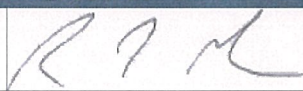


Contaminated Soils and Groundwater Management Plan (CSGMP)

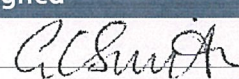
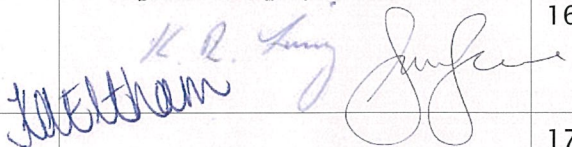
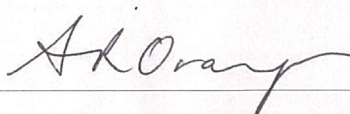
Contaminated Soils & Groundwater Management Plan (CSGMP) Revision History

Revision N°	Prepared By	Description	Date
1.0	Genevieve Smith	Draft for internal comments	18 April 2013
1.1	Genevieve Smith	Draft for external comments	22 April 2013
2.0	Genevieve Smith	Final for certification	25 June 2013
2.1	Genevieve Smith	Final for certification following comments	16 July 2013

Independent Review

Action	Name	Signed	Date
Reviewed by	Rob Burden		9 May 2013

Document Acceptance

Action	Name	Signed	Date
Prepared by	Genevieve Smith		16 July 2013
Reviewed by	Kerry Laing Kylie Eltham/Anna Lewis		16 July 2013
Approved by	Alan Orange Alliance Project Manager		17 July 2013
on behalf of	M2PP Alliance		

Certification

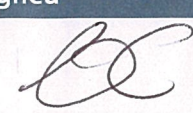
Action	Name	Signed	Date
Regulatory Manager Approval	Al Cross		20/8/13
on behalf of	Greater Wellington Regional Council		

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Appendix A – Contaminant Risk Register

Appendix B – Maps of Contaminated Sites

**Appendix C – Assessment of Land and Groundwater Contamination
Effects: Addendum Technical Report 23a**

Appendix D – Independent Review Table

Appendix E – GWRC Review Table

Appendix F – Iwi Consultation Record Table

Quick Reference Guide to Conditions

Condition Number	Condition Requirement	Comments	Key Final CSGMP Reference
G.19	Independent review of CSGMP required.		Appendix D
G.31	<p>a) In managing earthworks and the potential for effects to occur due to the disturbance of contaminated soils during construction of the Project, the Consent Holder shall achieve the following outcomes:</p> <ul style="list-style-type: none"> i) Contaminated dust or sediment discharged beyond the boundary is minimised; ii) All excavated contaminated soils are appropriately handled and disposed of at facilities registered for taking contaminated material; and iii) All soil that is to remain on a site will be suitable for the proposed future use of that site. 		Section 1 addresses outcomes generally; Section 3.1.3 addresses (i); Section 3.1.1 and 3.1.6 addresses (ii); and Section 3.1.10 addresses (iii)
	<p>b) In achieving these outcomes, the Consent Holder shall, at the least, comply or be consistent with the following standards and guidelines:</p> <ul style="list-style-type: none"> i) Contaminated Land Guidelines No.1 – Reporting on Contaminated Sites in New Zealand; ii) Contaminated Land Guidelines No. 5 – Site Investigation and Analysis of Soils; and iii) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. 		Section 1.3 and Appendix C
G.32	The purpose of the CSGMP is to identify contamination levels found during investigations, to detail the		Section 1.1

	minimum standards for contamination management and to identify the best practicable options for management of contaminated soil and groundwater for the Project.		
	The CSGMP shall be finalised in consultation with Te Āti Awa ki Whakarongotai and Takamore Trust.		Appendix F
	Specific inclusions within the CSGMP: a) Implementation and operational procedures including: i) roles and responsibilities of the Contaminated Land Specialist; ii) management of as yet un-investigated potentially contaminated sites; iii) management of areas of known contamination; iv) risk register records; and v) a contingency action plan for unexpected contaminant discoveries.		Section 7 addresses (i); Section 3 addresses (ii) and (iii); Section 2.3 addresses (iv); and Section 4 addresses (v)
	b) Soil, groundwater and surface water contamination monitoring requirements and testing and disposal procedures;		Section 5
	c) Site validation reports;		Section 6
	d) Consent monitoring requirements (including the role of Te Āti Awa ki Whakarongotai and Takamore Trust in monitoring stormwater treatment devices); and	Addressed in the CEMP	Section 5.2.1 TAA to be provided with groundwater quality reports
	e) Review procedures.		Section 9
G.33	Undertake and report on appropriate investigations into the areas of potentially contaminated land located at 16 Leinster Ave, 150 Raumatī Road, 58 Kiwi Road and 109 Kāpiti Road.		Section 2.2 and Appendix C

1 Introduction

1.1 Purpose

This Contaminated Soils and Groundwater Management Plan (CSGMP) forms part of a comprehensive suite of environmental controls within the Construction Environmental Management Plan (CEMP) for the construction phase of the MacKays to Peka Peka Expressway (“the Project”). The CSGMP addresses the potential adverse environmental effects resulting from contaminated soil, surface water and groundwater at selected locations associated with the construction of the Project.

The purpose of this Contaminated Soils and Groundwater Management Plan is to fulfil the requirements of the MacKays to Peka Peka designation condition G.31:

G.31 a) “...In managing earthworks and the potential for effects to occur due to the disturbance of contaminated soils during construction of the Project, the Consent Holder shall achieve the following outcomes:

- i) Contaminated dust or sediment discharged beyond the boundary is minimised;
- ii) All excavated contaminated soils are appropriately handled and disposed of at facilities registered for taking contaminated material; and
- iii) All soil that is to remain on a site will be suitable for the proposed future use of that site.

b) In achieving these outcomes, the Consent Holder shall, at the least, comply or be consistent with the following standards and guidelines:

- iv) Contaminated Land Guidelines No.1 – Reporting on Contaminated Sites in New Zealand;
- v) Contaminated Land Guidelines No. 5 – Site Investigation and Analysis of Soils; and
- vi) Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand.

This management plan is submitted to the Manager in accordance with G.31 for certification.

The principal purpose of this Plan is to highlight the minimum standards that must be complied with as well as best practicable options for management of contaminated soil, surface water and groundwater for the Project. It is intended as a guide for contractors on how to manage contaminated soil, surface water and groundwater at selected locations on site to minimise effects on the environment from disturbance of these materials. Procedures to be followed to minimise human health risks from contaminated soils are detailed in the Contaminated Soils Management Plan (Human Health) (CSMP(HH)) submitted to Kāpiti Coast District Council as the regulatory authority.

This Plan has been written to comply with consent conditions G.31, G.32 and G.33. In accordance with consent condition G.33, an addendum technical assessment report detailing the findings of further site investigations is included as **Appendix C** to this Plan.

The CSGMP shall be updated, with the necessary approval, throughout the course of the Project to account for changes to construction techniques or the natural environment and consent conditions. A copy of any revisions of a material nature shall be passed to Greater Wellington Regional Council (GWRC) and Kāpiti Coast District Council (KCDC) for comment.

1.2 Scope

The scope of this Plan is to:

- Detail the proposed contamination management strategy;
- Summarise contamination hotspots identified in Technical Report 23, Volume 3 and Addendum Technical Report 23a (**Appendix C**); and
- Identify appropriate control measures to minimise potential environmental risks from soil, surface water and groundwater contamination associated with construction of the MacKays to Peka Peka Expressway.

1.3 Environmental performance standards

The management of contaminated soils, surface water and groundwater during the Project shall follow the objectives of the CEMP and be undertaken in accordance with the legislative requirements and relevant conditions of consent or designation granted for the Project identified in the CEMP. The management, assessment and reporting of contaminated sites shall be undertaken in accordance with the *Contaminated Land Guidelines No.1 – Reporting on Contaminated Sites in New Zealand*; *Contaminated Land Guidelines No. 5 – Site Investigation and Analysis of Soils*; and *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand*.

1.4 Environmental plans and maps

This Plan has links to a number of other management plans which form the CEMP. A summary of the other management plans is included in Table 1.

This Plan refers to the Project team as carrying out works on behalf of and as contracted by the NZTA. The NZTA is the requiring authority and the consent holder.

Table 1 – Relevant Environmental Management Plans and Maps

Plan/map	Relevance	Location
Groundwater (Level) Management Plan (GWMP)	Monitoring and management of groundwater levels.	CEMP Appendix K
Hazardous Substances Management Plan (HSMP)	Spill management, storage and handling of hazardous substances to minimise contaminant discharges.	CEMP Appendix N
Erosion and Sediment Control Plan (ESCP)	Operation and maintenance of sediment retention devices for capture and treatment of sediment laden runoff. Plan details monitoring of water quality.	CEMP Appendix J
Construction Air Quality Management Plan (CAQMP)	Implementation of dust control measures at contaminated sites and monitoring of air quality during construction.	CEMP Appendix I
Ecological Management Plan (EMP) and Landscape Management Plan (LMP)	Monitoring of freshwater and marine ecology which could be affected by runoff from contaminated land.	CEMP Appendix O and Appendix P
Environmental Maps (GIS Layers)	Contaminated sites, construction footprint, Project alignment, receiving environment.	CEMP Appendix D

2 Environmental impacts summary

2.1 Site identification

The route has been divided into three zones (south, central and north). The zones are shown in Section 1 of the CEMP.

2.2 Soils characterisation

A contamination assessment has been conducted at selected locations along the proposed route of the Project, the full findings of which are detailed in Assessment of Environmental Effects Technical Report 23, Volume 3 and Addendum Technical Report 23a (**Appendix C**).

Sites identified as contaminated according to the Rules of the GWRC Discharges to Land Plan, which pose a potential risk to the environment are listed in Table 2 below.

Table 2 – Contaminated Sites along the Route of the Expressway

Zone	Site	Site Use	Activity	Contaminants Identified
South	16 Leinster Avenue	Contractors Yard	Dumped waste and uncontrolled fill	PAH
South	150 Raumati Road	Unoccupied land	Uncontrolled dumping	Heavy metals, PAH
South	55 Rata Road	Contractors Yard	Historical storage of hydrocarbons, uncontrolled fill	Heavy metals, TPH, PAH
South	61 Rata Road	Unoccupied land	Storage of waste materials/scrap	Contaminants similar to background levels
South	58 Kiwi Road	Horticulture	Market gardening	Heavy metals, OCP
Central	Kāpiti Road Intersection	Unoccupied land	Unknown dumping of waste	Heavy metals
Central	Otaihanga Project Yard	Landfill	Landfill	Contaminants assumed to be in landfill materials.
Central	Otaihanga Mountain Bike Park*	Bike park	No directly contaminating activity.	Leachate detected in surface water and groundwater from adjacent landfill.
Central	124-154 Te Moana Road	Horticulture	Market gardening	Heavy metals

Notes:

TPH – total petroleum hydrocarbons

PAH – polycyclic aromatic hydrocarbons.

OCP – organochlorine pesticides

Technical Report 23 and Addendum Technical Report 23a concluded that soil contaminant concentrations in isolated samples exceeded relevant environmental assessment criteria at each of the sites investigated.

*Groundwater and surface water at Otaihanga Mountain Bike Park contained leachate from the adjacent landfill. The source of the contamination is the adjacent landfill, there has been no contaminating activity occurring from the use of the land as a bike park. This site is included for completeness to ensure site controls are implemented during construction.

Soil contaminant concentrations exceeded health assessment criteria for human health at 55 Rata Road. Procedures to protect human health during the excavation of soils at these sites are detailed in the CSMP(HH).

The individual sampling locations at each site where contaminants pose a risk to the environment are identified in the Contaminant Risk Register (**Appendix A**) described in the following section.

2.3 Risk register

A contaminant risk register provides a record of the risk arising from chemical contaminants and the approach to managing the risk. For each contaminant the risk register records:

- A description of the contamination risk;
- An assessment of the consequences and likelihood of the risk occurring;
- A risk rating; and
- An outline of the controls required.

The Risk Register for contamination management along the route of the Expressway, based on chemical laboratory analysis data from soil sampling, is given in **Appendix A**. The contaminants of concern are: polycyclic aromatic hydrocarbons (PAH)/total petroleum hydrocarbons (TPH)/heavy metals.

3 Implementation and operation

3.1 Management plan for contaminated sites

The known locations of contaminated soil are illustrated on drawings GIS-3320901-87 to 92, 94 and 95 in **Appendix B**. Reference to this will allow preliminary evaluation of material disposal options before such material is excavated.

3.1.1 Pre-excavation procedure

Prior to any earthworks being undertaken at a site listed in **Table 2**, a pre-earthworks site meeting shall be held and attended by the Project staff including the Construction Manager, the Environmental Manager, the Contaminated Land Specialist (CLS) and personnel involved with the earthworks to discuss the risks and site procedures for handling contaminated soils and groundwater and/or potentially contaminated soils and groundwater located along the route. The Construction Manager shall ensure a Job Safety and Environmental Assessment (JSEA) is prepared for the earthworks which shall cover exposure to contaminated soil, groundwater and dust for construction workers and the general public.

Landfill acceptance of excavated materials shall be obtained by the Environmental Manager or CLS prior to works commencing, should landfill disposal be required.

The likelihood of encountering groundwater shall be assessed and contingency action to manage groundwater shall be developed (see Section 4.1).

Prior to works commencing, the Contractor shall establish the following controls:

- Access to the earthworked areas shall be restricted to authorised personnel (such as warning tape or barriers), following appropriate site induction procedures;
- Signage, including site works information, health and safety requirements, site reporting requirements;
- Dust control systems; and
- Stormwater and sediment controls.

Procedures relating to the management of dust, stormwater, sediment and stockpiling are detailed below and shall be implemented by the Project team. All procedures shall comply with the relevant Council bylaws and conditions of any applicable consents including the land use consents for soil disturbance as a Controlled and Restricted Discretionary Activities under the National Environmental Standard Regulations.

3.1.2 Site induction

All personnel working on the site during any intrusive ground works shall be required to undergo a site environmental awareness induction in addition to the health and safety induction (including iwi monitors – see CEMP Section 5.7). Construction workers toolbox meetings and daily briefings shall include aspects of contamination control (soil, water and dust).

3.1.3 Contaminated dust controls

Dust suppression controls shall be rigorously implemented during earthworks at contaminated sites (in particular at 55 Rata Road) as detailed in Section 3.1.2 and 3.2.1 of the CAQMP (CEMP Appendix I). Controls include but are not limited to:

- Reduction of vehicle speeds.
- Minimising drop heights from loaders.
- Considering timing of works including prevalent wind direction.
- Regular watering of haul roads.
- Revegetating/stabilising exposed surfaces as soon as possible.

3.1.4 Stormwater and sediment controls

Stormwater and sediment controls shall be installed prior to earthworks commencing in accordance with the ESCP (CEMP Appendix J). The following additional measures shall be required at contaminated sites:

- Where the construction of earth bunds is required for directing water flow, these shall be constructed from clean materials, either imported fill or using soils from outside of

the contaminated site. Topsoil from contaminated sites shall not be used in bund construction.

- Sediment retention ponds capturing runoff and sediment from contaminated sites shall have the decant mechanism raised to prevent immediate discharge.
- Surface water samples from the retained water shall be collected and analysed for contaminants identified as present in the soils at the site (as detailed in the Contaminant Risk Register (**Appendix A**)).
- Retained water shall not be discharged from retention ponds unless contaminants are confirmed by chemical laboratory analysis to be below ANZECC guideline values for the appropriate protection level for the receiving water.
- Contaminated water may require disposal at an appropriately licensed facility or to sewer with consent from Kāpiti Coast District Council (KCDC).
- Prior to the removal of sediment during maintenance of the sediment retention ponds, the sediment shall be tested for contaminants as detailed in the Contaminant Risk Register (**Appendix A**) for the relevant upstream contaminated site.
- Contaminated sediment shall be managed in the same manner as other contaminated soil, the procedure for which is detailed below.

3.1.5 Stockpile procedure

Stockpiling of contaminated material should be avoided. If stockpiling of contaminated materials cannot be avoided, then the stockpiles shall be managed by the Project team as below:

- Stockpiles shall be avoided in areas of wahi tapu/wahi taonga, and where there is uncertainty the Te Āti Awa ki Whakarongotai and the Takamore Trust shall be contacted.
- Stockpiled material shall be placed on plastic sheeting or similar to prevent contamination of underlying material. Stockpiles shall be sited within an area away from any surface water bodies and overland flow paths.
- A berm shall be installed around the stockpile to prevent runoff from leaving the area and stormwater from other areas entering the stockpile area.
- If significant rainfall is forecast, the stockpiled material shall be covered by a suitable material (such as polythene) to prevent the ingress of rainwater into the material and therefore minimise the potential for generation of leachate or sediment in stormwater.
- If stockpiles are placed on bare ground, samples of the soil underneath the proposed stockpile area shall be collected for contamination testing to determine any baseline levels of contamination, prior to the placing of the stockpile. Results of this sampling will be included in the Site Validation Report.
- Following removal of stockpiles placed on bare ground, the soil underneath the stockpile areas shall be tested to verify that contaminated materials have been removed. Results of this sampling will be included in the Site Validation Report.

3.1.6 Excavation procedure

The CLS or a suitably trained member of the Environmental Team shall be available on site during all excavation works in the areas identified as contaminated and shall be responsible, based upon the demarcation of fill and natural ground, for defining which materials are cleanfill, contaminated fill or highly contaminated fill. The CLS or appointed Environmental Team member should where necessary, undertake further contamination testing for defining the different areas of contamination.

Soil testing to date indicates that contaminant levels are above background levels and may pose a risk to the environment at these locations, and therefore any working of soils requires management to minimise contaminant dispersal and transport off site.

The methodology for the working of soils containing elevated contaminant levels and to minimise transport off site is as follows:

- 1 Materials requiring excavation for disposal to landfill shall be excavated and loaded directly into trucks where possible (limiting stockpiling).
- 2 All trucks are to be covered before leaving site and any soils brushed off wheels to avoid tracking onto public roads. Should the site become wet and material adheres to wheels a wheel wash facility shall be installed and truck wheels washed before exiting the site.
- 3 The Project team shall maintain a register of landfill disposal activities and records such as location of excavation, disposal location, quantity of material and off site weighbridge documents. This information may be required for a Site Validation Report.

The landfill operator may require further testing before accepting materials, in accordance with the landfill's resource consent.

3.1.7 Contaminated groundwater and surface water controls (Otaihanga Mountain Bike Park)

Leachate (containing dissolved heavy metals and bacteria) is present in the Landfill Drain separating the Mountain Bike Park from the landfill, and is also present at lower concentrations in the groundwater in the area. Before construction activities are undertaken in any area adjacent to the landfill that may expose workers to the contaminated groundwater or surface water, procedures for the isolation of the work area shall be implemented. A summary of the procedures, which shall be detailed in the CEMP and in site specific Health and Safety Plans, is given below.

General groundwater controls include the following:

- Monitoring of groundwater elevation, flow (into an excavation) and quality, and also measure groundwater levels and quality in established project piezometers in the vicinity.
- Installation of trench stops to control groundwater flow.

- Construction of impermeable barriers such as clay (bentonite) cut-off walls or sheet piles (in locations where the water is found to be grossly contaminated) to prevent contaminants from entering excavations as required.
- Removal of groundwater from excavations by pumping and discharge into sucker truck or sewer. Permission will be required from KCDC for discharge to sewer.

If contaminated groundwater or surface water is still present in the work area (e.g. shallow water that cannot be pumped), precautions shall be taken to protect human health from the bacteria and low level contaminants in the surface water and groundwater. These include but are not limited to the following actions:

- Avoid contact with water where possible.
- Where contact cannot be avoided, use PPE to prevent contact with water such as waterproof gauntlets, gumboots, waders etc.
- No eating or drinking on site. Wash hands before breaks and at the end of the day.
- Wash any skin abrasions immediately and treat to prevent infections.
- Any additional requirements in the Contractor (Site Specific) Health and Safety Plan.

3.1.8 Asbestos controls

Risks arising from suspected asbestos occur at localised areas within 55 Rata Road and Kāpiti Road Intersection. Excavations at these locations shall follow procedures detailed in this section of the plan and Section 4.

Should Asbestos Containing Material (ACM) be observed or suspected during the excavation works, all work shall cease and Guidelines for the Management and Removal of Asbestos (revised 1999) for the Department of Labour, and the Health & Safety in Employment (Asbestos) Regulations (1998) shall be followed. Works can recommence once all ACM has been managed safely. Any such asbestos works (assessment, delineation, removal and verification) shall be undertaken by a specialist asbestos contractor.

3.1.9 Post-excavation procedure

Upon completion of excavation works, all plant and equipment shall be cleaned and decontaminated prior to leaving the contaminated site. Water from wheel washes shall be collected and disposed of to sewer with consent from KCDC. Particular care shall be taken when cleaning equipment used at 55 Rata Road given that the contaminants in the soil pose a risk to human health. At 55 Rata Road loose soil on equipment shall be brushed off onto a tarpaulin and the soils transferred to the truck containing the contaminated soils being transported to landfill.

3.1.10 Imported materials

Consent condition G.31 states that all soil that is to remain on site shall be suitable for the proposed future use of that site.

Any fill imported to reinstate the sites shall be tested for an appropriate suite of contaminants to demonstrate that levels of contaminants are acceptable for the proposed future use of that site. Imported materials can include natural uncontaminated material. The suitability of imported materials shall be determined by the CLS.

4 Contingency action plan for unexpected contamination and hazardous materials discovery

This section outlines the steps to be taken if unexpected contaminated soils, surface water, groundwater or hazardous materials are discovered during the wider excavation works. Contingency action is similar to that for archaeological discovery (refer to the Project Accidental Discovery Protocol – Appendix V of the CEMP) and will be site specific and dependant on the extent and nature of the discovered contamination. The procedures outlined below provide the Project team with protocols to identify potential contamination and take appropriate action to avoid the dispersion of contaminants into the surrounding environment.

Contamination indicators or hazardous materials may include but are not limited to the following:

- Intact or broken drums and containers.
- Unusual odours.
- Discoloured or stained water seeps and soils.
- Petroleum hydrocarbon contaminated soil and/or free product.
- Liquid waste, putrescible waste, household refuse and any material that normally would be sent to a licensed landfill.
- Gas bubbles in standing/pooled water.
- Broken ACM sheets, pipes or fragments.
- Lack of, or stressed vegetation.

During the excavation works on site, the Environmental Management Team or CLS shall actively monitor for the conditions/materials specified above. In the event that one of these is identified, the Project team should take the following actions:

- Stop all earthworks within a 10m radius of the area where the suspect material/ emission/discharge has been recorded.
- Immediately notify the site supervisor.
- Cordon off the area as practicable with a suitable barrier.
- Work shall not resume or commence within a 10m radius of the area unless authorised by the Environmental Manager in conjunction with the CLS.

The site supervisor shall contact the Environmental Manager who shall advise on the appropriate course of action in consultation with the CLS. The CLS shall:

- Notify the regulatory authority (GWRC), if required, that contamination has been discovered and contingency action is being implemented.
- Characterise the contamination by collecting samples for chemical laboratory analysis.
- If appropriate, advise the Project team to excavate the suspected contaminated material into a covered bin to allow works to continue with minimum delay.
- If excavation into a covered bin is inappropriate, advise construction work to proceed to an area clear of contamination indicators until material testing, as necessary, defines the material characteristics.
- When the material characteristics have been established, advise the site supervisor as to whether the materials may remain on site or whether materials should be directly loaded into trucks for disposal at a licensed landfill, assuming it can be accepted without prior stabilisation.
- Instruct relevant staff so that all appropriate information such as location and quantity of material and off-site weighbridge dockets are recorded.
- Record all details on an incident form, including GPS of location.
- Information in relation to the unexpected contamination discovery should be provided to the Te Āti Awa ki Whakarongotai and the Takamore Trust.

4.1 Groundwater controls

In construction areas where the works intersect groundwater and there is visual or olfactory indication of contamination of that groundwater, the groundwater shall be tested to determine whether it is contaminated. Where groundwater is found to be contaminated, the land in the vicinity within the designation shall be tested to determine if it is the source of the groundwater contamination. If the ground is found to be contaminated, the procedures for contaminated land described in Section 4 shall be followed.

General groundwater contamination controls (depending on the nature and scale of the problem) for discovery of unexpected groundwater contamination include the following:

- Monitoring of groundwater elevation, flow (into an excavation) and quality, and also measure groundwater levels and quality in established project piezometers in the vicinity;
- Installation of trench stops to control groundwater flow;
- Construction of impermeable barriers such as clay (bentonite) cut-off walls or sheet piles (in locations discovered as being grossly contaminated) to prevent contaminants from entering excavations as required;
- Removal of groundwater from excavations by pumping and discharge into sucker truck or sewer. Permission will be required from KCDC for discharge to sewer.

Groundwater that is suspected of being contaminated and needs to be removed from the excavations may require disposal at an appropriately licensed facility. Chemical analysis of the groundwater shall be required to determine its contamination status. The analysis suite shall be determined by the CLS but may comprise heavy metals, semi volatile organic compounds, volatile organic compounds, polycyclic aromatic hydrocarbons or total petroleum hydrocarbons.

Appropriate health and safety procedures (as for Otaihangā landfill groundwater in Section 3.1.7) shall be followed in any work area that has residual contaminated groundwater present.

5 Contamination testing and monitoring requirements

In order to determine the contamination status of materials removed from or remaining within a contaminated site, a monitoring programme is required. This will also allow assessment of the effects of disturbing and disposing of contaminated materials on the environment.

5.1 Soil contamination testing and monitoring requirements

Soil quality monitoring is required to cover three key aspects of the management of contaminated and potentially contaminated materials associated with the Project works, namely:

- *Verification testing*: targeted at the management of materials removed from site to a controlled/consented disposal site.
- *Validation testing*: targeted at documenting the concentrations of contaminants within the materials underlying the excavation works that remain in situ.
- *Discovery testing*: in response to “unknown” or unexpected contamination.

An explanation of the three types of testing is given below. Any soil testing shall be carried out by (or by others under instruction from) the CLS.

5.1.1 Verification testing

Contaminated soil assessments have been undertaken to give an initial indication of the broad distribution of soil class within identified contaminated sites for each sector. Once the earthworks and materials requirements are finalised, further information on soil condition may need to be provided to the landfill operator prior to disposal of any contaminated soils.

5.1.2 Validation testing

At any location where waste materials or contaminated soils are to be excavated, samples of material shall be collected from the base and sides in proportion to the size of the excavated areas. The samples shall be submitted for chemical characterisation according to the nature of the contamination as defined in the Contaminant Risk Register in

Appendix A. This sampling and testing will provide information on any residual contamination of in situ soils underlying and surrounding the excavation works.

The testing of material being left in situ located at the subgrade layer may, in some locations, indicate that such materials are contaminated. It is noted that it is not intended that the works aim to remediate any such soils.

5.1.3 Discovery testing

If during the excavation works unexpected or contamination is encountered (refer to Section 4), additional chemical testing may be warranted to characterise the contamination. Such a decision shall be made in consultation with the CLS. This response is analogous to that required for archaeological discovery.

5.2 Otaihanga groundwater and surface water monitoring

Groundwater and surface water monitoring shall be undertaken in accordance with consent condition GD.8A. Monitoring of groundwater and surface water quality down gradient from the landfill shall be undertaken before, during and after the construction of the section of the Expressway through the Mountain Bike Park, including construction of the Otaihanga Project Yard.

5.2.1 Groundwater monitoring

A preconstruction groundwater quality monitoring programme shall be undertaken in the vicinity of the landfill prior to commencement of the works in this area. The purpose of the monitoring programme is to provide supplementary information to known baseline groundwater quality from KCDC from which the effects of the Expressway (during construction and once operational) on the existing groundwater quality in the area can be assessed.

As part of KCDC’s landfill consent requirements, groundwater quality is monitored at quarterly intervals at boreholes around the edge of the landfill. The groundwater quality is impacted by the leachate discharging from the landfill.

The details of the groundwater monitoring for the Expressway construction are included in Table 3.

Table 3 – Groundwater monitoring parameters

Monitoring parameter	
Frequency	Every 6 months at least 12 months (where practicable) in advance of construction, during construction and for a period of 2 years following construction of this section of the Expressway, (unless additional monitoring is required to measure the effectiveness of any treatment measures).
Monitoring locations	Borehole locations BH306, BH307, BH10 and BH11 (shown on drawing number GIS-3320901-94 in Appendix B)

Monitoring parameter	
Contaminant suite	Dissolved heavy metals (aluminium, arsenic, boron, cadmium, chromium, copper, lead, manganese, nickel and zinc), total metals (aluminium, boron, iron), total suspended solids, anion/cation profile, ammoniacal-N, nitrate-N, dissolved reactive phosphorus, sulphate, BOD ₅ , chemical oxygen demand, E.coli. Dissolved metal analyses to be performed at trace level. Field measurements of temperature, pH, dissolved oxygen and electrical conductivity shall be collected.
Reporting	<p>A report will be provided at the completion of the preconstruction monitoring which will provide an outline of the sampling methodologies and the results obtained. A baseline will be established from KCDC historical data and the pre-construction monitoring data.</p> <p>During the construction and post-construction phase, a report will be provided to the GWRC Manager within 30 days of each round of the monitoring being undertaken. A copy of the monitoring data shall be provided to KCDC and Te Āti Awa ki Whakarongotai. Analysis of the data shall be undertaken to determine whether there has been a significant departure from the baseline.</p>
Trigger points and actions	<p>If monitoring indicates any significant departure from the baseline, which is not consistent with the results and trends of the baseline or historical monitoring (undertaken by KCDC) which can be attributed to Expressway construction, the following actions shall be taken, depending on the significance of the departure:</p> <p>If the concentration of the test parameters is confirmed through repeat sampling to be at least 3 times the maximum value recorded in the last 3 years by the Project team or the routine KCDC monitoring, the frequency of monitoring shall be increased to once every 2 months.</p> <p>If the concentration of the test parameters is confirmed through repeat sampling to be at least 10 times the maximum value recorded in the last 3 years by the Project team or the routine KCDC monitoring, then the Project team shall provide a report to the GWRC Manager and KCDC within 30 working days, which will include (but not be limited to):</p> <ol style="list-style-type: none"> 1. Analysis of the results of monitoring; 2. Recommendations regarding the need for additional treatment to surface runoff or shallow groundwater

Monitoring parameter	
	<p>through-flow before exiting the landfill site boundary;</p> <p>3. Treatment options including preferred treatment option, and timeframes for implementing this; and</p> <p>4. Further monitoring proposed of this treatment measure and subsequent actions based on the results of further monitoring.</p>

5.2.2 Surface water monitoring

A preconstruction surface water quality monitoring programme shall be undertaken in the western tributary of the Mazengarb Drain prior to commencement of the works in this area. The purpose of the monitoring programme is to obtain a baseline of surface water quality information from which the effects of the Expressway (during construction and once operational) on the existing surface water quality in the tributary can be assessed.

The western tributary arises in the wetland area immediately northwest of the Otaihanga Landfill through which the Expressway will pass. As part of KCDC's landfill consent requirements, surface water quality is monitored at quarterly intervals in the western tributary at a site located a short distance downstream from the landfill's leachate collection drain (the Landfill Drain). The water quality at this sampling location is impacted by the leachate collection drain. The details of the surface water monitoring for the Expressway construction are included in Table 4.

Table 4 – Surface water monitoring parameters

Monitoring parameter	
Frequency	Once monthly during the preconstruction, construction phase and for a period of 2 years following construction of this section of the Expressway (unless additional monitoring is required to measure the effectiveness of any treatment measures).
Monitoring locations	Site 1 – Landfill, Site 2 – Wetland drain, Site 3 – Ratanui Road, Site 4 – ROW (shown on drawing number GIS-3320901-94 in Appendix B)
Water quality testing parameters	pH, suspended solids, alkalinity, conductivity, BOD ₅ , chemical oxygen demand, major cations, major anions, nitrate, ammonia-nitrogen, dissolved reactive phosphorus, total and dissolved metals (aluminium, arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, zinc), E coli and faecal coliforms.

Monitoring parameter	
Reporting	<p>A report will be provided at the completion of the preconstruction monitoring which will provide an outline of the sampling methodologies and the results obtained. A baseline will be established from KCDC historical data and the pre-construction monitoring data.</p> <p>During the construction and post-construction phase, a report will be provided to the GWRC Manager monthly within 30 days of the monitoring being undertaken. A copy of the monitoring data shall be provided to KCDC and Te Āti Awa ki Whakarongotai. Analysis of the data shall be undertaken to determine whether there has been a significant departure from the baseline.</p>
Trigger points and actions	<p>If monitoring indicates any significant departure from the baseline, which is not consistent with the results and trends of the baseline or historical monitoring (undertaken by KCDC) which can be attributed to Expressway construction, the following actions shall be taken, depending on the significance of the departure:</p> <p>If the concentration of the test parameters is confirmed through repeat sampling to be at least 3 times the maximum value recorded in the last 3 years by the Project team or the routine KCDC monitoring, the frequency of monitoring shall be increased to once every 2 months.</p> <p>If the concentration of the test parameters is confirmed through repeat sampling to be at least 10 times the maximum value recorded in the last 3 years by the Project team or the routine KCDC monitoring, then the Project team shall provide a report to the GWRC Manager and KCDC within 30 working days, which will include (but not be limited to):</p> <ol style="list-style-type: none"> 1. Analysis of the results of monitoring; 2. Recommendations regarding the need for additional treatment to surface runoff or shallow groundwater through-flow before exiting the landfill site boundary; 3. Treatment options including preferred treatment option, and timeframes for implementing this; and 4. Further monitoring proposed of this treatment measure and subsequent actions based on the results of further monitoring.

6 Site validation report

Within 3 months of completion of the construction works, a Site Validation Report (SVR) shall be prepared in general accordance with the *Contaminated Land Management Guidelines: No. 1*, Ministry for the Environment, 2001 and submitted to GWRC. The SVR shall provide the following:

- Description of all instances in which the contingency procedures outlined in Section 4 were applied, including the findings of any sampling works undertaken.
- Volume of soil disposed from contaminated sites and all associated weighbridge dockets or other documentation associated with the offsite disposal of soil.
- Details of validation testing undertaken.

7 Roles and responsibilities

Section 3.1 of the CEMP details the roles and responsibilities associated with managing the Project. Specifically the Environmental Manager and Construction Manager shall take responsibility for the implementation of the CSGMP including training personnel in the required procedures, the coordination of monitoring work by contaminated sites specialists and decision making in the event of discovery of unexpected potentially contaminated material. The Environmental Manager is responsible for liaison with the GWRC.

A CLS shall be engaged by the Project team to monitor, supervise and report on all works that may disturb contaminated land. Tasks include the following:

- Coordinate contaminated land assessments and testing;
- Advise on classification of excavated material for reuse and disposal;
- Coordinate contaminated groundwater management and disposal; and
- Train staff in contaminated land identification and control procedures.

For practical purposes, the CLS will train members of the Environmental Team to ensure that sampling, identification of potentially contaminated materials and other activities can be undertaken in consultation with the CLS.

8 Training

Environmental training for all staff shall be undertaken as part of the site induction programme described in Section 5 of the CEMP.

9 CSGMP review

This section describes how the CSGMP shall be reviewed, including looking at the environmental controls and procedures to make sure that they are still applicable to the activities being carried out

The CSGMP shall be updated, with the necessary approval, throughout the course of the Project to reflect material changes associated with changes to construction techniques or the natural environment. Approval from GWRC shall be required for any relevant revisions of a material nature to the CSGMP, for which GWRC has jurisdiction.

The plan shall be regularly reviewed throughout the course of the project. The review shall take into consideration:

- Any significant changes to construction activities or methods.
- Key changes to roles and responsibilities within the Project.
- Changes in industry best practice standards or recommended pollution controls.
- Changes in legal or other requirements (social and environmental legal requirements, NZTA objectives and relevant policies, plans, standards, specifications and guidelines).
- Results of: inspection and maintenance programmes, logs of incidents, corrective actions, and internal or external assessments.
- Consent condition G.10 regarding review of management plans.

The reasons for making changes to the CSGMP shall be documented. A copy of the original CSGMP document and subsequent versions shall be kept for the Project records, and marked as obsolete. Each new/updated version of the CSGMP documentation shall be issued with a version number and date to prevent obsolete CSGMP documentation being used. The Risk Register shall be provided periodically to Te Āti Awa ki Whakarongotai for review.

10 References

Kirkby, C. Construction Air Quality Management Plan: CEMP Appendix G, Volume 4 of the MacKays to Peka Peka Expressway Project AEE.

Ridley, G. Erosion and Sediment Control Plan: CEMP Appendix H, Volume 4 of the MacKays to Peka Peka Expressway Project AEE.

Smith, G. Contaminated Soils Management Plan (Human Health): CEMP Appendix K, Volume 4 of the MacKays to Peka Peka Expressway Project AEE.

Smith, G. Assessment of Land and Groundwater Contamination Effects: Technical Report 23, Volume 3 of the MacKays to Peka Peka Expressway Project AEE.

Smith, G. Assessment of Land and Groundwater Contamination Effects: Addendum Technical Report 23a.

Appendix A

Contaminant Risk Register

Risk Evaluation:

Likelihood of finding the contamination	Likely or Unlikely
Consequence	Minor: Low harm to environment or human health
	Moderate: Some harm to environment or human health
	Major: Severe harm to environment or human health
Risk	Low, Medium, High

Sample Location	Exceeds Background	Exceeds Environmental Risk	Soils Exceeds Human Health Risk	Non-natural Materials	Likelihood of Finding the Contamination	Consequence	Risk	Mitigation Controls
South Zone (POP-RAU) – 16 Leinster Avenue								
TP110	Cu, PAH, TPH	PAH	No	Yes	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
TP112	Cu, PAH	PAH	No	Yes	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
South Zone (POP-RAU) – 150 Raumati Road								
TP105	As, Cd, Cr, Cu, Pb, Ni, Zn, PAH, TPH	Pb, Zn	No	Yes	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
TP106	Cd, Cr, Cu, Pb, Zn, PAH	Pb, Zn	No	Yes	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
TP109	Cu, Zn, PAH	Zn	No	Yes	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
TP113	Cd, Cu, Zn, PAH	Zn	No	Yes	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
South Zone (RAU-IHA) – 55 Rata Road								
TP203	As, Cd, Cr, Cu, Pb, Ni, Zn	No	No	Yes, ACM	Likely	Minor	Low	Asbestos Containing Material (ACM) to landfill.
TP204	As, Cd, Cu, Pb, Ni	No	No	Yes, ACM	Likely	Minor	Low	Asbestos Containing Material (ACM) to landfill.
TP209	Cd, Cr, Cu, Pb, Ni, PAH, TPH	PAH	PAH, TPH	Yes	Likely	Moderate	Medium	Excavated materials shall be disposed of to landfill.
TP214	PAH	PAH	No	Yes	Likely	Moderate	Medium	Excavated materials may be disposed of to landfill.

TP217	As, Cd, Cr, Cu, Ni, Zn, PAH, TPH	Cr, Cu	Arsenic	Yes	Likely	Moderate	Medium	Excavated materials shall be disposed of to landfill.
South Zone (RAU-IHA) – 58 Kiwi Road								
All locations	As, Cd, Cr, Cu, Ni, Zn, DDT	As, Cu	No	No	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
South Zone (RAU-IHA) – 61 Rata Road								
TP101 and TP102	Cd, Cu, Zn, TPH	No	No	No	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
Central Zone (KAP-MAZ) – Kāpiti Road Intersection								
TP108	Cu, Pb	No	No	Yes, ACM	Likely	Minor	Low	Asbestos Containing Material (ACM) to landfill.
TP109	As	As	No	No	Likely	Minor	Low	Excavated materials may be disposed of to landfill.
Central Zone (MAZ-OT) – Otaihangā Mountain Bike Park and Project Yard								
BH305-307 Ground water & surface water	Ammoniacal Nitrogen, faecal coliforms, Cu, Zn	Ammoniacal Nitrogen, faecal coliforms, Cu, Zn	No	N/A	Likely	Minor	Low	Avoid contact with water where possible. Use PPE such as waterproof gauntlets, waders and gumboots. Wash and treat any skin abrasions immediately to prevent infection.
All locations within Project Yard	Assumed range of contaminants	Assumed range of contaminants	Potential for health risk	Yes	Likely	Moderate	Medium	Excavated materials shall be disposed of to landfill.
Central Zone (WAI-TEM) – 124-154 Te Moana Road								
HA125	Zn	Zn	No	No	Likely	Minor	Low	Excavated materials may be disposed of to landfill.

Appendix B

Maps of Contaminated Sites



Path: P:\318318-AKL\3320901\GIS55_Workspaces\01_mxd\GIS-3320901-96_ContaminantsExceedingGuidelines_16L_einsterAve.mxd

Legend

- Environmental Test Pits
- Non-natural Materials Encountered
- Alignment
- Designation Boundary

All exceedances are above environmental risk criteria unless noted otherwise.

This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.

Map intended for distribution as a PDF document. Scale may be incorrect when printed.

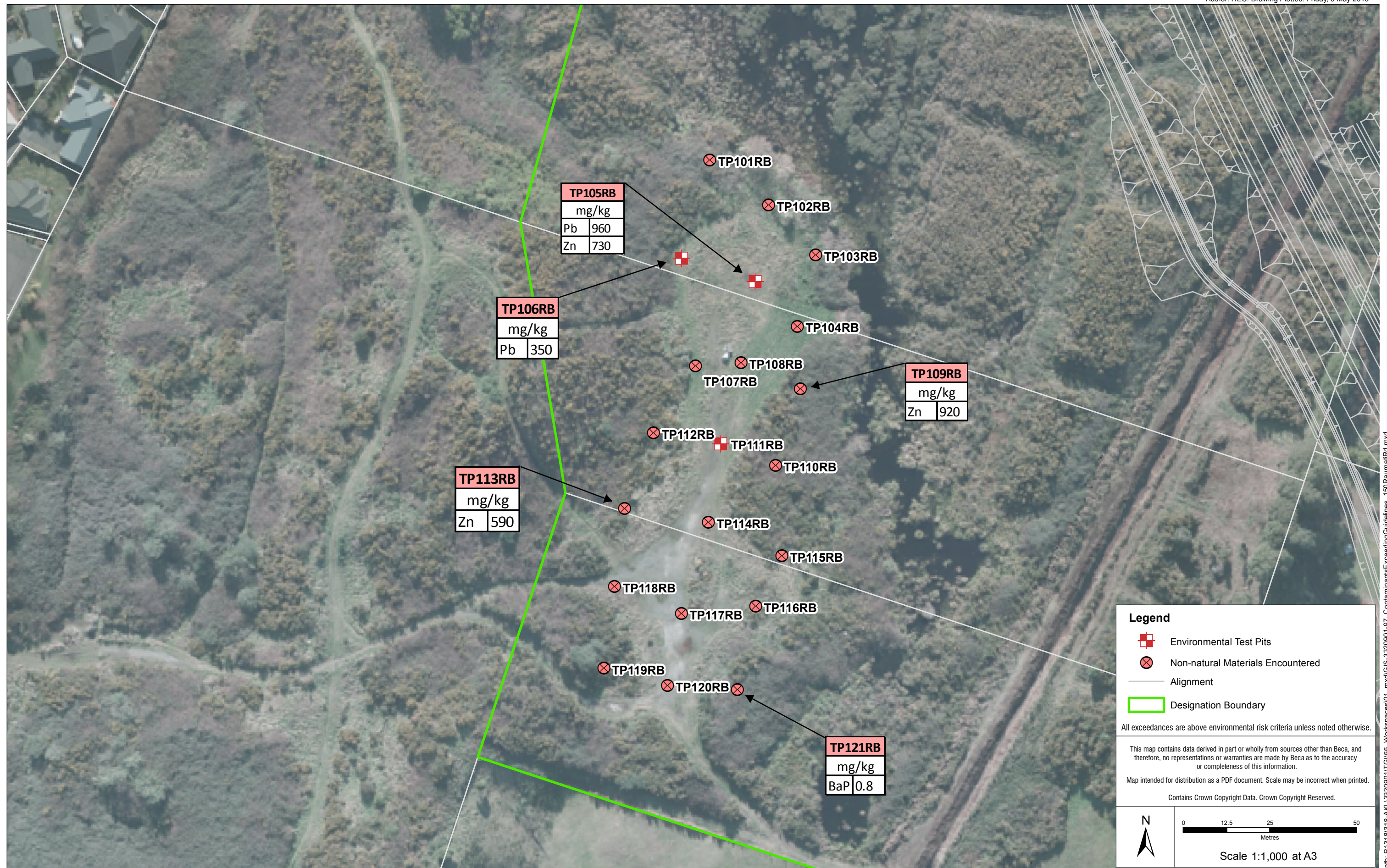
Contains Crown Copyright Data. Crown Copyright Reserved.

0 10 20 40 Metres
Scale 1:800 at A3

Notes:



Project:	MACKAYS TO PEKA PEKA EXPRESSWAY		
Title:	Contaminants Exceeding Guideline Values Sector 1: 16 Leinster Ave		
Status:	Document ID:	Rev.	
	Drawing No:		A
		GIS-3320901-96	



TP105RB

mg/kg	
Pb	960
Zn	730

TP106RB

mg/kg	
Pb	350

TP109RB

mg/kg	
Zn	920

TP113RB

mg/kg	
Zn	590

TP121RB

mg/kg	
BaP	0.8

Legend

- Environmental Test Pits
- Non-natural Materials Encountered
- Alignment
- Designation Boundary

All exceedances are above environmental risk criteria unless noted otherwise.

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Map intended for distribution as a PDF document. Scale may be incorrect when printed.

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Scale 1:1,000 at A3

Notes:



Project: **MACKAYS TO PEKA PEKA EXPRESSWAY**

Title: **Contaminants Exceeding Guideline Values Sector 1: 150 Raumati Road**

Status: Document ID: Rev.:

Drawing No: A

GIS-3320901-97

Path: P:\318318-AKL\3320901\GIS\55_Workspaces\01_mxd\GIS-3320901-97_ContaminantsExceedingGuidelines_150RaumatiRD.mxd