

APPENDIX FOURTEEN

SAMPLING AND ANALYSIS PLAN





Our Ref: Shelly Bay SAP:VLD
Contact: [REDACTED]

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Attention: [REDACTED]

Dear [REDACTED]

SHELLY BAY DEVELOPMENT – DRAFT SOIL SAMPLING AND ANALYSIS PLAN

The former RNZAF Base at Shelly Bay is being redeveloped with a mixture of residential and commercial properties planned. Potential for contamination at the site has been identified in two previous reports by AECOM in 2016¹ and Jacobs in 2018². The AECOM (2016) report is a Preliminary Site Investigation (PSI), which investigated the extent of the site covered by the former RNZAF base, including the areas known as South Bay and North Bay, the former rifle range and the area west of Shelly Bay Road (consisting of the inner wharf, Building 8, slipway and former fuel storage tanks), as shown in Figure 1 (appended). The PSI investigation also included limited sampling. The Jacobs (2018) report focused on an area of Wellington City Council land within South Bay and included soil sampling and analysis for asbestos and lead. Both of the reports identified areas where historic activities have occurred that may have resulted in contamination to soil.

This Sampling and Analysis Plan (SAP) has been prepared to address the areas of environmental concern (AEC) identified in the two reports, and to support the Contaminated Site Management Plan (CSMP) that has been developed for the proposed site works.

Sampling and Analysis Plan

The sampling rationale is based on the AEC identified in the AECOM (2016) report and the Jacobs (2018) investigation. Table 1 summarises the AECs identified in these reports and the proposed SAP. Figure 2 shows the proposed redevelopment boundary and extent of this SAP. Figure 3 shows the proposed sampling locations are shown in Figure 3. The sampling methodology is discussed in the following section.

Soil contamination, if present, is expected to be associated with the historic transformer location, former fuel storage areas, maintenance yard and slipway and the perimeters of buildings (asbestos and lead). Excluded from this SAP is the potential for contamination of soils from heavy metals or risk of unexploded ordnance (UXO) associated with the former rifle range adjacent to the site, or contamination of marine sediments associated with anti-fouling paint etc. adjacent to the slipway/maintenance area. If these areas are to be disturbed during redevelopment of the site, intrusive investigation and a UXO survey are strongly recommended.

¹ AECOM, 2016, Former Shelly Bay RNZAF Base, Shelly Bay Road, Wellington, letter dated 15 February 2016, addressed to The Wellington Company.

² Jacobs, 2018, Shelly Bay Development Soil Contamination Investigation South Bay, Ref: IZ109200-002-NG-RPT-0001/01 dated 4 October 2018.

Table 1 Sampling and Analysis Plan Summary

Location/AEC	Rationale	Samples and depths	Analysis
North Bay, fat trap, septic tank and interceptor areas	Potential for localised contamination. However, no evidence of impacts were noted during PSI walkover.	NA	NA Testing to be covered in updated CSMP if contamination is encountered during demolition and earthworks.
South Bay, former transformer	Potential for localised contamination from oils containing polychlorinated biphenyls (PCB).	One test pit location directly down-gradient of former transformer (Location 1). Collection of one near surface sample, then every metre until the top of the water table or a low permeability layer (whichever, comes first with a maximum of approximately 3m).	PCBs, TPH, PAH (if PAH surrogate exceeded), copper, tin, lead and mercury.
North and South Bays, two former boiler house locations and the coal bunker	Potential for localised contamination from burning and storage of coal.	Sample soil from top 0.5m at three locations (Locations 2, 3 and 4).	Heavy metals and TPH and polycyclic aromatic hydrocarbons (PAH) (if PAH surrogate exceeded).
South Bay, Paint Store	This area is sealed. The PSI indicated that contamination of soil/groundwater is not expected at this location.	NA	NA Testing to be covered in updated CSMP if contamination is encountered during demolition and earthworks.
South Bay, wastewater treatment plant	Localised contamination from leaks. PSI indicated that contamination of soil and groundwater is not expected.	NA	NA H&S for biohazards and soil handling to be covered in updated CSMP.
Slipway and maintenance area	Anti-fouling substances potential for contaminating slipway, and maintenance areas. Slipway is sealed and not being disturbed during the development however there is some exposed soil in maintenance area where	One to two test pits (Location 5) in the location of the maintenance yard where soil is exposed only. Collect sample from near surface and 0.5m.	7 heavy metal suite, mercury, tin, tributyltin (TBT), TPH and PAH (if PAH surrogate exceeded).

	concrete has deteriorated.		
Western side of Shelly Bay Road, fuel storage – two historic storage areas	Potential spills/leaks from tanks, bowsers and associated pipework.	One test pit at each historic fuel storage area (downgradient) (Locations 6 and 7). Sample every metre until the top of the water table or a low permeability layer (whichever comes first, with a maximum of approximately 3m).	TPH/BTEX and PAH (if PAH surrogate exceeded), and lead.
Western side for length of whole site, reclamation/landfill	Potential for contamination from fill materials. However, no evidence for landfill other than reclamation materials that were locally sourced were identified in the PSI.	NA	NA Testing to be covered off in updated CSMP if fill with anthropogenic material including ash is uncovered during development.
Whole site, perimeters of buildings	Lead based paints present on weatherboards and asbestos containing material (ACM) in rooves and associated building infrastructure. Paint and/or ACM materials in deteriorating state on buildings.	Sample at test locations outside the area previously tested by Jacobs (2018). Near surface soil samples (0.1 to 0.2m from beneath the rootzone and 0.4 to 0.5m) to be collected from locations 8 to 14 ³ . Samples should be collected below roof drip lines with a minimum of 1 sample per external wall. Deeper samples can be held in cold storage, to be tested only if the near surface samples exceed human health criteria.	Asbestos and lead.

Methodology

The total number of samples collected and analysed will be dependent on the number of asbestos and lead samples collected around building perimeters at locations 8 to 14. The number of samples analysed from Locations 1 to 7 will depend on visual assessment and onsite photoionisation detector (PID) measurements (where appropriate). Deeper samples can be held in cold storage pending the results of more shallow samples. One QA/QC sample should be collected per 10 samples. All samples are to be analysed at an IANZ accredited laboratory. Soil samples are to be analysed for the following potential contaminants of concern as presented in Table 1:

- > 7 heavy metals (arsenic, cadmium, chromium, copper, lead, nickel, and zinc)
- > Mercury

³ Given the amount of buildings on site, a representative group of larger buildings has been included for testing, it can be assumed that the remaining buildings onsite will have similar or lower results based on their size.

- > Tin
- > Lead and asbestos (ACM and fibres)
- > TBT
- > TPH
- > PAH (if PAH surrogate guideline exceeded).

All samples are to be collected under the guidance of a SQEP. Soil sampling is proposed using an excavator, or a spade/hand auger for lead and asbestos samples near buildings. If sampling is to be undertaken prior to demolition of the site, soil sampling locations will need to be checked by an underground utilities locator prior to breaking ground. As the location of utilities may impact the final test pit locations; the locations presented in Figure 3 are provisional. Additionally, this SAP has been based on third party reports from 2016 and 2018 and conditions on site may be different to those reported. Therefore, sampling locations/depths may be changed or added, depending on site observations and contaminant markers encountered, and any new information or reports that are presented.

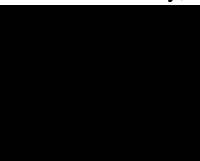
At some sampling locations (depending on contaminant source), we propose excavating to a maximum depth of 3m or until the water table or a low permeability soil layer (if less than 3m). There is potential for some of the contamination sources on site to be deeper than 3m; however groundwater is expected to be at this depth or higher. Additionally, if suspected contamination is encountered, we will avoid excavating further through any low permeable layers (if encountered) above the water table. Installation of groundwater wells are not proposed as part of this investigation, and risk to groundwater will be assessed based on the results of the soil investigation.

The following field procedures are to be followed:

- > Samples to be collected directly from the centre of the excavator bucket, spade or auger using a fresh pair of powder free nitrile gloves for each sample to avoid cross contamination.
- > Collection of samples from each soil sampling location into laboratory supplied sterilised soil jars (300 ml), labelled accordingly and immediately placed on ice.
- > Where petroleum hydrocarbons are potentially present, an additional sample will be collected into sealable plastic bags for PID measurements.
- > Sampling equipment to be decontaminated before moving on to the next sampling location.
- > Environmental logging of the soil profile encountered to be undertaken, along with a description of contamination markers and PID measurements (where appropriate).
- > Samples to be sent to a laboratory accredited for the tests performed under chain-of-custody (COC) documentation.

Please contact the undersigned if further clarification on the SAP is required.

Yours sincerely,



Water & Environment Manager
for Cardno



Figure 1: Site Layout with areas of environmental concern, figure adapted from the AECOM (2016) report Site Layout plan, Attachment A



Figure 2: Extent of redevelopment at Shelly Bay



Figure 3: Proposed sampling locations (annotated in yellow), figure adapted from the AECOM (2016) report Site Layout plan, Attachment A

