Omokoroa UFB2 Build (HNZPTA authority 2018/186): final report

report to
Heritage New Zealand Pouhere Taonga
and
Ultrafast Fibre

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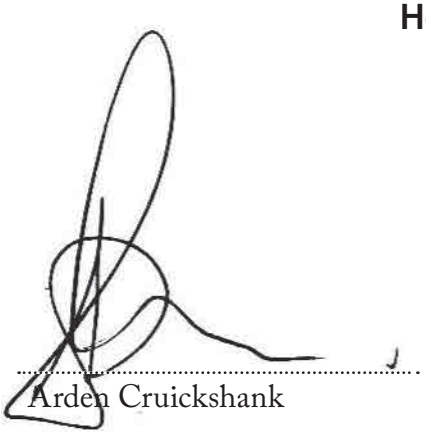
Prepared by: 
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Reviewed by: 
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Date: 22 April 2020
Reference: 17-0780

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Arden Cruickshank

Ultrafast Fibre Ltd have installed a new fibre optic cable network around Omokoroa as part of the second stage of the National Ultra-Fast Fibre project (UFB2). The installation of the cable mainly involved excavating small pits at regular intervals (usually in line with every second property boundary) within existing service trenches, and directional drilling between these. Other pits were opened to locate services or extend the cable to property boundaries. Sixteen recorded archaeological sites were identified in the project area with potential to be affected by the works (Cruickshank 2017). Ultrafast Fibre applied to Heritage New Zealand Pouhere Taonga (HNZPTA) for an archaeological authority to modify or destroy these sites under section 44 of the Heritage New Zealand Pouhere Taonga Act (2014). Authority 2018/663 was granted by HNZPT on 11 October 2017.

Work commenced on 16 November 2017 and t was completed in early 2019. Ground disturbance associated with the archaeological sites identified in the project were monitored or inspected prior to drilling to ensure that any archaeological features that were encountered were recorded and mapped for future site management.

Background

Omokoroa is a prominent peninsula jutting into Tauranga Harbour. It is currently under a mixof orchards and farms to the west and houses to the east. There are currently multiple housing developments in the undeveloped western areas spurred on by from the expansion of Tauranga city.

The peninsula is dominated by tephric loam from the Ngakura family of typic orthic allophanic soils. This soil is well draining and stoneless, making it ideal for pre-European Māori horticulture and subterranean kūmara storage. This type of well-draining loam is typical for the Bay of Plenty, which is indicated by the high number of storage pits uncovered in archaeological sites throughout the region.

Pre-European Māori occupation

The Bay of Plenty is known for its mild climate, fertile soils and abundant shellfish and fish populations, which supported a large pre-European population. Because of these natural resources, the region has one of the highest densities of archaeological sites in the country (McFadgen 2007: 173). Omokoroa, and the other headlands along the Tauranga Harbour are typical, as shown by the high density of archaeological sites recorded in the area.

Māori settlement in the Western Bay of Plenty was focused primarily at the Kaituna River mouth / Maketu and within Tauranga Harbour. The earliest known inhabitants of the Tauranga district were Ngā Marama who were conquered and absorbed by later groups. All present-day

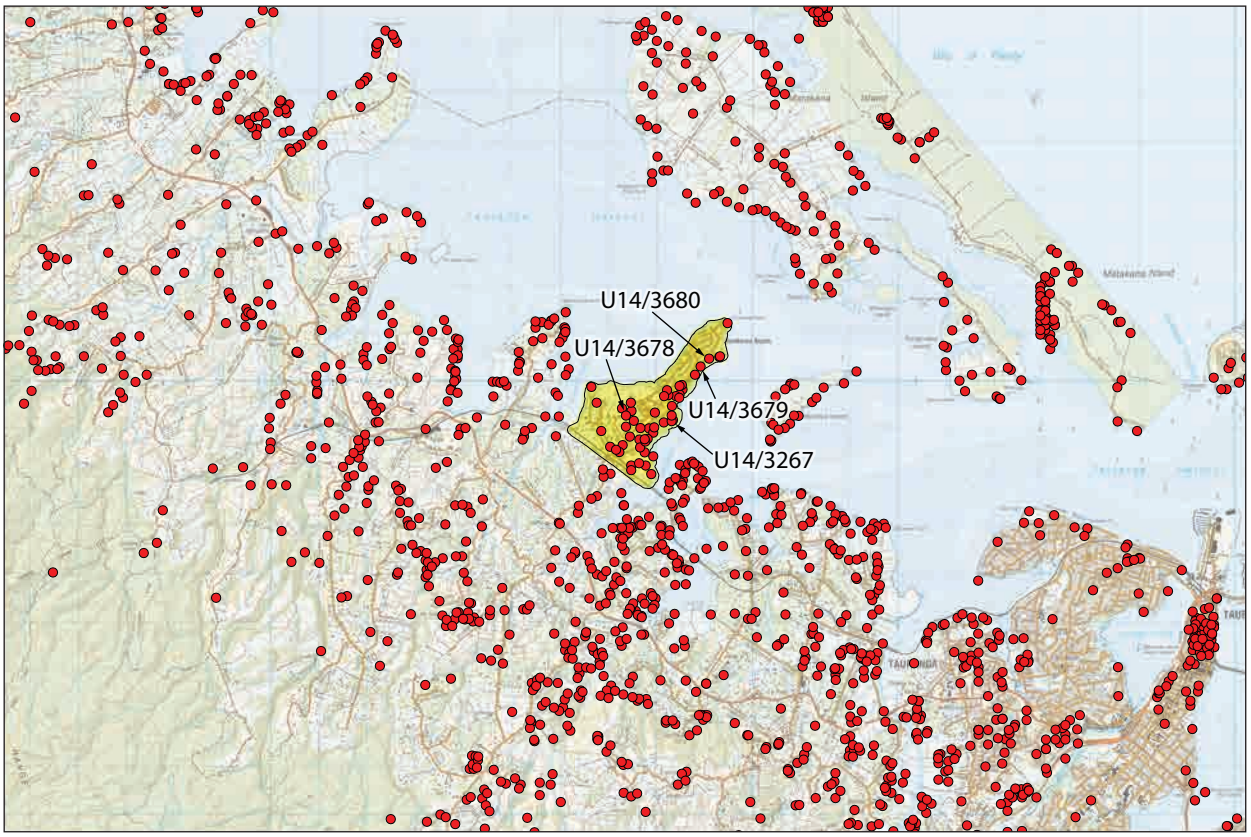

Figure 1. The Omokoroa build showing existing sites and the four midden deposits investigated.

tangata whenua in Tauranga trace their descent back to these original people. The first waka to arrive in Tauranga was *Tainui*. Although Tainui people did not settle in Tauranga, they settled nearby: Marutūahu in Hauraki and Ngāti Hauā and Ngāti Raukawa on the western side of the Kaimai Ranges. The next waka was *Te Arawa*, whose people mostly settled south and east of Tauranga. The third waka to arrive was *Takitimu*, which landed at Mauao. Ngāti Ranginui trace their descent to the Takitumu. Waitaha and Ngāti Ranginui conquered Nga Marama and divided the land between them: Ngāti Ranginui to the west of the Waimapu River, and Waitaha to the east (Stokes 1980: Chapter 1; Waitangi Tribunal 2004: 28).

After several generations, Ngai Te Rangi and Ngāti Pūkenga, descended from the people of the *Mātaatua* waka that had landed at Whakatāne, displaced Ngāti Ranginui and Waitaha from much of Tauranga so that by about AD 1800 Ngai Te Rangi had gained ascendancy on the coast and offshore islands of Tauranga while Ngāti Ranginui and Waitaha predominated inland east of the Waimapu (Waitangi Tribunal 2004: 29; Stokes 1980: Chapter 2; Stafford 1986: Chapter 22).

Tauranga supported a dense population prior to the arrival of Europeans. Coastal and inland hapu had reciprocal rights to resources and many migrated to the coast in winter and inland in summer. Early in the 19th century Ngāpuhi from Northland obtained muskets which provide them with a huge advantage in war. Tauranga was raided in 1818 and 1820. In 1828 Ngāti Maru of Hauraki attacked Tauranga, destroying Otamataha Pā and killing or enslaving the inhabitants. Tauranga Maori began to arm themselves with muskets and assisted Ngāti Hauā in expelling Ngāti Maru from Maungatautari in 1830. Further Ngāpuhi raids followed between 1830 and 1833 but these were successfully resisted. In 1836 Te Arawa took Te Tumu pa at

Maketu, successfully reoccupying lands they had lost to Ngai Te Rangi 100 years earlier. Wars and skirmishes continued through parts of Waikato / Hauraki / Bay of Plenty into the 1840s but Maori society was becoming less inclined to settle disputes through destructive musket warfare (Waitangi Tribunal 2004: 23; Stokes 1980: Chapter 3; Ballara 2003: Chapter 16).

Historic interaction and occupation

The first European to actively visit Tauranga appeared to be Rev. Samuel Marsden in 1820 (Gifford and Williams, 1940). Marsden's journey was overland from the Waihou River via the Karangahake Gorge guided by local Māori. On this arrival, he was informed that no European ships had visited the Bay of Plenty since Cook in the late 18th century, who didn't enter Tauranga Harbour. Upon noting that the area was fertile, and that the local Maori were eager to trade with Europeans, Marsden organised with the Church Missionary Society (CMS) to get a mission station established.

The CMS schooner *Herald* was likely the first European vessel to enter Tauranga Harbour in 1826 (Stokes 1980: 45). The first mission was set up in the 1830s at Te Papa, with a standing presence from 1838 onwards. The mission house is still standing on Mission Road. The first organised trade in the region began in 1830 when Phillip Tapsell settled at Maketu as a flax agent for Sydney based firm Jones and Walker. This became a large operation, employing hundreds of local Māori in the cultivation and preparation of flax fibre (Stokes 1980:53).

Following the development of trade in the Bay of Plenty, the first large scale industry in the area was timber milling, with rimu being the prime target species. There were already three timber mills working in the hills behind Tauranga at the beginning of the 20th century when a fourth, the Tauranga Rimu Company set up in the area later to be known as Tauriko (Cruickshank 2016).

Archaeological survey and investigations

The earliest archaeological survey of Omokoroa was undertaken by Larner and Robinson for the New Zealand Historic Places Trust in 1982. Prior to this, there were only two recorded sites on the peninsula, Both Pa, one of which (U14/520) is so vaguely recorded it cannot be relocated. Larner and Robinson identified more than 30 sites in the vicinity of Omokoroa, and as development and subdivision continue and further archaeological assessments are undertaken, this number grows.

A review and summary of all archaeological surveys that had been undertaken in the Bay of Plenty was undertaken in 2002 by Garry Law. This was the first attempt at collating data of the area, which was already subject to heavy impacts from construction, horticulture and forestry. At the same time the New Zealand Archaeological Association undertook a site record upgrade project, checking the condition of already recorded sites to get a better understanding of the location, condition and threats of the recorded archaeological sites of the region.

Archaeological work in Omokoroa has mainly been in response to residential subdivisions and associated developments such as roading. A number of sites including pa, pits and terraces were excavated at the Lynley Park subdivision (Furey 2004, 2005a, 2005b) and other sites have been investigated elsewhere in the peninsula, but many of the investigations in Omokoroa remain unreported. Of the 44 granted authorities for Omokoroa, only eight final reports have been submitted so far to Heritage New Zealand (Cable 2011; Harris and Furey 2011; Coster

2014; Hooker 2007; Hooker 2009; Moore 2009a, 2009b, 2010), so that the picture of what has been uncovered in the peninsula remains incomplete.

The most comprehensive report produced on the archaeology of Omokoroa was by Moore (2009a) for a stormwater upgrade project. Although it is smaller in size and scope to the UFB2 build, it utilised open trenching for the project compared to directional drilling, so it is likely that it represents a more accurate representation of archaeological sites that are present within road reserves. Another stormwater upgrade project was monitored by Ken Phillips in 2006 (Phillips, nd), but no final report has been submitted to HNZPT for these works, so the extent and results of the project is unknown.

Previous works within the 'old' part of Omokoroa, constructed during the 1950s and 1960s, would have undoubtedly have uncovered archaeological material, but as this has not been reported or recorded in the SRS, it is currently providing a 'false negative' of pre-European land use within the peninsula.

Methodology

During the initial assessment a desktop study was undertaken to identify areas within the build where archaeological sites would potentially be impacted during works. This was not a full assessment of all sites within the peninsula. The assessment and evaluation for the archaeological sites was based on the current information and supporting documentation in Archsite, the online database of the New Zealand Archaeological Association (NZAA) Site Recording Scheme (SRS) as accessed on 30 May 2017 (Cruickshank 2017).

As a result of the desktop evaluation, 15 sites were identified as having the potential of being affected by works. One of these was pa and had a 200 m buffer monitoring buffer placed around it. The remaining 14 sites had a 50 m buffer was placed around the central site point to demarcate areas within the road reserve in which any ground disturbance should be monitored by an archaeologist.

Construction Methodology

Installation of the ultrafast fibre network consisted primarily of directional drilling to minimise ground disturbance. These consisted of insertion and receiving pits which were generally 1.2 x 1.2 m, with varying depths, generally around 1 m. These pits also housed the underground cabinets which centralised the connections for a neighbourhood. Although drill shots were capable of being in excess of 200 m long, they were generally at distances of 40 m to allow for individual house connections. In addition to the drill pits, a number of 'potholes' were required to physically and visually identify the location of services prior to a drill shot being made. Because of the inherent risk of sub-surface drilling near existing services, the drill shots were often made next to existing service trenches to allow for accepted minimum distances from high voltage cables and other potentially hazardous services. It cannot be assumed that the areas where the fibre is being installed have been previously disturbed. Drill shots were generally run 600–900 mm beneath the ground surface and have the potential to run though sub-surface archaeological features such as storage pits and fire scoops.

The level of ground disturbance associated with this project depended on the complexity of services in a particular street and cannot be seen as consistent over the build, but is still less than traditional trenching methods for installation of services.

Figure 2. Locations of the 15 sites identified during assessment which required monitoring, and the four locations where archaeological features were encountered during works.

Figure 3. Kaylene Place showing lateral potholes to expose existing services prior to a drill shot.

Due to this type of ground disturbance, assessing the archaeological effects and interpreting features and the landscape is not as straight forward as typical archaeological monitoring projects. Trenching would traditionally be used for installation projects of this magnitude which would allow an archaeologist to view soil profiles over a significant length and identify subtle landscape modifications that would indicate human activity. Similarly, large scale topsoil stripping such as with housing developments provide an archaeologist with a complete knowledge of the sub-surface archaeological deposits within the project extent.

The drawback of those methods of extensive earthworks is that any archaeological features that are within it are significantly modified. The purpose of the Heritage New Zealand Pouhere Taonga Act (2014) is '…the identification, protection, preservation and conservation of the historical and cultural heritage of New Zealand', with avoidance and minimisation of damage the preferred approaches for archaeological landscapes. With this in mind, the approach for these projects is to manage the archaeological landscape and the effects on it, rather than to create a robust record of all archaeological sites within a build.

Archaeological monitoring and investigation procedures were developed to ensure disturbance to both archaeological features and council assets was minimised.

1. If archaeological features are discovered during works, the archaeologist will not extend the hole beyond its intended size. This was a two-fold limitation, as this would increase the modification of the feature, and has the potential of destabilisation of the road and other infrastructure. The only exception to this would be if koiwi were encountered, which would be dealt with upon discussion with mana whenua, the New Zealand Police, Heritage New Zealand and Western Bay of Plenty Regional Council.
2. Where archaeological features are discovered, drilling will be done at a depth of 1200 mm, or a suitable depth determined by the archaeologist as likely to avoid archaeological features.

The results of this project should not be seen as an exhaustive list of archaeological sites that exist within the road reserves around Omokoroa, or even a representative sample; but rather an exercise in minimising potential effects on the archaeological landscape of Omokoroa.

The Omokoroa Peninsula build covers some 309 ha, with road reserve being 42 ha, or 13.5% of the total surface area of the peninsula. Including potholes, the project opened up approximately 0.3 Ha of total road reserve, which equates to a sample of approximately 0.1 percent of the total land mass of the peninsula.

Monitoring Results

Works within the monitoring buffers identified in Figure 2 were monitored by Arden Cruickshank and Danielle Trilford of CFG Heritage Ltd. Some of the areas, especially near Kaylene Place and Lynley Park where recent kerb and channel improvements had been undertaken the ground were noted as heavily modified compared to some of the other parts of Omokoroa where the road reserve had been less disturbed.

There were five locations where potential archaeological material were encountered during works. One feature (Site 1) was initially recorded but was later determined to be non-archaeological in nature so was discounted from further analysis. Four in situ features (sites 2–5) were encountered during works. Only one of these was confidently associated with existing site U14/3276 (Site 2), with the three remaining ones identified as new sites (Sites 3, 4 and 5).

Site 2 (U14/3276)

This deposit was identified on 7 February 2018 while hand excavating a drill pit and exposing services outside 21 Tinopai Drive. It was identified as a sparse midden layer within a charcoal stained layer, with clean loam fill overlaying the deposit. This deposit appears similar to the midden recorded by Phil Moore in the vicinity (2006) and is probably the same thin lens he encountered approximately 15 m to the south. A 10 L sample was taken for analysis.

Site 3 (U14/3678)

This site was identified on 14 March 2018 outside 59c Western Avenue. Disturbed soil was initially thought to be a service trench until the contractors encountered shell midden and the discovery protocols were triggered. The feature was the south east corner of a storage pit with a layer of midden on the base. The full dimensions of the pit are unknown, but it is 750 mm deep, 1000 mm wide, with the length heading off in a north westerly direction. The drill shot was lowered to 900 mm and was angled around the south west corner of the pit to ensure that the remaining portion is not affected by the works. A 10 L sample of the shell midden was taken for analysis.

Site 4 (U14/3679)

This site was identified on 30 May 2018 outside 52 The Esplanade. Exposed in the hole was a midden filled firescoop in the north and east baulks. The fire scoop is 140 mm deep, of unknown diameter.

The midden appeared to have suffered some crushing, but was not redeposited. It is likely that this site had been damaged during the construction of the driveway for the property, likely through use of a compactor. A 10 L bulk sample of the shell midden was taken for analysis.

Site 5 (U14/3680)

This site was exposed on 6 June 2018 outside 2 Omokoroa Road. Contractors exposed crushed shell beneath the surface which was cleaned up and determined to be a midden which had been heavily modified through the installation of services, although a small portion remained in situ. This measured 220 mm deep, but due to the extent of modification the true extent of the midden was not able to be established. A 10 L sample was taken from the intact portion of the midden for analysis.

Figure 4. Plan view of insertion hole showing midden lens associated with U14/3276. Photo scale = 0.5m.

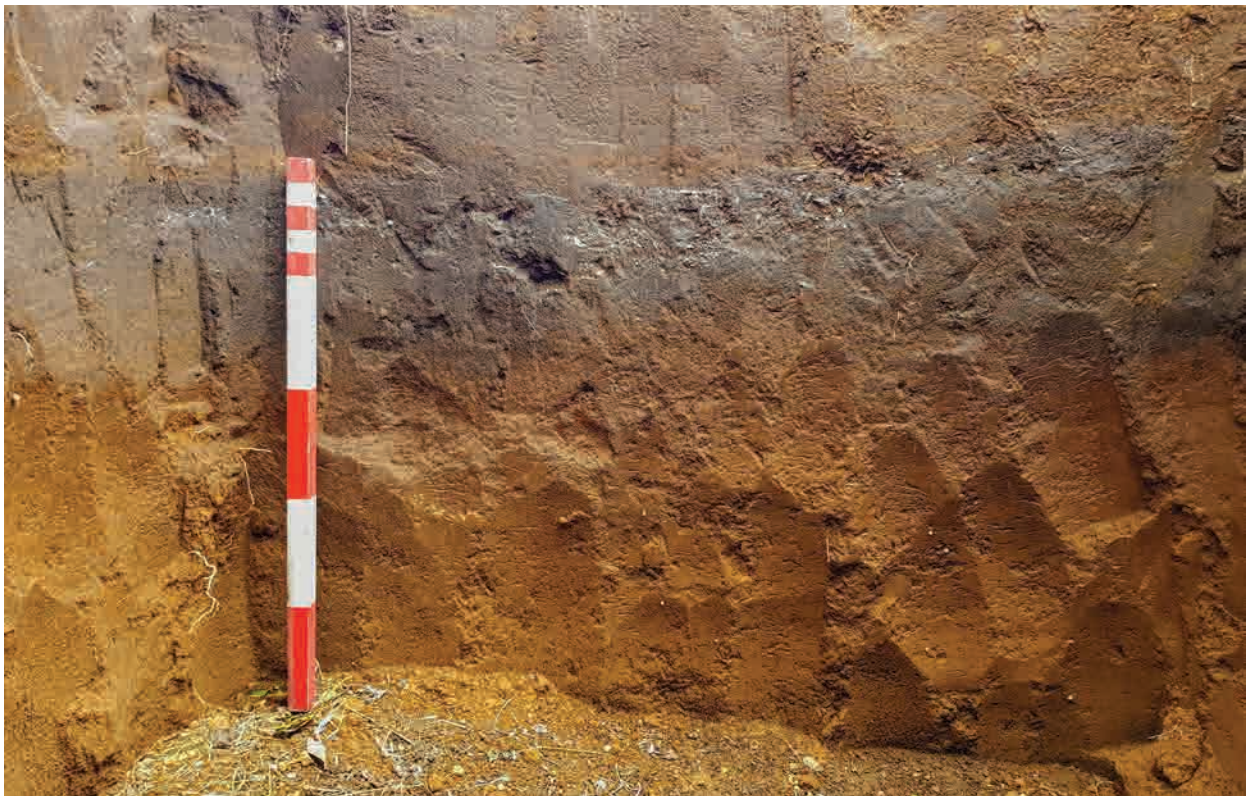

Figure 5. Soil profile of midden lens associated with U14/3276. Photo scale = 0.5m.

Figure 6. Excavated portion of storage pit at U14/3678. Photo scales = 0.5 and 0.25 m.

Figure 7. Northern and eastern baulks showing section of scoop U14/3679. Photo scales = 1 m and 0.5 m.

Figure 8. Intact portion of U14/3680 surrounded by service trenches. Photo scales = 1 m and 0.5 m.

Analysis

All samples retained from this project were 10 litre bulk samples of midden. These midden samples were analysed following the guidelines for midden sampling and analysis set out by HNZPT (2014). The bulk samples were wet sieved through a 6 mm screen, and the dried material was sorted by hand to faunal class, as well as separating stone (both fire cracked rock and worked stone), bone, shell and charcoal. Each class was weighed and bagged separately. Each bag was then passed on to the relevant specialist for analysis. Because the four sites are in separate parts of the peninsula, analysis is primarily discussed on a site by site basis, with a summary at the end.

The shellfish recovered from the midden samples was analysed by Samantha Agnew and Danielle Trilford of CFG Heritage , with species identification based on Morley (2006). Shellfish species were identified using diagnostic units, for bivalves this was single hinge units, and for gastropods with included the apex, operculum, or aperture.

Fishbone recovered from the midden samples was analysed by Matthew Campbell of CFG Heritage following the methodology outlined in Campbell (2016), adapted from the methodology developed by Anderson (1973) and Leach (1986).

Stone material recovered from the midden samples was analysed by Arden Cruickshank of CFG Heritage following the methodology outlined in Beyin (2010), Holdaway and Stern (2004), Turner (2005), Phillipps and Holdaway (2016) and Cruickshank (2011). They were also inspected macroscopically to ascertain their geographical source using Moore (1988), to better understand the exchange networks which were in place during the occupation of the site.

Charcoal recovered from the midden samples 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).

A 100 g sample of tuangi from each site was submitted to the University of Waikato Radiocarbon Dating Laboratory. These are discussed separately below.

Site 2 (U14/3276)

This sample consisted of a 10 L bulk sample which had a dried weight of 11.1 kg. Following sieving through a 6 mm screen, 1 kg was retained for analysis.

Shellfish

The midden results from U14/3276 match the overall patterns found in the other samples from the investigation, however, the total number is small (total MNI = 51) (Table 1). Assemblages with an MNI less than 100 are considered too small for statistical analysis and can only be treated as informative guides to the probable results if the samples were larger (Campbell 2017a: 276–279, 2017b).

Although a greater variation of shellfish species were recovered from the site when Moore (2009) first analysed it, the percentages of bivalves is nearly identical, with tuangi making up 89% of the assemblage and pipi and oval trough shell making up 4% each. The high proportion of shell residue from this sample in comparison to the whole shell is indicative of crushing of shell, likely from trampling.

Table 1. Shellfish from U14/3276.

Common name	Taxon	MNI	Weight (g)
Tuangi	*Austrovenus stutchbuyri*	47	47
Pipi	*Paphies australis*	2	7
Oval trough shell	*Cyclomactra ovata*	2	0
Residue			610
Total		51	664

Fishbone

A single scute from a mackerel (*Trachurus* sp.) was recovered from this sample. Mackerel are typical for this type of environment and are the most common fish in the Western Bay of Plenty archaeological sites.

Lithics

Several fire affected cooking stones were recovered from this sample. These all appear to be water rolled rhyolite cobbles and pebbles. According to Moore (2009) the closest source of rhyolite is the Waipapa River which flows into the harbour directly west of Omokoroa.

Charcoal

U14/3276 had the highest taxonomic diversity of all of the samples from Omokoroa, with a total of nine species present (Table 2). The species present suggest that the resources extracted came from a coastal area dominated by shrubs, such as hebe (13%), manuka (34.7%), coprosma (26%), tutu (4.3%) and pittosporums. (4.3%), indicating secondary growth. There are also some small numbers of larger coastal forest species, such as pohutukawa (4.3%) and puriri (4.3%) present that often survive forest clearance, while the presence of totara (4.3%) indicate some collection of stumps from the remains of primary forest in the area. A very small amount of mangrove (4.3%) was also identified.

Table 2. Charcoal results from U14/3276.

Common Name	Taxon	Count	%
Pohutukawa	*Metrosideros excelsa*	1	4.3
Hebe	*Hebe* sp.	3	13.
Manuka	*Leptospermum scoparium*	8	34.8
Coprosma	*Coprosma* sp.	6	26.1
Tutu	*Coriaria arborea*	1	4.3
Mangrove	*Avicennia marina*	1	4.3
Pittosporum	*Pittosporum* sp.	1	4.3
Puriri	*Vitex lucens*	1	4.3
Totara	*Podocarpus totara*	1	4.3
Total		23	

Radiocarbon dating

The calibrated radiocarbon date had a very wide distribution but indicated a probable date of occupation in the mid-17th to mid-18th centuries AD (Table 3).

Table 3. Radiocarbon date for U14/2376.

Lab number	Material	CRA	Cal AD 68%	Cal AD 95%
Wk-50302	Shell	612 ± 27	1632–1775 (62.7%) 1785–1804 (5.5%)	1539–1834

Site 3 (U14/3678)

This sample consisted of a 10 L bulk sample which had a dried weight of 9.9 kg. Following sieving through a 6 mm screen, 1.2 kg was retained for analysis

Shellfish

Shellfish results from U14/3678 suggest the harbour was targeted, and the rocky outcrops within the Harbour would have enabled sporadic foraging of gastropods (Table 4). The sample is dominated by pipi; both in weight and MNI, followed secondly by lesser amounts of tuangi. There is a wider breadth of species in this sample compared to others obtained during this project indicating that people were primarily targeting large bivalves such as oval trough shell, pipi,

Table 4. Shellfish from U14/3678.

Common name	Taxon	MNI	Weight (g)
Pipi	*Paphies australis*	537	517
Oval trough shell	*Cylcomactra ovata*	26	48
Spotted top shell	*Melagraphia aethiops*	2	0
Horn shell	*Zeacumantus lutulentus*	1	0
Lined whelk	*Buccinulum vittatum*	2	4
Mud snail	*Amphibola crenata*	1	3
Tuangi	*Austrovenus stutchburyi*	156	306
Residue			360
Total		725	1238

and tuangi with bycatch of smaller un-economic species such the Horn Shell; with some rocky outcrop species collected in addition to these main targeted species.

Charcoal

The range of species identified within U14/3678 indicate a coastal forest dominated by puriri (72%), with some smaller undergrowth shrubs such as Hebe sp. (16%), and Coprosma sp. (4%). Some other larger lowland and coastal species were also present such as pohutukawa (4%) and Quintinia sp. (4%) (Table 5).

Table 5. Charcoal results from U14/3276.

Common Name	Species	Count	%
Puriri	*Vitex lucens*	18	72
Hebe	*Hebe* sp.	4	16
Pohutukawa	*Metrosideros excelsa*	1	4
Quintinia	*Quintinia* sp.	1	4
Coprosma	*Coprosma* sp.	1	4
Total		25	

Radiocarbon dating

This sample had a tight distribution placing occupation in the mid-15th and early 16th centuries AD (Table 6). This is the earliest date of any of the sites reported here.

Table 6. Radiocarbon date for U14/3678.

Lab number	Material	CRA	Cal AD 68%	Cal AD 95%
Wk-50303	Shell	824 ± 29	1441–1530	1415–1623

Site 4 (U14/3679)

This sample consisted of a 10-litre bulk sample which had a dried weight of 14.5kg. Following sieving through a 6 mm screen, 2.2 kg was retained for analysis. It was noted at the time of sorting that some historic glass was present in the sample indicating that midden may have been modified during driveway construction.

Shellfish

The shellfish from U14/3679 were mostly tuangi and pipi with other estuarine species in small amounts (Table 7). A single cats eye operculum and a small quantity of mudsnail (*Amphibola crenata*) were also present confirming the harbour was targeted. The sample has a higher volume of unidentifiable shellfish residue than the other samples taken in this investigation, which suggests post-deposition site damage.

Table 7. Shellfish from U14/3679.

Common name	Taxon	MNI	Weight (g)
Pipi	*Paphies australis*	76	80
Cats eye (operculum)	*Turbo smaragdus*	1	1
Mud snail	*Amphibola crenata*	17	44
Tuangi	*Austrovenus stutchburyi*	89	193
Residue			1730
Total		183	2048

Charcoal

The species identified indicate an environment of secondary regrowth dominated by small shrubs such as Hebe sp. (43.5%), Coprosma sp. (17.3%), manuka (4.3%) and lancewood (13%) (Table 8). There were also several specimens that could be hesitantly identified as rangiora (8.6%) that is also a shrub that thrives in coastal environments.

Table 8. Charcoal results from U14/3679.

Common Name	Taxon	Count	%
Lancewood	*Pseudopanax crassifolius*	3	13
Hebe	*Hebe* sp.	10	43
Coprosma	*Coprosma* sp.	4	17
Manuka	*Leptospermum scoparium*	1	4
Unidentified bark		3	13
cf. Rangiora	*Brachyglottis repanda*	2	9
Total		23	

Fishbone

There were four fish bones from this sample, three mackerel and the other a small vertebra that could not be identified.

Lithics

A single piece of obsidian shatter was recovered from this sample. It is green in transmitted light and has inclusions within it. This piece of obsidian is likely from Tuhua, which is also the closest source to this site. As its dimensions were smaller than 10 mm, no further analysis was undertaken.

Radiocarbon dating

The sample had a wide date range, dating between the 18th century and the modern era (Table 9). The historic glass found on the sample could indicate that the midden was deposited in the historic period, but could also be a result of disturbance during driveway construction.

Table 9. Radiocarbon date for U14/3679.

Lab number	Material	CRA	Cal AD 68%	Cal AD 95%
Wk-50304	Shell	523 ± 27	1700–1854	1684…

Site 5 (U14/3680)

This sample consisted of a 10-litre bulk sample which had a dried weight of 12.6kg. Following sieving through a 6 mm screen, 2 kg was retained for analysis.

Shellfish

Over 70% of the sample by MNI is tuangi, with pipi, oval trough shell, mudsnail, and a single speckled whelk making up the rest (Table 10). Most of these are harbour or estuarine species.

Table 10. Shellfish from U14/3680.

Common name	Taxon	MNI	Weight (g)
Pipi	*Paphies australis*	28	11
Speckled whelk	*Cominella adspersa*	1	4
Mudsnail	*Amphibola crenata*	17	13
Oval trough shell	*Cylcomactra ovata*	17	28
Tuangi	*Austrovenus stutchburyi*	781	678
Residue			1000
Total		844	1734

Charcoal

The species identified indicate an environment of secondary regrowth dominated by small shrubs such as Hebe (50%), manuka (15.6%) and tutu (34.3%) (Table 11).

Table 11. Charcoal results from U14/3680.

Common name	Taxon	Count	%
Manuka	*Leptospermum scoparium*	5	16
Hebe	*Hebe* sp.	16	50
Tutu	*Coriaria arborea*	11	34
Total		32	

Fishbone

The small fishbone assemblage was dominated by mackerel (NISP = 11) with one small kingfish (*Seriola lalandi*) dentary and one unidentified vertebra. Mackerel are the most common fish in western Bay of Plenty assemblages and are usually assumed to have ben netted. The kingfish may be a bycatch or it may have been taken on a baited hook.

Lithics

There were several pieces of fire affected stone retrieved from this sample which have probably been used for cooking stones. These are mainly rhyolite, with some minor numbers of andesite. Moore (2009a) attributes the Waipapa River directly north of Omokoroa as the most likely source of rhyolite obtained from samples on the peninsula, with andesite sources being further afield at the Whatakao and Aongatete Rivers.

A single piece of obsidian shatter was recovered from this sample. It is green in transmitted and is likely from Tuhua, which is also the closest source to this site. As its dimensions were smaller than 10 mm, no further analysis was undertaken.

Radiocarbon dating

This sample returned a date to the late 16th and early 18th centuries AD (Table 12).

Table 12. Radiocarbon date for U14/3680.

Lab number	Material	CRA	Cal AD 68%	Cal AD 95%
Wk-50305	Shell	623 ± 30	1584–1724 (64.7%) 1746–1750 (1.0%) 1790–1800 (2.55)	1533–1824

Discussion and Conclusion

Four in situ archaeological sites were encountered, one of which had previously been encountered during stormwater upgrades in 2006 (Moore 2009a), and three which had not previously been recorded. The results of this project are similar to those recovered by Moore in 2006, both in species represented and occupation dates.

Of the four dates obtained, three produced quite large distributions, with the sample from U14/3679 stretching into the modern era. New Zealand radiocarbon dates often have wide distribution due to the timing of pre-European occupation falling within the flatter section of the calibration curve. Generally, the results indicate occupation and exploitation of resources in Omokoroa from the mid-15th century, through to the 19th century, when Maori occupation was noted in the area. The charcoal samples obtained indicated secondary growth from even the earliest ample (U14/3678), so it is probable that occupation was earlier than this.

The shellfish identified within this project are representative of harbour species which would have been exploited from primarily the intertidal areas, with lesser numbers coming from rocky outcrops in the area. This type of shellfish exploitation is to be expected in this region. Similar species were identified by Moore (2009a).

The fishbone identified within this project were dominated by mackerel, which is to be expected for these sites, as it is the most dominant species within Tauranga Harbour. Fishbone was recovered by Moore (2009a) but was not analysed.

The four samples of charcoal all indicate that the resources extracted came from a coastal area of secondary growth, dominated by shrubs. This is similar to those samples from Moore (2009a), although puriri was identified in all midden samples by Moore and it was only identified in half of the samples during this project. This could simply be a sample size issue, as the samples from this project were small, due to the minimal ground disturbance undertaken.

This project can be seen as a case study in which directional drilling can be compared to open trenching. Moore (2009a) monitored stormwater works where open trenching was utilised throughout a smaller portion of the peninsula, and encountered seven sites, including one (U14/3276) which was also encountered during these works. The midden analysis from both projects returned similar results, with this project having a lesser impact on the archaeological sites as drilling could be set to go beneath the sites, preserving the remainder of them.

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