Memorandum

To	William Hung
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From	Megan Baddiley (Senior Environmental Scientist); Greg Coffin (Principal Environmental Scientist)
Office	Auckland
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Subject	Queen Street Part 3 DSI Addendum – Part 3 – Part 4 Connector Tunnel

Introduction

Watercare Services Limited (Watercare) are proposing to upgrade the wastewater network in Auckland City Centre. As part of this upgrade, network infrastructure between 206 Queen Street and 329 Queen Street (between Mayoral Drive and Victoria Street East), approximately 600 metres in length, will be replaced to extend the overall capacity of the network.

WSP undertook a Detailed Site Investigation (DSI) for this work in early 2023. However, following the completion of the DSI, additional work areas were identified adjacent to the proposed alignment including a temporary shaft at Greys Ave, the establishment of a construction support area (CSA) adjacent to the Greys Ave carpark and a service tunnel between Greys Ave carpark and the Part 3 launch shaft (Figure 1).

This memorandum has been prepared as an addendum to and must be read in conjunction with the WSP report titled *Queen Street Wastewater Diversion – Part 3 Detailed Site Investigation, Version 3*, dated 22 June 2023 (WSP, 2023a).

Objectives

The objective of this DSI addendum is to characterise the contamination risk to human health and the environment during and following soil disturbance works for the establishment of the Part 3 – Part 4 Connector tunnel and shaft within the Greys Avenue carpark.

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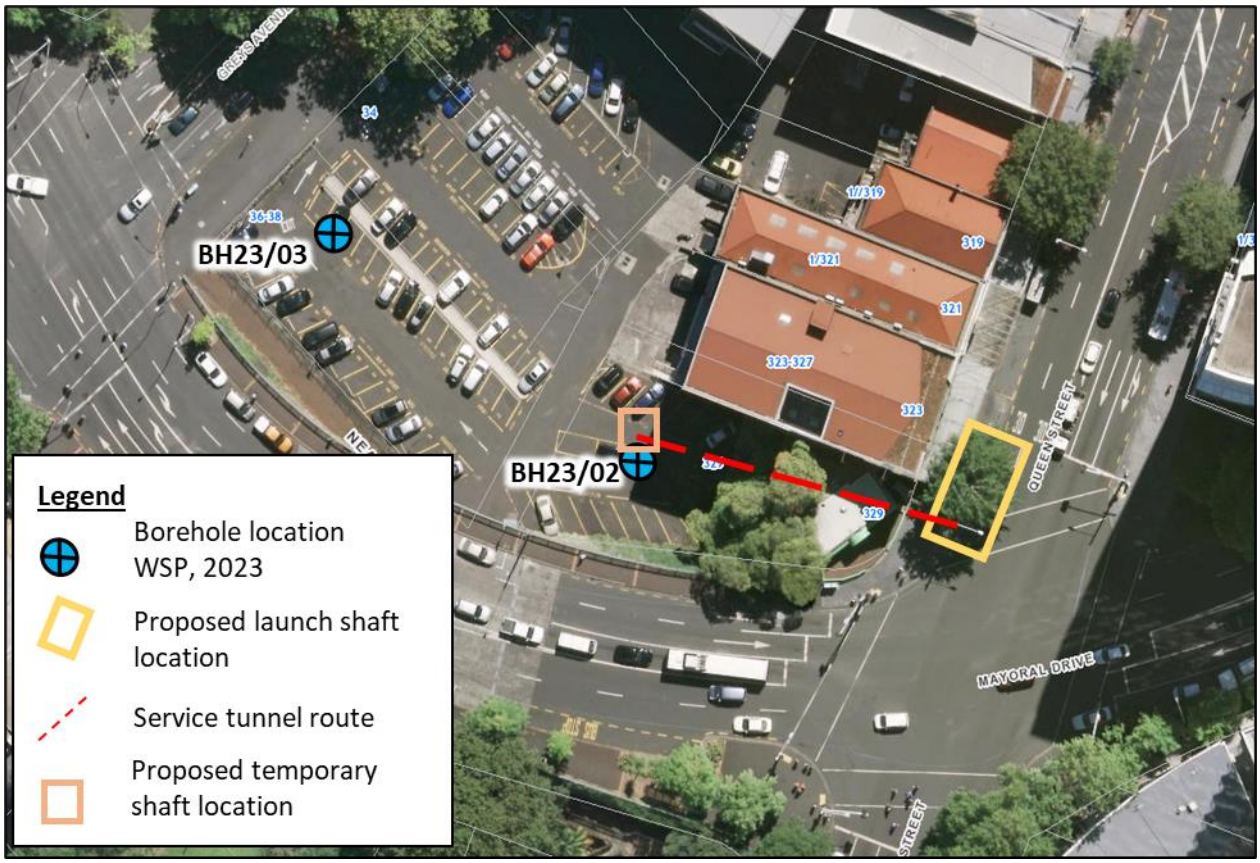

Figure 1 Site Layout and Sample Locations

Sampling and analysis

Methodology

Four soil samples were collected from two locations (BH23/02 and BH23/03) within the Greys Avenue carpark. The number of sampling locations was limited by asphalt surface cover.

Soil sampling was undertaken at the site between the 14 and 20 July by a WSP Environmental Scientist, site photographs are provided in Attachment A. Locations were concrete cut through the existing asphalt layer and air-vacuumed to a depth of up to 3 m below ground level (bgl). Soil samples were collected from the open hole by hand auger, using dedicated nitrile gloves. Near surface soil samples were unable to be obtained due to the gravel sub-base material or underlying fill present at shallow depths.

All non-dedicated sampling equipment was decontaminated between samples using Decon-90™ to minimise the potential of cross contamination between samples.

Subsurface conditions were logged, and soil samples were placed in laboratory supplied glass sample jars, leaving minimal headspace. All samples were stored on ice in a sealed cooler and transported to the laboratory under chain of custody.

Soil samples were submitted to Watercare Laboratory Services (Watercare Lab) for analysis of identified contaminants of concern, including heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH) and asbestos. Watercare Lab analysed the samples as per their International Accreditation New Zealand (IANZ) accreditation.

Lithology

Basecourse material was encountered to a depth of 0.15m bgl in BH23/03 and 0.5m bgl in BH23/02. Natural clays and silts were identified beneath basecourse in BH23/02 to end of clearance at 3.0m bgl. In BH23/03, fill material including building rubble (bricks, steel pieces, wires) and suspected asbestos containing material (ACM) fibre board was identified beneath the basecourse to a maximum depth of 1.0m bgl before a concrete foundation was exposed and air-vacuuming ceased.

Samples from BH23/02 were collected from natural soils at 0.5m bgl (BH23/02_0.5) directly beneath basecourse material and at 1.0m bgl (BH23/02_1.0). Samples were not collected from basecourse material due to the limited percentage of fines material.

Two asbestos samples were collected from within the fill in BH23/03: a bulk sample was collected at 0.5m bgl and a piece of suspected ACM fibre board at 0.7m bgl. Two samples were collected from natural soils situated beneath the concrete foundation in BH23/03. These were collected at 1.5m bgl and 2.0m bgl from the core retrieved via drill rig.

Results

WSP have adopted the following guideline criteria, outlined in Table 1, to classify soil at the site during soil disturbance, handling, and ongoing/future site use.

Table 1 – Guideline criteria for soil classification

Source Guideline	Criteria	Analyte
Human Health		
MfE (2011) Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Publication number ME 1055, June 2011 (MfE, 2011a)	Soil Contaminant Standards for Commercial/Industrial land use	Arsenic, cadmium, chromium, copper, lead, mercury, benzo(a)pyrene
National Environmental Protection Council (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC, 2013).*	Health Investigation Levels for Commercial/Industrial land use (HIL-D)**	Nickel and zinc
Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand 1999 (Revised, 2011) (MfE, 2011b)	Tier 1 Soil Acceptance Criteria for TPH and PAH. Commercial/industrial use, all pathways, Silty Clay	Benzo[a]pyrene (BAP), naphthalene and pyrene TPH fractions $C_7 – C_9$, $C_{10} – C_{14}$ and $C_{15} – C_{36}$
Building Research Association of New Zealand Ltd (2017). *New Zealand Guidelines for Assessing and Managing Asbestos in Soil*. November 2017.	Soil Guideline Values for commercia/industrial land use	Asbestos (ACM, FA/AF)
Background Concentrations		
Auckland Region Background Concentrations (ARC, 2001)	Background concentrations	Arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc
Auckland Unitary Plan Permitted Activity Criteria (AUP-OP, 2016; updated 2021)		Arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.

-* Included as NESCS does not have guideline values for the protection of human health for nickel and zinc.

** HIL-D – Health Investigation Level D – Commercial/industrial premises

Human Health Criteria

No human health exceedances for commercial/industrial land uses were reported for samples analysed for identified contaminants of concern.

Asbestos was positively identified in the shallow samples (0.5m and 0.7m bgl) collected from BH23/03. However, the bulk soil sample (BH23/03_0.5), had a percentage concentration of asbestos (Chrysotile) below the human health guidelines of <0.001% w/w. The compressed board sample (BH23/03_0.7) was also found to contain Chrysotile.

Background Criteria

Four samples (BH23/02_0.5, BH23/02_1.0, BH23/1.5 and BH23/03_2.0) were analysed for heavy metals and compared against the Auckland Regional Background Concentrations for Volcanic Soils, and the Auckland Unitary Plan Permitted Activity Criteria. Lead and mercury were each found to exceed background concentrations in BH23/02_0.5 but were below Auckland Council permitted activity criteria.

PAH and TPH were identified above the laboratory limit of detection in samples BH23/02_0.5 and BH23/02_1.0. As PAH and TPH are not naturally occurring compounds concentrations above laboratory detection limits are considered above expected background concentrations. PAH was not reported above AC permitted activity concentrations.

A summary of the results and the laboratory reports is provided in Attachment B.

Summary and Conclusion

NESCS

Based on the information presented herein the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS) Regulations 2011 (MfE, 2011c) applies to the Greys Avenue carpark area. Design plans indicate soil disturbance will likely exceed permitted volumes under Regulation 8(3), therefore a controlled consent will be required. Consent should be sought prior to any soil disturbance.

AUP-OP PERMITTED ACTIVITY CRITERIA

Consent will be required under the Auckland Council's Auckland Unitary Plan – Operative in Part (AUP-OP) as soil disturbance will not be considered a permitted activity due to elevated concentrations of lead and mercury found in BH23/02_0.5 (Regulation E30.6.1.4.) and the likelihood that soil disturbance volumes will exceed 200m^3 across the site (Regulation E30.6.1.2.). Therefore, consent will be required under Rule E30.4.1 (A6) as a controlled activity.

Consent under the AUP-OP should be sought prior to works commencing.

Recommendations

Based on the findings of this addendum WSP recommends that:

- A soil management plan (SMP) should be developed to manage soil disturbance and disposal in the vicinity of BH23/02 and BH23/03, including an unexpected discovery protocol (UDP) outlining the procedures and processes to be undertaken should any ground conditions be encountered in this area which are not anticipated based on the findings of this report.

- Demolition waste identified in BH23/03 may require further assessment and appropriate removal under a Class A / Class B licensed removalist.

- Any soils removed off-site will need to be disposed of at an appropriate licensed landfill facility. Prior acceptance may be dependent on the receiving facility and will need prior

approval to ensure the material meets the landfill consent conditions. It is recommended that additional soil sampling be undertaken to further characterise these soils prior to disposal.

Attachments

Attachment A – Site photographs

Attachment B – Laboratory reports and summary tables

1 References

ARC. (2001). *Background Concentrations of Inorganic Elements in Soils from the Auckland Region - Technical Publication No. 153.* Auckland: Auckland Regional Council.

AUP-OP. (2016; updated 2021). *Auckland Unitary Plan "Operative in part".* Auckland: Auckland Council.

MfE. (2011a). *Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health.* Wellington: Ministry for the Environment.

MfE. (2011b). *Guidelines for Assessing and Manging Petroleum Hydrocarbon Contaminated Sites in New Zealand.* Wellington: Ministry for the Environment.

MfE. (2011c). *National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.* Wellington: Ministry for the Environment.

NEPC. (2013). *Australian National Environmental Protection (Assessment of Site Contamination) Measure 1999 - Schedule B1: Health Investigation Levels.* The National Environment Protection Council.

NZGAMAS. (2017). *New Zealand Guidelines for Assessing and Managing Asbestos in Soil .*

WSP. (2023). *Queen Street Wastewater Diversion - Part 3; Detailed Site Investigation.*

Attachment A

Site Photographs

Attachment B

Laboratory Reports and Summary Tables