What Lies Beneath the Navy Museum?
- Mercury & Moa Bones at Torpedo Bay

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Site Location

Torpedo Bay, Devonport, Auckland
Site History
Overview

• How project came about
  • Stormwater upgrade
  • Relocation of Navy Museum

• Redevelopment for Museum
  • Consider various environmental issues
  • Challenges of managing archaeology & contamination
Site Features
Torpedo Boat / Mines
Project Background

- Site was seldom used in recent times
- Recorded Archaeological Site
- Soil investigation required
- Did not expect significant contamination/archaeology
Prehistoric Archaeology
Contaminated Land
Phase 1 Investigation

1886 Base
A. Whitehead torpedo shed / forge
B. General store
C. Carpenter’s shop
D. Small building

1896 Base
E. Barracks
F. Loaded mine store
G. Connecting up shed
H. Loading shed
I. Test room
J. Priming pits
K. Cable pond

L. Small buildings/sheds along the western seawall

20th Century Buildings
M. Boat club buildings
N. 20th century additions
Sampling Plan
Archaeology & Contamination Interaction

Benefits:

• Phase 1 investigation was fantastic

• An excellent background to potential contaminants including what and where
Challenges
• However all test pits had to be undertaken with an archaeologist observing.
• Slowed progress
• Pier head area
Remediation

• 1886 Reclamation
• Pier Head area
• Stormwater pipes
• Other areas capped or resealed
Capping
New Navy Museum

- Converted site from poor condition
- Benefits to community
- Café very popular!
Future Management

Management Plan:

- Future groundbreaking activities
- Planting and excavation of GCL liner
- Long term monitoring of water discharges (if required)
Item of Interest
WHAT LIES BENEATH THE NAVY MUSEUM?
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Introduction
The Royal New Zealand Navy Museum is located at Torpedo Bay, Devonport adjacent to Auckland’s Waitemata Harbour. The museum was relocated to this site in 2010 changing what was a deteriorated and little used area into a significant amenity for the people of Devonport and New Zealand.

Torpedo Bay has been continuously occupied by New Zealand Defence Force (NZDF) since 1886 when the coast was reclaimed for a Submarine Mining Base in response to fears of an attack by a Russian fleet. Further reclamation occurred in 1896 extending Torpedo Bay to its current form.

As part of the site redevelopment works for the Navy Museum various environmental issues had to be considered. Torpedo Bay was known to be a recorded archaeological site and was a suspected contaminated site. But the understanding at the time was that there had been limited activity on-site, and significant archaeology and contamination were not expected to be found. However during the excavation it became evident that the extent of the archaeology and contaminated land were more significant than anticipated and consequently the redevelopment works would require careful management. This paper outlines the findings and discusses the challenges and lessons of concurrently managing the archaeology and contamination at Torpedo Bay.

Site History
The earliest known use for the site was for the ship building industry – Torpedo Bay housed the Beddoes and Holmes Boat Yard prior to 1886. After the initial reclamation in 1886 the Submarine Mining Base was formed and further reclamation was undertaken to extend the area of the site in 1896 (Figure 1). Underwater mines were launched from the site across Auckland's harbour to a depot at Biddicks Bay (near Bastion Point) to defend the city from a possible invasion by Russia.
In addition, ten Whitehead torpedoes were stored in the Whitehead Torpedo Store at the site from 1886 to about 1902 when they were sold for scrap. Thornycroft torpedo boats were used to carry and launch torpedoes. The Whitehead torpedoes and boats were decommissioned about 1900 while the electro contact minefield was decommissioned in 1907.

The mining equipment was kept at the base until after WWI and the wharf and yard continued to be used for unloading weapons and ammunition for the batteries on North Head for many years. In the 1920s the base became an artillery yard and a new building was constructed to house field artillery. During WWI the base was used as an internment camp for German nationals including the infamous Count von Luckner and some of his crew from the German raider ‘Seeadler’. The base was used by Army engineers and field artillery units until 1958. Sometime after 1967 the Barracks building, the Whitehead Torpedo Store and the Forge were demolished. From 1964 the facility was used by Navy staff principally as a Sailing Club and for the Navy Band.

The site was seldom used in recent times. Then in 2008, after much deliberation, it was decided that the Navy Museum would be relocated to the Torpedo Bay site.
Archaeological Findings

Torpedo Bay is a recorded archaeological site (NZAA R11/1945) of national significance due to the historic Beddoes and Holmes Boat Yard and Submarine Mining Base. Significant 19th century buildings were still present when the site was redeveloped and these were refurbished to form the new Navy Museum. These buildings are considered Category A and B heritage buildings under NZDF’s Heritage Policy and had to be developed with due consideration to heritage values.

The scale of the works associated with the Navy Museum redevelopment proposal along with the required stormwater upgrade works meant that the archaeological site would be damaged and modified, therefore an Archaeological Authority from the New Zealand Historic Places Trust (NZHPT) was required, which included the requirement for an extensive archaeological investigation.

Despite the significance of the site, no substantial remains were expected to persist in the ground as it was considered likely that they would have been destroyed by the modifications on-site and the underground services installed over a number of years. However this initial assessment proved incorrect as the reclamation had generally buried the buildings and structures on site leaving them relatively well preserved. As the works progressed the nature of the archaeology became more important than originally anticipated.

The archaeological excavation unearthed many historic archaeological remains, most of which dated back to the late 1800s, including:

- An 1886 buried seawall, which marks Torpedo Bay's previous foreshore.
- Six cricket ball sized grenades (pre WWII), which were fortunately found to be inert.
- Old tram lines that were utilised for transporting the torpedoes/mines.
- Turntables used to navigate the trams through the Base.
- A cable pond.
- Foundations of original buildings.
- Chunks of flooring plastered with old newspapers.
The remains were surprisingly intact and are very significant from an early New Zealand military perspective.

Unexpected nationally significant prehistoric Maori archaeology was also found near the end of the investigation, including cooking ovens, moa bones and an adze.

Three species of Moa and at least five individuals have been identified from the lower two settlement layers. All of the species are known North Island Species of Coastal bush Moa (Anomalopteryx didiformis, Pachyornis geranoides and Euryapteryx curtus). As the only site in the Auckland, Coromandel Northland region with definitive evidence of hunted Moa rather than industrial Moa usage by Maori, the dating of this site will potentially answer long held questions concerning moa extinction in the North Island. It may dismiss the general belief that the Auckland Coromandel area was not associated with Moa hunting and is not a primary area of archaic settlement by early Polynesians and was therefore occupied later than other areas of settlement.

A small rectangular adze (hand tool) made from Motutapu greywacke was found in the prehistoric site. The Hauraki Gulf was a centre of adze production and the evidence found suggests that occupation of Torpedo Bay, at least during the Archaic period, was extensive, and that the people who inhabited the Bay played an active role in Motutapu greywacke adze production.

The preliminary radiocarbon dates indicate settlement at the site ranged between the early 15th century and the late 17th century. It could be one of the earliest sites discovered in Auckland.

**Contaminated Land Investigation**

The desktop site history (Phase 1 Investigation) was undertaken concurrently with a portion of the site sampling due to project time restrictions. The potential contaminants associated with previous land uses and areas on the site most at risk from contamination included:

- Tributiny Tin – from the Boat yard.
- Mercury – used in torpedoes in the form of mercury fulminate and in the mines for detonation, which was believed to be stored in the priming pits.
• Lead – from batteries used in the mines.
• Polycyclic Aromatic Hydrocarbons – from the forge, tramlines and coal tar used to seal the site.

The sampling plan (Figure 2) for the site investigation (Phase 2) was devised using information from the site history and was also influenced by:

• The regional council officer’s requirement to ensure that the area adjacent to the seawall was well characterised (due to its proximity to the receiving environment).
• The depth and geology of the reclamation.
• The reclamation being impacted by flushing with tidal water.

The site investigation results indicated there were areas contaminated with copper, lead, mercury, zinc and PAHs. There were also areas that were not contaminated. Figure 2 summarises the results. The site characterisation included groundwater/seawall discharges being sampled to determine if contaminants were discharging from the site. The results of the site investigation were used to determine where remediation was required.
Archaeology & Contamination Management

The contaminated land investigation was undertaken concurrently with the site development and archaeological excavation/investigation since the Museum development was under significant time pressure. The nature of the soil contamination and the archaeologists needing to work in the soil made it challenging to manage all of the compliance requirements during the development, which included contaminated land resource consents, an Archaeological Authority and health and safety. This also impacted on the contractors operations and had significant impacts on project costs.

A significant archaeological site and an intrusive contaminated land site investigation are not always easy bed fellows. For example archaeologists tend to favour intimate contact with the site, sitting with brushes and touching soils and artefacts. While for a contamination investigation limited contact with potentially contaminated material is preferred both for Health and Safety reasons and to limit the risk of cross contamination. However, although there were challenges faced during the investigations there were also considerable benefits to working on an archaeological site. One of the main benefits was a very comprehensive and detailed site history report. Information from the archaeological reports including historic photos and detailed accounts of the activities on the site contributed to a thorough site history and clear understanding of the potential contaminants and where they were likely to be found.

Some specific issues arose from working on an archaeological site. During the sampling phase of the investigation the project archaeologist preferred minimal intrusion into the site to minimise potential damage and exposure of archaeological artefacts. However as the site was reclaimed land to approximately 3m below ground level (bgl) and the geology of much of the reclamation was a gravelly tuff material interspersed with large blocks of tuff, less intrusive sampling techniques were generally not possible. Test pits were undertaken with a 500mm wide bucket and every test pit location had be agreed to and then observed by the archaeologist.

In many cases we found interesting items during test pitting – tramlines, glass bottles, lamps, hand carved bone pipes (probably by inmates that may have been
used for building construction). When artefacts were found, digging would cease while an assessment took place. Usually test pitting could proceed after less than an hour, occasionally we had to undertake a test pit adjacent to where the artefacts were found.

A larger volume of soil was required to be excavated as part of the archaeological exploration than would have been necessary for the contaminated land works. Strict sediment control measures were implemented to avoid discharges of contaminants off-site (for resource consent compliance), which meant that all unsealed areas and stockpiles had to be covered. This had to be closely managed as the archaeologists needed soil to be exposed to conduct their investigation.

For the investigation to be successful full cooperation and understanding of the issues was required by the archaeologist, contaminated land scientist and site project manager. The excavator operators also needed to be fully briefed on the technique required to protect artefacts while obtaining appropriate samples for analysis. This was managed successfully by frequent communication between all parties during this project.

One very difficult area to manage was around the 1896 pier head. Originally the sampling was attempted with a hand auger as there was a desire to preserve the pier head. However the nature of the soils did not allow the auger to a depth of more than 500mm bgl before the sides started to cave in and compromised the sample. This initial sampling also showed some of the most significant results with contamination of lead, mercury and PAHs. Since the pier head was to be protected for historical purposes the investigation had to be undertaken cautiously using a small bucket and a very cooperative and patient digger operator.

**Remediation**

The area around the Pier Head showed exceedances in mercury, lead and PAHs. This is thought to be where the mines were deployed and retrieved. This meant the Pier Head area again required particular consideration. Due to its proximity to the receiving environment and the future use as a grassed area there was a requirement
to remove contamination from this location. However there was also a desire to preserve the pier head and any remediation put this at risk.

The decisions for remediation were developed with regard to the following factors:

- The flushing of material through the seawall was possible.
- Most of the site would be sealed with asphalt.
- Some areas of the site were to be grassed and these areas would be open to the public.
- The pier head area was to have some exposure (i.e. would not be sealed).

The remediation plan for the site included:

- A geosynthetic liner (GCL) beneath the grassed areas.
- Removal of contaminants around the pier head.
- Removal of contaminants from the 1886 reclamation.
- Sealing of the site by asphalt and/or concrete.

Figure 3 shows the conceptual site model for contamination after remediation and illustrates that contaminants left on site are generally less than 1m bgl. It also shows that the pathways for contact or discharges of contaminants have largely been minimised.

Figure 3 – Torpedo Bay Conceptual Site model.
Conclusion
The Torpedo Bay site was converted from being in a poor condition to an asset for NZDF and public use.

The site archaeology and contamination were successfully managed. The Navy Museum experience illustrates that it is important to ensure sites are thoroughly investigated prior to works to 1) establish the site history and whether it could be an archaeological site 2) determine if contamination is present that will need to be managed throughout the works and 3) acquire any required resource consents and an Archaeological Authority well in advance. The lessons learnt from this experience range from understanding the increased time required to undertake investigations, to ensuring that clear and regular communication is undertaken between the various disciplines and a co-ordinated approach is essential. There is also the potential for important information exchange between archaeologists and contaminated land scientists that will benefit both investigations. An adequate float period for worst case scenarios should be included in project timeframes to allow for potential risks and implementation of management measures.

The end result of this project was that significant information was discovered about Torpedo Bay’s and New Zealand’s history and at the same time a contaminated site was remediated.

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References