



**TE APUNGA O TAINUI (R11/10):  
RICHMOND DEVELOPMENT,  
AND 9 AND 11 RYBURN ROAD, ŌTĀHUHU:**

**(HPA AUTHORITY 2014/1080; HNZPTA AUTHORITY 2019/722)**

REPORT TO  
HERITAGE NEW ZEALAND POUHERE TAONGA  
AND  
WILSHIRE RYBURN DEVELOPMENT LTD

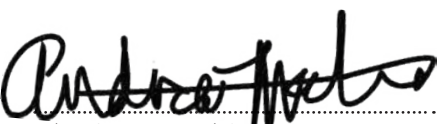
ANDREW MCALISTER AND MATTHEW CAMPBELL  
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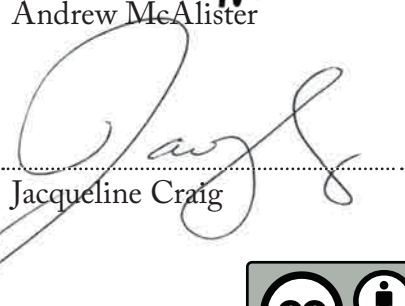


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Date: 11 November 2021

Reference: 19-101



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# TE APUNGA O TAINUI (R11/10): RICHMOND DEVELOPMENT, AND 9 AND 11 RYBURN ROAD, ŌTĀHUHU: (HPA AUTHORITY 2014/1080; HNZPTA AUTHORITY 2019/722)

ANDREW MCALISTER AND MATTHEW CAMPBELL

Wilshire Ryburn Development Ltd have undertaken earthworks to install a shotcrete retaining wall at 9 and 11 Ryburn Road, Ōtāhuhu (Lot 1 LT 51077, Lot 4 39188, Lot 2 DP 335130 and Lot 3 DP 513682). These properties are located on the outer slopes of Te Apunga o Tainui (also known as McLennan's Hill), a pā recorded as R11/10 in the New Zealand Archaeological Association (NZAA) Site Recording Scheme (SRS). The pā has largely been quarried away since the late 1940s with original ground only remaining around the perimeter of the site, including the Ryburn Road properties. An archaeological assessment was originally undertaken of the wider housing development by Matthew Campbell and Callum Ross-Shepherd of CFG Heritage (Campbell and Ross-Shepherd 2013) and updated for the Ryburn Road works (Campbell and Ross-Shepherd 2019). Panama Road Developments Ltd originally applied to the New Zealand Historic Places Trust (NZHPT) for an archaeological authority for earthworks for housing development on Lot 2 DP 88129, Lot 4 DP 39188, Lot 1 LT 51977, Lot 24 DP 37754, Pt Lot 52 DP 10490, Lot 53 DP 10490, Lot 54 DP 10490, Lot 55 DP 10490, Lot 1 DP 86615, Lot 2 DP 86615 and Lot 1 DP 194641. Authority 2014/1080 was granted on 21 May 2014 under section 14 of the Historic Places Act 1993. This authority was not transferred to Wilshire Group when Panama Road Developments sold their properties, but Wilshire Ryburn did not undertake any works that would have triggered any conditions of the authority. Wilshire Ryburn Development Ltd applied to Heritage New Zealand Pouhere Taonga (HNZPT) for an archaeological authority to undertake additional works at 9 and 11 Ryburn Road under section 44 of the Heritage New Zealand Pouhere Taonga Act 2014. Authority 2019/722 was granted on 15 July 2019.

## Methodology

The wider development was initially assessed by Matthew Campbell and Callan Ross-Shepherd in 2013. This was largely a desktop assessment, as the bulk of the maunga had been destroyed by quarrying in the 20th century.

The SRS was accessed online ([www.archsite.org.nz](http://www.archsite.org.nz)) to search for records of sites recorded in the area. Old maps and plans held by Land Information New Zealand (LINZ) were accessed using QuickMap software. The best visual historic record of the pā is aerial photography dating to 1940. Archival sources consulted included: the Auckland University Library; Auckland Museum Library; the Sir George Grey Special Collections at the Auckland Library; Auckland City Council Archives; the Alexander Turnbull Library manuscript and pictorial collections; the New Zealand Historic Places Trust digital library; Archives New Zealand Collections; Papers Past; Auckland Art Gallery online collections; academic journals; Department of Conservation archaeological publications; and the Appendices to the Journal of the House of Representatives. Following the preparation of the assessment report Tony Walzl of Walghan Partners undertook further archival research in the Army Department records at Archives New Zealand (Walzl 2013, 2014) into events

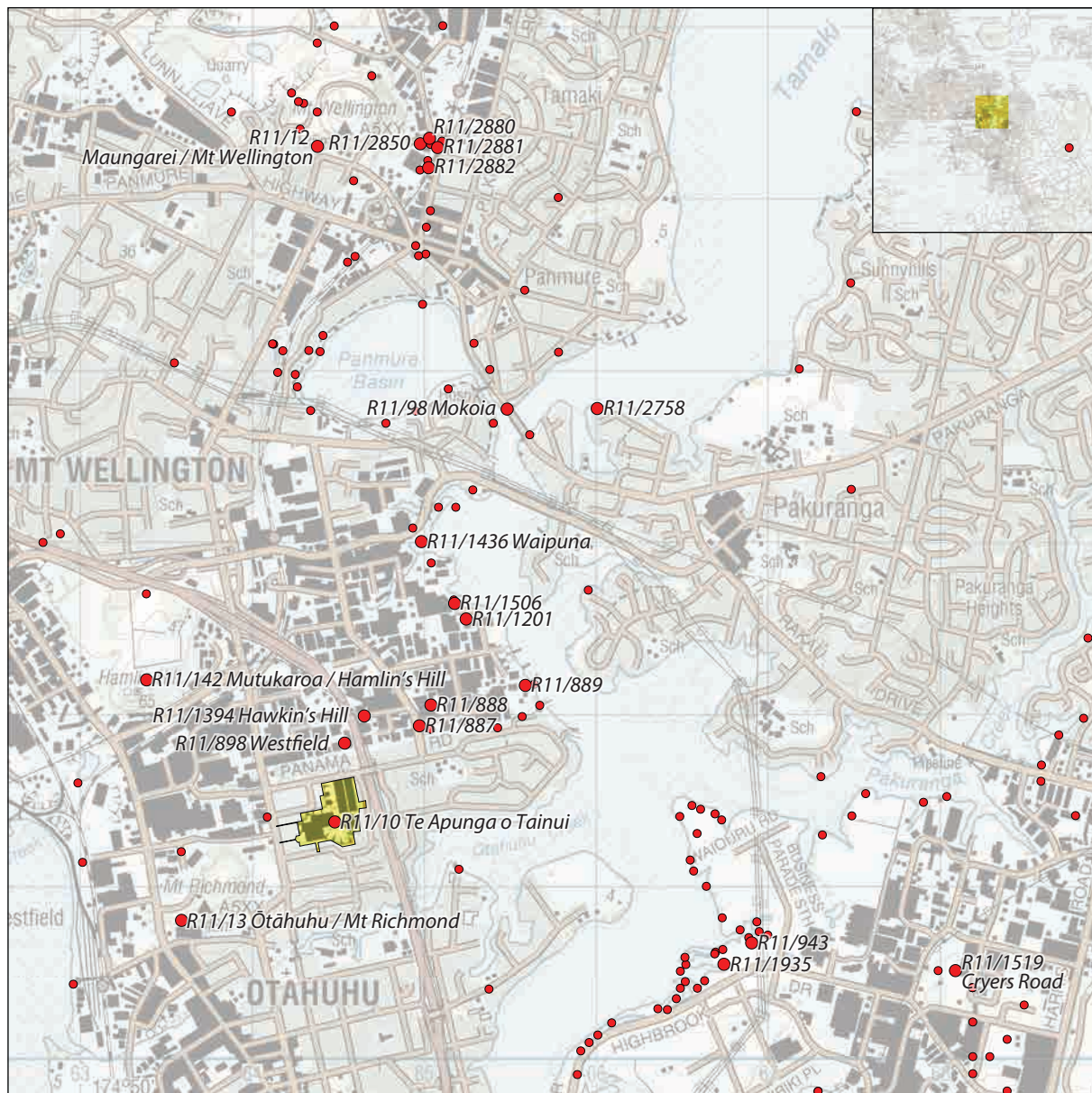


Figure 1. Location of the Richmond development, showing archaeological sites in the vicinity.

surrounding the 1860s military encampment on Te Apunga o Tainui and the internment of Ihaka Takaanini and his family. This research is incorporated into this report.

A stereoscope was used to view historic aerial photographs to help in resolving the identity of archaeological features and create an archaeological sketch map of Te Apunga o Tainui.

Archaeological investigation consisted of monitoring earthworks aimed at levelling an L-shaped area between the southern and eastern boundaries of 7–11 Ryburn Road and the upper surface of the adjoining quarry cut. Field work was carried out between September and November 2019 by Andrew McAlister and Hayley Glover of CFG Heritage, Nigel Denney and Jeff Lee of Te Ākitai Waiohua, and Sarah Karstens and Caitlin Smith of BioArch Consulting. The area was stripped using a 12 tonne hydraulic excavator and any exposed features were mapped, photographed and investigated following standard archaeological protocols. Lithics were analysed by Andrew McAlister. Charcoal was analysed by Ella Ussher

of CFG Heritage. Midden was analysed by Jenifer Graydon of CFG Heritage. Radiocarbon dating was undertaken at the Radiocarbon Dating Laboratory, University of Waikato.

## Background

The following background sections are largely taken from Campbell and Ross-Shepherd (2013) and Walzl (2013, 2014).

### *The Volcanic System*

Te Apunga o Tainui was part of the same volcanic system as nearby Ōtāhuhu / Mt Richmond<sup>1</sup>, often referred to as the portage volcanic complex (Sandiford et al. 2002). Te Apunga o Tainui is thought to have been created in a series of eruptions that ceased prior to the eruption of Ōtāhuhu / Mt Richmond. The sequence began with an explosive eruption creating a crater and tuff ring, similar to that still visible at the nearby Ōtāhuhu / Mt Richmond. Lava vents then opened up and produced a series of basaltic lava flows that overlaid the tuff ring and crater and flowed out to the north and east, creating a lava field and shield volcano. During the eruption four scoria cones formed at the location of the vents (Figure 2 shows the former area and layout of the cones). The lava flows (which are still extant) extend north of Te Apunga o Tainui to Hamlin's Hill and the Panmure basin tuff ring, and to the east they

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<sup>1</sup> The full name of Ōtāhuhu is Te Tāhūtāhūtanga o te Waka Tainui “The Ridgepole of the Tainui Canoe” (Hayward et al. 2011: 187).



Figure 2. 1940 aerial photo showing the extensive lava flow to the north and east forming the Panama Peninsula, with Te Apunga o Tainui in the lower left (detail of SN139 E/10, NZAerial Mapping Ltd.).

underlie the area all the way to the margin of the Tāmaki River (Searle 1961, 1981; Hayward et al. 2011).

The eruption that created Te Apunga o Tainui has been dated by several different techniques but these have yielded inconsistent results leading to a rather large timeframe in which the volcano could have erupted. It certainly erupted prior to Ōtāhuhu / Mt Richmond as ash from Ōtāhuhu / Mt Richmond overlies basaltic flows from Te Apunga o Tainui (Hayward et al. 2011). Lindsay et al. (2011) provide a grouped age estimate from the more reliable dating techniques (Ar–Ar, K–Ar and thermoluminescence) at  $42,600 \pm 3,800$  to  $55,000 \pm 6,000$  and a best estimate of 39–41 thousand years ago based on the Ar–Ar and K–Ar techniques. Lindsay et al. consider that this date is relatively unreliable compared to many other dates for volcanic eruptions in the Tāmaki region.

### Vegetation and land history

A series of studies have been carried out on the prehistoric environment and land history of the Ōtāhuhu region. Peats and silts found in boreholes near Ōtāhuhu / Mt Richmond indicate that the landscape prior to the eruption of the portage volcanic complex was potentially a floodplain or estuary (Searle 1961). It has also been suggested that volcanic activity created a lake in the region between volcanic deposits on the Tāmaki Isthmus and Panmure Basin (Searle 1981). Pollen studies by Sandiford et al. (2002) on sediment cores from near Ōtāhuhu / Mt Richmond indicate that the local environment during the onset and height of the Last Glacial Maximum, 25,000–16,500 years ago, changed from this lake or wetland environment to a beech (*Nothofagus* sp.) dominated semi-forested zone and then, as dryer conditions intensified, shifted to a more open grassy shrubland environment with some patches of forest which were dominated by both beech and conifer species.

Charcoal studies from the nearby Westfield, Fisher Road and Tāmaki River sites (whose archaeology is described in more detail below) also provide some insight into the local environment at the time of initial Māori occupation. These studies indicate that the environment was still mainly shrub land with remaining broadleaf / podocarp or coastal forested areas nearby (Furey 1986; Foster and Sewell 1988, 1993). Dominant species in the charcoal assemblages include pōhutukawa (*Metrosideros excelsa*), rātā (*Metrosideros robusta*), rewarewa (*Knightia excelsa*), tawa (*Beilschmiedia tarwa*), tōtara (*Podocarpus totara*) and pūriri (*Vitex lucens*). Clearing of land for cultivation introduced scrub species like bracken (*Pteridium esculentum*) (Furey 1986).

The presence of land snails in the Westfield site also provides some indication of past environmental conditions. Species intolerant of scrub- or bracken fern-dominated environments were found in the assemblage indicating that areas close to the site were forested to some degree. Other species found in this same assemblage, however, can be found in open scrub land environments potentially indicating a mixed or disturbed bush environment close to the site (Furey 1983: Appendix XI, 1986: 13). The Fisher Road sites also have a large assemblage of land snail species commonly found in more open scrub land environments (Foster and Sewell 1988: 60). These remains indicate that at the time of these occupations open scrubland was present but forested areas were still to be found nearby.

Later historic accounts present a very different picture of the environment in the greater Ōtāhuhu region, one dominated by bracken and scrub land (Foster and Sewell 1988, 1993). The account of missionary James Hamlin (cited in Sullivan 1986), who passed along the Tāmaki River in 1834, noted an unforested landscape covered in bracken. Local histories suggest that when the area was purchased by W.T. Fairburn in 1836, Ōtāhuhu / Mt Richmond and Te Apunga o Tainui were covered in grass and used by Fairburn for grazing flocks of sheep (Ōtāhuhu Borough Council 1962). Aerial photographs from 1940 show several fence lines



across the cones (Figure 3); like many other volcanic cones in the Auckland landscape Te Apunga o Tainui was used for farming well into the 20th century.

### *Soils*

The soils surrounding Te Apunga o Tainui are reddish and brown loams derived from volcanic tuff and the underlying basalt flows in the region (Pohlen 1979). Such volcanic soils tend to be fertile and free-draining and were attractive to pre-European Māori (Foster and Sewell 1988; Sullivan 1986: 7). Oral histories note Ōtāhuhu in general as a place of intensive kūmara cultivation (Sullivan 1986: 6) and archaeological evidence from the lava fields to the east of Te Apunga o Tainui and the lower slopes of the hills themselves, are consistent with this area being a centre of gardening (Foster and Sewell 1988, 1993; Sullivan 1986: 6).

### **Pre-European Māori archaeology**

No archaeological research was carried out on of Te Apunga o Tainui prior to its destruction in the 20th century and there are no published accounts of oral histories regarding the pā on the maunga. However, some basic details of the site have been reported. The NZAA site record for Te Apunga o Tainui (R11/10) lists it as a hill pā and terraced fortification. The record gives an estimate of the area formerly occupied by the site at around 200,000 square yards (167,000 m<sup>2</sup>).

The primary source of information regarding the archaeology of Te Apunga o Tainui is aerial photographs taken prior to its destruction in the 1950s. Bulmer (1994) reports that she completed a sketch map of the site in the 1980s based on aerial photographs, however, this map has not been relocated. Sullivan (1986) also presents findings related to viewing aerial maps of the Te Apunga o Tainui site. She notes that, like Ōtāhuhu / Mt Richmond, Te Apunga o Tainui was extensively terraced. She suggests that two high points located on the rim of the larger crater were defensive positions, one of which may have been made more so by a defensive ditch on the north west side of the crater. Sullivan also mentions that a 'lower knob' (she does not identify which lower knob; however, the terraced area to the south west of the highest point is a likely candidate) could also be a defensive position. She provides a count of ~50 kūmara pits on the terraces of the maunga and suggests that rock-walled kūmara gardens can be seen in the flatland area to the east of Te Apunga o Tainui.

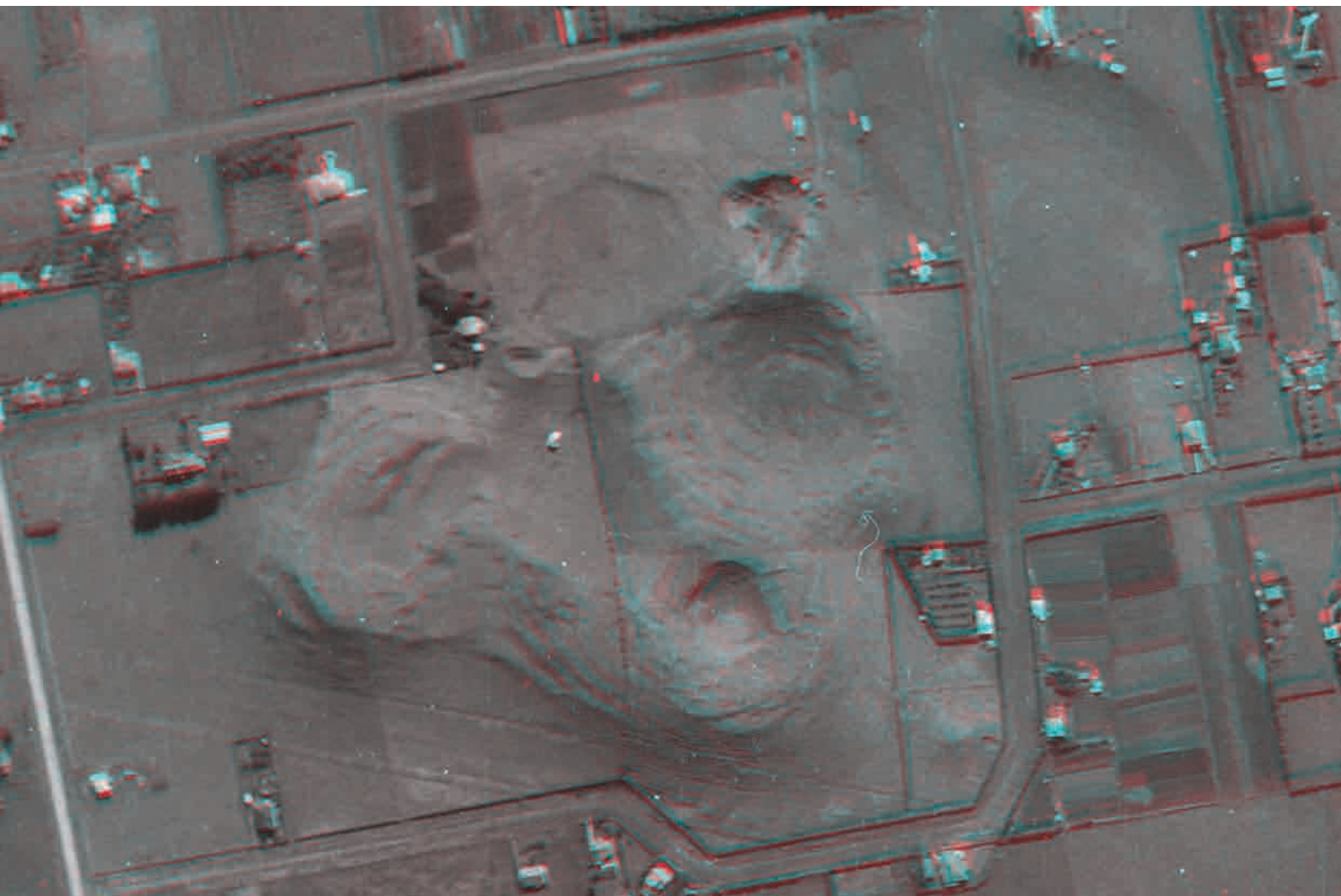
Aerial photos were viewed under a stereoscope and used to construct a sketch map of the terraces and large scale features site in order to supplement and confirm the details provided by the earlier reports (Figure 5). The photographs were taken around midday on 14 April 1940 in good light. There is reasonable, but not ideal, definition of features. The defensive high points around the main crater rim described by Sullivan are easily located when viewed in stereo. The southernmost of these points appears to occupy a terrace on the highest point of the maunga. Terraces are arrayed around this high point down along the lip of the crater and also down into the crater. Further terracing is apparent on top and down the western side of the southernmost, and highest, scoria cone. The small western hill also appears to be heavily terraced on its north western side. Occupying many of these terraces, and particularly those terraces inside the large crater, are large rectangular features that are almost certainly pits. This is again consistent with Sullivan's observations and the estimate that there are ~50 of them visible seems to be plausible and there are likely many more obscured due to the angle of the photographs. The defensive ditches described by Sullivan are not visible.

Surprisingly, a single archaeological date has been previously reported for Te Apunga o Tainui. Sewell (1992: 47) reports a shell midden sample taken from a remnant terrace on the edge of the quarried area was submitted for radiocarbon date at the University of Waikato



*Figure 3. Detail of 1940 aerial photograph of Te Apunga o Tainui (detail of SN139 E/9, NZ Aerial Mapping).*

*Figure 4. Anaglyph of 1940 aerial photographs of Te Apunga o Tainui (detail of SN139 E/9 and SN139 E/10, NZ Aerial Mapping). This image can be viewed in 3D with red (left) / cyan (right) stereo glasses.*



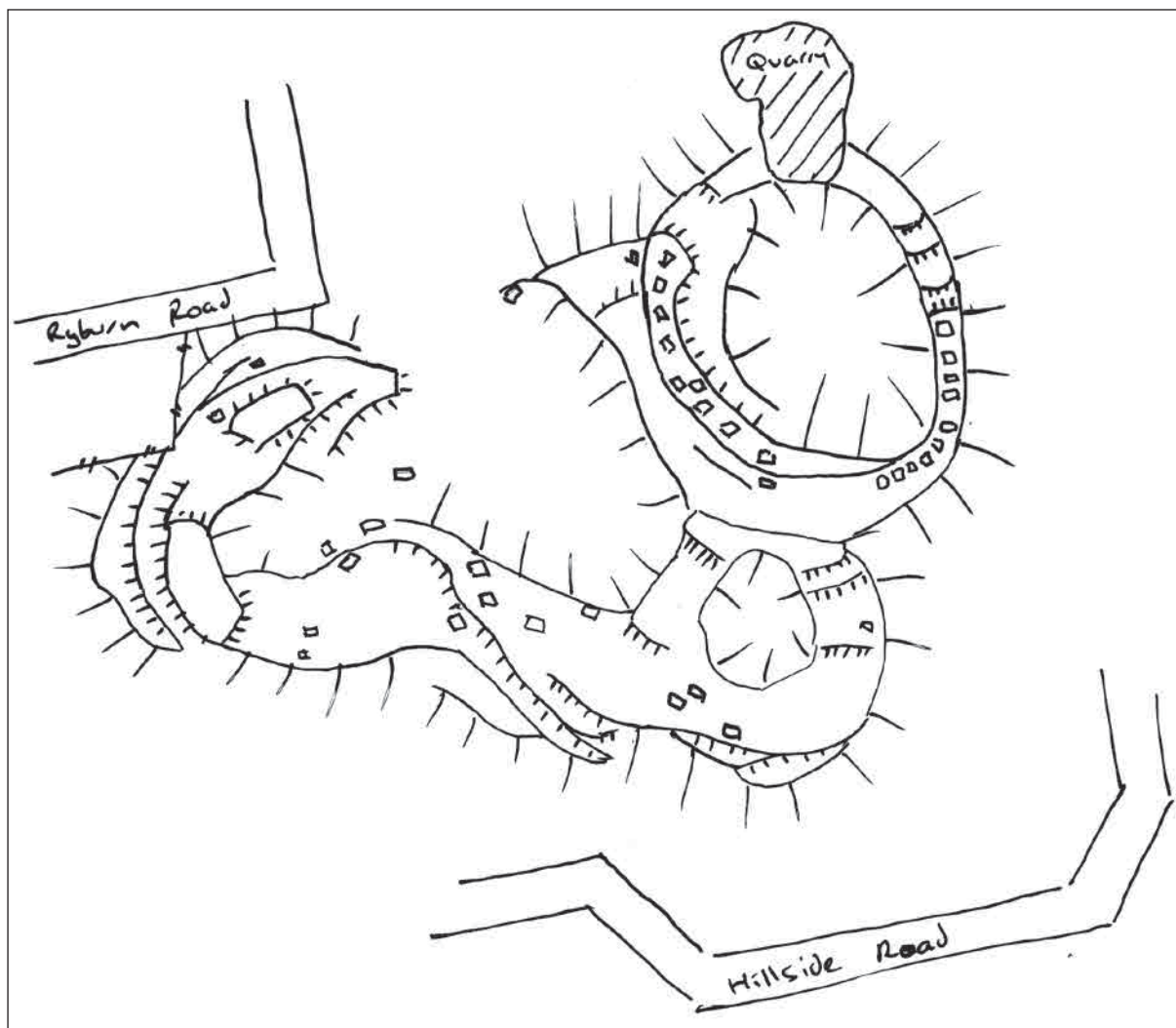


Figure 5. Sketch map of Te Apunga o Tainui from 1940 aerial photographs SN139 E/9 and SN139 E/10 viewed through a stereoscope.

Radiocarbon Laboratory (WK1722). The date has been recalibrated to AD 1470–1810 at a 95% confidence level (Table 4). The University of Waikato radiocarbon database entry notes that the sample was from tuangi (*Austrovenus stutchburyi*). This date range is essentially similar to dates for the surrounding sites (see below).

### *The archaeology of Ōtāhuhu and the Tāmaki River*

Many of the archaeological sites located in the area surrounding Te Apunga o Tainui, and dated to a similar time period, are thought to be directly or indirectly associated with the occupation of the pā at Te Apunga o Tainui and thus can be used to shed further light on the archaeological landscape. Figure 1 shows the distribution of these sites.

To the north of Te Apunga o Tainui lies Mutukaroa / Hamlin's Hill, R11/142. It is a large, gently rolling clay hill without natural defences, and has a permanent freshwater spring that would have made it attractive for occupation (Davidson 1970). This large non-volcanic hill once held a large open undefended village on its southern end, that was excavated over several seasons (Davidson 1970; Pearce 1975; Irwin 1975; Nichol 1980; Walton 1979; Sims

1977; Foster 1984). Pearce and Walton (1983) reported a midden date in the 17th or early 18th centuries. They proposed that there were at least five phases of occupation visible in the archaeology.

To the south of Mutukaroa / Hamlin's Hill but north of Te Apunga o Tainui lies Hawkin's Hill (R11/1394). This site has been interpreted as a small undefended hamlet (Coates et al. 1996). Features found at the site included kūmara pits, evidence of a house, possibly with a porch and compressed shell floor, potential wind breaks or cooking sheds, earth ovens and midden. Although no physical evidence of gardening was found at this site, the presence of storage pits suggested to Coates et al. (1996) that the gardens must have been located nearby and on the Te Apunga o Tainui lava field. The site was not dated.

To the north east of Te Apunga o Tainui, in the flatrock lava field area near modern day Fisher Road, are three archaeological sites: R11/887, R11/888 and R11/889 (Foster and Sewell 1988). These sites, much like the Hawkin's Hill site, have been interpreted as the remains of an open undefended hamlet or hamlets. Again, the internal features of these sites included pits, house structures, hearths and earth ovens, storage sheds, windbreaks or cooking shelters and large storage pits. They dated to the 16th century AD. Between Hawkin's Hill and Te Apunga o Tainui is the Westfield Site R11/898, which is again interpreted as a small undefended settlement and which shows a similar range of structures and areas in the site to the other undefended sites already mentioned (Furey 1983, 1986; Sewell 1992). The site dates to the 16th–17th centuries AD.

To the north east of Te Apunga o Tainui are two sites located on the banks of the Tāmaki River, known as the Tāmaki River Sites R11/1201 and R11/1506 (Foster and Sewell 1993). The excavation of R11/1201 revealed similar features to the other undefended settlements already mentioned. However, R11/1506, unlike these other sites, was a defended settlement, or flatland pa, with a clear palisade uncovered at one end of the site; this was suggested to have extended around the rest of the site. Inside the palisade were cooking and stone working areas as well as several pits in an alignment and several house structures. The sites dated to the late 15th–16th centuries AD.

Undoubtedly the most striking archaeological site in the vicinity of Te Apunga o Tainui is the pā at Ōtāhuhu / Mt Richmond, R11/13. Although never excavated, some features of the site are clearly visible (Bulmer 1994). The site has been extensively terraced and there appear to be several defensive features. Sullivan (1986) suggests five independent defensive strong points are located on the maunga and potentially over 60 kūmara storage pits are visible in aerial photographs.

Further afield, other pā further north along the Tāmaki River have also been investigated. Investigations were carried out on Maungarei / Mt Wellington (R11/12) in the 1960s and 70s and have recently been reported in full (Davidson 2011). Various types of kūmara pit were described, some stone lined, and ten radiocarbon dates indicated the main occupation was between the 15th and 17th centuries, with two main phases. Obsidian from as far afield as Taupō was found. One notable finding was that tuangi were always small but got smaller over time, as a result of a combination of overharvesting and siltation in the Tāmaki Estuary from land clearance. Recent investigations have included plant microfossil analysis, which found bracken fern spores dominant in all samples, indicating extensive forest clearance and abandonment of gardens (Foster et al. 2012).

Mokoia Pā, R11/98, was occupied by Ngāti Pāoa in the early 19th century and was sacked by Ngāpuhi in 1821. Investigations between 1978 and 1980 undertaken by the New Zealand Historic Place Trust have never been reported, but a preliminary examination of the excavation field notes and plans indicates that the 19th century defences overlie earlier defences (Matt Felgate pers. comm.). More recently, a large scale excavation was undertaken ahead of the construction of a new bus lane and bridge running parallel to Lagoon Drive and

across the Tāmaki river. This excavation encompassed the properties at 19A, 21 and 16 Bridge Street, as well as parts of the Bridge Street road reserve. This excavation provided a large cross section of the defended pā from just south of the outer defensive ditch, right through to the Tāmaki River (Figure 2). The final report for this excavation is still pending; however, preliminary results indicate a complex assortment of intercutting archaeological material and features including storage pits, defensive ditches, postholes and burials (Felgate 2020).

Other undefended sites have also been excavated along the Tāmaki River. Excavations at the Waipuna site, R11/1436, revealed a series of complex intercutting pits demonstrating repeated use and reuse of the site in the 15th to 17th centuries. The pits had internal and external drains and the site was partly palisaded (Clough and Turner 1998). At R11/1935 lines of postholes were interpreted as a windbreaks for a cooking area and a possible house. Charcoal here and at R11/943 indicated that bracken and shrub species were dominant, with some remnant pūriri, while microfossil analysis showed that kūmara had been gardened (Bacquié et al. 2007). The Cryers Road site, R11/1519, was located on the Matanginui / Green Mount stone field. Evidence of houses and gardening was found and radiocarbon dates indicated a long period, probably intermittent, of occupation from the mid-15th century into the early historic period (Fredericksen and Visser 1989).

Several other small-scale mitigation excavations have taken place in the Tāmaki River / Ōtāhuhu area which give similar results to the excavations already described; R11/2850 (Plowman 2012); R11/2897, from which 23 radiocarbon dates indicated occupation from AD 1650–1710 (Felgate and Opus 2014); R11/2880, which included two burials, and R11/2881, which included scattered kōiwi (Felgate and Opus 2014); R11/2882, which gave an early 15th century date and contained artefacts in an early period style (Phillips 2014); and R11/2758 (Felgate and Foster 2013).

### *Local settlement pattern and economy*

The lava field and area surrounding Te Apunga o Tainui was largely developed prior to the advent of archaeological site recording, so it is difficult to reconstruct settlement patterns. However, better recorded settlement patterns from similar environments can be projected onto Ōtāhuhu in conjunction with the results of the investigations described above.

The settlement pattern in the Tāmaki River / Ōtāhuhu area seems to have centred of undefended sites, possibly occupied seasonally, where gardening, stone working, cooking and other domestic and utilitarian activities were carried out, while also being part of the larger political units focused on the pā at Ōtāhuhu, Te Apunga o Tainui and Maungarei. Gardens were located along river edges and throughout the lava field, which was at this time lightly forested. Defended flatland sites indicate a degree of control of the Tāmaki River, though this control may have ebbed and flowed with the political fortunes of the inhabitants. Those wishing to use the portages would have to have sought permission from those living in the area, travelling up the defended Tāmaki River and across the defended Ōtāhuhu isthmus. The flatland and volcanic cone pā were strategic as much as defensive pā, controlling the portage route and providing a very visible focus for the groups living there.

Middens are dominated by tuangi (*Austrovenus stutchburyi*) along with pipi (*Paphies australis*) and mudsnail (*Amphibola crenata*), all of which are local harbour species. Snapper is the dominant fish taxon. The local volcanic soils would have been exploited for kūmara gardening, as the storage pits on Te Apunga o Tainui show (Figures 3–5) and gardening would have been the central focus of the economy.

## History

The earliest historic account of Te Apunga o Tainui comes from oral traditions surrounding the arrival of the *Tainui* waka at the Ōtāhuhu portage and its movement over the portage to the Manukau (Sullivan 1986:6). Sullivan (1986: 5) gives the translation of Te Apunga o Tainui as “the landing place of Tainui”, while Hayward et al. (2011: 184) translate it as “The bow wave or prow of the Tainui”. Sullivan (1986: 6) suggests that, based on genealogical evidence and chronologies, the arrival of the waka and the naming of Te Apunga o Tainui may have occurred sometime in the 14th century.

### *The portage*

One important aspect of the historic traditions regarding the area around Te Apunga o Tainui is its direct association with the portages in the region. Immediately to the south and following the course of today’s Portage Road was the Ōtāhuhu Portage. At about 1 km long this was the shortest portage between the Tāmaki River and the Manukau Harbour, or the east and west coasts of the North Island (Sullivan 1986: 12; Furey 1986: 3). Several other portages between the Tāmaki and Manukau were also located in the surrounding area. The Karetu portage was located north of Te Apunga o Tainui near Hamlin’s Hill, while the Pūkaki portage was located further south (Sullivan 1986). Many of the archaeological and historic texts consulted in the writing of this report make mention of the relationship of such important portages to the location of sites in the region and also the impact this may have had on the lifestyles of people living in the region (Sullivan 1986; Foster and Sewell 1993; Howard 1998; Sedal 1982). Historic traditions also state that the portages were occasionally used in times of war to move war fleets into the Manukau (Sullivan 1986: 16). In such times the pā would have been used as places of retreat (Furey 1986: 22).

### *The Fairburn purchase*

Other than the story of its naming, Te Apunga o Tainui is largely unmentioned in historic or oral traditions until 1836 when Reverend Fairburn purchased 84,000 acres (340 km<sup>2</sup>) of land in the south and east of Auckland, including Ōtāhuhu, from Māori. This purchase was instigated by Henry Williams as part of peace-making efforts between Ngāti Pāoa and Waikato. At the time the area of the purchase, including Ōtāhuhu where the hui to negotiate the purchase took place, was a no-man’s land deserted due to the conflict – Williams thought it deserted because it was being fought over and so proposed the purchase so that the Church Missionary Society could hold it in trust as a buffer. The Deed of Purchase was signed by 32 chiefs of Ngāti Pāoa and Waikato, though Te Ākitai, Ngāi Tai, Ngāti Whātua and other Hauraki tribes also had legitimate claims to parts of the Fairburn Purchase, a fact recognised by later payments made by Fairburn. The Fairburn Purchase was disallowed by the Crown Commissioners in 1841, although Governor Fitzroy, believing this purchase to be a ‘special case’ allowed Fairburn a grant of 5500 acres (2226 ha) including Ōtāhuhu. This was reduced by Governor Grey in 1847 to 2560 acres (1036 ha) but, as the Crown soon after purchased Ōtāhuhu to establish the Fencible settlement, Fairburn (by this time a private settler) made a nice profit (Sedal 1982; Sullivan 1986; Stone 2001: 161–169).

Sometime prior to the 1860s Te Apunga o Tainui was renamed by Pākeha settling in the region as Road Hill (Howard 1998).

### 1860s military landscape

The next major chapter in the use of the land immediately surrounding Te Apunga o Tainui was its use as the site of one of the largest military encampments in New Zealand during the Land Wars. In late 1859 the British government acquired the land north of the fencible settlement at Ōtāhuhu and south of Te Apunga o Tainui (Lennard 1986). This parcel of land later called Camp Farm, and accessed by Camp Road, was transformed into one of the primary military camps for the Imperial forces at Auckland. Several sources (Howard 1998; Lennard 1986; Sedal 1982; Reed 1955) speculate that most of the 10,000 Imperial troops involved in the Land Wars of the 1860s would have spent some time at Ōtāhuhu in this camp. Along with the construction of the camp, a stockade and blockhouse were also erected at Ōtāhuhu by 28 July 1860 (Lennard 1986). These structures were located on the canal reserve, a section of land immediately south of Ōtāhuhu / Mt Richmond between today's Hokonui and Hauiti Roads (a road running through this land and was originally called Stockade Road (Howard 1998; Lennard 1986). Details regarding the construction of these buildings have survived, notably that they were constructed of kauri timber and corrugated iron with an initial estimated cost of £490 (Lennard 1986: 214).

Photos and paintings of the camp (Figures 6–9) reveal tent lines and rows of hutments (a collection of huts) up to the base of the maunga, but no large fortifications in the camp or defensive trench lines. Local histories confirm that in the camp were tents, barrack hutments, a large mess tent and a military hospital all constructed by local builder W. Philcox (Howard 1998; Lennard 1986; Sedal 1982). Accounts from the period suggest that the camp was unpleasant and not well looked after, the hutments having mud floors and sleeping twenty-four (Reed 1955; Lennard 1986). G. Tattler (quoted in Lennard 1986) of the 65th regiment wrote: “They are miserable huts. We have to lie on boards with three blankets, no bed and the huts are not lined. We have been here a month now and a wet dirty place it is.” The tent lines are clearly visible in the 1940 aerial photograph (Figure 3) as two parallel lines crossing the south of the maunga – the larger marks in the northern line are probably hutment sites. This agrees well with the evidence from Cooper's painting (Figure 6) (this painting is labelled “Military encampment at Mount Richmond” and the topography depicted is Ōtāhuhu / Mt Richmond from the south, with Maungarei / Mt Wellington in the background. However, the tent lines were on Te Apunga o Tainui, not Ōtāhuhu / Mt Richmond, so Cooper has taken some licence with his depiction). After the end of the Land Wars the camp became superfluous and in 1866 the troops were withdrawn from Ōtāhuhu. In October 1866 the land on which the barracks was located was put up for sale (Howard 1998).

### The internment of Ihaka and his party

Ihaka Takaanini was the leading chief of Te Ākitai Waiohua at the beginning of the Waikato War. He was described at the time of being large in stature, with the Premier, William Fox, who met him in 1861, describing him as “a man of great natural humour, and much courtesy of manner, and held a high position among the tribes connected with Waikato” (*AJHR*, 1864(I): 51). Ihaka was known to the settlers as “old Isaac.” Before the war he was considered a great friend of the Pākehā (*Auckland Star*, 14 November 1928: 6). In August 1858 he was appointed as an Assessor, an official government position which he held over the next four years (*AJHR*, 1862(I); *Daily Southern Cross*, 31 August 1858: 3).

Ihaka was also a supporter of Kingitanga. He tried to balance this support with his ongoing commitment to Pākehā settlers. As war in Taranaki broke out, it became more difficult to maintain this balance. Nevertheless, at a hui in Waikato in May 1860 he is recorded speaking in favour of “peace and amity with the white men” (*Otago Witness*, 23 June 1860:



Figure 6. Military encampment at Mount Richmond, watercolour by G.H. Cooper. The tent lines indicate that this is more likely to be Te Apunga o Tainui. The tent lines can be seen south of the maunga in Figures 3 and 4. (Auckland Art Gallery Toi o Tāmaki, 1993/15/).



Figure 7. 12th and 40th Mess tents Otahuhu. N.Z.  
(Urquhart Album, Alexander Turnbull Library, PA1-q-250-23).





*Figure 8. Military camp for Imperial forces at Otahuhu (Urquhart Album, Alexander Turnbull Library, PA1-q-250-28).*



*Figure 9. Camp for Imperial forces at Otahuhu, Auckland (Urquhart Album, Alexander Turnbull Library, PA1-q-250-22).*

6). When an incident occurred in Patumahoe which almost resulted in the killing of several government officials and local settlers, Ihaka is credited with soothing the angry feelings of others and averting calamity (*AJHR*, 1864(I): 51).

Despite this, Ihaka could not keep ahead of the events surrounding the invasion of the Waikato by Government troops which occurred in mid-1863. Having made the decision to launch the invasion, Governor Grey required that all Māori who lived north of the Waikato River swear an oath of allegiance and surrender all their guns and ammunition if they wished to stay at their villages in Manukau and Tāmaki. If they did not, they had to leave their homes and travel south of the Mangatāwhiri into the Wāikato (Sewell 1864: 28). On 9 July 1863 Resident Magistrates were dispersed from Auckland to inform local Māori of the choice they had to make.

At this time Ihaka and several of his people, believing that the Governor's proclamation was simply an order to leave their homes, had left their kāinga at Pūkaki and travelled south until they reached another of their kāinga at Kirikiri near Drury. As there were old people, sick people and women and children among the party, they rested at Kirikiri. On 12 July, the Government troops crossed the Mangatāwhiri River, located many miles to the south of Kirikiri. The Waikato War had begun and Ihaka and his people were behind the front lines.

The presence of Te Ākitai at Kirikiri soon led to rumours that a group of Māori were gathered there preparing to take a stand. The Native Minister Francis Dillon Bell travelled out from Auckland to find out what was happening at Kirikiri. On 14 July, he met Ihaka who was very ill, along with six elderly men and a few women and children. Fellow chief Mohi Te Ahi a Te Ngu and several young warriors arrived. Bell explained that the proclamation had not necessarily meant eviction. He promised that if oaths of allegiance were signed, any persons doing so could return to Pūkaki. Mohi explained that all the people may have considered signing the oath if it had meant they could remain in peace at their homes, but that now the war had begun it was too late. He would therefore lead his warriors south into Waikato: "The Pakehas had attacked Waikato. And he should therefore go to join his people, and live or die with them." The possibility remained open, however, that for those too ill, old or vulnerable to make their way through the government's military lines, that they might return home. When Dillon Bell and his officials left Kirikiri and returned to Auckland, several of those present believed he would return the following day. Ihaka and Mohi discussed matters and it was agreed that Ihaka would lead a party of the old and the women and children back home to Pūkaki while Mohi and his warriors would go south. Ihaka had determined, therefore, that when Dillon Bell returned, he would sign the oath of allegiance for the good of his people (Gorst 1959: 248; Sewell 1864: 33; *New Zealand Herald*, 26 April 1865: 6; *Daily Southern Cross*, 25 April 1865: 5).

Dillon Bell did not return. Instead, on 15 July 1863 Governor Grey ordered cavalry and soldiers out from Ōtāhuhu camp under Colonel Murray and the following day they arrested Ihaka, and 22 others including Ihaka's father Pepene, his wife Riria, children and cousins at Kirikiri (*Daily Southern Cross*, 1 August 1863: 7). Two government officials later recorded that there had been no reason for the arrests. Native Department official James Falloon, an eyewitness to events, later noted: "During my three days that I had constant communication with Ihaka I never understood him to refuse to take the Oath or [refuse to] deliver up his arms" (*New Zealand Herald*, 26 April 1865: 6). He added that he was waiting for Dillon Bell's return. John Gorst, a Resident Magistrate travelling with the Native Minister and therefore eyewitness to events, added his view: "On whatever ground Ihaka and the innocent women and children were taken, their capture, just after safe conduct had been promised to them by a high officer of Government, had the unfortunate appearance of a gross breach of faith" (Gorst 1959: 250).

Once arrested, Ihaka and his people were taken to the stockade in Drury, and were moved to Ōtāhuhu on 20 July, travelling in the company of Bishop Selwyn, who ensured the prisoners were not ill-treated. On arrival the Bishop, military escort and prisoners passed the Criterion Hotel where they were confronted by an angry crowd. The Bishop is reported to have addressed the people gathered there as to the injustice of the arrest of Ihaka and his group (*Daily Southern Cross* 22 July 1863: 3). The response of the crowd is reported to have been less than pleasant and the exchange became heated to the point where the militia was forced to intervene and the prisoners are reported to have been sent to the stockade south of Ōtāhuhu / Mt Richmond (*Daily Southern Cross*, 22 July 1863: 3; Pittman 1952). On 24 July a letter to the editor published in the *Daily Southern Cross* reports that they are under guard by volunteers in a house in the “unentrenched camp” at Ōtāhuhu and that Ihaka was requesting to be moved into Auckland (*Daily Southern Cross* 24 July 1863: 4). Shortly after this, it was reported that the prisoners have been allowed to receive visitors, possibly due to the influence of Bishop Selwyn (*Daily Southern Cross*, 25 July 1863: 3).

By 24 July, despite Ihaka’s recorded request to be moved into Auckland, the prisoners were moved into the Ōtāhuhu camp where they occupied one of the huts under guard (*Daily Southern Cross*, 24 July 1863: 4).

Once in the camp, it appears that life in the first week of captivity may have been eased in several respects. Initial conditions at Ōtāhuhu appear to have been good. It was recorded that on the arrival the prisoners were given a hot supper and new bedding while, it was pointed out, the soldiers at the camp had not much to eat and shivered under just one blanket (*Daily Southern Cross*, 22 July 1863: 3). John Featon (1879: 23) recorded that four horses which were taken from Kirikiri along with the prisoners were sold for £20 each and the proceeds were given to Ihaka and his people “to the astonishment of everyone.” He also noted that this action caused a measure of resentment from those who were guarding the prisoners: “they [the prisoners] also were allowed far better rations than the troops, who not unnaturally grumbled considerably.” Another account also refers to the foods eaten by the prisoners as being better than prison fare and the guards’ own rations (*Daily Southern Cross*, 24 July 1863: 4). The prisoners were initially allowed to receive visitors (*Daily Southern Cross*, 25 July 1863: 2). Along with the Bishop, there were other Pākehā who objected to the arrest and internment of Ihaka and his people as historian James Cowan later recorded: “Pakeha neighbours protested that he had always been a friend of the whites, and urged his release” (*Auckland Star*, 14 November 1936: 2).

Clearly this treatment of the prisoners was short lived. Later reports recorded how the diet of the prisoners affected their health indicating, presumably, that somewhere along the way they were put on prison rations (*Daily Southern Cross*, 5 October 1863: 3). The camp was a damp and muddy place. Aside from dealing with these environmental conditions, the treatment that the prisoners received was later described by Minister of Defence William Fox as being “of a very stringent character.” By way of example he noted having heard “not even the women being allowed to leave the hut without a sentry standing over them while they performed those offices which even men perform in secret” (*AJHR*, 1864(I): 51).

After a month in the camp, several instances of serious ill-health were recorded among the prisoners. On 25 August 1863 the Camp’s Commanding Officer, Colonel George Carey, wrote to the Colonial Secretary to inform him that one of the female prisoners was of “unsound mind” and requesting instructions on how to handle the matter. Two days later, the Colonial Secretary responded noting that if two doctors could prove the woman’s ill-health before a Justice of the Peace, she would be committed to the Lunatic Asylum (27 August 1863, Seed to Carey, ACGO 8336 IA 4/244, 1863/249, ANZ-W). By 8 September, the unnamed woman had been committed “for safer keeping and treatment” (*Daily Southern Cross*, 8 September 1863: 2).

On 31 August 1863 the Native Secretary wrote to the Commanding Officer of the camp noting that it had been reported, apparently not from the camp, that two of the Māori prisoners were ill. The identity or sex of the two who were ill is not recorded. Nevertheless, the Colonial Secretary informed the Commanding Officer that the Governor had directed that the two sick prisoners were to be sent into Auckland to the Colonial Hospital “at once” (31 August 1863, Shortland to Officer Commanding Ōtāhuhu Garrison, ACIH 16039 MA 4/6, Micro No.6543, Letter No.287, ANZ-W). Nothing further has been located about the fate of these two prisoners.

On 7 September 1863, George Will, the Staff Assistant Surgeon of Ōtāhuhu Camp, informed the Camp Adjutant that Pepene Te Tihi, Ihaka’s father, was suffering from an attack of bronchitis. The illness was sufficiently severe for Dr Will to request that the chief be removed to the Colonial Hospital in Auckland for treatment (7 September 1863, Carey to the Governor’s Private Secretary, ACHK 16569 G 13/2, Letter No.74, ANZ-W). There is no indication whether this occurred or not, but the Governor was informed by the Camp’s Commanding Officer of this event.

Pepene did not recover and died on 20 September in the camp. Colonel Carey informed the Governor of the death. He noted that the family of chief had requested that he be buried in the urupā at Pūkaki, and that a means of transport would be required. He therefore sought instructions on the matter be sent “with as little delay as possible.” In the meantime, funeral arrangements for Pepene were being made (20 September 1863, Carey to the Governor’s Private Secretary, ACHK 16569 G 13/2, Letter No.78, ANZ-W). A response to this request for instructions has not been located by research conducted to date. If the family’s wishes were adhered to, the remains of Pepene lie at Pūkaki but this has not been able to be confirmed. Two of Ihaka’s own children also died during the imprisonment at Ōtāhuhu (*AJHR*, 1864(I): 51).

Clearly these cases of severe illness and death were significant enough for the officials to record. The likelihood is, however, that given the conditions in the camp, sickness would have been prevalent among the prisoners. This certainly is indicated by a newspaper report that described all prisoners as “far from being healthy” and Ihaka as being in a very weak state and possibly dying. The widespread illness was put down to the state of confinement and the diet on which the prisoners had to exist (*Daily Southern Cross*, 5 October 1863: 3).

The effect of the deaths which had occurred on the other prisoners can only be imagined. As late as the beginning of November, Rogan reported that Ihaka felt “very much the loss of his father and two children” (*AJHR*, 1864(I)). These deaths also brought spiritual impacts as it appears that initially there was no catering for the customary sensibilities of those who still lived. This is shown in a telegram sent to the Native Minister on 30 October 1863 from Lieutenant Colonel Haultain, the Commander of the 2nd Waikato Regiment. Haultain recorded that the Maori prisoners were “very anxious to be allowed to change their hut as two of their number have died in present one.” Without necessarily realising it, Haultain was recording the prisoners’ view that tapu was being breached by their continuing to stay in the hut. Haultain expressed his view that he thought it was “desirable” to accommodate the request but that the Barrack Master, a Mr. Hawley, “throws difficulties in the way.” This led Haultain to telegraph the Native Minister expressing again his view that he saw “no objection at all” (30 October 1863, Haultain to Native Minister, AAYS 8640 AD 3/1, 1863/1429, ANZ-W). Haultain’s action gained the desired result as a minute scrawled on the telegram by a Native Department official recorded “This has been done” referring, presumably, to the transfer of the prisoners to another hut.

Although Haultain had achieved a good result for the prisoners, the spiritual and cultural damage had been done. Presumably, Pepene was one of the two deaths referred to. If this was the case, he had died more than a month previous to Haultain’s telegram having been

sent. The prisoners had lived with this breach of tikanga for all this time which was clearly exacerbated when the second unidentified person had died.

As the conditions in the camp remained bad and the health of the prisoners deteriorated, consideration was being given in Government circles as to how matters around the prisoners should be handled. Although arrested and detained, neither Ihaka or any of his party had been charged or given a hearing or even an arrest warrant. The Government needed to find a solution. This need probably increased as word of the illness and deaths began to spread.

It appears one early suggestion that may have been canvassed was escorting Ihaka and his people out of the Auckland area. There is little available information on this other than a single brief entry in a correspondence register of the Native Department. This records that the Native Department official Rogan wrote to the Native Secretary on 1 September 1863 “Relative to the removal of prisoners Ihaka Takaanini to Waikato” (1 Sept 1863, Rogan to Native Secretary, ACIH 16039 MA 2/5, 1863/1284, ANZ-W). As Native Department correspondence from 1840 to 1908 was destroyed in a historic fire, the actual letter is not extant but the register entry suggests that it was considered at one point to let Ihaka and his people join the rest of their iwi and find refuge amongst their Waikato relations.

It also appears that the possibility of placing the prisoners on Rakino Island, located in the Hauraki Gulf, was raised at this time (*AJHR*, 1864(I): 51). This possibility had been around for some time. As early as 15 July 1863, just days before Ihaka and his people were arrested, the Superintendent of Auckland wrote to the Colonial Secretary suggesting that any ‘friendly’ Māori who had taken the oath of allegiance and then found themselves behind the front lines, might pose a security risk and leak information to the rebels despite their profession of loyalty. The Superintendent suggested that Rakino, privately owned by Governor Grey, might be a ‘suitable’ location to place such Māori (15 July 1863, Graham to Colonial Secretary, ACGO 8335 IA 3/1/18, 1863/1957, ANZ-W). However, the government first sought to explore the possibility of charging Ihaka with a crime. During September 1863 the opinion of the Attorney General was twice sought as to whether it was possible to secure a successful prosecution against the chief. On both occasions the Attorney General expressed his view that a prosecution was unlikely to eventuate or succeed (*AJHR*, 1864(E)). In the aftermath of this result, it appears that the prisoners were somewhat forgotten about in the context of a General Election taking place. This particular General Election was of significance as from the time that the new government came into power, it would have responsibility for native affairs taking this over from the Governor.

While these events occurred on the national scene, the prisoners languished. Aside from the 30 October request to move huts, little further is recorded of their experiences. The only other evidence found for October in relation to Ihaka and his people comes from the correspondence registers of the Native Department. Several entries of letters received are noted but, as indicated above, the letters are not available having been destroyed by fire.

One register entry is again from departmental official John Rogan on 3 October 1863 when he reported on his visit to Ihaka in the camp (3 Oct 1863, Rogan to Native Secretary, ACIH 16039 MA 2/5, 1863/1680A, ANZ-W). A second entry comes from the end of the month when the Ōtāhuhu Camp Adjutant forwarded to the department two “Native letters” (presumably letters in te reo) written by Ihaka. The subject of these letters is not recorded.

In the meantime, a new Government had taken office. The plight of the prisoners was again considered. The decision was made to release them from Ōtāhuhu and take them to Rakino. One final Native Department register entry reflects one aspect of the preparations being made for the transfer. The register records a 21 November letter from builders Harvey and Gilbert noting: “Will build a house at Rakino for Ihaka for £50” (21 Nov 1863, Harvey and Gilbert to Native Secretary, ACIH 16039 MA 2/5, 1863/1767, ANZ-W). A return letter from the Native Secretary to Harvey and Gilbert on 23 November 1863 informed the builders

that their tender to build the house had been accepted (23 Nov 1863, Shortland to Harvey & Gilbert, ACIH 16039 MA 4/6, Micro No.6543, Letter No.363, ANZ-W). Nothing further is recorded in relation to the building of this house.

It appears that an exact date and time can be assigned for when the prisoners left Ōtāhuhu camp: 10 am on 26 November 1863. On the previous day, the Commanding Officer at Ōtāhuhu was informed of the date and time and asked to keep the prisoners in safe custody until then (25 November 1863, Russell to Officer Commanding Ōtāhuhu Garrison, AAYS 8640 AD 3/1, 1863/1655). On 27 November Rogan was sent out to Rakino. Presumably he was sent to see how Ihaka and his people had settled in. He was not to stay there long, however, as the captain taking him to the island was told not to wait on the island any longer than six hours (27 November 1863, Russell to Captain Chamberlain, AAYS 8640 AD 3/1, 1863/1680, ANZ-W). Nothing further is recorded in relation to the settling in of Ihaka and his people on the Island. Their experience on Rakino was not to be a happy one, however, as Ihaka died there. Although long recorded as being ill, commentators ascribed his death to being down to more than physical causes. On 18 January 1864, the *New Zealand Herald* reported of the death of Ihaka Takaanini noting that “...confinement and the loss of caste, which imprisonment entails on a Maori chief, so preyed upon him that he has, it appears, sunk under it” (*New Zealand Herald*, 18 January 1864: 3). The historian James Cowan agreed noting that while imprisoned Ihaka was “always grieving for his tribe and his home of the happy days before the war... The Maoris say he died of grief and love for the people – ‘aroha ki te iwi’” (*Auckland Star*, 14 November 1936: 2).

### 20th century

Sometime later Road Hill was renamed McLennan’s Hill, after Ewen Donald McLennan (1861–1948), a local farmer who owned the land and was an MP for the Reform Party from 1925, when he won the Franklin by-election following the death of Prime Minister William Massey, until his retirement in 1928 (Scholfield 1950: 124; Fowlds 1967; Howard 1998).

Later uses for the maunga included commercial wells (Hellaby’s and Thompson’s wells) in the crater (Howard 1998). Around 1910 South Canterbury Meats put a well through the basalt after a first well through the scoria 6 or so metres away had found no water. At one stage five abattoirs in Ōtāhuhu used up to 1,000,000 gallons (3750 m<sup>3</sup>) of water per day – the last abattoir closed in 1985 (Graham Windross pers. comm. 10 February 2014).

### Quarrying and destruction

Eventually Te Apunga o Tainui, like many other maunga in Tāmaki, was used as a quarry. Initially a small quarry was operated by Walter McAnulty mining the northern face of the cone off Panama Road (visible towards the top of Figure 3) (Howard 1998). Ivan Whale bought the properties in the mid-late 1940s and quarrying was expanded from the 1950s (Howard 1998; Hayward et al. 2011). More than 2 million tonnes of scoria were removed in the period to the 1970s when the quarry closed (Hayward et al. 2011: 185) (Figure 10). Much of the quarried material was used as fill for the Southern Motorway.

### Zealandia Nurseries

Zealandia Nurseries (at the time Mt Wellington Nurseries) bought the properties in 1985. It was at this time that the pōhutukawa surrounding much of the site were planted. Ivan Whale Ltd had left the central basalt core of the cone untouched and Zealandia drilled and



Figure 10. Oblique aerial view of Te Apunga o Tainui in 1955, mid-quarrying (Whites Aviation Ltd. WA-39922-F, Alexander Turnbull Library).

dynamited this, removing around 10,000 m<sup>3</sup> of basalt, much of which was used as fill to level the quarry. By 1989 about 8 ha had been levelled and paved with concrete pads, the sheds and greenhouses had been built and the nursery was fully established. Zealandia capped the 1910 well and put in another from which they drew up to a maximum of 200 m<sup>3</sup> per day for their operation. The well was constantly replenished and the water remained potable. In 2013 the properties were purchased by Panama Road Developments Ltd and Zealandia progressively moved to a new site in Alfriston as development progressed (Graham Windross, managing director of Zealandia Nurseries, pers. comm. 10 February 2014).

## Summary of assessment

As so little of the pā at Te Apunga o Tainui remains following quarrying, field survey formed only a small part of the assessment. The larger development site was assessed by Matthew Campbell and Callan Ross-Shepherd on 5 June 2013. Around the edges of much of the quarry the ground level is now up to 10 m below the original (Figure 12), but this is on the lower slopes of Te Apunga o Tainui and obviously much further below the former high points of the maunga.

11 Ryburn Road was identified as probably containing original ground, although this surface has been altered and there was no visible evidence of pre-European Māori occupation (Figure 13).

In addition to Ryburn Road, three other possible areas were identified where original ground and archaeological features might survive: the south east corner of the development area; 98 and 100 Hillside Road; and the north east corner of the development area. As Figure 14, which is georeferenced to about a  $\pm 5$  m accuracy, shows some of these areas are close to terraces and pits but are not on them.

For the shotcrete wall installation, the top of the intact surface above the batter was assessed by Matthew Campbell on 24 May 2019. This is a narrow strip between 1 and 2 m wide in the northwest corner of Lot 1 DP 194641 (Figure 15). Occasional shell was visible on the surface (Figure 16) and it was expected that archaeological features, if present, would survive beneath the ground surface.

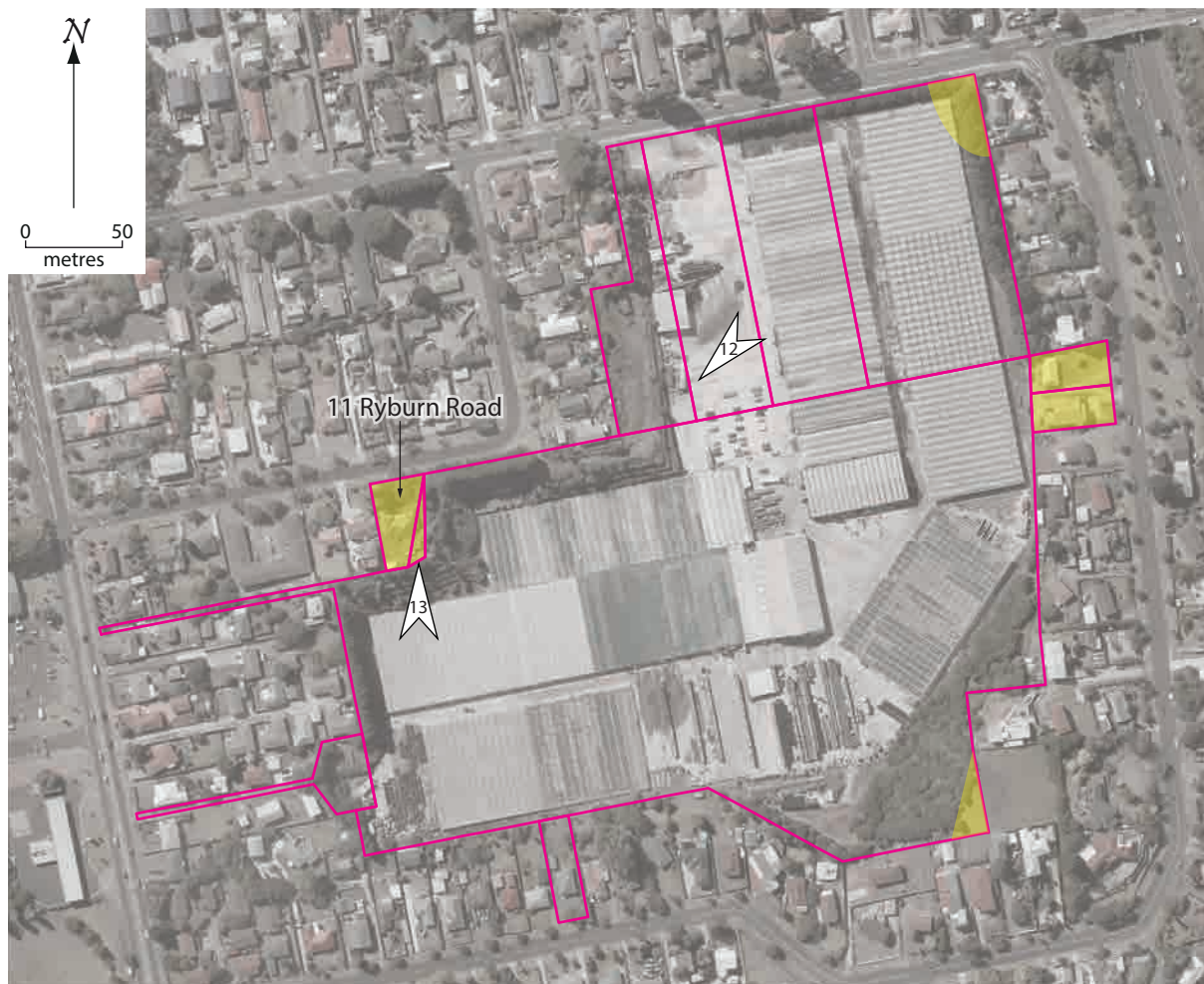


Figure 11. Pre-development aerial photograph of Te Apunga o Tainui showing the Zelandia nursery complex and possible surviving original ground surfaces. Photograph locations are labelled.

## Richmond Development 2014

During the original development, 100 Hillside Road was considered to be the most likely place where original ground would remain (Campbell and Ross-Shepherd 2013). Under authority HPA 2014/1080, five test pits were excavated in the front lawn of 100 Hillside Road on 18 July 2014 by Matthew Campbell of CFG Heritage and Nigel Denny of Te Ākitai Waiohūa to determine the likelihood of archaeology remaining in situ (Figure 17).

- Test Pit 1 Test Pit 1 was dug through 700 mm of mixed, brown, volcanic loam fill containing scoria stones of various sizes, occasional small lumps of clay, broken salt-glazed drainage pipe and very occasional flakes of shell. At 700 mm a piece of heavy wire prevented further digging.
- Test Pit 2 Test Pit 2 was dug through a similar fill to Test Pit 1 to a depth of 500 mm
- Test Pit 3 Test Pit 3 was shifted about 1.5 m uphill from the original intended location to avoid a monitoring well. It was dug through the same general fill to 600 mm, where a piece of canvas or tarpaulin was found.
- Test Pit 4 Test Pit 4 was dug through 200 mm of the same fill when it came down on solid, dark scoria that is presumably the original surface, or the quarry surface.
- Test Pit 5 Test Pit 5 was the same as Test Pit 4, encountering the scoria at 550 mm.





*Figure 12. Terraced inner face of the quarry in 2013.*



*Figure 13. Back yard of the house at 11 Ryburn Road in 2013.*



Figure 14. The development area overlain on the 1940 aerial photo and potential surviving original surfaces highlighted (detail of SN139 E/9, NZ Aerial Mapping).

It was evident that the front yard of 100 Hillside Road was covered over with fill to a depth of between 200 and 700 mm. Test Pits 4 and 5 indicated that the area had been quarried and it is unlikely that any original ground surface remained on the property.

Earthworks at 100 Hillside Road were monitored on 22–23 September 2014 by Arden Cruickshank of CFG Heritage. All material encountered was fill.

Earthworks in the northeast corner were monitored by Arden Cruickshank on 16 January 2015. This found only fill to a depth of 2 m. This fill included asbestos indicating that it is modern – it is probably a result of filling operations to level the floor of the abandoned quarry to establish the Zealandia nursery.

On 8 December 2014 further shell midden was found near the quarry rim at the western boundary of Pt Lot 52 DP 10490 but the shell appeared to be modern and it also contained modern material, including plastic. A sample was taken but not analysed.



Figure 15. Top of the batter in the Lot 1 DP 194641 in 2019, showing recently cleared conifers.



Figure 16. Sparse redeposited shell on the slope below the conifers.

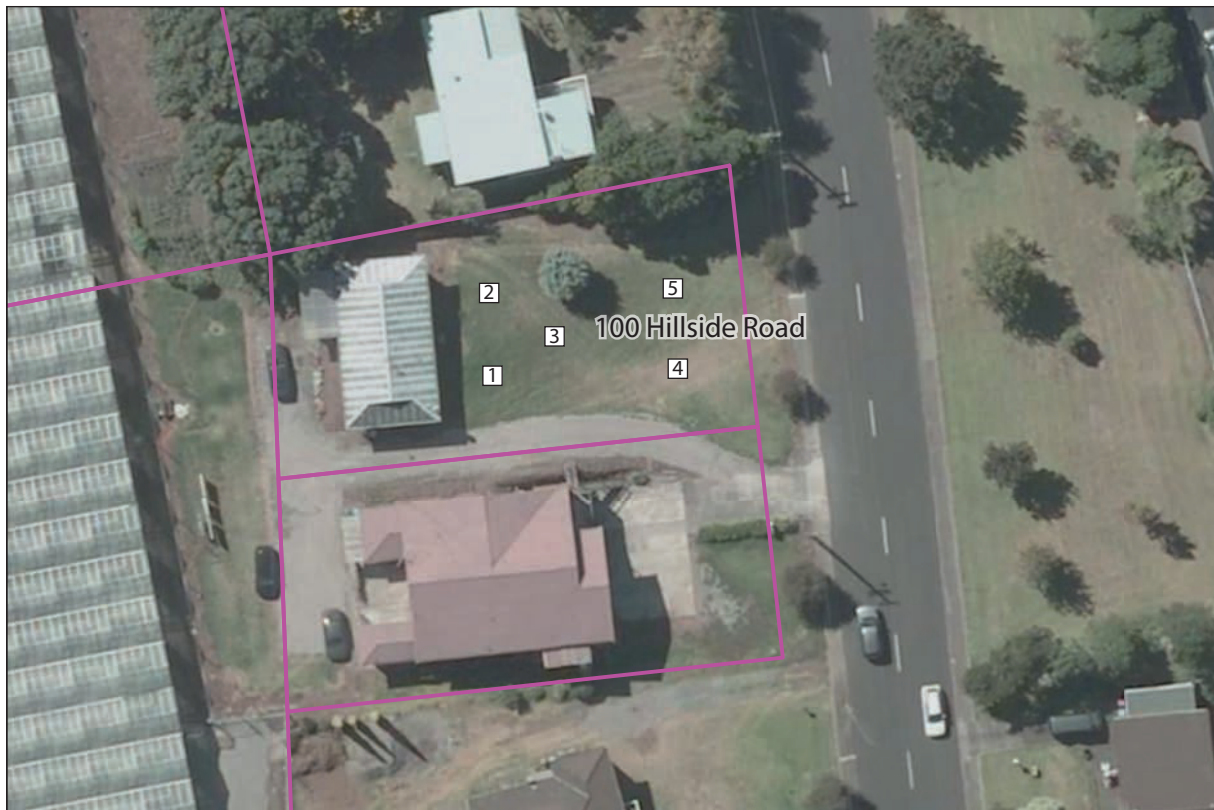


Figure 17. Locations of Test Pits at 100 Hillside Road.

## Archaeological investigation

The investigation area was divided into three parts to coordinate with the earthworks scheduling: Area 1 encompassed the southern portion of 11 Ryburn Road between the house foundations and the batter slope; Area 2 comprised the eastern side of 11 Ryburn Road; and Area 3 covered the strip of land between the southern boundaries of the properties at 7 and 9 Ryburn Road and the eastern-facing rear boundary of 602 Mt Wellington Highway (Figure 18).

### Area 1

Prior to investigation much of Area 1 had been stripped of vegetation while removing the house. Undisturbed ground at the southern margins of the area indicated that the remaining topsoil was thin, around 100–200 mm, over sterile yellow clay, which probably represented the cut surface of the slope from quarrying. Six features were identified while monitoring topsoil removal (Features 1–6). All were located along the southern boundary near the fence, towards the edge of the quarry face, an area that had probably been less disturbed during house construction (Figure 19).

Feature 1 is a small shell midden deposit measuring 380 x 300 mm x 160 mm deep, consisting almost entirely of whole pipi (*Paphies australis*) with smaller amounts of other species (Table 9). The midden originates and terminates in the topsoil indicating it was deposited after the slope had been contoured. No traditional or modern artefacts were identified, making it uncertain whether it represents recent disposal of kitchen midden or redeposited pre-European midden (Figure 20).



Figure 18. Extent of archaeological investigation at Ryburn Road showing the division of the site.



Figure 19. Locations of Features 1 to 6 and the two stone artefacts (Samples 80 and 81).

Feature 2 was larger in extent than Feature 1, measuring 480 x 460 mm x 70 mm deep, but its contents were less concentrated (Figure 21). It consisted of highly fragmented shell. This feature was truncated on its southern side, probably by the boundary fence footing. The presence of broken window glass among the shell indicates that it has either been disturbed or was deposited recently. No traditional artefacts were recovered from this feature.

Feature 3 was a distinct deposit consisting solely of snapper bone (tāmure, *Chrysophrys auratus*), adjacent to Feature 2. This small feature, measuring 200 x 200 mm x 100 mm deep, probably represented the disposal of a single large fish.

Feature 4 was a deposit of highly fragmented mussel shell (Mytilidae), measuring 470 x 450 mm x 70 mm deep, disturbed by roots. Its base was sitting in the topsoil and the presence of an iron nut and bolt indicates it was most probably deposited in the historic period (Figure 22).

Feature 5 was a roughly circular, bowl shaped feature, measuring 1100 x 750 mm x 120 mm deep, located just beyond the southern boundary fence footing of the property. It consisted of charcoal-stained soil with a small amount of fragmented shell. The feature was half-sectioned and found to be sitting in the topsoil (Figure 23).

Feature 6 was also beyond the southern boundary fence footing. It was a straight-walled circular pit filled with broken crockery, bottles and glassware, that originated in the topsoil and was cut into the clay.



Figure 20. Feature 1, prior to excavation. Photo scale = 0.5 m, north to bottom of image.



Figure 21. Feature 2, prior to excavation. Photo scale = 0.5 m, north to bottom of image.



Figure 22. Feature 4, prior to excavation. Photo scale = 0.5 m, north to bottom of image.



Figure 23. Feature 5, excavated in half section. Photo scale = 0.5 m, north to top of image.

Table 1. Summary of features identified in Area 1.

Feature	L x W x D (mm)	Origin	Base	Contents
1	380 x 300 x 160	topsoil	topsoil	shell, charcoal
2	480 x 460 x 70	topsoil	topsoil	shell, glass
3	200 x 200 x 100	topsoil	topsoil	fish bone
4	470 x 450 x 70	topsoil	topsoil	shell, iron bolt
5	1100 x 750 x 120	topsoil	topsoil	shell, charcoal
6	300 x 260 x 550	topsoil	basal clay	broken crockery and glass

## Area 2

Topsoil removal in Area 2 revealed a roughly rectangular area of darker fill (Feature 8) adjacent to the house foundations, measuring approximately 6 x 3 m. Initially a 500 mm wide trench was excavated across the feature, which showed that it rested on the same yellow clay that surrounded it. The remnants of a small firescoop (Feature 9) were also exposed under the base of Feature 8 (Figure 25). The southern side of Feature 8 had a well-defined straight cut margin, typically 250 mm deep, while the northern and eastern sides thin out to merge with the slope of the ground. According to the digger operator, the western side of this feature was truncated by the house foundations, which had been removed just prior to the archaeological investigation (Figure 24).

The fill of Feature 8 was distinguished from the surrounding ground by charcoal staining and fragmented shell. It also contained a few traditional stone artefacts, including a complete polished adze (Sample 17), stone flakes and an unworked piece of pumice (see below). The fill also contained modern materials, such as chunks of concrete and painted wood,





Figure 24. Surface of Feature 8 facing north-east, with cut from the removal of the house foundations.



Figure 25. Trench cut through Feature 8 exposing Feature 9.

indicating some degree of post-depositional disturbance. During excavation, a drainage trench containing ceramic field tiles was uncovered at the base of the western side of Feature 8. In addition to the mixing of traditional and modern materials, this demonstrated that the fill was not in its original context but had been redeposited, possibly during the construction of the house and presumably from elsewhere on or near the site.

The firescoop (Feature 9) measured 780 x 690 mm x 250 mm deep. The eastern part was half-sectioned, revealing a red-burnt layer resting on sterile clay, indicating that the base of the feature was in-situ, although the upper portion may have been truncated by the cut of Feature 8 (Figure 26). The contents were mainly fire-cracked rock, along with some charcoal and a few fragments of degraded shell. A charcoal sample from the base of the feature was collected for radiocarbon dating.

At the base of eastern end of Feature 8 a concentration of darker fill, 940 x 710 mm x 90 mm deep, with small rocks and degraded black cloth and lace fibres, probably discarded clothing, was identified (Feature 11). The margins of this feature were indistinct and it was slumped against the same cut of Feature 8, suggesting that both fills were deposited at the same time, rather than from separate events.

Under the northeast corner of Feature 8, just to the east of the firescoop, a distinct rectangular cut, 2140 x 960 mm x 190 mm deep, was identified (Feature 12). The fill was similar to Feature 8, containing a mix of traditional and modern materials, and the interface between the fills of these features could not be distinguished clearly during excavation, indicating that both may have been deposited at the same time and from the same source (Figure 27).

Three other features were identified in the base of Feature 8: two circular features, most likely postholes (Features 10a & 10b), and an irregular depression, probably a tree root cast (Figure 28). The fills of all three features were consistent with that of Feature 8, suggesting



Figure 26. Base of Feature 9 after half-sectioning.



Figure 27. Features 8, 9 and 12 during excavation. Photo scale = 0.5 m.



Figure 28. Postholes and tree root cast in base of Feature 8. Photo scale = 0.5 m.

Table 2. Summary of features identified in Area 2.

Feature	Type	L x W x D (mm)	Origin	Base	Contents
8	cut	5910 x 2210 x 250	topsoil	basal clay	shell, charcoal, modern and pre-European Māori artefacts
9	hearth	780 x 690 x 250	Feature 8	basal clay	rock, charcoal, shell
10a	posthole	120 x 110 x 120	Feature 8	basal clay	same as Feature 8, no artefacts
10b	posthole	180 x 170 x 140	Feature 8	basal clay	same as Feature 8, no artefacts
11	fill	940 x 710 x 90	Feature 8	Feature 9	rock, charcoal, cloth fibres
12	pit	2140 x 950 x 190	Feature 8	basal clay	same as Feature 8



Figure 29. Base of excavations in Area 2.

that the posts and tree had been removed at around the same time the fill of Feature 8 was deposited. The two postholes are not obviously aligned with the cuts of either Features 8 or 12 and are relatively shallow (120–140 mm), suggesting that they likely originated when the ground level was higher and were truncated by the base cut of Feature 8.

At the conclusion of the excavations a spade-width pit was cut into the base of Feature 12 to a depth of 500 mm to ensure that no additional cultural materials lay beneath; only clean yellow clay was found.

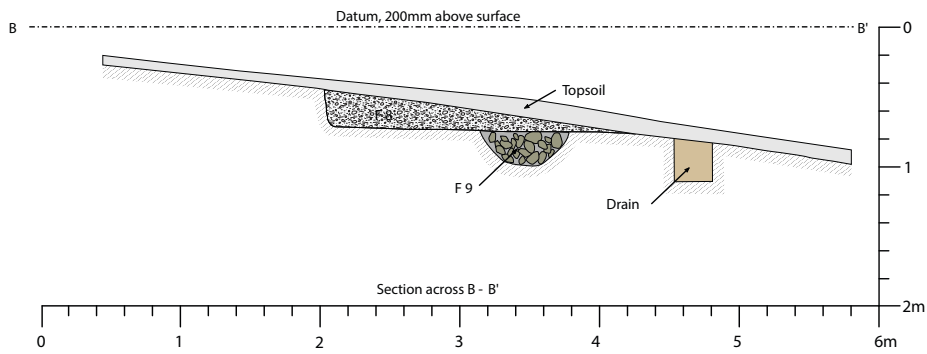
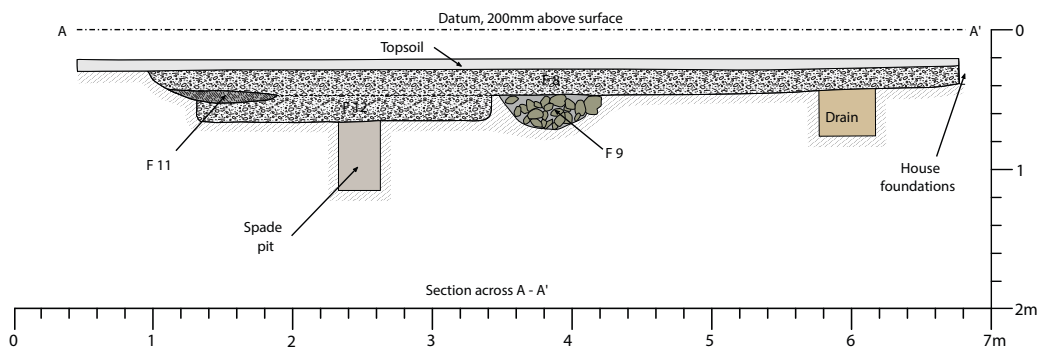
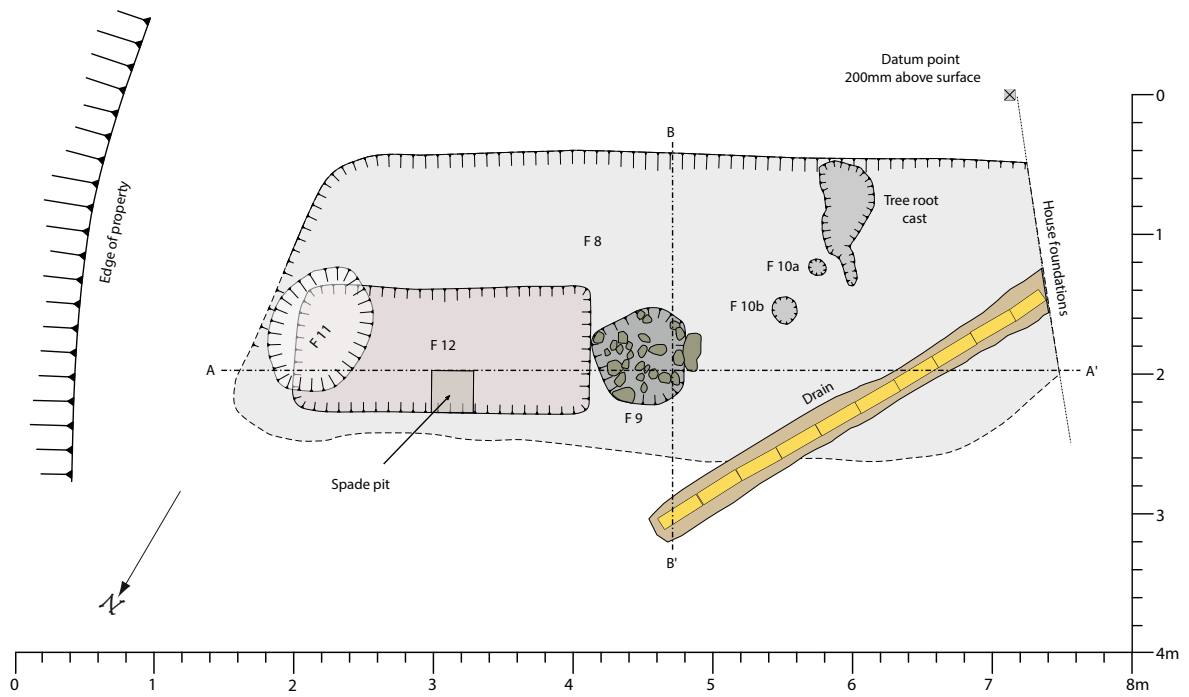


Figure 30. Plan and sections of Area 2.

### Area 3

Area 3 comprised the land between the southern boundaries of 7 and 9 Ryburn Road, the eastern boundary of 602 Mt Wellington Highway (Figure 18). At 9 Ryburn Road the earthworks extended approximately 2 metres into the property in order to level an existing retaining wall and provide the property owner a more useful space. Prior to archaeological investigation, the area had been stripped of trees and large shrubs but some low scrub and roots remained (Figure 31). The existing ground surface had been contoured by terracing cut into yellow clay. Based on aerial photos, this was probably carried out at some time after the 1950s, either during quarrying or subsequent development of the Zelandia nursery a complex (Figures 11 and 12). The cut clay face was exposed in a few areas and this indicated that a soil overburden covered much of the area, up to 800 mm thick in the eastern part but only 100–200 mm at the western end. The remnants of a disused pipe were also exposed on the surface, possibly one that was used to supply water from a bore on the maunga to the nearby Hellaby Freezing Works (Matthews & Matthews Architects 2014).

At the western margin of the area, a concentration of scattered stone flakes with some shell and charcoal was identified beneath the soil overburden (Feature 7). The margins of this feature were irregular but it extended into the sterile clay, indicating that it was probably in original context and the remnants of a stone-working floor, although its upper portion may have been truncated by the terracing the slope (Figure 32). The western margin of Feature 7 extended into 602 Mt Wellington Highway and the northern margin was truncated by the installation of the water supply pipe, indicating that its original extent was somewhat greater than that recorded. One hundred and forty-one stone artefacts, including two complete adzes (Samples 10 and 100) and a preform (Sample 11) were collected.



Figure 31. View of Area 3 facing east prior to archaeological investigation. Photo scale = 0.5 m.



Figure 32. Feature 7 and Test Pit 5 during excavation. The bamboo skewers mark stone flakes.



Figure 33. Top surface of Feature 13. Photo scale = 0.5 m.



Figure 34. Cut of Feature 15. Photo scale = 0.5 m.

Feature 13 was a concentration of degraded shell measuring 700 x 280 mm. This feature overlay Feature 7 but originated in the topsoil, so was either deposited recently or in secondary deposition. No charcoal or artefacts were associated with it (Figure 33).

At the rear of 9 Ryburn Road, kōiwi were identified just below the surface of the topsoil. Consequently, the area around the initial discovery was hand excavated and screened under the supervision of osteoarchaeologists Sarah Karstens and Caitlin Smith of BioArch Consulting. A number of additional kōiwi were recovered scattered across an area approximately 8 x 5 m and extending from the surface to a depth of about 300 mm (Feature 14). As was the case with other material near the surface, the kōiwi had been disturbed by historic development on the property, making it difficult to determine the location of their primary burials. Subsequent analysis of the remains found that two adult individuals were represented, but the poor preservation and fragmentary condition of the kōiwi meant that it was not possible to determine the sex or precise ages of the individuals (see Appendix 2 Kōiwi report – this appendix is only included in paper copies of this report, not in online versions).

Feature 15 was a deposit of fragmented dog bone. The cut was square-sided, indicating it was made with a metal spade. The feature originated in the topsoil and cut through to the clean clay underneath. It probably represents a recent pet burial (Figure 34).

Five lenses of charcoal-stained fill with fragmented shell and mixed with occasional modern materials were identified at the eastern side of Area 3 (Features 16–20; Figure 21). The faces of these features were cleaned back and all were found to be sitting in the topsoil overburden, indicating that they had been redeposited during or after the historic contouring of the slope (Figure 20). Given their proximity to the kōiwi discovery, the upper portions of these features were excavated and screened; no additional kōiwi were identified. During the excavations in Area 3, a series of Test Pits (TP 1–5, Figure 21) were cut into the basal clay to gauge the depth of the overburden and ensure that no additional cultural deposits lay beneath.



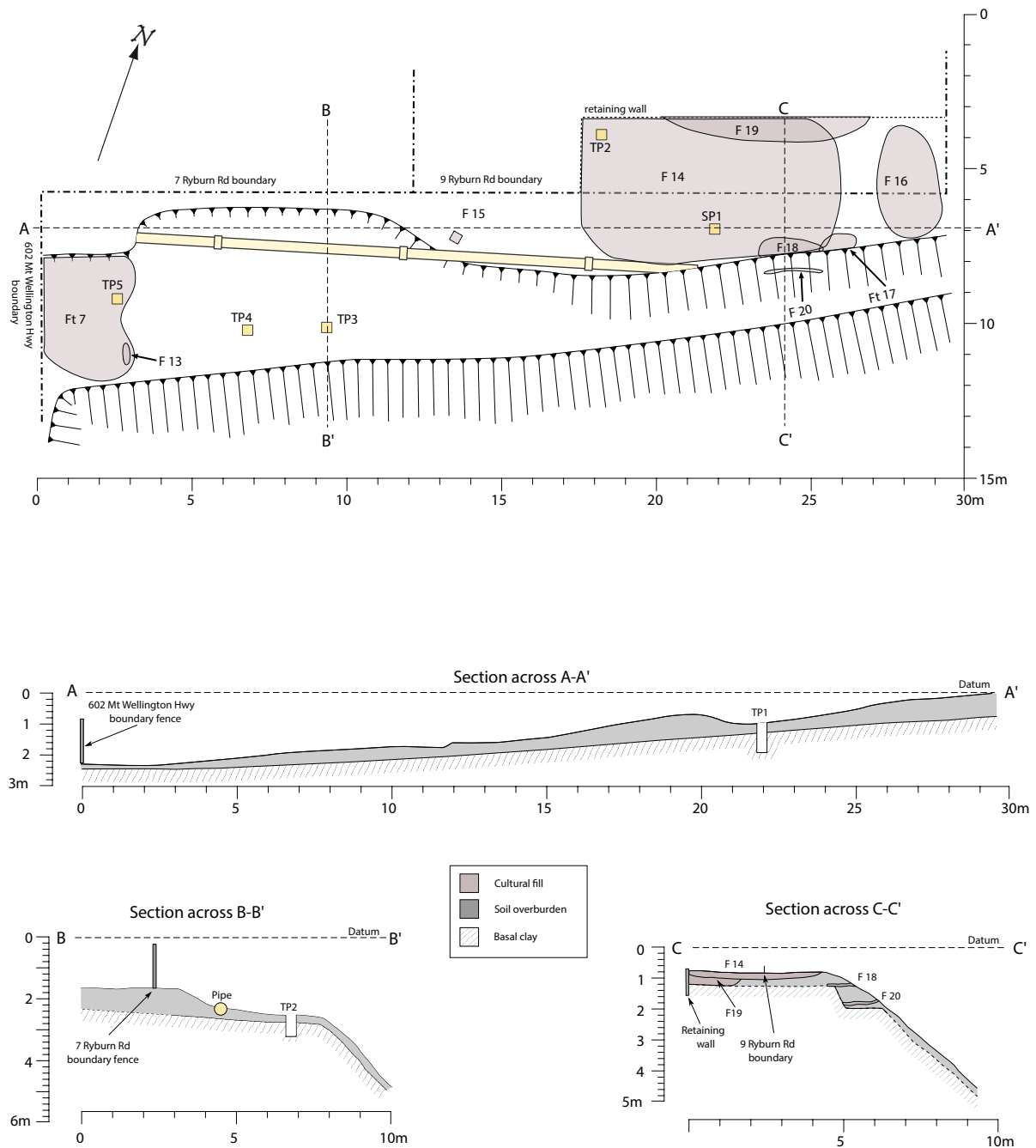


Figure 35. Plan and sections of Area 3.

Table 3. Summary of features identified in Area 3.

Feature	Description	L x W x D (mm)	Origin	Base	Contents
7	lithic scatter	4500 x 3000 x 150*	basal clay	basal clay	stone artefacts, shell, charcoal
13	midden	710 x 280 x 150*	topsoil	Feature 7	shell
14	scattered kōiwi	8400 x 4700 x 300	topsoil	topsoil	kōiwi
15	dog burial	300 x 300 x 450	topsoil	basal clay	dog bone
16	redeposited fill	3660 x 2150 x 100	topsoil	topsoil	charcoal, shell, modern materials
17	redeposited fill	6800 x 840 x 150*	topsoil	topsoil	charcoal, shell, modern materials
18	redeposited fill	2120 x 660 x 100*	topsoil	topsoil	charcoal, shell, modern materials
19	redeposited fill	1230 x 590 x 150*	topsoil	topsoil	charcoal, shell, modern materials
20	redeposited fill	1900 x ? x 200*	topsoil	topsoil	charcoal, shell, modern materials

\* incomplete

### Summary of the archaeological investigation

Most of the six features identified in Area 1 consisted of isolated shell or fishbone deposits and likely represent small-scale disposal of kitchen refuse; three included modern materials but no traditional artefacts were recovered. With the exception of Feature 6, these features did not extend beyond the topsoil, indicating that they were either recently deposited or, more likely, that they had been disturbed and redeposited during the historical terracing of the slope.

In Area 2, the matching alignments of the southern cuts of Features 8 and 12 suggest that they could be related to one another in some manner. However, because the northern and eastern sides of Feature 8 merge with the ground slope, the original extent and form of this feature is unknown. Similarly, while the base of Feature 9 is resting on sterile clay, its temporal relationship to Feature 8 and 12 is unclear. Because the fill of Feature 8 has been redeposited, it cannot be determined whether Feature 9 was cut into the base of Feature 8 or whether the cutting of Feature 8 truncated the upper portion of Feature 9.

Area 3 has also been heavily modified by recent activities. The identification of disturbed kōiwi to the rear of 9 Ryburn Road necessitated careful screening of the area to ensure full recovery and allow mana whenua to make appropriate arrangements for reburial. The lithic scatter uncovered at the western end of Area 3 was the only feature judged to be in original context and even portions of this feature have been affected through historic development on the site.

Because most of the features identified during archaeological investigation were not in original context but redeposited during or after the historic quarrying of the site, and often mixed with modern materials, analysis of the excavated materials concentrated on the two features thought to be in original deposition – Features 7 and 9.

### Chronology

Radiocarbon dating was carried out on two samples from secure contexts (Features 7 and 9). Both samples submitted for dating were specimens of the short-lived shrub, *Coprosma* sp. The calibrated dates are in close agreement and place occupation in this area to the 15th century AD (Table 4, Figure 36). Although no previous archaeological excavations have been carried out at the site, a single radiocarbon date has been reported by Brenda Sewell (1992). Sewell's sample, a tuangi (*Austrovenus stutchburyi*) shell, was collected from midden on a terrace on the edge of the quarry, although the exact location is not reported. Due to the reported error ( $\pm 50$ ) this sample (Wk-1722) returned a comparatively large calibrated range

from the late 15th to early 19th centuries, around a century or more after the occupation dated by Features 7 and 9 (Table 4).

All results were calibrated using Oxcal v. 4.4. The Southern Hemisphere calibration curve, SHCal20, was used for terrestrial samples (Hogg et al. 2020). For marine shell, a  $\Delta R$  value of  $-7 \pm 45$  was applied to the Marine13 curve (Petchey et al. 2008; Reimer et al. 2013).

Lab Number	Feature	Material	CRA	cal AD 68%	cal AD 95%
Wk-51754	7	<i>Coprosma</i> sp.	$478 \pm 19$	1440–1460	1420–1490
Wk-51755	9	<i>Coprosma</i> sp.	$537 \pm 36$	1410–1450	1390–1460
Wk-1722	n/a	Tuangi	$680 \pm 50$	1530–1680	1470–1810

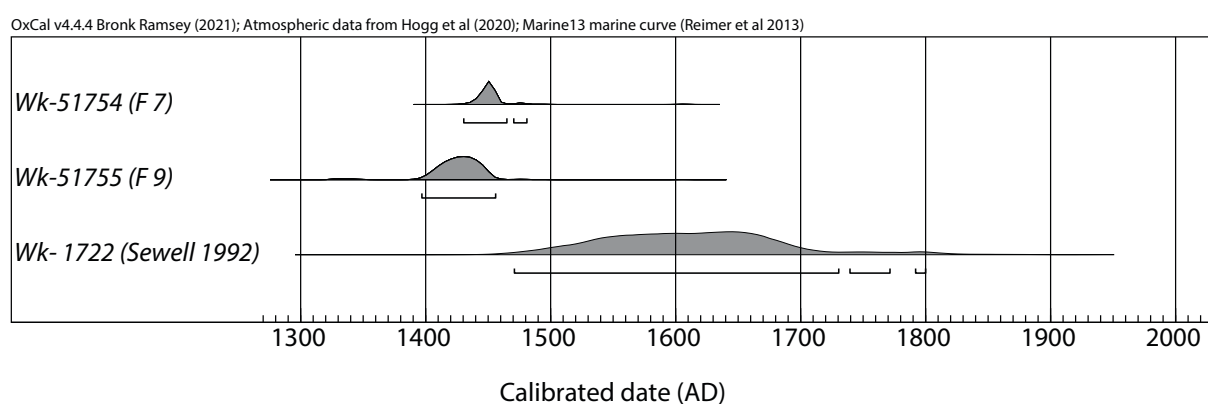


Figure 36. Calibrated radiocarbon date ranges from Features 7 and 9, compared to Sewell's (1992) sample.

## Charcoal

Charcoal was analysed by Ella Ussher of CFG Heritage following the methodology outlined in Chabal et al. (1999), Théry-Parisot et al. (2010) and Dotte-Sarout et al. (2015), although the sample sizes were lower (50 fragments) than recommended (200–400 fragments).

Samples from Features 7 and 9, the undisturbed contexts, were analysed. Samples of coprosma from each were separated for radiocarbon dating (above). The dates indicate that both contexts were from the same period of occupation. For this reason, these charcoal results were combined for discussion here.

Overall, the identified charcoal derived from 12 species, with similar ratios of small trees and shrubs (49%), to broad-leaved canopy trees (46%). These were dominated by three taxa: coprosma, pūriri (*Vitex lucens*) and taraire (*Beilschmiedia tarairi*) (Table 5). When considered together, all of the species suggest an environment of coastal or lowland primary forest, rather than secondary growth. The species composition reflects the nearby coastal environment, and probably represents use of locally available resources for firewood. Fragments of storage parenchyma from roots or tubers also indicates food preparation and consumption, although it is not possible to identify parenchyma to taxonomic level.

Table 5. Charcoal identification from Features 7 and 9, combined.

Taxon	Type	Count	%
Coprosma ( <i>Coprosma</i> sp.)		32	49
Tutu ( <i>Coriaria arborea</i> )		2	
Mānuka ( <i>Leptospermum scoparium</i> )	Small trees and shrubs	2	
cf. Ngaio ( <i>Myoporum laetum</i> )		10	
Pittosporum ( <i>Pittosporum</i> sp.)		1	
cf. Pseudopanax ( <i>Pseudopanax</i> sp.)		2	
cf. Kohekohe ( <i>Dysoxylum spectabile</i> )		3	46
Pūriri ( <i>Vitex lucens</i> )		18	
cf. Māhoe ( <i>Melicactus ramiflorus</i> )	Broad-leaved trees	2	
Taraire ( <i>Beilschmiedia taraire</i> )		22	
Pukatea ( <i>Laurelia novae-zelandiae</i> )		1	
cf. Miro ( <i>Prumnopitys ferruginea</i> )	Conifers	1	1
Parenchyma	Storage parenchyma	2	2
Unidentified		2	2
Total		100	100

## Lithics

A total of 157 stone artefacts were recovered from the investigation. Most were fine-grained flakes collected from Feature 7, but smaller amounts of obsidian, chert and pumice were also collected (Table 6). A Bruker Tracer III SD portable x-ray fluorescence (pXRF) instrument was used to carry out non-destructive geochemical analyses of the obsidian and fine-grained specimens, using the same methods as reported in McAlister (2019), McAlister and Allen (2017) and Kneebone (2018). Additionally, a technological analysis of the fine-grained flakes from Feature 7 was carried out to better understand the types of activities represented by the assemblage. The assemblage was analysed by Andrew McAlister.

Table 6. Summary of stone artefacts finds.

Material	Description	F 7	F 8	F 12	F 17	n/a*
greywacke	adze	2	1			1
greywacke	preform	1				
greywacke	hammerstone			1		
greywacke	point	2				
greywacke	reworked flake	4		1		
greywacke	polished flake	6				
greywacke	unmodified flake	107	1	3	1	1
obsidian	unmodified flake	16	2	1		
chert	unmodified flake	3				
pumice	unworked		1			

\* isolated finds in Area 1.

## Obsidian

Of the 19 obsidian flakes, 16 were suitable for geochemical analysis. To determine the geological sources of the artefacts, a series of multivariate techniques were employed. Details of the analytical procedures and obsidian sourcing techniques are reported in McAlister (2019). All six of the multivariate techniques produced the same results, sourcing three flakes

to Tūhua / Mayor Island and the remaining 13 to the Te Ahumatā source on Aotea / Great Barrier Island (Table 7). These results can be seen graphically (Figure 37): a scatterplot of the trace elements rubidium (Rb) versus zirconium (Zr) separates several distinctive New Zealand obsidian sources, including Kaeo, Tūhua / Mayor Island, Burgess/Fanal, Weta and Maratoto (Figure 37a) and shows that the artefacts form two clear groups; one is unambiguously associated with the Tūhua source while the other clusters near several groups. Restricting the range of the scatterplot shown in Figure 23a indicates that the second artefact group clusters with reference samples from only two sources, Te Ahumatā and a sub-source from Awana (Group II), both located on Aotea Great Barrier Island (Figure 37b). An additional scatterplot of yttrium (Y) versus strontium (Sr) shows that of these two sources, Te Ahumatā provides the closest match to the artefacts (Figure 37c), in agreement with the multivariate analyses.

### *Fine-grained lithics*

To date fine-grained stone sources used for manufacturing adzes, scrapers and other implements, have not been studied as extensively as obsidian sources in New Zealand. Although further work is required, recent studies have made inroads into the geochemical characterisation of New Zealand adze raw materials (e.g., Felgate et al. 2001; Kneebone 2018). For the current assemblage of fine-grained stone artefacts, discriminant function analysis was employed to compare the specimens to reference samples of the three adze stones most commonly found in the Tāmaki region: Tahanga basalt (karā) from the Coromandel Peninsula, argillite (pakohe) from the Nelson/Marlborough region and greywacke (ōnewa) from the east coast of the Auckland region. This analysis showed that all of the fine-grained stone artefacts, including all the adzes, are made from Tāmaki greywacke (Figure 38). Although this material is commonly known as Motutapu greywacke after the discovery of large-scale adze quarries on that island (Davidson 1981; Leach 1990), high-quality greywacke suitable for adze manufacture also occurs on neighbouring Rakino Island as well as some coastal locations on the Tāmaki mainland (D. Bonica, pers. comm. 2018; Davidson 1981; Turner and Bonica 1994).

Turner and Bonica (1994) found that analysing the physical properties of flake assemblages can be useful for understanding the activities carried out at archaeological sites. Using Tahanga basalt assemblages, they found that the initial production of roughouts and preforms was restricted to the immediate vicinity of the Tahanga quarry itself, the finishing of preforms to produce adzes was carried out at nearby sites on the Coromandel coast, and that more distant sites were not involved in the primary production of Tahanga adzes but only the reworking and repair of finished tools. Turner and Bonica characterised flake types using seven weight categories; the largest flakes are formed during the initial stages of manufacture, reducing boulders to blanks and roughouts, while the smaller of their size categories are more commonly produced during fine trimming and final shaping of preforms. Through experimental work, they also found that secondary flakes (i.e., those with more than two dorsal scars) mainly occurred during the advanced stages of adze manufacture, and that cortex is generally absent from late-stage flakes.

Applying Turner and Bonica's (1994) methods shows that the greywacke flake assemblage from Feature 7 (n=113) is consistent with a workshop where the final shaping of preforms into adzes took place (Figure 39). Flake size is dominated by the smallest of their size categories, 6 and 7, and the largest categories (> 200g) are completely absent (Figure 39). The majority of flakes have little or no cortex, indicating that the initial stages of reduction were carried out elsewhere, probably close to the quarry site. Many of the specimens have three or more dorsal scars, which is also indicative of trimming preforms. Finally, the presence of polished adze flakes in Feature 7 shows that finished adzes were also rejuvenated.

Table 7. Results and associated probabilities of the obsidian sourcing using multivariate classification (see McAlister 2019 for details).

Sample	Feature	KNN		LDA		SVMML		SVMR		RF		NN	
		Source	prob.	Source	prob.	Source	prob.	Source	prob.	Source	prob.	Source	prob.
97	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.96	Te Ahumatā	0.969	Te Ahumatā	0.995	Te Ahumatā	0.995
103	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.968	Te Ahumatā	0.975	Te Ahumatā	0.992	Te Ahumatā	0.996
120	12	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.958	Te Ahumatā	0.967	Te Ahumatā	1	Te Ahumatā	0.995
121	7	Tūhua	1	Tūhua	1	Tūhua	0.971	Tūhua	0.971	Tūhua	1	Tūhua	0.999
122	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.961	Te Ahumatā	0.973	Te Ahumatā	0.996	Te Ahumatā	0.997
123	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.962	Te Ahumatā	0.973	Te Ahumatā	0.999	Te Ahumatā	0.996
125	7	Tūhua	1	Tūhua	1	Tūhua	0.935	Tūhua	0.955	Tūhua	0.766	Tūhua	0.998
127	8	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.929	Te Ahumatā	0.955	Te Ahumatā	0.997	Te Ahumatā	0.977
128	8	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.945	Te Ahumatā	0.955	Te Ahumatā	0.992	Te Ahumatā	0.985
190	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.962	Te Ahumatā	0.962	Te Ahumatā	0.913	Te Ahumatā	0.995
191	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.895	Te Ahumatā	0.939	Te Ahumatā	0.938	Te Ahumatā	0.984
215	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.932	Te Ahumatā	0.924	Te Ahumatā	0.934	Te Ahumatā	0.986
222	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.938	Te Ahumatā	0.911	Te Ahumatā	0.869	Te Ahumatā	0.992
223	7	Tūhua	1	Tūhua	1	Tūhua	0.901	Tūhua	0.934	Tūhua	0.76	Tūhua	0.996
224	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.945	Te Ahumatā	0.923	Te Ahumatā	0.854	Te Ahumatā	0.992
225	7	Te Ahumatā	1	Te Ahumatā	1	Te Ahumatā	0.965	Te Ahumatā	0.965	Te Ahumatā	0.945	Te Ahumatā	0.995

KNN = K-nearest neighbours; LDA = linear discriminant analysis; SVMML = Support vector machines (linear kernel); SVMR = Support vector machines (radial basis function kernel); RF = Random forests; NN = Neural networks.

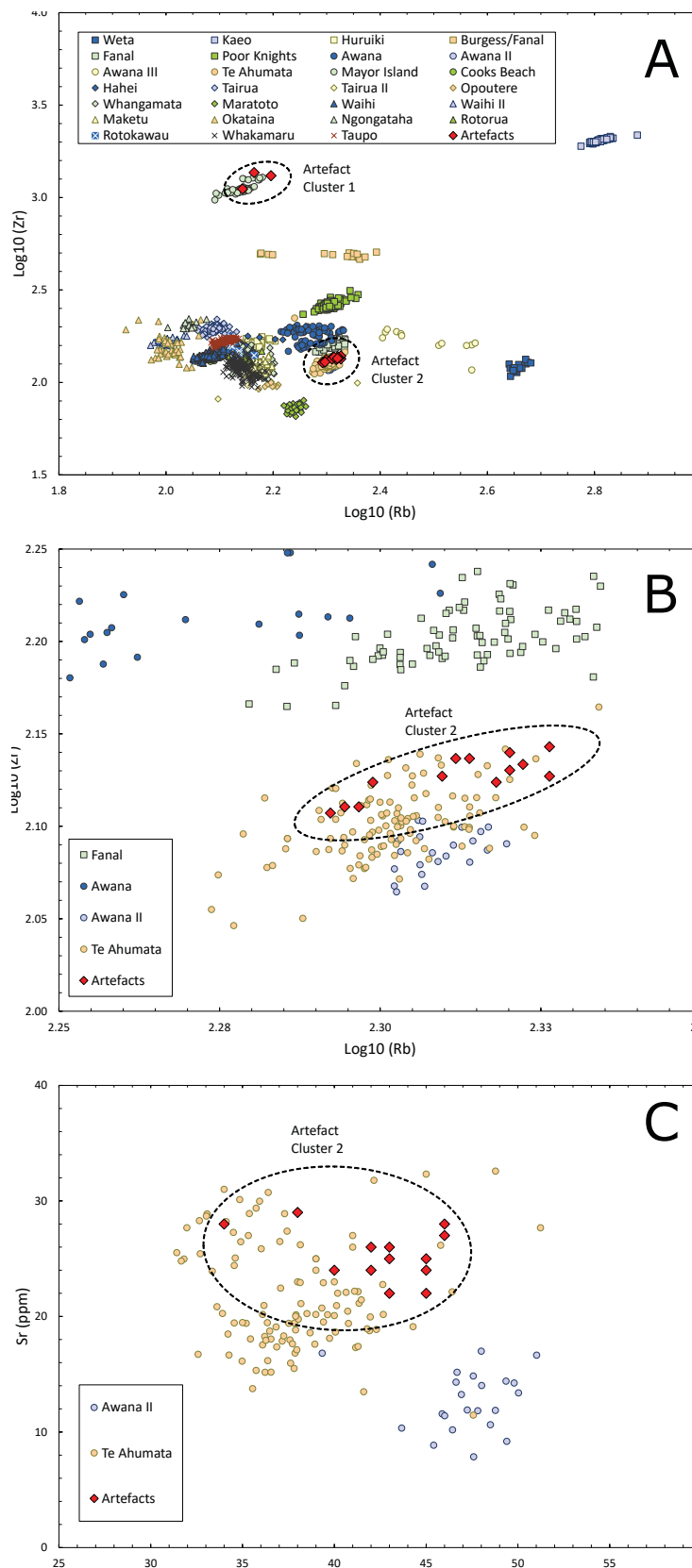


Figure 37. Graphical analysis of the obsidian specimens. A: artefacts compared with all known New Zealand sources; B: Sources similar to the Cluster 2 artefacts; C: Cluster 2 artefacts compared to the Te Ahumatā and Awana II sources.

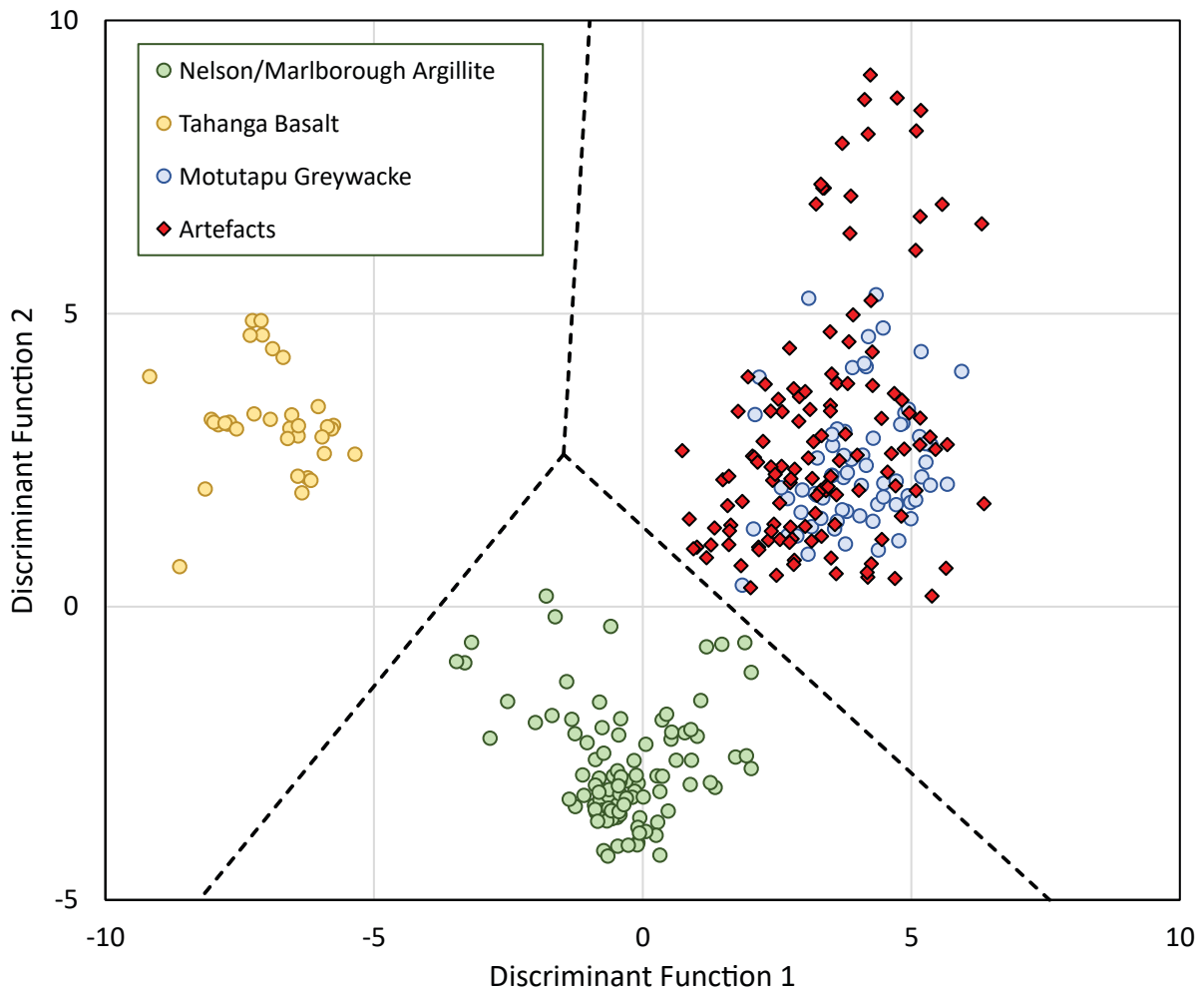


Figure 38. Discriminant functions of the fine-grained stone artefact geochemistry compared with Tahanga basalt, Nelson/Marlborough argillite and Motutapu greywacke. The dashed lines show the geochemical group boundaries.

### Adzes

Four finished adzes and one preform were recovered from the archaeological investigations (Table 8; Figure 40 to Figure 44). As noted above, all are made from greywacke. The four finished specimens are consistent with Duff's (1959) Type 2B form, although several studies have questioned the usefulness of this classification system, especially as applied to reworked specimens (Kneebone 2018; Shipton et al. 2016; Turner 2004). Three of the finished adzes (Samples 10, 17 and 80) have damaged bevels, which might explain their discard. The unfinished preform (Sample 11) was abandoned before completion, possibly because of the difficulty in reducing a large bulge in the back face (Figure 41).



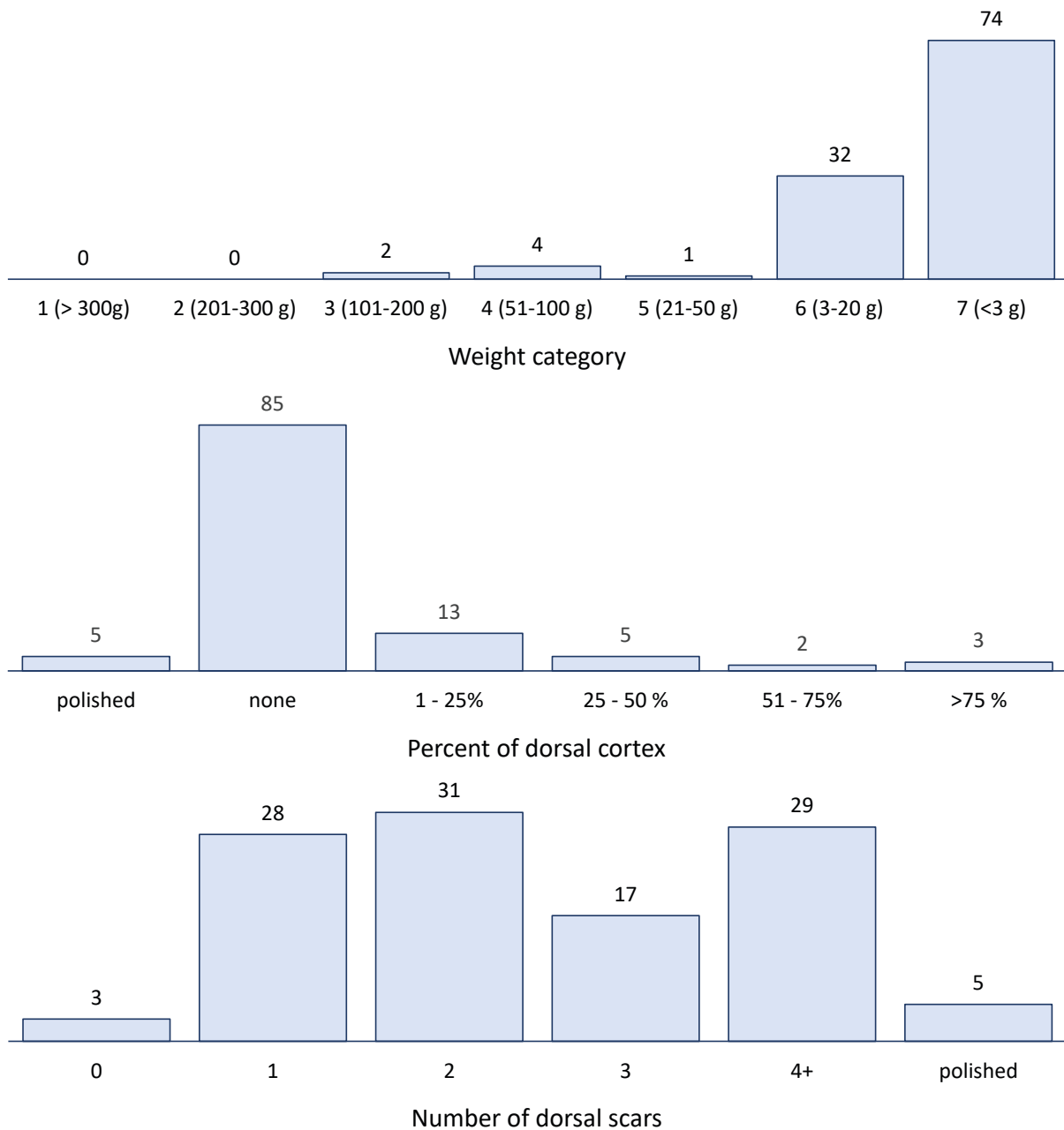


Figure 39. Distributions of greywacke flakes from Feature 7 using Turner and Bonica's (1994) attributes. Counts are shown above the bars.

Table 8. Dimensions of adzes.

Sample	Feature	Type	length (mm)	width (mm)	thickness (mm)	poll width (mm)	bevel width (mm)	weight (g)
10	7	adze	130	45	32	33	39	296
11	7	preform	117	51	27	31	50	192
17	8	adze	75	35	20	32	34	93
80	n/a*	adze	59	33	16	17	30	48
100	7	adze	79	40	21	23	40	88

\* isolated find in Area 1.



Figure 40. Finished adze from Feature 7 (Sample 10).



Figure 41. Preform from Feature 7 (Sample 11).



Figure 42. Finished adze from Feature 7 (Sample 17).



Figure 43. Finished adze from Area 1 (Sample 80).



Figure 44. Finished adze from Feature 7 (Sample 100).

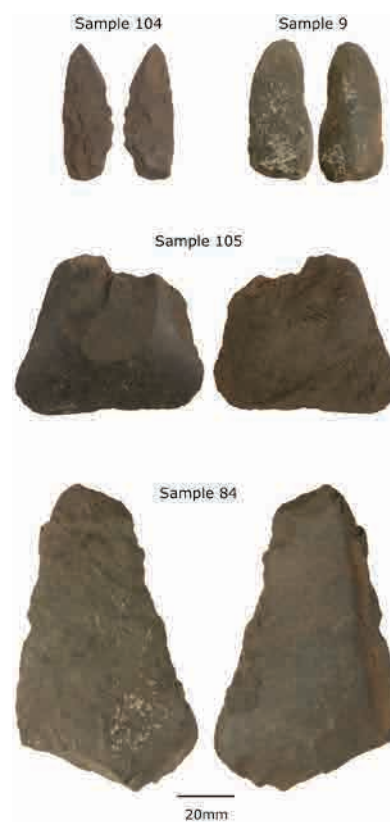


Figure 45. Examples of worked stone tools; top row, adze fragments reworked as points; middle and bottom flakes with reworked edges.

### Other stone tools

In addition to adzes and manufacturing debris, several other tool types were made from greywacke. These include adze fragments sharpened to points, either for use as drill points or awls, and large flakes with reworked edges to serve as scrapers (Figure 31).

### Midden

Only Features 7 and 9 were clearly undisturbed pre-European deposits and only Feature 7 contained much shell. A small assemblage was analysed by Jennifer Graydon of CFG Heritage (Table 9), but little can be said from this. The presence of tuangi and pipi is expected, given that the nearest environment from which shellfish could be harvested were the Tāmaki River or the Māngere Inlet. These two species predominate in other excavations in the wider area. The presence of a single toheroa (*Paphies ventricosa*) valve is surprising as this species is not found in any local environments. The nearest location where they are likely to be found is Muriwai more than 40 km away. It is not clear that this single valve represents food remains. It could as easily have been a container, or even a souvenir, but, like the lithics described above, it demonstrates the movement of people and resources.

Table 9. Shell counts for Feature 7.

Taxon	NISP	Weight (g)
Toheroa ( <i>Paphies ventricosa</i> )	1	5
Pipi ( <i>Paphies australis</i> )	3	6
Tuangi ( <i>Austrovenus stutchburyi</i> )	15	12

### Summary and conclusion

Excavations at Ryburn Road revealed both traditional and historic activities. Much of the site has been modified by successive episodes of development, including housing construction and landscaping, laying pipework, quarrying, and associated contouring of the slope. This has resulted in considerable disturbance and mixing of deposits from different time periods. Despite this disturbance, archaeological investigation was able to gain some insights into the lives of the early inhabitants of the area.

Geochemical sourcing of the stone artefacts indicates that the occupants of the site enjoyed access to high-quality lithic resources, including obsidian from Tūhūa / Mayor Island and Aotea / Great Barrier Island, and Motutapu greywacke from the east coast of the Tāmaki region. Technological analysis of the fine-grained stone suggests that greywacke adzes were imported in unfinished condition and the final stages of manufacture were carried out at Te Apunga o Tainui. Other adze raw materials, such as Tahanga basalt and Nelson–Marlborough argillite, which are commonly found in contemporaneous sites in the vicinity (Kneebone 2018) were not present in this assemblage. However, the lithic materials recovered during these excavations were almost all from one small area (Feature 7), making it likely that they represent a specific activity, possibly transforming a single batch of greywacke preforms into finished adzes.

Radiocarbon dating of the two in situ features (Features 7 and 9) indicates that the northern margins of Te Apunga o Tainui were occupied in the early to mid-15th century, surprisingly early, and a hundred years or more earlier than previously recorded for the site by Sewell (1992), and for other nearby sites. They are also earlier than the AD 1500 date for the commencement of pā construction proposed by Schmidt (1996), although neither feature can be associated with pā defences or domestic structures. The early horizon on Maungarei had

slightly later dates, AD 1450–1630 (Davidson 2011: 48), although, as with Sewell’s date, the reported errors are large ( $\pm 40$ –50).

The charcoal results for Features 7 and 9 indicate that the surrounding vegetation was not heavily disturbed at the time of occupation and so these features are early in the sequence. This contrasts with Maungarei, where the charcoal results indicate occupation “at a time when the impacts of humans on the local environment were already marked and the vegetation was much modified by human activity” (Davidson 2011: 77). Maungarei and Te Apunga o Tainui are 4 km apart (Figure 1) and these two investigations are of essentially the same landscape. The contrasting charcoal assemblages indicate that the occupation of this landscape was rapid, first glimpsed at Te Apunga on Tainui, where the lithic scatter of non-local greywacke suggests some degree of settled occupation, and well-established a few decades later at Maungarei by which time the surrounding environment was heavily impacted.

The mid-15th century seems to be when occupation began to expand from early sites in favourable harbour and estuarine environments to coastal and inland areas. For instance, the initial occupation of Long Bay on Auckland’s north shore dates to this time (Campbell et al. 2019) and large scale settlement of the Waikato Basin began around then or a little later (Gumbley et al. 2003). The evidence from Te Apunga o Tainui indicates that occupation of the Tāmaki maunga may have begun at much the same time, although we are unable to say if this was associated with pā construction or if the results imply that Schmidt’s model requires refinement. Te Apunga o Tainui, and Maungarei, were occupied at relatively early dates, though perhaps they were not yet pā in the classic sense of exhibiting defensive earthworks. On the other hand, we have noted the strategic location of Te Apunga o Tainui at the head of the Tāmaki River and controlling the Ōtāhuhu portage. It is not unreasonable to hypothesise that such strategic places would have been occupied and fortified early in the pā building sequence, but with the maunga effectively destroyed by 20th century quarrying this hypothesis cannot now be tested.

## References

- Bacquié, B., M. Horrocks and R. Clough 2007. Archaeological excavation of R11/1935 & R11/943, Highbrook Business Park, East Tamaki, Manukau City: investigation report (Authority No. 2005/243). Unpublished Clough and Associates report to Highbrook Developments Ltd.
- Bulmer, S. 1994. Sources for the archaeology of the Maaori settlement of the Taamaki volcanic district. *Science and Research Series*, 63. Department of Conservation, Wellington.
- Campbell, M. and C. Ross-Sheppard 2013. Springpark, Panama Road, Otahuhu – Te Apunga o Tainui McLennan Hills: archaeological assessment. Unpublished CFG Heritage report to Panama Road Development Ltd and Barker and Associates.
- Campbell, M. and C. Ross-Sheppard 2019. Richmond Stage 3, Panama Road, Otahuhu – Te Apunga o Tainui McLennan Hills: archaeological assessment. Unpublished CFG Heritage report to Wilshire Group.
- Campbell, M., B. Hudson, J. Craig, A. Cruickshank, L. Furey, K. Greig, A. McAlister, B. Marshall, R. Nims, F. Petchey, T. Russell, D. Trilford and R. Wallace 2019. The Long Bay Restaurant site (R10/1374), Auckland, New Zealand, and the archaeology of the mid-15th century in the upper North Island. *Journal of Pacific Archaeology*, 10(2): 19–42.
- Chabal, L. 1990. L'étude paléo-écologique de sites protohistoriques à partir des charbons de bois: la question de l'unité de mesure. Dénombrement de fragments ou pesées. In T. Hackens, A. Munaut and C. Till (eds), *Wood and Archaeology. Bois et Archéologie. First European Conference, Louvain-la-Neuve*, 189–205. PACT, 22. Conseil de l'Europe, Strasbourg.
- Clough, R. and M. Turner 1998. The archaeology of the South Eastern Arterial: the Waipuna site R11/1436. Unpublished Clough and Associates report to the New Zealand Historic Places Trust.
- Coates, J.M., Foster R.S. and Sewell, B.M. 1996. Excavations at R11/1394 (Hawkins Hill), Tamaki, South Auckland. *Auckland Conservancy Historic Resource Series*, 13. Department of Conservation, Auckland.
- Davidson, J.M. 1970. Salvage excavations at Hamlins Hill, N42/137, Auckland, New Zealand. *Records of the Auckland Institute and Museum*, 7: 105–122.
- Davidson, J.M. 1981. The prehistoric exploitation of stone resources in Northern New Zealand. In B. F. Leach and J. M. Davidson (eds), *Archaeological Studies of Pacific Stone Sources*, 107–119. British Archaeological Reports, International Series, 104, Oxford.
- Davidson, J. 2011. Archaeological investigations at Maungarei: a large Māori settlement on a volcanic cone in Auckland, New Zealand. *Tuhinga*, 22: 19–100.
- Dotte-Sarout, E., X. Carah and C. Byrne 2015. Not just carbon: assessment and prospects for the application of anthracology in Oceania. *Archaeology in Oceania*, 50(1): 1–22.
- Duff, R. 1959. Neolithic adzes of Eastern Polynesia. In J.D. Freeman and W.R. Geddes (eds) *Anthropology in the South Seas: Essays Presented to H.D. Skinner*, 121–149. Thomas Avery & Sons, New Plymouth.
- Featou, J. 1879. *The Waikato War, 1863–4*. J.D. Wickham, Auckland.
- Felgate, M. 2020. NZHPT Archaeological Authority 2018/285 Interim Report: Mokoia Pā Research Investigation Eastern Busway 1 Project Area, Panmure. Unpublished Maatai Taonga report to Auckland Transport.
- Felgate, M.W., P.J. Shepperd and J. Wilmshurst 2001. Geochemical characteristics of the Tahanga archaeological quarry complex. *Archaeology in New Zealand*, 44: 215–240.
- Felgate, M. and R. Foster 2013. Archaeological investigation of R11/2758 Rotary Walkway, Pakuranga. Unpublished report to the New Zealand Historic Places Trust.
- Felgate, M.W. and Opus 2014. Archaeology in the shadow of Maungarei: AMETI Phase 1: annual report on archaeological investigations undertaken for authorities 2013/424, 2013/550, 2013/573, 2014/550. Unpublished Opus International Consultants report to the Heritage New Zealand Pouhere Taonga.
- Foster, R. 1984. Test Excavations at Hamlins Hill. Unpublished report to The New Zealand Historic Places Trust, Auckland.
- Foster, R. and B. Sewell. 1988. An open settlement in Tamaki, Auckland, New Zealand: excavation of sites R11/887, R11/888 and R11/899. *Science and Research*, 4. Department of Conservation, Wellington.
- Foster, R. and B. Sewell. 1993. The Tamaki River Sites: excavations at sites R11/1201 and R11/1506, Tamaki, Auckland, New Zealand. *Auckland Conservancy Historic Research Series*, 6. Department of Conservation, Wellington.
- Foster, R., M. Felgate and M. Horrocks 2012. Mt Wellington Water Supply; Section 3c, Mt Wellington Domain, archaeological report: NZ Historic Places Trust Authority 2010/137. Unpublished report to Watercare Services Ltd and the New Zealand Historic Places Trust.
- Fowlds, G.M. 1967. *The Maori Association with the Volcanic Hills and Craters of the Auckland Isthmus*. Fowlds, Auckland.

- Fredericksen, C.F.K. and E.P. Visser 1989. *Archaeological Investigations at Site R11/1519, Cryers Road, East Tamaki, Auckland, New Zealand*. Science and Research Series, 21. Department Of Conservation, Wellington, Wellington.
- Furey, L. 1983. Excavation of N42/941 Westfield South Auckland. New Zealand Historic Places Trust, Auckland.
- Furey, L. 1986. The excavation of Westfield (R11/898), South Auckland. *Records of the Auckland Institute and Museum*, 23: 1–24.
- Gorst, J. 1959. *The Maori King: Or, the Story of Our Quarrel with the Natives of New Zealand*. Paul's Book Arcade, Oxford University Press, Oxford.
- Gumbley, W., T.F.G. Higham and D.J. Lowe 2003. Prehistoric horticultural adaptation of soils in the Middle Waikato Basin: review and evidence from S14/201 and S14/185, Hamilton. *New Zealand Journal of Archaeology*, 25: 5–30.
- Hayward B.W., G. Murdoch and G. Maitland 2011. *Volcanoes of Auckland: The Essential Guide*. Auckland University Press, Auckland.
- Hogg, A., T. Heaton, Q. Hua, J. Palmer, C. Turney, J. Southon, A. Bayliss, P. Blackwell, G. Boswijk, C. Bronk Ramsey, F. Petchey, P. Reimer, R. Reimer and L. Wacker 2020. SHCal20 Southern Hemisphere calibration, 0–55,000 years cal BP. *Radiocarbon*, 62: 759–778.
- Howard, G. 1998. *A Passing Parade: A Reflection of 150 Years in Otahuhu*. Otahuhu–Tamaki Historical, Otahuhu.
- Irwin, G.J. 1975. Further salvage excavations on Hamlins Hill (N42/137), Auckland, New Zealand. *Records of the Auckland Institute and Museum*, 12: 49–55.
- Kneebone, B., 2018. The Sharpest Tool in the Shed; a Morphological, Typological and Geochemical Analysis of Stone Adzes from the Auckland (Tamaki) Region. M.A. Thesis, University of Auckland.
- Leach, H. 1990. Archaic adze quarries and working floors: an historical review. *The Journal of the Polynesian Society*, 99: 373–394.
- Lennard, M. 1986. *The Road to War: The Great South Road 1862–64*. Whakatane & District Historical Society, Whakatane.
- Lindsay, J.M., G.S. Leonard, E.R. Smid and B.W. Hayward 2011. Age of the Auckland Volcanic Field: a review of existing data, *New Zealand Journal of Geology and Geophysics*, 54:4, pp. 379–401.
- McAlister, A. 2019. On provenance studies of New Zealand obsidians: A pXRF-based geochemical reference dataset and a review of analytical methods. *Archaeology in Oceania*, 54: 131–148.
- McAlister, A. and M.S. Allen 2017. Basalt geochemistry reveals high frequency of prehistoric tool exchange in low hierarchy Marquesas Islands (Polynesia). *PLoS one*, 12(12), e0188207.
- Matthews & Matthews Architects Ltd 2014. Otahuhu Historic Heritage Survey Overview. Report to Auckland Council in association with Lyn Williams, Lisa Truttman, Bruce W Hayward, Clough and Associates Ltd, J.P. Adam, R.A. Skidmore & Urban Design Ltd.
- Nichol R. 1980. Hamlin's Hill (N42/137) excavations: fourth season. *New Zealand Archaeological Association Newsletter*, 23(4): 208–225.
- Otahuhu Borough Council. 1962. *Otahuhu Golden Jubilee 1912–1962*. The Council: Auckland.
- Pearce, P. 1975. Additional excavations on the main upper terrace, Hamlins Hill (N42/137). *New Zealand Archaeological Association Newsletter*, 18(4): 191–199.
- Pearce, P. and A. Walton 1983. Radiocarbon dates from Hamlins Hill (N42/137). *New Zealand Archaeological Association Newsletter*, 26(4): 276–278.
- Petchey, F., A. Anderson, A. Hogg and A. Zondervan 2008. The marine reservoir effect in the Southern Ocean: an evaluation of extant and new  $\Delta R$  values and their application to archaeological chronologies. *Journal of the Royal Society of New Zealand*, 38: 243–262.
- Phillips, R. 2014. Technological Analysis of Selected Artefacts, AMETI Phase 1 Project. Unpublished report to Opus International Consultants.
- Pittman, J.A. 1952. *The First Hundred Years in a New Zealand Parish: Otahuhu, 1847–1952*. Otahuhu Parish, Otahuhu.
- Plowman, M. 2012. Chorus Installations Fraser Road, Panmure: archaeological site damage report. Unpublished Opus International Consultants report to Chorus Ltd and the New Zealand Historic Places Trust.
- Pohlen, I.J. 1979. Soils of the Auckland District, In P.J. Brook, (ed.) *Natural History of Auckland*, 27–30. Auckland War Memorial Museum Handbook, Auckland.
- Reed, A.W. 1955. *Auckland: The City of the Seas*. A.H and A.W. Reed, Wellington.
- Reimer, P.J., E. Bard, A. Bayliss, J.W. Beck, P.G. Blackwell, C.B. Ramsey, C.E. Buck, H. Cheng, R.L. Edwards, M. Friedrich. and P.M. Grootes, P.M. 2013. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. *Radiocarbon*, 55: 1869–1887.



- Sandiford A., Horrocks M., Newnham R., Ogden J. & B. Alloway. 2002. Environmental change during the last glacial maximum (c. 25 000-c. 16 500 years BP) at Mt Richmond, Auckland Isthmus, New Zealand. *Journal of the Royal Society of New Zealand*, 32(1): 155–167.
- Schmidt, M. 1996. The commencement of pa construction in New Zealand prehistory. *The Journal of the Polynesian Society*, 105(4): 441–460.
- Scholefield, G. 1950. *New Zealand Parliamentary Record, 1840–1949* (3rd ed.). Government Printer, Wellington
- Searle, E. J. 1961. Volcanoes of the Otahuhu–Manurewa district, Auckland, New Zealand. *Journal of Geology and Geophysics*, 4(3): 239–255.
- Searle, E. J. 1981. *City of Volcanoes: A Geology of Auckland*. Longman Paul, Auckland.
- Sedal, V.I. 1982. *A Brief History of Otahuhu*. Otahuhu Borough Council, Otahuhu.
- Sewell, B. 1992. Further Excavations at the Westfield site (R11/898), Tamaki, Auckland. *Auckland Conservancy Historic Research Series*, 1. Department of Conservation: Auckland.
- Sewell, H. 1864. *The New Zealand Rebellion, A Letter from Henry Sewell, Esq., Late Attorney General of New Zealand to the Right Hon. Lord Lyttleton*. Macmillan and Co., London and Cambridge.
- Shipton, C., M. Weisler, C. Jacomb, C. Clarkson and R. Walter 2016. A morphometric reassessment of Roger Duff's Polynesian adze typology. *Journal of Archaeological Science: Reports*, 6: 361–375.
- Sims, M. 1977. Excavation of M15 & L14, Hamlins Hill (N42/137), May 1977. Unpublished report.
- Stone, R.J.C. 2001. *From Tamaki–Makau–Rau to Auckland*. Auckland University Press, Auckland.
- Sullivan, A. 1986. Maori Occupation of the Otahuhu District up to 1840. Unpublished report, New Zealand Historic Places Trust, Auckland.
- Théry-Parisot, I., L. Chabal and J. Chravzev 2010. Anthracology and taphonomy, from wood gathering to charcoal analysis: a review of the taphonomic processes modifying charcoal assemblages, in archaeological contexts. *Palaeogeography, Palaeoclimatology, Palaeoecology* 291: 142–153.
- Turner, M. 2004. Functional and technological explanations for the variation among early New Zealand adzes. *New Zealand Journal of Archaeology*, 26: 57–101.
- Turner, M. and D. Bonica 1994. Following the flake trail: adze production on the Coromandel East Coast, New Zealand. *New Zealand Journal of Archaeology*, 16: 5–32.
- Walton, A. 1979. The 1976 excavation on Hamlins Hill (N42/137). *New Zealand Archaeological Association Newsletter*, 22(3): 105–116.
- Walzl, T. 2013. Te Akitai Waiohua and Otahuhu Camp. Unpublished Walghan Partners report.
- Walzl, T. 2014. Te Akitai Waiohua and Otahuhu Camp: Addendum. Unpublished Walghan Partners report.



## **Appendix 1 Radiocarbon dates**



Friday, 23 October 2020

## Radiocarbon Dating Laboratory

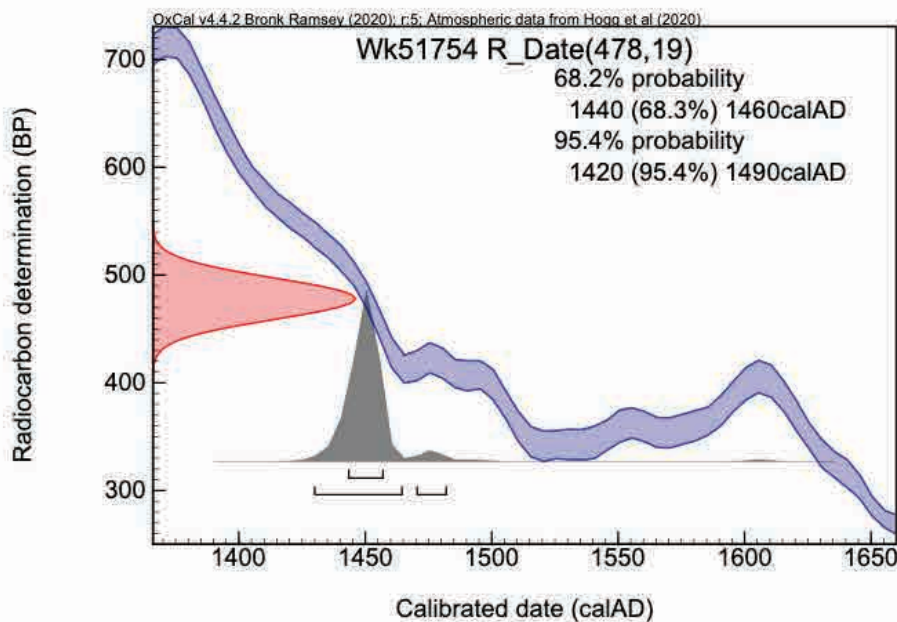
### Report on Radiocarbon Age Determination for Wk- 51754

<b>Submitter</b>	M Campbell
<b>Submitter's Code</b>	R11/10 sample 7
<b>Site &amp; Location</b>	archaeological site R11/10, Te Apunga o Tainui, New Zealand
<b>Sample Material</b>	
<b>Physical Pretreatment</b>	Sample cleaned.
<b>Chemical Pretreatment</b>	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

D<sup>14</sup>C                    -57.8 ± 2.3 ‰  
F<sup>14</sup>C%                    94.2 ± 0.2 ‰  
**Result**                    **478 ± 19 BP**  
  
(AMS measurement)

#### Comments

Please note: The Carbon-13 stable isotope value ( $\delta^{13}\text{C}$ ) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured  $\delta^{13}\text{C}$  value can differ from the  $\delta^{13}\text{C}$  of the original material and it is therefore not shown.



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation,  $\delta^{13}\text{C}$ , is expressed as ‰ wrt PDB and is measured on sample CO<sub>2</sub>.
- F<sup>14</sup>C% is also known as *Percent Modern Carbon (pMC)*.

*M. Campbell*



Friday, 23 October 2020

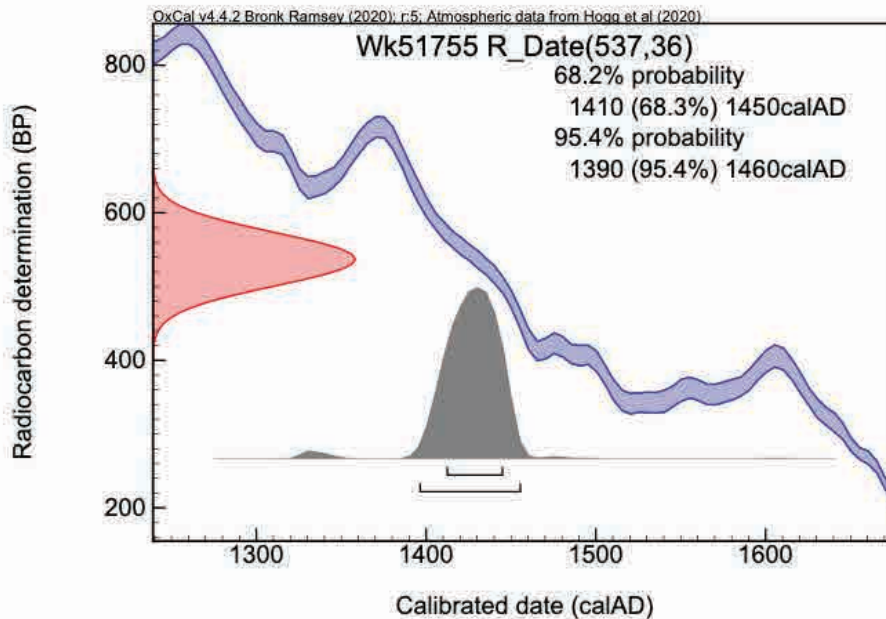
## Radiocarbon Dating Laboratory

### Report on Radiocarbon Age Determination for Wk- 51755

<b>Submitter</b>	M Campbell
<b>Submitter's Code</b>	R11/10 sample 31
<b>Site &amp; Location</b>	archaeological site R11/10, Te Apunga o Tainui, New Zealand
<b>Sample Material</b>	
<b>Physical Pretreatment</b>	Possible contaminants were removed. Washed in ultrasonic bath.
<b>Chemical Pretreatment</b>	Sample washed in hot 10% HCl, rinsed and treated with hot 1% NaOH. The NaOH insoluble fraction was treated with hot 10% HCl, filtered, rinsed and dried.

$\delta^{13}\text{C}$	$-26.0 \pm 0.6 \text{ ‰}$	(CRDS)
$\text{D}^{14}\text{C}$	$-64.7 \pm 4.2 \text{ ‰}$	
$\text{F}^{14}\text{C}\%$	$93.5 \pm 0.4 \%$	
<b>Result</b>	<b><math>537 \pm 36 \text{ BP}</math></b>	

#### Comments



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation,  $\delta^{13}\text{C}$ , is expressed as ‰ wrt PDB and is measured on sample  $\text{CO}_2$ .
- $\text{F}^{14}\text{C}\%$  is also known as *Percent Modern Carbon (pMC)*.

*M. Campbell*

## **Appendix 2 Kōiwi report**

30 October 2019

# Kōiwi tangata from the Richmond Developments site: Osteological Report

Prepared for CFG Heritage, Te Ākitai Waiohūa and  
Heritage New Zealand Pouhere Taonga

Report prepared by Caitlin Smith and Sarah Karstens, BioArch  
Consulting

## Contents

Summary:	1
Location of Kōiwi	2
Site Description and Archaeological Context:	2
Minimum Number of Individuals:	3
Burial Context	3
Individual #1:	3
Individual #2:	3
Preservation	4
Taphonomy:	4
Degree of completeness:	4
Age and Sex Determination	5
Metrics and Stature Estimation	5
Pathology	6
Dental Pathology:	6
INDIVIDUAL #1	6
INDIVIDUAL #2	6
Current Location of Kōiwi and Reburial	7
Further Analyses	8
References	9
APPENDIX I: Individual #2 Skeletal Inventory	10
APPENDIX II: Dental Wear Scoring	11



## Summary:

Following the discovery of kōiwi tangata during excavation work for the Richmond Developments subdivision at 11 Ryburn Rd, Otahuhu, BioArch Consulting were contacted by CFG Heritage at the request of Te Ākitai Waiohua to conduct an excavation and analysis of the kōiwi. The kōiwi uncovered were poorly preserved and highly fragmentary. Subsequent analysis revealed that the excavated kōiwi represent the remains of two adult individuals. The first individual is more incomplete than the second individual. Dental wear patterns suggest that these two people were performing different activities with their teeth. Additionally, based on the degree of wear on the teeth, it seems as though Individual #2 died at a younger age than Individual #1. Given the fragmentary nature of the remains it was not possible to determine sex or provide more specific age estimations.

Should you have any queries regarding the content of this report please contact Caitlin Smith (0273022141) or Sarah Karstens (0223982066) of BioArch Consulting ([info@bioarchconsulting.com](mailto:info@bioarchconsulting.com)).

## Location of Kōiwi

<b>General Site Location</b>	11 Ryburn Rd, Otahuhu, Auckland, New Zealand
<b>Site Coordinates (UTM)</b>	60H 308022 5910814
<b>Coordinate Source</b>	Handheld GPS

### Site Description and Archaeological Context:

The site sits on the north-western edge of the edge of the volcanic cone pa, Te Apunga o Tainui (R11/10). The pa site was largely destroyed through scoria quarrying between the 1940s and 1970s, however the property on which the kōiwi were discovered sits slightly outside the main extent of the quarry (Figure 1). There have also been phases of construction and destruction of residential properties and retaining walls on the site, as well as the placement of city waterpipes.



*Figure 1: Map showing approximate location of kōiwi uncovered at Richmond Developments site. Note: The property to the east had been demolished and vegetation along the terrace edge cleared between the taking of this satellite image and the onset of excavations*

No other burials have been recorded within the immediate vicinity of the site in the New Zealand Archaeological Association (NZAA) Site Recording Scheme (SRS). During excavations an array of cultural material was identified in close proximity to the kōiwi, including stone tools and flakes, midden and butchered animal bone. However, most of this material had been disturbed and therefore its direct relationship to the kōiwi is unclear.

## Minimum Number of Individuals:

The excavated remains were assessed as representing two individuals. This assessment was made based on the presence of two fragments of antero-medial mandibular corpii, both featuring the mental eminence and duplication of a right maxillary lateral incisor, left maxillary canine and second premolar, and right mandibular second premolar.

## Burial Context

### Individual #1:

A mandible fragment and several teeth were initially identified as a result of earthworks on the site. Subsequent survey and hand excavation of the area uncovered a number of additional fragments most of which were too poorly preserved to allow for definitive identification. These fragments were located both as surface scatter and within a layer of mid-greyish-brown clay approximately 50-100mm below the surface (Figure 2). These fragments were spread across an area of approximately 10m<sup>2</sup>. This dispersal is likely the result of multiple phases of disturbance of the site and as such an assessment of the likely primary burial location or position is not possible.



*Figure 2: Stratigraphic profile, showing the layer of mid-greyish-brown clay from which the kōiwi were recovered. Relevant layer is roughly in the middle of the profile.*

### Individual #2:

The pelvis, feet and fragments of the leg bones of Individual #2 were located in a layer of lighter clay, approximately 50mm deeper than the fragments of Individual #1 and slightly further west. The innominate, right femoral head, calcanei, tali, tarsals and metatarsals were all in articulation, indicating that they likely represent the primary site of burial. The positioning of the lower limbs suggests that the individual was buried on their left side, facing South, with the lower legs drawn up behind the thighs (see Figure 3). None of

the postcranial elements above the pelvis were identified so it is not possible to determine the positioning of the upper body.



*Figure 3: Likely positioning of Individual #2's lower limbs at time of burial*

The skull and several phalanges of the hand were located approximately 2 metres west of the lower postcranial skeleton. These demonstrated significant post-mortem damage including breaks and 'crushing', indicating that they had likely been displaced by past disturbance of the site. With the exception of this additional post-mortem damage, the condition, size and indicators of age are consistent with the postcranial remains.

## Preservation

### Taphonomy:

The kōiwi were recovered either as surface scatter or from a layer of clay. Both of these conditions resulted in poor preservation. Many of the elements identified in the clay were recovered en-bloc so that they could be dried and cleaned more carefully in a laboratory environment to prevent further destruction. Despite this, the prolonged dampness of the burial environment had resulted in the complete or partial destruction of most elements. The few fragments recovered from the surface also displayed some evidence of bleaching and weathering.

### Degree of completeness:

Individual #1, mostly recovered as surface scatter, is represented by the antero-medial portion of the mandibular corpus, four permanent teeth and a small number of long bone pieces that are too fragmentary and poorly preserved to allow for identification.

Individual #2 is represented by 23 permanent teeth, along with portions of the maxilla, mandible, pelvis, femora, hands and feet (Figure 4). A full inventory can be found in Appendix I. Additional fragments of the cranium, right femur and right metatarsals were identified in-situ, however due to their extremely poor preservation recovery of these elements intact was not possible and they are not included in the inventory.

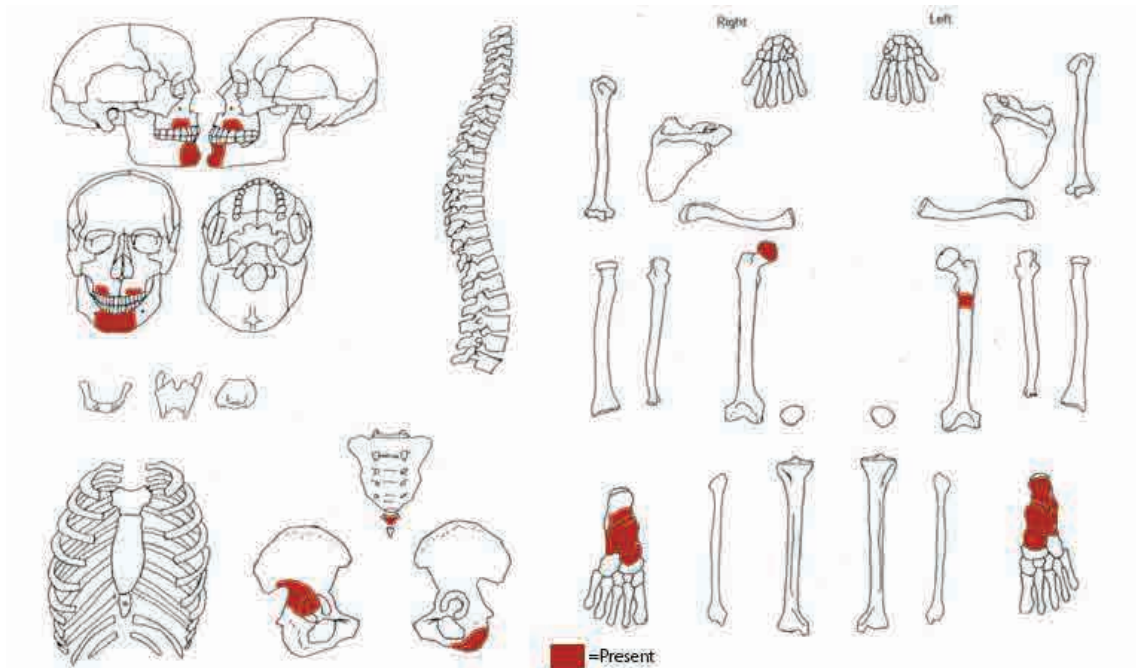


Figure 4: Image showing preservation of Individual #2. Note: Five tarsals were also present but were too poorly preserved to allow for siding

## Age and Sex Determination

The fragmentary nature of the kōiwi meant that an assessment of sex based on morphological features was not possible for either individual.

The dentition indicates that both individuals were adults and a comparison of the dental wear suggests that Individual #2 likely died at a younger age than Individual #1 (see the Dental Pathology section below for a more detailed discussion of attrition). Given the lack of additional indicators of age a more precise age estimate for either individual is not possible.

## Metrics and Stature Estimation

Due to the fragmentary nature of the kōiwi, measurements and thus estimates of stature were not possible.

## Pathology

None of the observable elements of either individual showed any evidence of ante-mortem trauma, infection, or metabolic disorders. Some dental pathology was noted and will be described below.

## Dental Pathology:

In the case of both individuals, as is often the case in archaeological sites, the teeth are the best-preserved elements and therefore allow us some insight into these individuals.

### INDIVIDUAL #1

The first individual had four teeth present, all permanent. The teeth are: left maxillary canine, right maxillary lateral incisor, right maxillary second premolar, and a mandibular left second premolar. All teeth showed significant wear on the enamel. Little of the enamel could be recorded for enamel defects because of this wear. No defects were found. Attrition was scored using Scott's (1979) 10 point system: 1 representing minimal wear, 10 indicating tooth roots functional. Each cusp of the molars and premolars are scored separately and then recorded as a composite score by tooth (see Appendix II for full dental wear scoring for both individuals). The wear pattern exhibited is distinctive because it produced cupped incisal wear (Figure 5) and the loss of all enamel on the premolars. When all of the enamel is lost, a tooth is considered tooth-root functional. This person was chewing with their tooth root. While significant enamel wear can result from eating coarse or fibrous foods (Houghton 1977; Kieser et al. 2001), the pattern of wear exhibited by this person is more consistent with some form of activity involving the teeth such as working leather or fibre with the teeth (Taylor 1986).

Dental calculus or mineralised tooth plaque was found on the lateral left maxillary incisor. The presence of calculus suggests a diet with starches or other foods that promote an oral environment in which plaque is formed. However, given the limited number of teeth recovered of this person, it is difficult to know how many teeth were affected by calculus, and there is not enough calculus present to analyse its constituents.

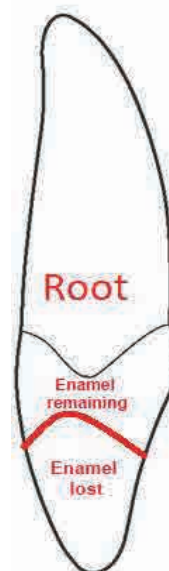


Figure 5:  
Illustration of  
cupped incisal  
wear

### INDIVIDUAL #2

The second individual has 23 permanent teeth present. Dental calculus is present on the right maxillary molars. This calculus was sitting in sheets in the inter-dental spaces. This suggests that food was impacted between the teeth and it led to the formation of calculus in this location. Interestingly, in the same location two caries formed as shown in Figure 6 below. While it is uncommon for calculus and caries to form on the same teeth, because

they result from different processes, in this case it appears that the impacted food resulted in the formation of calculus and the fermentation of that food resulted in the caries.

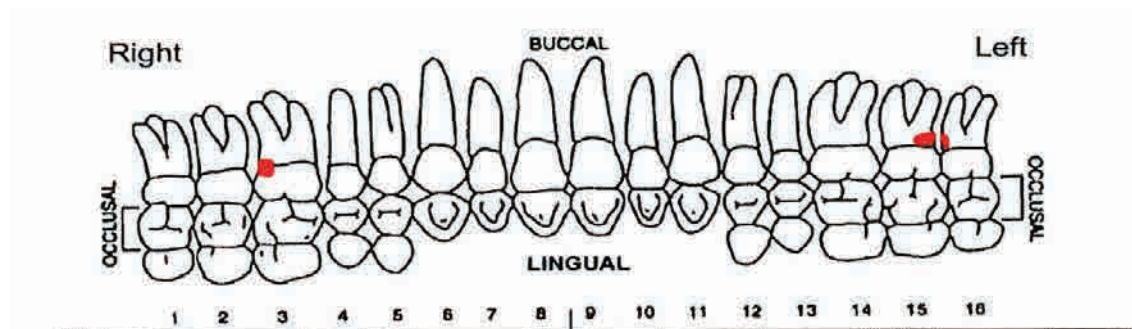


Figure 6: Illustration of maxillary dentition showing location of caries

In terms of dental wear this individual shows less wear than the first individual, and overall a more moderate, flat plane of wear (see Appendix II for full dental wear scoring). This may indicate that this individual was younger when they died, but it certainly suggests that these two people were doing very different activities with their teeth.

The relative completeness of the enamel in this individual means that enamel defects could be recorded. Two enamel defects were observable without the use of a microscope. These defects were present in the lower 1/3 of the mandibular canines (Figure 7). Enamel hypoplasia defects typically form as the result of a period of illness during childhood when the enamel is forming. This person likely experienced a period of illness between the ages of 3 and 5 years. This is a typical age for young children to experience some illness so there is nothing unusual about the presence of these defects.



Figure 7: Illustration indicating location of enamel defects on the mandibular canines

## Current Location of Kōiwi and Reburial

At the request of Te Ākitai Waiohū the kōiwi are currently being housed in a secure facility within the University of Auckland Anthropology Department, until suitable arrangements for reburial can be made.

## Further Analyses

It is our opinion that both individuals have enough sufficiently preserved bone for radiocarbon dating (1-5g per individual), although it is not possible to guarantee that the radiocarbon dating process would be successful. It is important to note however, that radiocarbon dating is destructive, and therefore should only be performed if people are interested in knowing when these individuals were buried or if they were buried at the same time. We are happy to communicate further with iwi to determine if this is a step that people want to take.



## References

- Houghton, P. 1977. Dental evidence for dietary variation in prehistoric New Zealand. *Journal of the Polynesian Society* 87(3):257-263.
- Kieser, J.A., Dennison, K.J., Kaidonis, J.A., Huang, D., Herbison, P.G.P., Tayles, N.G. 2001. Patterns of dental wear in the early Maori dentition. *International Journal of Osteoarchaeology* 11:206-217.
- Scott, E. 1979. Dental wear scoring technique. *American Journal of Physical Anthropology* 51:213-218.
- Taylor, R.M.S. 1986. Sealskin softening by teeth – A Maori case? *Journal of the Polynesian Society* 95(3):357-369.

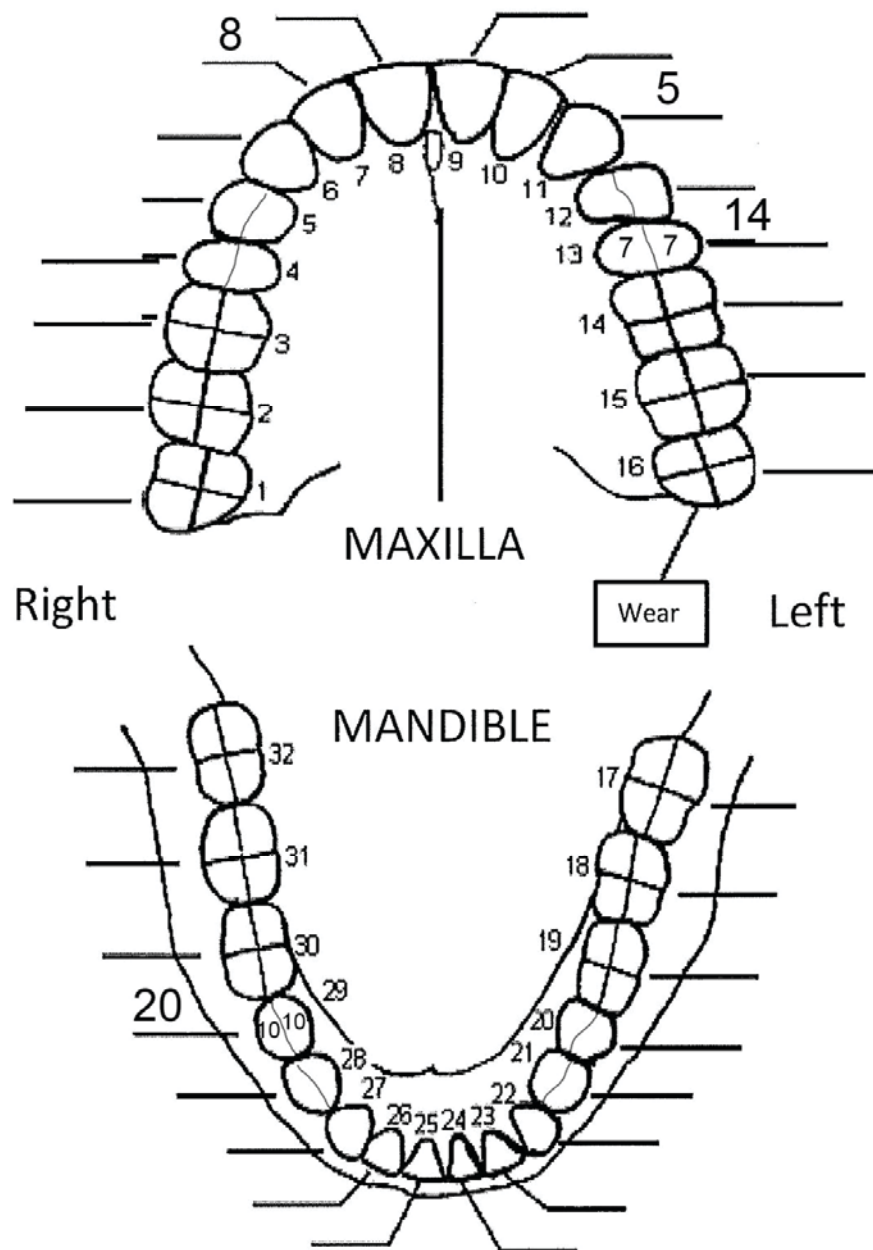
## APPENDIX I: Individual #2 Skeletal Inventory

*\*Indicates that element is unable to be sided*

	LEFT	RIGHT		LEFT	RIGHT
<b>Skull</b>					
<b>Occipital</b>			<b>Maxilla</b>	10%	10%
<b>Temporal</b>			<b>Mandible</b>	5%	5%
<b>Parietal</b>			<b>Zygomatic</b>		
<b>Frontal</b>			<b>Permanent Teeth</b>	23	
<b>Sphenoid</b>					
<b>Basicranium</b>					
<b>Vertebrae</b>					
<b>Atlas</b>			<b>Sternum</b>		
<b>Axis</b>			<b>Manubrium</b>		
<b>Cervical</b>			<b>Sacrum</b>		
<b>Thoracic</b>			<b>Coccyx</b>	20%	
<b>Lumbar</b>			<b>Innominate</b>	10%	15%
<b>Ribs</b>					
<b>Upper Girdle</b>					
<b>Clavicle</b>			<b>Carpals</b>		
<b>Scapula</b>			<b>Metacarpals</b>		
<b>Humerus</b>			<b>Phalanges</b>	4*	
<b>Radius</b>					
<b>Ulna</b>					
<b>Lower Girdle</b>					
<b>Femur</b>	5%	15%	<b>Calcaneus</b>	50%	10%
<b>Patella</b>			<b>Tarsals</b>	5*	
<b>Tibia</b>			<b>Metatarsals</b>		
<b>Fibula</b>			<b>Phalanges</b>		
<b>Talus</b>	95%	95%			

# APPENDIX II: Dental Wear Scoring

RICHMOND DEVELOPMENTS INDIVIDUAL #1



RICHMOND DEVELOPMENTS INDIVIDUAL #2

