15 February 2016

The Wellington Company
50 Manners Street
Te Aro
WELLINGTON 6011

Dear Sir/Madam

Former Shelly Bay RNZAF Base, Shelly Bay Road, Wellington

1.0 Introduction

1.1 Terms of Reference

This report has been prepared for The Wellington Company Ltd (TWC) by AECOM New Zealand Limited (AECOM), in accordance with the Scope of Works described in the AECOM proposal entitled Shelly Bay Masterplan Validation and Concept Design Initiation: Tender for Professional Services dated 5 November 2015. It documents a Preliminary Site Investigation (PSI) undertaken to establish the likely nature and extent of soil contamination at the proposed Shelly Bay residential/commercial development at Shelly Bay, Wellington (the site).

The general site location is shown below.

1.2 Site Description

The site is situated on the western shore of the Watts (Miramar) Peninsula, on Shelly Bay. The wider site encompasses an area of steep, forested hillside above Shelly Bay, dropping down to a narrow coastal strip which contains facilities associated with the former Royal New Zealand Airforce (RNZAF) Shelly Bay Base. Colloquially, these facilities are referenced as being located in North Bay or South Bay.

A public road, which changes from Shelly Bay Road to Massey Road within the site boundary, runs through the site and on the seaward side of the road between North and South Bay are the RNZAF former workshops, wharf and slipway structures.

The figure in Attachment A shows the layout of the site.

There are no immediate neighbours to the site, the nearest being those residents in the accommodation area of the south bay and in the former commanders house (located at 264 Shelly Bay Road). The former Mount Crawford Prison is located approximately 500 m above the site to the east.

1.3 Planning Context

Owing to the industrial nature of some of the site’s current and former operations, the site has been identified as being on the hazardous activities or industries list (HAIL), as defined by the Ministry for the Environment (MfE). The planned change of land use from a former military base to a mixed residential/commercial development at the site is an activity subject to the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESC). Under subclause 9(4) of...
the NESCS, subdividing land or changing land use is a Permitted Activity while the following requirements are met:

(a) A PSI of the land or piece of land must exist;
(b) The report on the PSI must state that it is highly unlikely that there will be a risk to human health if the activity is done to the piece of land;
(c) The report must be accompanied by a relevant site plan to which the report is referenced;
(d) The consent authority must have the report and the plan.

If the requirement in subclause 8(4) is not met, the activity reverts initially to a Controlled Activity under regulation 9 subclause 9(3).

TWC requested that AECOM complete a PSI as part of a package of work to assess the suitability of the site for a mixed residential/commercial development.

2.0 Objectives

The objectives of the PSI were to:

- Compile information on the potentially contaminating activities that may have been undertaken at or affected the site;
- Provide an assessment of the likelihood of risk to human health for the proposed mixed commercial/residential development.

3.0 Scope of Works

The PSI works were undertaken by AECOM between December 2015 and February 2016 and included:

1. Review of records provided by TWC in relation to previous land uses that could have had an impact on soil and groundwater quality at the site.
2. Targeted soil sampling at pre-selected locations, on 17 December 2015, during geotechnical works undertaken at the site as part of a Preliminary Geotechnical Assessment (PGA).¹
3. A site walkover² undertaken on 17 December 2015 (including compilation of a photographic record) to identify potential sources of impact to soil.
4. A review of information held in the Greater Wellington Regional Council (GWRC) Selected Land Use Register (SLUR).
5. Review of records and selected aerial photographs held by Wellington City Council (WCC) Archives, on 22 January 2016, to determine previous land uses of the site and the surrounding area.
6. Review of selected historical aerial photographs available from Opus International Consultants to determine previous land uses of the site and the surrounding area.
7. Production of this PSI report.

Assessment of compliance of the site with environmental legislation, the presence of asbestos or asbestos containing building material and consideration of responsibility for previous contamination (if any), do not form part of the scope of works for this PSI.

4.0 Environmental Setting

According to the New Zealand Geological Map of the Wellington Area³, the site is underlain by grey sandstone-mudstone sequences (collectively known as Greywacke) of the Rakaia terrane. The greywacke is overlain by a thin sequence of marine sediments and fill.

² Access to the seaward side of the site was not able to be gained by the AECOM environmental scientist. Photographs of this area were collected from the roadway.
Investigations indicate that groundwater is present at the site between approximately 1.8 m and 1.9 m below ground level (bgl). Shallow groundwater is inferred to flow to the west towards Shelly Bay at the base of the sediments, at the interface with the greywacke basement.

The closest surface water body is Shelly Bay, located immediately west of the site.

5.0 Overview of Site History

The Wairarapa earthquake in 1855 raised several beach terraces above sea level on the Watts Peninsula. The resultant beaches at the site were selected as a suitable location for the re-location of the Submarine Mining Depot from Thorndon during the “Russian Scare” of 1885.

An area of approximately 76 hectares of Watts Peninsula was acquired by Proclamation No.55, New Zealand Gazette on 28 May 1886 (GAZ 1886 P864) by the New Zealand Defence Force (NZDF) for the “Construction of Defence Works at Watts Peninsula”⁴. The land holdings that form the wider site comprise five individual parcels of land legally described as follows:

- Section 1, SO 19026 - 1.7787ha
- Part Section 1, SO 37939 - 39.5965ha
- Part Section 2, SO 37939 - 25.8338ha
- Part Section 3, SO 37939 - 8.8923ha
- Part Section 3, SO 37939 - 0.2859ha

The site was used for military purposes but remained largely undeveloped until 1914⁵ with the construction of munitions stores and a small tramway connecting the stores to the wharf at the site.

The site underwent major development in 1942 with reclamation of 2.7 ha of land, dredging, and the construction of ten naval magazines. The breastwork, wharves, slipway and boilerhouse were added in 1943. The reclamation also enabled substantial re-alignment of the coastal road.

From 1943 the wider site was used for the maintenance of navy support vessels based in Wellington. Associated activities included workshop operations, storage of munitions and fuel, vehicle washing and maintenance and firearms practice.

Occupancy of Shelly Bay was transferred to the RNZAF in 1946 and the site was occupied until 1995, however during the time of occupation a number of civilian influences were present at Shelly Bay. The breastwork and slipway have been leased to a series of civilian companies from 1947 to the present day.

A number of facilities have been decommissioned or removed, including fuel storage tanks, the coal fired boilerhouse and parts of the steam reticulation system. Structural instability also led to the closure of the main wharf area.

The site is now occupied by a number of artisans; film properties hire stores and a cafe.

A summary of the information on the wider site sourced from TWC records, WCC archive files, property files and the GWRC SLUR, is presented in a timeline in Attachment B.

A summary of the publically available aerial photographs covering the period 1948 to 2013 is presented in Attachment C.

A plan taken from Opus January 2008⁶ and the GWRC SLUR are presented as Attachment D for reference of building names.

6.0 GWRC SLUR

The wider site is included on the GWRC SLUR as it is believed to have been, or has been, used for the following hazardous activity or industry listed on the HAIL:

C1 - Explosives and ordinances production, storage and use - Explosive or ordinance production, maintenance, dismantling, disposal, bulk storage or re-packaging;

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⁴ Letter from Defence Headquarters to the City Solicitor (Letter dated 5 May 1981). Wellington City Council Archive Files.
A17 - Chemical manufacture, application and bulk storage - Storage tanks or drums for fuel, chemicals or liquid waste.

The property appears on the SLUR as: Verified History of Hazardous Activity or Industry. The information included on the SLUR entry is included below

"This site has been used as an Air-Force base. General military camp facilities including workshops, paint stores, munitions stores, sewage pumping station, a rifle range and a shipway and repair yard were onsite. An underground storage tank was also on site but has since been removed. No tank pull report is held by Greater Wellington. There are unconfirmed notes on file suggesting a landfill on this site, but there is no indication of a location or likely contents if it exists. The site was decommissioned in 1995. Potential contaminants include explosives, lead, copper, antimony, solvents and metals and hydrocarbons. No detailed information is held for this site regarding the level of contamination, if any, that has occurred."

A file note associated with the SLUR listing notes that there are three polygons (areas where HAIL activities may have occurred) on the SLUR related to the previous activities undertaken at the site. These are described below. The polygon locations are shown in Attachment E.

<table>
<thead>
<tr>
<th>Polygon Identified</th>
<th>Activity Undertaken</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polygon A</td>
<td>SERCO Paint store</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fuel Supply building</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shipway/Repair Yard</td>
<td></td>
</tr>
<tr>
<td>Polygon B</td>
<td>Commanders House (no activity identified)</td>
<td>No hazardous activities were associated with this location specifically, however as this location was originally identified in the early versions of the SLUR the polygon remains.</td>
</tr>
<tr>
<td>No polygon identified</td>
<td>Sewage Pumping Station</td>
<td>No specific polygon associated with the presence of the sewage pumping station, however this activity is noted to have occurred at the site.</td>
</tr>
<tr>
<td>Polygon C</td>
<td>Riffle range and munitions store sites.</td>
<td>Outside the area of the site defined as part of the PSI.</td>
</tr>
</tbody>
</table>

4.0 Site Walkover

A site inspection was undertaken during site works on 17 December 2015 to observe current conditions and evidence of historic activities and included;

- Gaining an understanding of the general environmental setting of the site in respect of the site neighbours and proximity and condition of adjacent water bodies, particularly any areas of potential risk from environmental incidents.

- Record of physical evidence of historical contamination or structures that may indicate activities that could have resulted in contamination in the past, including the locations of current or former underground storage tanks, grease or oil traps, sumps or other interceptors and waste treatment areas.

A photographic record of current site conditions is included as Attachment F.

8.0 Soil Sampling

An AECOM environmental scientist was present during advancement of three test pits at the site. The test pit locations were chosen to assess geotechnical properties of soil. The locations of the test pits were;

- TP4 – located adjacent to the roadway near Building No. 8.

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7 Greater Wellington Regional Council File note 15 October 2008 (SN/05/059/02).
- TP5 – located across estimated hydraulic gradient from the boilerhouse and associated drainage separator.
- TP6 – located down estimated hydraulic gradient of the former laundry.

Nine soil samples were collected from the test pits during advancement. Soil samples were collected at changes in lithology in fill material at the site. The location of the test pits are shown on the plan in Attachment F.

Sub-samples of soils were screened in the field by placing a portion of each sample collected into a bag for analysis of headspace volatile organic compounds (VOCs) using a photo-ionisation detector (PID).

Soil samples were packaged and sent to Hill Laboratories Ltd in Hamilton under AECOM Chain of Custody procedures. Three soil samples TP04 0.5, TP5 0.5, TP6 0.7 were analysed for total petroleum hydrocarbon (TPH) concentrations and samples TP4 0.3, TP4 1.1, TP5 0.7 and TP5 1.1 and TP6 0.5 for metals (arsenic, cadmium, chromium, copper, lead, nickel and zinc).

Chain of custody documentation and analytical reports as received are presented as Attachment G.

8.1 Observations

No visual or olfactory evidence of impact by petroleum hydrocarbons was noted during the site works. Headspace VOC concentrations ranged between 0.0 ppm and 0.1 ppm.

Soils comprised greywacke fill material underlain by marine sands and greywacke basement. Groundwater was present at approximately 1.8 m bgl.

8.2 Analytical Results

Soil sample analytical results as received, together with selected environmental guideline criteria, are included in Attachment H.

Reported TPH concentrations were below laboratory method detection limits. Metals concentrations were generally at or close to the Wellington background concentrations with the exception of arsenic concentrations of 34 mg/kg in the soil sample collected of fill from test pit 6 at 0.5 m bgl, compared to background range of < 2 mg/kg to 7 mg/kg.

9.0 Potential for Contamination

Records indicate that the site has been used for industrial and commercial activities since at least the 1940s, mainly associated with the operation of the RNZAF base including, the boilerhouse, workshop activities, the operation of the slipway and munitions storage in magazines. A summary of the potential hazardous activities and industries undertaken is as per Attachment F.

A plan included in Attachment F shows the areas of the site where impact to environmental media may have resulted from the hazardous activities carried out.

The main potential sources of contamination associated with the land uses comprise;

- Leaks and spills of hydrocarbon products to ground from the refuelling of vehicles and marine craft.
- Leaks and spills of hydrocarbon products associated with the storage and the maintenance of transport vehicles.
- Concentrations of metals and antifouling substances associated with the maintenance of marine craft and the operation of the slipway.
- Localised impact from the wastewater treatment plant in South Bay.
- Localised metals impact to soil from the use of lead paint, coal ash (if buried at the site) and munitions residues.

A survey of asbestos containing material has not been undertaken at the site as part of this investigation, however as the structures at the site pre-date the cessation of the use of asbestos in building materials (1990’s), there is potential for impact to soil from the use and removal of asbestos containing material at the site. Investigations undertaken by Tonkin and Taylor have identified the presence of asbestos in the form of Chrysotile, Amosite and Crocidolite in the subsurface beneath Building No.8 workshops. No other environmental investigations of the site are known to AECOM.
With the exception of potential localised soil and groundwater impact around the wastewater treatment plant, the South Bay area mainly comprised residential facilities. On this basis, it is considered highly unlikely that there is a risk to human health from contaminants in soil and groundwater, under the current or proposed commercial/residential land use. This assessment does not cover the potential for asbestos in soils.

A boilerhouse and septic tank were located in North Bay. Other buildings in North Bay were mainly used for administrative purposes, including messes and a hospital. Notwithstanding the presence of localised impact associated with former activities, as indicated by elevated arsenic encountered within shallow fill at one location, it is considered that it is highly unlikely that there is a risk to human health under the current or proposed commercial/residential land use for much of North Bay. This assessment does not cover the potential for asbestos in soils.

AECOM were not able to investigate the seaward side of Shelly Bay Road where the record review has shown the presence of partially buried fuel storage tanks and industrial activities occurred. As such the likelihood of impact to soil and groundwater in this area is currently unknown.

10.0 Closure

We trust this PSI report meets your requirements. Please do not hesitate to contact us should you wish to discuss it.

Yours sincerely,

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Direct Dial: +64 4 896 6024

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Attachments
Attachment A: Site Layout
Attachment B: Timeline of Events
Attachment C: Aerial Photograph Review
Attachment D: Plans Showing Building Locations
Attachment E: Wellington Regional Council GIS Viewer Selected Land Use Register Polygons
Attachment F: Potential Contaminant Sources and Photolog
Attachment G: Laboratory Analytical Results and Chain of Custody Documentation: Soil Sample Analytical
Attachment H: Results Compare to Guideline Values

11.0 Limitations

This conclusion and all information in this Report is given strictly in accordance with and subject to the following limitations and recommendations:

AECOM New Zealand Limited (AECOM) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of The Wellington Company and only those third parties who have been authorised in writing by AECOM to rely on this Report.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this Report.

It is prepared in accordance with the scope of work and for the purpose outlined in the contract dated 7 December 2015.

Where this Report indicates that information has been provided to AECOM by third parties, AECOM has made no independent verification of this information except as expressly stated in the Report. AECOM assumes no liability for any inaccuracies in or omissions to that information.
This Report was prepared between 7 December 2015 and 12 February 2016 is based on the conditions encountered and information reviewed at the time of preparation. AECOM disclaims responsibility for any changes that may have occurred after this time.

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Except as specifically stated in this section, AECOM does not authorise the use of this Report by any third party. It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the site.

Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.
<table>
<thead>
<tr>
<th>Date</th>
<th>Source</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1886</td>
<td>Letter from Defence Headquarters to the City Solicitor (Letter dated 5 May 1981).</td>
<td>The base area is contained within an area of land that was set aside in 1886 for Defence Works by proclamation under the Public Works Act 1885. Notes that the existing formed road is largely formed on land reclaimed by Defence during World War II and only coincides with the legal road in isolated places.</td>
</tr>
<tr>
<td>1886</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>The Submarine Mining Depot was relocated from Thorndon and Mahanga Bay to the site.</td>
</tr>
<tr>
<td>1907</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Responsibility for the Submarine Mining Depot at Shelly Bay transferred to the Navy.</td>
</tr>
<tr>
<td>1914</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Munitions stores were built and a small tramway constructed connecting the depot with “its wharf” – it not clear which Wharf this document is referring to.</td>
</tr>
<tr>
<td>1942</td>
<td>Shelly Bay Naval Depot Plans - Wellington City Archive</td>
<td>General plans prepared for the development of the site.</td>
</tr>
<tr>
<td>1942</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Excavations made for the magazines.</td>
</tr>
<tr>
<td>April 1942</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Contract let to construct the armament depot located on the hillside behind Shelly Bay. Involved the construction of ten magazine buildings, laboratory, office, garage and a house for an ordinance officer.</td>
</tr>
<tr>
<td>May 1942</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Reclamation work commenced in Shelly Bay and adjacent Northward Bay. Notes that the reclamation was done by excavating the adjacent hillside and using it as fill for reclamation works. Reclamation largely completed by the end of 1942.</td>
</tr>
<tr>
<td>October 1942</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Wharves started in October following dredging of the bay.</td>
</tr>
<tr>
<td>Date</td>
<td>Source</td>
<td>Information</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1 June 1944</td>
<td>Shelly Bay Character and Condition Assessment Opus January 2008.</td>
<td>Full complement of 200 personnel at the site but construction not completed.</td>
</tr>
<tr>
<td>May 1945</td>
<td>Shelly Bay Character and Condition Assessment Opus January 2008.</td>
<td>Base completed</td>
</tr>
<tr>
<td>April 1946</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Base transferred to the RNZAF.</td>
</tr>
<tr>
<td>21 April 1947</td>
<td>Letter to the town clerk from PMoF entitled Military Buildings on Road Reservation Areas.</td>
<td>Letter references temporary buildings erected on road reserve areas by the Public Works Department for the “respective fighting services during the war period have been removed with the exception of the following:”</td>
</tr>
<tr>
<td>16 November 1971</td>
<td>Letter from GI Cooper and WS Brambley Trustees for a Company being formed to be known as Shelly Bay Slipways Limited: Application for a Motors Spirits Retailers Licence Restricted to Marine Craft Only at Shelly Bay Wharf Wellington.</td>
<td>Proposed marine refuelling facilities for dispensing super and regular grade petrol from wharf with 2 x 1000 gallon tanks located outside workshop. Letter notes the presence of a marine diesel pump installed “on the Slipway”. The plan notes that the 2000 gallon marine diesel tank is semi buried with a concrete block pit and that the pumps are located on a jetty that is lower than the main wharf.</td>
</tr>
<tr>
<td>1979</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Largely used for administration for 300 personnel with approximately 150 people based at the site.</td>
</tr>
<tr>
<td>8 May 1981</td>
<td>Letter from City Solicitor (Mr Kerr) to the Town Clerk.</td>
<td>Reference to “reclaimed land”. I gather that some of the wharf and associated area are unauthorised harbour reclamation.”</td>
</tr>
<tr>
<td>11 June 1981(or 1983 writing is not clear)</td>
<td>Evening Post Article: the slipping of Shelly Bay.</td>
<td>Article notes: Ex-wartime launches used as civil aviation control craft for the flying boat base in Evans Bay and also finishing boats, pleasure craft and coasters that needed repairing were serviced at the Shelly Bay Slipway.</td>
</tr>
<tr>
<td>Date</td>
<td>Source</td>
<td>Information</td>
</tr>
<tr>
<td>-----------------</td>
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</tr>
<tr>
<td>1 July 1986</td>
<td>Memorandum to the Town Clerk from the Town Planning Committee</td>
<td>Memorandum to construct three stretches of rock slope protection (rip rap) to prevent coastal erosion. Notes that the improvement works – will “improve the present unsightly mess of demolition material which has been dumped there.</td>
</tr>
<tr>
<td>15 September 1987</td>
<td>Letter from Wellington Harbour Maritime Planning Authority Circular No. 13391 to the Chairman and Members of the Authority – Seawall in Shelly Bay – Ministry of Defence. Report by the Planner A W Stewart</td>
<td>Notes that during an inspection of the replacement of the sea wall at Shelly Bay – most of the concrete and brick building rubble had been removed. The letter also indicates that a few pieces of old steel and a piece of reinforcing mesh remain.</td>
</tr>
<tr>
<td>24 October 1990</td>
<td>Letter from Wellington City Council to the Secretary for Defence.</td>
<td>Notes that the slipway facility at Shelley Bay (sic) is to be closed.</td>
</tr>
<tr>
<td>28 August 1992</td>
<td>Letter to Defence Force Headquarters NZ from Wellington Regional Council (Manager of Consents and Investigations) – Contained in WRC SLUR search.</td>
<td>Consideration being given to decommissioning various underground storage tanks at Shelly Bay.</td>
</tr>
<tr>
<td>11 January 1993</td>
<td>Application to Wellington City Council for Building Consent to remove “two petrol tanks”</td>
<td>Application to remove “existing fuel tanks and pumps”.</td>
</tr>
<tr>
<td>30 June 1995</td>
<td>Capital Defence – Wellington Built Military Heritage</td>
<td>Last official day of RNZAF on site.</td>
</tr>
<tr>
<td>November 2001</td>
<td>Email to Wellington City Council from Unknown?: Shelly Bay Slipway Building Demolition of Lean-to Structures.</td>
<td>Application to demolish lean-to’s constructed without the permission of NZDF containing Asbestos sheet wall lining on the Shelly Bay Slipway. SERCO quotation sought and accepted for the removal “of the asbestos content in an approved manner and to demolish the structures and remove all debris to the closest landfill”. Demolition to occur 10-20 December 2001.</td>
</tr>
</tbody>
</table>
**ATTACHMENT B: TIMELINE OF EVENTS**

<table>
<thead>
<tr>
<th>Date</th>
<th>Source</th>
<th>Information</th>
</tr>
</thead>
</table>
| 15 October 2008 | Greater Wellington Regional Council File Note entitled Changes to GISMO polygon layer, Shelly Bay Defence Land (SN/05/059/02) | Potential hazardous activities and industries undertaken include;  
- SERCO Paint Store  
- Fuel Supply Buildings  
- Sewage Pumping Station  
- Shipway/Repair Yard  
- Commanders House (no hazardous activities but area of original polygon so remains),  
- Munitions store sites and rifle range.  
Map attached 2002 Serco map. |
| Mid 2010     | Capital Defence – Wellington Built Military Heritage  
http://capitaldefence.freewebhost.co.nz/prfles/other/sbay2.htm | One wing of the WW2 barracks was demolished due to an unsafe roof. |
<table>
<thead>
<tr>
<th>Date/Source</th>
<th>Key Site Features</th>
<th>Surrounding Land Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947 Oblique Aerial Photograph Page 31 (00278:10:31)</td>
<td>Oblique angle photograph of South Bay, the Wharf area and North Bay. South Bay accommodation buildings developed. Buildings present over the area that currently houses the sewage treatment plant. North Bay building in the area of grass in front of the current cafe property (use unknown). Hospital, boilerhouse, gymnasium accommodations and mess present.</td>
<td>Magazines present on “Main Road” leading to the site of the current Massey Memorial.</td>
</tr>
<tr>
<td>1948 Aerial taken from <a href="http://capitaldefence.freewebhost.co.nz/prfles/other/sbay2.htm">http://capitaldefence.freewebhost.co.nz/prfles/other/sbay2.htm</a></td>
<td>Oblique angle photograph showing the South Bay accommodation area and the Wharf area in the foreground with the North Bay buildings present in the area of the current cafe and the gymnasium.</td>
<td>Magazines present on Main Road.</td>
</tr>
<tr>
<td>1962 Supplied by TWC. Scale unknown.</td>
<td>Aerial showing North and South bays and Main Road. The site layout is as per the current layout with the exception of the following: - The combined mess is not present. - The garaging is not present in either the north or South Bay - Accommodation buildings present in the area of the sewage treatment plant. - The dangerous goods store is not present.</td>
<td>Magazines present on Main Road.</td>
</tr>
<tr>
<td>5 May 1968 Aerial Contact Print Sheet 1/9 and 1/10. Wellington City Council Archives Scale 1:3000 (AC108:1:61 and AC108:1:62)</td>
<td>Aerial showing North and South Bays and Main Road. - Accommodation buildings present in the area of the sewage treatment plant have been removed. - The building in the area in front of the cafe has been removed. - The coal bunkers are visible. The site layout is as per the current layout with the exception of the following: - The combined mess is not present. - The dangerous goods store is not present.</td>
<td>Magazines present on Main Road.</td>
</tr>
<tr>
<td>28 September 1975 Aerial Contract Print Sheet 1:124 and 1:125. Wellington City Council Archives 1:3000 (AC109:1:124 and AC109:1:125)</td>
<td>Aerial showing North and South Bays and Main Road. As for the 1968 aerial with the exception that a lean-to structure is present in the area between the Shipwrights Building and the Inner Wharf.</td>
<td>Magazines present on Main Road.</td>
</tr>
<tr>
<td>Date/Source</td>
<td>Key Site Features</td>
<td>Surrounding Land Features</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 1996 Aerial Photograph – Wellington City Council website                    | Aerial showing North and South Bay, Main Road (with heavy vegetation) and the Wellington Prison.  
  As for the 1975 aerial with the exception of;  
  - The combined mess is present.  
  - The dangerous goods store is present.  
  - There is a concrete pad present directly adjacent to the dangerous good store.  
  - The sewage treatment plant is present.                                                                 |
| 2004 Aerial Photograph – Wellington City Council website                    | Aerial showing North and South Bay, Main Road (no longer recognisable) and the Wellington Prison.  
  As for the 1996 aerial with the exception of;  
  - The lean-to structure has been removed and several white structures (possibly concrete) are in the area of the lean-to. Possibly indicating the presence of fuel storage tanks? |
| 2006 Aerial Photograph – Wellington City Council website                    | No significant change to features at the site. More storage of materials around the dangerous goods store. |
| 2009 Aerial Photograph – Wellington City Council website                    | No significant change to features at the site. More storage of materials around the dangerous goods store. |
| 2010 Aerial Photograph – Wellington City Council website                    | No significant change to features at the site.                                                                 |
| 2013 Aerial Photograph – Wellington City Council website                    | Airmens accommodation removed from the site between 2010 aerial and this aerial. | None relevant to the investigation.                                                                 |
SHELLY BAY
AIR FORCE BASE
Wellington, New Zealand.

1. Gym and Cook lounge.
2. "Elephant House"
6. MTC / Bayview Annex
7. Other ranks garages.
8. Airman's Accommodation
9. Laundry and boiler house.
10. Coal bunker.

12. Junior Ranks Club
   (orig 1896 bldg)
13. SERCO workshop/offices.
14. SERCO paint store.
15. Fuel supply bldg.
16. Wharf - outer.
17. Wharf - inner.
18. Supply MT & AFCC
20. Shipyard/repair yard
22. Library.
23. Garages.
24. Base HQ and Officers
    Accommodation.
25. Officers Mess and
    accommodation.
27. Sewage pumping station.
28.
29. BCDR's Tied HQ & outbuildings.
32. Officers Pad.
33. Magazines
    (numbered mi - m10).
    (m10 is off the map).
34. Reservoir.
35. Rifle range.

Map traced 19/5/2002
from SERCO map.
No bores present within 1000 m of the site (Buffer Search 19 January 2016).
<table>
<thead>
<tr>
<th>Element</th>
<th>Source of Information</th>
<th>Comment</th>
<th>Photograph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormwater</td>
<td>Site Walkover</td>
<td>The boilerhouse condensate and blowdown previously entered the stormwater via an interceptor located adjacent to the boilerhouse facility. Photograph 1: Overview of the separator pit located adjacent to the boilerhouse. The stormwater manhole is noted in the middle of the picture. Photograph 2: Interceptor pit – no visual or olfactory evidence of impact of the water. Sediment in the interceptor may be impacted by metal contamination. Photograph 3: Inside the stormwater manhole located closest to the boiler house. No visual or olfactory evidence of impact noted on the water surface. Evaluation of potential for soil and groundwater impact: No significant impact expected.</td>
<td><img src="image1" alt="Stormwater separator" /> <img src="image2" alt="Stormwater separator" /> <img src="image3" alt="Stormwater manhole" /> <img src="image4" alt="Interceptor channel" /> <img src="image5" alt="Interceptor channel" /> <img src="image6" alt="Stormwater grate" /> <img src="image7" alt="Stormwater grate" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surface water run-off and small streams are evident on the hillside with all water draining from the slope collected in an interceptor channel at the foot of the slope. Photograph 4: Example of the interceptor channel at the base of the greywacke escarpment (North Bay). No visual or olfactory evidence of impact. Photograph 5: Example of the interceptor channel at the base of the greywacke escarpment (North Bay). No visual or olfactory evidence of impact. Evaluation of potential for soil and groundwater impact: No significant impact expected.</td>
<td><img src="image4" alt="Interceptor channel" /> <img src="image5" alt="Interceptor channel" /></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stormwater collection at the rear of the Officers Mess and Accommodation building (South Bay). Photograph 6: Stormwater grate. Evaluation of potential for soil and groundwater impact: No significant impact expected.</td>
<td><img src="image6" alt="Stormwater grate" /> <img src="image7" alt="Stormwater grate" /></td>
</tr>
<tr>
<td>Potential Contaminant Sources</td>
<td>Evaluation of Potential for Soil and Groundwater Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commanders House Wellington Regional Council Selected Land Use Register</td>
<td>No evidence of current or historical hazardous activities. Photograph 7: Commanders House showing stormwater runoff from the hills above the site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wastewater Pumping Station Site walkover</td>
<td>A wastewater pumping station is a wooden building and associated underground structures operated by Wellington Water located at the south end of South Bay. Photograph 8: Building housing the pumping station equipment. Photograph 9: Wastewater retention structures. Access was unable to be made to the chambers present in the area to assess if biosolids were present.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewage/Septic Opus January 2008</td>
<td>Opus January 2008 notes that wastewater from the Shipwrights Building drains to the Sea. Anecdotal evidence indicates that a disused septic tank is located at Building 6. A partially buried septic tank present adjacent to the Mess Building. Photograph 10: Septic tank located adjacent to the Mess Building.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Evaluation of potential for soil and groundwater impact:**
- No significant impact expected.
- Biosolids may be present at the site and operational losses may have potential to create localised impact to soil and water in the vicinity of the plant.
- Considering the potential age and if maintenance of the facility is undertaken, significant impact to soil and groundwater is considered unlikely.
Current Dangerous Goods Storage Container

Geotechnical Investigation

A dangerous goods storage container is present in the area between Building No. 8 and the Shipwrights Building. No information on the contents of the container was sought as part of this investigation.

Photograph 11: Dangerous Goods Storage Container (black in the centre of the photograph)
Photograph 12: Overview of the area containing the Dangerous Goods Storage Container.

Evaluation of potential for soil and groundwater impact: The photograph does not show any significant staining associated with the dangerous goods storage container. It is considered unlikely that significant impact to soil or groundwater would be related to the storage container.

Dangerous Goods Store/Fuel Storage

Geotechnical Investigation / Opus

The facility was not observed as part of the PSI, however information provided during the geotechnical investigation showed that the dangerous goods store (referred to as the fuel supply building and paint store) is a concrete block structure adjacent to Building No. 8. The fuel supply building contained a diesel tank (an above ground tank located in shallow pit) which was removed in 1995 when the base closed.

Photograph 14: Inside the Dangerous Goods Store.

Evaluation of potential for soil and groundwater impact: The photograph does not show significant staining inside the Dangerous Goods Store. As the building is retaining water it is considered unlikely that significant impact to soil and groundwater would be associated with this structure.

Fuel Storage

Geotechnical Investigation

Wellington City Council Archives Plan 0066_1.34.pdf (1993).


An above ground fuel storage tank was located inside the Dangerous Goods Store (details above).

Photograph 15: Plan from Wellington City Archives file 0060:1:34 showing the location of the Dangerous Goods Store and “existing fuel tanks” it is not clear if the “existing tanks are below or above ground.

No direct records are available to confirm if the removal of the “existing tanks. A fax from Wellington Regional Council to the New Zealand Defence Force dated 9 February 1998 states that the site contained underground storage tanks which have now been removed. It is not clear if the tanks removed are related to these “existing tanks”.

Evaluation of potential for soil and groundwater impact: It is not known from the records reviewed if the tanks are above ground or underground. If the tanks were located underground, soil and groundwater may have been impacted due to operational losses.
| Geotechnical Investigation  | Wellington City Council records show the presence of an existing 2,000 gallon semi-buried diesel storage tank present in a concrete block bund. The document also includes an application dated 16 November 1971 for the installation of 2 semi-buried 1000 gallon super and regular motor spirits tanks. No direct records are available to confirm if the removal of the “existing” tank or whether the proposed tanks were installed.
| (Photograph)  | A fax from Wellington Regional Council to the New Zealand Defence Force dated 9 February 1998 states that the site contained underground storage tanks which have now been removed. It is not clear if the tanks removed are related to these tanks.
| Plan: Shelly Bay Slipways Limited  | Photograph 16: Plan from Wellington City Council archives of the location of the existing and proposed semi-buried tanks.
| Shelly Bay Wharf Wellington – Proposed marine refuelling facilities  | Photograph 17: Photograph of the approximate area where the semi-buried tanks are/were thought to be located.
| Letter from GI Cooper and WS Brambley Trustees for a Company being formed to be known as Shelly Bay Slipways Limited: Application for a Motors Spirits Retailers Licence Restricted to Marine Craft Only at Shelly Bay Wharf Wellington.  | Evaluation of potential for soil and groundwater impact: soil and groundwater may have been impacted due to operational losses.
|  |  |
| Asbestos Site Walkover  | Asbestos lagging may have been used in piping that transferred heat from the boilerhouse to the buildings at the base. The piping remains present at the site with sections showing various stages of aging/decay exposing lagging.
| Testing of the lagging material and an asbestos survey have not been undertaken as part of these works.  | Photograph 18: Pipping and lagging exiting the boilerhouse roof.
| Photograph 19: Pipe lagging exposed at the base of the greywacke escarpment (North Bay).  | Evaluation of potential for soil and groundwater impact: An asbestos survey has not been completed for the site. There is potential for the structures already demolished to impact soil if the asbestos was not removed appropriately. If structures or the lagging is to be removed at the site there is potential for soil to be impacted by asbestos if not undertaken correctly. Groundwater is unlikely to be affected by asbestos.
| Site Walkover  | Possible asbestos containing material present on the floor of the boilerhouse.
| Photograph 20: Possible asbestos containing material noted on the floor of the boilerhouse.  | Evaluation of potential for soil and groundwater impact: An asbestos survey has not been completed for the site. There is potential for the structures already demolished to impact soil if the asbestos was not removed appropriately. If structures or the lagging is to be removed at the site there is potential for soil to be impacted by asbestos if not undertaken correctly. Groundwater is unlikely to be affected by asbestos.
### Wellington City Archives

Email to Wellington City Council from Unknown?: Shelly Bay Slipway Building Demolition of Lean-to Structures November 2001.


Council records from 2001 show that asbestos sheeting was present in unauthorised lean-to’s in the area of the Slipway. These lean-to’s were demolished as they were deemed unsafe in December 2001. The letter indicates that SERCO (the base maintenance operators) were to remove the asbestos appropriately and send material to the closest landfill.

Photograph 21: Wellington City Council 1996 aerial photograph showing the presence of the lean-to structures adjacent to the Shipwrights Building.

**Evaluation of potential for soil and groundwater impact:** There is potential for the structures already demolished to impact soil if the asbestos was not removed appropriately. Groundwater is unlikely to be affected by asbestos.

### Anecdotal Evidence

AECOM understands that during works undertaken by Tonkin and Taylor in relation to the sea wall in the area of Building No. 8 that asbestos was found in loose and asbestos containing material namely Chrysotile, Amosite and Crocidolite.

**Evaluation of potential for soil and groundwater impact:** There is potential for the asbestos to be present in soil adjacent to the seawall in the area of Building No. 8. Groundwater is unlikely to be affected by asbestos.

### Opus January 2008

Opus report that the interior of Building No. 8/HQ Building and the Laundry Building (adjacent to the Boilerhouse) may have asbestos present in the interior of the building. Opus also report that Super 6 roofing (containing asbestos) may be present on the Shipwrights Building.

Photograph 22: Shipwrights Building looking northwest across the Slipway area. It appears that the roof of the structure is newly painted/new. This may have occurred following the Opus January 2008 report.

**Evaluation of potential for soil and groundwater impact:** An asbestos survey has not been completed for the site. There is potential for the structures already demolished to impact soil if the asbestos was not removed appropriately. If structures are to be removed at the site there is potential for soil to be impacted by asbestos if not undertaken correctly. Groundwater is unlikely to be affected by asbestos.

### Transformer/PCB’s

Current Transformer Location: Site Walkover

Historical Transformer Location: Plan Showing Naval Buildings in Relation to the Road Reserve Shelly Bay (Compiled from Survey Office Plan No. 18318 and Public Works Dept Plan No. W.D.O 1785). Pencil date

Two transformer locations were noted at the site, one historical transformer located to the east of the slipway adjacent to the library and one located adjacent to the current café.

Photograph 23: Current transformer location in the area of the café.

Photograph 24: Snapshot of the plan showing the historical transformer location.

**Evaluation of potential for soil and groundwater impact:** The transformers may have previously contained oils with polychlorinated biphenyls (PCB). No visual or olfactory evidence of staining was observed around the current transformer. There may be so localised impact around the transformer locations.

### Leaded Paints

The presence of leaded paint on the buildings is possible and may have affected soil quality. Limited soil sampling suggests that there is not a significant risk from leaded paint associated with the former Airmen’s Accommodation.

No photograph available.
**Liquid Waste Site Walkover**

Opus January 2008 reports that an area of liquid residue contamination was present on the concrete floor in southwest corner of the Shipwrights Building. Access to this building was restricted during the PSI. No photograph of the staining is available.

**Evaluation of potential for soil and groundwater impact:** Significant impact to soil or groundwater is not expected related to the fat trap.

The origin of the liquid residue “contamination” noted in the Opus January 2008 report is unknown, therefore the impact on soil and groundwater is unable to be quantified.

---

**Boilerhouse/Pumphouses Site Walkover**

A coal fired boilerhouse is present in the north bay. There was no evidence in either Wellington City Archives or during the Site Walkover of boiler ash at the site.

Minor hydrocarbon staining noted on the floor of the main boilerhouse room.

**Evaluation of potential for soil and groundwater impact:** Soil and groundwater impact may be present related to the burning of coal to fire the boiler and hydrocarbon staining on the concrete. No evidence of ash burial was found in records relating to the site or during the site walkover. Significant impact related to the operation of the boilerhouse is considered unlikely.
<table>
<thead>
<tr>
<th>Potential Contaminant Sources and PhotoLog</th>
</tr>
</thead>
</table>
| **Pumphouses for Heating** Site Walkover | Pumphouses located across the site to service the heating system.  
Photograph 31: Pumphouse located adjacent to the South Bay parade ground.  
Photograph 32: Pumphouse exterior – North Bay behind the mess buildings.  
Photograph 33: Pumphouse interior – North Bay behind the mess buildings.  
Photograph 34: Pumphouse located adjacent to the Serco Paint Store.  

**Evaluation of potential for soil and groundwater impact:** No significant impact expected. |

| **Landfilling** | Wellington Regional Council  
Selected Land Use Register  
Wellington Regional Council fax to  
New Zealand Defence Force – dated 9 February 1998. Reference K/9/5/59 – Contained in WRC SLUR search. | The records contained in the Selected land use register mentions a landfill present at the site, however no information is available to confirm the location.  
Anecdotal evidence suggest that a green waste landfill was located at the head of Magazine Road.  
Photograph 35: Fax noting the presence of a landfill at the site.  

**Evaluation of potential for soil and groundwater impact:** No evidence of placement of domestic refuse or inert waste was noted in records reviewed and no evidence of landfilling (other than reclamation) was found. It is considered unlikely that significant impact related to landfilling at the site is present. |

| **Magazines** | Aerial photographs and historical  
information from Capital Defence | Not in area of audit. Materials used for the construction of the magazines is unknown.  
No photographs available. |
ATTACHMENT E: POTENTIAL CONTAMINANT SOURCES AND PHOTLOG

Slipway Site walkover

Evening Post Article: the slipping of Shelly Bay.
Opus January 2008

The facility was not observed as part of the PSI. Photographs were taken from outside the fenced area.

Article notes:
- Ex-wartime launches used as civil aviation control craft for the flying boat base in Evans Bay and also finishing boats, pleasure craft and coasters that needed repairing were serviced at the Shelly Bay Slipway.
- Activities at the slipway have included the recovery of scrap metal, vehicle repair and trailer fabrication.
- Sediments may contain elevated levels of metals and hydrocarbons from industries undertaken in the area.

Photograph 36: Slipway and finger pier taken from Shelly Bay Road.
Photograph 37: Slipway concrete area looking southwest taken from Shelly Bay Road.
Photograph 38: Slipway concrete area looking north taken from Shelly Bay Road.
Photograph 39: Slipway cradle area looking south taken from Shelly Bay Road.

**Evaluation of potential for soil and groundwater impact**: Based on aerial photographs it appears that the working areas of the slipway have been concreted. It is therefore considered that localised impact to soil and groundwater may have occurred in localised area (such as the crane hydraulic fluids (if used).

If dredging of the slipway area is required for the development, sediment may be impacted and require specialist disposal.

Generator/Refrigeration? Site Walkover

Generator/Refrigerator present at the rear (east) of the mess facility in North Bay.

Photograph 40: Southern exposure of the gas/refrigeration plant at the mess facility.
Photograph 41: Northern exposure of the gas/refrigeration plant at the mess facility.

**Evaluation of potential for soil and groundwater impact**: No significant impact expected.
<table>
<thead>
<tr>
<th>Site Activity</th>
<th>Site Walkover</th>
<th>Photograph</th>
<th>Evaluation of potential for soil and groundwater impact:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garaging</td>
<td>Vehicle garages are located on the eastern boundary of North Bay and the northeast boundary of South Bay. Photograph 42: North Bay garaging. Photograph 43: South Bay garaging</td>
<td>![Garaging Site Photograph]</td>
<td>No significant impact expected.</td>
</tr>
<tr>
<td>Serco Paint Store</td>
<td>The Serco Paint Store and Workshop is located directly to the east of Building 8. The facility was not inspected as part of the PSI, however it is expected that vehicle maintenance and the storage of paint was undertaken in this building. Photograph 44: Serco workshop facility.</td>
<td>![Serco Workshop Photograph]</td>
<td>No significant impact expected.</td>
</tr>
<tr>
<td>Current Site Activities</td>
<td>The interior of buildings were not inspected during the PSI and a survey of current use was not undertaken. The wider site is occupied by artists, sculptors, printmakers and Propeller Studios. With the exception of Propeller Studios (which has a Dangerous Goods Container – listed above), significant use of hazardous substances is not expected. Minor use of solvents, paints and printers ink is not expected to create a significant impact at the site.</td>
<td>![Current Site Photograph]</td>
<td>No photographs available.</td>
</tr>
</tbody>
</table>
**Analysis Report**

**Client:** AECOM Consulting Services (NZ) Limited  
**Contact:** N Rowe  
**Address:** C/- AECOM Consulting Services (NZ) Limited PO Box 3367 WELLYONGTON 6140

**Lab No:** 1518089  
**Date Registered:** 19-Dec-2015  
**Date Reported:** 13-Jan-2016  
**Quote No:** 72191  
**Order No:** 60480847.1.02  
**Client Reference:** SB WC  
**Submitted By:** N Rowe

**Sample Type:** Soil

<table>
<thead>
<tr>
<th>Sample Name</th>
<th>Lab Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP4 0.3 17-Dec-2015</td>
<td>1518089.1</td>
</tr>
<tr>
<td>TP4 0.5m 17-Dec-2015</td>
<td>1518089.2</td>
</tr>
<tr>
<td>TP4 1.1m 17-Dec-2015</td>
<td>1518089.3</td>
</tr>
<tr>
<td>TP5 0.5 17-Dec-2015</td>
<td>1518089.5</td>
</tr>
<tr>
<td>TP5 0.7 17-Dec-2015</td>
<td>1518089.6</td>
</tr>
</tbody>
</table>

**Individual Tests**

**Dry Matter**  
g/100g as rcvd  
- 92 - 92 -

**Heavy Metals, Screen Level**

- **Total Recoverable Arsenic** mg/kg dry wt  
  5 - 4 - 4

- **Total Recoverable Cadmium** mg/kg dry wt  
  0.14 - < 0.10 - 0.14

- **Total Recoverable Chromium** mg/kg dry wt  
  18 - 22 - 8

- **Total Recoverable Copper** mg/kg dry wt  
  29 - 16 - 7

- **Total Recoverable Lead** mg/kg dry wt  
  85 - 64 - 10.9

- **Total Recoverable Nickel** mg/kg dry wt  
  10 - 17 - 6

- **Total Recoverable Zinc** mg/kg dry wt  
  89 - 76 - 41

**Total Petroleum Hydrocarbons in Soil**

- **C7 - C9** mg/kg dry wt  
  - < 8 - < 8 -

- **C10 - C14** mg/kg dry wt  
  - < 20 - < 20 -

- **C15 - C36** mg/kg dry wt  
  - < 40 - < 40 -

- **Total hydrocarbons (C7 - C36)** mg/kg dry wt  
  - < 70 - < 70 -

**Sample Name:** TP5 1.1 17-Dec-2015  
**Lab Number:** 1518089.7  
**Sample Name:** TP6 0.5 17-Dec-2015  
**Lab Number:** 1518089.8  
**Sample Name:** TP6 0.7 17-Dec-2015  
**Lab Number:** 1518089.9

**Individual Tests**

**Dry Matter**  
g/100g as rcvd  
- - 90 -

**Heavy Metals, Screen Level**

- **Total Recoverable Arsenic** mg/kg dry wt  
  2 - 34 -

- **Total Recoverable Cadmium** mg/kg dry wt  
  < 0.10 - 0.10 -

- **Total Recoverable Chromium** mg/kg dry wt  
  9 - 21 -

- **Total Recoverable Copper** mg/kg dry wt  
  3 - 17 -

- **Total Recoverable Lead** mg/kg dry wt  
  7.5 - 62 -

- **Total Recoverable Nickel** mg/kg dry wt  
  5 - 11 -

- **Total Recoverable Zinc** mg/kg dry wt  
  25 - 71 -

**Total Petroleum Hydrocarbons in Soil**

- **C7 - C9** mg/kg dry wt  
  - - < 8 -

- **C10 - C14** mg/kg dry wt  
  - - < 20 -

- **C15 - C36** mg/kg dry wt  
  - - < 40 -

**Total hydrocarbons (C7 - C36)** mg/kg dry wt  
- - < 70 -

**Analyst's Comments**

Appendix No.1 - Chain of Custody

---

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.

The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.
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.

<table>
<thead>
<tr>
<th>Sample Type: Soil</th>
<th>Test</th>
<th>Method Description</th>
<th>Default Detection Limit</th>
<th>Sample No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heavy Metals, Screen Level</td>
<td>Dried sample, &lt; 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.</td>
<td>0.10 - 4 mg/kg dry wt</td>
<td>1, 3, 6-8</td>
</tr>
<tr>
<td></td>
<td>Total Petroleum Hydrocarbons in Soil</td>
<td>Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MIE Petroleum Industry Guidelines. Tested on as received sample [KBIs:5786,2805,10734]</td>
<td>8 - 60 mg/kg dry wt</td>
<td>2, 5, 9</td>
</tr>
<tr>
<td></td>
<td>Dry Matter (Env)</td>
<td>Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. US EPA 3550. (Free water removed before analysis).</td>
<td>0.10 g/100g as rcvd</td>
<td>2, 5, 9</td>
</tr>
</tbody>
</table>

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.

Martin Cowell - BSc
Client Services Manager - Environmental Division
# Chain of Custody and Sample Receipt Documentation

## Sample ID

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Matrix</th>
<th>Date/Time</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPA 0.3</td>
<td>SCA.</td>
<td>17/12/15</td>
<td></td>
</tr>
<tr>
<td>TPA 0.5</td>
<td>SCA.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPA 1.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPA 2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPA 0.5</td>
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<td>TPA 0.7</td>
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<tr>
<td>TPA 2.0</td>
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<tr>
<td>TPA 0.7</td>
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</tr>
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<td>TPA 0.5</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TPA 0.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Total No. of Sample Bottles:

- Including: 0 Blank or Duplicate Samples

## Chain of Custody Data

- Relinquished By: [Name] [Date: 17/12/15] [Time: ]
- Received By: [Name] [Date: ] [Time: ]
- Method of Shipment: URS Reception

## Sample Receipt Data

- All samples and associated documentation were received in good order: YES / NO
- Please contact the laboratory: YES / NO
- Samples Chilled: YES / NO / NA
- Laboratory Batch No.: Temp: 17°C

## Special Handling/Storage or Disposal Instructions:

- Caution - Samples may contain hazardous substances

# Internal Use - URS Work Instructions and Checklist Overleaf
## Table 1: Shelly Bay - Soil Sample Analytical Results

### Sample Details and Analytical Results

<table>
<thead>
<tr>
<th>Test Pit</th>
<th>Sample Location</th>
<th>Sample Depth (m below current surface)</th>
<th>Sample Soil Type</th>
<th>Sample of soil remaining or removed</th>
<th>Total Petroleum Hydrocarbons (TPH)</th>
<th>Heavy Metals - Total Recoverable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.3</td>
<td>Sandy SILT</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Sodium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5</td>
<td>Sandy SILT</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Chloride</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.7</td>
<td>Sandy SILT</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Arsenic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.1</td>
<td>Sandy SILT</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Cadmium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sandy GRAVEL</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Chromium III</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAND</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Copper</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAND</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Lead (guideline is for Inorganic Lead)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAND</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Nickel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SAND</td>
<td>Remaining</td>
<td>Remaining</td>
<td>Zinc</td>
</tr>
</tbody>
</table>

### Wellington Background Concentrations for Comparative Purposes

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Contamination depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAND</td>
<td>Surface (&lt;1m) / 1m-4m</td>
</tr>
</tbody>
</table>

### Oil Industry Guidelines: Tier 2 Soil Acceptance Criteria

<table>
<thead>
<tr>
<th>Soil Contaminant Standards</th>
<th>Residential (10%)</th>
<th>Soil Contaminant Standards</th>
<th>High Density Residential</th>
<th>Soil Contaminant Standards</th>
<th>Commercial/Industrial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>20</td>
<td>45</td>
<td>70</td>
<td>3</td>
<td>1500</td>
</tr>
<tr>
<td>Chloride</td>
<td>0.14</td>
<td>&lt;0.10</td>
<td>&lt;0.10</td>
<td>&lt;0.1-0.1</td>
<td>20</td>
</tr>
<tr>
<td>Arsenic</td>
<td>18</td>
<td>22</td>
<td>23</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Cadmium</td>
<td>29.0</td>
<td>26</td>
<td>27</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Lead (guideline is for Inorganic Lead)</td>
<td>1.5</td>
<td>210</td>
<td>500</td>
<td>3300</td>
<td>1.5</td>
</tr>
<tr>
<td>Nickel</td>
<td>11</td>
<td>13</td>
<td>15</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Zinc</td>
<td>25</td>
<td>28</td>
<td>30</td>
<td>10</td>
<td>50</td>
</tr>
</tbody>
</table>

### Notes:

- All results and criteria are expressed in mg/kg dry weight.
- Bold - exceeds the Wellington Background Concentrations
- Italic - Exceeds the Residential (10% Produce)
- Italics - Exceeds the Residential (10% Produce)
- Bold - exceeds the Wellington Background Concentrations
- Italics - Exceeds the Residential (10% Produce)

3. Greater Wellington Regional Council (GWRC) August 2003. Determination of Common Pollutant Background Soil Concentrations for the Wellington Region. Table 3-3: For main soil type 2 - Greywacke

**Wellington Background Guideline values for total TPH are for the C7-C44 hydrocarbon range

**Guideline value is for Chromium V1

Groundwater was encountered at approximately 1.8 m below ground level (bgl) at the site.