.013	< 0.015
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.12	< 0.04	< 0.04	< 0.04	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.12	< 0.04	< 0.04	< 0.04	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.089	< 0.014	< 0.015	< 0.013	< 0.015
Benzo[e]pyrene	mg/kg dry wt	0.053	< 0.014	< 0.015	< 0.013	< 0.015
Benzo[g,h,i]perylene	mg/kg dry wt	0.059	< 0.014	< 0.015	< 0.013	< 0.015
Benzo[k]fluoranthene	mg/kg dry wt	0.035	< 0.014	< 0.015	< 0.013	< 0.015
Chrysene	mg/kg dry wt	0.072	< 0.014	< 0.015	< 0.013	< 0.015
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.014	< 0.015	< 0.013	< 0.015
Fluoranthene	mg/kg dry wt	0.132	< 0.014	< 0.015	< 0.013	0.019
Fluorene	mg/kg dry wt	< 0.013	< 0.014	< 0.015	< 0.013	< 0.015
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.056	< 0.014	< 0.015	< 0.013	< 0.015
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.08	< 0.07	< 0.08
Perylene	mg/kg dry wt	0.025	< 0.014	< 0.015	< 0.013	< 0.015
Phenanthrene	mg/kg dry wt	0.043	< 0.014	< 0.015	< 0.013	< 0.015
Pyrene	mg/kg dry wt	0.139	< 0.014	< 0.015	< 0.013	0.022

Sample Name:		BH08-1.1m 25-Nov-2020 3:00 pm	BH05-0.5m 24-Nov-2020 8:30 am	BH05-1.5m 24-Nov-2020	BH03 1.95m 30-Nov-2020	BH03-3.45m 30-Nov-2020
Lab Number:		2487795.88	2487795.90	2487795.92	2487795.95	2487795.96
Individual Tests						
Dry Matter	g/100g as rcvd	79	76	77	66	65
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	2	4	3	11	7
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	1.29	< 0.10
Total Recoverable Chromium	mg/kg dry wt	11	16	13	25	18
Total Recoverable Copper	mg/kg dry wt	4	4	4	157	9
Total Recoverable Lead	mg/kg dry wt	9.2	8.4	6.7	700	17.0 #1
Total Recoverable Nickel	mg/kg dry wt	9	9	10	32	13
Total Recoverable Zinc	mg/kg dry wt	70	41	38	630	60
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	0.6	< 0.4
1-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.015
2-Methylnaphthalene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.015
Acenaphthylene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.015
Acenaphthene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.015
Anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.015
Benzo[a]anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.046	< 0.015
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.059	< 0.015
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	0.09	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	0.09	< 0.04
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.066	< 0.015
Benzo[e]pyrene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.048	< 0.015
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.046	< 0.015
Benzo[k]fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.028	< 0.015
Chrysene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.047	< 0.015
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.015
Fluoranthene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.078	< 0.015

Sample Type: Soil						
Sample Name:		BH08-1.1m 25-Nov-2020 3:00 pm	BH05-0.5m 24-Nov-2020 8:30 am	BH05-1.5m 24-Nov-2020	BH03 1.95m 30-Nov-2020	BH03-3.45m 30-Nov-2020
Lab Number:		2487795.88	2487795.90	2487795.92	2487795.95	2487795.96
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Fluorene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	< 0.015
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.045	< 0.015
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.07	< 0.08	< 0.08
Perylene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	< 0.015	0.023
Phenanthrene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.035	< 0.015
Pyrene	mg/kg dry wt	< 0.013	< 0.013	< 0.013	0.085	< 0.015

Sample Name:		BH02-0.5m 25-Nov-2020 3:00 pm	BH02-1.95m 30-Nov-2020	BH01-1.95m 03-Dec-2020	BH01-3.45m 03-Dec-2020	
Lab Number:		2487795.98	2487795.100	2487795.102	2487795.103	
Individual Tests						
Dry Matter	g/100g as rcvd	70	70	72	70	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	3	3	5	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	19	13	13	15	-
Total Recoverable Copper	mg/kg dry wt	11	5	6	6	-
Total Recoverable Lead	mg/kg dry wt	16.2 #1	7.5	9.0	12.1	-
Total Recoverable Nickel	mg/kg dry wt	16	10	11	11	-
Total Recoverable Zinc	mg/kg dry wt	64	39	43	47	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	< 0.4	-
1-Methylnaphthalene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
2-Methylnaphthalene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Acenaphthylene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Acenaphthene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Anthracene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Benzo[a]anthracene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Benzo[e]pyrene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Chrysene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Fluoranthene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Fluorene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Naphthalene	mg/kg dry wt	< 0.08	< 0.07	< 0.07	< 0.07	-
Perylene	mg/kg dry wt	< 0.015	0.022	0.058	< 0.014	-
Phenanthrene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-
Pyrene	mg/kg dry wt	< 0.015	< 0.014	< 0.014	< 0.014	-

Analyst's Comments

#1 It has been noted that there was carry over of approximately 2ug/L in the reported result. Results should be treated with caution.

Amended Report: This certificate of analysis replaces report '2487795-SPv1' issued on 29-Dec-2020 at 4:26 pm. Reason for amendment: Additional testing added.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 47-48, 51-53, 55, 57, 59-63, 65-68, 70-72, 75, 77, 84, 86-88, 90, 92, 95-96, 98, 100, 102-103
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 47-48, 51-53, 55, 57, 59-63, 65-68, 70-72, 75, 77, 84, 86-88, 90, 92, 95-96, 98, 100, 102-103
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 47-48, 51-53, 55, 57, 59-63, 65-68, 70-72, 75, 77, 84, 86-88, 90, 92, 95-96, 98, 100, 102-103

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 0.05 mg/kg dry wt	2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 47-48, 51-53, 55, 57, 59-63, 65-68, 70-72, 75, 77, 84, 86-88, 90, 92, 95-96, 98, 100, 102-103
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 47-48, 51-53, 55, 57, 59-63, 65-68, 70-72, 75, 77, 84, 86-88, 90, 92, 95-96, 98, 100, 102-103
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 47-48, 51-53, 55, 57, 59-63, 65-68, 70-72, 75, 77, 84, 86-88, 90, 92, 95-96, 98, 100, 102-103
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 47-48, 51-53, 55, 57, 59-63, 65-68, 70-72, 75, 77, 84, 86-88, 90, 92, 95-96, 98, 100, 102-103

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 24-Dec-2020 and 13-Jan-2021. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2488498	A2Pv2
Contact:	Melody Robyns	**Date Received:**	07-Dec-2020	
	C/- Tonkin & Taylor	**Date Reported:**	13-Jan-2021	**(Amended)**
	PO Box 2083	**Quote No:**	80842	
	Wellington 6140	**Order No:**	1009171	
		Client Reference:	Project 1009171	
		Submitted By:	Melody Robyns	

Sample Type: Soil

Sample Name:		TP05-0.5m 26-Nov-2020	TP06-0.5m 26-Nov-2020	TP06-0.9m 26-Nov-2020	TP07-0.4m 26-Nov-2020	TP07-0.8m 26-Nov-2020
Lab Number:		2488498.2	2488498.4	2488498.5	2488498.7	2488498.8
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	602.0	817.2	865.5	669.4	839.7
Dry Weight	g	465.7	673.5	699.7	534.1	649.6
Moisture	%	23	18	19	20	23
Sample Fraction >10mm	g dry wt	7.9	2.8	< 0.1	7.6	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	66.1	92.4	< 0.1	69.7	< 0.1
Sample Fraction <2mm	g dry wt	391.0	577.3	699.0	455.8	648.2
<2mm Subsample Weight	g dry wt	51.9	58.0	57.9	56.4	57.4
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		TP08-0.4m 26-Nov-2020	TP08-0.8m 26-Nov-2020	TP09-0.6m 27-Nov-2020	TP09-1.0m 27-Nov-2020	TP10-0.35m 27-Nov-2020
Lab Number:		2488498.10	2488498.11	2488498.13	2488498.14	2488498.16
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	682.2	871.9	707.0	912.7	629.8
Dry Weight	g	558.2	681.6	584.1	746.5	469.9
Moisture	%	18	22	17	18	25

Sample Type: Soil						
Sample Name:		TP08-0.4m 26-Nov-2020	TP08-0.8m 26-Nov-2020	TP09-0.6m 27-Nov-2020	TP09-1.0m 27-Nov-2020	TP10-0.35m 27-Nov-2020
Lab Number:		2488498.10	2488498.11	2488498.13	2488498.14	2488498.16
Sample Fraction >10mm	g dry wt	11.5	< 0.1	6.4	32.8	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	75.2	< 0.1	96.4	154.4	43.5
Sample Fraction <2mm	g dry wt	470.8	680.6	480.4	558.2	425.2
<2mm Subsample Weight	g dry wt	56.1	57.7	59.8	57.0	51.7
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		TP11-0.40m 27-Nov-2020	TP11-0.85m 27-Nov-2020	TP12-0.3m 27-Nov-2020	TP13-0.6m 27-Nov-2020	TP14-0.4m 27-Nov-2020
Lab Number:		2488498.19	2488498.20	2488498.21	2488498.25	2488498.28
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	776.8	936.0	632.9	847.7	765.6
Dry Weight	g	664.1	713.9	525.9	658.3	612.8
Moisture	%	15	24	17	22	20
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	< 0.1	< 0.1	1.2
Sample Fraction <10mm to >2mm	g dry wt	8.2	4.7	25.8	< 0.1	26.5
Sample Fraction <2mm	g dry wt	655.5	708.1	499.2	657.6	584.3
<2mm Subsample Weight	g dry wt	55.3	51.9	55.0	59.9	58.0
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		TP15-0.15m 27-Nov-2020	TP15-1m 27-Nov-2020	TP16-0.6m 27-Nov-2020	TP16-1.5m 27-Nov-2020	TP17-0.40m 30-Nov-2020
Lab Number:		2488498.30	2488498.32	2488498.35	2488498.37	2488498.39
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	Chrysotile (White Asbestos) detected.
Description of Asbestos Form		-	-	-	Loose fibres	Loose fibres
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	706.9	711.5	567.1	617.4	622.7
Dry Weight	g	616.6	598.2	476.9	435.8	510.4
Moisture	%	13	16	16	29	18
Sample Fraction >10mm	g dry wt	59.0	30.4	6.1	103.8	8.0
Sample Fraction <10mm to >2mm	g dry wt	164.2	174.4	37.6	142.6	89.4
Sample Fraction <2mm	g dry wt	392.7	392.0	432.8	188.2	412.2
<2mm Subsample Weight	g dry wt	55.6	53.7	54.6	57.9	59.8

Sample Type: Soil						
Sample Name:		TP15-0.15m 27-Nov-2020	TP15-1m 27-Nov-2020	TP16-0.6m 27-Nov-2020	TP16-1.5m 27-Nov-2020	TP17-0.40m 30-Nov-2020
Lab Number:		2488498.30	2488498.32	2488498.35	2488498.37	2488498.39
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	0.00110	0.00233

Sample Name:		TP17-0.90m 30-Nov-2020	TP18-0.6m 30-Nov-2020	TP18-2m 30-Nov-2020	TP19-0.1m 30-Nov-2020	TP19-0.7m 30-Nov-2020
Lab Number:		2488498.40	2488498.42	2488498.43	2488498.44	2488498.45
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	797.6	721.7	849.4	549.7	726.0
Dry Weight	g	636.3	585.9	606.0	451.1	560.8
Moisture	%	20	19	29	18	23
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	< 0.1	12.0	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	65.4	142.1	< 0.1	95.9	79.2
Sample Fraction <2mm	g dry wt	568.6	442.0	604.2	342.3	480.0
<2mm Subsample Weight	g dry wt	57.9	56.1	51.1	51.3	57.9
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		TP20-0.55m 30-Nov-2020	TP20-0.85m 30-Nov-2020	TP21-0.7m 30-Nov-2020	TP21-1.3m 30-Nov-2020	TP22-0.2m 30-Nov-2020
Lab Number:		2488498.48	2488498.49	2488498.52	2488498.53	2488498.54
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Chrysotile (White Asbestos) detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	ACM debris	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.020	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	0.020	< 0.001	< 0.001
As Received Weight	g	741.9	721.7	642.4	752.0	557.6
Dry Weight	g	648.2	588.8	518.7	563.6	449.1
Moisture	%	13	18	19	25	19
Sample Fraction >10mm	g dry wt	133.0	2.7	3.0	< 0.1	2.2
Sample Fraction <10mm to >2mm	g dry wt	189.5	106.0	107.7	87.1	62.2
Sample Fraction <2mm	g dry wt	325.1	480.0	407.0	474.7	384.6
<2mm Subsample Weight	g dry wt	58.0	57.8	55.4	51.6	55.6
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Type: Soil						
Sample Name:		TP20-0.55m 30-Nov-2020	TP20-0.85m 30-Nov-2020	TP21-0.7m 30-Nov-2020	TP21-1.3m 30-Nov-2020	TP22-0.2m 30-Nov-2020
Lab Number:		2488498.48	2488498.49	2488498.52	2488498.53	2488498.54
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	0.10424	< 0.00001	< 0.00001

Sample Name:		TP22-1.8m 30-Nov-2020	TP01-0.5m 26-Nov-2020	TP01-1.5m 26-Nov-2020	TP02-0.2m 26-Nov-2020	TP02-0.6m 26-Nov-2020
Lab Number:		2488498.56	2488498.58	2488498.59	2488498.61	2488498.62
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	733.1	641.6	864.4	573.1	605.8
Dry Weight	g	523.8	512.7	659.8	458.4	438.0
Moisture	%	29	20	24	20	28
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	< 0.1	33.8	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	103.7	46.0	< 0.1	65.8	75.4
Sample Fraction <2mm	g dry wt	418.9	466.5	658.8	358.3	361.3
<2mm Subsample Weight	g dry wt	59.4	55.3	51.6	52.0	54.8
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		TP03-0.3m 26-Nov-2020	TP03-0.6m 26-Nov-2020	TP04-0.2m 26-Nov-2020	TP04-0.5m 26-Nov-2020	HA1-0.1m 25-Nov-2020
Lab Number:		2488498.63	2488498.64	2488498.66	2488498.67	2488498.68
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	585.4	566.2	665.7	638.5	680.4
Dry Weight	g	443.4	417.1	517.3	496.4	518.5
Moisture	%	24	26	22	22	24
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	< 0.1	< 0.1	1.3
Sample Fraction <10mm to >2mm	g dry wt	104.7	48.2	88.1	79.9	65.4
Sample Fraction <2mm	g dry wt	337.6	368.4	429.1	414.8	451.1
<2mm Subsample Weight	g dry wt	56.6	58.4	55.4	57.3	57.3
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Type: Soil						
Sample Name:		HA1-0.6m 25-Nov-2020	HA2-0.7m 25-Nov-2020	HA3-0.2m 25-Nov-2020	HA3-0.6m 25-Nov-2020	BH7-0.5m 24-Nov-2020
Lab Number:		2488498.69	2488498.71	2488498.72	2488498.73	2488498.76
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	-	-	-	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	-	-	-	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	-	-	-	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	-	-	-	< 0.001	< 0.001
As Received Weight	g	628.0	766.4	636.2	654.2	686.4
Dry Weight	g	492.3	594.8	481.8	518.5	535.5
Moisture	%	-	-	-	21	22
Sample Fraction >10mm	g dry wt	< 0.1	< 0.1	35.2	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	< 0.1	3.4	73.5	15.6	98.3
Sample Fraction <2mm	g dry wt	491.4	591.3	371.7	501.7	435.9
<2mm Subsample Weight	g dry wt	59.9	59.2	51.9	57.1	58.8
Weight of Asbestos in >10mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in <10mm to > 2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in <2mm Sample Fraction	g dry wt	< 0.00001	< 0.00001	< 0.00001	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	-	-	-	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	-	-	-	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	-	-	-	< 0.00001	< 0.00001

Sample Name:		BH7-1.95m 30-Nov-2020	BH06-0.5m 24-Nov-2020	BH06-1.5m 24-Nov-2020	BH08-0.5m 25-Nov-2020	BH08-1.95m 30-Nov-2020
Lab Number:		2488498.78	2488498.83	2488498.85	2488498.86	2488498.88
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	671.4	968.4	1,079.0	961.4	855.9
Dry Weight	g	504.8	721.4	864.0	721.0	781.2
Moisture	%	25	26	20	25	9
Sample Fraction >10mm	g dry wt	3.9	4.0	< 0.1	130.2	299.1
Sample Fraction <10mm to >2mm	g dry wt	96.9	154.0	8.6	143.5	299.2
Sample Fraction <2mm	g dry wt	403.1	561.4	855.3	445.6	181.7
<2mm Subsample Weight	g dry wt	56.0	58.2	57.3	59.8	56.0
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Type: Soil						
Sample Name:		BH05-0.5m 24-Nov-2020	BH05-1.95-3m 24-Nov-2020	BH03-1.95m	BH02-0.5m 25-Nov-2020	BH02-1.95m 30-Nov-2020
Lab Number:		2488498.89	2488498.91	2488498.93	2488498.95	2488498.97
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	901.6	1,096.7	692.0	795.9	826.4
Dry Weight	g	639.2	803.1	481.9	565.9	599.3
Moisture	%	29	27	30	29	27
Sample Fraction >10mm	g dry wt	< 0.1	23.2	11.1	< 0.1	< 0.1
Sample Fraction <10mm to >2mm	g dry wt	159.8	46.3	129.9	43.2	< 0.1
Sample Fraction <2mm	g dry wt	477.0	731.2	339.2	521.0	597.1
<2mm Subsample Weight	g dry wt	57.1	53.6	54.3	55.3	58.9
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		BH01-1.95m 03-Dec-2020				
Lab Number:		2488498.98				
Asbestos Presence / Absence		Asbestos NOT detected.	-	-	-	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	-	-	-	-
As Received Weight	g	869.0	-	-	-	-
Dry Weight	g	595.7	-	-	-	-
Moisture	%	31	-	-	-	-
Sample Fraction >10mm	g dry wt	< 0.1	-	-	-	-
Sample Fraction <10mm to >2mm	g dry wt	8.9	-	-	-	-
Sample Fraction <2mm	g dry wt	585.3	-	-	-	-
<2mm Subsample Weight	g dry wt	57.0	-	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	-	-	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	-	-	-	-

Glossary of Terms
• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

Analyst's Comments

Amended Report: This certificate of analysis replaces report '2488498-A2Pv1' issued on 05-Jan-2021 at 11:46 am.
Reason for amendment: Additional testing added.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Semi Quantitative Asbestos in Soil	Based on approximately 100g of sample provided.	-	69, 71-72
Semi Quantitative Asbestos in Soil			
Weight of Asbestos in >10mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	69, 71-72
Weight of Asbestos in <10mm to >2mm Sample Fraction	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	69, 71-72
Weight of Asbestos in <2mm Sample Fraction	Measurement on analytical balance. Asbestos weight in <2mm subsample, if <2mm subsample weight is not "Entire Fraction". Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	69, 71-72
New Zealand Guidelines Semi Quantitative Asbestos in Soil			

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-69, 71-73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-69, 71-73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-69, 71-73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-69, 71-73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-69, 71-73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-69, 71-73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-69, 71-73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2, 4-5, 7-8, 10-11, 13-14, 16, 19-21, 25, 28, 30, 32, 35, 37, 39-40, 42-45, 48-49, 52-54, 56, 58-59, 61-64, 66-68, 73, 76, 78, 83, 85-86, 88-89, 91, 93, 95, 97-98

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 05-Jan-2021 and 13-Jan-2021. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

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TRIED, TESTED AND TRUSTED

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Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2506056	SPv1
Contact:	Melody Robyns C/- Tonkin & Taylor PO Box 2083 Wellington 6140	**Date Received:**	13-Jan-2021	
		Date Reported:	22-Jan-2021	
		Quote No:	80842	
		Order No:	1009171	
		Client Reference:	1009171	
		Submitted By:	Melody Robyns	

Sample Type: Soil

Sample Name:		HA4 - 0.5m 11-Jan-2021	HA4 - 1m 11-Jan-2021	HA5 - 0.5m 11-Jan-2021	HA5 - 1.7m 11-Jan-2021	HA6 - 0.2m 11-Jan-2021
Lab Number:		2506056.2	2506056.3	2506056.5	2506056.7	2506056.8
Individual Tests						
Dry Matter	g/100g as rcvd	92	91	86	80	95
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	11	16	16	6	7
Total Recoverable Cadmium	mg/kg dry wt	0.49	0.65	1.01	0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	20	23	23	15	12
Total Recoverable Copper	mg/kg dry wt	81	139	230	16	19
Total Recoverable Lead	mg/kg dry wt	430	1,220	1,890	48	26
Total Recoverable Nickel	mg/kg dry wt	17	21	30	14	8
Total Recoverable Zinc	mg/kg dry wt	440	780	950	153	68
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	6.7	6.6	2.2	0.5	0.3
1-Methylnaphthalene	mg/kg dry wt	< 0.011	0.028	< 0.012	< 0.012	< 0.011
2-Methylnaphthalene	mg/kg dry wt	< 0.011	0.034	< 0.012	< 0.012	< 0.011
Acenaphthylene	mg/kg dry wt	0.025	0.057	0.017	< 0.012	< 0.011
Acenaphthene	mg/kg dry wt	0.026	< 0.011	< 0.012	< 0.012	< 0.011
Anthracene	mg/kg dry wt	0.151	0.102	0.036	< 0.012	< 0.011
Benzo[a]anthracene	mg/kg dry wt	0.56	0.52	0.173	0.040	0.026
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.55	0.60	0.21	0.043	0.032
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	0.81	0.87	0.31	0.06	0.05
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	0.80	0.86	0.31	0.06	0.05
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.63	0.65	0.24	0.048	0.035
Benzo[e]pyrene	mg/kg dry wt	0.35	0.37	0.136	0.029	0.022
Benzo[g,h,i]perylene	mg/kg dry wt	0.36	0.41	0.147	0.029	0.023
Benzo[k]fluoranthene	mg/kg dry wt	0.22	0.26	0.090	0.021	0.014
Chrysene	mg/kg dry wt	0.52	0.52	0.181	0.038	0.025
Dibenzo[a,h]anthracene	mg/kg dry wt	0.073	0.079	0.030	< 0.012	< 0.011
Fluoranthene	mg/kg dry wt	1.15	0.96	0.29	0.070	0.044
Fluorene	mg/kg dry wt	0.019	0.014	< 0.012	< 0.012	< 0.011
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.36	0.42	0.141	0.027	0.022
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Perylene	mg/kg dry wt	0.129	0.134	0.047	0.013	< 0.011
Phenanthrene	mg/kg dry wt	0.46	0.38	0.138	0.046	0.017
Pyrene	mg/kg dry wt	1.06	1.03	0.33	0.073	0.048

Sample Type: Soil						
	Sample Name:	HA6 - 0.5m 11-Jan-2021	HA7 - 0.2m 11-Jan-2021	HA8 - 0.2m 11-Jan-2021	HA9 - 0.2m 11-Jan-2021	HA9 - 0.5m 11-Jan-2021
	Lab Number:	2506056.9	2506056.11	2506056.12	2506056.13	2506056.14
Individual Tests						
Dry Matter	g/100g as rcvd	91	92	95	88	84
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	4	5	5	5
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.11	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	10	12	13	14	14
Total Recoverable Copper	mg/kg dry wt	10	10	10	9	9
Total Recoverable Lead	mg/kg dry wt	14.3	21	30	25	22
Total Recoverable Nickel	mg/kg dry wt	7	9	11	12	11
Total Recoverable Zinc	mg/kg dry wt	50	58	86	68	63
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.3	< 0.3	< 0.3	4.0	2.0
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
2-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Acenaphthylene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.014	< 0.012
Acenaphthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.011	< 0.012
Anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.065	< 0.012
Benzo[a]anthracene	mg/kg dry wt	< 0.011	0.018	< 0.011	0.31	0.157
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.011	0.022	< 0.011	0.33	0.20
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.03	0.03	< 0.03	0.50	0.30
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.03	0.03	< 0.03	0.49	0.30
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.011	0.023	< 0.011	0.41	0.25
Benzo[e]pyrene	mg/kg dry wt	< 0.011	0.016	< 0.011	0.21	0.130
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.011	0.016	< 0.011	0.22	0.140
Benzo[k]fluoranthene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.161	0.098
Chrysene	mg/kg dry wt	< 0.011	0.016	< 0.011	0.32	0.177
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.044	0.028
Fluoranthene	mg/kg dry wt	0.013	0.022	< 0.011	0.70	0.28
Fluorene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	< 0.011	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.011	0.015	< 0.011	0.23	0.143
Naphthalene	mg/kg dry wt	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Perylene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.084	0.050
Phenanthrene	mg/kg dry wt	< 0.011	< 0.011	< 0.011	0.176	0.050
Pyrene	mg/kg dry wt	0.012	0.023	< 0.011	0.73	0.30

	Sample Name:	HA10 - 0.2m 11-Jan-2021	BH04 - 1.95m 11-Jan-2021			
	Lab Number:	2506056.16	2506056.17			
Individual Tests						
Dry Matter	g/100g as rcvd	91	99	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	3	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.13	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	13	10	-	-	-
Total Recoverable Copper	mg/kg dry wt	14	3	-	-	-
Total Recoverable Lead	mg/kg dry wt	36	5.1	-	-	-
Total Recoverable Nickel	mg/kg dry wt	11	8	-	-	-
Total Recoverable Zinc	mg/kg dry wt	83	33	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	10.1	< 0.3	-	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.010	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.011	< 0.010	-	-	-
Acenaphthylene	mg/kg dry wt	0.019	< 0.010	-	-	-
Acenaphthene	mg/kg dry wt	< 0.011	< 0.010	-	-	-

Sample Type: Soil						
Sample Name:		HA10 - 0.2m 11-Jan-2021	BH04 - 1.95m 11-Jan-2021			
Lab Number:		2506056.16	2506056.17			
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Anthracene	mg/kg dry wt	0.091	< 0.010	-	-	-
Benzo[a]anthracene	mg/kg dry wt	0.82	< 0.010	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.93	< 0.010	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	1.44	< 0.03	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	1.43	< 0.03	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	1.27	< 0.010	-	-	-
Benzo[e]pyrene	mg/kg dry wt	0.60	< 0.010	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.63	< 0.010	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.52	< 0.010	-	-	-
Chrysene	mg/kg dry wt	0.96	< 0.010	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	0.158	< 0.010	-	-	-
Fluoranthene	mg/kg dry wt	1.42	< 0.010	-	-	-
Fluorene	mg/kg dry wt	< 0.011	< 0.010	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.70	< 0.010	-	-	-
Naphthalene	mg/kg dry wt	< 0.06	< 0.05	-	-	-
Perylene	mg/kg dry wt	0.22	0.020	-	-	-
Phenanthrene	mg/kg dry wt	0.26	< 0.010	-	-	-
Pyrene	mg/kg dry wt	1.48	< 0.010	-	-	-

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	2-3, 5, 7-9, 11-14, 16-17
Total of Reported PAHs in Soil	Sonication extraction, GC-MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	2-3, 5, 7-9, 11-14, 16-17
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	2-3, 5, 7-9, 11-14, 16-17
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.002 - 0.05 mg/kg dry wt	2-3, 5, 7-9, 11-14, 16-17
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2-3, 5, 7-9, 11-14, 16-17
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	2-3, 5, 7-9, 11-14, 16-17
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b) fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	2-3, 5, 7-9, 11-14, 16-17

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 21-Jan-2021 and 22-Jan-2021. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
101C Waterloo Road
Hornby
Christchurch 8042 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Tonkin & Taylor	**Lab No:**	2506585 A2Pv1
Contact:	Melody Robyns	**Date Received:**	13-Jan-2021
	C/- Tonkin & Taylor	**Date Reported:**	21-Jan-2021
	PO Box 2083	**Quote No:**	80842
	Wellington 6140	**Order No:**	1009171
		Client Reference:	1009171
		Submitted By:	Melody Robyns

Sample Type: Soil

Sample Name:		HA4 - 0.5m 11-Jan-2021	HA4 - 1m 11-Jan-2021	HA5 - 0.5m 11-Jan-2021	HA5 - 1.7m 11-Jan-2021	HA6 - 0.2m 11-Jan-2021
Lab Number:		2506585.2	2506585.3	2506585.5	2506585.7	2506585.8
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	607.1	608.4	697.9	738.9	783.1
Dry Weight	g	561.6	547.5	597.5	603.1	747.6
Moisture	%	7	10	14	18	5
Sample Fraction >10mm	g dry wt	5.1	24.1	21.1	3.3	20.5
Sample Fraction <10mm to >2mm	g dry wt	102.0	133.9	99.4	83.6	69.2
Sample Fraction <2mm	g dry wt	452.6	386.9	474.9	514.4	656.4
<2mm Subsample Weight	g dry wt	58.9	52.7	57.0	58.8	54.6
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HA6 - 0.5m 11-Jan-2021	HA7 - 0.2m 11-Jan-2021	HA8 - 0.2m 11-Jan-2021	HA9 - 0.2m 11-Jan-2021	HA9 - 0.5m 11-Jan-2021
Lab Number:		2506585.9	2506585.11	2506585.12	2506585.13	2506585.14
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
As Received Weight	g	750.1	653.6	616.3	706.7	917.6
Dry Weight	g	678.0	610.1	588.5	622.9	735.5
Moisture	%	10	7	5	12	20

Sample Type: Soil						
Sample Name:		HA6 - 0.5m 11-Jan-2021	HA7 - 0.2m 11-Jan-2021	HA8 - 0.2m 11-Jan-2021	HA9 - 0.2m 11-Jan-2021	HA9 - 0.5m 11-Jan-2021
Lab Number:		2506585.9	2506585.11	2506585.12	2506585.13	2506585.14
Sample Fraction >10mm	g dry wt	7.9	44.3	82.7	26.9	0.7
Sample Fraction <10mm to >2mm	g dry wt	67.5	82.5	95.6	94.1	48.3
Sample Fraction <2mm	g dry wt	600.8	481.1	408.3	500.7	683.4
<2mm Subsample Weight	g dry wt	57.5	56.2	59.1	55.3	58.5
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	< 0.00001	< 0.00001	< 0.00001

Sample Name:		HA10 - 0.2m 11-Jan-2021	BH04 - 1.95m 11-Jan-2021			
Lab Number:		2506585.16	2506585.17			
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	-	-	-
Description of Asbestos Form		-	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
As Received Weight	g	657.7	682.2	-	-	-
Dry Weight	g	595.3	668.9	-	-	-
Moisture	%	9	2	-	-	-
Sample Fraction >10mm	g dry wt	10.9	0.4	-	-	-
Sample Fraction <10mm to >2mm	g dry wt	72.6	24.1	-	-	-
Sample Fraction <2mm	g dry wt	510.5	642.8	-	-	-
<2mm Subsample Weight	g dry wt	58.8	58.7	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g dry wt	< 0.00001	< 0.00001	-	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g dry wt	< 0.00001	< 0.00001	-	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g dry wt	< 0.00001	< 0.00001	-	-	-

Glossary of Terms

• Loose fibres (Minor) - One or two fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• Loose fibres (Major) - Three or more fibres/fibre bundles identified during analysis by stereo microscope/PLM.
• ACM Debris (Minor) - One or two small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• ACM Debris (Major) - Large (>2mm) piece, or more than three small (<2mm) pieces of material attached to fibres identified during analysis by stereo microscope/PLM.
• Unknown Mineral Fibres - Mineral fibres of unknown type detected by polarised light microscopy including dispersion staining. The fibres detected may or may not be asbestos fibres. To confirm the identities, another independent analytical technique may be required.
• Trace - Trace levels of asbestos, as defined by AS4964-2004.
For further details, please contact the Asbestos Team.

Please refer to the BRANZ New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
https://www.branz.co.nz/asbestos

The following assumptions have been made:

1. Asbestos Fines in the <2mm fraction, after homogenisation, is evenly distributed throughout the fraction
2. The weight of asbestos in the sample is unaffected by the ashing process.

Results are representative of the sample provided to Hill Laboratories only.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Wgt of Asbestos as Asbestos Fines in <10mm >2mm Fraction*	Measurement on analytical balance, from the <10mm >2mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.00001 g dry wt	2-3, 5, 7-9, 11-14, 16-17
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2-3, 5, 7-9, 11-14, 16-17
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	2-3, 5, 7-9, 11-14, 16-17
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100.	1 %	2-3, 5, 7-9, 11-14, 16-17
Sample Fraction >10mm	Sample dried at 100 to 105°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2-3, 5, 7-9, 11-14, 16-17
Sample Fraction <10mm to >2mm	Sample dried at 100 to 105°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2-3, 5, 7-9, 11-14, 16-17
Sample Fraction <2mm	Sample dried at 100 to 105°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g dry wt	2-3, 5, 7-9, 11-14, 16-17
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	0.01%	2-3, 5, 7-9, 11-14, 16-17
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	2-3, 5, 7-9, 11-14, 16-17
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2-3, 5, 7-9, 11-14, 16-17
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2-3, 5, 7-9, 11-14, 16-17
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2-3, 5, 7-9, 11-14, 16-17
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2-3, 5, 7-9, 11-14, 16-17
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g dry wt	2-3, 5, 7-9, 11-14, 16-17
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2-3, 5, 7-9, 11-14, 16-17
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	2-3, 5, 7-9, 11-14, 16-17

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed on 21-Jan-2021. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Rhodri Williams BSc (Hons)
Technical Manager - Asbestos

Appendix H: Relevant council property file information

UFI 129187

BCAPP

Napier City Council

Application for a Building Consent

1. OWNER

Name: NCC

Postal Address: Private Bag 6010

Napier

Phone: 835 7579 Fax: 835 7574

2. CONTACT (If Not Owner)

Contact Name: Alexander Construction

Postal Address: 55 Dunlop Road, Napier

Person Contact: Mark Hamilton

Phone: 843 9626 Fax: 843 9079

3. PROJECT LOCATION

Address: Netball Pavilion - Onekawa Aquatic Centre 48 Flanders Ave, Npr X471

4. LEGAL DESCRIPTION

Lot(s): 6 DP(s): 10462 Valuation No:

- One copy of Certificate of Title. The Certificate of Title is to be current within three months of application. (Not required for domestic internal alterations). A1 -536 N/A ☐

5. PROJECT (Being stage 1 of an intended 1 stages)

5.1

- New Building ☐
- Alteration ☑
- Relocation ☐
- Demolition ☐

5.2 Intended Life

- Indefinite but not less than 50 years ☑
- OR
- Specified as .....Years

5.3 Description of Work: remove asbestos cladding & reclad in colorsteel; cover in porch; add external sliding doors to pool side; remove existing WC & shower

Intended Use(s) (in detail): office

5.4 Estimated Value (GST Include):

Building	$ 15,000
Plumbing & Drainage	$ 200 - terminate existing only
Total:	$ 15,200 -

5.5 Total floor area of Project: 105 M²

Do you intend to:

- Cross Lease ☐
- Subdivide ☐
- Rental Flats ☐

Please Note: 1) **Work must not commence prior to the issue of the consent.**

2) **Applications not finalised within one month of contact or issue of invoice may be cancelled.**

Signed by or on behalf of the owner:

Signed: ..... **Name:** Mark Hamilton **Date:** 25/8/99

The information which you have provided in this application is placed on the building register which is available for public inspection at Council offices. As useful service for the building community, the Council provides monthly lists of this information. Tradespeople and manufacturers often use the lists to offer products or services available at the time of construction. They also provide important analysis of market trends and indicators to industry. The information from the building register is required to be supplied by the Council under the Building Act and Local Government Official Information and Meetings Act.

PRELIMINARY DRAFT

ONEKAWA PARK

Introduction

This area was set aside in 1946 when the first part of Onekawa was planned for residential sites. Parts of the park were used for a dump whilst the remainder was leased for grazing purposes.

The legacy from the dumping areas is all too evident in the form of broken glass, bricks and stones, and other rubbish in the surface soil.

Onekawa Park was chosen as the site for the Olympic Pool and this swimming complex was completed and opened in December 1964.

Later, 12 all-weather tennis courts were constructed next to the pool and these were opened for play in December, 1966.

The Courts are used in winter for netball.

In 1974 the indoor heated pool was opened.

Exhibition courts for netball and tennis were constructed in 1983.

Present Use

The predominant uses are swimming all year round, tennis in summer, and netball in winter. The park is also used for passive recreation.

Existing Buildings

(As per attached schedule).

Objectives

To manage the park as a Principal and Restricted use sportsgrounds subject to the objectives of the overall management plan for sportsgrounds and also as appropriate as a Neighbourhood park subject to the objectives of the overall management plan for neighbourhood parks.

Policies

The policies for the overall management plans for sportsgrounds and neighbourhood parks shall apply.

It shall also be the Councils policy to encourage general public use of the swimming pools but permit exclusive use by swimming clubs and other organisations during specified hours.

Legal Description

(As per attached schedule).

Napier City Council

28/05

Application for a Building Consent

UPI 101715

1. OWNER

Name: OMNI GYMNASTIC CENTRE INC

Postal Address: C/- RICHARD HOWELL
RICHARD HOWELL MOTORS, TARADALE

Phone: 8442129 WORK Fax:

2. CONTACT *(Person who will receive the invoice)*

Contact name: WOOLAWAY LIMITED

Postal Address: P.O. BOX 3010
ONEKAWA NAPIER

Phone: 8433624 Fax: 8436097

3. PROJECT LOCATION

Address 58 FLANDERS AVENUE, ONEKAWA

BC NUMBER

BC 040511

4. LEGAL DESCRIPTION

Lot(s): 6 DP:(s): 10462 Valuation Number:

5. CERTIFICATE OF TITLE CT Number:

The Certificate of Title together with diagram is to be current within three months of application

Certificate Provided ☐ Certificate Not Required ☐ Certificate to be obtained on my behalf ☑

6. PROJECT (Being stage..... of an intended .....stages)

6.1
New Building ☑
Alteration ☐
Relocation ☐
Demolition ☐

6.2
Intended Life:
Indefinite but not less than 50 yrs: ☑
or
Specified as.....yrs

6.3 Description of work: NEW GYMNASIUM
Intended Use(s) (in detail):

6.4 Estimated Value (GST Include): $ 560,000

6.5 Total floor area of Project: 814 M²

Do you intend to:-
Cross Lease ☐
Subdivide ☐
Rental Flats ☐

BCAPP

Please Note:
1) Work must not commence prior to the issue of the consent.
2) Applications not finalised within one month of contact or issue of invoice may be cancelled.
3) A $100 deposit is required on Application. Remaining fees are payable at time of uplifting the consent.

Signed for and on behalf of:

Signature: Name: GARY McCALMONT P.P. WOOLAWAY LTD Date: 29/4/04

The information which you have provided in this application is placed on the building register which is available for public inspection at Council offices. As a useful service for the building community, the Council provides monthly lists of this information. Tradespeople and manufacturers often use the lists to offer products or services available at the time of construction. They also provide important analysis of market trends and indicators to industry. The information from the building register is required to be supplied by the Council under the Building Act and Local Government Official Information and Meetings Act.

NOTE: You are advised to contact the relevant Electric Power Company and Gas Company for any requirements that either utility may have for your intended project.

Parker Estcourt Ltd
Consulting Engineers
P O Box 12060 Ahuriri Napier
Telephone 835 5842 Fax 835 9030

27 Mar. 02

The Building Inspector
Napier City Council
Private Bag 6010
Napier

Dear Sir

PROPOSED GYMNASIUM AT FLANDERS AVE. NAPIER
FOUNDATION REPORT

Site Description
The site is a level grassed area on the Flanders Ave frontage of the NCC Olympic Pool. Several trees will need to be removed to make space for the building.
The attached aerial photograph shows the approximate location of the proposed gymnasium and the five foundation test holes that were made on 20 March.

Site Investigation
We made 5 hand augured holes to depths of 900 to 1500 mm deep at the locations shown on the plan. Scala penetrometer tests were made beside holes 1 and 3 and the logs of these tests are appended.
All of the test holes showed 300 to 500 mm thickness of dry silt over a layer of moist firm clay/silt. Below this there is a layer of fine sand and at 1200 to 1300 depth there is soft silt.
No fill was identified in the test holes.
Ground water was encountered at 1.7 m in hole 1.

Site Assessment
The soft silty material will tend to cause settlement of foundations.
The bearing pressure under the foundations should be limited to 65 kPa under serviceability limit state loads to control the building settlements to within acceptable limits.
The foundations should be taken down 300 mm below existing ground level to bear on undisturbed silt or sand.
The stumps and major roots of trees within the building area will have to be removed and the resulting excavations backfilled with shingle compacted in layers.
Excavations for the foundations should be inspected during construction to further check that firm undisturbed ground is present

Stan Estcourt, B. E., M.I.P.E.N.Z. Director

This report has been prepared solely for the benefit of the Omni Gymnasium Club as our client with respect to the brief, and the Napier City Council. The reliance of other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

Yours faithfully,

S K Estcourt

TRANSMISSION VERIFICATION REPORT

TIME : 16/05/2002 19:17

DATE,TIME	16/05 19:16
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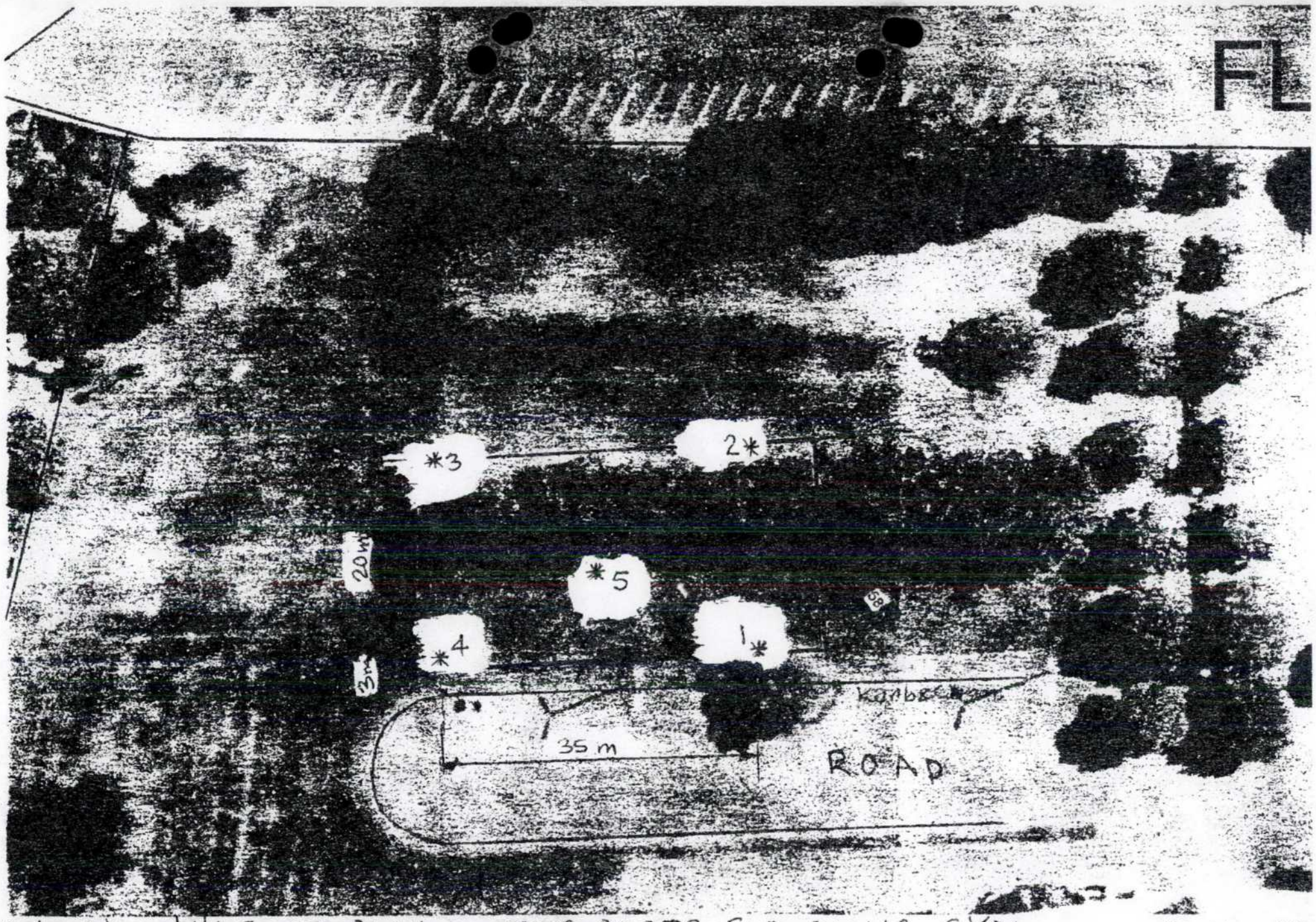


Parker Estcourt Ltd. SITE PLAN – TEST BORES FOR OMNI GYM. 26-Mar-02.

Parker Estcourt Ltd
CONSULTING ENGINEERS NAPIER

PROJECT
OMNI GYM SITE
FLANDERS AVE

PAGE 1
JOB No. 515
CALC BY SKE
DATE 20-3-02

SCALA PENETROMETER

BLOWS No	DEPTH mm	DIST mm	RATE mm/blows	BORE LOG	HOLE NO	3
6	170			0. Dry fawn silt		
6	320	150	25			
3	470	150	50	0.35 Moist firm mottled silt		
3	570	100	33			
3	700	130	43	0.60 - fine sand		
1	725		25			
				1.0 - Wet soft silt		
				1.2 - finish		

NOTES
SCALA Extension rods = 800 mm each

3 blows / 75 mm = 25 mm / blow.

2 blows / 75 mm = 38 mm / blow.

Stiff = cannot be moulded by fingers

Firm = can be by strong pressure

Soft = can be easily

Very soft = Exudes when squeezed

BLOWS No	DEPTH mm	DIST mm	RATE mm/blow	BORE LOG	HOLE NO.	4
				Dry fawn silt		
				0.45 firm moist mottled silt		
				0.90 fine sand		
				1.20 wet soft silt		
				1.30 finish		
				HOLE (5)		
				Dry fawn silt		
				0.5 m roots		
				0.5 firm moist silt		
				0.7 sand - fine		
				0.9 finish		

Parker Estcourt Ltd
CONSULTING ENGINEERS NAPIER

PROJECT
OMNI GYM SITE
FLANDERS AVE

PAGE 2
JOB No. SIS
CALC BY SKE
DATE 20-3-02

SCALA PENETROMETER

BLOWS No	DEPTH mm	DIST mm	RATE mm/blows	BORE LOG. HOLE NO 1
6	170			0 Dry fawn silt
6	240	70	11	
•	300	60	10	0.5 Mottled clay/silt - firm moist. softer with depth
4	380	80	13	
3	450	70	23	1.0 m fine Sand
3	580	130	43	
4	730	150	50	1.3m soft, grey mottled clay
				1.7m wet grey silt/fine sand = ground water
				1.8m finish

BLOWS No	DEPTH mm	DIST mm	RATE mm/blow	BORE LOG HOLE NO. 2
				Dry brown silt
				0.30 Moist, firm mottled silt
				0.6 moist fine sand mottled
				1.8 Soft brown silt finish

NOTES
SCALA Extension rods = 300 mm each

3 blows / 75 mm = 25 mm / blow.

2 blows / 75 mm. = 38 mm / blow.

Stiff = cannot be moulded by fingers

Firm = Can be by strong pressure

Soft = Can be easily

Very soft = Exudes when squeezed

HAZARDOUS SITE(S)

Address: 27 MAADI RD
NAPIER.

Legal Description: Lot 6 DP 10462

Important Site Information:

☑ Fill Site
Fill Type - SUBSIDENCE / FILL
Usage -
Compaction -
Other Notes - REFER TOPIC FILE - HAZARDS – 3.15.1.19.1 3.11.3.8.

☐ Contaminated Site
Site name -
Contaminant -
Current State -
Risk -
Source -

HAZ

☐ Engineering Hazard
Type -
Other Notes -

☐ Coastal Hazard
Subdistrict -
Hazard -

☐ Mass Movement
Hazard -
Subdistrict -
Other Notes/Source -

☐ Flooding
Type -
Other Notes/Source -

· ONEKAWA KINDERGARTEN ·

NAPIER - TARADALE FREE KINDERGARTEN ASSOCIATION ·

MALCOLM & SWEET
REGISTERED ARCHITECTS
STRUCTURAL ENGINEERS
NAPIER HASTINGS

SCALE - 3/8" & 1/8" = 1'0"
666 - 1.
DATE - FEB. 1965.

Permit No. 1336

CITY OF NAPIER

CITY ENGINEER'S DEPARTMENT

Notice of Intention to do Sanitary Plumbing or Drainage work, and Application for Permit

To the HEALTH INSPECTOR, City Council Offices, Napier.

1118

I GIVE YOU NOTICE that I intend to carry out SANITARY **Drainage** **Plumbing** Work as under, and hereby make Application for the necessary Permit.

Premises situated at No. Maadi Rd Section No.

Owner, M Onekawa Kindergarten Address

Specification of Work

Value of work including materials:

(a) Plumbing £400 Plumbers Name Des Rowe plo Ltd

(b) Drainage £230 Drainlayers Name Neil Tiller

Total £630 Fee herewith £ 4.10.0

Date July 28th (Signed) R J Tiller

The omission or neglect to forward the above notice may lead to the cancellation of the Licence.

Martin Print 8.62

HAWKE'S BAY
District Health Board

Media Statement

Further soil testing to reassure Onekawa residents

Further soil testing of residential properties on the closed Onekawa Landfill site will help provide information and reassurance to property owners, representatives from Napier City Council, Hawke's Bay Regional Council and the district health board agreed today.

Medical Officer of Health Dr Nicholas Jones said all three agencies agreed that further soil testing would help provide more detail on any possible contamination.

"Testing already indicates that the health risk for residents is low and further sampling will provide a more complete picture. The three agencies are working collaboratively to make sure additional accurate information is provided to residents and further testing will allow us to do this," he said.

Dr Jones said the Public Health Unit had reviewed the Pattle Delamore Partners report and had sought expert advice from the Ministry of Health. A key finding of the residential property tests was that in general, the depth of cover over the waste found on tested properties was adequate to prevent a risk to health providing deeper soils remain undisturbed.

The most important preventative measure residents could do was to avoid bringing deeper soil to the surface such as any excavation or deep digging," Dr Jones said.

Residents who wanted to take extra precautions could:

- Ensure a good coverage of grass over soil
- Pave or deck, over bare soil areas that cannot be grassed to create a permanent barrier between potential contaminated soil and your family and pets
- Growing vegetables in a raised bed garden constructed with untreated timber and filled with clean topsoil
- Wash soil off and peel all produce grown from the garden before eating
- Wear gardening gloves. Remove gardening clothing and gloves before going inside.

Residents would be kept up-to-date and informed as soil testing took place.

All the agencies wanted to thank residents for their cooperation, patience and feedback while they worked together to provide more information and reassurance to them.
ENDS

For further information please contact:
Anna Kirk
Media & Communications Advisor
Hawke's Bay District Health Board
Telephone: (06) 873 2150 or (027) 234 3667

Property Reference: 50 Flanders Avenue

JB

Mr Taylor
CE/Direct Fax No: 06) 8344147

29 March 2011

Napier City Council
Private Bag 6010
NAPIER 4142

Dear Sir / Madam

FORMER ONEKAWA LANDFILL SITE

Introduction

The purpose of this newsletter is to confirm that your property is located within the area of Onekawa where landfilling activities occurred in the past. We want to inform you of the investigations undertaken and the results of our work.

Background

Napier Borough Council owned a 29 hectare area between Taradale Road and Kennedy Road, centred on Onekawa Park, which operated as a landfill before 1932 and up to 1960.

Some 333 residential properties were understood to be situated over the former landfill; however the actual extent of the landfill was not clearly defined. After careful review, the number of properties situated over the active area of the landfill has been identified as 125. Some of these properties are only just touching the identified area.

As a requirement of the Resource Management Act 1991, the properties sited over the landfill were recorded on a HB Regional Council register, known as the HAIL (Hazardous Activities and Industries List) register or Worley 1995 list.

Site Investigations

HB Regional Council and Napier City Council enlisted environmental consultants, Pattle Delamore Partners Ltd, to identify the extent of the former landfill, give an initial assessment of possible health risks and provide recommendations for further work. This did not include an investigation of property stability or subsidence.

Following their recommendations, a second site investigation was carried out, limited to the 8.6 hectare Onekawa Sports Park. This was to identify the typical depth of soil cover where waste material was present and to assess contamination levels in the waste.

4356
30/3

PERM

NAPIER CITY COUNCIL

BUILDING APPLICATION FORM

To the CITY ENGINEER, Date 22-7 1976

I hereby apply for permission to ERECT A TWO-STOREY BUILDING 55-07-25 according to locality plan and detailed plans, elevations, cross sections, computations and specification of buildings deposited herewith in duplicate.

Primary use to which the building will be put: SPORTS PAVILION

Name of owner: NAPIER CITY COUNCIL Phone: 57579

Postal Address: PRIVATE BAG NAPIER

Situation of Building: ONEKAWA PARK (House No. and Street)

Legal description: Lot No. D.P. 10462

Suburb: ONEKAWA

PARTICULARS OF BUILDING:

Area of ground floor 280 sq. m. Area of outbuildings: — sq. m.

ESTIMATED VALUE:

If work is valued at more than $20,000 state estimated date of commencement:

Building .... $48,381 Month AUGUST Year 1976

Plumbing and Drainage .... $ 5800 Estimated date of completion:

Total .... $54,181 Month NOVEMBER Year 1976

POWER BOARD REQUIREMENT:

If any portion of the proposed building is within 12ft. of any power line, approval must be sought from the appropriate Power Authority, M.E.D. or H.B. Electric Power Board.

I do hereby agree to abide by all the provisions of the Napier City Council By-laws, regulations and Code of Ordinances governing and regulating all matters the subject of the foregoing.

APPLICANT'S NAME (please print): NAPIER CITY COUNCIL

ADDRESS: PRIVATE BAG, NAPIER

SIGNATURE: PHONE: 57579

OFFICE USE ONLY

Date received: Permit No.: 19464 Date: 3-8-76 Receipt No.:

CONDITIONS OF APPROVAL:

Town Planner: Application complies (RR) 23/7/76

Health Inspector: Approved. Sewer drain to be laid in 100 mm. PVC. 29/7/76

Dangerous Goods Inspector:

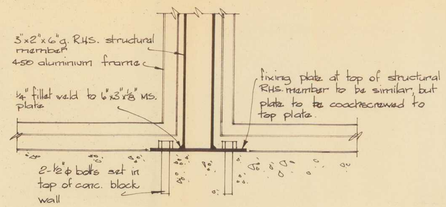
Structural Engineer: X471

Building Inspector: Approved 2/8/76

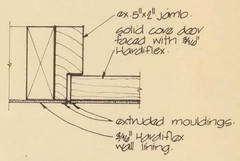
FEES, CHARGES AND DEPOSITS:

Building Permit Fee	$
B.R.A.N.Z. Levy	$
Plumbing and Drainage Permit Fee	$
Sewer Connection	$
Storm Water Connection	$
Water Connection	$
Builders' Licence	$
Open Formed Footpath Deposit	$
Footpath Crossing Deposit	$
	$
Total	$ NO FEE.

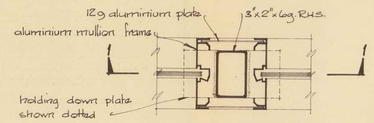
NO FEE TO PAY



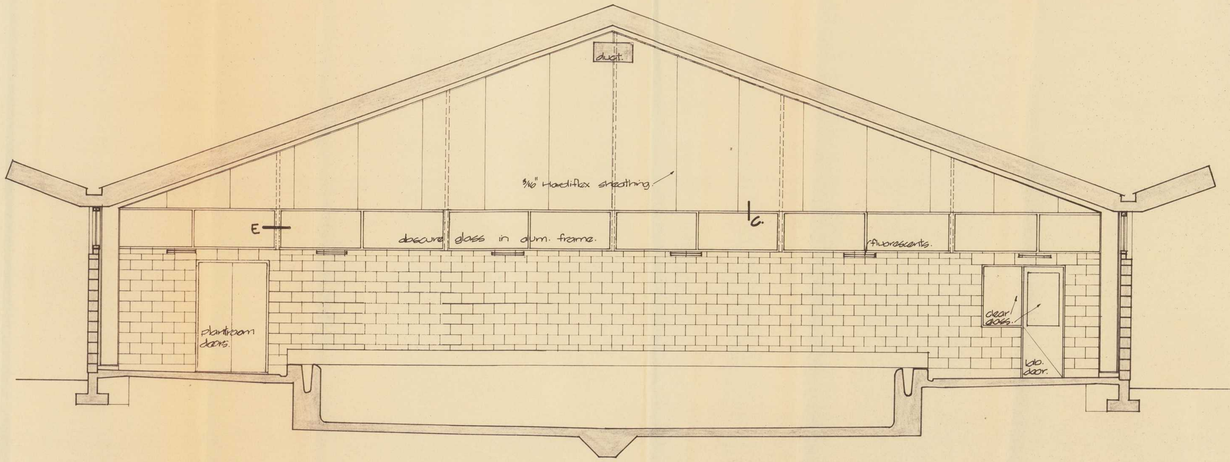
SECTION 1-1



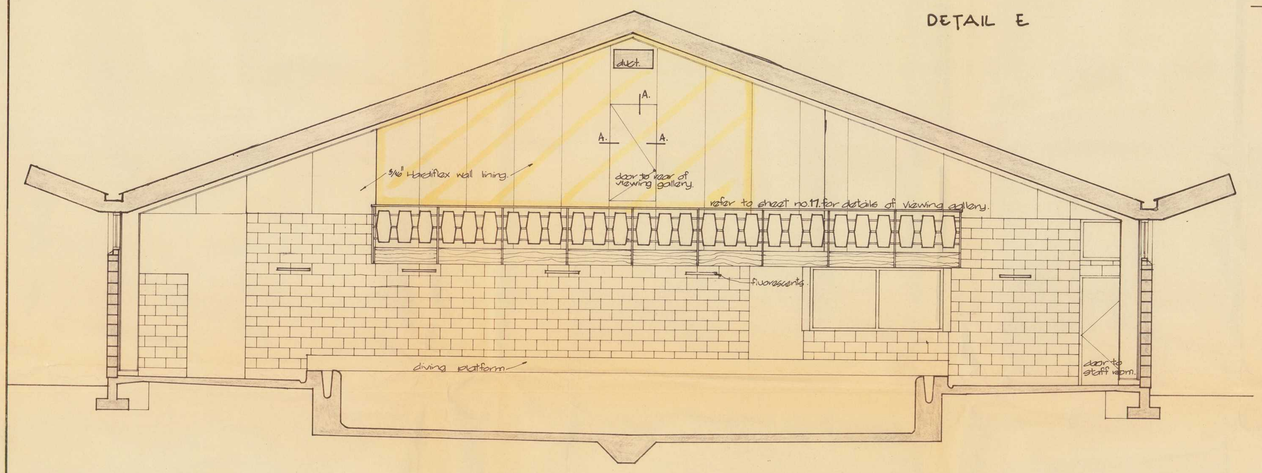
DETAIL A. scale: 3" = 1'-0"



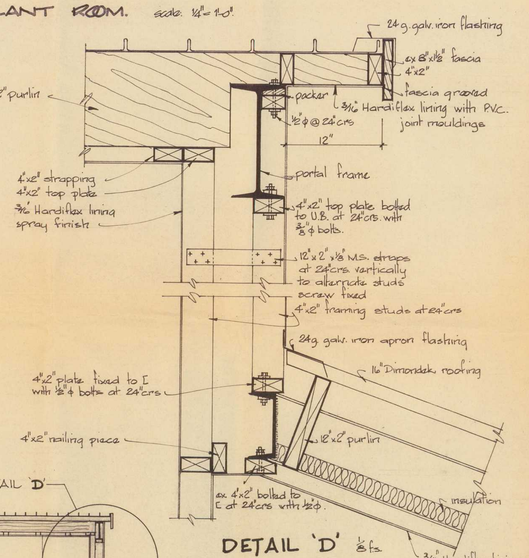
DETAIL E



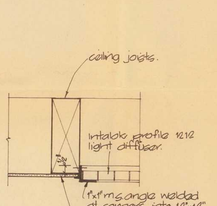
TYPICAL CROSS SECTION THRO. BUILDING TOWARDS PLANT ROOM. scale: ⅛" = 1'-0"



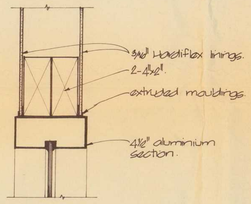
TYPICAL CROSS SECTION THRO. BUILDING TOWARDS VIEWING GALLERY. scale: ⅛" = 1'-0"



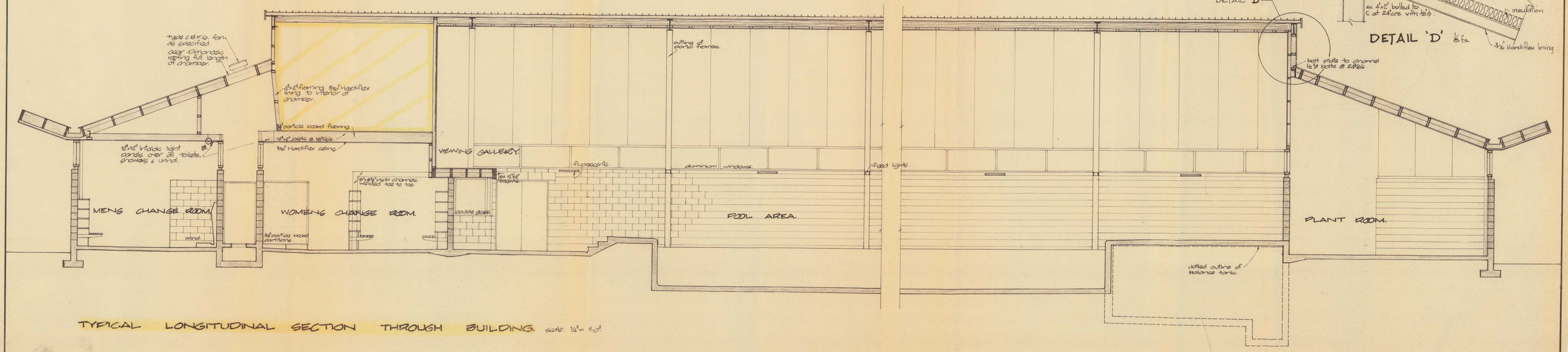
DETAIL 'D' ⅜" fs.



DETAIL B. scale: ⅜" = 1'-0"



DETAIL C. scale: ⅜" = 1'-0"



TYPICAL LONGITUDINAL SECTION THROUGH BUILDING. scale: ⅛" = 1'-0"

OCTOBER 1970 L. G. SPEIGHT ANZIA A.I.A.A. CITY ARCHITECT	NAPIER CITY COUNCIL CITY ENGINEERS DEPARTMENT ONEKAWA HEATED POOL	GENERAL SECTIONS.	SCALES. ⅛" = 1'-0" ⅜" = 1'-0" ½ fs. CITY ENGINEER DATE 11-12-70	DRN. C. Lane TRCD. C. Lane CHKD. L.G.S. JOB NO. C. 493.	SHEET NO. 6 IN SET OF 20

Napier City Council

CITY OF NAPIER

Building Consent 110348 Issued: 18/10/11

Section 51, Building Act 2004

THE BUILDING

Street address of building: 62 FLANDERS AVE

Legal description of land where building is located: Lot 6 DP 10462

Valuation number: 0994027500

ISSU

Building name:

Level/unit number:

THE OWNER

Name of owner: ROYAL NZ PLUNKET SOCIETY HAWKES BAY

(include preferred form of address, e.g., Mr, Ms, Miss, Dr if an individual)

Mailing address: C/- EOS DESIGN, 252 KENNEDY ROAD, NAPIER 4110

Contact person: BEN LUDES

Phone Contact

Landline: 843 5050 Mobile: 021 287 4626

Daytime phone: Fax number: Email address:

First point of Contact: **Full Name: EOS DESIGN LTD**
Mailing Address: 252 KENNEDY ROAD, NAPIER
Phones:: 021 287 4626: 843 5050

BUILDING WORK

The following building work is authorised by this building consent:

NEW COMMUNITY PLUNKET BUILDING, FAMILY CENTRE,

This building consent is issued under section 51 of the Building Act 2004. This building consent does not relieve the owner of the building (or proposed building) of any duty or responsibility under any other Act relating to or affecting the building (or proposed building).

This building consent also does not permit the construction, alteration, demolition, or removal of the building (or proposed building) if that construction, alteration, demolition, or removal would be in breach of any other Act.

All work subject to Engineers Design to be inspected by the Engineer and a Producer Statement (PS4) issued before the issue of the Code Compliance Certificate

Compliance schedule

A compliance schedule is required for the building.

The compliance schedule must contain the following specified systems and comply with the performance standards for those systems required by the building code:

Automatic or manual emergency warning systems SS2

Electromagnetic or automatic doors or windows SS3

Mechanical ventilation or air conditioning systems SS9

Any or all of the following systems and features, so long as they form part of a building's means of escape from fire SS15

Final Exits SS15/2

Signed for and on behalf of the Council:

Name: John Bryson **Date :** 18/10/11

Position: **Building Consents Officer**

EAM
ENVIRONMENTAL CONSULTANTS

DETAILED SITE INVESTIGATION

PROPOSED NEW PLUNKET SITE
MAADIE ROAD
ONEKAWA
NAPIER

Project No
EAM268

Prepared for
PLUNKET HAWKE'S BAY

Prepared by
SUSAN RABBITTE

MAY 2011

EAM - ENVIRONMENTAL CONSULTANTS
Level 1 Bowman Building, 3 Market Street PO Box 1154, Napier 4110
Phone 06 835 0248 **Fax** 06 835 0247 **Email** info@eam.co.nz **Web** www.eam.co.nz

Report prepared by:

SUSAN RABBITTE MSc, BA *(Hons)*, DIC
Principal Geologist/Hydrogeologist

Reviewed by:

JASON STRONG MSc
Principal Environmental Scientist

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Environmental Assessments and Monitoring (EAM) Limited was engaged by Plunket Hawke's Bay in May 2011 to undertake an investigation of the soils on the proposed new Plunket Centre site at Maadi Road, Onekawa, Napier. The site is located within an area that was formerly used as a municipal landfill from prior to 1932 until the late 1950s. Phase 1 and 2 Investigations were carried out by Pattle Delamore Partners (PDP) Limited and the proposed new centre site lies wholly within the area of their investigations (PDP, 2009 & 2011).

The key objective of this detailed site investigation is to confirm the concentrations of contaminants and their relative distributions at the site, and to assess the suitability of the site for the proposed end use as a Plunket Centre. The assessment is based primarily on the comparison of soil analysis results of samples collected during the site investigation to selected criteria for human health exposure as described in the MfE CLM Guidelines (2003) and the proposed National Environmental Standard (MfE, 2010).

The site investigation followed procedures outlined in the MfE CLM guidelines for Site Investigation and Analysis of Soils (MfE, 2004) as detailed in Section 4 of this report.

Samples were collected from surface/near surface soils and of material identified as landfill at 9 locations across the site on 11th May 2011. The shallow soils comprised predominantly brown and orange mottled variably silt or soft clay with some fine sand and occasional gravel. Some rootlets, charcoal and shell fragments were also present. The landfill material comprised a dark brown to black clay to sand matrix with extraneous materials including ceramics, glass, concrete, bone, red brick, charcoal, metal, cables and wood.

Covering shallow soils extended across the site to depths ranging between 0.3m and 1.35m with an average of 0.65m. Landfill material was encountered in all of the boreholes and ranged in depth from 0.1m to 0.45m, being on average 0.25m thick.

Analytical results reported concentrations of Arsenic, Lead and/or some PAHs above the adopted guideline values within one shallow soil sample and 7 of the 9 samples of landfill material. The guideline values adopted are conservative and represent a high density residential setting. The proposed use is not residential but the new facility is for childcare and thus the more conservative approach is deemed warranted. A risk assessment indicates that a contamination hazard is present and that an exposure pathway to receptors may exist.

Mitigation measures will be required and this would likely take the form of some excavation and removal of the affected soils/landfill material or modification to the building plan to ensure adequate cover and isolation from potential receptors.

For geotechnical reasons cover and isolation from the contaminated soils may not be an option at this site. Therefore, excavation and separation of the shallow soils from the landfill material and removal from site of the landfill material will likely be the preferred option.

1.0 INTRODUCTION

1.1 BACKGROUND

Environmental Assessments and Monitoring (EAM) Limited was engaged by Plunket Hawke's Bay in May 2011 to undertake an investigation of the soils on the proposed new Plunket Centre site at Maadi Road, Onekawa, Napier.

The site is located within an area that was formerly used as a municipal landfill from prior to 1932 until the late 1950s. The area of this landfill extended between Taradale Road, Gallipoli Road, Kennedy Road and Maadi Road. Phase 1 and 2 Investigations were carried out by Pattle Delamore Partners Limited (PDP, 2009 & 2011) to identify zones where landfilling activities occurred and identify the presence or absence of waste within a number of properties in the area owned by Hawke's Bay Regional Council (HBRC). The proposed new Plunket Centre site lies wholly within their area of investigation and a detailed site history and environmental setting is provided in the Phase 1 report (PDP, 2009). The Phase 2 Detailed Site Investigation confirmed the presence of heavy metal concentrations exceeding residential guidelines (PDP, 2011).

Three trial pits were excavated within the site area for geotechnical purposes and these confirmed the presence of landfill material at the site and prompted the need for a detailed site investigation.

1.2 OBJECTIVE AND SCOPE OF WORKS

The objectives of this detailed site investigation are:

- determination of the depth of cover and to identify whether contaminant concentrations of concern are present within the covering soils;
- Identify the presence or absence of landfill material below the area of the site and delineate its extent;
- Assess typical contamination levels within the landfill material.

The scope of works for this investigation included;

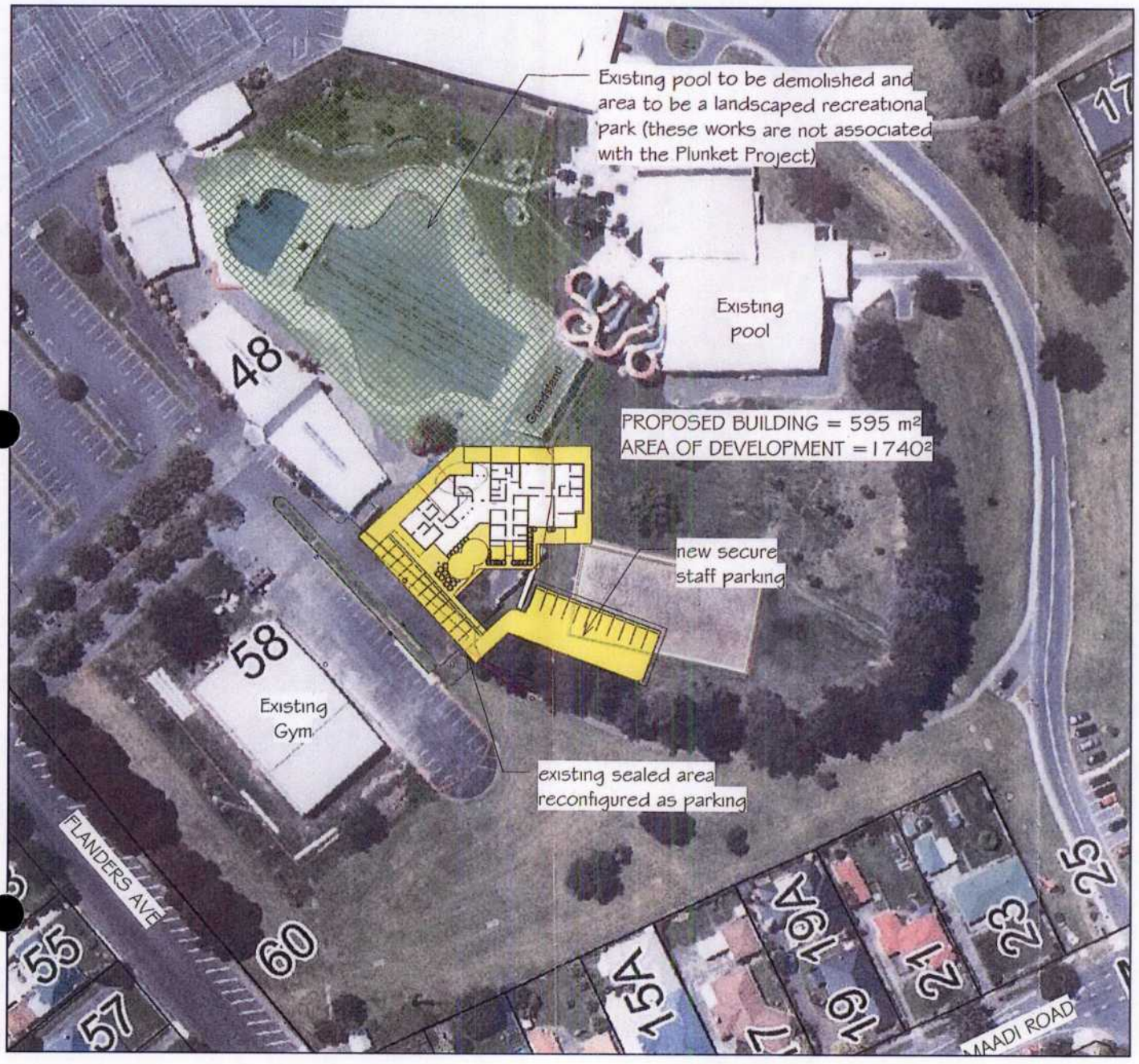
- Construction of 9 hand auger boreholes, the locations of which are a combination of targeted and grid space sampling;
- Analysis of samples of soil and fill material collected as appropriate for heavy metal and polycyclic aromatic hydrocarbons (PAHs);
- Assessment of the risk to potential receptors and the suitability of the proposed new Plunket Centre development for this site;
- Outline of potential options for mitigation of risk.

2.0 SITE DESCRIPTION

The site is located off Maadi Road, Napier and is within the area of the Onekawa Park and Aquatic Centre. The total land area is 1740m^2 with the building platform being 595m^2. The land is currently partly occupied by grassed park area and partly sub-base from an area of hardstanding that was adjacent to the grandstand and former Onekawa Aquatic Centre's outdoor pool. The site aspect is generally flat with the surrounding land use being parkland, recreational and residential. Photographs of the site are presented in Appendix 2.

The proposed development for the site includes a building, car parking, hard landscaped area with raised planter boxes and a strip of garden along the eastern side of the new building that may form an outdoor play area for children attending the centre. The site location and lay-out plans are presented in Figure 1.

FIGURE 1: SITE LOCATION PLAN AND PROPOSED LAYOUT (PRODUCED BY EOS DESIGN)



3.0 FIELD SAMPLING PLANNING

A site visit and inspection was carried out on 9 May 2011 during which time a meeting was held with EOS Design (EOS) to discuss the proposed development and building plans. Enquiries were made to EOS with respect to the presence of buried services at the site, none were reported with the exception of drainage pipes. The presence of manholes makes the drain locations clearly visible. A sampling plan was developed on the basis of this meeting.

Much of the area of the proposed development will be covered by the building platform and areas of hardstanding including carparking, patio areas and footpaths. The area of investigation was focused to that shown in yellow in Figure 1 as this is the area of investigation initially identified by EOS. A landscaped concept plan was provided and is shown in Appendix 1, this plan includes landscaping features, trees and grass mounds, within the wider park area and specific investigation of these areas is not included within this report. A strip of ground outside of the building platform along the eastern side of the site was identified as a possible child's play area, therefore specific consideration was given to sampling in this location with a total of three sample locations placed along this space. A systematic sampling pattern was used across the rest of the site. Sampling density guidelines provided by Ministry for the Environment (MfE) indicate a total of 7 sample locations for a site area of 2000m^2, the Plunket site is 1740m^2. Therefore, the sampling plan made allowance for sampling at 9 locations.

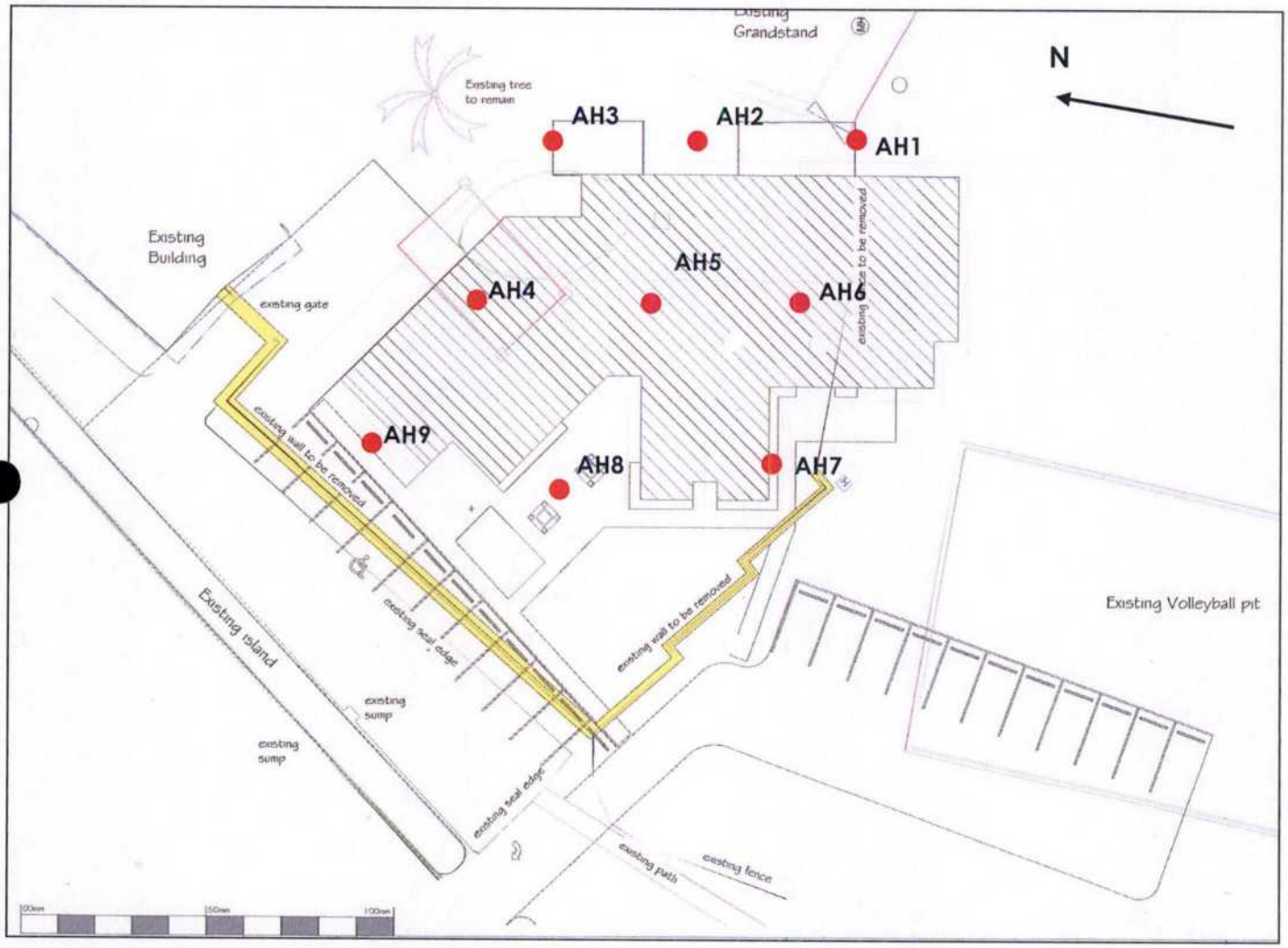
The presence of landfill material below the site is known and the depth to this material is variable being just beneath the surface to approximately 1m below ground level (PDP, 2011). The purpose of the sampling is to characterise the shallow soil (alluvial fill) material that is overlying the landfill to assess the suitability of this material to remain on site. The sampling also aimed to identify the depth to, and thickness of, the landfill material to gain an understanding of the potential volume of this material and to separately characterise chemical components to assist planning of disposal options.

The sample analysis suites identified for the sample analysis are heavy metals and polyaromatic hydrocarbons (PAH) screening. The presence of heavy metal contamination was identified with the soils in this area (PDP, 2011). Whilst no elevated levels of PAH were previously encountered these analytes were selected to guard against uncertainties associated with the inherently variable nature of the landfill material.

4.0 SITE INVESTIGATION

Field sampling was carried out on site on 11 May 2011 using a hand auger a total of 9 boreholes were drilled, the borehole locations are shown on the plan in Figure 2. Landfill material was identified in all of the borehole locations. In some areas recent fill material (pea metal) is present and where this material was identified samples were taken from below it to represent the original shallow soil (alluvial fill). Groundwater was encountered in all of the borehole locations the water table is reported as 0.8m bgl. The bores were drilled to total depth (TD) of 1.5m below ground level (bgl). In some instance the boreholes were terminated earlier because ground conditions meant sample material could not be recovered. A geological log for each borehole is provided in Appendix 2.

FIGURE 2: SOIL SAMPLE LOCATIONS (BASE MAP PROVIDED BY EOS DESIGN)



4.1 SUMMARY OF GEOLOGY

Reworked alluvial fill material is described as soft brown and slightly orange to orange mottled, in places grey variably sandy silty clay to clayey fine sandy silt. Occasional gravel, shell fragments, charcoal and roots are also present. This material extends to between 1.45m, in BH1 and 0.3m in BH4 with an average depth of 0.65m.

The landfill material was encountered at all of the borehole locations and comprised dark brown to brown variably silty sandy clay to silty sand with gravel and various extraneous material including glass, ceramics, wood, bone, brick, concrete, charcoal, metal and copper cable. This material varied in thickness across the site from a minimum of 0.1in AH3 to a maximum of 0.45m in BH7. The thickness of landfill in BH1 was not recorded because the bore was terminated at 1.45m due to poor sample recovery. The average thickness of the landfill material is reported as 0.25m.

4.2 SOIL SAMPLING

A total of 19 soil samples were collected two from each borehole, with three from BH2, to represent the shallow soils and possible landfill at an intermediate depth. Soil samples were lifted from the borehole in the auger blade attachment. The sample material was removed from the auger and laid out on a plastic liner for inspection, lithology logging and sample collection, some photographs are presented in Appendix 3. All sample handling was carried out using disposable gloves that were changed between samples. The samples were placed in clean, glass jars supplied by Hill Laboratories (Hills) Limited and labelled with the sample name, depth and date of collection. Samples were transported in chilled conditions to Hills, an IANZ accredited laboratory, accompanied by chain of custody documentation, Appendix 4.

Nine of the shallow samples were analysed for heavy metals and all nine of the samples of landfill were analysed for heavy metals and polyaromatic hydrocarbons (PAHs).

4.2.1 QA/QC PROCEDURES

Quality Assurance and Quality Control procedures undertaken during sampling included the following:

- Changing of disposable gloves after each sample;
- Collection of soil samples in new, clean, appropriately labelled glass jars supplied by Hills;
- Storing of samples in chilled conditions whilst on site and until delivery to the laboratory for analysis;
- Use of chain of custody procedures and forms;
- Use of an IANZ accredited laboratory with in-house QA/QC procedures for the analyses requested;
- Analysis of samples within recommended sample storage times.

5.0 ASSESSMENT GUIDELINES

The preliminary risk assessment carried out during the Phase 1 investigation (PDP, 2009) concluded that risks to the wider environment, including groundwater and surface water receptors were unlikely to be significant. The findings of this assessment are considered valid for this site as it is located within the area investigated by PDP in their report.

Guideline values are therefore imposed to assist with determining the suitability of a site for its intended purpose; and to indicate the potential human health risk.

Health based guidelines, or Soil Guideline Values (SGVs) are derived through consideration of a variety of potential exposure pathways and the degree of exposure based on the physical setting of each land use. Potential pathways may be considered in the form of oral ingestion, dermal absorption and inhalation. In comparison with agricultural or industrial purposes, residential land use in New Zealand is considered the most sensitive to exposure with potential contaminants as a result of residential practices.

New Zealand guidelines are the foremost assessment guidelines employed when assessing contaminated sites in New Zealand. Guidelines in New Zealand (MfE, 2010) attempt to take into account risk of exposure attributable to produce ingestion, which is likely, particularly in a residential setting, where vegetable gardening is a common practice. In the absence of NZ guidelines for specific contaminants, select overseas guidelines are adopted. During the selection of the guideline values used in this document preference was given to New Zealand documents with extra weight given to more recently published documents (MfE, 2003). In the event of a number of numerical options the lowest most sensitive was chosen.

In this instance the site is commercial but the activities that will be carried out include childcare and therefore conservative guideline values are adopted being those for high density residential (MfE, 2010), with no vegetable gardening.

The following documents were used for selection of SGVs for comparison with the analysis results obtained during this investigation:

- Ministry for Environment (2010) Proposed National Environmental Standard for Assessing and Managing Contaminants in Soil: Discussion Document
- Health and Environmental Guidelines for Selected Timber Treatment Chemicals, Ministry for the Environment/Ministry of Health (1997) New Zealand;

- Health and Environmental Guidelines for Selected Timber Treatment Chemicals, Ministry for the Environment/Ministry of Health (1997) New Zealand;
- National Environmental Protection (Assessment of Site Contamination) Measure (NEPM), National Environment Protection Council (NEPC) December 1999. Australia;
- Guidelines fot Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE (1997) NZ;
- Preliminary Remediation Goals, US EPA (2002b) [Region 9 Guidelines]; and
- Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites, US EPA (2001).

The selected SGVs are generally conservative and are regarded as a guide only. Concentrations exceeding the "trigger value" do not necessarily mean that the site will be unsuitable for the intended use, but merely are an indication that further investigation and remediation may be warranted. The soil acceptance guidelines and the analytical results from the soil investigation are discussed in more detail in the following sections.

6.0 ANALYTICAL RESULTS

The laboratory analytical results are discussed below and the laboratory report is presented in Appendix 4.

6.1 HEAVY METALS

Analytical results for heavy metals and comparisons with the relevant guidelines are presented in Table 1.

TABLE 1: HEAVY METALS (MG/KG)

Sample Name	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
BH1@0.05	5	<0.10	14	8	25	10	60
BH1@1.35	53	9.1	61	640	7300	107	7200
BH2@0.0	6	0.15	18	19	100	14	154
BH2@0.65	69	5.7	40	270	2400	79	4700
BH3@0.1	9	0.45	18	46	310	17	610
BH3@0.8	7	0.48	21	65	260	17	410
BH4@0.15	20	1.99	34	300	1670	93	1290
BH4@0.4	3	<0.10	17	11	40	20	78
BH5@0.0	4	<0.10	17	9	25	12	76
BH5@0.65	59	3.9	56	850	3900	84	3300
BH6@0.0	5	<0.10	15	15	50	12	98
BH6@0.7	57	5.6	72	7000	8800	91	5200
BH7@0.05	4	<0.10	15	12	55	11	82
BH7@0.55	47	3.9	54	1380	5900	83	3100
BH8@0.15	6	0.2	16	19	98	12	280
BH8@0.7	12	0.45	25	67	520	22	400
BH9@0.05	7	0.14	19	31	142	15	153
BH9@0.4	20	5.8	34	290	2100	37	1730
Guideline	**50[1]**	**370[1]**	**1800[1]**	**60000[1]**	**1600[1]**	**2400[2]**	**28000[2]**

* **RED** text indicates exceedence of guideline

[1] Ministry for Environment (2010) Proposed National Environmental Standard for Assessing and Managing Contaminants in Soil: Discussion Document

[2] National Environmental Protection Measure (NEPC, 1999)-Category D

TABLE 2: POLYAROMATIC HYDROCARBONS (MG/KG)

Sample Name	Ace-naphthene	Ace-naphthylene	Anthra-cene	Benzo [a] anthra-cene	Benzo [a] pyrene	Benzo [b] fluoran-thene+ Benzo [j] fluoran-thene	Benzo [g,h,i] pery-lene	Benzo [k] fluoranthene	Chry-sene	Dibenzo[a,h] anthra-cene	Fluoranthene	Fluo-rene	Indeno (1,2,3-c,d) pyrene	Naph-thalene	Phenan-threne	Pyrene
BH1@1.35	0.03	0.08	0.17	**0.68**	0.95	**0.9**	0.8	0.36	0.56	0.12	1.19	0.04	0.57	<0.15	0.54	1.6
BH2@0.65	<0.04	0.06	0.09	0.39	0.52	0.51	0.44	0.2	0.32	**0.06**	0.75	<0.04	0.3	<0.16	0.33	0.98
BH3@0.8	<0.03	<0.03	0.04	0.19	0.25	0.25	0.22	0.1	0.17	0.03	0.38	<0.03	0.15	<0.15	0.18	0.52
BH4@0.4	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.15	<0.03	<0.03
BH5@0.65	0.04	0.08	0.24	**0.87**	1.1	**1.14**	0.89	0.44	0.74	**0.13**	1.88	0.04	**0.64**	<0.17	0.84	2.2
BH6@0.7	<0.04	0.21	0.46	**1.69**	2.1	**2.1**	1.65	0.83	1.38	**0.25**	3.0	0.06	1.2	<0.16	1.18	3.7
BH7@0.55	<0.04	0.08	0.09	**0.66**	0.92	**0.93**	0.78	0.35	0.54	**0.12**	1.07	<0.04	0.56	<0.16	0.36	1.36
BH8@0.7	<0.04	<0.04	<0.04	0.07	0.11	0.11	0.13	0.04	0.06	<0.04	0.09	<0.04	0.08	<0.16	0.04	0.12
BH9@0.4	<0.03	0.04	0.05	0.29	0.38	0.4	0.33	0.15	0.25	0.05	0.53	<0.03	0.24	<0.15	0.2	0.71
Guide-line	**3400** (5)	**105** (2)	**23000** (2)	**0.6** (5)	**240**(1)	**0.6** (5)	**N/A**	**6** (5)	**62** (5)	**0.06** (5)	**13000** (2)	**13000** (2)	**0.6** (5)	**56** (4)	**176** (2)	**330** (3)

RED text indicates exceedence of guideline

(1) Ministry for Environment (2010) Proposed National Environmental Standard for Assessing and Managing Contaminants in Soil: Discussion Document;
(2) Guidelines for Assessing and Managing Contaminated Gasworks Sites in New Zealand, MfE (1997);
(3) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, MfE and MoH (1999), NZ;
(4) Preliminary Remediation Goals, US EPA (2002b) [Region 9 Guidelines;
(5) Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites, US EPA (2001);
N/A Not Available.

Of the samples analysed for heavy metals concentrations of both arsenic and lead were reported in excess of the adopted guideline values for 7 of the 9 samples analysed of the material identified as landfill. Slightly elevated lead was also encountered within the shallow soil sample from BH4@0.15m. If the guideline values are amended to the less sensitive category of commercial the generic SGVs for arsenic and lead increase to 70mg/kg and 7000mg/kg, respectively, in which case there is still an exceedence of lead in two of the landfill samples BH1@1.35m and BH6@0.6m. Where the shallow soils show elevated lead the depth to the top of the landfill material is shallowest being only 0.3m deep.

6.2 POLYAROMATIC HYDROCARBONS (PAHS)

Only the sample material identified as landfill was analysed for PAH. Of the 9 samples analysed 5 contained PAH concentrations in excess of the guidelines adopted for this site for Benzo[a]anthracene, Benzo[b]fluoranthene+Benzo[j]fluoranthene, Dibenzo[a,h]anthracene and Indeno(1,2,3-c,d)pyrene, these results are shown in Table 2. The guidelines for these determinants were obtained from a US Environmental Protection Agency (EPA) document.

7.0 RISK ASSESSMENT

In line with the proposed National Environmental Standard (MfE, 2010), in order to carry out a site risk assessment an initial conceptual model of the envisaged plausible contamination is developed in the form of a hazard – pathway – receptor pollution linkage concept.

7.1 HAZARD IDENTIFICATION

On the basis of the laboratory analysis and assessment of these results against the adopted guideline values the hazards identified for this site are the heavy metals lead and arsenic and the PAHs Benzo[a]anthracene, Benzo[b]fluoranthene+Benzo[j]fluoranthene, Dibenzo[a,h]anthracene and Indeno(1,2,3-c,d)pyrene.

7.2 PATHWAY AND POTENTIAL RECEPTORS

The possible pathways and receptors associated with this site and its end use are presented in Table 3.

TABLE 3. PATHWAYS AND POTENTIAL RECEPTORS

Contaminants	Receptor	Pathway
Heavy Metals & PAHs	End Users	Oral Ingestion of soil or dust, dermal absorption or inhalation where soil is exposed
		Oral ingestion of soil where soil is exposed in garden areas
	Site workers	Dermal absorption and Inhalation
	Adjacent Sites	Dust Generation

7.2.1 RISK TO HUMAN HEALTH

The results from the shallow soil samples indicate one sample that is slightly in exceedance of the adopted guideline value. Contamination with landfill material is also confirmed within the top 0.6m of soil. Therefore, there is a human health exposure risk and oral ingestion and dermal absorption could occur. A pathway for this exposure is though soft landscaping or gardens. The proposed development limits this potential exposure through the use of hard landscaping and raised planter boxes, but some areas of soil contact may remain. It is essential to provide clean soils in all areas where children may play.

7.2.2 BUILDING CONTRACTORS, SITE WORKERS

Normal precautions for development of sites will apply and should include dust suppression measures. Site workers will need to be made aware of the presence of contamination at this site and a programme of site working should be developed in accordance with relevant building guidelines.

7.2.3 ADJACENT SITES

Heavy metals are generally immobile and therefore the potential for lateral migration in the soil profile is considered low. There is a possibility that dust may be generated at the site during excavation and construction works, hence a small risk is associated with airborne contaminants.

8.0 CONCLUSION

The key objective of this detailed site investigation is to confirm the concentrations of contaminants and their relative distributions at the site, and to assess the suitability of the site for the proposed end use as a Plunket Centre. The assessment is based primarily on the comparison of soil analysis results of samples collected during the site investigation to selected criteria for human health exposure as described in the MfE CLM Guidelines (2003) and the proposed National Environmental Standard (MfE, 2010).

The site investigation followed procedures outlined in the MfE CLM guidelines for Site Investigation and Analysis of Soils (MfE, 2004) as detailed in Section 4 of this report.

Samples were collected from surface/near surface soils and of material identified as landfill at 9 locations across the site on 11th May 2011. The shallow soils comprised predominantly brown and orange mottled variably silt or soft clay with some fine sand and occasional gravel. Some rootlets, charcoal and shell fragments were also present. The landfill material comprised a dark brown to black clay to sand matrix with extraneous materials including ceramics, glass, concrete, bone, red brick, charcoal, metal, cables and wood.

Covering shallow soils extended across the site to depths ranging between 0.3 and 1.35m with an average of 0.65m. Landfill material was encountered in all of the boreholes and ranged in depth from 0.1 to 0.45m, being on average 0.25m thick.

Analytical results reported concentrations of Arsenic, Lead and/or some PAHs above the adopted guideline values within one shallow soil sample and 7 of the 9 samples of landfill material. The guideline values adopted are conservative and represent a high density residential setting. The proposed use is not residential but the new facility is for childcare and thus the more conservative approach is deemed warranted. A risk assessment indicates that a contamination hazard is present and that an exposure pathway to receptors may exist.

Mitigation measures will be required and this would likely take the form of some excavation and removal of the affected soils/landfill material or modification to the building plan to ensure adequate cover and isolation from potential receptors.

9.0 RECOMMENDATIONS

The presence of the landfill material may not provide a suitable bearing material for the new building platform, specific advice should be sought from a geotechnical specialist in this regard. This being the case cover and isolation from the contaminated soils may not be an option. Excavation and separation of the shallow soils from the landfill material and removal from site of the landfill material will likely be the preferred option.

Prior to carrying out any remedial activities a Remedial Action Plan (RAP) document will be required that details the specifics of the proposed remedial activities. It is usual that the site investigation report and the remedial plan are submitted to the local authorities as part of the consenting process. Once approved the remedial action plan can be carried out.

During remediation and dependant on the details of the remedial activities, site visits and further validation soil sampling will likely be required, such as within the area of excavation to ensure complete removal of affected soils. A Completion Report will also be required that details the results of any validation sampling and confirms the remedial activities were carried out as detailed in the RAP.

10.0 REFERENCES

Ministry for the Environment (2001) Contaminated Land Management Guidelines No. 1: *Reporting on Contaminated Sites in New Zealand*. ISBN 0-478-18909-5

Ministry for the Environment (2003) Contaminated Land Management Guidelines No. 2: *Hierarchy and Application in New Zealand of Environmental Guidelines*. ISBN 0-478-18912-5

Ministry for the Environment (2004) Contaminated Land Management Guidelines No. 5: *Site Investigation and Analysis of Soils*. ISBN 0-478-18917-6

Ministry for the Environment (2010) Proposed National Environmental Standard for Assessing and Managing Contaminants in Soil: Discussion Document

Pattle Delamore Partners Ltd (2009) Phase 1 Site Assessment - Former Taradale Road Landfill, Onekawa, Napier. Reference W0171606. Prepared by Mike Clyde.

Pattle Delamore Partners Ltd (2011) Phase 2 Site Investigation at the Former Taradale Road Landfill. Reference W01716109. Prepared by Susan Hemming.

APPENDIX 1
LANDSCAPE CONCEPT PLAN

Key

Trees
- Pohutukawa
- Titoki
- Lancewood
- Cabbage tree
- Mt Fuji Cherry

Paving and Furniture
- Concrete seat
- Exposed aggregate concrete
- Pigmented concrete
- Exposed glass concrete
- Cobble/brick
- Match material/bond in main entry
- Timber seating deck
- Joints (decorative cut)

Features
- Local stone or poles
- Rumble strip
- Coloured poles/Pou feature
- Grass mounds

Code	Plant Species	Common Name	Size	Spacing	Centres	Area	Quantity
	Plant Mix 1 (Blue Theme)						
	Agapanthus 'Peter Pan'	Agapanthus	PB3	0.5	7.5		30
	Lithodora 'Grace Ward'	Groundcover	PB3	0.45	1		5
	Liriope muscari	Liriope	PB3	0.5	2		8
	Pimelia prostrata	NZ Daphne	PB3	0.5	3		12
	Plant Mix 2 (Yellow Theme)						
	Arctotis 'Sunflower'	Daisy	PB3	0.5	4.5		18
Ab	Astelia banksii	Astelia	PB3	Specimen	N/A		26
	Libertia peregrinans	NZ Iris	PB3	0.45	6.5		33
	Plant Mix 3 (Red Theme)						
	Arctotis 'Red Flame' or 'Hannah'	Daisy	PB3	0.5	3		12
Crr	Coprosma acerosa 'Red Rocks'	Coprosma	PB3	Specimen	N/A		11
	Imperata cylindrica	Blood grass	PB3	0.45	1.1		5
Peg	Phormium 'Emerald Gem'	Phormium	PB3	Specimen	N/A		16
	Plant Mix 4 (Green Theme)						
	Astelia 'Red Devil'	Astelia	PB3	0.6	5.2		16
	Hebe diosmifolia	Hebe	PB3	0.6	11.7		35
	Muehlenbeckia axillaris	Pohuehue	PB3	0.6	6.5		20
	Trees						
	Alectryon excelsus (2x Stakes)	Titoki	PB40	Specimen	N/A		7
	Cordyline australis (2x Stakes)	Cabbage tree	PB18	Specimen	N/A		5
	Metrosideros excelsa (2x Stakes)	Pohutukawa	PB18	Specimen	N/A		6
	Pseudopanax crassifolius (2x Stakes)	Lancewood	PB18	Specimen	N/A		5
	Prunus 'Shirotae' (2x Stakes)	Mt Fuji Cherry	Open Ground	Specimen	N/A		20
Total							288

Notes:
To be read in conjunction with construction concept drawings

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OPUS LANDSCAPE Architecture

PLUNKET PARENTS CENTRE ONEKAWA
LANDSCAPE CONCEPT PLAN

PLUNKET
2-T5008.PP
Scale 1:100 - For internal discussion
MARCH 2011

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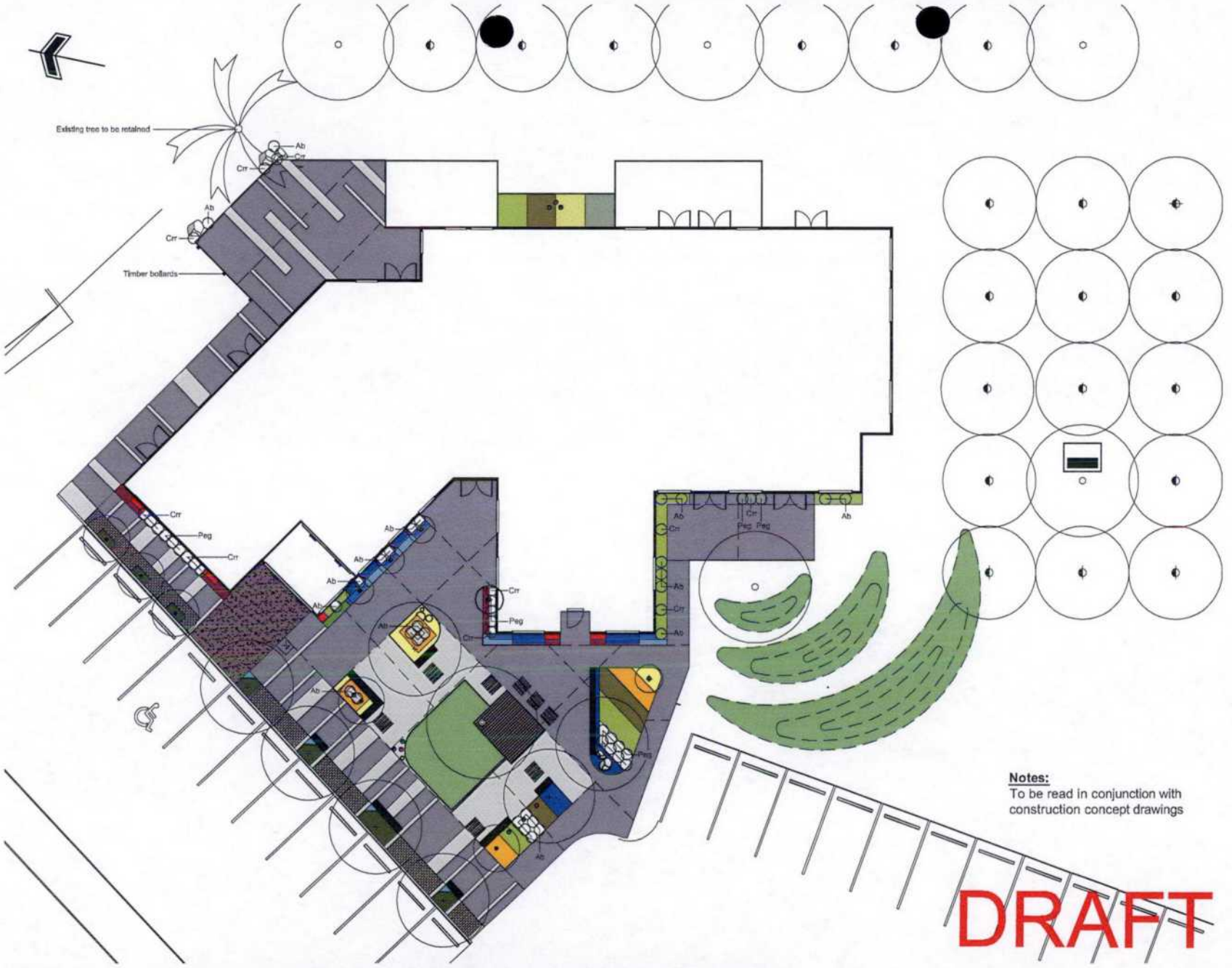
Plunket



Key

Trees
- Pohutukawa
- Titoki
- Lancewood
- Cabbage tree
- Mt Fuji Cherry

Shrubs and groundcovers
- Arctotis 'Sunflower'
- Agapanthus 'Peter Pan'
- Arctotis 'Red Flame '
- Astelia 'Red Devil'
- Ab — Astelia banksii
- Blood grass
- Crr — Coprosma 'Red Rocks'
- Lithodora 'Grace Ward'
- Hebe diosmifolia
- Libertia perigrans
- Liriope muscari
- Peg — Phormium 'Emerald Gem'
- Pimelia prostrata

Paving and Furniture
- Concrete seat
- Exposed aggregate concrete
- Pigmented concrete
- Exposed glass concrete
- Cobble/brick
- Match material/bond in main entry
- Timber seating deck

Features Joints (decorative cut)
- Local stone or poles
- Rumble strip
- Coloured poles/Pou feature
- Grass mounds

Notes:
To be read in conjunction with construction concept drawings

DRAFT

OPUS LANDSCAPE Architecture

PLUNKET PARENTS CENTRE ONEKAWA
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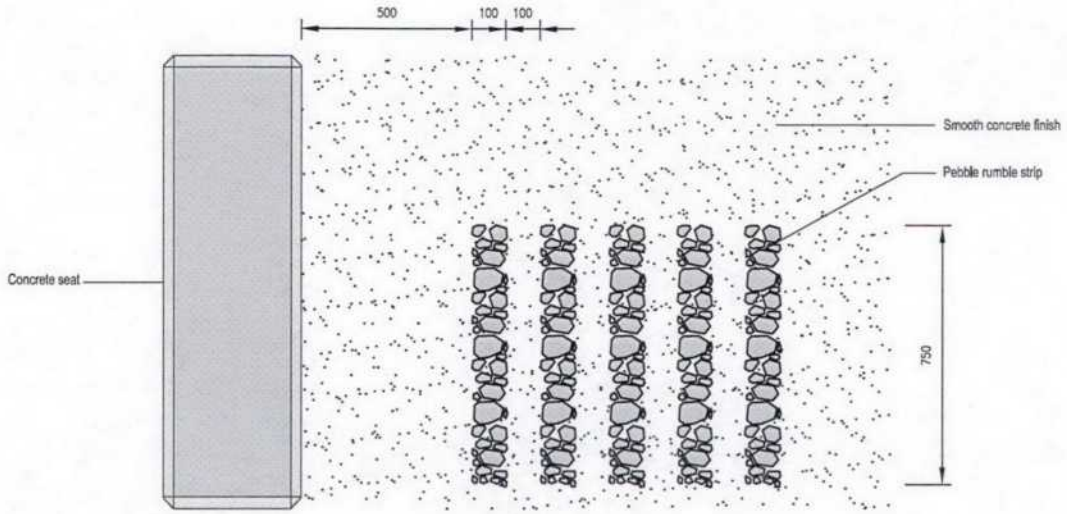
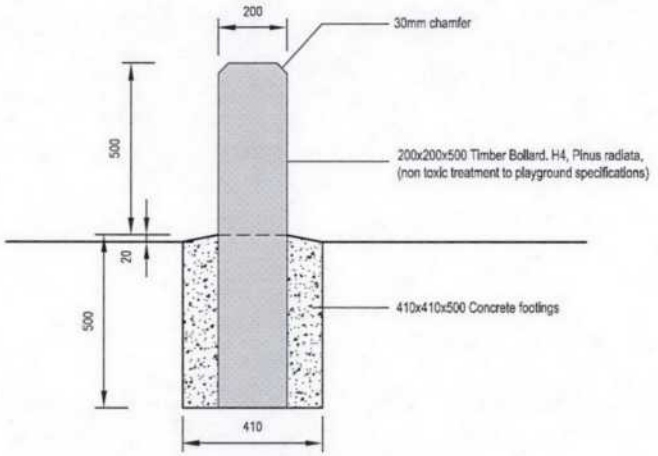
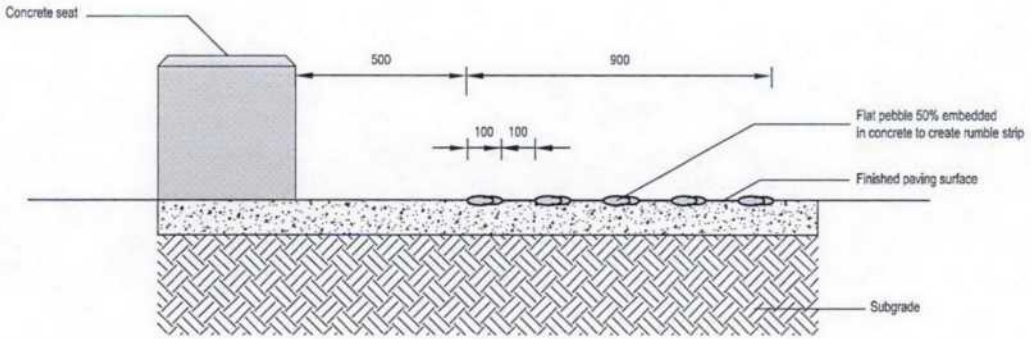
Plunket



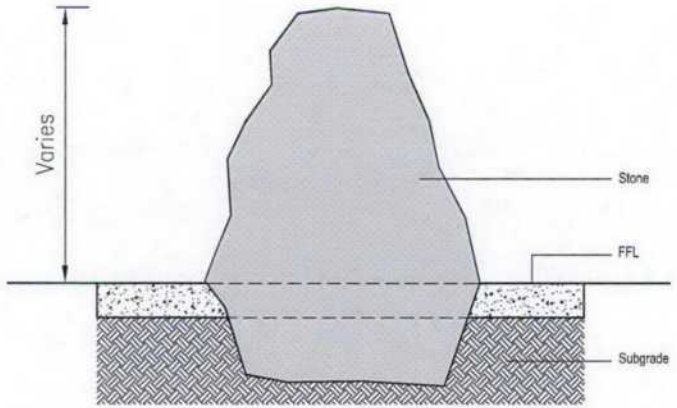
Plan - Pebble Rumblestrip in Concrete
Scale 1:15



Section - Timber Bollard
Scale 1:15



Indicative Section - Pebble Rumblestrip in Concrete
Scale 1:15



Indicative Section - Feature Stone
Scale 1:15

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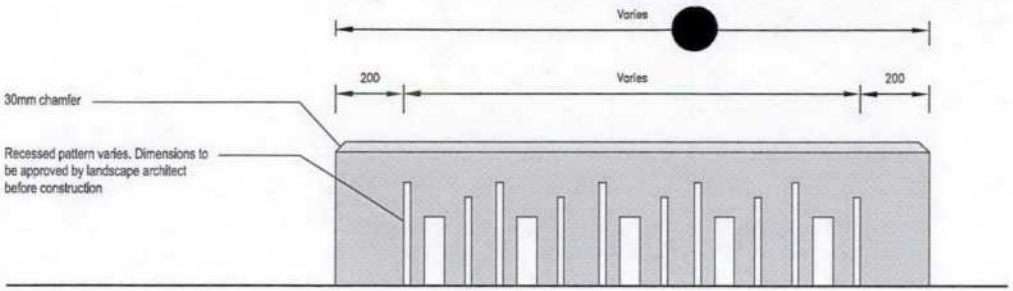
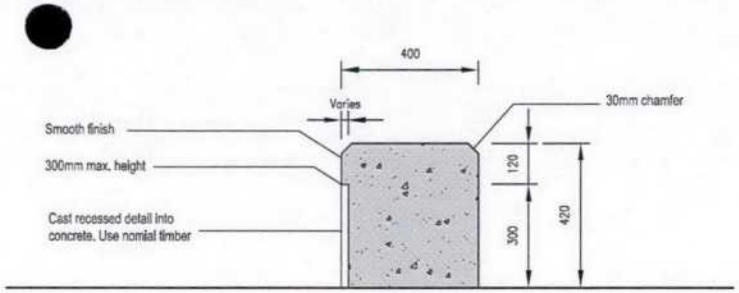
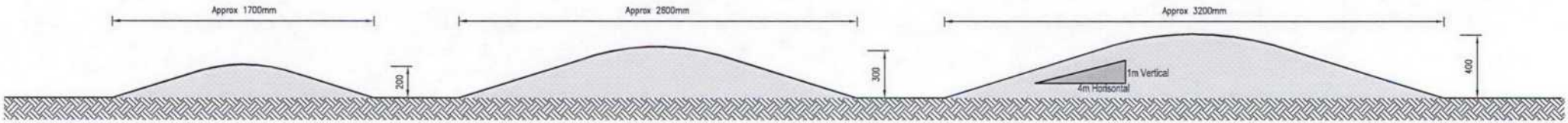


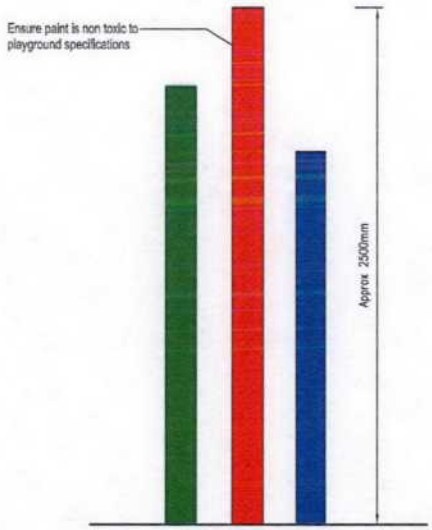
Elevation - Cast Concrete Seat
Scale 1:15



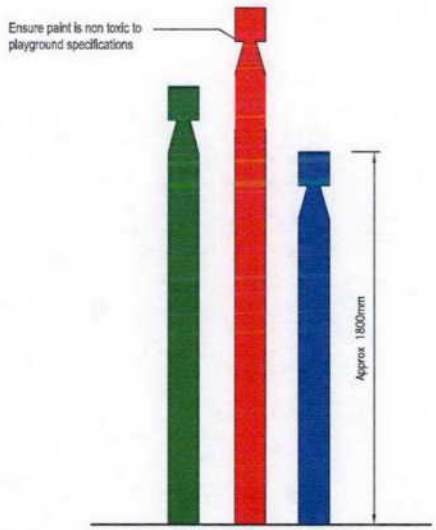
Indicative Section - Cast Concrete Seat
Scale 1:15



Indicative Section - Grass Mounds
Scale 1:25



Elevation Option 1
Painted Timber/Concrete/Metal Post
Scale 1:25



Elevation Option 2
Painted Timber/Concrete/Metal Post
Scale 1:25

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OPUS LANDSCAPE Architecture

PLUNKET PARENTS CENTRE ONEKAWA
CONSTRUCTION CONCEPTS - FEATURES

PLUNKET
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Scale as shown - For internal discussion
MARCH 2011

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Plunket

Paving Pattern


Vivid colour inlays


Concrete strips for visual interest and variation

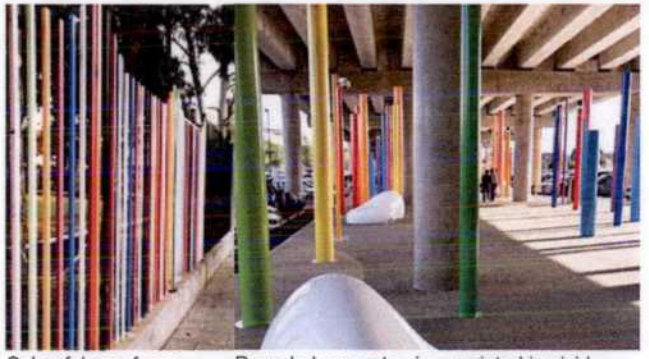

Recycled glass - honed to a non-slip surface


Concrete paving - robust and economical

Landscape Elements - Art, Features and Furniture


Timber seating (central lawn)


Cultural Feature - Pou


Colourful rear fence and bollards

Recycled concrete pipes painted in vivid colours provide vertical interest (recycled materials)

Landscape Elements - Seating


Concrete seats - robust, low maintenance and economical

OPUS LANDSCAPE Architecture

PLUNKET PARENTS CENTRE ONEKAWA LANDSCAPE CONCEPT IDEAS

PLUNKET

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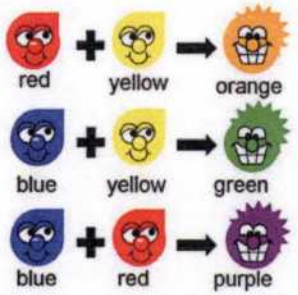
Plunket

Plant Mix 1 - Blue

Phormium 'Emerald Gem'

Pimelia prostrata

Agapanthus 'Peter Pan' or 'Streamline'



Plant selection - playfull primary colours

Muehlenbeckia axillaris

Astelia and Hebe

Plant Mix 2 - Yellow

Arctotis 'Yellow'

Libertia preregrinans

Astelia banksii

Plant Mix 3 - Red

Coprosma acerosa 'Red Rocks'

Imperata cylindrica

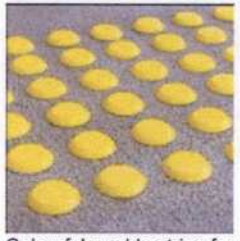
Arctotis 'Red Flame'

Plant Mix 4 - Green

Hebe diosmifolia, Astelia 'Westland' and Lithodora 'Grace Ward'

Concept Ideas

Main entrance



Colourful rumble strips for rocking buggies and prams. This could also include trowel grooves or pebbles

Forest of respite - mass planting of trees will provide a visual and physical buffer between sleeping rooms and rest of park

Feature - local stone

Mass planting under trees

Concrete edging

Sculptural lawn play area

Mass planting of textured plants next to central lawn area

Main Plaza - Titoki

Forest of respite - Mt Fuji cherry provides seasonal sun and shade

Feature Tree - Pohutukawa

Main Entry - formal line of lancewoods

Waiting Area - formal line of cabbage trees

OPUS LANDSCAPE Architecture

PLUNKET PARENTS CENTRE ONEKAWA LANDSCAPE CONCEPT IDEAS

PLUNKET

2-T5008.PP

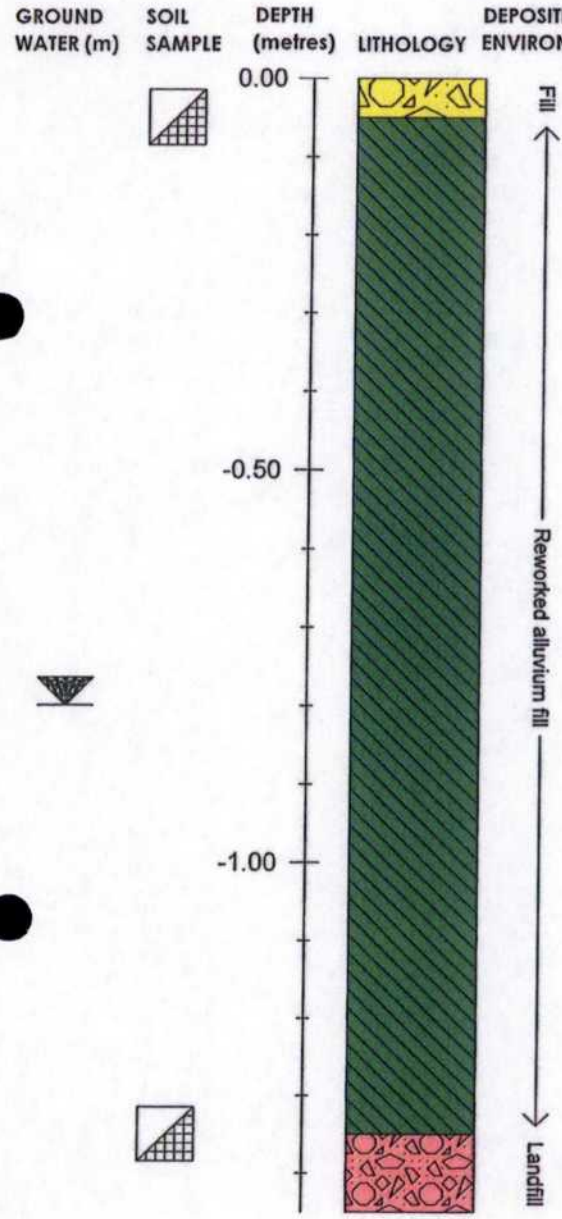
MARCH 2011

Plunket

APPENDIX 2
BOREHOLE LOGS

Hand Auger Borehole

Auger Hole No.:	BH1	**Total Depth:**	1.45m
Date:	11 May 2011	**Static Water Level:**	0.8m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



DESCRIPTION

fill: Grey brown silty sand and gravel fill (pea metal)

clay: Brown slightly orange mottled sandy silty clay with occasional gravel, shell and brick fragments. Soft.

landfill: Dark brown to black silty sand with brown and orange clay and occasional gravel. Fragments of glass, ceramics, wood and bone.

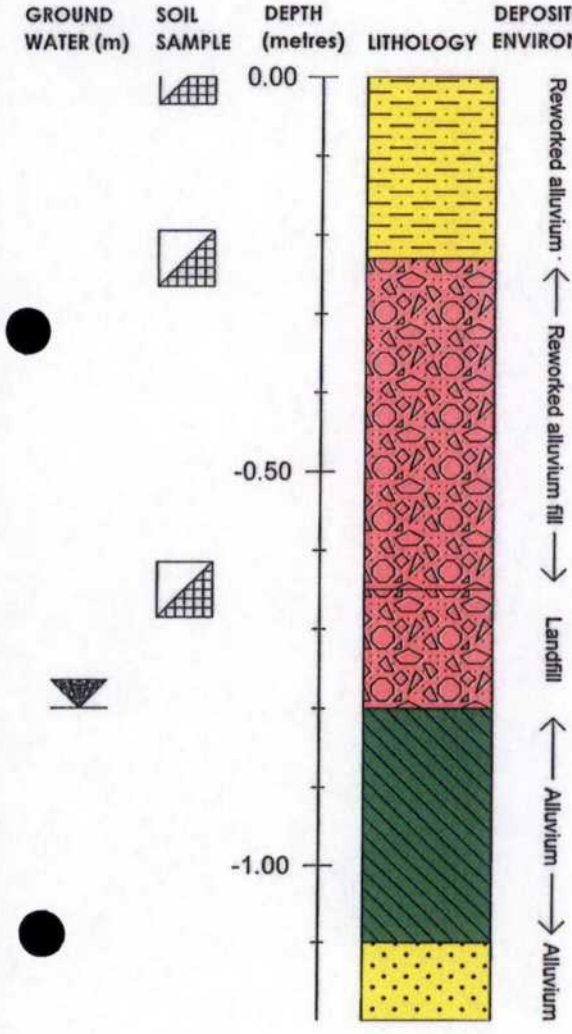
EAM ENVIRONMENTAL CONSULTANTS

EAM Environmental Consultants
Bowman Building, Market Street,
PO Box 1154
Napier, NZ
ph: +64 6 8350248

Client: Plunket Hawke's Bay
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

Hand Auger Borehole

Auger Hole No.:	BH2	**Total Depth:**	1.2m
Date:	11 May 2011	**Static Water Level:**	0.8m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



DESCRIPTION
silt: Brown and orange mottled sandy clayey silt with occasional gravel and rare shell fragments. Soft.
landfill: Grey slightly clayey fine sandy silt with occasional gravel and shell fragments. Charcoal fragments at base.
landfill: Brown and orange silty sandy clay. Fragments of brick, glass and ceramics.
clay: Grey silty fine sandy clay with occasional rootlets and soft black organic material. Ash/micaecous.
sand: Grey brown fine sand with silt and ash/micaceous

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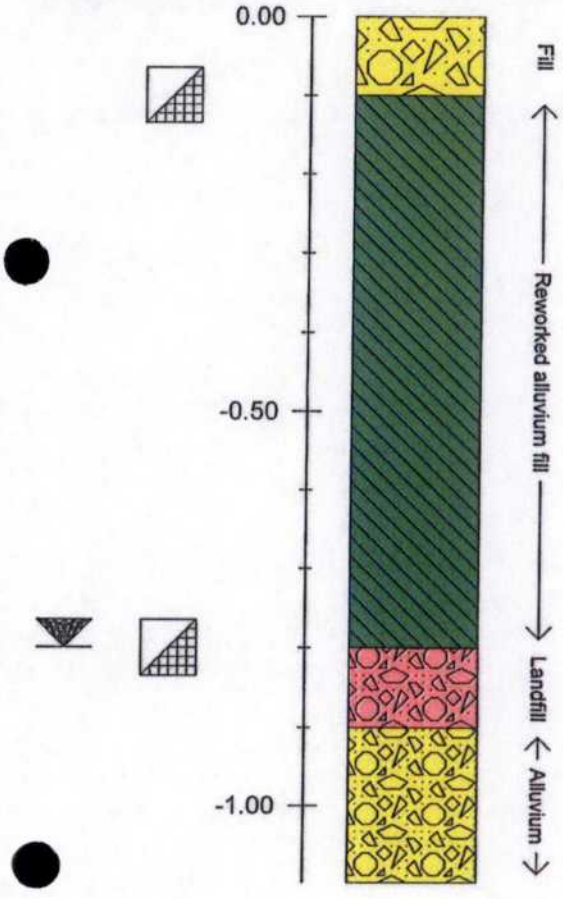
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

Hand Auger Borehole

Auger Hole No.:	BH3	**Total Depth:**	1.1m
Date:	11 May 2011	**Static Water Level:**	0.8m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



DESCRIPTION
fill: Grey brown silty sand and gravel fill (pea metal)
clay: Brown and orange mottled silty fine sandy clay occasional gravel, shell fragments and charcoal. Tree roots. Soft.
landfill: Brown silty clayey rounded gravel (<5cm). Fragments of red brick and wood.
gravel: Brown gravel with brown and orange mottled silty sandy clay matrix. Rootlets.

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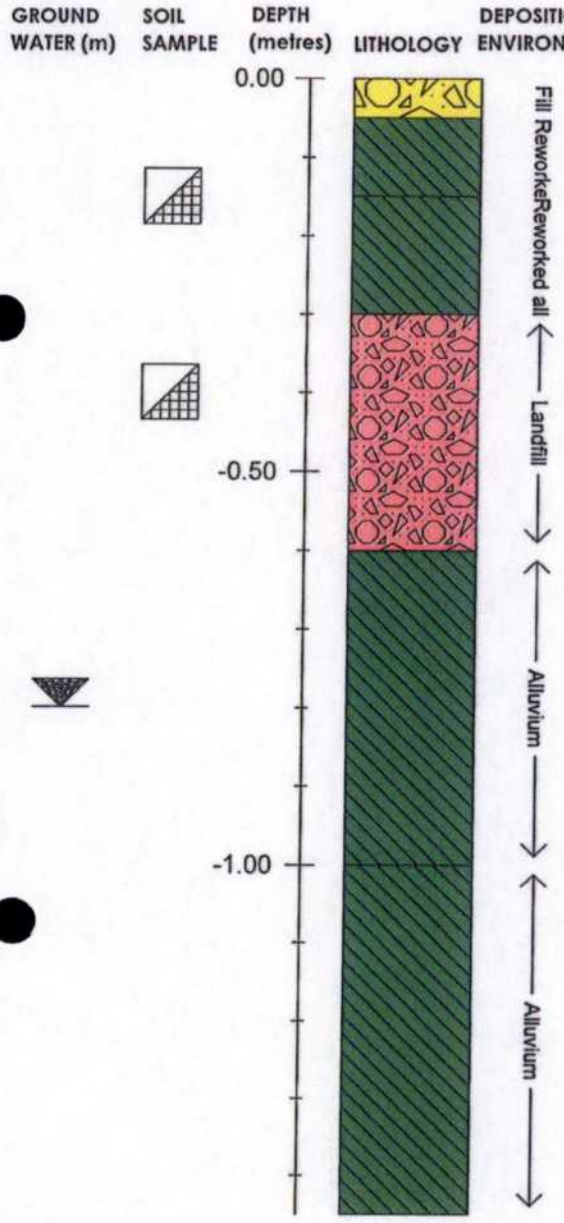
Client: Plunket Hawke's Bay
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

Hand Auger Borehole

Auger Hole No.:	BH4	**Total Depth:**	1.45m
Date:	11 May 2011	**Static Water Level:**	0.8m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



DESCRIPTION
fill: Grey brown silty sand and gravel fill (pea metal)
clay: Brown and orange mottled silty fine sandy clay with occasional gravel. Soft.
clay: Brown slightly orange mottled silty fine sandy clay with charcoal fragments. Soft.
landfill: Dark brown to black silty clay. Fragments of ceramics, glass, concrete and bone.
clay: Grey silty fine sandy clay. Soft. Abundant rootlets (blackened) Organic odour.
clay: Grey silty clay with layers fine sand. Shell fragments. Soft. Organic odour.

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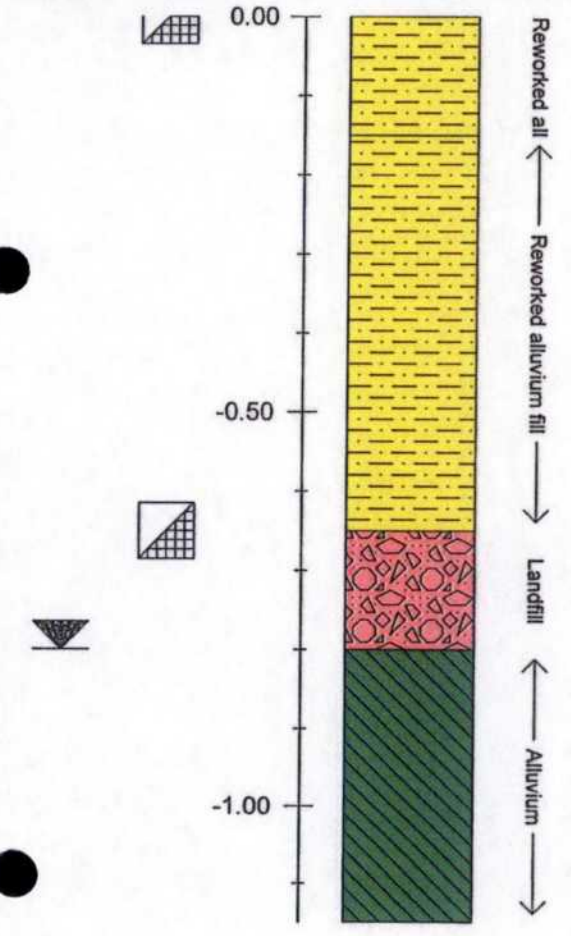
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

Hand Auger Borehole

Auger Hole No.:	BH5	**Total Depth:**	1.15m
Date:	11 May 2011	**Static Water Level:**	0.8m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



DESCRIPTION
silt: Brown and orange mottled fine sandy clayey silt with rootlets.
silt: Grey fine sandy silt more clay rich at base. Occasional shell fragments. Organic odour.
landfill: Brown and orange silty clay. Soft. Fragments of glass, red brick and charcoal.
clay: Grey silty clay with layers fine sand. Shell fragments. Slightly firm. Organic odour.

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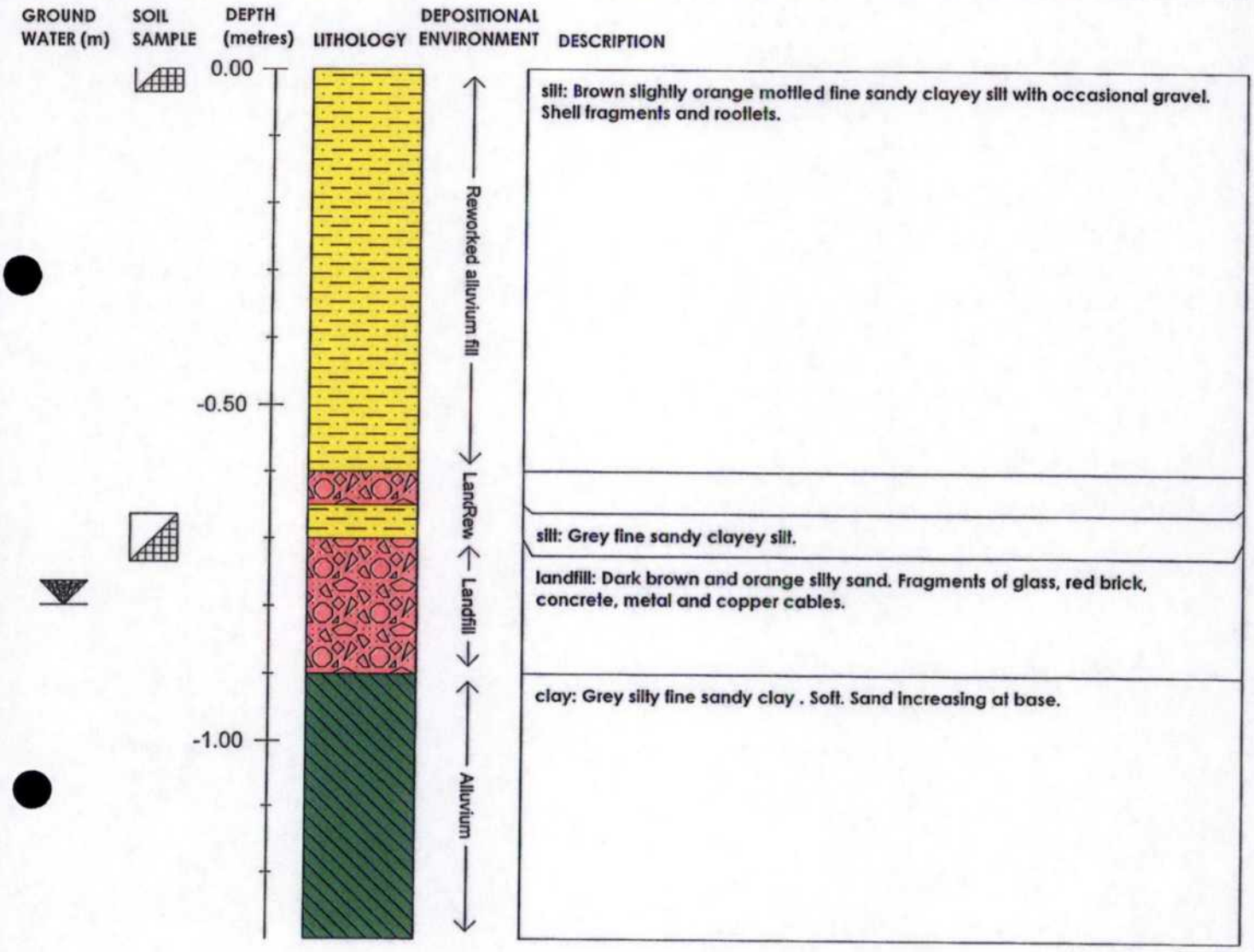
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

Hand Auger Borehole

Auger Hole No.:	BH6	**Total Depth:**	1.3m
Date:	11 May 2011	**Static Water Level:**	0.8m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



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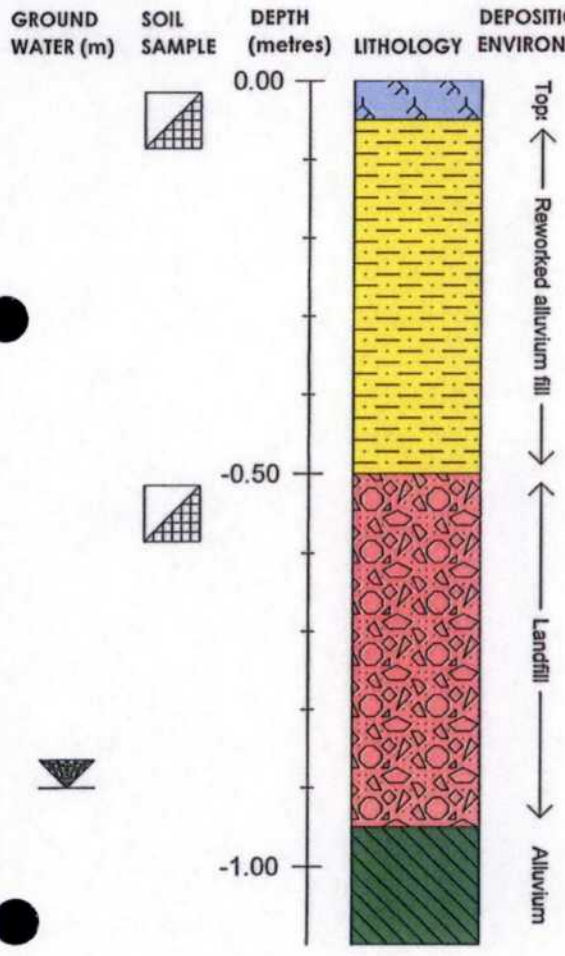
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

Hand Auger Borehole

Auger Hole No.:	BH7	**Total Depth:**	1.1m
Date:	11 May 2011	**Static Water Level:**	0.9m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



DESCRIPTION
topsoil: Brown humic silty clay with abundant rootlets. Soft
silt: Brown fine sandy clayey silt. Occasional gravel and rootlets.
landfill: Dark brown and orange silty clayey sand. Fragments of glass and charcoal.
clay: Brown slightly orange mottled silty sandy clay. Ash/micaceous. Occasional rootlets. Soft.

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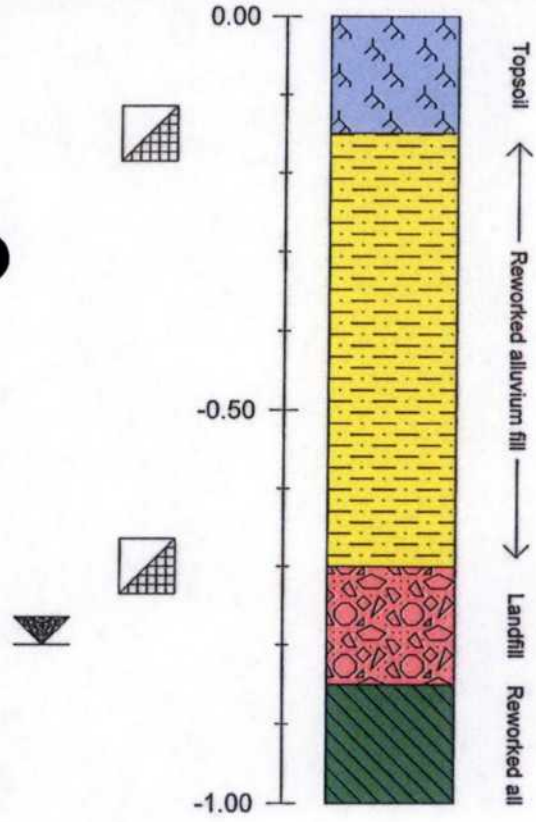
Client: Plunket Hawke's Bay
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

Hand Auger Borehole

Auger Hole No.:	BH8	**Total Depth:**	1.0m
Date:	11 May 2011	**Static Water Level:**	0.8m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



DESCRIPTION
topsoil: Brown humic silty clay with abundant rootlets. Soft
silt: Brown fine sandy clayey silt. Occasional rootlets and brick fragments.
landfill: Brown slightly orange mottled silty clay. Soft. Fragments of glass and red brick.
clay: Brown slightly orange mottled silty fine sandy clay. Soft.

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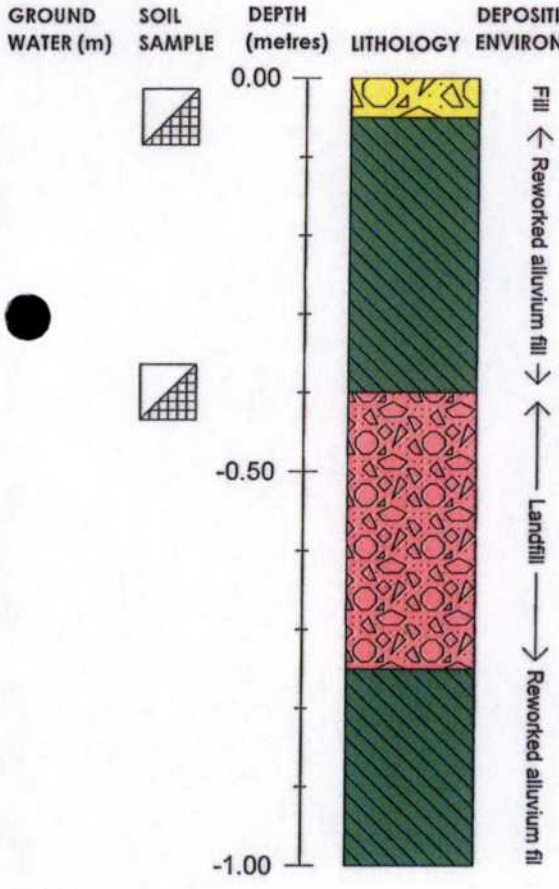
Client: Plunket Hawke's Bay
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

Hand Auger Borehole

Auger Hole No.:	BH9	**Total Depth:**	1.0m
Date:	11 May 2011	**Static Water Level:**	0.8m
Field Geologist:	Susan Rabbitte	**Co-ordinates:**	Easting 0 Northing 0 Elevation 0
Field Equipment:	Hand Auger		



DESCRIPTION
fill: Grey brown silty sand and gravel fill (pea metal)
clay: Brown and orange mottled fine sandy silty clay. Occasional rootlets.
landfill: Dark brown silty clayey sand. Fragments of decomposed wood, ceramics, clay pipe and brick.
clay: Grey fine sandy silty clay. Soft.

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EAM Environmental Consultants
Bowman Building, Market Street,
PO Box 1154
Napier, NZ
ph: +64 6 8350248

Client: Plunket Hawke's Bay
Project Title: Plunket Centre, Onekawa
Project Ref: EAM268

APPENDIX 3
SITE PHOTOGRAPHS

APPENDIX 4
LABORATORY RESULTS

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street,
Private Bag 3205
Hamilton, New Zealand

ANALYSIS

Time Received 12-May-2011 9:13:22 am
Job No **896058**
No of Samples **19** No of Fractions **73**

Office use only: Job No

Client
Name EAM Ltd 24699
Address PO Box 1154, NAPIER 4140

Phone 06 835 0248 Fax 06 835 0247
Client Reference
Quote No 44806 Order No
Primary Contact S Rabbitte 111604
Submitted By S Rabbitte 111604
Charge To EAM Ltd 24699

Results To ☒ Mail Primary Contact ☐ Mail Submitter
☐ Fax Results
☒ Email Results

ADDITIONAL INFORMATION

As per Quote.

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
☒ Please tick if you require COC to be faxed back
Date & Time: 4:30pm 11/5
Name: Susan Rabbitte
Signature: SRabbitte

Received at Hill Laboratories
Date & Time: MAY 12 2011 AM 6:58
Name: Lisa B
Signature: LBailey

Condition ☐ Room Temp ☐ Chilled ☐ Frozen
Temp: 9.7°C

☐ Sample & Analysis details checked
Signature:

Priority ☐ Low ☑ Normal ☐ High
☐ Urgent (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 10 working days following receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	BH1@0.05	11/5/11	SOIL	Heavy Metals
2	BH1@1.35	〃	〃	Metals + PAH
3	BH2@0.0			Heavy Metals.
4	BH2@0.23			Hold.
5	BH2@0.65			~~Heavy~~ Metals + PAH.
6	BH3@0.1			Heavy Metals
7	BH3@0.8			Metals + PAH.
8	BH4@0.15			Heavy Metals
9	BH4@0.4			Metals + PAH.
10	BH5@0.0	〃	〃	Heavy Metals.

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS REQUEST

R J Hill Laboratories Limited
1 Clyde Street,
Private Bag 3205
Hamilton, New Zealand

Phone: + 64 (7) 858 2000
Fax: + 64 (7) 858 2001
Email: mail@hill-labs.co.nz
Web: www.hill-labs.co.nz

Client

Name EAM Ltd 24699

Address PO Box 1154, NAPIER 4140

Phone 06 835 0248 Fax 06 835 0247

Client Reference

Quote No 44806 Order No

Primary Contact S Rabbitte 111604

Submitted By S Rabbitte 111604

Charge To EAM Ltd 24699

Results To ☐ Mail Primary Contact ☐ Mail Submitter

☐ Fax Results

☐ Email Results

Office use only: Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
☐ Please tick if you require COC to be faxed back
Date & Time:
Name:
Signature:

Received at Hill Laboratories
Date & Time: MAY 12 2011 AM 6:58
Name:
Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen
Temp:

☐ Sample & Analysis details checked
Signature:

ADDITIONAL INFORMATION

Priority ☐ Low ☑ Normal ☐ High

☐ **Urgent** (ASAP, extra charge applies, please contact lab first)

NOTE: The estimated turnaround time for the types and number of samples and analyses specified on this quote is by 4:30 pm, 10 working days following receipt of the samples at the laboratory.

Quoted Sample Types

Requested Reporting Date:

Soil (Soil)

No.	Sample Name	Sample Date/Time	Sample Type	Tests Required
1	BH5@0.65	11/5/11	SOIL	Heavy Metals + PAH
2	BH6@0.0	〃	〃	Metals.
3	BH6@0.7			Metals + PAH.
4	BH7@0.05			Metals
5	BH7@0.55			Metals + PAH.
6	BH8@0.15			Metals.
7	BH8@0.7			Metals + PAH.
8	BH9@0.05			Metals
9	BH9@0.4			Metals + PAH.
10				

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	EAM Ltd	**Lab No:**	896058	SPv1
Contact:	S Rabbitte	**Date Registered:**	12-May-2011	
	C/- EAM Ltd	**Date Reported:**	20-May-2011	
	PO Box 1154	**Quote No:**	44806	
	NAPIER 4140	**Order No:**		
		Client Reference:		
		Submitted By:	S Rabbitte	

Sample Type: Soil

Sample Name:		BH1 @ 0.05 11-May-2011 11:05 am	BH1 @ 1.35 11-May-2011 11:15 am	BH2 @ 0.0 11-May-2011 11:50 am	BH2 @ 0.65 11-May-2011 11:50 am	BH3 @ 0.1 11-May-2011 12:00 pm
Lab Number:		896058.1	896058.2	896058.3	896058.5	896058.6
Individual Tests						
Dry Matter	g/100g as rcvd	-	75	-	76	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	5	53	6	69	9
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	9.1	0.15	5.7	0.45
Total Recoverable Chromium	mg/kg dry wt	14	61	18	40	18
Total Recoverable Copper	mg/kg dry wt	8	640	19	270	46
Total Recoverable Lead	mg/kg dry wt	25	7,300	100	2,400	310
Total Recoverable Nickel	mg/kg dry wt	10	107	14	79	17
Total Recoverable Zinc	mg/kg dry wt	60	7,200	154	4,700	610
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	0.03	-	< 0.04	-
Acenaphthylene	mg/kg dry wt	-	0.08	-	0.06	-
Anthracene	mg/kg dry wt	-	0.17	-	0.09	-
Benzo[a]anthracene	mg/kg dry wt	-	0.68	-	0.39	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	0.95	-	0.52	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	0.90	-	0.51	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	0.80	-	0.44	-
Benzo[k]fluoranthene	mg/kg dry wt	-	0.36	-	0.20	-
Chrysene	mg/kg dry wt	-	0.56	-	0.32	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	0.12	-	0.06	-
Fluoranthene	mg/kg dry wt	-	1.19	-	0.75	-
Fluorene	mg/kg dry wt	-	0.04	-	< 0.04	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	0.57	-	0.30	-
Naphthalene	mg/kg dry wt	-	< 0.15	-	< 0.16	-
Phenanthrene	mg/kg dry wt	-	0.54	-	0.33	-
Pyrene	mg/kg dry wt	-	1.60	-	0.98	-

Sample Name:		BH3 @ 0.8 11-May-2011 12:20 pm	BH4 @ 0.15 11-May-2011 12:40 pm	BH4 @ 0.4 11-May-2011 12:45 pm	BH5 @ 0.0 11-May-2011 1:15 pm	BH5 @ 0.65 11-May-2011 1:20 pm
Lab Number:		896058.7	896058.8	896058.9	896058.10	896058.11
Individual Tests						
Dry Matter	g/100g as rcvd	82	-	78	-	72
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	7	20	3	4	59
Total Recoverable Cadmium	mg/kg dry wt	0.48	1.99	< 0.10	< 0.10	3.9
Total Recoverable Chromium	mg/kg dry wt	21	34	17	17	56

Sample Type: Soil						
Sample Name:		BH3 @ 0.8 11-May-2011 12:20 pm	BH4 @ 0.15 11-May-2011 12:40 pm	BH4 @ 0.4 11-May-2011 12:45 pm	BH5 @ 0.0 11-May-2011 1:15 pm	BH5 @ 0.65 11-May-2011 1:20 pm
Lab Number:		896058.7	896058.8	896058.9	896058.10	896058.11
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Copper	mg/kg dry wt	65	300	11	9	850
Total Recoverable Lead	mg/kg dry wt	260	1,670	40	25	3,900
Total Recoverable Nickel	mg/kg dry wt	17	93	20	12	84
Total Recoverable Zinc	mg/kg dry wt	410	1,290	78	76	3,300
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	-	< 0.03	-	0.04
Acenaphthylene	mg/kg dry wt	< 0.03	-	< 0.03	-	0.08
Anthracene	mg/kg dry wt	0.04	-	< 0.03	-	0.24
Benzo[a]anthracene	mg/kg dry wt	0.19	-	< 0.03	-	0.87
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.25	-	< 0.03	-	1.10
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.25	-	< 0.03	-	1.14
Benzo[g,h,i]perylene	mg/kg dry wt	0.22	-	< 0.03	-	0.89
Benzo[k]fluoranthene	mg/kg dry wt	0.10	-	< 0.03	-	0.44
Chrysene	mg/kg dry wt	0.17	-	< 0.03	-	0.74
Dibenzo[a,h]anthracene	mg/kg dry wt	0.03	-	< 0.03	-	0.13
Fluoranthene	mg/kg dry wt	0.38	-	< 0.03	-	1.88
Fluorene	mg/kg dry wt	< 0.03	-	< 0.03	-	0.04
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.15	-	< 0.03	-	0.64
Naphthalene	mg/kg dry wt	< 0.15	-	< 0.15	-	< 0.17
Phenanthrene	mg/kg dry wt	0.18	-	< 0.03	-	0.84
Pyrene	mg/kg dry wt	0.52	-	< 0.03	-	2.2

Sample Name:		BH6 @ 0.0 11-May-2011 2:30 pm	BH6 @ 0.7 11-May-2011 2:35 pm	BH7 @ 0.05 11-May-2011 2:45 pm	BH7 @ 0.55 11-May-2011 2:55 pm	BH8 @ 0.15 11-May-2011 3:10 pm
Lab Number:		896058.12	896058.13	896058.14	896058.15	896058.16
Individual Tests						
Dry Matter	g/100g as rcvd	-	74	-	75	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	5	57	4	47	6
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	5.6	< 0.10	3.9	0.20
Total Recoverable Chromium	mg/kg dry wt	15	72	15	54	16
Total Recoverable Copper	mg/kg dry wt	15	7,000	12	1,380	19
Total Recoverable Lead	mg/kg dry wt	50	8,800	55	5,900	98
Total Recoverable Nickel	mg/kg dry wt	12	91	11	83	12
Total Recoverable Zinc	mg/kg dry wt	98	5,200	82	3,100	280
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	-	< 0.04	-	< 0.04	-
Acenaphthylene	mg/kg dry wt	-	0.21	-	0.08	-
Anthracene	mg/kg dry wt	-	0.46	-	0.09	-
Benzo[a]anthracene	mg/kg dry wt	-	1.69	-	0.66	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	2.1	-	0.92	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	2.1	-	0.93	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	1.65	-	0.78	-
Benzo[k]fluoranthene	mg/kg dry wt	-	0.83	-	0.35	-
Chrysene	mg/kg dry wt	-	1.38	-	0.54	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	0.25	-	0.12	-
Fluoranthene	mg/kg dry wt	-	3.0	-	1.07	-
Fluorene	mg/kg dry wt	-	0.06	-	< 0.04	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	1.20	-	0.56	-
Naphthalene	mg/kg dry wt	-	< 0.16	-	< 0.16	-
Phenanthrene	mg/kg dry wt	-	1.18	-	0.36	-
Pyrene	mg/kg dry wt	-	3.7	-	1.36	-

Sample Type: Soil						
Sample Name:		BH8 @ 0.7 11-May-2011 3:30 pm	BH9 @ 0.05 11-May-2011 3:35 pm	BH9 @ 0.4 11-May-2011 3:40 pm		
Lab Number:		896058.17	896058.18	896058.19		
Individual Tests						
Dry Matter	g/100g as rcvd	74	-	74	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	12	7	20	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.45	0.14	5.8	-	-
Total Recoverable Chromium	mg/kg dry wt	25	19	34	-	-
Total Recoverable Copper	mg/kg dry wt	67	31	290	-	-
Total Recoverable Lead	mg/kg dry wt	520	142	2,100	-	-
Total Recoverable Nickel	mg/kg dry wt	22	15	37	-	-
Total Recoverable Zinc	mg/kg dry wt	400	153	1,730	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.04	-	< 0.03	-	-
Acenaphthylene	mg/kg dry wt	< 0.04	-	0.04	-	-
Anthracene	mg/kg dry wt	< 0.04	-	0.05	-	-
Benzo[a]anthracene	mg/kg dry wt	0.07	-	0.29	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.11	-	0.38	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.11	-	0.40	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.13	-	0.33	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.04	-	0.15	-	-
Chrysene	mg/kg dry wt	0.06	-	0.25	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.04	-	0.05	-	-
Fluoranthene	mg/kg dry wt	0.09	-	0.53	-	-
Fluorene	mg/kg dry wt	< 0.04	-	< 0.03	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.08	-	0.24	-	-
Naphthalene	mg/kg dry wt	< 0.16	-	< 0.15	-	-
Phenanthrene	mg/kg dry wt	0.04	-	0.20	-	-
Pyrene	mg/kg dry wt	0.12	-	0.71	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-3, 5-19
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-3, 5-19
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270).. Tested on as received sample	-	2, 5, 7, 9, 11, 13, 15, 17, 19
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550.	0.10 g/100g as rcvd	2, 5, 7, 9, 11, 13, 15, 17, 19
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-3, 5-19

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)
Client Services Manager - Environmental Division

APPENDIX 5
REPORT LIMITATIONS

REPORT LIMITATIONS

This Document has been provided by Environmental Assessments & Monitoring Ltd (EAM) subject to the following limitations:

I. This Document has been prepared for the particular purpose outlined in EAM's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

II. The scope and the period of EAM's Services are as described in EAM's proposal, and are subject to restrictions and limitations. EAM did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by EAM in regards to it.

III. Conditions may exist which were undetectable given the limited nature of the enquiry EAM was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

IV. In addition, it is recognized that the passage of time affects the information and assessment provided in this Document. EAM's opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed EAM to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

V. Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

VI. Where data supplied by the Client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by EAM for incomplete or inaccurate data supplied by others.

VII. The Client acknowledges that EAM may have retained sub-consultants affiliated with EAM to provide Services for the benefit o EAM. EAM will be fully responsible to the Client for the Services and work done by all of its sub-consultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from EAM and not EAM's affiliated companies, and their employees, officers and directors.

VIII. This Document is provided for sole use by the Client and is confidential to it and its professional advisers. No responsibility whatsoever for the contents of this Document will be accepted to any person other than the Client. Any use which a third party makes of this Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. EAM accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Document.

Reference: 60 Flanders Ave

Contact: Paul O'Shaughnessy

22 June 2012

Eos Design
252 Kennedy Road
Napier 4110

Attention: Ben Luders

Dear Mr Luders

Plunket Site Remediation – 60 Flanders Avenue, Napier

Thanks for meeting myself and Colin Hunt on 5 June 2012 to discuss the on-going redevelopment and remediation of the above site.

Subsequent to our meeting Council staff have disposed of the larger pile of fill into an area adjacent to the new volleyball court. This fill was not deemed to be suitable for further use on the surface of the reserve and was thus deposited beneath a layer of geotextile matting and clean fill. You are advised that Council may seek to recover the costs incurred in this disposal process from Plunket.

Additionally, Council have serious concerns regarding the current ground conditions in the area surrounding the proposed Plunket carpark.

The March 2012 Remediation Action Plan (Version 3) clearly outlined the measures that were to be implemented by Plunket to dispose of unsuitable fill material into a trench adjacent to the new Plunket carpark. This work has not been completed to a satisfactory standard with much of the top layer of fill contaminated with broken glass and associated non-organic materials.

The area is currently unsafe and not suitable for re-sowing. Council require this area to be fully remediated by Plunket in accordance with the March 2012 remedial action plan and conditions of the November 2010 Resource Consent.

This work will entail removing and disposing of the contaminated top layer and replaced with clean fill which must then be re-sown.

The attached aerial photograph indicates the total area of the site which has been disturbed by the ongoing development and which must be remediated by Plunket. Remediation must include removal of non-organic material from the upper 600mm layer of fill, replacement with clean fill, levelling and re-sowing.

Council understands the ongoing financial implications for Plunket in completing their facility and remediating the site. However, it is considered that Council has been and continues to be very supportive of the Plunket development and that the total remediation of the construction site and surrounding environs is essential for Plunket and Council.

Council appreciates your ongoing co-operation in these matters.

If you have any further queries please do not hesitate to contact me directly on 834-4189.

Yours faithfully

Paul O'Shaughnessy
SENIOR PLANNER/RESOURCE CONSENTS

DATUM : NZGD 2000
RL in terms of Hawkes Bay Datum 1972
(MSL + 10.000m)

Cadastral information derived from Land Information New Zealand Digital Cadastral Database (DCDB). CROWN COPYRIGHT RESERVED.

SCHEME APPROVAL

_____ -/-/-

Antoinette Campbell
Community Development Manager

REVISIONS	NO.	INITIALS	DESCRIPTION	APPROVED	DATE

CITY OF NAPIER

	BY	CHECKED	DATE
DESIGN			
DRAWN			
RECOMD			
APPROVED			

DESIGN
NAPIER The Art Deco City
231 Hastings Street, Napier 4142
Ph: 06 835 7579 - Fax: 06 834 4168

PLUNKET 62 FLANDERS AVE

Sheet No.
Ex. sheets
Contract No.

Scale 1:1000 (A3)
Rev.
Date 00/00/00
Drawing No.

R:\caddata\DGN\2011\NCC\Misc\Onekawa Pools Spray Park\Master.dgn

Paul O'Shaughnessy

From: Antoinette Campbell
Sent: Thursday, 7 June 2012 11:00 a.m.
To: Paul O'Shaughnessy
Subject: Fw: Contaminated Stock Pile
Attachments: Contaminated fill.pdf; image001.jpg; image001.jpg; image001.jpg

FYI

Connected by MOTOBLUR™
Hi Lance

Further to our site meeting today at the Aquatic centre regarding the condition of the contaminated stock pile, the contaminated material will need to be buried within the Aquatic Centre site.

I have estimated the quantity of contaminated fill to be between 675m^3 and 900m^3. To bury this amount of fill the trench will need to be dug down 1.95m-2.4m (includes 600mm clean fill cap). The attached plan shows the size and location of the dump site. The plan also shows another possible secondary dump site which will avoid cutting into the sand volleyball court. Excess clean fill will be spread elsewhere on the Aquatic centre site.

Regards

Michael Pickernell
Design Services
Napier City Council, Private Bag 6010, Napier 4142
Phone: 06 834 4199 x8714 Fax: 06 834 4168
www.napier.govt.nz

Paul O'Shaughnessy

From: Antoinette Campbell
Sent: Thursday, 31 May 2012 8:44 a.m.
To: Paul O'Shaughnessy
Subject: FW: Plunket Centre

FYI

From: Antoinette Campbell
Sent: Wednesday, 2 May 2012 8:53 a.m.
To: 'ben@eosdesign.net.nz'
Cc: Alison Prins; Michael Pickernell
Subject: RE: Plunket Centre

Hi Ben, how is everything tracking? The new building is really starting to take shape now.

In terms of the pool fencing I will have to chase that up with Michael Pickernell who is now the project manager for the spray park (taken over from Colin McNatty who has since retired). If it is still available I'm sure there will be no problem with you recycling it for the use of the centre.

We should be just about to commence the installation of the water toys which should take approximately 4 weeks. I need to follow this up with Michael to confirm timing etc however he is out of the office today. I'm sure we should be able to coordinate the installation of the fencing with your plans. We need to be ensured that the park will be secure from Plunket's side however.

I would presume that the wider area will be remedied by Plunket as part of the consent conditions? We would expect that this will involve the removal of any fill/rubbish and regrassing the area. As discussed if there is any leftover clean fill/topsoil we would be happy to stockpile it on site and reuse it for landscaping on the wider park. It must be of good quality however and have no contaminate.

On the matter of your contractor's error in relocating the old sand for the volleyball court and the necessity to dispose and replace due to contamination, we have since had the sand removed and are currently having new sand deposited. This may have even been completed in my absence over the last week and a half. As discussed we expect Plunket to cover the full cost of the sand disposal and 75% of the cost of the new sand. The sand disposal cost was around $2,600 plus GST but I will need to confirm this. We have not been invoiced for the replacement sand yet but the quote was $15,860 of which 75% is $11,895. Once I have received the final cost I will invoice you directly. I presume you will recover this from your contractor.

Many thanks
Antoinette

From: Ben Luders [mailto:ben@eosdesign.net.nz]
Sent: Wednesday, 2 May 2012 6:16 a.m.
To: Antoinette Campbell
Cc: Alison Prins
Subject: Plunket Centre

Dear Antoinette,

1. We would like to take you up on your offer of the second hand pool fencing and are just wondering if you have an idea of the quantity of this available? If we are free to use it we can perhaps inspect it and check the quantities.
2. Are we able to confirm when you are looking to construct your new security fencing? We are about 4 weeks away from removing the masonry wall at the front of the building but it would be good to coordinate this with the new fence instillation.

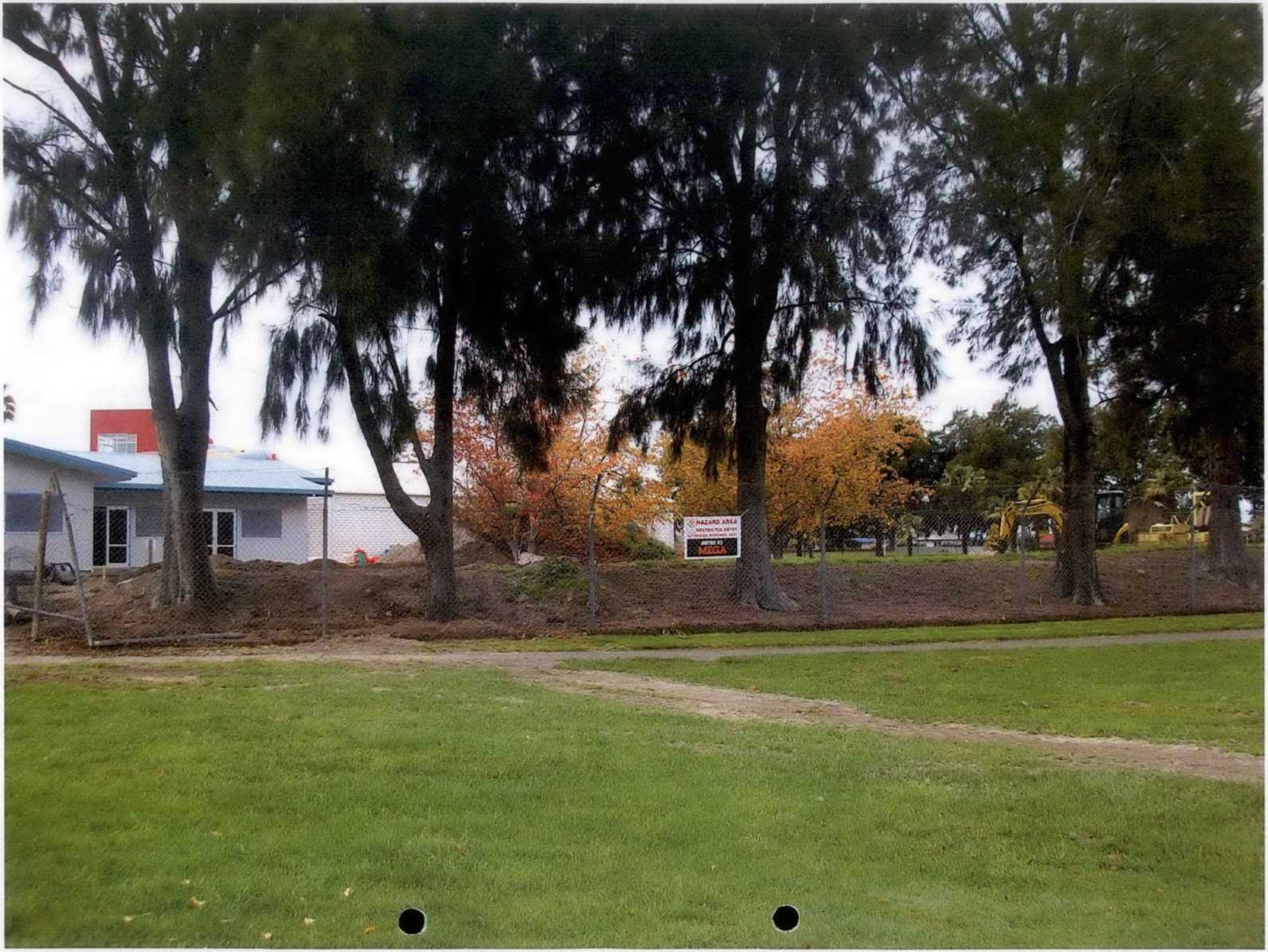
3. What is the intention for the wider area beyond the Plunket site? Are you intending to seed it with grass? What will get us the best results as we head into winter?

Regards,

Ben Luders
Director

Mobile 021 287 4626
Office 06 843 5050

Eos design
Residential and Commercial Architecture


HAZARD AREA
MEGA


HYUNDAI


HYUNDAI

CITY OF NAPIER

Reference: 60 Flanders Ave

Contact: Paul O'Shaughnessy

13 March 2012

Eos Design
252 Kennedy Road
Napier 4110

Attention: Ben Luders

Dear Mr Luders

Plunket – 60 Flanders Avenue, Napier

Thanks for the remedial action plan (dated 7 March 2012) submitted to Council.

This option has been assessed by Council and is considered to be an appropriate form of mitigation to dispose of the contaminated material.

Assuming that the material excavated from the new trench is suitable and clean Council are amenable to that soil being stockpiled in situ. Council staff will then assess options for disposing of this clean fill within Onekawa Park.

Council would appreciate ongoing consultation during this process, specifically in relation to the quality of the fill removed from the new trench.

Please contact me with queries.

Yours faithfully

Paul O'Shaughnessy
SENIOR PLANNER/RESOURCE CONSENTS

Paul O'Shaughnessy

From: Ben Luders [ben@eosdesign.net.nz]
Sent: Wednesday, 7 March 2012 6:25 a.m.
To: Paul O'Shaughnessy
Cc: Alison Prins; 'Bill Mantell-Harding'; 'Geoff Kell Consulting Ltd'
Subject: Site Remediation
Attachments: eos146 plunket remediation 07-03-12.pdf; eos146 Plunket site RAP v3.pdf

Dear Paul,

Thank you for meeting with me yesterday afternoon.

As per our discussions, please find attached a plan for the proposed trench to take the excess volume of land fill material.
I will confirm the minimum cover required so as to be compliant with the relevant requirements.

Regards,

Ben Luders
Director

Mobile 021 287 4626
Office 06 843 5050

Eos design
Residential and Commercial Architecture

LICENSED BUILDING PRACTITIONER
www.dbh.govt.nz
BUILDING CONFIDENCE

Eos design
Residential and Commercial Architecture

Site works
Remedial Action Plan
Version 3

Proposed Plunket Centre

62 Flanders Avenue
Napier

To be read in conjunction with:

Eos Design sheet A200

Environmental report prepared by EAM consultants

Job number: eos146

Date: 7 March 2012

eosdesign.net.nz

The site:

Initial site assessment:

- An average 650mm thick layer of top material which has been determined as being uncontaminated and suitable for re use
- Approximately 250mm thick layer of historic land fill material which is contaminated but seems to be dry and well defined.
- This is all over an undisturbed typical blue clay layer (typical for Napier)
- Ground water level (summer) is approximately 1.6m below existing ground level

Actual conditions on site:

- An average 650mm thick layer of top material which has been determined as being uncontaminated and suitable for re use
- This is over an undisturbed typical blue clay layer (typical for Napier)
- Ground water level (summer) is approximately 1.6m below existing ground level
- Landfill material was reasonably isolated to 2 trenches through the site as indicated on sheet A200 (attached)

Original remedial action:

1. **Excavation of top layer of uncontaminated material**
   1.1. The building platform and immediately adjacent play areas are to excavated to the depth of the contaminated land fill layer
   1.2. Care is to taken to ensure no mixing of the land fill layer with the top uncontaminated layer
   1.3. The material from the top layer is to be stockpiled at the southern end of the site adjacent to the existing volleyball pit and out of the way of construction traffic access

The stockpiling and location of this material has been agreed with the Community Development Manager of the council, this material will be re used for landscaping on site where possible.

2. **Excavation and transportation of contaminated historic land fill material**
   2.1. The contaminated land fill layer of material is to be excavated and transported off site to the Omarunui landfill.
   2.2. Care is to be taken to ensure no dust is distributed over the site during excavation.
   2.3. The contaminated material is to be transported and handled as required by the relevant industry standards
   2.4. Care is to be taken to ensure that the fill layer is not subject to rain or wetting during the excavation process

The removal of this material to the Omarunui land fill site has been discussed and agreed with the Napier City Council.

New remedial action:

1. **Excavation of top layer of uncontaminated material**
   1.1. The building platform and immediately adjacent play areas have been excavated to the depth of the contaminated land fill layer and the material has been stockpiled on the site

2. **Removal of contaminated historic land fill material**
   2.1. The contaminated land fill layer of material has been excavated and was to be transported off site to the Omarunui landfill, this is no longer a viable option and the material has currently been stockpiled in a contained manner on site.
   2.2. Care is to be taken to ensure no dust is distributed over the site during excavation.

3. **Relocation of contaminated historic land fill material**

3.1. It is proposed that the landfill material be located in an even layer under the proposed car park. This would conform to the recommendations of the EAM report as far as providing a non permeable surface over the material.

3.2. The process for this construction would be as follows:

- Excavation of the footprint of the proposed car park down to approx 1.5m
- Laying of a suitable geotextile cloth as recommended by the civil engineer over the undisturbed ground
- Stabilising of the landfill material by mixing with an appropriate product e.g. cement. This is to be determined with the civil engineer
- Rolling of the land fill material into the excavation to from a reasonably compressed layer
- Placement of a suitable geotextile cloth as recommended by the civil engineer over the compacted land fill material
- The car park will then be constructed over this based on the bearing pressure achieved

Additional remedial action:

4. **Relocation of excess contaminated historic land fill material**

4.1. Due to the excess amount of landfill material the finished level of the proposed car park would be too high in relation to surrounding ground levels. The proposal discussed is to relocate this material to a trench adjacent to the car park as per Plan A200

4.2. The process for this construction would be as follows:

- Excavation of a trench approximately 5m wide and of a depth and length sufficient to contain the material but located above the water table.
- Placement of a suitable geotextile cloth over the landfill trench.
- Placement of topsoil material over the trench to a depth that will be confirmed with EAM as acceptable

This construction will be supervised by Eos design and Geoff Kell consulting.

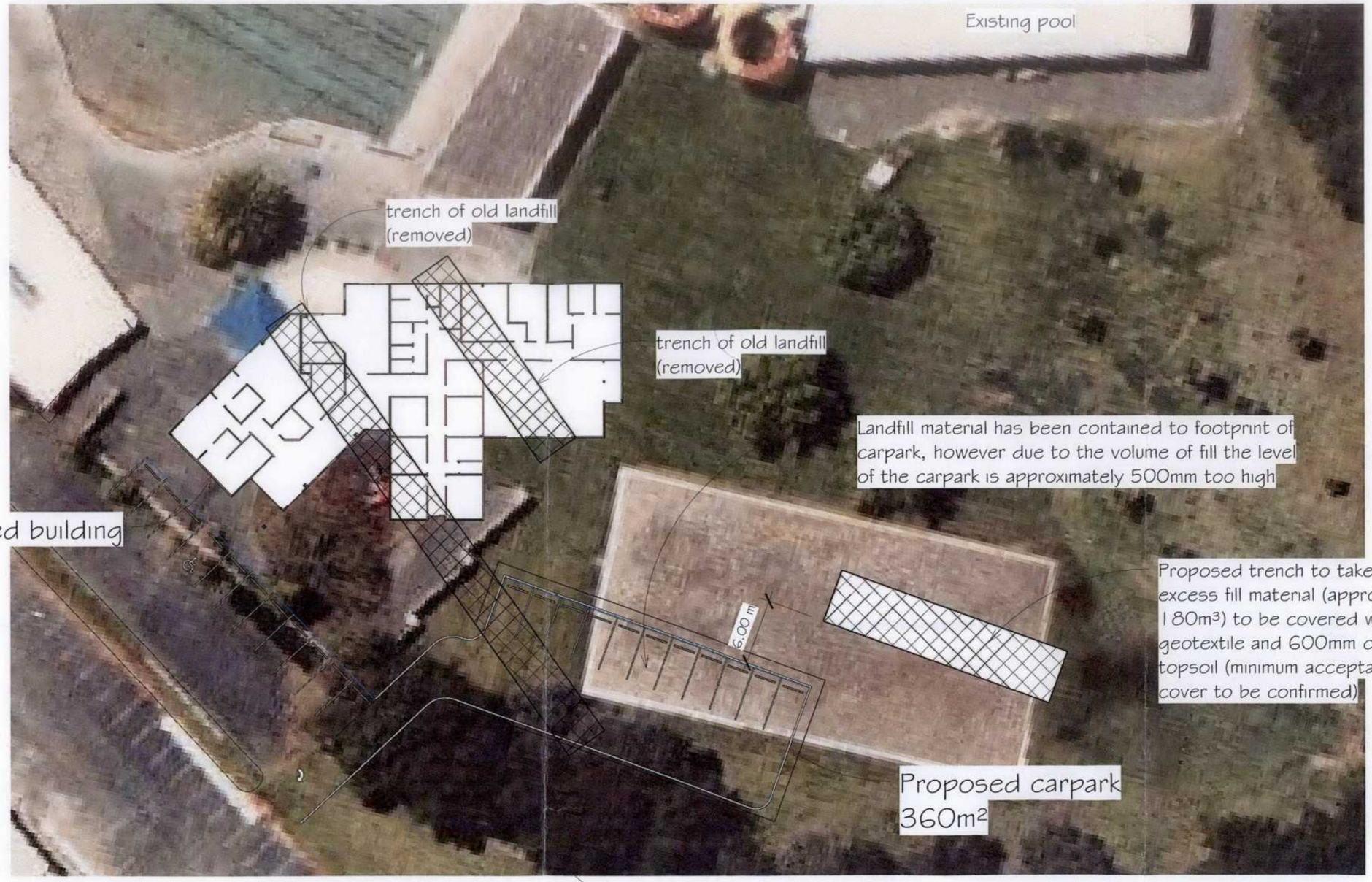
Ben Luders
Director
Eos Design Ltd

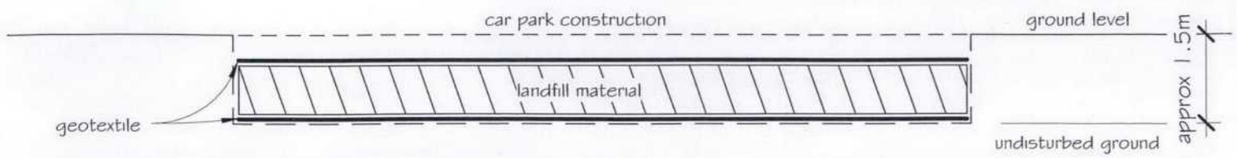
For and on behalf of the Royal New Zealand Plunket Society, Hawke's Bay

Plunket

whānau āwhina
caring for young families

North





earthworks section thru proposed carpark

00mm 50mm 100mm

All dimensions in mm unless noted otherwise contractor to check all dimensions on site before work commences.

LICENSED BUILDING PRACTITIONER www.dbh.govt.nz BUILDING CONFIDENCE

Eos design
Residential and Commercial Architecture

office (06) 843 5050
mobile 021 2874626
ben@eosdesign.co.nz

Project
Proposed Plunket Centre, Flanders Ave, Napier

Title
Site remediation plan

07/03/12

Drawing No.		Revision
eos146 A200		
Drawn	Date	Scale (at A3)
Ben	2012	1 : 400

Eos design
Residential and Commercial Architecture

27 February 2012

Napier City Council
231 Hastings Street
Private Bag 6010
Napier 4142

Paul O'Shaughnessy

Plunket Centre at 62 Flanders Avenue, Napier

Paul,

I have been trying to open a dialogue with the Council for the past 3 weeks to no avail.

On the 18th of January I emailed Antoinette and asked if we could meet on site to discuss issues in regards to the remediation of landfill material. She referred me to Andrew White who I met on site that afternoon. I discussed with Andrew my ideas and we concluded with him referring me back to Antoinette for further comment.
On the 23rd of January I sent an email to Antoinette containing the following:

"I met with Andrew on site last week and he suggested that the discussion regarding the landfill material under the car park is best had with you.

Here are the issues:

1. As you will probably be aware the landfill material has been partially stabilised and located where the staff parking is to be constructed, however due to the volume of this the level of the car park will be quite high in relation to the adjacent embankment and will have more visual impact on the surrounding area than originally intended.
2. The material is still quite unconsolidated and at this stage is not suitable for sub grade for the car park, so we will have to do something to it to make it more suitable, I will be discussing this with the engineer late this week.

What I am wondering is are we able to distribute the landfill material beyond the car park footprint in the immediately adjacent area so as to lower the level, during this process we would stabilise the material more so as to get a better bearing from it. We would then cover all the material with geofabric to contain it and landscape over the non car park areas with the good top soil. This would be part of a rough landscaping to the former volleyball pit and surrounding areas to blend the car park levels into the surrounding area. Ideally I would like to drop the current fill level by about 500mm.

Please let me know your thoughts."

Eos design
Residential and Commercial Architecture

I received a response from Antoinette referring me to you for a decision and I have left many messages for you to call me back since that time.

It has now become a matter of priority that we resolve the remediation of the landfill material as we will need to commence construction of the car park in the next 3 weeks or we risk it not being complete at the opening of the centre.
The last thing we want is for there to be negative publicity about the state of exposed landfill material at the centre, not to mention the massive health and safety issues that will arise when we demolish the enclosing fence in the next few weeks.
Could you please arrange for the appropriate person to get in contact with me as soon as possible as there is some urgency to resolving this matter. The build is scheduled for completion mid May and remediation needs to be completed by then as well as soil testing to demonstrate there is no risk to users of the centre.

Regards,

Ben Luders

Eos Design
Mobile 021 2874626
Email ben@eosdesign.net.nz

Site Plan

Napier City Council

Application for a Building Consent

1. OWNER

Name: Freestyle Fitness Centre (2001) LTD.*

Postal Address: P.O. Box 422

Napier

Phone: 843-0999 Fax: 843-0999

2. CONTACT *(Person who will receive the invoice)*

Contact name: Scotty Thomson

Postal Address: P.O. Box 422

Napier

Phone: 843-0999 Fax: 843-0999

3. PROJECT LOCATION 25 MAADI RD.

Address ONEKAWA POOL COMPLEX ~~FENDERS AVENUE, NAPIER~~

BC NUMBER 021165

4. LEGAL DESCRIPTION

Lot(s): 6 DP:(s) 10462 Valuation Number 0994027500A

Council land?

5. CERTIFICATE OF TITLE CT Number: _____

The Certificate of Title is to be current within three months of application

Certificate Provided ☑ Certificate Not Required ☐ Certificate to be obtained on my behalf ☐

6. PROJECT (Being stage 1 of an intended 1 stages)

6.1

New Building ☑

Alteration ☐

Relocation ☐

Demolition ☐

6.2

Intended Life:

Indefinite but not less than 50 yrs: ☑

or

Specified as.....yrs

6.3 Description of work: Gymnasium Addition

Intended Use(s) (in detail): Aerobics & Martial Arts

6.4 Estimated Value (GST Include): $ 70,000-00.

6.5 Total floor area of Project: ~~242~~ M²

Do you intend to:-

Cross Lease ☐

Subdivide ☐

Rental Flats ☐

BCAPP

Please Note:

1) **Work must not commence prior to the issue of the consent.**
2) **Applications not finalised within one month of contact or issue of invoice may be cancelled.**
3) **A $100 deposit is required on Application. Remaining fees are payable at time of uplifting the consent.**

Signed for and on behalf of:

Signature _____ **Name** GARY THOMSON **Date:** 14/10/02.

The information which you have provided in this application is placed on the building register which is available for public inspection at Council offices. As a useful service for the building community, the Council provides monthly lists of this information. Tradespeople and manufacturers often use the lists to offer products or services available at the time of construction. They also provide important analysis of market trends and indicators to industry. The information from the building register is required to be supplied by the Council under the Building Act and Local Government Official Information and Meetings Act.

NOTE: You are advised to contact the relevant Electric Power Company and Gas Company for any requirements that either utility may have for your intended project.

$100 -

37026-0074

BCAPP

Napier City Council

Application for a Building Consent

1. OWNER IAIN JOHNSTONE
Name: DRAINAGE ASSET MANAGER N.C.C.
Postal Address: C/- N C C
Phone: ..... Fax: .....

2. CONTACT (If Not Owner)
Contact Name: .....
Postal Address: .....
Phone: ..... Fax: .....

3. PROJECT LOCATION
Address: 27 MAADI ROAD, ONEKAWA PARK ✓

4. LEGAL DESCRIPTION
Lot(s): 6 DP(s): 10462 ✓ Valuation No: .....

- One copy of Certificate of Title. The Certificate of Title is to be current within three months of application. (Not required for domestic internal alterations). ☐

5. PROJECT (Being stage 1 of an intended 1 stages)

5.1		5.2 Intended Life	
New Building	☑	Indefinite but not less	
Alteration	☐	than 50 years	☑
Relocation	☐	OR	
Demolition	☐	Specified as .....Years	

5.3 Description of Work: CONSTRUCTION OF A PUBLIC TOILET

Intended Use(s) (in detail): .....

5.4 Estimated Value (GST Include):

Building	$	40 000
Plumbing & Drainage	$	5 000
Total:	$	45 000

5.5 Total floor area of Project: 15 M²

Do you intend to:
- Cross Lease ☐
- Subdivide ☐
- Rental Flats ☐

Please Note: 1) **Work must not commence prior to the issue of the consent.**
2) **Applications not finalised within one month of contact or issue of invoice may be cancelled.**

Signed by or on behalf of the owner:

Signed: I A Johnstone **Name:** IAIN JOHNSTONE **Date:** 29/4/98

The information which you have provided in this application is placed on the building register which is available for public inspection at Council offices. As useful service for the building community, the Council provides monthly lists of this information. Tradespeople and manufacturers often use the lists to offer products or services available at the time of construction. They also provide important analysis of market trends and indicators to industry. The information from the building register is required to be supplied by the Council under the Building Act and Local Government Official Information and Meetings Act.

BUILDING CONSENT NO: 97/0995

Project Information Memorandum No:

Section 35, Building Act 1991

ISSUED BY NAPIER CITY COUNCIL

(Insert a cross in each applicable box. Attach relevant documents).

APPLICANT

Name: NAPIER CITY COUNCIL

Mailing Address:

PB 6010
NAPIER

PROJECT LOCATION

Street Address:

25 MAADI RD
NAPIER

LEGAL DESCRIPTION

Property Number: 3/10/97

Valuation Roll Number:

Lot: 6 DP: 10462

Section: Block:

Survey District: HERETAUNGA

PROJECT

All [X]

Stage No X of an intended stages of:

New Building [X]

Alteration [ ]

Intended Use(s) (in detail):

SWIMMING POOL
NEW INDOOR SWIMMING & LEISURE COMPLEX

Intended Life:

Indefinite, but not less than 50 years [X]

Specified as years

Demolition [ ]

Estimated Value: $ 1,934,300.00

COUNCIL CHARGES

The balance of Council's charges payable on uplifting of this building consent, in accordance with the tax invoice are:

ISSU

Total: $ 0.00

ALL FEES ARE G.S.T. INCLUSIVE

Signed for and on behalf of the Council:

Name: .....

Position: .....

Date: 7 / 1 / 98

This building consent is a consent under the Building Act 1991 to undertake building work in accordance with the attached plans and specifications so as to comply with the provisions of the building code. It does not affect any duty or responsibility under any other Act nor permit any breach of any other Act.

This building consent is issued subject to the conditions specified in the attached ..... pages, headed "Conditions of Building Consent No / "

PERM

826
29/11

NAPIER CITY COUNCIL

BUILDING APPLICATION FORM

To the CITY ENGINEER. Date 11 – 1 – 19 71

I hereby apply for ~~permission to erect, alter, repair~~ Preliminary approval of proposed Swimming Pool

according to locality plan and detailed plan, elevations, cross-sections, computations and specifications of buildings deposited herewith ~~in duplicate~~. 1 set only.

Name of owner: NAPIER CITY COUNCIL

Address:

Situation: ONEKAWA PARK (House No. and Street)

Lot No. 6 D.P. 10462 Frontage: (feet)

Average Depth Area: roods perches

PARTICULARS OF BUILDING:

State whether brick, concrete, wood, iron, etc.

Foundations Concrete Floors Concrete

Walls Masonry Roof Galv. Iron.

Area of ground floor 11 000 square feet. Top floor

Area of outbuildings square feet.

ESTIMATED VALUE:

Building	$	Building Permit Fee	$:
Plumbing and Drainage	$	Plumbing & Drainage Permit Fee	$:
		Footpath Crossing Deposit	$:
TOTAL	$ 160 000	Builders Licence Fee	$:
		Water Connection Fee	$:
		Sewer Connection Fee	$:
		Storm Water Connection Fee	$:
		Open Formed Footpath Deposit	$:
		TOTAL	$:

If any portion of the proposed building is within 12ft. of a power line, approval must be obtained from the appropriate Power Authority. (M.E.D. or H.B. Electric Power Board.)

Proposed purposes for which every part of building is to be used or occupied, describing separately each part intended for use or occupation for separate purposes.

Nature of ground on which building is to be placed and of subjacent strata

And I do hereby agree to abide by all the provisions of the Napier City Council By-laws governing and regulating all matters the subject of the foregoing.

NOTE: Where the work involves any drainage or sanitary plumbing work, a separate permit for this work must be obtained at the same time.

State whether dwelling, shop (intended use) office, garage, etc.

SCHEME

Owner/~~Builder~~: Napier City Council

Address:

Amended Plans R. 9-3-71

OFFICE USE ONLY

Date Received 11 – 1 – 71 Permit No. Date Receipt No.

Town Planner Application complies 12 JAN 1971

Building Inspector Approved as Amended Plans - AC 9/3/71

Health Inspector Approved 14.1.71

S/E

FW 979

PERM

3661
1.4.68.

NAPIER CITY COUNCIL

BUILDING APPLICATION FORM

To the CITY ENGINEER, Date 6 Mar 1968

I hereby apply for permission to erect, ~~alter~~, ~~repair~~ Pavilion at Onekawa Park for Tennis & B/Ball according to locality plan and detailed plan, elevations, cross-sections, computations and specifications of buildings deposited herewith in duplicate.

Name of owner: Napier City Council.

Address: P.O. Box 167 NAPIER.

Situation: ONEKAWA PARK. (House No. and Street)

Lot No. 6 D.P. 10462 Frontage: (Feet)

Average Depth Area: roods perches

PARTICULARS OF BUILDING:

State whether brick, concrete wood, iron, etc.

Foundations R/ concrete. Floors Concrete.

Walls Fibrolite & Brick. Roof Ponderosa.

Area of ground floor 1128 square feet. Top floor

Area of outbuildings square feet.

ESTIMATED VALUE:

Building	$6561
Plumbing and Drainage	$765.
TOTAL	$7326-00

Building Permit Fee	£	: :
Plumbing & Drainage Permit Fee	£	: :
Footpath Crossing Deposit	£	: :
Builders Licence Fee	£	: :
Water Connection Fee	£	: :
Sewer Connection Fee	£	: :
Storm Water Connection Fee	£	: :
Open Formed Footpath Deposit	£	: :
TOTAL	£	: :

No FEE Council Bldg.

State whether dwelling, shop (intended use) office, garage, etc.

Proposed purposes for which every part of building is to be used or occupied, describing separately each part intended for use or occupation for separate purposes.

Tennis & Basketball facilities.

Nature of ground on which building is to be placed and of subjacent strata

And I do hereby agree to abide by all the provisions of the Napier City Council By-laws governing and regulating all matters the subject of the foregoing.

NOTE: Where the work involves any drainage or sanitary plumbing work a separate permit for this work must be obtained at the same time.

HIRD BROS. & WHYTE

Owner/Builder: Hird Bros & Whyte.

Address: Leyland St Onekawa.

REFER C482 Construction DRAWER

OFFICE USE ONLY

Date Received 7/3/68 Permit No. 8559 Date 13.3.68 Receipt No. No FEE

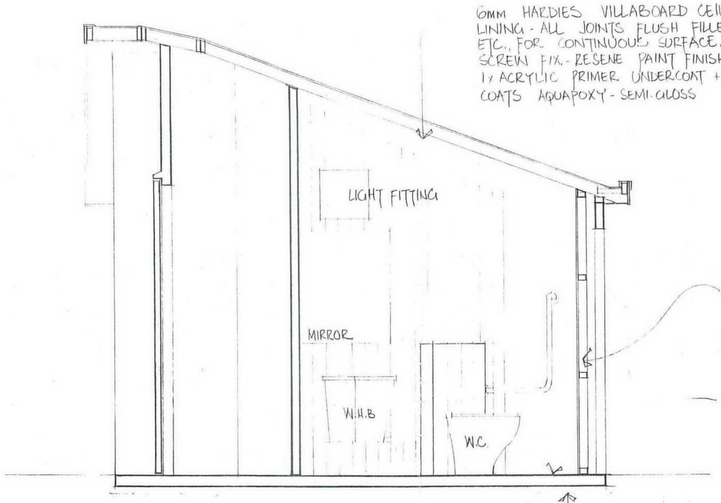
13.3.68

Town Planner Siting Approved. W.G.D. 12/3/68.

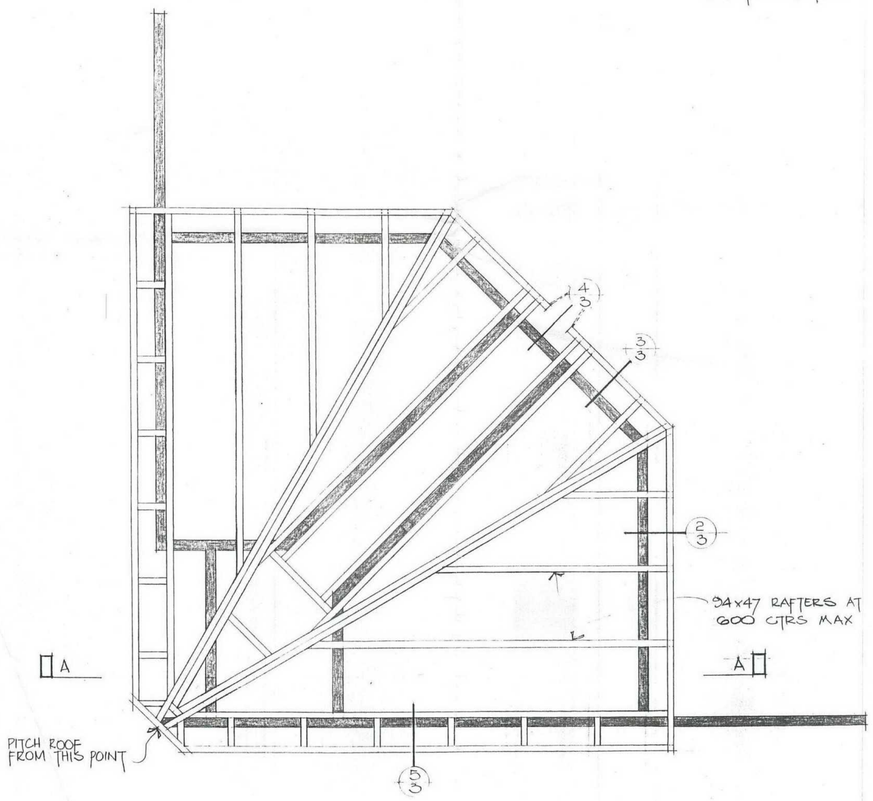
Building Inspector Approved subject to inclusion of items submitted to architect to comply with By law requirments 12/3/68.

Health Inspector Approved

Martin Print 23816/66

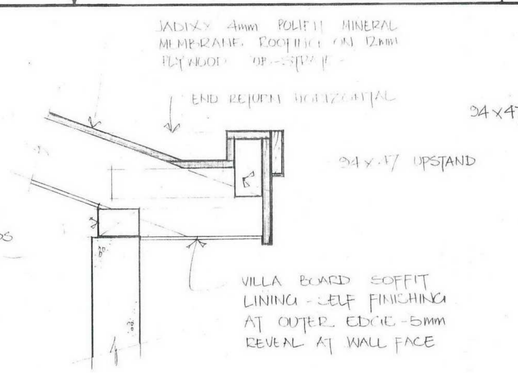


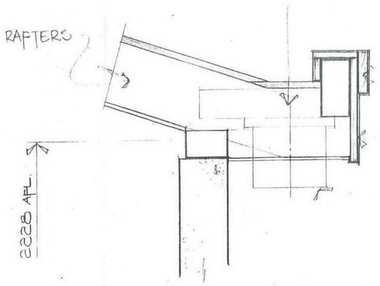
SECTION A-A 1:25

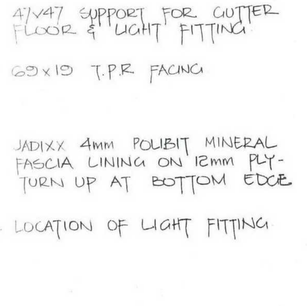


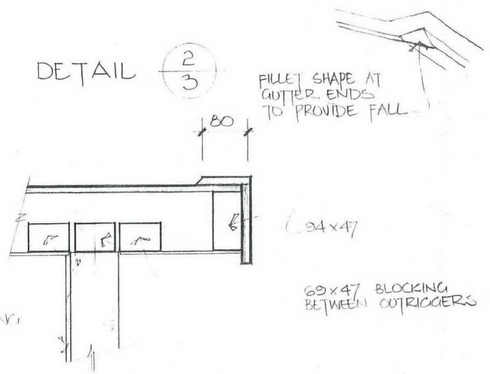
ROOF FRAMING PLAN 1:25

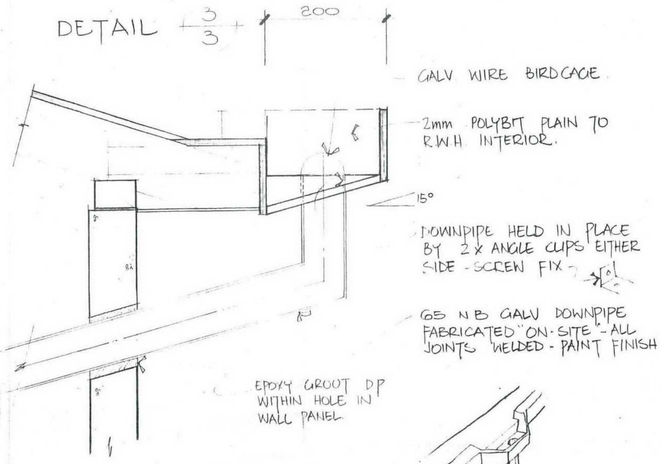
NOTE: RAFTERS NOGGED OUT TO SUIT ROOFING PLY AND CEILING LININGS

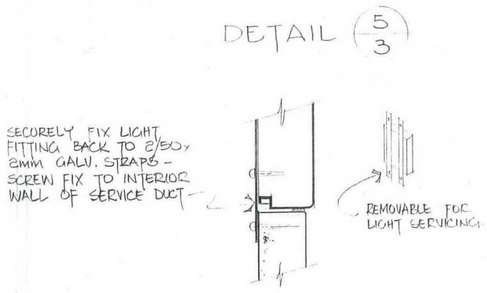


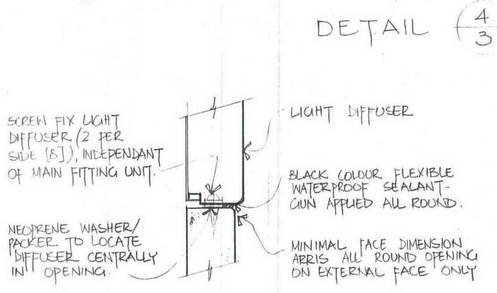


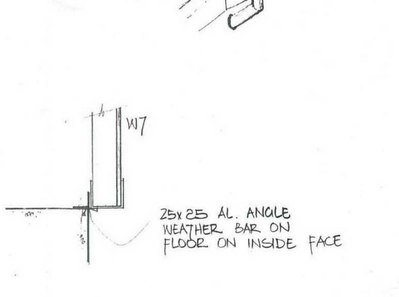








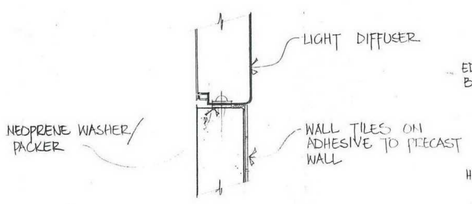


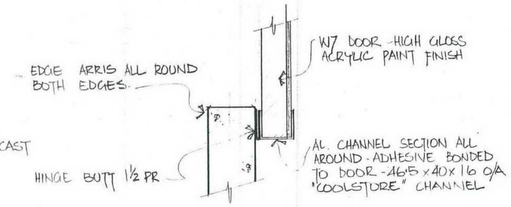


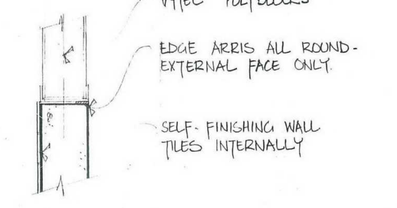
DETAIL 6/1

DETAIL 7/2

DETAIL 10/1







DETAIL 8/2

DETAIL 9/1

DETAIL 11/1

DESIGNED	WORKS MANAGER	NAPIER CITY COUNCIL + CITY WORKS DEPARTMENT	ORIGINAL SCALES
DRAWN			
TRACED		ROOF FRAMING & DETAILS.	ORIGIN OF LEVELS
CHECKED			FIELD BOOK PAGE
RECOMMENDED	C. SQUIRE		LEVEL BOOK PAGE
	DATE		SHEET 3 OF 3 SHEETS

ORIGINAL SIZE A1

PERM

9355
18/11

C

NAPIER CITY COUNCIL

BUILDING APPLICATION FORM

To the CITY ENGINEER, Date 11th November 1971

I hereby apply for permission to erect, ~~alter, repair~~ LAWN MOWER SHED. + TOOLS.

according to locality plan and detailed plan, elevations, cross-sections, computations and specifications of buildings deposited herewith in duplicate. (N.C.C. Onekawa Park Cite)

Name of owner: ~~ONEKAWA~~ NAPIER FREE KINDERGARTEN ASSC.

Address: MAADI RD.

Situation: 29 MAADI RD. ONEKAWA. (House No. and Street) (O/W/K)

Lot No. 6 D.P. 10462. Frontage: 122. (feet)

Average Depth 185 ft. Area: roods perches

PARTICULARS OF BUILDING:

State whether brick, concrete, wood, iron, etc.

Foundations CONCRETE. Floors CONCRETE.

Walls SHADOW LINE. ON TIMBER. Roof IRON.

Area of ground floor 30. sq ft. square feet. Top floor —

Area of outbuildings square feet.

ESTIMATED VALUE:

Building	$ 100
Plumbing and Drainage	$
TOTAL	$ 100

Building Permit Fee	$	1 : 00
Plumbing & Drainage Permit Fee	$	:
Footpath Crossing Deposit	$	:
Builders Licence Fee	$	:
Water Connection Fee	$	:
Sewer Connection Fee	$	:
Storm Water Connection Fee	$	:
Open Formed Footpath Deposit	$	:
TOTAL	$	1 : 00

If any portion of the proposed building is within 12ft. any power line, approval must be obtained from the appropriate Power Authority. (M.E.D. or H.B. Electric Power Board.)

State whether dwelling, shop (intended use) office, garage, etc.

Proposed purposes for which every part of building is to be used or occupied, describing separately each part intended for use or occupation for separate purposes.

TOOLS + LAWN MOWER SHED.

Nature of ground on which building is to be placed and of subjacent strata

And I do hereby agree to abide by all the provisions of the Napier City Council By-laws governing and regulating all matters the subject of the foregoing.

NOTE: Where the work involves any drainage or sanitary plumbing work, a separate permit for this work must be obtained at the same time.

Owner/Builder: R.P. SINGLE

Address: 64 HAROLD HOLT AVE.

65/6428

OFFICE USE ONLY

Date Received 11. 11. 71. Permit No. 12962 Date 13-12-71 Receipt No. 8014

Town Planner OK Tech Comm 24/11/71 [illegible] [illegible] 17/11/71

Application complies [illegible] 25/11/71

Building Inspector Application approved [illegible] 15/11/71. Note. 1465

Health Inspector approved [illegible]

vw 979

Appendix I: Contamination enquiry

11th February 2021

Tonkin & Taylor
C/- Melody Robyns
PO Box 2083
Wellington

Dear Melody

PROPERTY ENQUIRY: LISTED LAND USE REGISTER (LLUR) STATEMENT

Thank you for submitting your property enquiry in regards to our Listed Land Use Register which holds information about sites that have been used, or are currently used for activities which have the potential to have caused contamination.

The Listed Land Use Register statement provided below indicates the location of the land parcel(s) you enquired about and provides information regarding any listed sites within a radius of this land as specified in the statement.

Please note that if a property is not currently entered on the Register, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The Register is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The Listed Land Use Register only contains information held by Hawkes Bay Regional Council in relation to contaminated or potentially contaminated land; other information relevant to potential contamination may be held in other files (for example consent and enforcement files).

If your enquiry relates to a farm property, please note that many current and past activities undertaken on farms may not be listed on the Register. Activities such as the storage, formulation and disposal of pesticides, offal pits, foot rot troughs, animal dips and underground or above ground fuel tanks have the potential to cause contamination.

Please contact the Hawkes Bay Regional Council hazardous substances team if you wish to discuss the contents of the Register statement, or if you require additional information.

Yours sincerely

IRENA MIKOLIC
ENVIRONMENTAL OFFICER COMPLIANCE
REGULATION GROUP - HAZARDOUS SUBSTANCES TEAM
Email: contaminated.land@hbrc.govt.nz

Hawkes Bay Regional Council Listed Land Use Register Statement

Date requested: 07/09/2020
Date generated: 11/02/2021

PARCEL ENQUIRY REFERENCE:

Property Address(s):	60 Flanders Avenue, Napier
Legal Description(s):	Lot 6 DP 10462 Section 2 SO 440945
Parcel ID(s):	7334510
Valuation Number(s):	0994027500

Area of enquiry

Listed sites

The above map outlines the specific parcel(s) or area(s) where contaminated land information has been requested

SITES WITHIN AREA OF ENQUIRY:

Summary of sites:

Site ID	Site Name	Location	HAIL activity(s)	Category	Sub-Category
SLS-11027	60 Flanders Avenue, Napier, Onekawa Park	60 Flanders Avenue, Napier	G3	Verified HAIL	Managed for Land Use

Please note that the above table represents a summary of sites and HAIL within the area of enquiry stated above only.

Information held about the sites on the Listed Land Use Register

Site ID:	SLS-11027
Site address:	60 Flanders Avenue, Napier
Legal Description(s):	Lot 6 DP 10462 Section SO 440945
Site category:	Verified HAIL
Site sub category:	Managed for Land Use

HAIL Details:	HAIL description	Period from	Period to
G3	Former municipal landfill at Onekawa Park and some of the surrounding area.	Pre-1932	Late 1950s

Site Notes:

A former municipal landfill operated on Onekawa Park and some of the surrounding area from pre-1932 until the late 1950s. Construction of houses over parts of the closed landfill then continued through the late 1950's and 1960's. Affected properties were identified and registered on the HBRC Listed Land Use Register. Limited historical information means there is uncertainty about the extent of the landfill and the thickness of the clean cover material placed over the landfill prior to redevelopment into the park and residential areas.

A report by Pattle Delamore Partners Limited (2011) notes there is reasonable confidence landfilling activities have occurred. Further investigation was undertaken in 2012 including sampling in the areas of suspected fill. Sampling found moderately elevated levels of heavy metals, but within relevant guidelines. Samples were taken from the top of the waste layer so concentrations could be higher deeper. In general, surface cover was adequate to prevent an immediate risk to human health, but there is risk if soils are disturbed and subsurface soils brought to the surface. Please refer to the report for full details and limitations.

Site Investigation(s):

Investigation reports attached:

1. Phase 2 Site Investigation at the Former Taradale Road Landfill (January 2011) by Pattle Delamore Partners Ltd

2. Former landfill, Onekawa: Residential Property Investigation (June 2012) by Pattle Delamore Partners Ltd

Resource Consent(s):

1. To discharge contaminants into or onto land in circumstances which may result in that contaminant entering water (AUTH-107743-01) consent document attached. This consent includes a total of 7 sites.

2. To drill bores for groundwater monitoring (AUTH-126518-01) consent document attached.

Photograph(s):

Photo 1: Onekawa likely landfill extent area
Yellow: reasonable confidence that landfilling activities have occurred.
Green: some indication that landfilling may have occurred.

Please refer to the updated map in the 2012 report by Pattle Delamore for a further refined area of the likely extent.

Other Relevant Information

Incident (historic):

1. 17th March 2016 - complainant reported chlorinated water flowing into stormwater outside the netball pavilion next to the Aquatic centre.

   Napier City Council quick to respond and mitigate.

2. 23rd November 2006 - call from complainant to say there was flooding at the netball courts coming from the Onekawa Aquatic Centre.

   Visited site, flooding from overfull pool in complex. Spoke to staff member, the pool had been emptied for maintenance and had overflowed when they refilled it. No chlorine in water at the time. NCC on site unblocking drains to allow flooding to subside.

Disclaimer:

This service is provided by the Hawke's Bay Regional Council as a public service. Information is derived from Hawke's Bay Regional Council's Listed Land Use Register. The Register has been established by the Council for the purpose of performing its functions under the Resource Management Act 1991.

The information is made available in good faith but the council does not warrant the accuracy or completeness of the information. Users of this Register who rely on the information provided without obtaining independent verification, do so at their own risk. Hawke's Bay Regional Council accepts no liability for any inaccuracy in or omission from the information. Any party relying on the information does so at their own risk.

The given land use category reflects the Council's understanding at the time of the date indicated for the property's assessment, which is based only on the information obtained by it and held on record at the time. The site condition or information available may have changed since the date of the Council's assessment of the property. Any person acting on the information should verify the site's condition at the time. The Council accepts no responsibility for changes to the site condition since the site was listed on the Register.

Properties listed on the Register include properties where potentially contaminating activities are suspected to have occurred (Unverified HAIL sites) or are known to have occurred but no physical investigation has taken place (Not investigated sites). In both cases, the listing is not an indication of actual contamination and no reliance can or should be placed by any person as indicating the actual presence of contaminants on such sites. Further investigation is required to establish the actual presence or absence of contaminants.

The Council does not warrant a listed property's suitability for any specific purpose. The listing is based only on human health considerations. Where a site has been investigated and been listed as suitable for one of several generic uses (e.g. residential or commercial), the suitability is within the given constraints (e.g. a management plan is in place and being adhered to). Such a property may not be suitable for particular land uses within that general use (e.g. being able to grow particularly plants; different plants having a widely varying sensitivity to soil contaminants). Any person relying on a property's general suitability as demonstrating the land is suitable for a specific purpose does so at their own risk. Conversely a property listed as being hazardous to people for the given generic land use may not be hazardous for some other less sensitive land use. Independent, expert advice should be sought as to the property's suitability for a particular purpose.

The listing of a property does not necessarily mean the property condition implied by the listing occurs over the complete parcel of land represented by the street address or legal description of the property. For example, a large property may only have had a small part of it used for a potentially contaminating activity or have actual contamination over only a small part of it (e.g. a sheep dip within a large block of otherwise uncontaminated land).

Where a property or properties have been subdivided or amalgamated since the date of listing, in the absence of information to the contrary, as a precautionary approach the Council will automatically apply the original listing to the new land parcels. Given a potentially contaminating historical activity or actual contamination may originally have had a limited extent, it is not necessarily the case that all the newly subdivided properties are in the condition implied by the listing after subdivision. Similarly, not all of a newly amalgamated property is necessarily in the condition implied by the listing. Further investigation may be necessary to determine the extent of the land actually affected.

www.tonkintaylor.co.nz