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ARCHAEOLOGICAL INVESTIGATIONS OF THE ARA TŪHONO – PŪHOI TO WELLSFORD ROAD

(STAGE 1 – PŪHOI TO WARKWORTH SECTION)

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With contributions by Mark Horrocks, Karen Greig, Jessie Hurford, Tristan Russell, Monica Tromp, Rod Wallace and Dilys Johns

Report prepared for
Waka Kotahi NZ Transport Agency
and the Northern Express Group (NX2)

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ARCHAEOLOGICAL INVESTIGATIONS OF THE ARA TŪHONO – PŪHOI TO WELLSFORD ROAD (STAGE 1 - PŪHOI TO WARKWORTH SECTION)

In accordance with HNZPT Authority Nos. 2017/628 and 2018/097

Prepared for Waka Kotahi NZ Transport Agency and the Northern Express Group (NX2)

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EXECUTIVE SUMMARY

The Northern Express Group (NX2) has created a four-lane, 18.5km extension of the State Highway 1 (SH1) Northern Motorway from the Johnstones Hill Tunnels to just north of Warkworth, as the first stage of the Ara Tūhono – Pūhoi to Wellsford Road of National Significance. The Ara Tūhono – Pūhoi to Wellsford Road SH1 extension was one of the seven routes announced. It was envisaged that the motorway extension would lead to a more efficient, resilient and safer connection between Pūhoi and Warkworth, improve journey times (especially during peak holiday periods and weekends) and freight efficiency, resulting in regional economic growth.

To deliver the Pūhoi to Warkworth project a Private Public Partnership (PPP) was established between the Waka Kotahi NZ Transport Agency (NZTA) and NX2. NX2 was formed of New Zealand and overseas firms with considerable experience in the design, construction, finance, maintenance and management of major infrastructure projects. The consortium's principal partners consisted of Acciona Infrastructures, Fletcher Building Ltd and Waka Kotahi NZ Transport Agency with Hōkai Nuku Ltd as Treaty partner representing mana whenua – Ngāti Manuhiri, Ngāti Mauku/Ngāti Kauae of Te Uri o Hau, Ngāti Rango of Kaipara and Ngāti Whātua Iwi. The consortium is responsible for financing, designing, building, maintaining and operating the motorway for up to 25 years, although the motorway remains a public asset. The new motorway is scheduled to open in June 2023.

Clough & Associates were commissioned by NX2 to undertake the archaeological monitoring of the Pūhoi to Warkworth works and the investigation of any archaeological remains exposed. The project was split into split into four zones, each subdivided further into a total of 12 work areas, each with their own Site Access Point (SAP). At the time of works commencement five recorded archaeological sites were known to be modified by construction works – middens R11/1106 and R10/1417; a log skid that was part of site R10/1107; and two historic house sites recorded as archaeological sites, R10/1436 (Schollum House) and R10/1437 (Wenzlick's house). All five sites were located in the Southern Zone. In addition, two pā sites were identified at the assessment stage (Pā o Te Hēmara Tauhia – R10/921, and Kāinga Tawhito Ngā Tupuna – R10/1369). Both pā were situated within 'no soil disturbance areas' with their management during and post-construction covered by a Pā Management Plan. Archaeological monitoring and excavations were undertaken at five of the 12 work areas/SAPs. Three of the work areas were situated in the Southern Zone of the project area and to the west of the Pūhoi River, consisting of 3 Puhoi Road (SAP 10); 11 and 22B Billing Road (SAP 11), and the Stanaway Property at 1457 Hibiscus Coast Highway (SAP 12), situated immediately to the northwest of the Johnstones Hill Tunnels. The two other work areas were to the north of the Pūhoi River in the Central South Zone at 517 State Highway 1 (SAP 9) and in the north at the junction between Woodcocks Road and Carran Road, Warkworth (SAP 2). No archaeological deposits or features were exposed at any of the other seven works areas.

During the road construction works 31 archaeological sites relating to Māori settlement and activities were exposed, as well as the two historic European house sites and log skid site. In total some 3,561 individual archaeological contexts were investigated and recorded. All but five of the sites were situated within the western reaches of the Pūhoi River Valley south of the existing Puhoi Road and north of the Johnstones Hill Tunnels. The vast majority of the sites consisted of shell middens with associated cooking and marine resource processing features situated in elevated positions on terraces and ridge spurs

overlooking the Pūhoi River Valley. Of particular note was an extremely large earth oven some 2.98m in length by 2.68m wide and almost half a metre deep (site R10/1512) that was located at the 3 Puhoi Road property and is interpreted as an umu tī. It was evident quite early on in the monitoring of works on the property that the modern topography of its western area bore little to no resemblance to that of the former landscape that would have been contemporary with Māori occupation of the area. As a result of the presence of a line of springs issuing from the steep sides of the large hill that dominated the 3 Puhoi Road site, coupled with the steeply angled interbedded mudstones and sandstones, the western side of the property formed the perfect environment for producing landslips. Evidence of former land movement was present as rotational slump scars, significant soil creep in the form of terracettes present on the steep slopes, along with associated depositional features such as lobe and cone/fan shaped formations situated on the more gentle, lower slopes. In some cases the landslips entailed the movement of topsoil, subsoil and even the upper levels of the natural mudstone, which had then descended en masse, and redeposited in fan or lobe-shaped formations. This led to the situation where a number of areas that had been determined to have been stripped to 'natural' horizons, had to be subsequently revisited as buried topsoil, and in some cases shell midden deposits, were then encountered at depth where such features were not expected to be present. Once an understanding of the nature of the geomorphology had been gained, subsequent stripping of the topsoil and modern overburden was taken to deeper levels to ensure there were no deeply buried archaeological sites present.

There were also four Māori sites located just north of the Pūhoi River, situated on three terraces (sites R10/1417, R10/1509 and R10/1510) and (R10/1495) on the floodplain close to the northern banks of the river, and again consisting of shell middens.

Only a single archaeological site was exposed by the road construction works in the northern zone. A cache of well-preserved wooden Māori artefacts (R09/2247) was exposed during drainage works at the intersection of Woodcocks and Carran Roads within a palaeochannel, located some 2.5km to the west of Warkworth.

The principal archaeological excavations, however, were focused on two complex, stratified occupation sites of longer duration, situated at 3 Puhoi Road west of the Pūhoi River (R10/1484) and the existing State Highway 1, and at 517 State Highway 1 just north of the river and to the west of Hikauae Creek (R10/1417). These sites were both multi-phased and produced a large volume of archaeological data including artefactual, ecofactual and environmental materials. A further small site characterised by a large umu ti (oven) R10/1512) was located to the north of R10/1484 but south of R10/417.

Site R10/1484, situated in a prominent location overlooking the Pūhoi River and its floodplain as well as its confluence with the Hikauae Creek, was found to be remarkably intact with only very minimal disturbance, with a relatively artefact-rich buried soil, which also contained significant quantities of kōkōwai (red ochre). Of significance were two large post-pit features each of which contained two extremely large and deep postholes, the function of which was interpreted as being to support two substantial, tall upright posts. A number of other postholes within the post-pits would have held bracing timbers for the large posts, and several alcoves were cut into the post-pits and large postholes. There was also an ovoid structure, ochre roasting ovens and an area of intercutting pits. The posts would have been visible for some distance to those approaching by river or overland. The combined archaeological features and location suggest the site was both culturally and archaeologically significant.

Site R10/1417 was located to the north of the Pūhoi River, overlooking the river and its confluence with the Hikauae Creek. The site was spread over two terraces on a roughly north-south trending ridgeline. Both terraces held strategic views to the southeast and south along both waterways. There was little evidence of any disturbance to the site, with well-preserved stratigraphy that represented two distinct phases of occupation. The features on the two terraces predominantly comprised postholes and stakeholes related to a palisaded enclosure, kūmara storage pits, two whare, pātaka, as well as three shell midden deposits with associated features such as earth ovens, firescoops, and posthole alignments. The site was well stratified, with the archaeology relating to distinct phases. The earlier phase consisted of the palisaded enclosure on the upper terrace containing the kūmara storage pits, which were somewhat unusual, being sub-circular to slightly oval in shape, and which had an associated above-ground roof superstructure. They are referred to as rua porotaka. A further rua porotaka, which was also by far the largest of the features, was situated outside of the upper terrace palisade on the lower terrace.

Site R10/1484 produced a lithic assemblage numbering some 234 stone artefacts relating to tool manufacture. The assemblage predominantly comprised obsidian, chert, basalt and argillite, with 41 items displaying evidence of shaping or reduction into specific tool forms such as adzes, blades, abraders, hammer stones and pounders as well as retouched flakes. The assemblage also included a small amount of sandstone, breccia and unidentifiable volcanic stone that was probably intended for use in abrading or sharpening tools. X-ray fluorescence analysis of obsidian from site R10/1484 established that the majority of the assemblage was likely from north of the Coromandel Peninsula, with most being sourced from Great Barrier Island, although there were also examples from Mayor Island and Huruki or Hahei in the Coromandel.

Site R10/1417, however, produced the largest artefact assemblage of the archaeological investigations with a lithic assemblage consisting of some 314 stone artefacts relating to tool manufacture. The assemblage predominantly comprised obsidian, chert, basalt and argillite, with 19 items displaying evidence of shaping or reduction into specific tool forms, while 63 items were classified as flakes and 13 as cores. X-ray fluorescence analysis of almost half of the 228 obsidian specimens from site R10/1417 determined that the vast majority of the obsidian was sourced from north of the Coromandel Peninsula, and most likely from Great Barrier Island, although some specimens were also established to have originated in the Coromandel Peninsula and Mayor Island.

Of the smaller investigated sites, R10/1106 produced obsidian, chert and, together with site R10/1485, fragments of argillite, each displaying hammer dressing and cortex polish attesting to the reworking of adzes at these sites. The assemblage as a whole demonstrates lithic trade networks between the Pūhoi region and a number of North Island volcanic zones, as well as argillite from Nelson and the use of local geological sources.

Plant microfossil analysis of samples taken from R10/1484, situated at the eastern end of a broad flat terrace, provided evidence of several Māori-introduced cultigens, namely bottle gourd, greater yam, kūmara and taro and suggested moderate scale landscape disturbance. Analysis of charcoal samples from site R10/1484 suggests that the vegetation surrounding the site during its occupation was dominated by scrub species along with pohutukawa and puriri, while many of the smaller dispersed shell midden sites across the rest of the property at 3 Puhoi Road (such as sites R10/1498, R10/1501, R10/1503, R10/1512 and R10/1514) had a wider range of broadleaf tree species, implying that more developed bush was present at various times across the landscape.

Analysis of shell midden samples taken from the sites illustrates that the inhabitants exploited both the local tidal river and its muddy inlets, as well as the estuarine and sandy shore environments on the Hauraki Gulf, with cockle, pipi and mud snail being particularly well represented. Snapper, unidentified fishbone and unidentified avian bone was also present in samples from two of the sites at the 3 Puhoi Road property.

The 78 radiocarbon samples taken from the investigated sites in the Pūhoi River Valley enable a valuable understanding of the chronology of Māori settlement within the area, as prior to the project there was only a single extant radiocarbon determination from the area, from a site near the Johnstones Hill Tunnels to the south of the current project. The dates demonstrate that the landscape on the western side of the river was being utilised, transited through, and at times settled between the late 15th century and the end of the first quarter of the 1800s. Bayesian statistical analysis of the radiocarbon determinations from sites R10/1417 and R10/1484 further refined the date ranges and developed a robust chronology of each site.

No archaeological sites relating to the 19th century European settlement period were exposed by the works, but an early 20th century historic artefact-rich deposit found at the property at 1457 Hibiscus Coast Highway, in the far south of the project area, related to a hitherto unknown, small, late 19th century cottage on the property that had been demolished in 1902. However, no in situ pre-1900 features or deposits remained.

The archaeological investigations and monitoring of the Pūhoi to Warkworth Section of the Ara Tūhono project roadworks reported on here were undertaken in several stages from 20 April 2017 to 10 September 2020 in accordance with Heritage New Zealand Pouhere Taonga (HNZPT) Authority Nos. 2017/628 and 2018/097. This final report presents the results of the Ara Tūhono – Pūhoi to Wellsford, Pūhoi to Warkworth Section, archaeological investigations.

METADATA

Keywords	Palisade; pouwhenua; pit and terrace sites; multi-phased settlement sites; shell middens; pre-contact Māori; post-contact Māori
Authority No.	2017/628 and 2018/097
Authority Holder	Fletcher – Acciona (Company Joint Venture)
NZAA Site Nos.	Sites all prefixed with R10 = 1106; 1107; 1417; 1436; 1437; 1482; 1484; 1485; 1486; 1495; 1496; 1497; 1498; 1499; 1500; 1501; 1502; 1503; 1504; 1505; 1506; 1507; 1508; 1509; 1510; 1511; 1512; 1513; 1514; 1515; 1516; 1517; 1518 and 1519. Also R09/2247
Address of works	1457 Hibiscus Coast Highway, Puhoi; 11 Billing Road and 22B Billing Road, Puhoi; 3 Puhoi Road, Puhoi; 517 State Highway 1, Puhoi; and Junction of Carran Road and Woodcocks Road, Warkworth.
Local authority	Auckland Council Te Kaunihera o Tāmaki Makaurau
Iwi/ hapū	Ngāti Manuhiri, Ngāti Mauku/Ngāti Kauae of Te Uri o Hau, Ngāti Rango of Kaipara and Ngāti Whātua Iwi
Section 45 approved person	Dr Sarah Phear and (in the later stages) Dr Rod Clough
Radiocarbon date lab assigned numbers	Wk49636, Wk49676, Wk49728, Wk49925-Wk49926, Wk49982-Wk50000, Wk50202-Wk50542, Wk51896, Wk52430-Wk52434
Feature types	Palisaded enclosure, whare, kūmara pits, shell middens, terraces, hāngī, firescoops, post-pits, postholes, stakeholes, board-slots
Date of fieldwork	20 April 2017 to 10 September 2020
Archaeological site management plan reference	Phear, S. June 2018 (updated from July 2017). Ara Tūhono Project, Pūhoi to Warkworth Section: Archaeological Research Strategy & Site Management Plan. Prepared by Clough & Associates Ltd for NX2
Research strategy reference	Phear, S. June 2018 (updated from July 2017). Ara Tūhono Project, Pūhoi to Warkworth Section: Archaeological Research Strategy & Site Management Plan. Prepared by Clough & Associates Ltd for NX2
Location of material remains and samples	Hōkai Nuku, 26 Billing Road, Puhoi 0994
Location of documentation	Clough & Associates Ltd Digital Archive - 321 Forest Hill Rd, Waiatarua, Auckland 0612
Title and author of report	Archaeological Investigations of the Ara Tūhono – Pūhoi to Wellsford Road of National Significance (Stage 1 - Puhoi to Warkworth Section). Richard Shakles, Sarah Phear, Simon Bickler, Carly Mailhot, Jennifer Low, Zarah Burnett and Tom Clough-Macready

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1 INTRODUCTION

1.1 Project Background

The Northern Express Group (NX2) has constructed a four-lane, 18.5km extension of the State Highway 1 (SH1) Northern Motorway from the Johnstones Hill Tunnels to just north of Warkworth, as the first stage of the Ara Tūhono – Pūhoi to Wellsford Road (Figure 1.1). The road was commissioned to create a more efficient, resilient and safer connection between Pūhoi and Warkworth, and to improve journey times (particularly during peak holiday periods and weekends) as well as freight efficiency, resulting in regional economic growth. The new motorway has been built to the west of the existing SH1 and bypasses Warkworth on its western side (Figure 1.1). The works for the construction phase of the project involved large-scale cut and fill earthworks, formation of access tracks, sediment and erosion control earthworks, bridge (viaduct) pier and abutment construction, carparking and construction yards, and building demolition. Due to its considerable scale, the project was split into four construction zones: Northern Zone, Central North, Central South and Southern Zone (Figure 1.2).

Clough & Associates were commissioned by NX2 to undertake an Assessment of Environmental Effects (AEE) on historic heritage for the southern section of the Ara Tūhono – Pūhoi to Wellsford Road (Clough et al. 2015) within the boundaries of the proposed road corridor (Figure 1.3). The AEE followed four earlier archaeological assessment reports (Farley, Burnett and Clough 2010a; Farley, Burnett and Clough 2010b; Farley, Burnett and Clough 2011; Phear and Shakles 2014), and historic building evaluation and conditions reports (Brown and Burnett 2015a, 2015b; The Heritage Studio 2015a, 2015b). The AEE report documented the history of the areas traversed by the project, identified sites within or in close proximity to the road corridor designation, described the archaeological and built heritage sites with the potential to be affected by the project, and assessed the effects of the project on historic heritage. It also incorporated the results of all of the fieldwork conducted up to that point for the project.

In July 2017 an archaeological addendum assessment (Phear 2017b) was also undertaken to aid in the finalising of the road design, alignment and associated works. The addendum, in conjunction with the earlier AEE, established that that the project had the potential to affect eight recorded archaeological sites within the designation corridor in the Pūhoi Sector (now the Southern Zone) and southern part of the Central South Zone, as well as two historic heritage sites at the Stanaway property in the far south of the project area (Phear 2017b). The eight recorded archaeological sites included two pā sites (R10/921, Pā o Te Hēmara Tauhia, and R10/1369, Kāinga Tawhito o Ngā Tupuna); however, they were specified as ‘no soil disturbance areas’, with plans to covenant the sites and as such they were protected from any adverse effects of the road’s construction and a Pā Management Plan was developed (Phear et al. 2018). The remaining six archaeological sites consisted of shell middens, a log skid and the remains of a mid-19th century early European settlement period house (Wenzlick’s House) and a turn of the century European house (Schollum House) both located at 517 State Highway 1, to the north of Pūhoi River and east of Hungry Creek (Figure 1.4). The two historic heritage sites consisted of the Titford House, and Titford Cottage situated at 1457 Hibiscus Coast Highway to the northeast of the northern portals of the Johnstones Hill Tunnels.

Additionally, two World War II US Army Camps were identified within the designation in the Perry Road Sector (now the Northern Zone) that were located within the road corridor designation (Clough et al. 2015).

A number of enabling works were undertaken prior to the commencement of the main earthworks phase of the project under an authority issued by Heritage New Zealand Pouhere Taonga (HNZPT, Authority No. 2017/628). These consisted of borehole drilling, fencing, vegetation clearance (including tree felling) and the relocation of the turn of the century Schollum House at 517 State Highway 1 to a location in the Pūhoi area. Two archaeological sites (both shell middens) were exposed by the enabling works in May and June 2017 respectively. One of the shell midden sites (R10/1496), along with an unrelated European settlement period refuse pit, was exposed during track formation works at 1457 Hibiscus Coast Highway, and was excavated, recorded and sampled at the time under the enabling works Authority. The other shell midden site (R10/1476) was only partially exposed by tree felling and vegetation clearance works at 22B Billing Road, and was excavated later in November 2017 under the main project earthworks HNZPT Authority (No. 2018/097).

The Pūhoi to Warkworth Section of the Ara Tūhono project works affected 34 archaeological sites, three of which were able to be avoided and left in situ, with the remainder investigated. The majority of the sites were situated in the western reaches of the Pūhoi River Valley and along the banks of extant and former tidal inlets of the river and related to Māori settlement. Almost all of these sites consisted of shell middens with associated cooking and processing features, and represented primarily brief occupation periods or perhaps even transitory visits of highly mobile groups. However, the principal archaeological excavations were focused on two complex, stratified occupation sites of longer duration, situated at 3 Puhoi Road west of the Pūhoi River and at 517 State Highway 1 just north of the river and west of Hikauae Creek respectively. The investigations at these sites exposed a number of phases of Māori occupation activities and produced a variety of artefactual, ecofactual and environmental materials, and consequently a very large volume of archaeological data was generated. Post-excavation analyses, cataloguing, research and reporting by the Clough & Associates team and a number of external specialists was undertaken between mid-2018 and late 2021.

The archaeological investigation and monitoring of the Pūhoi to Warkworth Section of the Ara Tūhono project roadworks reported on here were undertaken in several stages from 20 April 2017 to 10 September 2020 in accordance with HNZPT Authority Nos 2017/628 and 2018/097. Subsequent site visits and monitoring continued into 2022, but did not produce any additional archaeological material requiring analysis. This final report presents the results of the Ara Tūhono – Pūhoi to Wellsford Road of National Significance Pūhoi to Warkworth Section archaeological investigations.

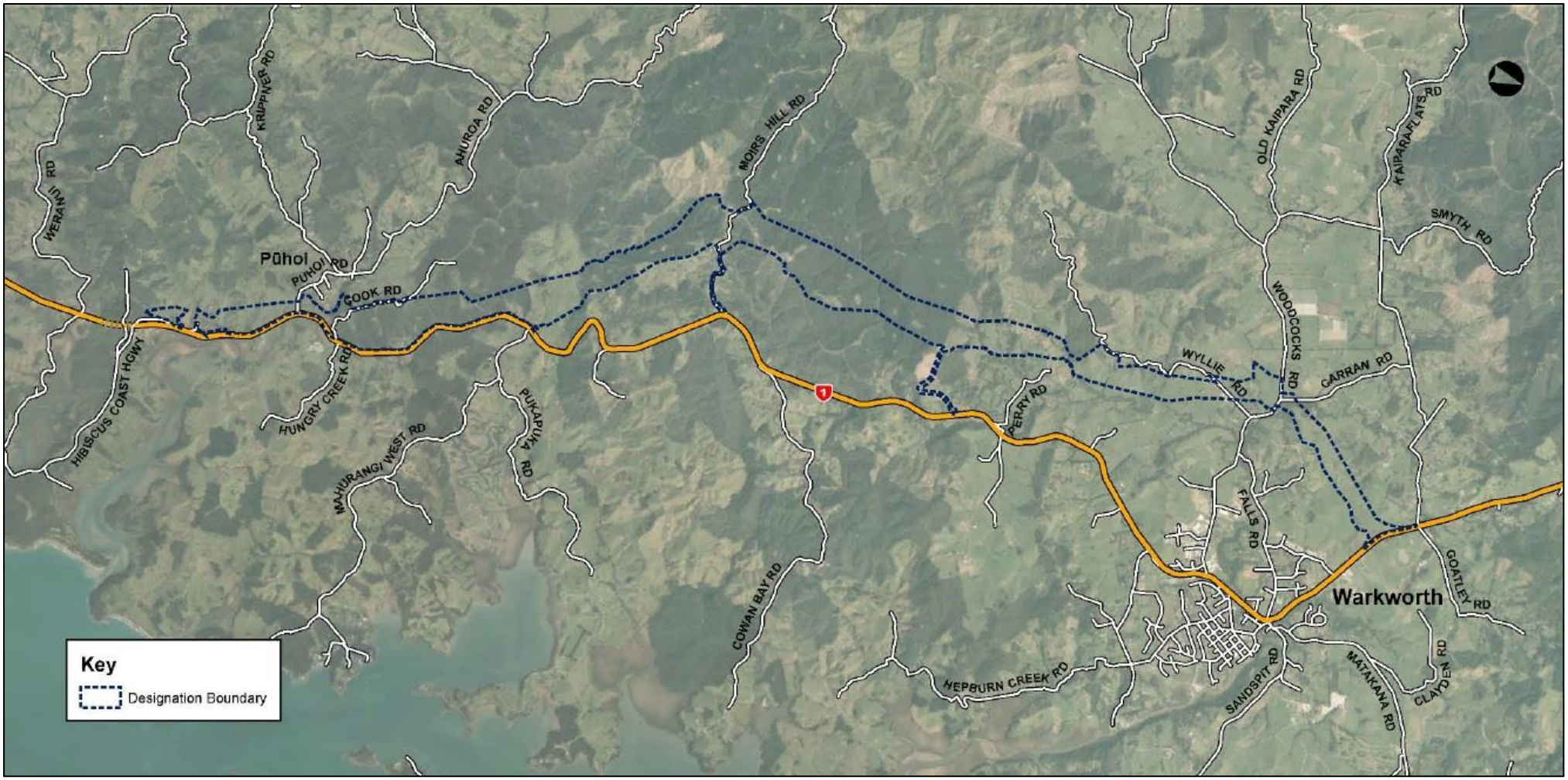


Figure 1.1 Map of the Ara Tūhono, Pūhoi to Warkworth section of the Ara Tūhono – Pūhoi to Wellsford Road with the road corridor designation outlined by the dashed line (source: NZTA)

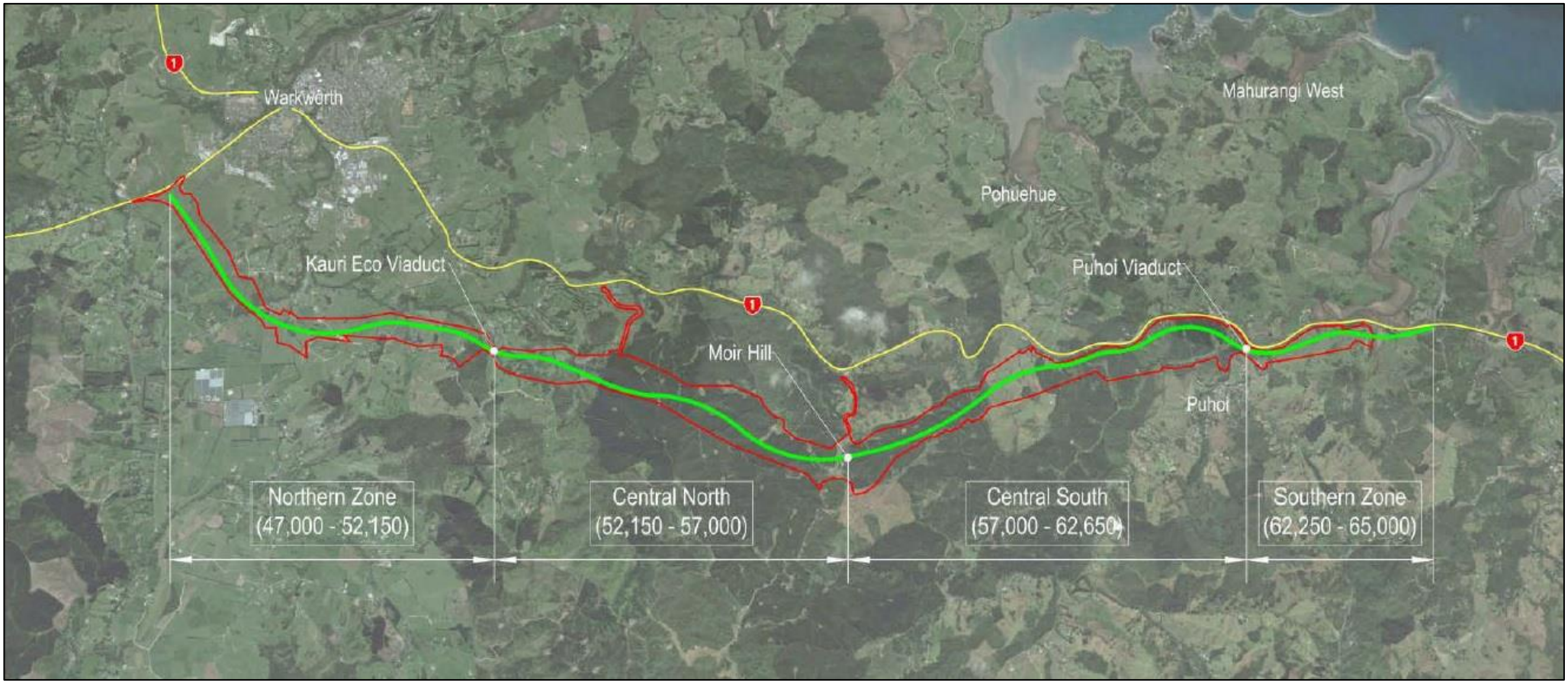


Figure 1.2 Aerial map of the Ara Tūhono, Pūhoi to Warkworth section indicating the four construction zones and the associated chainages (source: CJV)

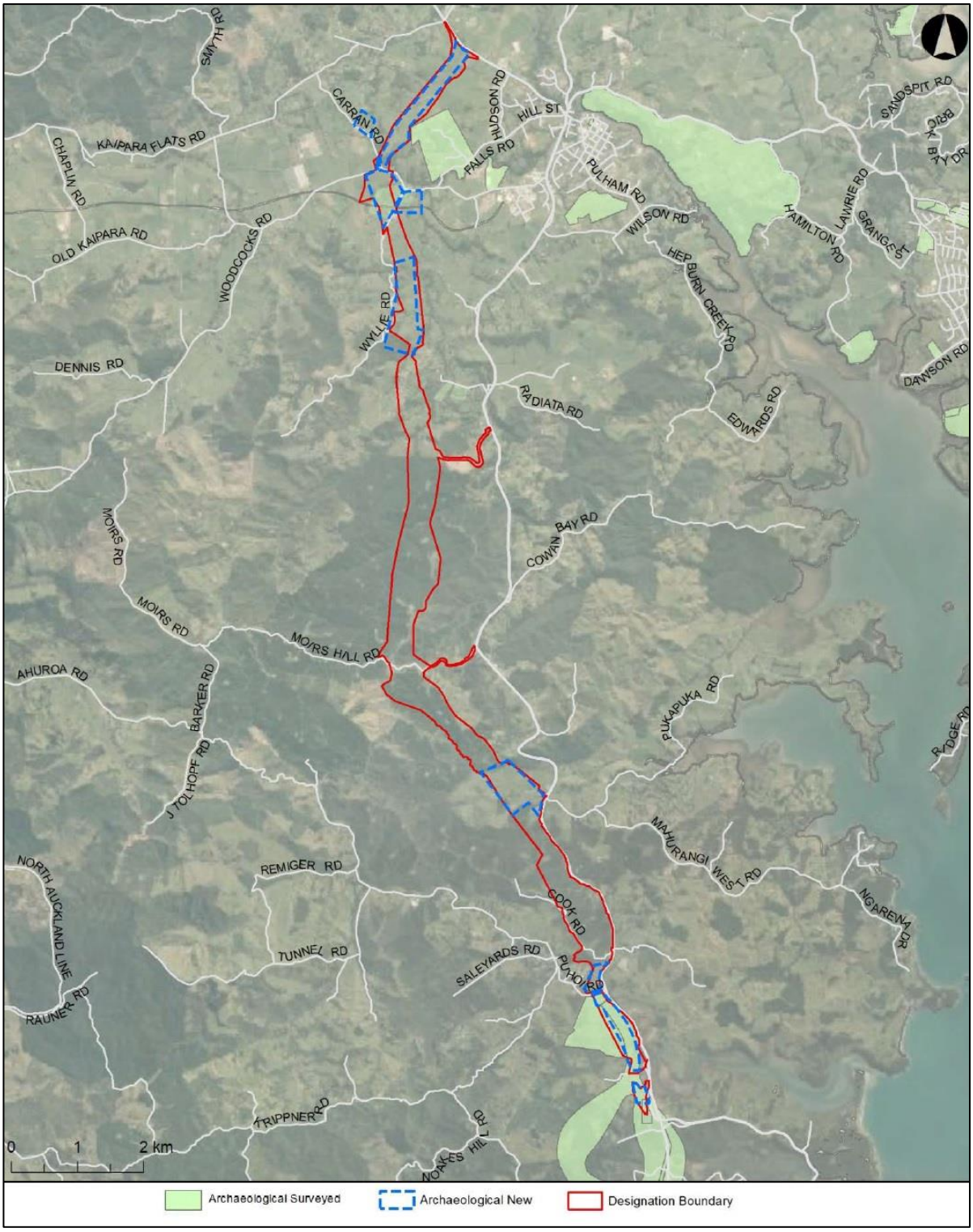


Figure 1.3. Aerial image showing the road corridor designation (red) and the locations where archaeological surveys had previously been carried out (green shading), while areas surveyed during the assessment stage of the project are shown in blue

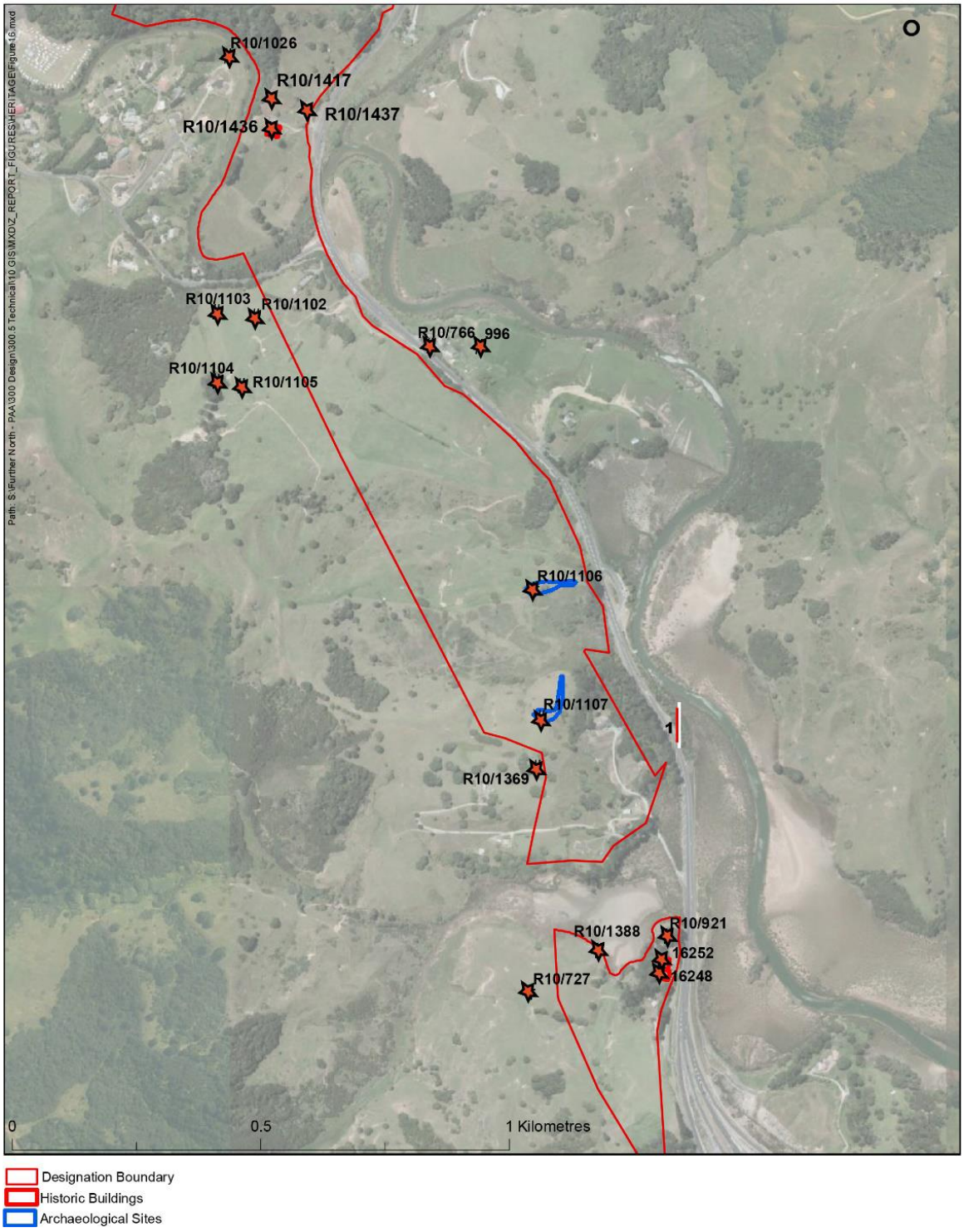


Figure 1.4. Plan illustrating the previously recorded heritage sites (stars) located within the road corridor designation (red line) in the Pūhoi area. Those without the prefix R10 are historic heritage sites recorded in the Auckland Council CHI – Titford House and Titford Cottage. (NB. While site R10/1369 appears to be located outside of the designation, part of the site extends within it)

1.2 Excavation Methodology

The project was split into four construction zones that were further subdivided into 12 work areas each with their own Site Access Point (SAP). The areas that required archaeological monitoring and investigation in the Southern Zone consisted of the Stanaway Property at 1457 Hibiscus Coast Highway (SAP 12), in the far south of the project area and situated to the northwest of the Johnstones Hill Tunnels; 11 and 22B Billing Road (SAP 11) situated to the north of the Ōkahu Creek Inlet; and 3 Puhoi Road (SAP 10) on the southern side of Puhoi Road. The other areas requiring monitoring were at 517 State Highway 1 (SAP 9) in the Central South Zone to the north of the Pūhoi River; and in the Northern Zone at the junction between Woodcocks Road and Carran Road, Warkworth (SAP 2).

Preceding the main archaeological investigations, several enabling works were undertaken under HNZPT Authority no. 2017/628, which consisted of tree and vegetation clearance, and geotechnical testing (boreholes) which had the potential to affect sites R10/921, R10/1106, R10/1107, R10/1417, R10/1436 and R10/1437. However, the pā site R10/921 was not impacted by these works.

The archaeological investigations and monitoring works were undertaken over numerous stages from 20 April 2017 to 10 September 2020, with intermittent site visits continuing into 2022, in accordance with HNZPT Authority Nos. 2017/628 and 2018/097. Detailed descriptions of the archaeological excavation methodologies during the monitoring works as well as for the large-scale excavations at site R10/1484 and R10/1417 are presented in Sections 3.1.2, 4.1.2 and 4.4.2.

1.3 Report Methodology and Structure

This report presents the results of the archaeological investigations of the Ara Tūhono, Pūhoi to Warkworth Section of the Road of National Significance. This detailed report complies with condition 6 of HNZPT Authority Nos. 2017/628 and 2018/097. The excavation results are discussed in relation to occupation phases, the date ranges of which have been derived from stratigraphic interpretation, radiocarbon dating and historic research. The artefacts and ecofacts are discussed in full, while a representative subset of environmental and shell midden samples are discussed in relation to the archaeology, and are also used to date archaeological layers and/or deposits, as well as to highlight the composition of the cultural assemblage recovered.

The report is structured based on geographical boundaries, concentrating in the main on the archaeology of the Southern Construction Zone which relates to the western reaches of the Pūhoi River valley, north of the Johnstones Hill Tunnels and south of Puhoi Road. However, a substantial part of the report also concentrates on the archaeology of the southernmost part of the Central South Construction Zone, which relates to the area north of the Pūhoi River and west of Hikauae Creek (Hungry Creek). The only archaeological site exposed and reported on in the Northern Construction Zone was a cache of wooden artefacts found at the intersection of Woodcocks Road and Carran Road to the west of Warkworth. In addition, the remains of elements of the World War II US Army Camps situated in the area around Wylies Road, Warkworth are briefly reported on.

1.4 Research Strategy

A research strategy incorporating a range of research questions was originally developed within the Archaeological Management Plan which accompanied the authority application (Phear 2017a). This research strategy related specifically to the recorded midden sites which were going to be modified/destroyed as part of the project – R10/1106 and R10/1417. The research strategy was updated in June 2018 (Phear 2018) following the discovery of significant archaeological remains likely relating to the erection of large pou whenua (R10/1484). Targeted research questions that were developed relating to the midden sites and the new site are provided below, with a synopsis of the site types provided.

1.4.1 Midden

While shell midden sites are ubiquitous across coastal Auckland, and along the coastline north of Auckland, midden sites in the project area have not previously been subject to archaeological investigation. In the wider area, those archaeological investigations undertaken on shell midden sites have predominantly been in Orewa and the Whangaparāoa Peninsula areas to the south, and in the Omaha/Sandspit, Whangateau Harbour and Matakana Tāwharanui Peninsula areas to the northeast.

In general, however, there is an abundance of reports related to both the investigation of midden sites and the broader themes of settlement. In summary, by the 15th century AD Māori settlement of land across the Hauraki coastal area is well attested to by the archaeological data, and the majority of archaeological sites investigated have produced radiocarbon determinations that reflect activities that date from this period to the contact period. Other developments occurring at this time include the establishment of both open settlement and fortified pā sites. Settlements on the Gulf Islands are also of relevance, as are those along rivers like the Tāmaki, with a range of comparative data available for analysis.

1.4.2 Research Aims – Midden Sites R10/1106 and R10/1417

Site R10/1106 was located on a ridge spur oriented east-west, which extended to the Pūhoi River but had been truncated by the existing SH1. The midden had been disturbed by the growth of pine and kauri trees and there was evidence of erosion down the northern slope. It was considered that the midden might also be related to settlement of the northern of the two pā recorded within the designation corridor, R10/1369, which was located to the south. However, there was as yet no dating evidence to link the two sites as contemporary.

Site R10/1417 was located further to the north, at the end of a run of hills on the northern side of the Pūhoi River. The midden was located on a terrace above a flat river terrace area, where the river meanders inland through Pūhoi Township.

The aims of the investigation of these two middens were to:

- Establish the full extent of surviving archaeological evidence that make up the sites.
- Establish the composition of the midden sites to determine whether the shellfish were locally derived or came from further afield to address questions of resource procurement.
- Gain information regarding the functional nature of occupation on the basis of any structural remains and evidence of lifestyle revealed by associated artefacts and analysis of the midden deposits.

- Retrieve all possible information relating to the environmental contexts of the sites.
- Establish the date of occupation of the sites.
- Consider the archaeological remains as they fit within the broader archaeological landscape of the area; in particular relationships with other pre-European Māori sites such as the two pā sites R10/921 and R10/1369, and sites that have been fully or partially excavated in the wider area.
- Broaden the existing knowledge of midden sites and artefact assemblages of recorded settlement sites in the wider area.

1.4.3 Pou Whenua Site (R10/1484)

The new site discovered during the early stages of the project was thought likely to be related to the processing and erection of possible pou whenua and appeared to be unique archaeologically, not only because it was located outside of a pā but also due to the large size of the postholes excavated at the time (80cm in diameter and up to 1.8m deep). Pou whenua can signify a territory, boundary of ownership or symbol of land claimed by mana whenua, a centre of a resource, and wāhi tapu (Ballara 1991; Forbes 1996).

Initial research into archaeological literature relating to pou and/or pou whenua was limited to a small number of reports, which relate to small pou: a small remnant pou recorded during forestry monitoring in Whangarei (Bruce 2003); pou or pou rahui used in eel weirs (Marshall 1987; Neich 1991); and evidence of possible pou whenua at Tata Beach, Golden Bay in a small settlement site (Barber 1999). A possible pou whenua posthole was found by Campbell (2005) within a settlement site (U14/3235) in Tauranga, and this one bore some similarities to the Pūhoi site, the pou interpreted as being located within a pit measuring 750mm x 450mm and extending 1.2m below the surface.

Ethnohistoric studies also provide insight into different types of pou whenua. For example, in the Waikato, some pou whenua were described as being in the form of waka tūpāpaku (tombs), where two haumi (front waka panels) were planted in the ground vertically forming a shell or tomb. The chief's body was placed in the tomb prior to the hahunga (exhumation) ceremony. Once the body was removed the waka tūpāpaku was left standing as a pou whenua commemorating the life and mana of the chief (Opus 2000).

The pou whenua location in Pūhoi was on a ridge spur which extended eastwards from the north-south oriented ridgeline located between Pūhoi village and the Johnstones Hill Tunnels. The site sat just above the confluence of the Pūhoi River and Hungry Creek/ Hikauae. The Pūhoi River turns inland heading west towards the Kaipara, while the Hikauae tributary branches off to the north. The site location was highly visible in the landscape, and the visibility from both the Pūhoi River and Hikauae was of particular note. It would also have been visible from Maungatauhoro/Wenderholm and other high points in the surrounding topography. The sheer size of the postholes was impressive and the pou whenua site can be considered monumental. Monumentality is not really addressed in the archaeological literature until pā were constructed after 1500 AD.

At the Pūhoi site, there were two large pit features that were interpreted as being the pits where the pou whenua were located. The following artefacts and features were also likely to relate to the site:

Features

- Small alcoves/niches located around the lower extent of the postholes.

- Kōkōwai – red, pink, and yellow ochre, suggesting the pou whenua were painted.
- One kōkōwai/ochre burning pit (excavated).
- Cluster of intercutting large ovens (up to 10 at the time of writing) possibly used in ceremonial feasting.
- Midden deposit (pipi dominated; occasional highly degraded fish and bird bone) which currently formed the westernmost site feature, located some 20m away from the pits, and may have been related to food consumption while the pou whenua were being constructed (some kōkōwai was also mixed within it).
- Some isolated postholes, although they may post-date the pou whenua construction and use.

Lithic Artefacts

- Hōanga, for sharpening tools.
- Abraders for wood processing – fine grained and coarse.
- Chert tools likely to have been for wood processing.
- Hammerstones.
- Two adzes/toki.
- Obsidian tools for non-wood processing activities.
- Possible basalt choppers and a core – for mammal processing?
- Lithics of unknown material (possibly silicious limestone).

1.4.4 Research Aims – Pou Whenua Site (R10/1484)

The new site interpreted as a pou whenua site was considered important in that it represents a unique site type within the New Zealand archaeological record. It is not just the pou whenua that are of significance, but the site components as a whole (the kōkōwai, hōanga, alcoves, toki) which suggest that a particular activity was taking place here in relation to land and cultural identification.

A landscape approach was proposed to interpret the site, and in order to achieve this a sound dataset needed to be produced to understand the environment present at the time of site formation, as well as answering questions relating to the movement of people and materials across the landscape and region as a whole. As such, the site required particular detailed attention in the field, and analysis of artefacts and environmental samples, as well as establishing a robust radiocarbon chronology.

The following research questions were to be addressed following site investigation:

- How does the site compare to other contemporary sites in the near vicinity, and within the wider archaeological landscape?
- How does the site compare with other examples of monumentality in Māori history, and further afield (e.g. Eastern and wider Polynesia)
- Where would the pou whenua have been most visible? Are there any natural, cultural and archaeological landscape features that may have been of importance visually?
- What social processes are suggested by monumentality, and what does this tell us about the social structures of the people who created them?

- Is there evidence for lithic sources from outside of the Mahurangi area? What does this tell us about potential movement of people and resource procurement?
- How does the lithic assemblage differ to settlement sites? Are there clear working areas?
- How does the kōkōwai assemblage compare to other sites in the region and wider afield?

1.5 Project Personnel

The archaeological excavations were undertaken over a number of stages from 20 April 2017 to 2 February 2020, and involved more than 12 Clough & Associates field archaeologists. A number of Clough & Associates staff and external specialists were also involved in the post-excavation analysis and reporting stage of the project. Table 1.1 provides a full list of personnel involved in the project.

1.5.1 Report Authorship

Several members of the Clough & Associates team as well as external specialists were involved in the production of this report. The introductions, archaeological monitoring, site R10/1484 and R10/1417 excavation results, environmental analysis, C14 dating analysis, discussions and conclusion were written by Richard Shakles. Simon Bickler undertook and reported on the Bayesian analysis of the C14 dating. The historical background was written by Zarah Burnett. Shell midden analysis was undertaken and reported on by Tom Clough-Macready and Jennifer Low.

External specialists who produced reports presented within this final report include Dr Karen Greig, Tristan Russell, Jessie Hurford and Monica Tromp of Southern Pacific Archaeological Research, who undertook the analysis and reporting of the lithic and X-ray fluorescence analyses, as well as the faunal analysis of sites R10/1484, R10/1512 and R10/1417.

Dr Mark Horrocks of Microfossil Research Ltd undertook the plant microfossil analysis and reporting on sites R10/1484, R10/1417, R10/1512 and R09/2247.

Dr Rod Wallace of the University of Auckland undertook and reported on the charcoal analysis from 12 of the sites investigated, while Dilys Johns, also of the University of Auckland, undertook the conservation of and reporting on the assemblage of wooden artefacts from site R09/2247.

Ewen Cameron and Dr Rhys Gardiner of the Auckland War Memorial Museum identified plant macrofossils from site R10/1417.

Lastly, the report was edited and reviewed by Sarah Phear and Sarah Macready.

Table 1.1 Clough & Associates team and external specialists who contributed to both the excavations and post-excavation analyses of the archaeological investigations

Clough & Associates Excavation Team	**Responsibilities**
Rod Clough	Director – overall direction of project, S45
Sarah Phear	S45 and project manager
Richard Shakles	Lead archaeologist in field and report authorship
Simon Bickler	Field archaeologist and lead archaeologist site R10/1417 (August 2019)
Carly Mailhot	Field archaeologist
Tom Clough-Macready	Field archaeologist
Doug Gaylard	Field archaeologist
Brooke Jamieson	Field archaeologist
Leah Harding	Field archaeologist
Helen Heath	Field archaeologist
Ellen Cameron	Field archaeologist
Jennifer Low	Field archaeologist
Jaime Grant	Field archaeologist
Benjamin Jones	Field archaeologist
Leela Moses	Field archaeologist
Adina Brown	Historic buildings survey
Clough & Associates Post-Excavation Analysis	
Zarah Burnett	Historic research
Tom Clough-Macready	Midden and European artefact analyses
Sarah Phear	Illustrations and editing
Richard Shakles	Research, C14 dating & midden analyses
Simon Bickler	C14 dating Bayesian analysis
Jennifer Low	Midden analysis and European artefacts
Sarah Macready	Editor
External Specialists	
Wesley Maguire	Total station and GPS survey
Samuel Cox – NX2	Aerial drone and laser surveys
Dr Mark Horrocks - Microfossil Research Ltd	Plant microfossil analysis
Prof. Richard Walter - University of Otago	Lithic and XRF analysis
Dr Karen Greig (SPAR) - University of Otago	Lithic, XRF and faunal analysis
Jessie Hurford (SPAR) - University of Otago	Lithic and XRF analysis
Monica Tromp (SPAR) - University of Otago	Lithic and XRF analysis
Tristan Russell (SPAR) - University of Otago	Lithic, XRF and faunal analysis
Dr Rod Wallace - University of Auckland	Charcoal identification
Prof. Alan Hogg – University of Waikato	Radiocarbon dating
Prof. Fiona Petchey – University of Waikato	Radiocarbon dating
Ewen Cameron – Auckland War Memorial Museum	Plant macrofossil identification
Dr Rhys Gardner - Auckland War Memorial Museum	Plant macrofossil identification
Dilys Johns – University of Auckland	Wet organics conservation
Tom MacDiarmid	Illustrations and 3D reconstructions

1.5.2 Acknowledgements

The Clough & Associates team would like to extend their thanks and appreciation to all the NX2 staff who helped during the Pūhoi to Warkworth Road of National Significance archaeological investigations. Special thanks are given to those who went out of their way to provide invaluable assistance to the archaeology team. They are: Karsten Stevenson, Robert Jones, Jonathan Green, Alan Orange, Tommy Temple, Ryan Tickelpenny, Robert Graves, Cain Simpson, Dan McNamara, Danielle Hobby, Simon Butler, Dane Gray, Steve Parry, Viki Hurring, Charles Palmer, Liang Cao, Johan Pratomo, Hugh Leersnyder, Kelly Kilipati, Alberto Torres Caballero, Steve Jenkins, Phil Skinner, Samuel Cox, Sam Williams, Matt Lloyd, Hannah Giess, Thomas Alexander, Ravinesh Ratnam, Howard Ruha-Henry, Max van der Maas, Samuel Loveday, Nicola Gray, Peter Mitchell, Caitlin Golder, Rion Gulley, Karlo Kodoic, and Natasha Van Nieuwenhuizen.

We acknowledge the invaluable cultural support provided by Hōkai Nuku, under the management of Gena Moses-Te Kani, and all of its members on behalf of mana whenua – Ngāti Manuhiri, Ngāti Mauku/Ngāti Kauae of Te Uri o Hau, Ngāti Rango of Kaipara and Ngāti Whātua Iwi. In particular, we would like to acknowledge the advice, assistance and wisdom of Marion Leth, Aroha Greenhalgh, Josephine Clarke, Paulette Reidy-Davis, Kim Komene, Ringi Brown and Luke Connelly.

We are also grateful to the Auckland Regional Office of HNZPT, and appreciation goes to Bev Parslow, Greg Walter and Makere Rika-Heke for their support.

Special appreciation is extended to all the members of the excavation team who worked very long hours, often in extremely unpleasant weather, and yet excavated meticulously and tirelessly to retrieve as much archaeological information as possible from the various sites.

In particular, considerable gratitude and the utmost respect is extended to Carly Mailhot, Brooke Jamieson and Doug Gaylard for enduring at times extremely difficult conditions during the excavation of site R10/1484, situated as it was on an exposed, incredibly wet and windswept hill at 3 Puhoi Road.

1.5.3 Glossary of Abbreviations

Abbreviation	Definition
CHI	Auckland Council Cultural Heritage Inventory
CJV	Company Joint Venture (Fletcher – Acciona)
HNZPTA	Heritage New Zealand Pouhere Taonga Act 2014
HNZPT	Heritage New Zealand Pouhere Taonga
LINZ	Land Information New Zealand
NX2	Northern Express Group
NZAA	New Zealand Archaeological Association
NZTA	Waka Kotahi - New Zealand Transport Agency

1.5.4 Tikanga Statement

Hōkai Nuku provided cultural support on behalf of Ngāti Manuhiri, Ngāti Mauku/Ngāti Kauae of Te Uri o Hau, Ngāti Rango of Kaipara and Ngāti Whātua Iwi.

Karakia were undertaken by kaitiaki on a twice daily basis (prior to the commencement of works and at the end of works) during the excavation of site R10/1484 at 3 Puhoi Road, Pūhoi. Additionally, whakanoa was undertaken before entering and leaving the site, including at all meal breaks, at the request of Hōkai Nuku to remove tapu and to keep the members of the archaeology team safe.

Karakia were also undertaken by kaitiaki whenever cultural material had to be removed from site for purposes of specialist analysis. This included the removal of taonga such as toki, environmental samples of shell midden deposits, and the fills of other archaeological features.

All environmental samples (including shell midden samples and oven stones) that were taken during the archaeological investigations for analysis were returned to Hōkai Nuku and reburied on site in excavated pits as close to the site of original deposition as possible. These locations were surveyed and recorded.

With the exception of the wooden artefacts from site R09/2247, all taonga (including the entire artefact assemblages from sites R10/1106, R10/1417, R10/1484 and R10/1485, were retained by or returned to Hōkai Nuku after analysis of the artefacts had been completed. The wooden artefacts retrieved from site R09/2247 were treated and conserved at the University of Auckland Wet Organic Archaeological Materials Conservation Laboratory.

No kōiwi tangata were exposed or encountered anywhere within the project earthworks footprint.

2 HISTORICAL BACKGROUND

2.1 Māori History

The road corridor transects two significant areas of traditional Māori occupation – Kaipara and Mahurangi. Several tribes and sub-tribes claim affiliation with the land in these districts and today the mana whenua of the area are Ngāti Manuhiri, Ngāti Mauku/Ngāti Kauwae, Ngāti Rango and Ngāti Whātua (Hōkai Nuku Cultural Effects Assessment Report).

The tribes of Ngāti Whātua descend from the ancestor Tuputupuwhenua and are affiliated with the Mahuhu-ki-te-rangi canoe which landed between the Hokianga and Kaipara Harbour. By the mid-18th century, the southerly expansion of Ngāti Whātua tribes had extended the boundaries of the confederation from the Hokianga to Tāmaki Makaurau (Auckland) (NZMCH 2006: 196-197).

Control of the northern Kaipara and parts of the eastern inland region, including Wellsford, was claimed by Te Uri-O-Hau (Ngāti Whātua), led by Haumoewharangi, whose son Rango and his descendants established Ngāti Rango on the north-eastern Kaipara Harbour (NZMCH 2006: 198). Although conflict occurred with other groups, close relationships were largely maintained between the Ngāti Whātua tribes, with tracks and portage routes between the west and east coasts providing effective means of communication. Intermarriage was also used to secure peace, notably in the marriage of Moerangaranga (daughter of Rongo) and Ngawhetu (of Te Kawerau), which forged important links between Ngāti Rango and Te Kawerau of the Mahurangi.

Te Kawerau descended from Ngāti Awa, who migrated north from Kawhia in the early to mid-17th century. Led by Maki, Te Kawerau occupied Auckland before expanding as far north as Te Arai Point. Maki occupied the Mahurangi for a time before continuing further north, leaving his son Ngawhetu behind to claim control of the land between Whangaparāoa and Pūhoi. The descendants of Ngawhetu and Moerangaranga remained in the Mahurangi, and by the time of European arrival were known variously as Te Kawerau and Ngāti Rango (Mackintosh 2005: 2).

Māori in the Kaipara and Mahurangi districts did not occupy permanent year-round settlement sites but moved between their kāinga (villages) in accordance with the seasons. The east and west coastal boundaries provided abundant marine resources, while the inland forest supplied Māori with hunting and resource gathering opportunities. Rivers such as the Pūhoi and Mahurangi supplied plentiful fresh water, and sandy soils near coastal areas were highly suited to kūmara cultivation (Murdoch 1992; Dave Pearson Architects 2003: 11).

Competition for control of one of the most highly prized resources of the Mahurangi – the muru or small spotted shark, which could be dried and used as a winter food source – led to protracted conflict between Te Kawerau and Hauraki tribes in the 1700s. Known as the Marutūahu confederation, these Hauraki tribes comprised Ngāti Pāoa, Ngāti Whanaunga, Ngāti Maru, Ngāti Tamaterā and Ngāti Ronoū. Battles continued intermittently throughout the 18th century, with Marutūahu eventually gaining permanent control of the fishing grounds. (Murdoch 1992).

Further warfare occurred in the 1820s and 1830s when raiding Ngāpuhi from the north, armed with muskets, launched a series of attacks throughout the tribal territories of Ngāti Whātua. Māori of the Kaipara and Mahurangi, armed only with traditional hand combat

weapons such as mere and taiaha, were swiftly defeated. Most fled the invasion, leaving the region virtually deserted for several years. (Murdoch 1992).

By the late 1830s small numbers of Ngāti Whātua began to return to their traditional occupation areas in the Kaipara and Mahurangi, eventually re-establishing themselves in the districts. Te Kawerau/Ngāti Rango Māori of the Mahurangi were now under the leadership of Te Hēmara Tauhia. They settled north of Wenderholm, at Te Muri, where a kāinga (village), large gardens and an orchard were established (Mackintosh 2005: 4-5).

Te Hēmara Tauhia was baptised Te Hēmara after the CMS Missionary James Hamlin. He died in October 1891 and was taken for burial at Te Rurunga on the eastern shores of the Kaipara. Te Hēmara Tauhia laid claim to three primary land blocks – Te Akeake, Maungatauhoro and Pūhoi (see below) (Hōkai Nuku Cultural Effects Assessment Report: section 3.1). Descent formed the means of the claims from Haumoewarangi to Rongo, and in particular the union between Moerangaranga and Ngawheto of Kawerau. The couple lived in the Kaipara, Waiwera and Pūhoi River valley (Hōkai Nuku Cultural Effects Assessment Report: section 3.1).

2.2 European Land Purchase

Missionaries and sawyers began appearing in the Kaipara and Mahurangi districts by the early 1830s and, with the arrival of Europeans, Ngāti Whātua tribes came under increasing pressure to relinquish land (Mackintosh 2005: 5). Although several Ngāti Whātua chiefs signed the Treaty of Waitangi in 1840, including Te Roha from Te Uri-O-Hau, large tracts of land were lost through Crown purchases, pre-1840 claims and Native Land Court proceedings (NZMCH 2006: 199).

Further pressure was placed on Ngāti Whātua land after the decision by Governor Hobson to relocate the colonial capital southwards from the Bay of Islands shortly after the signing of the Treaty of Waitangi. Hobson ordered his Surveyor General, Felton Mathew, to investigate every inlet from the Bay of Islands to the Firth of Thames, including the Mahurangi River, which was surveyed in June 1840. In Mathew's report of the Mahurangi he noted that:

> '...it would be highly desirable that the Government should obtain possession of this harbour and a considerable portion of the surrounding country. A settlement once formed here, would I have no doubt, rapidly attain a very flourishing condition. Several Europeans lay claim, I believe, to this portion of the country, but their titles, I am informed, are of no value. And even among the native chiefs a dispute exists to the right of ownership. The government should therefore have no difficulty in taking possession of it. I did not see the slightest trace of native inhabitants during the time I was in the place' (Locker 2001: 61-2).

When the Tāmaki isthmus was chosen as the site of the new capital, land in the Mahurangi became even more essential to the Crown, as it was now one of the main gateways to Auckland (Rigby 1998: 11).

On 13 April 1841, the Crown acquired its first large tract of land in the area, known as the Mahurangi Purchase. This included the Mahurangi and Omaha Block (Deed No. 192) comprising 100,000 acres, 'more or less', with boundaries stretching from Takapuna in the south to Te Arai Point in the north (Locker 2001: 64). The land was not obtained from Ngāti Whātua, but from Hauraki tribes who claimed ancestral control of the area from the

18th century. The Mahurangi Purchase made Ngāti Rango theoretically landless, and the sale was therefore disputed by their chief Te Hēmara Tauhia before it was finalised. Te Hēmara appealed for the return of Mahurangi to Ngāti Rango, in particular Te Pūhoi (Mackintosh 2005: 6).

In 1853 the Pūhoi (or Te Hēmara) Reserve was granted to Ngāti Rango, the boundaries of which ran 'from the south shore of the Pukapuka to Waiwera, and inland to the western boundary of the [Mahurangi] Purchase' (Locker 2001: 80). In 1866 the title to this reserve was granted to Ngāti Rango at a Native Land Court hearing. The Pūhoi Reserve was eventually surveyed into 10 blocks, with Te Hēmara Tauhia retaining the titles to Maungatauhoro (70 acres), Orokaraka (8 acres) and Pūhoi (2,537 acres) (Mackintosh 2005: 6).

Following the final settlement of claims against the Mahurangi Purchase in 1853, surveying and land sales in the district continued. Ngāti Whātua tribes were among the signatories of several large land purchases by the Crown, including: the Ahuroa–Kourawhero Block (Deed 201) on 22 June 1854 for £1,200; the Wainui Block (Deed 200) on 22 June 1854 for a first instalment of £600, with a final payment of £200 made on 22 January 1855; the Komokoriki No. 1 Block (Deed 203) on 29 September 1862 for £3,500 and the Komokoriki No. 2 Block (Deed 204) on 4 November 1862 for £39 10s (Locker 2001: 81) (Figure 2.1).

Across the western boundary of the Mahurangi Purchase line, Te Uri-O-Hau negotiated the sale of the Oruawharo Block No. 1 (Deed 161) on 27 January 1860 for £500 and the Oruawharo Block No. 2 on 2 February 1860 for £700 (Turton 1877: 212-213). Within the Oruawharo Blocks the Paraheke Native Reserve, which was wāhi tapu, was set aside. Ngāti Whātua were also involved in the protracted sale of the Hoteo Block, which was eventually sold to the Crown in 1868, with a total purchase price estimated to have been over £10,000, which was paid out in instalments (Goldsmith 2003: 62) (Figure 2.2).

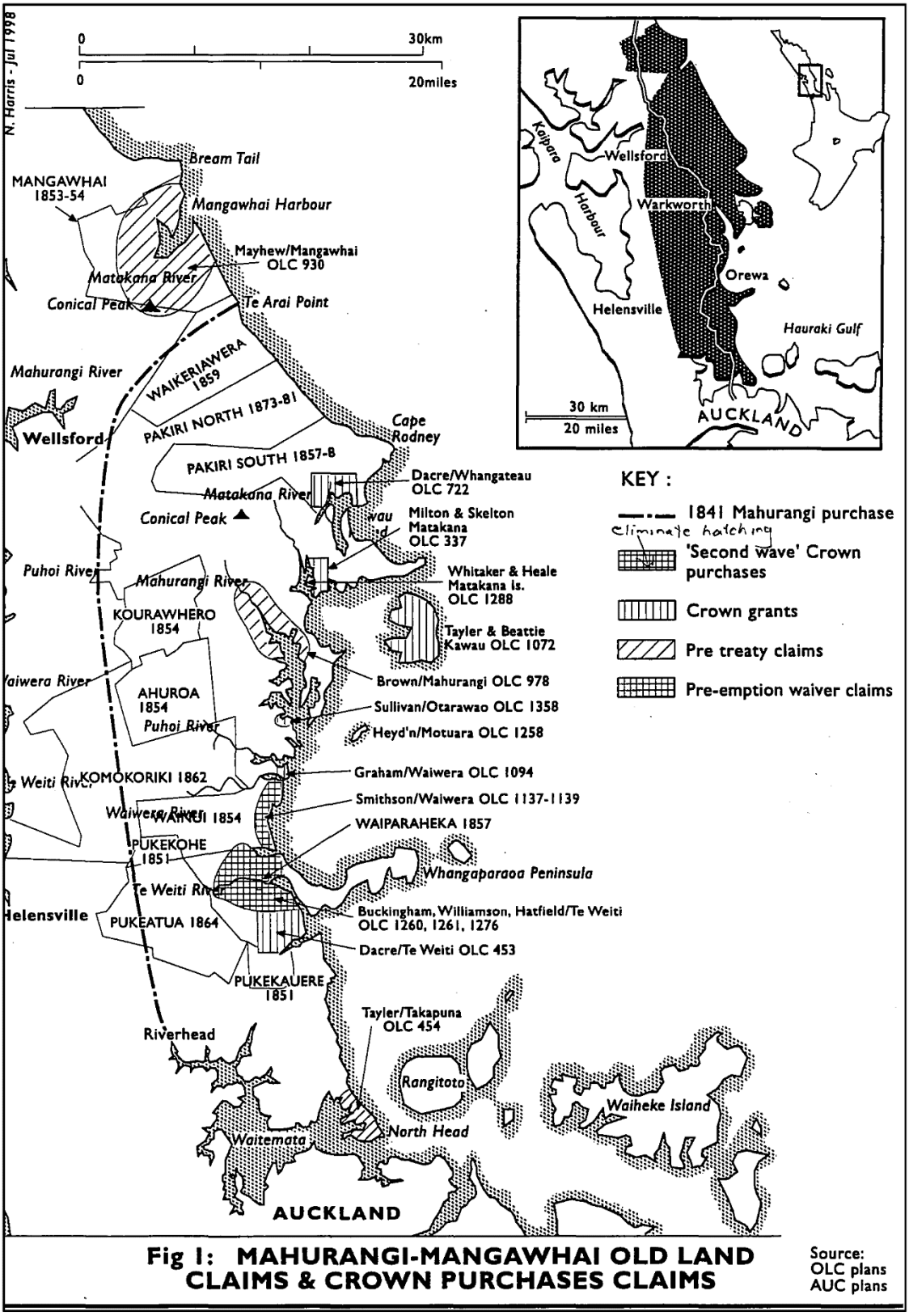


Figure 2.1 Plan showing land claims and Crown purchases in the Mahurangi (source: Rigby 1998: 3)

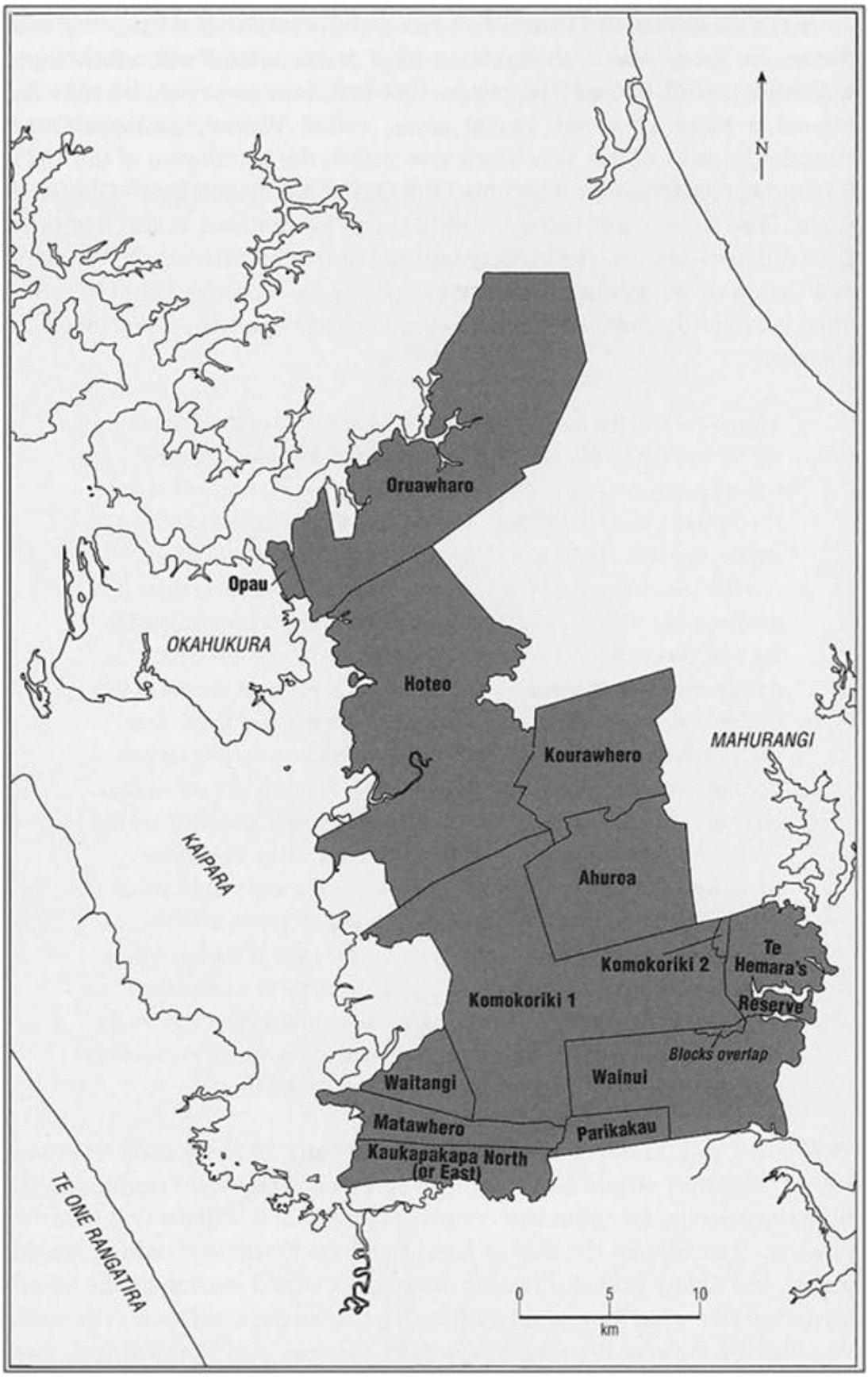


Figure 2.2 Plan showing Crown purchases in the Mahurangi and Kaipara (source: Goldsmith 2003: 36)

2.3 Pūhoi

Pūhoi (meaning 'slow water') was established within the eastern extremity of the Komokoriki Block, which had been sold to the Crown in 1862. The 395-acre Komokoriki No. 2 Block (Deed 204) became the Pūhoi village reserve and is now the location of the Pūhoi Historic Village. Pūhoi was gazetted as a 'German Special Settlement' of 10,000 acres in January 1863, under the provisions of the Auckland Waste Lands Act of 1858. This Act guaranteed 40 acres of land to every adult, and 20 acres for every child over 5 years, provided they paid the cost of their own passage to New Zealand (Rigby 1998: 67-69; Schmidt 2007: 24). The first settlers in Pūhoi arrived in June 1863 from Bohemia, a province in the northern part of the former Austro-Hungarian Empire (Eghalanda Association 1984: 1). Ngāti Rango transported the settlers along the Pūhoi River to the settlement site where they had erected two nikau whare, each 20ft by 10ft (6.1 x 3m). Further Bohemian groups arrived in the area in 1866, 1872 and 1873. Some of these later settlers were allocated land in the adjacent Ahuroa Block, under the Homestead Act (Schmidt 2007: 19-21).

Early pioneering industry in Pūhoi was dominated by the timber trade, as settlers attempted to clear their 40 acres of dense bush and forest trees. Pūhoi villagers had ready access to kauri, rimu, totara and puriri, which were made into house-blocks, palings and shingles, wharf piles, fencing posts and railway sleepers, most of which were shipped to the burgeoning Auckland market. Wood was also used for furniture manufacture, firewood and burned for charcoal. Subsistence farming on cleared land was also vital to early Pūhoi residents. By December 1869 the *Weekly News* reported that settlers had 600 acres of land under cultivation with some 200 head of cattle (Schmidt 2007: 37- 39). The first sheep were introduced in the 1870s, and by 1895 the *New Zealand Gazette* listed over 100 sheep on 13 Pūhoi farms (Mabbett 1977: 275-276).

Limited transportation and communication links to Pūhoi restricted the amount of incoming resources to early settlers. In 1869 the Government authorised the construction of a road through Pūhoi, which provided regular employment for many men in the district. The Puhoi Road Board was established in 1873. The Board initiated several projects including building culverts, bridge repairs and the construction of two new roads (Straka's Road and Paul's Road) within its first year. The Board was also instrumental in the founding of Pūhoi's first Post Office in 1874. By 1876 a section of the Great North Road through Pūhoi had been completed, and the steamship *Tam o' Shanter* (for which a wharf and wharf shed were provided in 1877) became the first regular vessel to stop at the village, both supplying Pūhoi with regular traffic and trade (Schmidt 2007: 32, 34-35).

Further development continued in 1876 with the opening of a general store, boarding house and hotel by brothers John and Vincent Schischka. The first liquor license in Pūhoi had been obtained by an Irishman named Meaney in 1873, who converted his four-roomed shanty into a saloon, but was forced to abandon the venture due to competition from John Schollum, who established the German Hotel. This was followed by the Pūhoi Hotel, which was opened by Vincent Schischka in 1879 (Mooney 1963: 55). By 1881 the Catholic church of Saints Peter and Paul had been opened, and in 1884 a state school (replacing an earlier building dated 1872) was erected along with a School House. The Pūhoi Town Hall followed in 1900 (Turnwald 1993: 2-4). By the turn of the century dairy farming in Pūhoi had experienced rapid growth. The opening of the nearby Glyn Dairy Factory in 1910 sustained development, and by the 1920s dairying had become Pūhoi's foremost industry (Schmidt 2007: 40).

2.4 Titford House and Cottage

Detailed research was undertaken relating to two buildings known as Titford House and Titford Cottage that were located within the proposed road designation boundary, to establish their history and date of construction. These buildings were situated on Pt Lot 1, Pt Section 8, Block III of the Waiwera Survey District. Section 8, which originally comprised 117 acres, was acquired by Gregor Wenzlick, a settler, on 4 November 1886; his land is visible on an undated plan.[1] Wenzlick had immigrated to New Zealand from the village of Litice (now part of the Czech Republic) in 1865. Following his arrival, he settled in Thames before moving to Pūhoi to join family members around 1880. It is not known whether Wenzlick constructed any buildings on his land; however, he is known to have worked as a carpenter at Pūhoi and was employed as a builder on the first Hotel and Spa at Waiwera.[2] Auckland Council Cultural Heritage Inventory records for Titford Cottage note that it was made from the timbers of the 'very old Titford house (gone) originally further uphill on the site.'[3] This earlier building may have been constructed by Wenzlick, but further historic research would be needed to verify this.

On 7 March 1902, Section 8 was transferred to Mary Titford (née Schollum), wife of James Titford.[4] Mary and James were both descendants of well-known Bohemian settlers in Pūhoi, and when they married in 1891 around 800 people attended the ceremony.[5] By the time Mary purchased Section 8, Block III, the couple had four children – John William, Frederick James, James Charles Leo and Gustave Frances.[6] James Titford Snr worked as a farmer and was later publican of the Pūhoi Hotel.[7] It seems likely that the construction of Titford Cottage on Section 8 was undertaken shortly after the purchase of the land by Mary Titford in 1902.

Titford House was also constructed on the property in the 20th century. A valuation of the property dated 1940 stated that the house was constructed of wood with an iron roof and was approximately 20 years old. A later insurance assessment dated 1947 noted the existence of more than seven buildings on the property including Titford House, which comprised five rooms and conveniences, and the old Titford Cottage, which was used as a workshop. An accompanying handwritten letter, also dated 1947, detailed that the age of the house was 30 years and that the cottage was floored but not lined.[8] A newspaper article from 2009 recorded an interview with Maureen Straka (née Titford), who was born in Titford House in 1924 and recalled that her parents James and Elizabeth had built the house shortly after they were married.[9] James Charles Leo Titford, a saddler, and Elizabeth Mary Christina Turnwald were married in 1918 and had four children – Evelyn, Philip, Maureen and Rona.[10] Given the dates proposed by the historical sources the likely date range of construction for Titford House is between 1918 and 1920.

[1] NA 50/186, LINZ.
[2] The Wenzlick family of New Zealand website, see: https://sites.google.com/site/wenzlickfamilyofnewzealand/Home .
[3] CHI Record No. 16252.
[4] NA 50/186, LINZ.
[5] *Observer*, 14 February 1891, p.17.
[6] BDM 1891/12473, BDM 1893/6310, BDM 1894/12659, BDM 1900/6056.
[7] *New Zealand Herald*, 11 June 1910, p.5.
[8] BBAE A2 5632 Box 777 q, Application for consent to sale – James Charles Titford to Allan A Stanaway, 1947, Archives New Zealand.
[9] *Rodney Times*, 20 January 2009, np.
[10] BDM 1918/4627, *Rodney Times*, 20 January 2009, np.

Section 8 was eventually conveyed to James Charles Leo Titford by his mother Mary Titford in 1927.[11] James retained ownership of the land until 1947 when it was conveyed to Allan Archibald Stanaway, a farmer.[12] The land was subsequently divided; however, Pt Lot 1, Pt Section 8 on which the two buildings stood remained under the ownership of the Stanaway family until recently.[13]

2.5 Warkworth

In 1840 the Surveyor-General, Felton Mathew, sailed up the Mahurangi Harbour with the intent of investigating the suitability of the land for settlement and industry. Mathew's report noted:

> 'Brick earth is abundant, and the forest in every direction presents a profusion of timber for building, almost entirely Kowdie [sic] [Kauri]. The river is perfectly adapted for navigation by steamers or small vessels; and the harbour forming the depot for shipping being at so short a distance I consider the spot I have described as being most admirably adapted for the formation of a town' (Locker 2001: 62).

The opportunities of the timber trade had already attracted a few Europeans to the area. From the late 1820s, camps of up to 300 seamen had been employed cutting and dressing spars for the Royal Navy, and a spar station at the Mahurangi Heads had been established by Captain Ranulph Dacre and Gordon Davies Browne in 1832 (Keys 1954: 18, 23).

Following the Mahurangi Purchase of 1841, it would be a decade before surveying was completed and land offered for sale to settlers along the Mahurangi River. In the interim, the Crown sought revenue from the land by issuing timber licenses (to cut wood or firewood) at £5 a year. One of the first licenses issued was to John Anderson Brown in 1844 (Locker 2001: 66). Brown had lived in the Mahurangi as a squatter since 1843, and by the following year had constructed a dam, water-race, and mill along the left bank of the Mahurangi River (Keys 1954: 32). This was the first water-powered timber mill in the district, and for a time the area was known as 'Brown's Mill'.

In 1853 Brown purchased 153 acres of land situated between the river and the proposed Great North Road for £68 17s (Keys 1954: 35). Brown renamed the area Warkworth, and by 1854 quarter acre Lots were advertised at £6 15s each (Locker 2001: 75). Settlement progressed at a slow rate, and by 1864 those town Lots that had not been sold were put up for public auction.

The Mahurangi Library and the Mahurangi Post Office were opened in 1859, with Brown appointed as Postmaster. Brown was also elected chairman of the Mahurangi Highway Board in 1863, the same year in which the first Mahurangi School was established. Local industry expanded with the development of Henry Palmer's flour mill, which was in operation on the right side of the river by 1868, and the manufacture of lime for which Warkworth would become renowned (Keys 1954: 41- 42).

John Sullivan was the first to begin lime production in Warkworth as early as 1849, with Combes and Daldy advertising lime for sale in the *Southern Cross* by 1850. The first lime-

[11] NA 462/204, LINZ & NA 488/105, LINZ.
[12] NA 488/105, LINZ.
[13] NA 20d/1469, LINZ.

works were in operation by the 1850s and were situated near Brown's Mill on the right bank of the Mahurangi River. A second lime production site, down river from Warkworth, was acquired in 1857 by John Southgate, who built a hotel and several lime kilns on the land. Southgate sold to Nathaniel Wilson in 1864, who continued manufacturing lime on the site, eventually establishing the Wilsons Cement Works in 1884. The company was credited with being the first producer of Portland cement in New Zealand and the Southern Hemisphere and was responsible for the material used to construct the Warkworth Bridge in 1899 (Dave Pearson Architects 2005: 9-12).

2.6 World War II US Military Camps

Several United States military camps were located throughout the wider Warkworth area during World War II. American forces stationed at these camps comprised elements of the 3rd Marine Corps Division, the 25th Infantry Division and the 43rd Infantry Division (Figure 2.3 and Figure 2.4). The first division to establish camps in the area was the 43rd Infantry Division, which arrived in October 1942. The division remained for only a few weeks but later returned in March 1944. Elements of the 3rd Marine Corps Division, including the 21st Regiment, 12th Artillery Regiment and 3rd Tank Battalion, were stationed in Warkworth for several months from March 1943. Last to arrive in the area was the 25th Infantry Division, which occupied camps from December 1943 to February 1944 (Bioletti 1989: 27-29).

Most US military camps in the area consisted of several native timber 'two- and four-men huts' (Figure 2.5 and Figure 2.6). These were mostly constructed with louvre windows (Bioletti 1989: 111). Khaki pyramidal tents were also erected in some camps, and were fitted with wooden floors and pot-belly stoves (Bioletti 1989: 131). Wells were dug by troops at certain farm camps to provide fresh water sources, some of which are still in use today (John Wynyard, local landowner, pers. comm.).

By 4 August 1944 the *Evening Post* reported that a group of the Warkworth army camps had been handed over by the New Zealand Army to the War Assets Realisation Board. The article noted:

> 'The camps are built to the usual New Zealand Army pattern, and consist largely of prefabricated huts and various auxiliary buildings, including stores, kitchens, mess-rooms, and drying rooms…The camps which have now been vacated by the New Zealand Army provided accommodation for many thousands of soldiers. The Warkworth group alone had room for about 5000' (*Evening Post*, 4 August 1944: 5).

Detailed layouts of the camps in the Warkworth area are shown on a series of military plans dated September 1943. These plans record the positions of various personnel and ancillary buildings as well as services such as water supply, drains and power lines, and notable other buildings and roads in the immediate surrounds of the camps. We located the original copies of these plans within the records held by Archives New Zealand. Plans of some of the more relevant (to the project) camp sites are presented in Figure 2.7 through Figure 2.14 below.[14]

[14] Note that the camps located near Wyllie Road were known as Wylies [sic] Road Camps D1, D2, E, F and G. The correct historical spelling is used in this Report when referring to the camps.

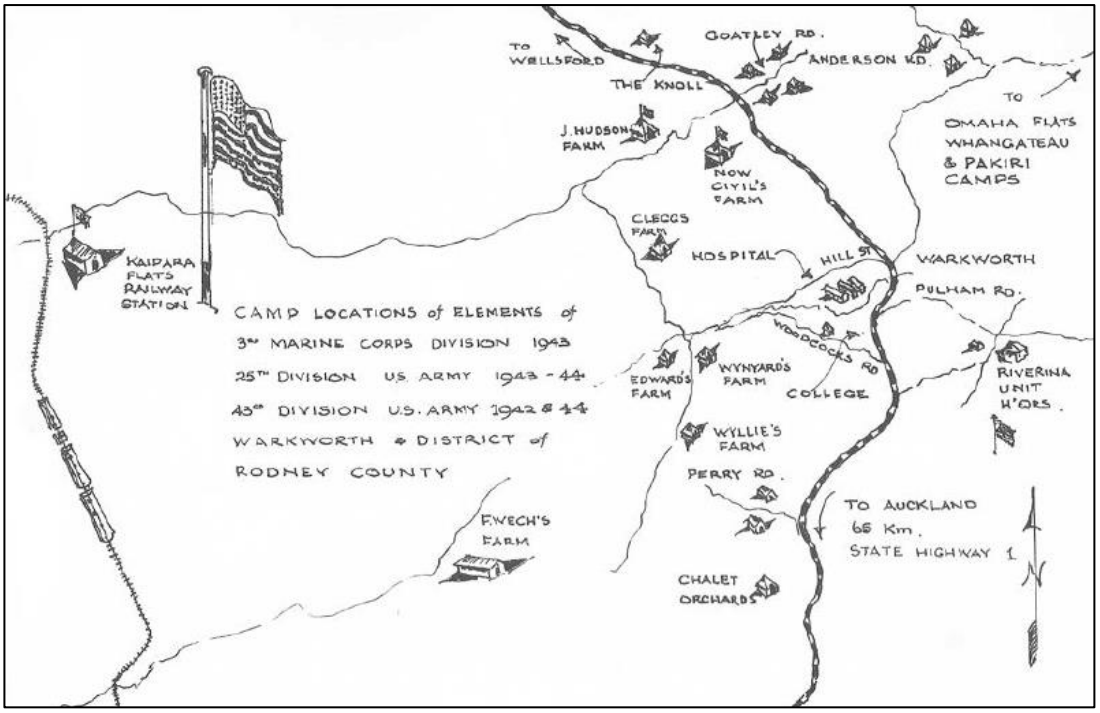


Figure 2.3 Sketch plan showing the location of World War II US military camps in the Warkworth area (source: Bioletti 1989: xii)

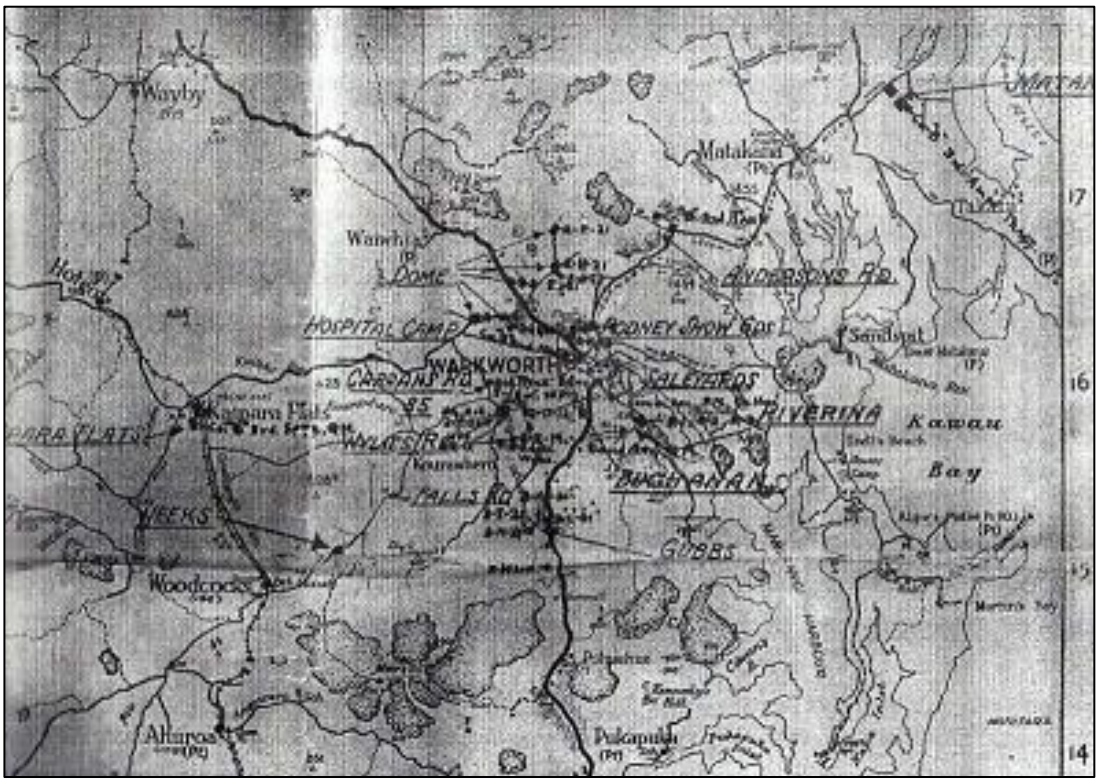


Figure 2.4 Plan, unnamed and undated, showing the locations of the US military camps in the Warkworth District (source: Warkworth and District Museum and Archives)

Figure 2.5 A photo by Tudor Collins showing a typical US military camp with two- and four- men huts. SH1 heading north to Wellsford is visible in the photo (source: Bioletti 1989: 27)

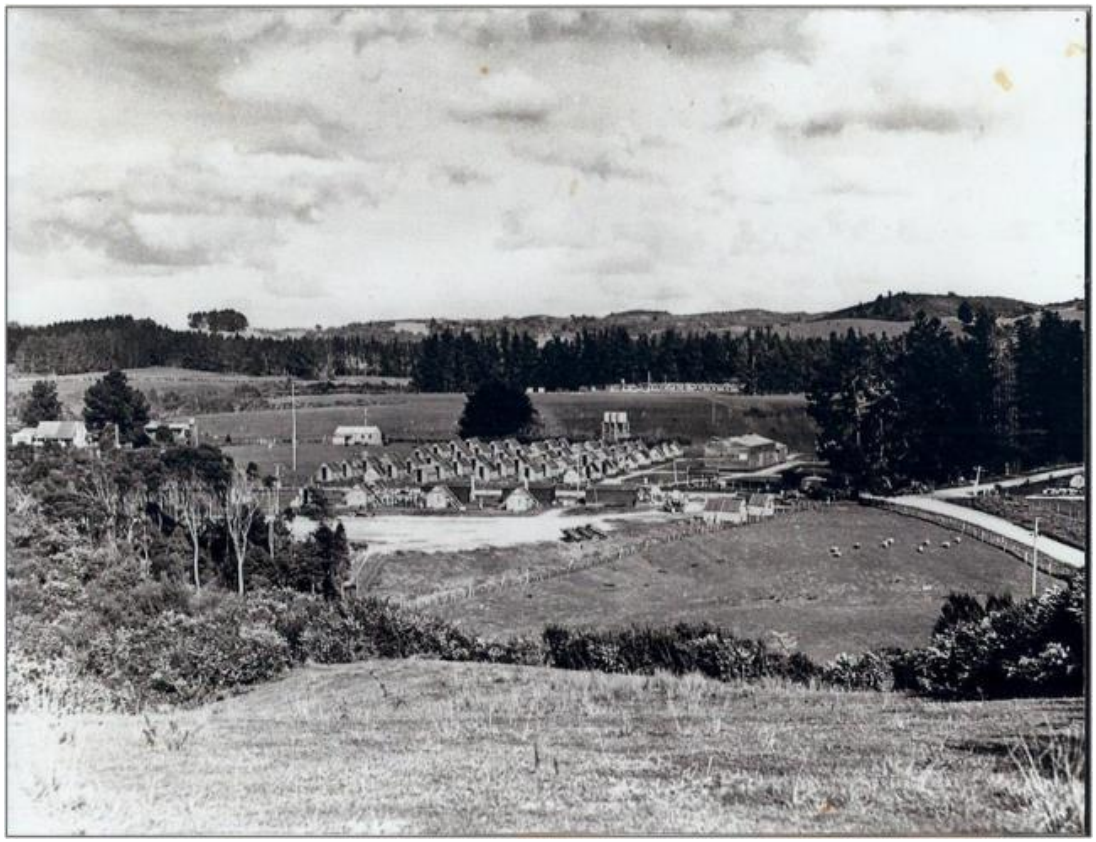


Figure 2.6 Photograph facing south showing Wylies Road Camps D1 and D2, with Camp G in background. Intersection of Wyllie and Woodcocks Roads present on right of image below hedge line. Date unknown but must be between October 1942 and August 1944 (source: Warkworth and District Museum Archive)

Figure 2.7 Plan detailing the layout of Carran Road Camp H2, situated along Carran Road (source: Archives New Zealand, ACIO 8722 6/ 77/2)

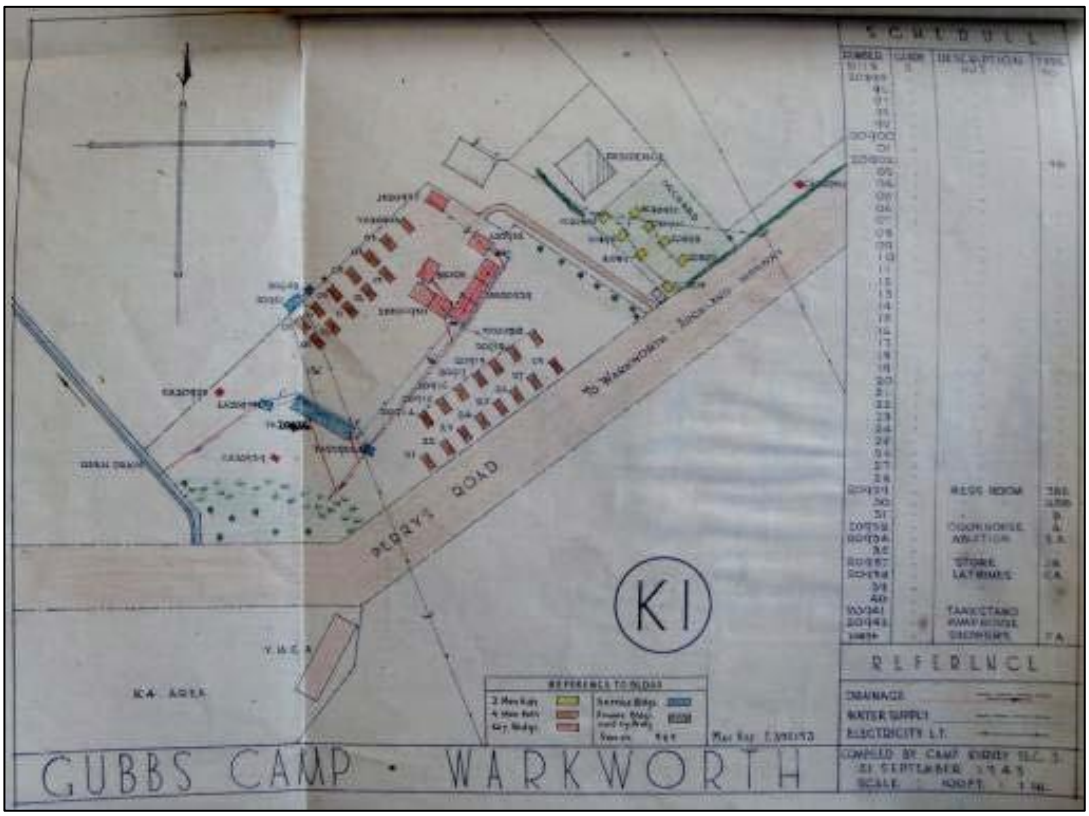


Figure 2.8 Plan detailing the layout of Gubbs Camp K1, situated along Perry Road (source: Archives New Zealand, ACIO 8722 6/ 79/1)

Figure 2.9 Plan detailing the layout of Gubbs Camp K2, situated along Perry and Twin Stream Roads (source: Archives New Zealand, ACIO 8722 6/ 79/2)

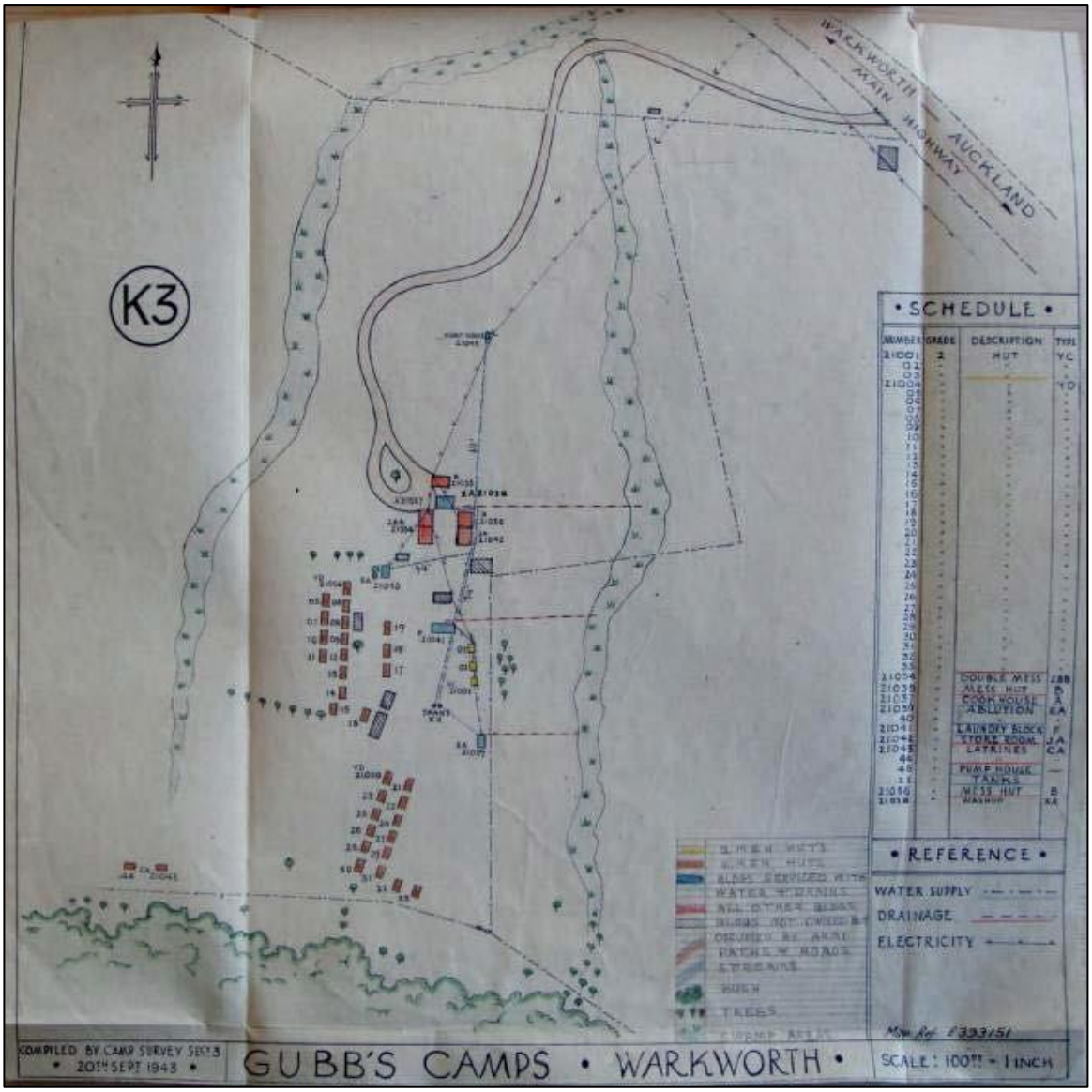


Figure 2.10 Plan detailing the layout of Gubbs Camp K3, situated along SH1 (source: Archives New Zealand, ACIO 8722 6/ 79/3)

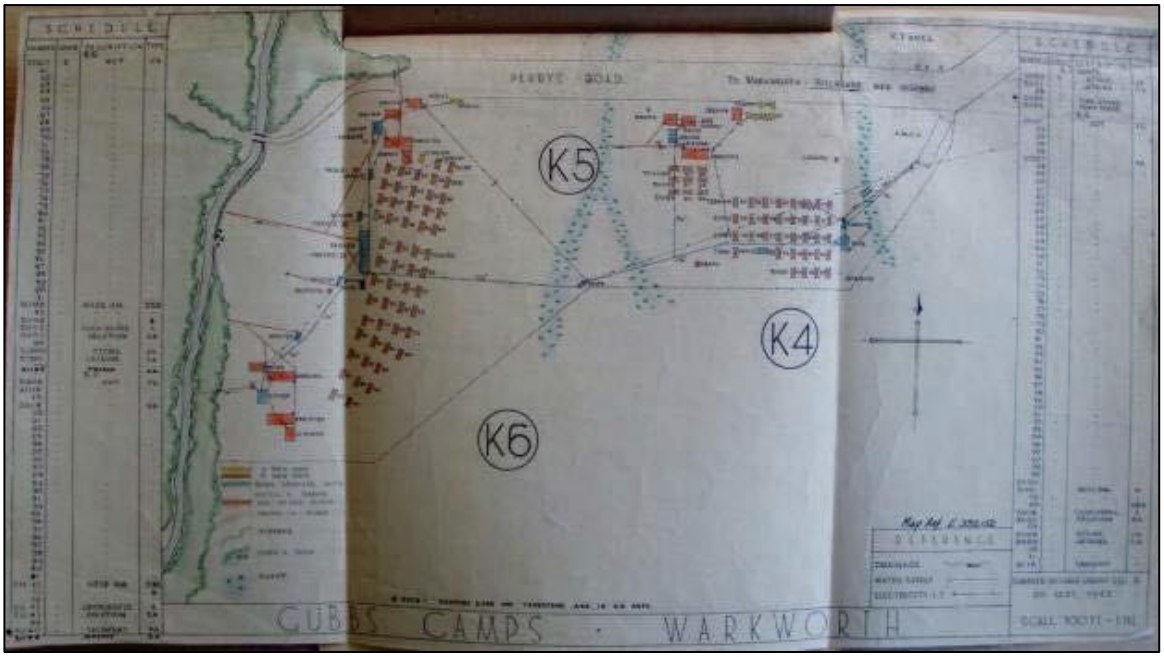


Figure 2.11 Plan detailing the layout of Gubbs Camps K4, K5 and K6, situated along Perry Road (source: Archives New Zealand, ACIO 8722, 6/ 79/4)

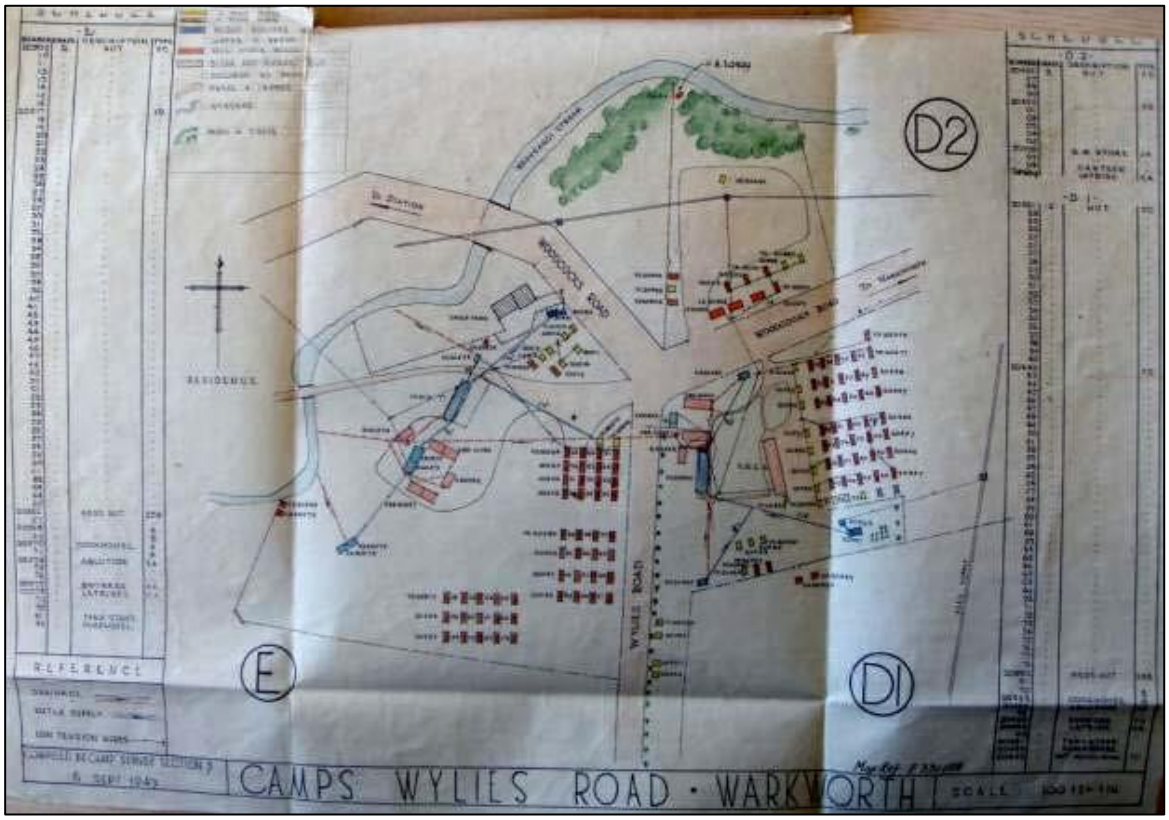


Figure 2.12 Plan detailing the layout of Wylies Road Camps D1, D2, and E, situated near the intersection of Wyllie and Woodcocks Roads (source: Archives New Zealand, ACIO 8722, 6/ 73)

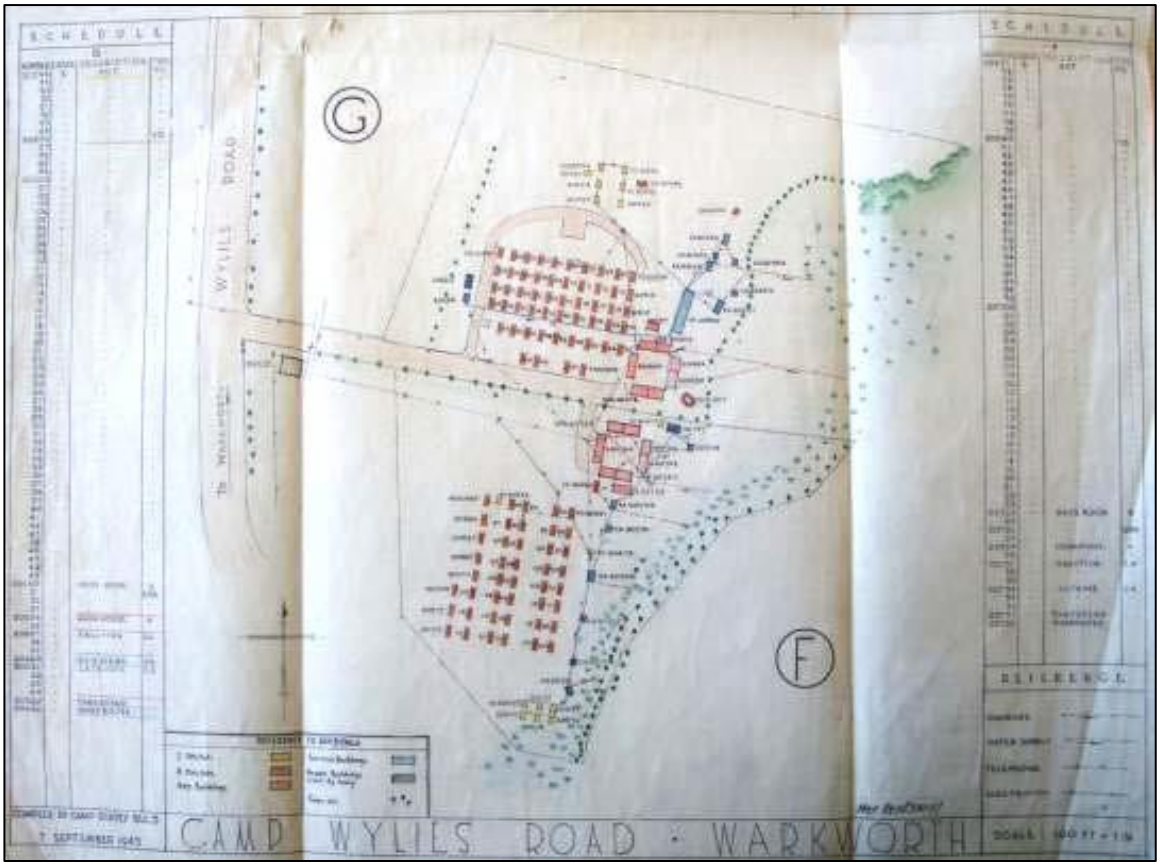


Figure 2.13 Plan detailing the layout of Wylies Road Camps F and G, situated along Wyllie Road (source: Archives New Zealand, ACIO 8722 6/ 75)

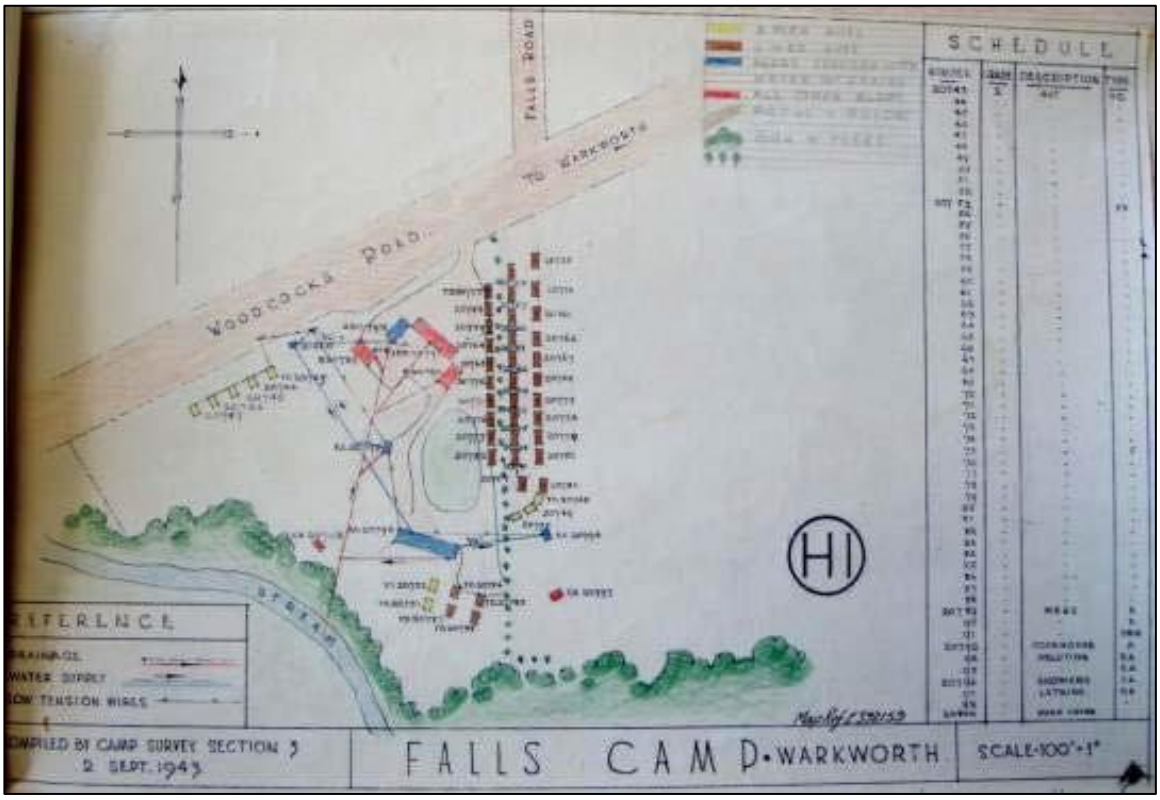


Figure 2.14 Plan detailing the layout of Falls Camp H1, situated along Woodcocks Road (source: Archives New Zealand, ACIO 8722 6/ 77/1).

3 ARCHAEOLOGICAL MONITORING RESULTS

3.1 Introduction

The majority of archaeological sites exposed during the Ara Tūhono road project consisted of single phase shell midden/oven sites. Prior to the commencement of the earthworks stage of the project, five sites in total were known to be modified by construction works – R10/1107 (logging skid only), midden sites R10/1106 and R10/1417; Schollum House (R10/1436) and the site of Wenzlick's House (R10/1437). It was expected that further archaeological sites and, in particular, shell midden sites would likely be present and exposed during the earthworks stage of the project. Two pā sites were also identified (R10/921 and R10/1369), however they were located within 'no soil disturbance' zones.

In total 34 sites were affected by the project works, the five previously recorded sites noted above and 29 new sites. The sites that were investigated were exposed by a variety of earthworks undertaken for the main road cut, facilitating works such as sediment ponds, silt ponds and haul roads, or embankment cuts and vegetation planting works. The topsoil stripping of areas considered to have higher potential for unrecorded archaeological sites, such as ridge spurs and flat terrace-like areas, especially closer to the Pūhoi River or water courses, were monitored by archaeologists, while all earthworks on the project were monitored by kaitiaki of Hōkai Nuku. The project earthwork contractors were also issued with a visual identification guide with examples of how a wide range of archaeological site types and features might appear when initially exposed during topsoil stripping/trenching works, or even impacted during borehole drilling. This resulted in minimal disturbance to any archaeological sites found in areas where an archaeologist was not directly monitoring. Such partially exposed sites were immediately secured and marked out until they could be fully stripped and defined by a mechanical excavator under continuous archaeological supervision.

3.1.1 Work Areas and Sequence

The project was split into four construction zones that were further subdivided into 12 work areas, each with their own Site Access Point (SAP). There were three work areas in which archaeological sites were exposed in the Southern Zone situated south of the Pūhoi River, consisting of 3 Puhoi Road (SAP 10), 11 and 22B Billing Road (SAP 11), and the Stanaway Property at 1457 Hibiscus Coast Highway (SAP 12), situated to the northwest of the Johnstones Hill Tunnels (Figure 3.1). A number of archaeological sites were also exposed on the property at 517 State Highway 1 (SAP 9) located immediately north of the Pūhoi River and to the west of Hikauae Creek (Hungry Creek) in the Central South Zone (Figure 3.2).

Prior to the main earthworks commencing, a number of enabling works consisting predominantly of borehole drilling, fencing and vegetation clearance were undertaken under archaeological Authority number 2017/628. The initial enabling works exposed elements of two archaeological sites located on the properties at 1457 Hibiscus Highway and 22B Billing Road. During monitoring of an access track on the Stanaway property in May 2017, a small shell midden deposit (R10/1496) was exposed along with an unrelated later European settlement period refuse pit. Site R10/1496 was excavated, recorded and sampled at the time. At 22B Billing Road, a shell midden site (R10/1497) was partially exposed during tree felling and vegetation clearance works in June 2017. It was determined

that this site would be fully exposed and excavated at a subsequent date. Both of these sites are reported fully within the Monitoring Results (Section 3.2) below.

The main roading earthworks were undertaken in a number of stages between October 2017 and September 2020. At the Stanaway property in the far south of the project area (SAP 12), in addition to the exposure of site R10/1496 during the enabling works in April and May of 2017, further archaeological sites were exposed on the property in January and February of 2018, and in May and September of 2020 by roading earthworks, planting and fencing works respectively (R10/1482, R10/1504 and R10/1518).

At the SAP 11 Billing Road works area, shell midden site R10/1497, first exposed during vegetation clearance works, was fully exposed and excavated on 1 November 2017, while a further seven shell midden/oven sites (R10/1486, R10/1506, R10/1508, R10/1516, R10/1519, T10/1515 and R10/1517) were exposed and investigated on the property between 3 September 2018 and 2 September 2019.

The 3 Puhoi Road property (SAP 10) had by far the most archaeological sites exposed during the roading earthworks of any of the project work areas. The monitoring of the property began in early November 2017 when a shell midden site (R10/1498) was exposed during earthworks to create a decanter earth bund and small sediment pond on the northern boundary of the property overlooking the Pūhoi River. A further 13 archaeological sites were exposed and investigated on the property between 15 November 2017 and 28 February 2019 (R10/1485, R10/1499, R10/1106, R10/1500, R10/1501, R10/1502, R10/1503, R10/1505, R10/1507, R10/1511, R10/1512, R10/ 1513 and R10/1514). The investigation of site R10/1481 is reported on separately in Chapter 4.

The monitoring of the 517 State Highway 1 (SAP 9) property located adjacent to and north of the Pūhoi River and west of Hikauae Creek commenced with the partial exposure of a shell midden site (R10/1510) on 30 July 2018, as well as monitoring of earthworks at the location or Wenzlick's House (R10/1437) and Schollum's House (R10/1436). A further two sites (R10/1495 and R10/1509) were exposed and investigated between 16 November 2018 and 3 September 2020. The investigation of site R10/1417 is reported on separately in Chapter 4.

In the Northern Zone only one archaeological site (R09/2247) was exposed, near the junction of Woodocks Road and Carran Road. Clough & Associates archaeologists investigated the site on 25 May 2018, having been called in by the contractors.

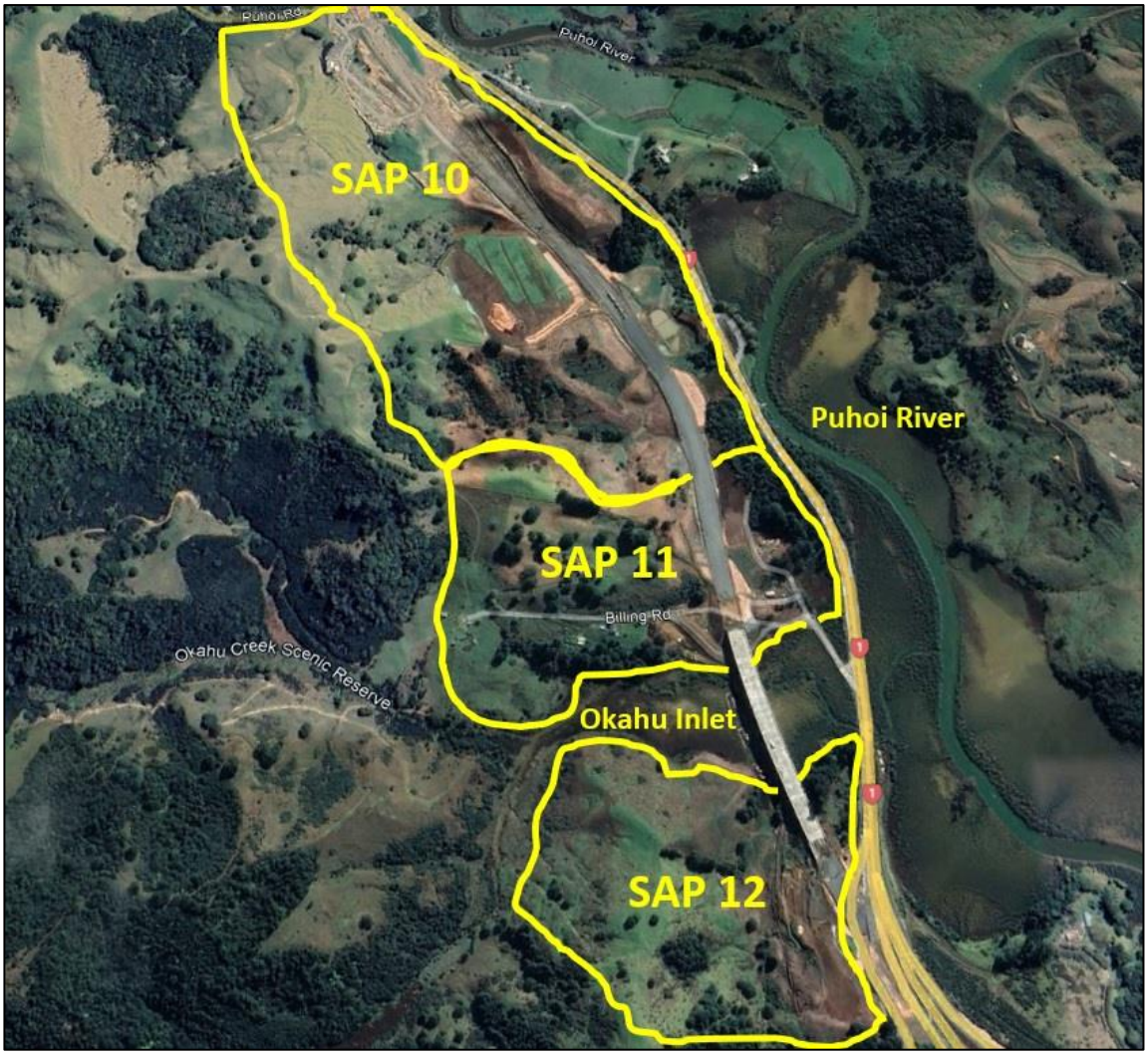


Figure 3.1 Aerial satellite image showing the approximate boundaries of the three Ara Tūhono project work areas in the Southern Zone south of the Pūhoi River (see Figure 1.2). Aerial source: Google Earth Pro

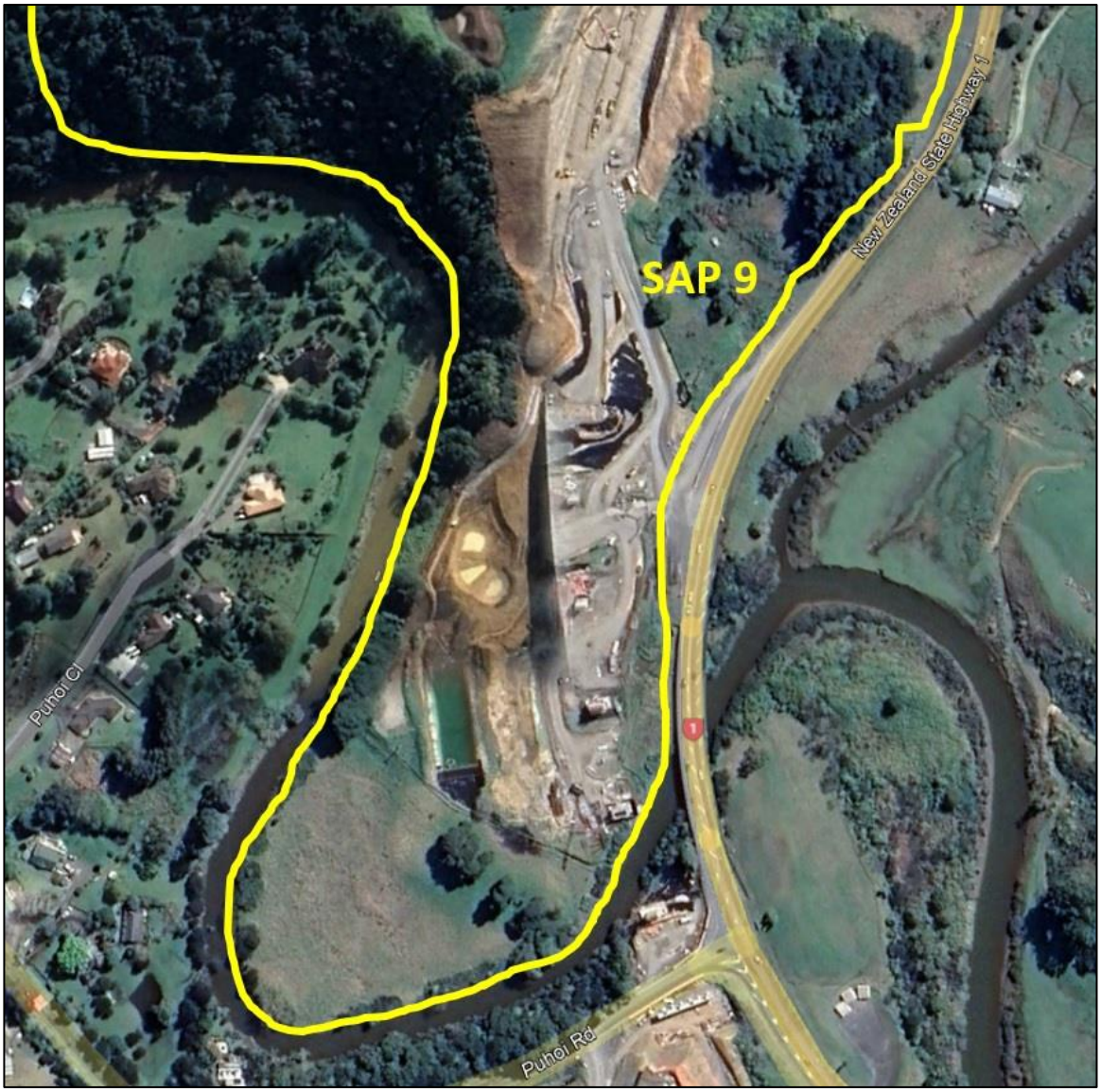


Figure 3.2 Aerial satellite image showing the approximate boundary of the part of the SAP 9 works area in the Central South Zone situated north of the Pūhoi River and west of Hikauae Creek (Hungry Creek) that was monitored by the archaeologists. Aerial source: Google Earth Pro

3.1.2 Monitoring Excavations Methodology

The removal of the majority of non-archaeologically significant overburden present across the investigation areas was undertaken by 6-ton, 14-ton and 20-ton tracked mechanical excavators utilising toothless grading buckets. All machine work was carried out under continuous archaeological supervision until archaeological levels were reached. Archaeological surfaces and features were then cleaned with hand tools by the team of archaeologists in advance of excavation. The excavation of archaeological features was undertaken for the most part by trowel, mattock and spade.

In accordance with condition 3 of the HNZPT authority (2018/097), and utilising a sampling strategy, archaeological features, surfaces and/or deposits were assessed, investigated, recorded and sampled in accordance with accepted archaeological practice and within the framework of the research strategy and management plan (Phear 2017a, 2018) and the requirements of the HNZPT authority. Subsequently, excavation by machine

then proceeded until either natural, sterile deposits were reached, or the impact level for construction had been exceeded – whichever was relevant for any particular area of investigation.

The single context recording system was used, with each cut, deposit, layer and structure given an individual context number and recorded on a tablet utilising a context recording application which enabled the determination of occupation phasing on site and the production of a site Harris Matrix. Individual features were planned at scales of 1:10 or 1:20, and cuts and deposits were drawn in section or profile at scales of 1:10 or 1:20. A photographic record was compiled of all deposits and features with a digital SLR camera. Additionally, an aerial drone was also utilised to obtain aerial images of the larger excavation sites. The context records of the monitored smaller sites are presented in the digital Appendices as Appendix 1.

Artefacts discovered were recorded, retained and analysed as set out in the AMP/research strategy (Phear 2017a and 2018). In general they were recorded on plan (when appropriate); diagnostic, representative or otherwise significant artefacts recovered were retained for analysis by appropriate specialists; and selected artefacts were digitally photographed to include in the final report or as part of the site archive.

Faunal material related to Māori settlement activities was collected, sorted and labelled per context number on site and retained for specialist analysis and radiocarbon dating purposes, with soil samples for environmental analysis collected where appropriate.

Additionally, a site survey of all the archaeological sites and features exposed during the Ara Tūhono project works was undertaken by Wesley Maguire of Recon, utilising a Real Time Kinematic GPS unit with sub-cm accuracy. The excavations were led by Richard Shakles assisted by Carly Mailhot, Ellen Cameron, Sarah Phear, Tom Clough-Macready, Doug Gaylard, Ben Jones and Simon Bickler, and were carried out under the overall direction of Sarah Phear and (in the later stages) Rod Clough.

3.2 Monitoring Results

3.2.1 SAP 12 – Stanaway Property (1457 Hibiscus Coast Highway) South of Pā o Te Hēmara Tauhia (Site R10/921)

The archaeological investigation of the Stanaway property at 1457 Hibiscus Coast Highway exposed four archaeological sites, all of which were located to the south of site R10/921 –Pā o Te Hēmara Tauhia (Figure 3.3). The works were undertaken in a number of stages, with midden site R10/1496 exposed during the initial monitoring of small-scale earthworks on 20 April 2017, while midden R10/1504 and associated oven features were investigated between 15 January and 12 February 2018 during the enabling works for the Ōkahu Viaduct. Two further shell midden sites were exposed during fencing and tree planting works undertaken in May and September of 2020 respectively (sites R10/1482 and R10/1518; Figure 3.3). Neither of these sites were investigated as in both cases activities were modified to avoid the in situ deposits and as such investigation of the two shell midden sites was not required. Additionally, a historical period demolition deposit was exposed which consisted of 19th century building and artefactual material intermixed with redeposited shell midden deposits (Figure 3.3). However, as the demolition deposit dated to the early 20th century, it was not recorded as an archaeological site.

Stratigraphy

The stratigraphy present in the excavation areas on the Stanaway property consisted of a mid-brown silt loam (context 1000) that was up to 0.18m thick and sealed a yellowish light brown subsoil (context 1001), which in turn sealed a natural clay colluvium (context 1002). However, almost complete truncation of the original topsoil and subsoil had occurred across the top of the flat-topped ridge that formed the majority of the area to the south and southeast of the pā site, which was in the area where the Titford Cottage and ancillary buildings had been situated, with the result that the modern topsoil directly sealed the clay natural. The cause of the truncation was the levelling of the site in the 1930s, most likely via a bulldozer, and the subsequent construction of a number of farm buildings throughout the remainder of the 20th century.

Figure 3.3 Location of archaeological sites (red stars) exposed by the earthworks on the Stanaway property located at 1457 Hibiscus Coast Highway. The yellow and red outlined star (R10/921) is the previously recorded pa site that was not affected by the projects earthworks

R10/1496 – Shell Midden (Context 1006)

Site R10/1496 (context 1006; see Appendix 1) was a shell midden deposit located on a relatively flat to gently sloping area a few metres to the west of a narrow, flat topped ridge

some 110m south-southwest of the recorded pa site (R10/921), and 70m south of the c.1920 Titford House (Figure 3.4).

The midden deposit was patchy and discontinuous in nature, not particularly dense, and there was also evidence of previous disturbance. It is possible that some components of the deposit had been redeposited by historical earthworks related to the construction of a concrete footpath composed of crushed scoria that truncated the western edge of the midden (Figure 3.4). The deposit measured approximately 5m (north-south) by 4.6m (east-west) and was only some 0.04m thick, and sealed beneath topsoil (context 1000). The shell midden consisted predominantly of cockle with lesser amounts of pipi present, and was within a silty clay matrix that contained moderate inclusions of charcoal. It is likely that the midden deposit was formed from cooking activities associated with settlement activities related to the occupation of the nearby pā.

Two vertically truncated postholes, one oval and one sub-circular (contexts 1007 and 1009; see Appendix 1), were exposed within the footprint of the midden and are considered contemporary with its formation; they may indicate the presence of drying racks.

No artefacts were present within the midden deposit or within the fills of the ovens and postholes.

Figure 3.4 Southeast facing view across the partially exposed shell midden R10/1496 that consisted of a thin scatter of cockle and pipi shell. Scale: 2 x 1m

R10/1504 – Shell Midden (Context 1099)

Shell midden site R10/1504 (context 1099) was located approximately 65m south-southwest of the pā at the base of a northeast trending slope that descended from the flat-topped ridge (Figure 3.3 and Figure 3.5). The midden deposit extended for some 3.43m (north-south) and 5.57m (east-west) and was up to 0.17m thick but was only partially exposed as it extended both northward and north-westward beyond the edge of excavation (Figure 3.6). The midden deposit consisted predominantly of cockle, with pipi and small

amounts of mud snail also present, which were within a moderately compacted dark greyish-black ashy silt matrix that contained moderate inclusions of charcoal and occasional heat fractured rock fragments. The deposit was sealed by the topsoil (context 1000), which in this area was a blackish dark grey clayey silt (Figure 3.7). The midden sealed the remnants of a buried soil (context 1116), which was a greyish-brown silty clay that contained occasional inclusions of charcoal and very small fragments of marine shell, that in turn sealed the subsoil (context 1001). A 15 litre sample of the shell midden deposit was taken for analysis and dating purposes.

Approximately 8.9m upslope and to the south-southwest of midden 1099, four associated earth ovens (contexts 1100, 1102, 1104 and 1114; Figure 3.5; see Appendix 1) were observed cut into the clay natural (Figure 3.5 and Figure 3.8). All of the ovens were oval in plan with flat to slightly concave bases and contained single fills (contexts 1101, 1103, 1105 and 1115) that consisted of mid-greyish brown mottled silty clays with frequent shell and occasional heat fractured rock and charcoal inclusions (Figure 3.8). In addition to the ovens, four postholes (contexts 1106, 1108, 1110 and 1112), all of which were oval in plan, were situated in close proximity to the midden deposit (Figure 3.5). All the postholes had been cut into the natural clay and had vertical to steep sides and concave bases. The postholes most likely represent the presence of drying racks to cure fish and/or other marine resources. No artefacts were present within the midden deposit or within the fills of the ovens and postholes.

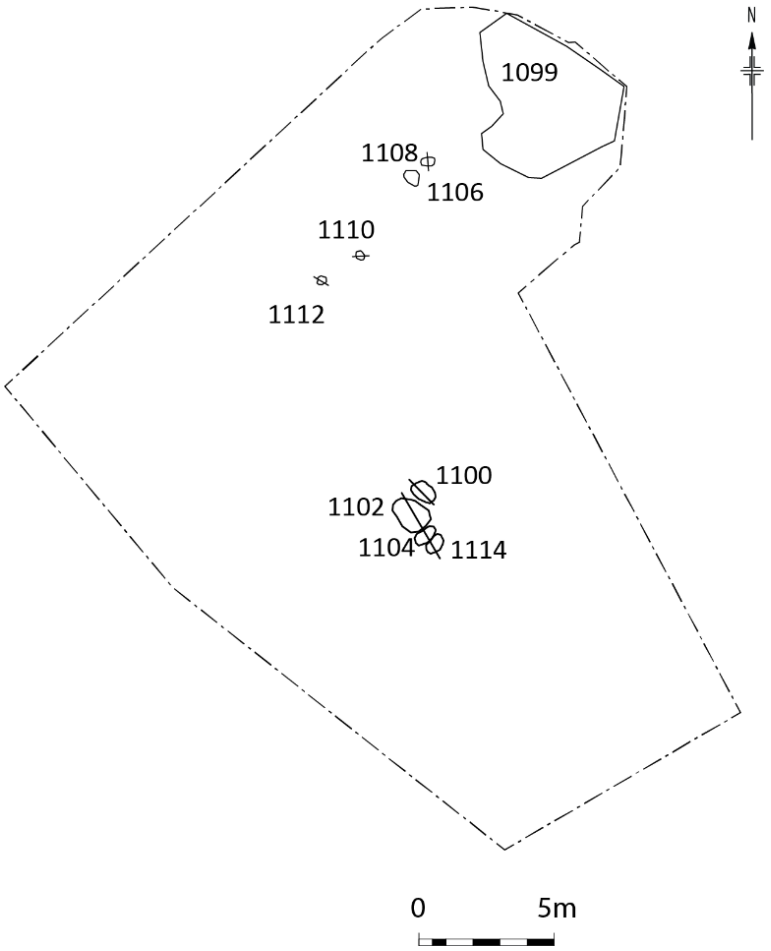


Figure 3.5 Survey plan of excavation area and archaeological features comprising site R10/1504

Figure 3.6 Looking northeast across the shell midden deposit (context 1099) that formed the main component of site R10/1504. Scale: 1m

Figure 3.7 West facing section through midden deposit 1099. Scale: 1m

Figure 3.8 The intercutting hāngi situated upslope from midden deposit 1099 seen after excavation in half section, facing north. Scale: 2 x 1m

Historic Period Demolition Deposit (Context 1098) and Refuse Pit (Context 1003)

A historic period artefact-rich deposit was exposed during topsoil stripping immediately to the south-southwest of a southeast-northwest trending flat-topped spur at 1457 Hibiscus Coast Highway. The deposit extended for some 19.59m downslope and was up to 12.23m wide and up to 0.15m thick. It consisted of a loosely compacted, friable, greyish dark brown silt loam that contained frequent 19th century artefactual material (Figure 3.9). The deposit was completely intermixed with an earlier Māori shell midden deposit which consisted of pipi, cockle whelk and rare fishbone, and contained frequent charcoal and moderate heat fractured rock inclusions. The historic period artefacts present within the deposit consisted of broken fire bricks, sandstock bricks, nails, iron and copper alloy items, intermixed with a refuse deposit that was likely an underfloor refuse dump in origin that contained ceramic (both earthenware and stoneware), alcohol bottle glass, clay tobacco pipe components, and animal bone. The artefacts were typical of mid- to late 19th century artefacts recovered from European settlement period sites within New Zealand. An argillite adze of type 2b form was recovered from the deposit and had most likely originally been deposited within the shell midden prior to its disturbance (Figure 3.10).

It is interpreted that the deposit was formed by the demolition of a modest dwelling built by Gregor Wenzlick that was still extant on the site when the land was purchased by Mary Titford in March 1902, after which the Titford Cottage was built (see Section 2.4). It is likely that Wenzlick had constructed his own small cottage on top of an in situ shell midden deposit, and when the Titfords demolished the cottage the building materials, an underfloor

refuse deposit, and the shell midden were all intermixed and deposited immediately downslope of the flat spur upon which the cottage would have been situated. The shell midden material would originally have derived from site R10/1496, situated only some 10m to the southeast, and indicates that the shell midden deposit had originally been much larger. The argillite adze would almost certainly have been deposited in association with the original shell midden site.

As the deposit's formation dates to the early 20th century, it therefore does not meet the definition of an archaeological site under the HNZPTA. The site was not recorded on the NZAA ArchSite Database.

In addition to the demolition deposit (context 1098), there was one other European settlement period feature present on the Stanaway property, which consisted of a refuse pit (context 1003). The feature was cut into the subsoil, was oval in plan and was 0.98m long by 0.57m wide and due to severe vertical truncation survived only to a depth of 0.04m. The feature contained a single fill (context 1004) which consisted of a mid-greyish brown silty clay that contained both late 19th century and earlier 20th century artefactual material. The pit is interpreted as a rubbish pit relating to the earlier 20th century occupation of Titford Cottage.

Figure 3.9 The exposed historical demolition deposit intermixed with a redeposited shell midden that was situated immediately to the south-southwest of a southeast-northwest trending flat-topped spur at 1457 Hibiscus Coast Highway. The arrow marks the location where the argillite adze was recovered

Figure 3.10 The argillite adze recovered from context 1098 and seen here immediately after it was recovered

R10/1482 – Shell Midden

During fencing works undertaken in May 2020 along the southern project boundary at 1457 Hibiscus Coast Highway, a small shell midden deposit (site R10/1482) was exposed (Figure 3.3; Figure 3.11). The fencing crew had ceased excavation of a posthole as soon as shell midden was encountered (Figure 3.12). The midden deposit consisted of crushed and fragmented pipi and probing with a spear probe established that the deposit was approximately 3cm thick and that it extended 2m in length (east to west) and was approximately 1m wide. Further probing did not identify any more shell in the surrounding area.

The shell midden deposit was avoided by the fence line, and its extent was marked out so that it could be avoided by planned vegetation planting in the area. As the site was avoided, archaeological investigation was not necessary and the aborted posthole was backfilled.

Figure 3.11 Location of shell midden R10/1482 on high ground situated on the southern boundary of the project area, facing north

Figure 3.12 Exposed shell midden deposit seen in the aborted posthole excavation

R10/1518 – Shell Midden

During tree planting works undertaken in September 2020 on the property at 1457 Hibiscus Coast Highway and in an area some 65m west-northwest of shell midden R10/1482, a shell midden deposit (site R10/1518) was exposed (Figure 3.3; Figure 3.13). The fencing crew had ceased excavation of a tree planting hole as soon as shell midden was encountered. The midden deposit consisted of fragmented and whole pipi with some cockle and probing with a spear probe established that the deposit was approximately 4cm thick and approximately 2.5m in diameter. Further probing identified another, much smaller shell deposit situated 3m to the south further up slope that was approximately 0.5m in diameter and very possibly a backfilled earth oven or firescoop feature.

The two shell midden deposits were marked out and fenced off so that they could be avoided by the tree planting in the area. As the site was avoided, archaeological investigation was not required and the aborted tree planting excavation was backfilled.

Figure 3.13 The northernmost of the two shell midden deposits comprising site R10/1518 at 1457 Hibiscus Coast Highway, facing north. The stick marks the exposed shell midden that was observed in the aborted tree planting excavation.

3.2.2 Sap 11 – 11 Billing Road and 22B Billing Road

The archaeological investigations of the Billing Road properties to the north of the Ōkahu Viaduct exposed eight archaeological sites, all of which were shell middens with associated features (Figure 3.14). The works were undertaken in a number of stages, with midden site R10/1497 exposed during the initial monitoring of vegetation removal and small-scale

earthworks on 1 November 2017, while the other seven sites were investigated between 3 September 2018 and 2 September 2019.

R10/1497 – Shell Midden (Context 1012)

Site R10/1497 (context 1012; see Appendix 1) was located at 22B Billing Road, northeast of the existing house on the property (Figure 3.14 and Figure 3.15). It was first partially exposed during ground disturbance related to tree felling and vegetation clearance operations. The midden was subsequently fully exposed by mechanical excavator utilising a weed bucket under the supervision of an archaeologist. Archaeological investigation of the midden was undertaken on 1 November 2017. Investigation consisted of the manual excavation of one trench measuring 1m in width and 5.2m in length, running north-south through the centre of the midden, from which samples were taken for detailed midden analysis and dating purposes (Figure 3.16).

The midden measured 7m (east-west) by 5.2m (north-south). The hand-excavated trench revealed that the deposit was 0.20m thick at its deepest point. The midden consisted primarily of cockle and pipi, with occasional mud snail. A small amount of rock oyster was also present. The midden contained occasional inclusions of heat fractured rock/burnt stones and charcoal.

No artefacts were present within the deposit.

Figure 3.14 Location of archaeological sites (red stars) exposed by the earthworks on the 11 Billing Road and 22B Billing Road properties

Figure 3.15 Pre-excavation view of the shell midden deposit that comprised site R10/1497 at 22B Billing Road, facing south. Scale: 2 x 1m

Figure 3.16 East facing post-excavation plan view of site R10/1497. Scale: 2 x 1m

R10/1506 – Shell Midden (Contexts 1371 and 1372)

Site R10/1506 was exposed on the northern shoreline of the Ōkahu Inlet during enabling works for the Ōkahu Viaduct (Figure 3.14) and consisted of two distinct shell midden deposits. A small exposure of shell midden (context 1371; see Appendix 1) was observed within the roots of a large macrocarpa tree stump exposed during vegetation clearance works. The small shell midden deposit consisted predominantly of pipi (99%) with a small amount of cockle (1%), that was within a silty ashy matrix that contained occasional charcoal and heat fractured rock (sandstone) fragments. The deposit measured 0.40m in width and extended back some 0.30m and was 0.04 m thick.

On further inspection of the surrounding area utilising a spear probe, a second larger shell midden deposit was located and established to be some 5.16m in length (northwest-southeast) by up to 2.87m wide (Figure 3.17), although the deposit was patchy and irregular and varied in thickness from 0.04m to as little as 0.01m. A 10 litre sample was taken for species analysis and dating purposes.

No artefacts were present within the deposit.

Figure 3.17 Looking east-northeast across the site of the larger of the two midden deposits in R10/1506 (marked out by the flagged area) on the northern bank of the Ōkahu Inlet south of Billing Road

R10/1508 – Shell Midden/Oven (Contexts 2352 to 2363)

Site R10/1508 was situated adjacent to and just above the northern bank of the Ōkahu Inlet, to the east of the former dwelling at 22A Billing Road, Pūhoi (Figure 3.14 and Figure 3.18; Appendix 1). The site was exposed during earthworks related to the formation of a haul road to facilitate the construction of the Ōkahu Viaduct and consisted of a group of six hāngi, five of which were oval in shape with the remaining oven being sub-circular (Figure 3.19; Figure 3.20). All of the features were partially vertically truncated by the mechanical

excavator and the features had been impacted by the growth of macrocarpa tree roots into and in some cases through them. Two of the ovens (contexts 2354 and 2356) were only seen in section as they had been almost completely truncated in plan by the mechanical excavator undertaking the initial earthworking of the area (Figure 3.19 and Figure 3.20). Of the four oven features that survived intact, the most substantial (context 2360) was oval in plan, measured 0.68m in length by 0.52 m wide and survived to a depth of 0.09m (Figure 3.19). The feature had been cut with smoothly sloping sides and a concave base, and contained one fill (context 2361), which consisted of shell midden, almost exclusively composed of whole and fragmented mud snail within a dark greyish-black ashy silt matrix that contained moderate inclusions of charcoal and occasional fragments of heat fractured rock. Four of the other five hāngi (contexts 2354, 2356, 2358 and 2362) contained fills consistent with context 2361, while oven 2352 contained a dark grey clayey silt (context 2353) that contained frequent inclusions of sandstone oven stone fragments and moderate charcoal inclusions. The fill of oven 2352 was bulk sampled for charcoal analysis and dating purposes, while context 2359 (the fill of oven 2358) was sampled for shell species analysis.

Following excavation, recording, sampling and survey, site R10/1508 was completely truncated by the haul road formation earthworks.

No artefacts were present within any of the oven features.

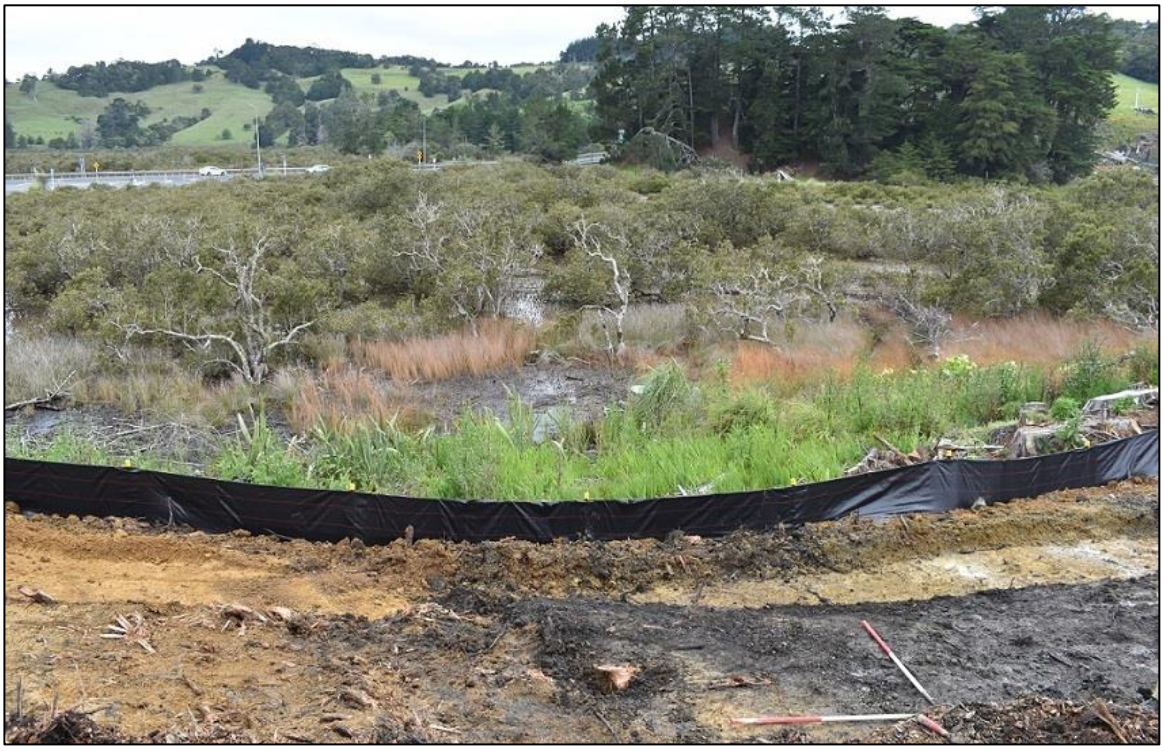


Figure 3.18 View southeast showing the location of site R10/1508, situated close to and just above the northern bank of the Ōkahu Inlet. Scale: 2 x 1m

Figure 3.19 Southeast facing plan view of four of the hāngi features comprising site R10/1508. Scale: 2 x 1m

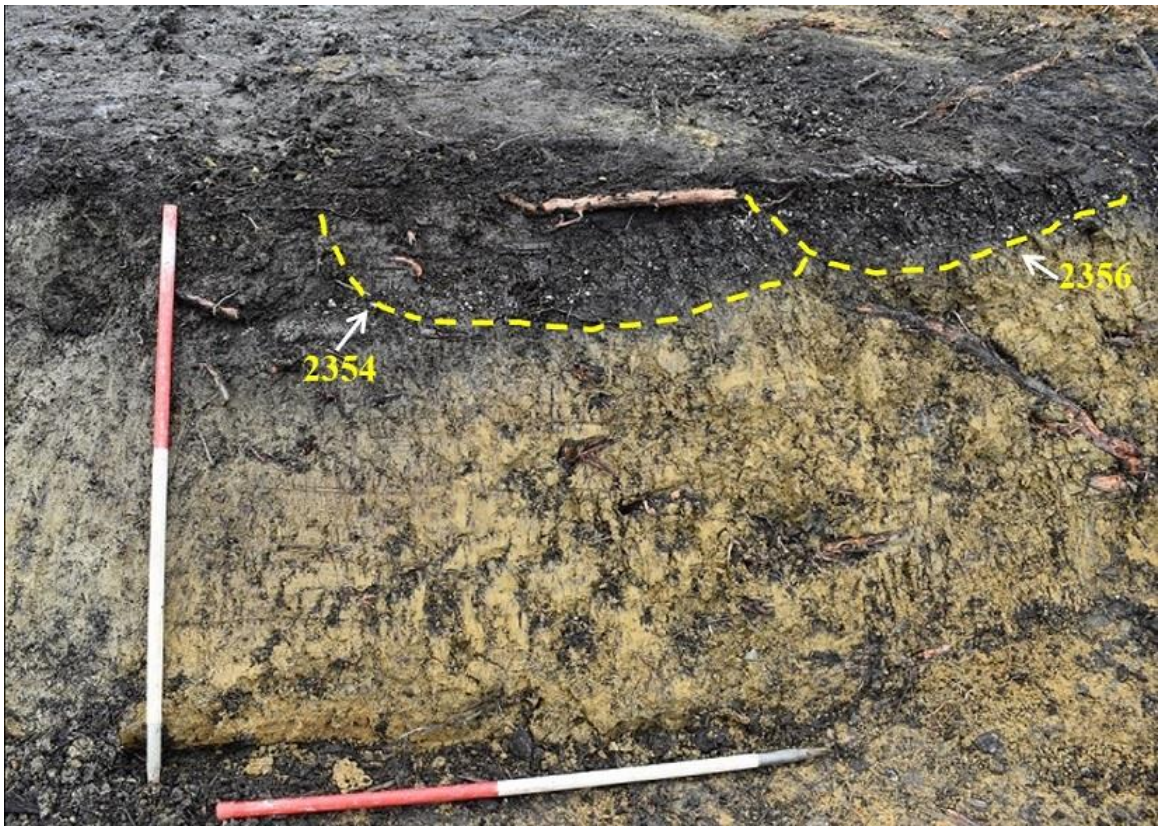


Figure 3.20 Earth ovens 2354 and 2356 seen in section following initial earthworking related to the formation of the haulage road to the Ōkahu Viaduct works site, facing northwest. Scale: 2 x 1m

R10/1515 – Shell Midden (Context 3063)

Site R10/1515 was located on a southwest-northeast trending ridge overlooking an inlet of the Pūhoi River at 22B Billing Road, Pūhoi (Figure 3.14 and Figure 3.22). The site was exposed during the initial topsoil strip in advance of large-scale earthworks associated with the construction of the Pūhoi to Warkworth section of the new SH1 motorway extension. The site consisted of six discrete shell midden deposits spread across an area of 35m (north-south) by 11m (east-west), a drain, and a single posthole and stakehole (Figure 3.21).

The shell midden deposits (context 3063) were sealed by the modern topsoil under turf (context 3062) which was 0.10m thick and consisted of a greyish-brown silt loam that contained charcoal inclusions and burnt roots, probably from the burn-off of gorse. The main concentration, and the larger of the midden deposits, consisted of three distinct patches with two smaller isolated deposits 8.6m and 20m to the southwest, while a single deposit was located approximately 4m to the northeast (Figure 3.21). The shell midden deposits were homogenous and consisted of fragmented and whole pipi, cockle and some mud snail within a dark brown silty clay matrix that contained charcoal inclusions, and all sealed the subsoil which was a mottled greyish-brown and yellowish-brown silty clay with occasional charcoal flecks, small fragments of heat fractured rock and burnt clay patches (Figure 3.23 and Figure 3.24). The midden deposits had probably been vertically truncated at some point, as the largest of them (some 6.18m in length by 3.40m wide) only survived to a depth of 0.05m, while many were of the remainder were as little as 0.02m thick. A 10 litre sample of shell midden was retrieved from the largest of the shell midden deposits for species analysis and dating purposes.

A drain that was curvilinear in plan (context 3066), and initially ran on a north-south alignment before it curved to the northeast, was situated approximately 12m southeast of the main concentration of the largest midden deposits (Figure 3.21 and Figure 3.25). The drain was cut through the subsoil (context 3064) and into the natural clay (context 3065) and was some 8.52m in length, 0.23m wide and 0.16m deep, filled with a single fill (context 3067) which consisted of a greyish dark brown silt that contained occasional charcoal and small fragments of heat fractured rock (Figure 3.25). It is likely that the feature would have functioned to drain water away from a living area, perhaps even a small whare; however no postholes or board-slots indicating the presence of such a structure were observed, almost certainly due to vertical truncation and/or erosion of the area. Charcoal from the fill was sampled for identification and dating purposes.

The sub-circular posthole (context 3070) was 0.25m in diameter and was not excavated. The single small stakehole (context 3068) was 0.08m in diameter and 0.18m deep and contained a single fill (context 3069) which consisted of a dark greyish-brown silt with very occasional charcoal flecks. As the sub-circular posthole and stakehole were in isolation it is not possible to infer a function.

No artefacts were present within any of the midden deposits or within the fills of the drain, posthole or stakehole.

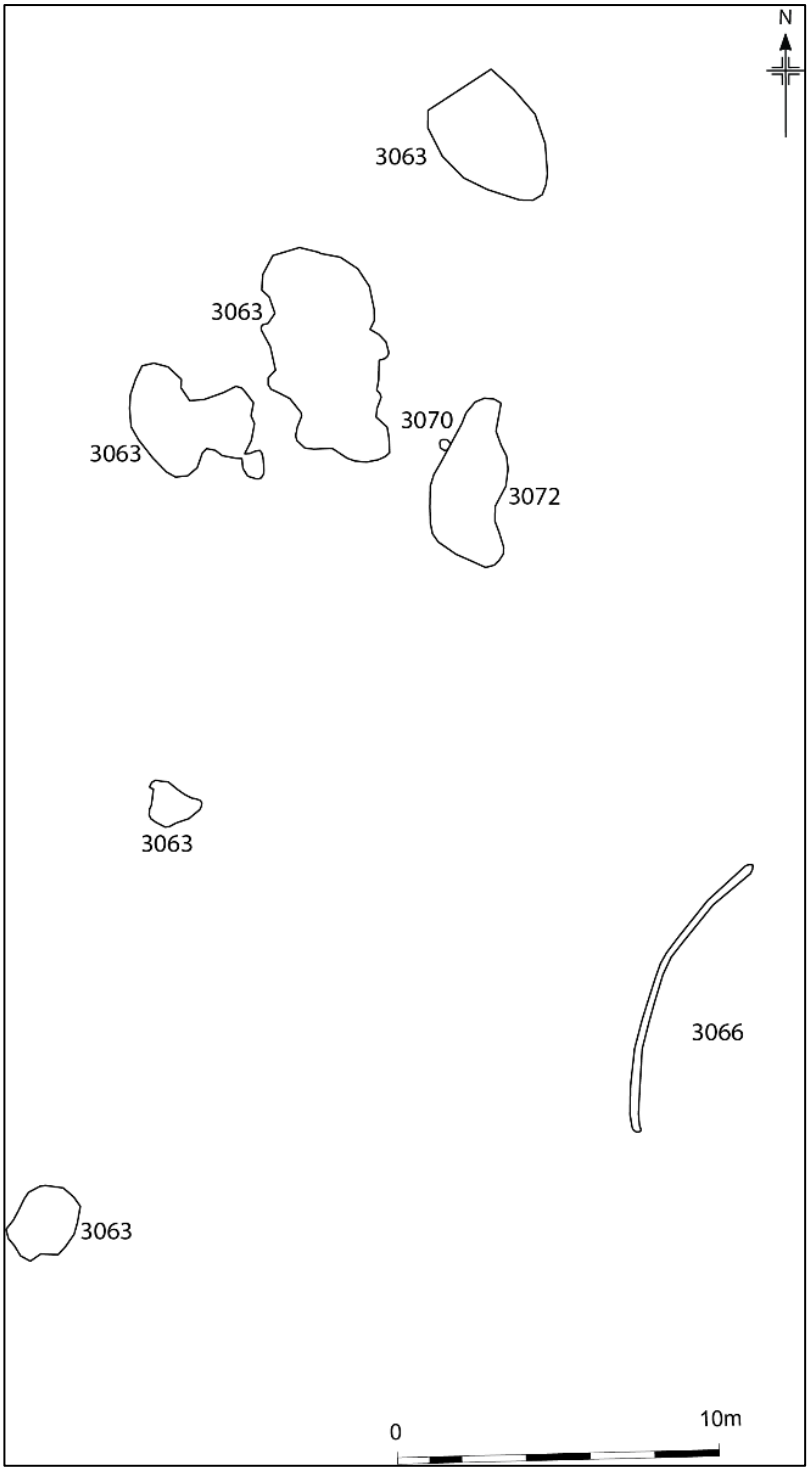


Figure 3.21 Survey plan of excavation area and archaeological features comprising site R10/1515 at 22B Billing Road

Figure 3.22 Looking east-northeast along the ridge at 22B Billing Road on which site R10/1515 was situated. Scale: 2 x 1m

Figure 3.23 Looking east across the largest midden deposit (context 3063) of R10/1515. Scale: 2 x 1m

Figure 3.24 West facing section within the largest midden deposit (context 3063) of site R10/1515. Scale: 1m

Figure 3.25 Post-excavation shot looking north along drain 3066. Scale: 2 x 1m

R10/1516 – Shell Midden (Context 3073)

Site R10/1516 was located just north of Billing Road and approximately 100m north of the northern banks of the Ōkahu Inlet of the Pūhoi River, at 22B Billing Road, Pūhoi (Figure 3.14). The site consisted of a small shell midden deposit (context 3073) that primarily contained mud snail, with lesser amounts of cockle and rock oyster, within a silty clay matrix that had occasional charcoal inclusions and heat fractured rock fragments (Figure 3.26). The midden deposit was 2.07m in length by 1.90m wide and was up to 0.06m thick. The shell midden was sealed beneath the modern topsoil (context 3072), which consisted of a greyish-brown silt loam beneath turf, and itself sealed the natural subsoil (context 3074), which was a light brown silty clay.

A 10 litre sample of the midden deposits was taken for species identification and dating purposes. No artefacts were observed or retrieved from the site.

Figure 3.26 Looking west across the midden deposit (context 3073) comprising site R10/1516

R10/1517 – Shell Midden (Contexts 3076 and 3079)

The site was located beneath what had been the back lawn and to the north of the former dwelling at 22B Billing Road, Pūhoi, approximately 125m due west of the northbound carriageway of the existing SH1, on flat ground situated above and to the south of an inlet of the Pūhoi River (Figure 3.14). The site consisted of two small distinct shell midden deposits approximately 8m apart from one another, and a single earth oven feature. Both deposits were sealed beneath the modern topsoil, which consisted of a mid-brown silty clay loam beneath turf, while the deposits sealed the natural subsoil (context 3077), with the the oven feature cut into the subsoil.

The largest midden deposit (context 3079) was situated between two disturbed and truncated areas. The midden had been cut by service trenches to both the east and west. It survived for approximately 3.0m (east-west) and up to 2.56m (north-south) and had a maximum thickness of 0.08m (Figure 3.27). The midden deposit consisted predominantly of fragmented and whole pipi (85%) with cockle forming the remainder and was within a dark brown silty clay matrix with occasional to moderate charcoal inclusions and occasional heat fractured rock fragments (sandstone).

After the shell midden had been bulk sampled for analysis and dating purposes the remaining shell was removed by mechanical excavator under constant archaeological supervision. After the shell had been cleared a sub-circular earth oven feature (context 3080) was exposed cut into the natural subsoil (3077). The hāngi had been cut with gradual, smoothly sloping sides and a flattish to concave base. The feature contained one fill (context 3081) which consisted of a dark brown silty clay that contained frequent heat fractured sandstone fragments, and occasional to moderate charcoal inclusions (Figure 3.28).

The smaller of the two midden deposits (context 3076) also consisted predominantly of pipi (whole, fragmented and crushed) with the remainder being whole and fragmented cockle. The shell was within a dark blackish-brown loamy clay matrix which contained occasional charcoal inclusions and heat fractured sandstone fragments. The deposit was only some 1.60m in length by up to 1m in width, and had a maximum thickness of just 0.02m.

A 10 litre sample from each of the two midden deposits was taken for analysis and dating purposes. No artefacts were observed in any of the deposits or features comprising site R10/1517.

Figure 3.27 Northwest facing view across the larger of the two midden deposits (context 3079) comprising site R10/1517. Scale: 2 x 1m

Figure 3.28 The earth oven (context 3080) seen after the remaining shell midden deposit 3079 had been removed and prior to excavation, facing east. Scale: 2 x 1m

R10/1486 – Shell Midden/Oven (Context 3084)

Site R10/1486, located to the west of the driveway and sites R10/1508 and R10/1506 (Figure 3.14), consisted of at least one firescoop/oven feature (context 3084). However, due to the very small-scale nature of the investigation it was not clear, and it is likely that there were at least two other intercutting features present (Figure 3.29). A very narrow 10cm wide section through the feature was excavated and established that the main firescoop/oven feature was 0.65m in length, by 0.62m wide and had been cut into the subsoil (context 3086) with smooth, gradual sloping sides and a concave base. The feature contained a single fill (context 3085) that was 0.15m thick, which consisted of pipi and cockle in a dark greyish-brown clayey silt matrix that also contained moderate inclusions of charcoal and occasional fragments of heat fractured rock (Figure 3.29). The feature was sealed by the modern topsoil (context 3083), which consisted of a mid-brown silty clay with frequent root action and rootlets under turf. It is clear from the photographic section (Figure 3.30) that firescoop 3084 truncated earlier existing features, as represented by partially excavated/exposed fills visible either side of the cut of the firescoop. It was likely that the area was utilised for cooking for a period of short duration, with features being recut into earlier features.

A 10 litre sample of the fill of earth oven 3084 was taken for analysis and dating purposes. No artefacts were observed or retrieved.

Figure 3.29 North facing post-excavation view of firescoop/earth oven feature 3084, site R10/1486. Scale: 1m

Figure 3.30 West facing section of firescoop/oven feature 3084. Scale: 2 x 1m (0.10m increments)

R10/1519 – Shell Midden (Contexts 3100, 3101 and 3102)

The site consisted of three distinct shell midden deposits on what was elevated ground above the northern banks of the Ōkahu Inlet with views southeast down the Pūhoi River (Figure 3.14 and Figure 3.31). The largest of the midden deposits (context 3100) had been within the footprint of the former house at 22B Billing Road and as such had been severely impacted, with a ceramic drain having been cut through its centre, while the remainder of the deposit had been severely disturbed, likely at the time of the construction of the former

house. The midden deposit was 8.06m (northeast-southwest) by 5.09m (northwest-southeast) with a maximum thickness of 0.08m but which was often as little as 0.02m (Figure 3.32). The midden was sealed by the shallow modern topsoil and consisted of fragmented, whole and crushed pipi and cockle shell within a mid-greyish brown clayey silt with occasional charcoal and heat fractured rock fragments. A 10 litre sample was taken for analysis and dating purposes.

The second midden deposit (context 3101) was situated some 30m to the southeast close to the edge of the promontory and the location had commanding views across both the Ōkahu Inlet and the lower reaches of the Pūhoi River toward its estuary. The site consisted of a shell midden deposit approximately 4m in diameter containing mud snail, pipi and cockle with small amounts of rock oyster within a mid-brown silt soil that contained occasional charcoal, heat fractured rock fragments and burnt shell inclusions. The deposit had been disturbed by macrocarpa roots that had penetrated the deposit both laterally and vertically. A 20 litre sample was taken for analysis and dating purposes.

The third and smallest shell midden deposit (context 3102) was situated approximately 5m to the southwest of deposit 2, and consisted of a small midden deposit (1m in diameter) predominantly comprising pipi with some mud snail and cockle also present within a dark, greyish-brown clayey silt matrix that was just 0.03m thick and contained occasional charcoal and very small heat fractured rock fragments (Figure 3.33). As with midden deposit 2 (context 3101), the midden had been greatly affected by tree roots. A 10 litre sample was taken for analysis and dating purposes.

No artefacts were observed in any of the midden deposits.

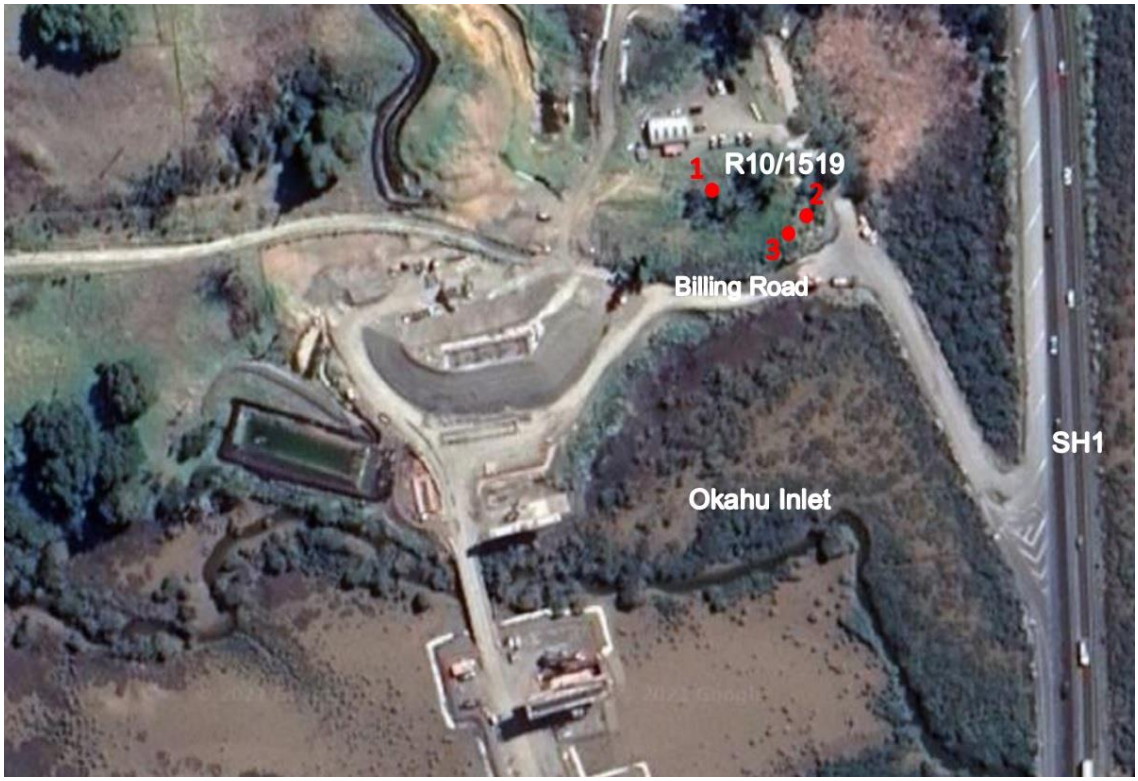


Figure 3.31 Aerial showing the location of the three shell midden deposits (numbered in red) that comprised site R10/1519

Figure 3.32 Facing west looking over midden deposit 2 (context 3101) of site R10/1519; pre-excavation view with the disturbance by large macrocarpa tree roots clearly visible. Scale: 1m

Figure 3.33 South facing pre-excavation view over the small midden deposit 3 (context 3102) of site R10/1519 at 22B Billing Road. Scale: 1m

R10/1107 – Logging Skid

Monitoring of vegetation clearance and earthworks within the extent recorded on the site record form for R10/1107 did not result in any evidence of a logging skid being present (see Figure 1.4). As such, no further record of this feature was made. However, the midden element of the site was outside the construction footprint and is still present.

3.2.3 SAP 10 – 3 Puhoi Road

The archaeological investigations of the 3 Puhoi Road works area located to the south of Puhoi Road and the Pūhoi River and west of the extant SH1 road, exposed 15 archaeological sites ranging from shell middens with associated oven features to a relatively large site (R10/1484) that was indicative of more permanent settlement activities (Figure 3.34). R10/1484 was a complex multi-phased site that required a detailed large-scale excavation and, as such, is reported on separately in Chapter 4. Many of the sites, and particularly those located on or towards the western project boundary, had been buried by historical landslips that had descended from the steep slopes of the eastern flanks of the large hill that dominated the property at 3 Puhoi Road.

The eastern flanks of the large hill were observed during the course of the archaeological monitoring works to remain 'wet' in many places, even during prolonged periods of dry weather. This was due to the presence of several springs which, together with the steeply angled interbedded mudstones and sandstones that formed the geology of the site, provided the perfect environment for producing landslips as well as active soil creep. Evidence of former landslips was observed as rotational slump scars, significant soil creep in the form of terracettes present on the steep slopes, along with associated depositional features such as lobe and cone/fan shaped formations located on the more gentle, lower slopes. In some cases the landslips entailed the movement of topsoil, subsoil and even the upper levels of the natural mudstone, which had then descended and been redeposited in fan or lobe shaped formations. Initially, a number of areas that had been stripped to 'natural' horizons had to then be revisited as buried topsoil, and in some cases shell midden deposits, were encountered at depths where such features were not expected to be present. Moreover, it soon became apparent that the modern topography of the western area of the 3 Puhoi Road property bore little or no resemblance to the former landscape that would have been contemporary with Māori occupation of the area. Once a more informed understanding of the nature of the geomorphology of that part of the property had been gained, subsequent stripping of the topsoil and modern overburden was taken deeper to ensure there were no deeply buried archaeological sites present.

The archaeological monitoring works were undertaken in a number of stages, with midden site R10/1498 exposed during initial excavations for a sediment pond and investigated from 10 to 13 November 2017, while the other 14 sites were investigated between 15 November 2017 and 28 February 2019.

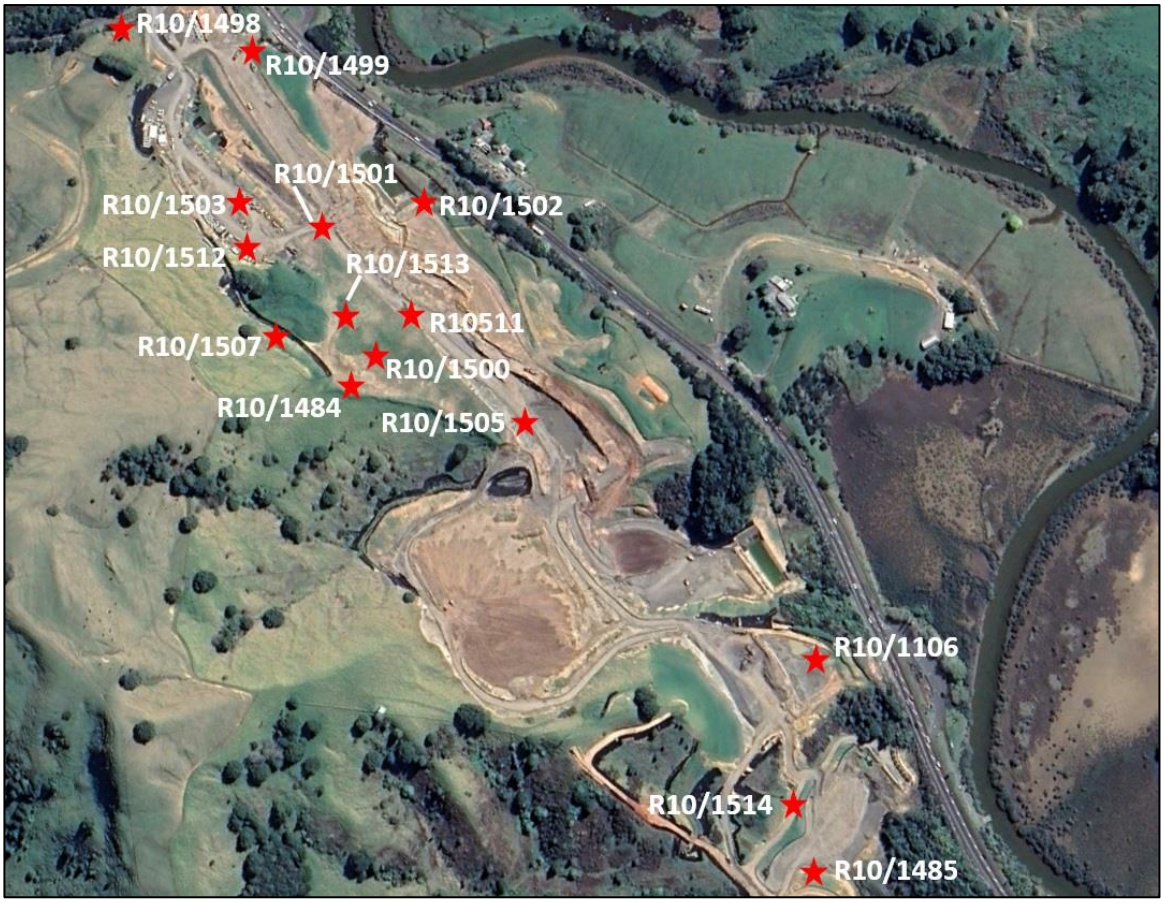


Figure 3.34 Location of archaeological sites (red stars) exposed by the motorway earthworks at 3 Puhoi Road

R10/1498 – Shell Midden (Context 1019)

Site R10/1498 (context 1019) was located at 3 Puhoi Road on a moderate to gentle slope approximately 10m to the south of and above Puhoi Road, and overlooking the southern bank of the Pūhoi River (Figure 3.34; Figure 3.35, and Figure 3.36). It was first exposed during topsoil stripping for a decanter earth bund in November 2017. Further topsoil stripping to expose the remainder of the midden deposit proceeded under the direct supervision of an archaeologist. The initial investigation was then undertaken which consisted of two hand-excavated trenches, situated perpendicular to one other and bisected approximately in the centre of the midden deposit (Figure 3.37).

The shell midden deposit measured 8.5m (north-south) by 8m (east-west), was up to 0.26m thick at its deepest point, and consisted predominantly of pipi, with moderate amounts of cockle, while lesser amounts of mud snail were also present in occasional, discrete concentrations. The shell was present within an ashy silt matrix that contained frequent charcoal inclusions, and occasional heat fractured rock/burnt oven stones were also present. A large percentage of the shells were whole, especially so on the base, where they had been pressed into the clay subsoil. A 20 litre sample of shells were taken for detailed midden analysis, while a sample of shells was also collected from the base for radiocarbon dating purposes.

A mid-brown silt buried former topsoil (context 1098) that survived intermittently was sealed in part by the shell midden and would have been contemporary with the beginning of midden deposition.

Three vertically truncated postholes (contexts 1020, 1036 and 1038; see Appendix 1) were exposed within the two trenches that were excavated through the midden. All three of the postholes were oval in plan, cut into the subsoil (context 1017) with steep sides and concave bases at depths of either 0.06m or 0.07m. All of the features contained similar fills (contexts 1021, 1037 and 1039) that consisted of blackish dark brown silt with occasional to moderate inclusions of charcoal, marine shell and heat fractured rock fragments. Following the removal of the midden deposit by mechanical excavator, a further seven vertically truncated postholes (contexts 1022, 1028, 1030, 1032, 1034, 1040 and 1046), five of which were oval in shape with the remaining two being sub-circular, were exposed cut into the subsoil. The postholes are considered contemporary with the formation of the midden deposit and almost certainly represent drying racks that indicate the seasonal processing of fish at the site, for consumption elsewhere.

Additionally, four earth ovens (contexts 1024, 1026, 1042 and 1044) were exposed and excavated. The ovens were all oval in plan, and following excavation were shown to have been cut with steep sides and flattish concave bases. The largest hāngi (context 1044) measured 0.50m in length by 0.37m wide and survived to a depth of just 0.03m, indicating vertical truncation of the feature (Figure 3.36). As with the postholes, all the ovens had been vertically truncated, most likely by farming land clearance activities subsequent to European settlement.

The northern baulk edge of excavation was located to the north and immediately upslope of the midden deposit, situated at the base of the southern trending slope that descended from a flat-topped ridge spur where re-deposited shell midden was also present, exposed in an access track. The stratigraphy exposed within the northern excavation edge illustrated a topsoil deposit (context 1016) of approximately 0.42m thickness, while in the southern edge of excavation close to and above the southern carriageway of Puhoi Road, it was only approximately 0.10m thick. This demonstrates that the topsoil had built up at the base of the slope beneath the flat-topped spur line, almost certainly from erosion of the spur and subsequent soil slippage. However, the midden was observed to be situated on flat, level ground and it is likely that it had originally been situated on a modified terrace. Further inspection of the area to the north of Puhoi Road identified a likely lower terrace situated immediately above the southern bank of Pūhoi River and, together with the redeposited midden situated on the ridge, this may well indicate a larger site with occupation activities on the two terraces and the spur in very close proximity to the river channel.

Figure 3.35 North facing view across site R10/1498 at 3 Puhoi Road, prior to excavation. Scale: 2 x 1m

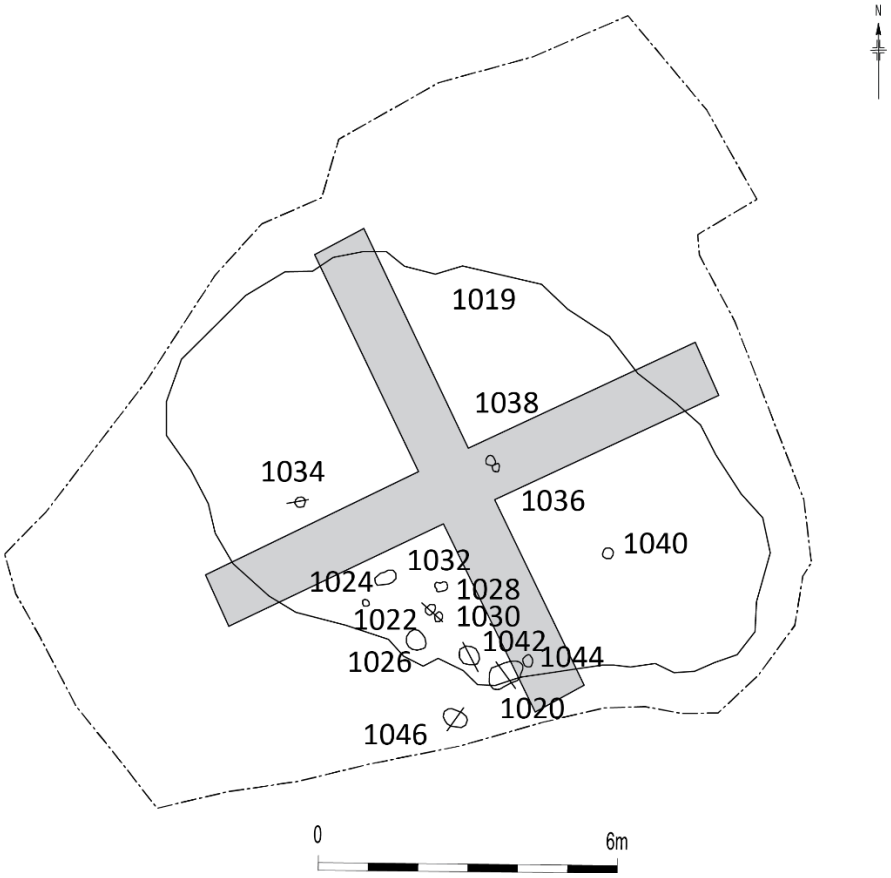


Figure 3.36 Survey plan of excavation area and archaeological features comprising site R10/1498 at 3 Puhoi Road

Figure 3.37 North facing post-excavation shot of midden site R10/1498. Scale: 2 x 1m

R10/1499 – Shell Midden (Context 1048)

Site R10/1499 (context 1048) was initially exposed during topsoil stripping for silt control works 110m to the east of R10/1498 (Figure 3.34). It consisted of three distinct concentrations of midden deposits spread over an area of approximately 8m (north-south) by 8m (east-west) (Figure 3.38). The deposits extended from close to the top of a southward trending slope that descended from the spur above. The deposits initially appeared to have been severely impacted by previous earthworks, such as the cutting of the farm track situated above the midden at the end of a west-east trending flat-topped spur located to the immediate north.

The midden deposits were intermittent, patchy, and thin, as evidenced by the spade test pits that were excavated through the three deposits and revealed that the midden had a maximum thickness of just 0.04m. The shell midden deposits consisted predominantly of pipi and cockle which were highly fragmentary in nature. The absence of associated features such as hāngi or postholes and the fact that even fragments of heat fractured rock were absent from the deposits together lends to the interpretation of the shell deposits being redeposited and, therefore, originating from elsewhere. It is likely that the material originated from a shell midden deposit that was situated on top of the spur and that was either truncated by the 1950s road widening of the original SH1 carriageway, or by works associated with the construction of the residential property at 3 Puhoi Road. It is possible however, that that elements of an original upslope shell midden were simply eroded/washed out and redeposited lower downslope contemporary with the period of deposition.

A 10 litre sample of shells was taken for detailed midden analysis, while a sample of shells was also collected from the base of one of the deposits for radiocarbon dating purposes.

Figure 3.38 Southwest facing view across the intermittent deposits comprising site R10/1499. Scale: 2 x 1m

R10/1500 – Shell Midden (Context 1049)

Site R10/1500 (context 1049) was exposed during topsoil stripping along the western extent of works at 3 Puhoi Road (Figure 3.34 and Figure 3.39). It was located on a flattish slumped natural terrace, in an elevated position on the eastern slopes of the large hill that dominated the 3 Puhoi Road site (Figure 3.39). The shell midden deposit measured 3.8m (east-west) by 2.8m (north-south) and a test pit excavated through the midden revealed that it ranged in thickness from 0.04m to 0.10m. The midden consisted of pipi and mud snail, the pipi being highly fragmented while the mud snail were mainly complete. Occasional charcoal and heat fractured rock was present within the ashy, silty matrix. The majority of the pieces of heat fractured rock were of the local mudstone, but one piece of basalt was also observed No further features were exposed following the removal of the shell midden deposit. It is possible that associated features such as ovens and postholes contemporary with the formation of the midden deposit had been situated further upslope, and beyond the western boundary of works.

A 10 litre sample of shells were taken for detailed midden analysis, while a sample of shells was also collected from the base of one of the deposits for radiocarbon dating purposes.

Figure 3.39 Northeast facing view across shell midden site R10/1500 (context 1049). Scale: 2 x 1m

R10/1501 – Firescoop and Earth Oven (Contexts 1083 and 1085)

A large sub-circular firescoop (context 1083) was located on a small terrace-like area that was situated on the eastern toe end of a historical (pre-European contact period) landslide lobe feature that trended southwest-northeast (Figure 3.34 and Figure 3.40). More recent post-European settlement period landslips had buried the terrace beneath approximately 0.40m of redeposited topsoil and subsoil from the steep slopes above and to the west of the site. The firescoop had been cut into the colluvial subsoil (context 1053) and measured 1.18m by 1.15m and was 0.16m deep (Figure 3.41 and Figure 3.42). The feature contained one fill (context 1084), a dark greyish black ashy silt that contained frequent charcoal inclusions, moderate burnt sandstone and fired clay pieces, as well as occasional marine shell (pipi, cockle and whelk). An oval hāngi (context 1085) that measured 0.86m by 0.65m and was 0.17m deep had been cut through context 1084 on the western side of the firescoop, but is considered contemporary to the use of the firescoop (Figure 3.41 and Figure 3.42). The fill of the oven comprised a black ashy charcoal-rich deposit that contained frequent oven stones, some of which consisted of very large volcanic cobbles (basalt-like and scoria) that were up to 0.34m x 0.22m x 0.12m in size (Figure 3.43). As the local rock consists of sandstones and mudstones, this indicates that the oven stones were brought to the site from elsewhere.

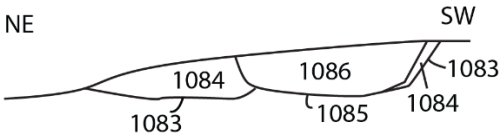
On the east facing slope at the end of the terrace, a dark area of charcoal-rich soil that contained frequent inclusions of charcoal and small fragments of heat fractured rock represented the rake-out of features and indicates that the features were used a number of times. It is interpreted that the site reflects seasonal usage of the area, possibly by people transiting through the area by the Pūhoi River.

A bulk charcoal sample was taken for environmental analysis and radiocarbon dating purposes. No artefacts were present within the fills of either feature.

Figure 3.40 Southwest facing view showing the location of R10/1501 on a small terrace at the end of a historical landslip that would have descended downslope from the area behind the mechanical excavator. Scale: 0.5m

Figure 3.41 South facing plan view of firescoop 1083 and earth oven 1085 seen cutting the firescoop at left. Scale: 0.5m

DWG 15 NW Facing section of 1083 and 1085



DWG 16 Plan of 1083 and 1085

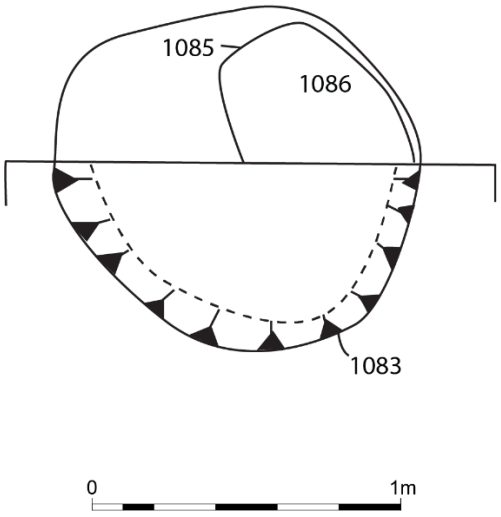


Figure 3.42 Plan and section of firescoop feature 1083 and oven 1085, site R10/1501

Figure 3.43 Selection of the volcanic oven stones including two very large cobbles that were retrieved from the fill of hāngi 1085 and firescoop 1083. Scale: 0.5m

R10/1502 – Shell Midden (Context 1087)

Site R10/1517 (context 1087), was situated on the northern edge of a small natural terrace that would originally have been situated close to and above a meander of the Pūhoi River (Figure 3.34 and Figure 3.44). The midden measured 6.5m (north-south) by 5.5m (east-west) and two 1m square test pits excavated through it illustrated that the deposit was thin and not very dense, with a maximum thickness of just 0.05m (Figure 3.45). The deposit was primarily composed of pipi, with some cockle, and was present within a silty, ashy matrix that contained occasional inclusions of charcoal and heat fractured rock fragments. The midden was sealed beneath the topsoil (context 1016), and the deposit itself sealed the subsoil (context 1017).

A 10 litre sample of shells was taken for detailed midden analysis and radiocarbon dating purposes. No artefacts were present within the deposit.

Figure 3.44 South facing view showing site R10/1502 (context 1050) located on a small natural terrace (arrowed)

Figure 3.45 East facing view across shell midden site R10/1502 (context 1087). Scale: 2 x 1m

R10/1503 – Intercutting Ovens and Firescoop (Contexts 1088, 1090, 1092 and 1094)

Site R10/1503 was situated on the eastern edge of a natural terrace, and beneath the eastern end of a large historical landslip deposit on the lower slopes of the eastern flank of the large hill that formed the western boundary of the project area at the 3 Puhoi Road site (Figure 3.34 and Figure 3.46). The terrace would have originally held a commanding position overlooking a large meander of the Pūhoi River, and the landslip that buried it had likely occurred after large-scale European land clearance activities. The site consisted of a cluster of three intercutting ovens and a firescoop/oven feature that were all sealed by a redeposited topsoil (context 1096), overlying redeposited subsoil (context 1097), that formed the bulk of the slumped deposit, while the features themselves were observed to be cut into the buried topsoil (context 1016) and subsoil (context 1017) (Figure 3.47 and Figure 3.48). The first of the sequence of ovens (context 1094) was likely originally oval in plan but had been truncated on both its northern and southern sides by ovens 1088 and 1092 respectively, and its surviving dimensions were 0.53m by 0.33m and 0.15m deep. It contained a single fill (context 1095), a greyish light brown ashy silt that contained frequent inclusions of shell and occasional charcoal and heat fractured rock fragments (Figure 3.49, and see Appendix 1). Oven 1092 was an oval feature that was 0.47m in length (surviving) by 0.43m wide and was 0.17m deep and filled by a single deposit (context 1093) that was consistent with the fill of oven 1094 (context 1095; Figure 3.49). The feature was truncated along its southern side by an oval firescoop (context 1090) that was 0.98m long, 0.55m wide and 0.19m deep (Figure 3.49). The feature was filled with a single deposit (context 1091) consisting of a greyish-brown ashy silt with moderate inclusions of heat fractured rock, charcoal and occasional pipi and cockle shell.

The largest of the ovens (context 1088) was oval in plan, 1.47m long, 0.98m wide and 0.23m deep, and aligned on a north-south axis (Figure 3.48, Figure 3.49 and Figure 3.50). The feature contained one fill (context 1089), a dark grey ashy silt matrix that consisted of super abundant marine shell (composed of pipi, cockle and mud snail) with moderate charcoal inclusions and occasional oven stone fragments (Figure 3.50). The deposit was formed by backfilling the oven with the waste shells produced by the consumption on site of the food that had been cooked within it. It is considered likely that firescoop 1090 was utilised to heat the oven stones for use within oven 1088.

The site is considered likely to have been formed by activities associated with a seasonal visit of brief duration, likely on the scale of a few days at most.

No artefacts were present within the fills of any of the oven features. A 20 litre sample of shells were taken from context 1089 for detailed midden analysis, and a large sample of charcoal was also taken for environmental analysis and radiocarbon dating purposes.

Figure 3.46 Location of site R10/1503 (indicated by the arrow) situated on a natural terrace on the lower slopes of the eastern flank of the large hill at 3 Puhoi Road

Figure 3.47 South facing view taken during machine stripping of the area in which site R10/1503 was situated, with the redeposited subsoil from the historical landslip indicated by the yellow arrows, and the buried topsoil by the red arrow

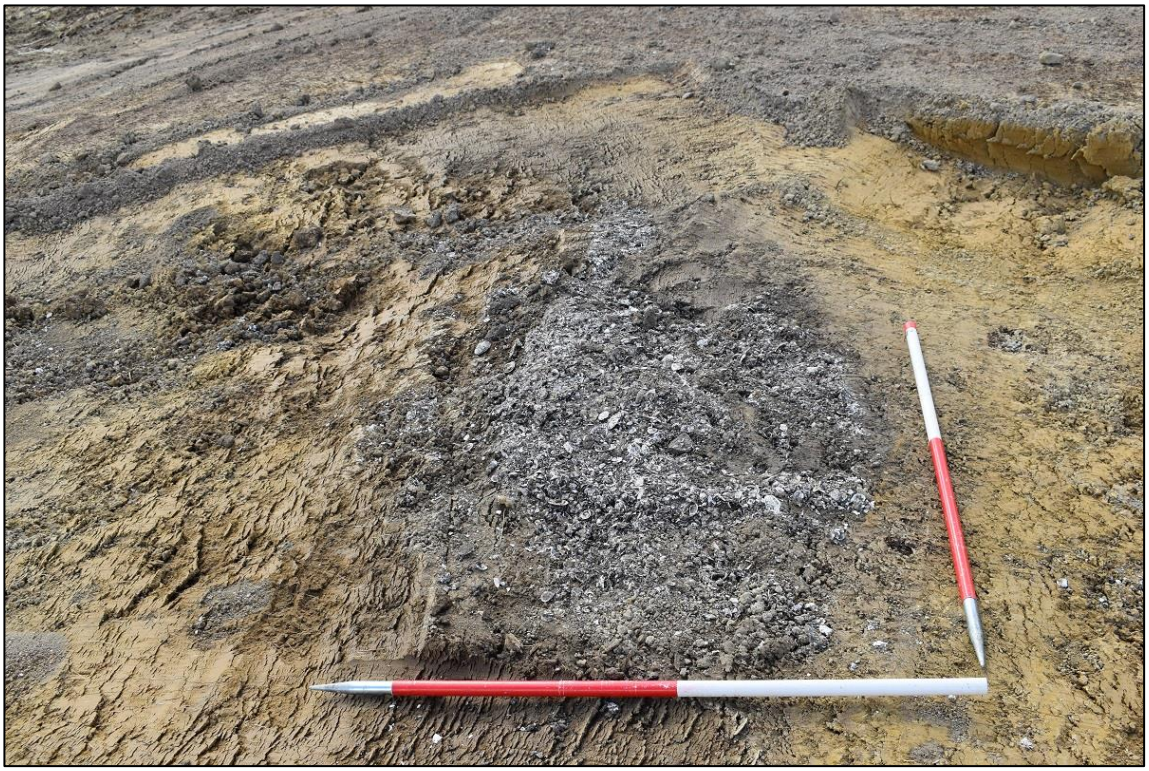


Figure 3.48 Pre-excavation view of the cluster of the three intercutting ovens and firescoop that formed site R10/1503, facing south-southeast. Scale: 2 x 1m

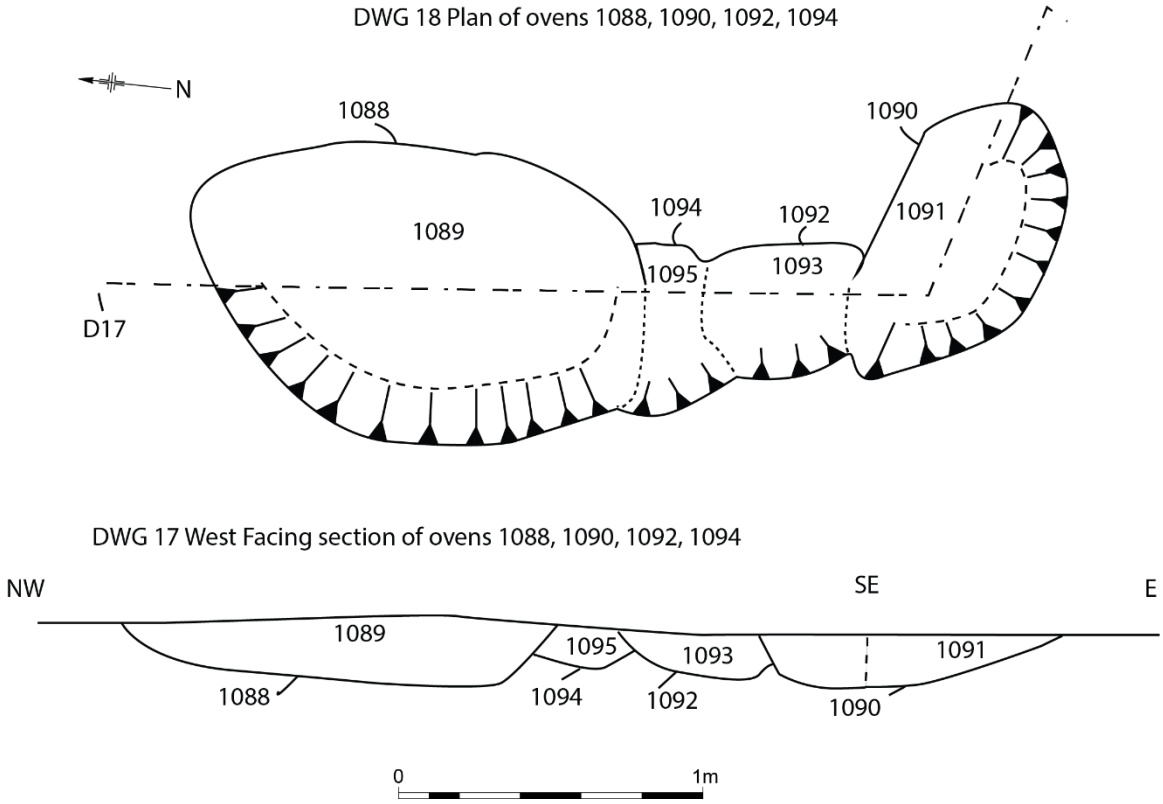


Figure 3.49 Plan of ovens 1088, 1092, 1094 and firescoop 1090 (top), and section through the same features (bottom)

Figure 3.50 Post-excavation view of half section through earth oven 1088, facing east. Scale:1m

Figure 3.51 Post-excavation shot of the ovens and firescoop comprising site R10/1503. Scale:1m

R10/1505 – Shell Midden (Context 1119)

Site R10/1505 consisted of two distinct groups of archaeological features situated on top of a west-northwest to east-southeast trending spur that descended from the eastern flanks of the large hill at 3 Puhoi Road (Figure 3.34, Figure 3.52, Figure 3.53, Figure 3.54 and Figure 3.55). The easternmost group of features consisted of a shell midden (context 1119) and a single associated oven feature (context 1120; see Figure 3.52). Shell midden deposit 1119 consisted predominantly of cockle (80%), pipi (17%), oyster (2%) and mud snail (1%) within a silty ashy matrix that contained moderate inclusions of charcoal and heat fractured rock derived from the breakdown of oven stones, some of which were quite large. The midden was sealed by modern topsoil (1016) and, in turn, sealed the subsoil (1017). Approximately 4.3m to the southwest of the midden, a small oval earth oven (context 1120) was situated. The oven had been vertically truncated by the cut of a farm track that ran along the top of the ridge spur. The oven had sloping sides and a concave base and had been cut through the subsoil (1017) and into the top of the natural clay (context 1018). The oven contained two fills, with the upper fill (context 1121) consisting of a dark brown silt with occasional charcoal inclusions and occasional heat fractured rock fragments, while the lower fill (context 1145) consisted of redeposited subsoil and natural clay. A 10 litre sample of shells was taken for detailed midden analysis and radiocarbon dating purposes.

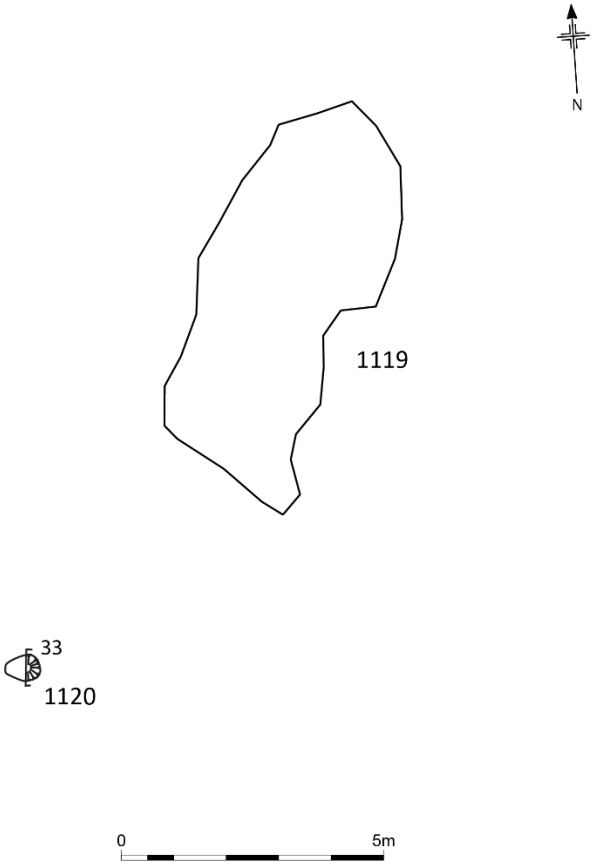


Figure 3.52 Survey plan of the easternmost group of features in site R10/1505

Figure 3.53 East facing view looking across midden site R10/1505. Scale: 2 x 1m

While there was no further archaeology present in the immediate vicinity of the shell midden and hāngi, a concentration of nine features consisting of three earth ovens, a firescoop and five postholes was situated approximately 70m west-northwest and further up the ridge spur (Figure 3.54, Figure 3.55, Figure 3.56). A sub-circular firescoop (context 1122) and an associated hāngi (context 1124) were located adjacent to one another, with a group of three postholes situated nearby (contexts 1126, 1128, and 1130) (Figure 3.54 and Figure 3.57). The firescoop and oven were both cut into the subsoil and sealed by the modern topsoil (1016). The firescoop (1122) was sub-circular in plan and was 0.84m in length by 0.76m wide and contained a single fill (context 1123) which consisted of a mottled mid-grey silty clay intermixed with a yellowish light brown clay which contained frequent charcoal and occasional fragments of heat fractured rock. The feature had been severely vertically truncated as had the associated earth oven, and it survived to a depth of just 0.04m (Figure 3.56). Hāngi 1124 was oval in plan and was 0.82m long by 0.56m wide and survived to a depth of just 0.03m (Figure 3.56). The feature contained a single fill (context 1125) which consisted of greyish-brown clayey silt with inclusions of frequent heat fractured rock fragments and occasional whole oven stones and charcoal. Approximately 2m to the west, a group of three postholes formed an alignment roughly east-west just over a metre in length and which possibly represented a structure such as a drying rack for curing fish (Figure 3.54, Figure 3.57, Figure 3.56). The postholes were all cut through the subsoil and into the natural colluvial clay (context 1018). Two of the postholes (contexts 1126 and 1128) were sub-circular in plan, 0.19m and 0.34m in diameter respectively, with the remaining posthole (context 1130) being oval in form, and all had vertical sides, narrow concave bases and contained single fills. The fill of postholes 1128 and 1130 (contexts 1129 and 1131 respectively), both consisted of mid-brown silty clay with occasional fragmented marine shell inclusions, while context 1127 (the fill of posthole 1126), consisted of dark brown silty clay with occasional heat fractured rock fragments. The fills of the postholes, together with the known vertical truncation by farming activities and track formation, suggest the presence of a shell midden deposit that would have been associated with the features and had been completely truncated.

Some 9.8m to the west of the three postholes (1126, 1128 and 1130), a further two postholes (contexts 1136 and 1138) were situated in isolation (Figure 3.54). The postholes were oval in plan and more substantial than those of the other posthole group, being some 0.36m by 0.33m (context 1136) and 0.39m by 0.35m (context 1138). The posthole fills (contexts 1137 and 1139) were very similar and consisted of yellowish mid-brown silty clay with occasional charcoal inclusions and occasional heat fractured rock fragments. It is considered that the postholes may represent part of a drying structure or posts for a raised storage platform such as a whata.

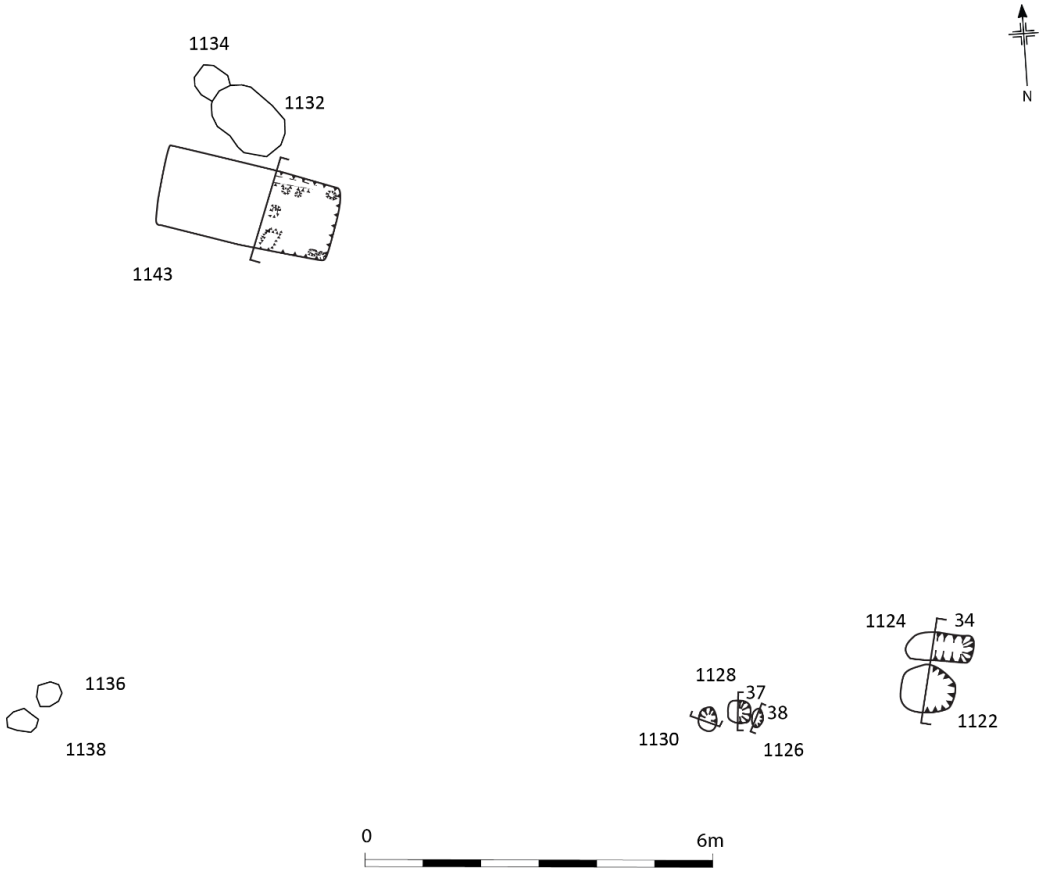


Figure 3.54 Survey plan of the western group of features in site R10/1505 situated further up the ridge spur toward site R10/1484

Figure 3.55 Looking east-southeast along the ridge spur upon which site R10/1505 was located. The yellow arrows in the background indicate the location of shell midden deposit 1119 and oven 1120. The red arrow marks the location of firescoop 1122 and earth oven 1124

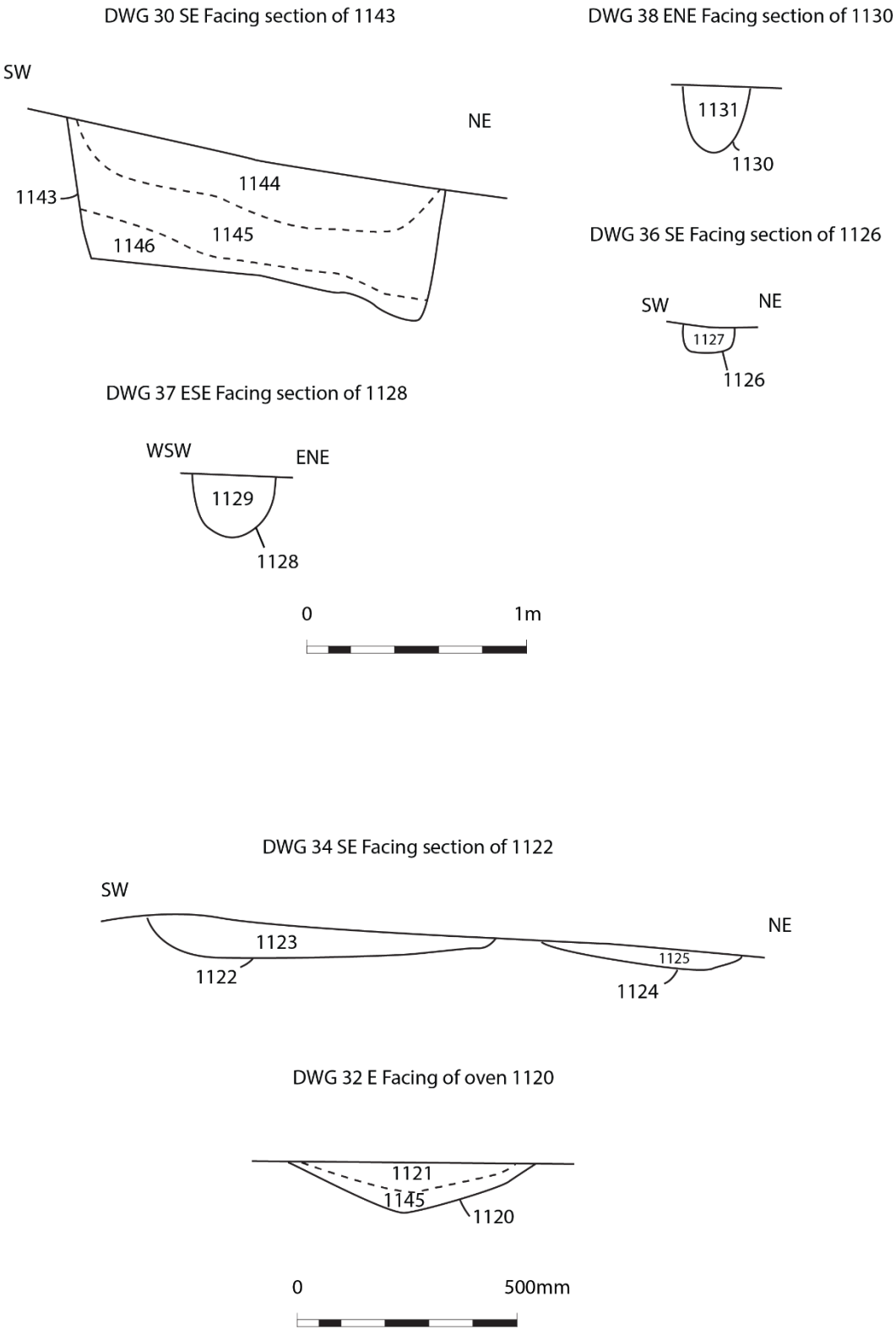


Figure 3.56 Section profiles of a selection of features from site R10/1505

Figure 3.57 Plan view of the three postholes (from left: contexts 1126, 1128 and 1130) that possibly represent a drying rack structure and were probably associated with firescoop 1122 and oven 1124. Scale: 1m

Situated approximately 8.2m to the north-northeast of the two western postholes was a rectangular kūmara pit (context 1143) with two earth oven features (contexts 1132 and 1134) situated adjacent to the northern side of the pit's western end (Figure 3.54, Figure 3.56, Figure 3.58 and Figure 3.59). The kūmara pit was rectangular in plan and was 3.05m in length by 1.64m wide and was 0.61m deep (Figure 3.54 and Figure 3.58). The kūmara pit had been excavated with steep to vertical sides and a flat base, contained three fills (contexts 1144, 1202 and 1203), and had a buttress of unexcavated clay natural on its southern side towards the eastern end of the pit (Figure 3.59 and Figure 3.61). The excavation of the pit also revealed a single posthole (context 1204) on the central axis of the pit, and a further two postholes were situated in the southeastern (context 1205) and northeastern (context 1206) corners respectively (Figure 3.60 and Figure 3.61). There was also an oval drain/sump feature (context 1207) that was 0.20m by 0.16m and 0.41m deep cut through the base and also through the southeastern corner of the pit where it would have drained water out and away from the feature (Figure 3.60).

The pit feature was somewhat distorted as the pit was situated on the edge of the ridge top adjacent to a steep slope and had at some point in the past begun to slip over the edge due to soil movement. The slip scarp was situated approximately 0.4m from the pit's southern edge, with the result that the feature was tilted downslope and had likely lost some of its upper extents (Figure 3.58 and Figure 3.59). The primary fill of the pit consisted of a yellowish light brown and greyish light brown mottled clayey silt which contained occasional small fragments of light grey mudstone. The deposit for the most part did not exceed about 9 cm of depth and represented the primary silting of the feature as well as trample (Figure 3.56 and Figure 3.59). The main fill (context 1202) was up to 0.44m thick and consisted of light brown and yellowish brown mottled silty clay that contained patches of redeposited topsoil and occasional charcoal inclusions. The upper fill (context 1144) was mottled yellowish brown, mid-brown and greyish brown silty clay with occasional

fragments of mudstone natural and occasional charcoal and heat fractured rock fragment inclusions.

The hāngi situated immediately to the north of pit 1143 (contexts 1132 and 1134) were both oval in plan and, as with many of the other features on the ridge spur, they had been vertically truncated by either track formation or farming activities, although in this case not as substantially. Oven 1132 was the far larger of the two features and had truncated the smaller oven 1134 at its southeastern end (Figure 3.54, Figure 3.58 and Figure 3.62). Feature 1132 was oval in plan, cut into the subsoil and was 1.24m long by 0.82m wide and survived to a depth of 0.12m. The feature contained a single fill (context 1133) which was a mottled greyish-brown, mid-brown and yellowish light brown silty clay that contained frequent whole and fragmented oven stones. The smaller oven 1134 was also cut into the subsoil and survived to a length of 0.51m by up to 0.45m wide, and survived to a depth of 0.08m. Hāngi 1134 contained a single fill (context 1135) that consisted of a brownish-grey silty clay that contained frequent oven stones and occasional fragments of heat fractured rock and occasional inclusions of charcoal.

No artefacts were present within any of the features in site R10/1505.

Figure 3.58 Slightly oblique aerial drone image showing kūmara pit 1143 and ovens 1132 and 1334 during excavation (arrowed). The pronounced break of slope running approximately from the western edge of pit 1143 (right hand side of feature) down the steep north-northeast grassed slope can clearly be seen

Figure 3.59 West-northwest facing post-excavation shot of kūmara pit 1143 with its east-southeast facing section. Note the buttress of firm natural clay just in front of the western side of the section face. The earth ovens and the steep break of slope from the slumping of the ridge can clearly be seen at right. Scale: 2 x 1m

Figure 3.60 North facing view across the eastern excavated half of kūmara pit 1143 with the buttress posthole 1204 (centre), posthole 1206 (top right) posthole 1205 bottom and drain/sump 1207 that extended through the corner of the pit wall (bottom right – arrowed). Scale: 2 x 1m; 1 x 0.50m and 1 x 0.30m

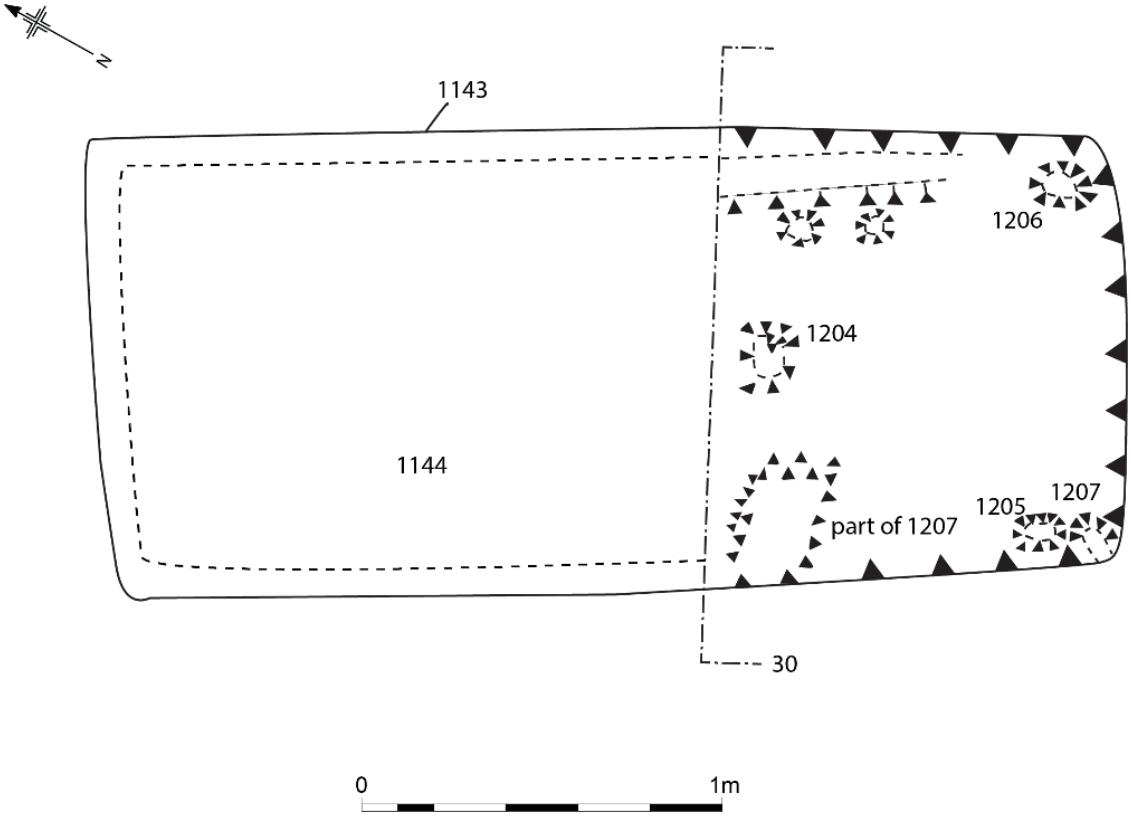


Figure 3.61 Post-excavation plan of kūmara pit 1143

Figure 3.62 Pre-excavation plan view of earth ovens 1134 (left) and 1132 (right), facing northwest. Scale: 1m

R10/1507 – Shell Midden (Context 1456)

Site R10/1507 was exposed during small-scale excavation works in preparation for erecting power poles to facilitate the re-routing of power lines crossing the property at 3 Puhoi Road. The site was situated close to the western boundary of the project area, on slightly sloping ground that may have originally been a small terrace (either natural or modified) that had slumped with the active slope movement on the eastern flanks of the large hill that dominates the property at 3 Puhoi Road (Figure 3.34). The site was located some 72m to the west-northwest of R10/1484 (Figure 3.34). The shell midden deposit (context 1456) was small, measuring only 2.65m (north-south) by 2.51m (east-west) and was 0.09m thick but relatively dense (Figure 3.63). The midden consisted predominantly of pipi (80%) and cockle (20%) in a greyish mid-brown silty clay that contained occasional charcoal inclusions and very occasional heat fractured rock fragments (Figure 3.63). The midden was sealed by the modern topsoil (1016) and sealed a buried soil (context 1457), which was a greyish-brown clayey silt which contained very occasional charcoal inclusions, and was some 0.05m thick and sealed the colluvial subsoil (context 1142; Figure 3.64). A 10 litre sample of the midden deposit was taken for dating and species analysis purposes.

No artefacts were present within the deposit.

Figure 3.63 The exposed deposits of midden R10/1507 prior to sampling, facing north. Scale: 1m

Figure 3.64 South facing section through shell midden R10/1507. Scale: 1m and 0.3m

R10/1106 – Shell Midden and Occupation Site

Site R10/1106 was situated approximately 40m due west of the existing SH1 carriageway, on a relatively flat-topped, west-east trending ridge spur (Figure 3.34). The ridge spur upon which the site was located descended from the southern part of the large hill that dominated the 3 Puhoi Road site (Figure 3.66, Figure 3.67). The site extended along the ridge spur for approximately 110m and the ridge top became wider and flatter towards its eastern end. The site comprised two separate concentrations of features separated by some 70m, with the western part of the site situated on a flat upper terrace which encompassed three fairly large sized shell midden deposits, two associated earth ovens, a firescoop and a single posthole (Figure 3.65). The other concentration of features was situated further down the ridge spur on a broad, wide, lower terrace, and consisted of 16 earth ovens, 2 firescoops, 17 postholes, and a single bin pit (see Appendix 1). Both the upper and lower terrace sites held commanding views to the south and southeast along the Pūhoi River and its lower valley reaches (Figure 3.68). The ridge spur would have continued to descend down towards the upper river terrace to the east but had been truncated by earthworks associated with the original SH1 construction. It is possible that the site originally consisted of further occupied terraces.

Upper Terrace Shell Midden Deposits

The upper terrace of site R10/1106 consisted of three shell midden deposits and associated features that were situated on a flattish terrace approximately 70m west-southwest from the end of the ridge (Figure 3.65 and Figure 3.66; Appendix 1). The three shell midden deposits and their associated features were sealed beneath the modern topsoil beneath turf (context 1800), which was a friable, dark brown silt loam with frequent root action. The shell midden deposits themselves sealed a subsoil (context 1891) that consisted of a yellowish-brown clayey silt with occasional mid-brown silt loam mottles and very rare charcoal

inclusions, which in turn sealed a yellowish light brown sterile natural clay (context 1801). It was also apparent that there had been some loss of the terrace site to erosion via soil slumping, and much of the shell midden deposits were observed spilling down both sides of the ridge spur (Figure 3.69). It was also clear that there had been some vertical truncation (although not severe) of the archaeological features at some point in the past, probably as a result of farm track formation.

Context 1886 was the largest of the three shell midden deposits being some 16.48m by 13.51m in size and some 0.07m deep (Figure 3.65, Figure 3.70 and Figure 3.71). The deposit consisted of fragmented and crushed cockle, pipi, mud snail and rock oyster within a greyish dark brown silty clay matrix. Of the other two shell midden deposits, context 1887 consisted of the same shellfish species composition as the larger context 1886, while context 1888 consisted only of crushed and fragmented cockle and pipi. However, context 1887 contained moderate inclusions of heat fractured rock while context 1886 contained none. Of these deposits, context 1887 was the larger, being some 15.47m in length by up to 11.08m wide and up to 0.05m thick, while context 1888, situated mainly on sloping ground towards the south, was 13.38m in length by up to 7.16m wide and only some 0.03m deep (Figure 3.65).

Upper Terrace Cooking Features

Features associated with the shell midden deposits consisted of two oval-shaped earth ovens (contexts 1878 and 1884), a firescoop (context 1880) and a single sub-circular posthole (1882) (see Appendix 1). Both of the earth ovens were oval in plan with oven 1884 being the largest with dimensions of 1.23m by 0.91 wide and a depth of 0.05m (Figure 3.65 and Figure 3.72). The feature had been cut with gradual smooth, sloping sides and a flat base and contained one fill (context 1885) that consisted of a brownish-black silty clay with frequent inclusions of charcoal, crushed pipi and small fragments of heat fractured rock. The other earth oven (context 1878) was 1.15m in length, 0.66m wide and 0.11m in depth, and had been cut with steep to gradual, smooth, sloping sides and a flattish to slightly concave base (Figure 3.65 and Figure 3.72). The feature contained two fills (contexts 1879 and 1890), with the upper fill (context 1879) consisting of a blackish grey silty clay that contained moderate heat fractured rock inclusions and occasional charcoal. The deposit was 0.65m long by 0.37m wide and represented the infilling of a hollow, left when the original backfilling had settled (Figure 3.72). The lower, primary fill (context 1890) consisted of a brown silty clay that contained frequent crushed marine shell (pipi) and occasional charcoal and heat fractured rock fragments (Figure 3.72). The firescoop feature (context 1880) was also oval in plan, and had been cut with smooth, gradual sloping sides and a flat base (Figure 3.72). The feature contained a single fill (context 1881) that consisted of a dark brownish-black silty clay with frequent inclusions of charcoal, crushed, burnt pipi shell and small fragments of heat fractured rock and which produced single angular fragments of both chert and argillite (Figure 3.72).

A 20 litre sample of shell midden deposit 1886 was taken for species and dating analysis purposes.

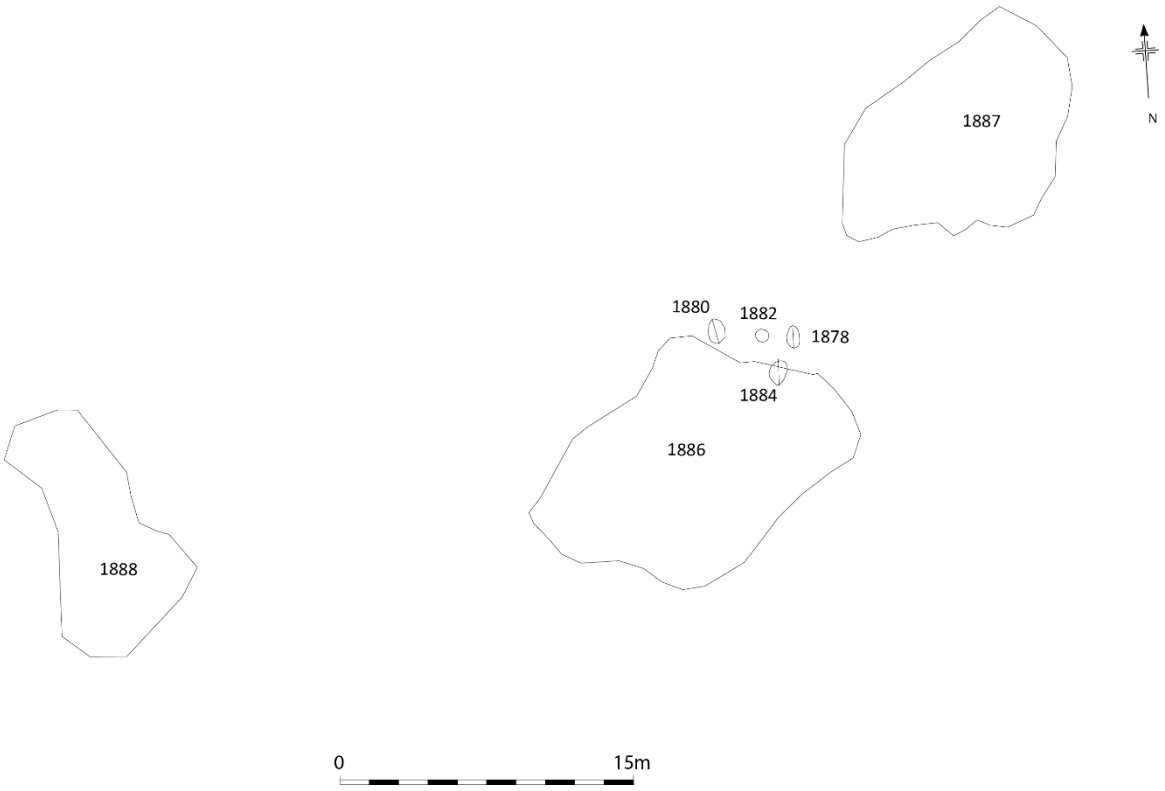


Figure 3.65 Survey plan of archaeological features on the upper terrace of site R10/1106 at 3 Puhoi Road

Figure 3.66 Looking west along the ridge spur to the upper terrace of site R10/1106 (arrowed)

Figure 3.67 Looking east from the upper terrace to the lower terrace area of site R10/1106 (indicated by the arrow)

Figure 3.68 Looking southeast from site R10/1106 showing the commanding view along the lower courses of the Pūhoi River

Figure 3.69 Slumping of the ridge spur to the north (left) and south (right) of the upper terrace of site R10/1106, with shell midden visible spilling down both slopes

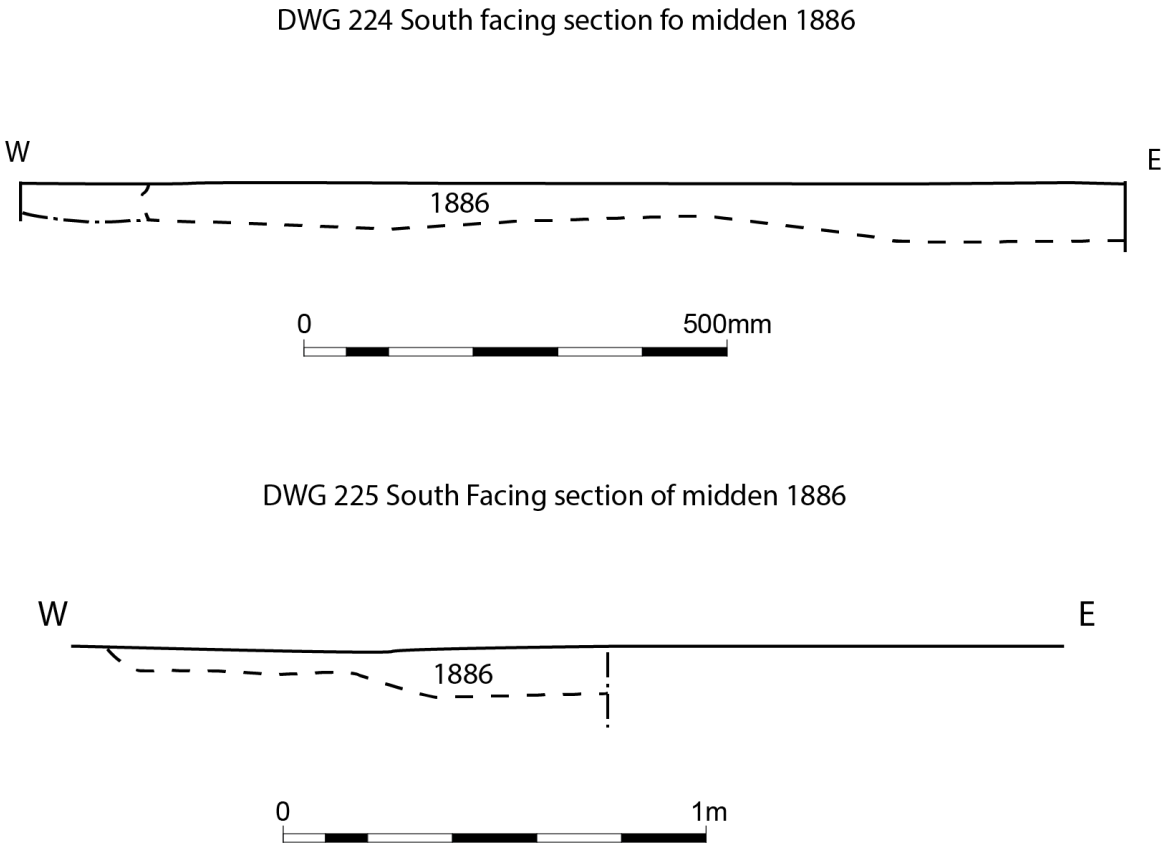


Figure 3.70 Section profiles of trenches excavated through the largest shell midden deposit (context 1886)

Figure 3.71 East-southeast facing view across shell midden deposits 1886 and 1887 on the upper terrace of site R10/1106

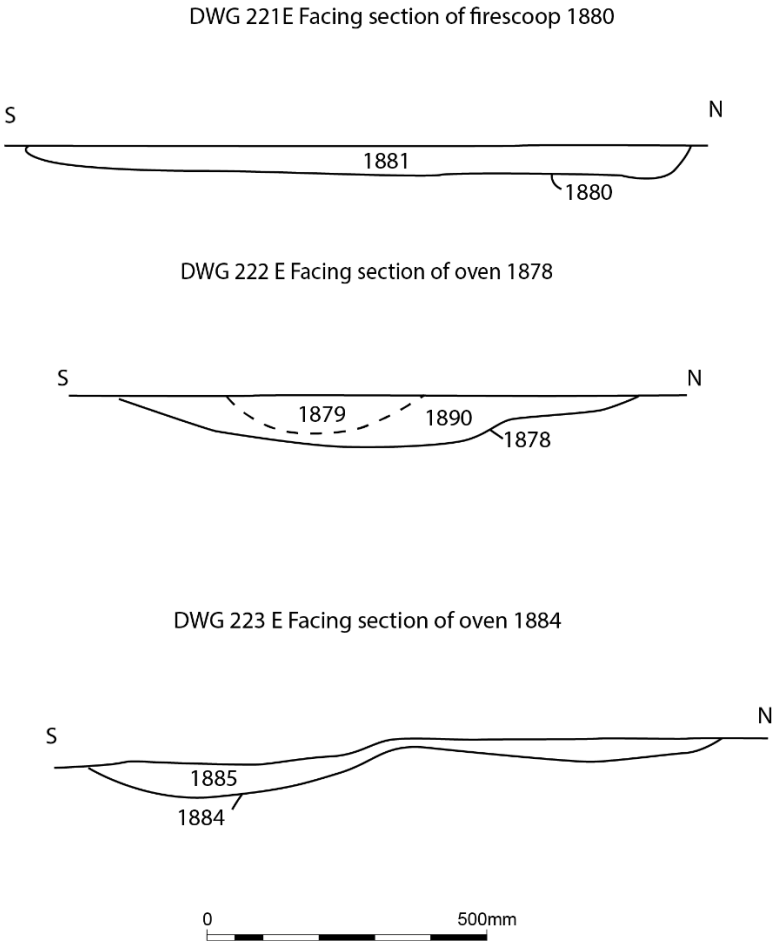


Figure 3.72 Section profiles of earth ovens 1878 and 1884 and firescoop 1880 situated on the upper terrace of site R10/1106

Lower Terrace Occupation Area

The lower terrace of site R10/1106 was some 70m downslope and east of the upper terrace, and was situated on a broad, wide terrace close to the northbound carriageway of the extant SH1 (Figure 3.73 and Figure 3.67). The site consisted of a number of cooking features, postholes and a bin pit, with all but two features (firescoop/oven 1870 and bin pit 1876) concentrated within an area of 8.5m by 7.5m in the far east of the site (Figure 3.73; Appendix 1). The features were all sealed by the modern topsoil (context 1800) and had been cut through the subsoil (context 1891) and into the natural clay (context 1801). The features on the lower terrace had clearly been vertically truncated which had resulted in significant loss of their upper sections and the entirety of a shell midden deposit that would have once been present. The vertical truncation had occurred most likely as a result of farm track formation at some point in the past.

Eastern Concentration of Cooking Features and Postholes (Lower Terrace)

There were 18 features related to cooking activities situated on the lower terrace of site R10/1106 that consisted of 16 earth ovens and two firescoops (Figure 3.73 and Figure 3.74; Appendix 1). All of the features had been vertically truncated while three of the earth oven features (contexts 1806, 1808, and 1822) had been heavily disturbed by large tree roots, and as a result were somewhat distorted (Appendix 1). Of the remaining earth ovens, the smaller examples tended to be sub-circular in plan and ranging in size from as little as 0.26m by 0.24m up to 0.48m by 0.46m and only surviving to depths of just 0.04m (Figure 3.74; Appendix 1). The larger earth oven examples were all oval, excavated with steep to gradual sloping sides and flattish or concave bases. The largest ovens in the eastern concentration were features 1802, 1804, 1806, 1808 and 1868, which were all excavated in half section (Figure 3.73 and Figure 3.74). The features ranged in size from 0.85m by 0.74 by 0.04m deep (context 1804), to up to 1.01m by 0.73m by 0.03m deep (context 1806). The features' fills consisted in the main of greyish-brown silty clays that contained moderate to frequent amounts of heat fractured rock derived from oven stones and occasional charcoal and marine shell fragments (Appendix 1). The fill (1869) of firescoop 1868 produced a single struck obsidian flake. The duration of occupation of the site was long enough for some of the oven features to have been intercut with the smaller oval ovens (contexts 1816 and 1820) shown in half section to have been cut into the larger oven 1818 (Figure 3.73 and Figure 3.74).

Within the eastern concentration of features there was a total of 17 postholes that were either sub-circular or oval in plan (Figure 3.73; Appendix 1). Four of the postholes partially truncated the fills of ovens, with context 1832 cutting the earlier oven 1802, while postholes 1836 and 1842 truncated oven 1840 on its eastern and northwestern sides respectively (Figure 3.73). Context 1850 (the cut of a sub-circular posthole) truncated context 1853, the fill of the earlier earth oven 1852 (Figure 3.73). The postholes had been cut through the subsoil (context 1891) and into the clay natural (context 1801) and contained single fills (Appendix 1). The postholes that were excavated had been cut with steep to vertical sides and narrow concave bases (Figure 3.75). Three of the postholes (contexts 1824, 1826 and 1828) were situated on a north-south alignment for some 0.75m and probably represent a drying rack or perhaps a shelter screen structure (Figure 3.73).

Six of the postholes' fills (contexts 1825, 1827, 1829, 1831, 1847 and 1849) contained frequent cockle shell and in most cases rare pipi shell, as well as charcoal and heat fractured rock fragments that would have been derived from a shell midden deposit once present in

the area but lost to truncation, erosion, or perhaps elements of both (Appendix 1). The fill of one of the postholes (context 1829, the fill of posthole 1828) was typical of these fills and consisted of a dark greyish-brown clayey silt with frequent shell fragments (predominantly of cockle, and rare pipi) along with occasional heat fractured rock fragments and charcoal, and was sampled for radiocarbon dating purposes.

Firescoop/Oven (Context 1870) and Bin Pit (Context 1876)

A single sub-circular firescoop/oven feature (context 1870) was situated approximately 11m to the west of the eastern concentration of features (Figure 3.73). The feature was sub-circular in plan and cut with smooth, gradual sides and a concave base (Figure 3.76). The feature was 1.04 m by 0.98m in size, and survived to a depth of 0.08m, and contained a single fill (context 1871) that consisted of a blackish grey silty clay that contained frequent inclusions of whole and crushed marine shell (pipi, cockle, mud snail, rock oyster), and moderate charcoal and small heat fractured rock fragments. An oval bin pit (context 1876) was situated approximately 4.3m to the west-northwest of the firescoop and represented the largest cut feature of site R10/1106 (Figure 3.73). The feature was 2.23m long by 1.14m wide and survived to a depth of 0.21m (Figure 3.76). The pit contained one fill (context 1877), a dark brown silty clay that contained very occasional charcoal, while part of the fill had been impacted by tree roots.

A bulk sample was taken from context 1871, the fill of firescoop 1870, for charcoal and shell species analysis and radiocarbon dating purposes.

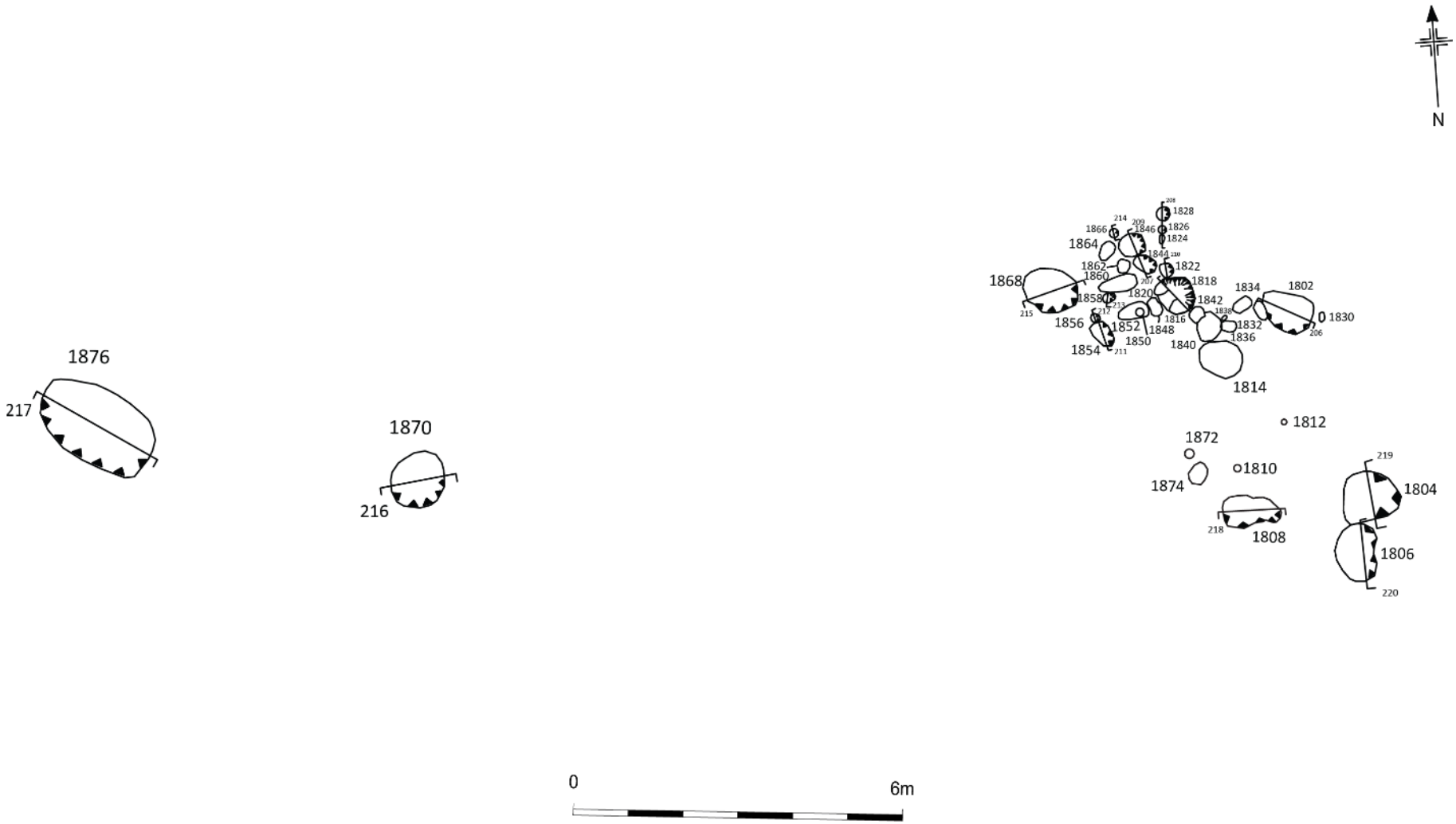


Figure 3.73 Survey plan of archaeological features on the lower terrace of site R10/1106 situated at 3 Puhoi Road

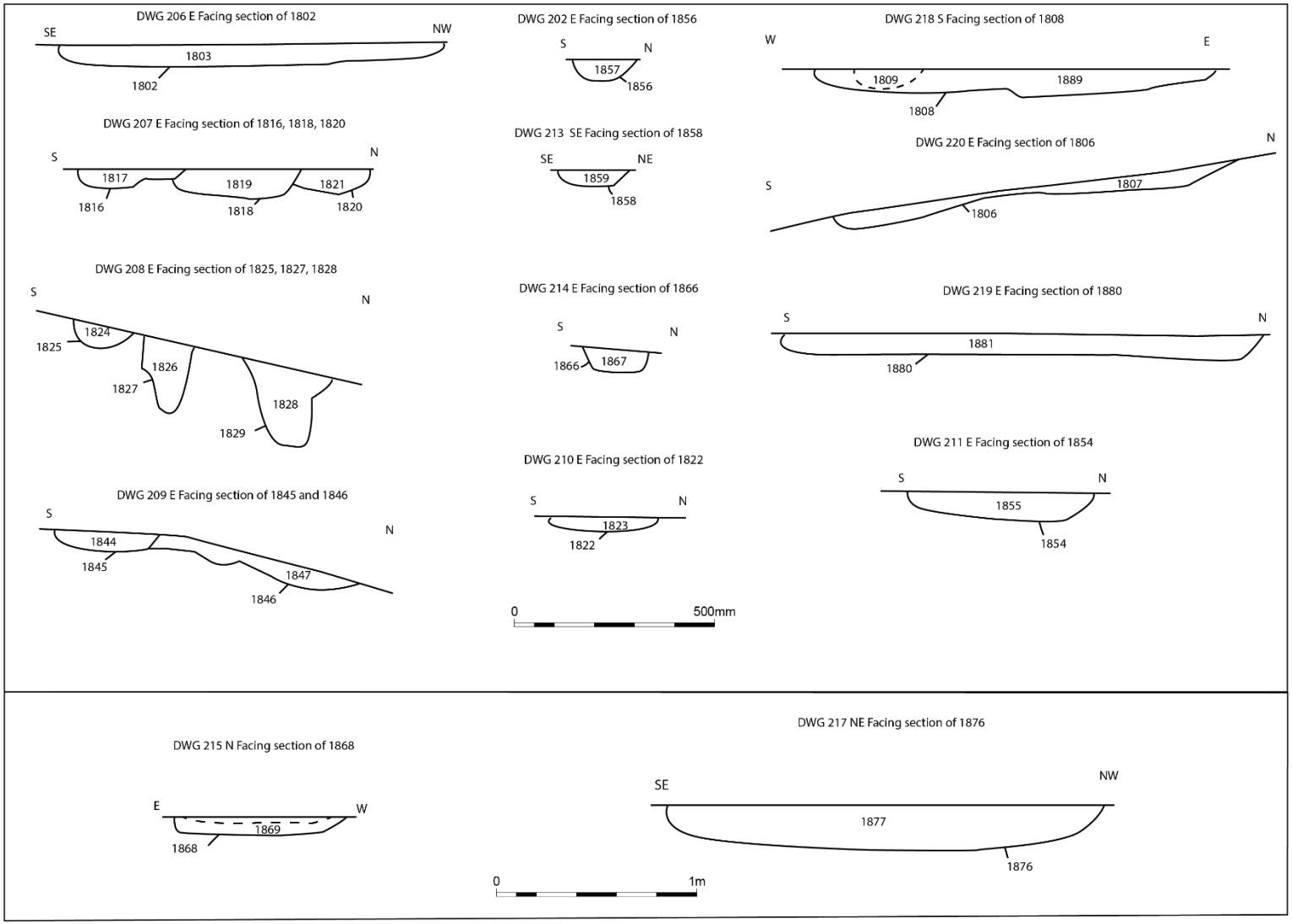


Figure 3.74. Section profiles of earth ovens and firescoops situated on the lower terrace of site R10/1106

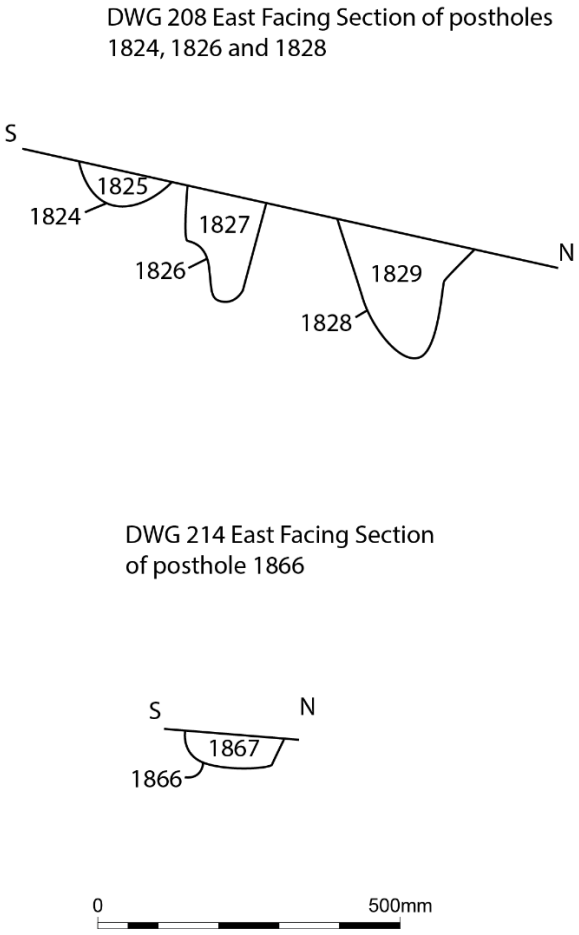


Figure 3.75 Section profiles of postholes 1824, 1826, 1828 and 1866 located on the lower terrace of site R10/1106

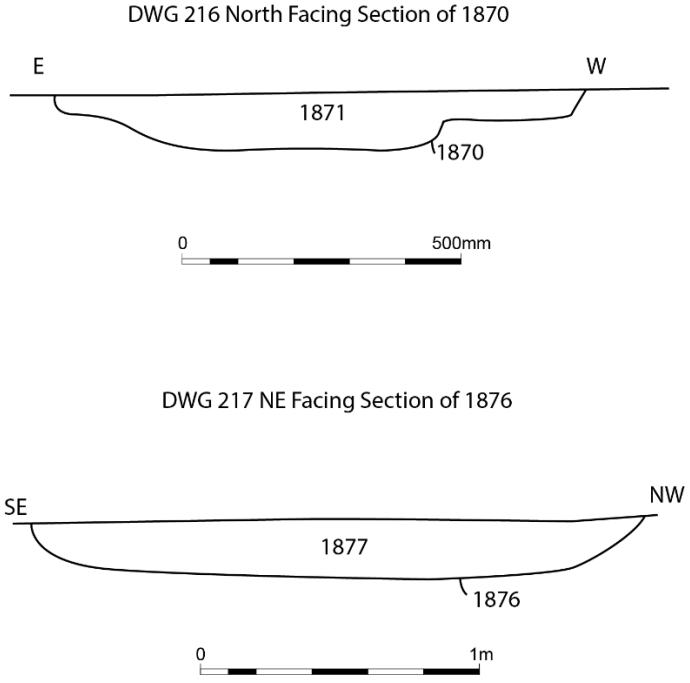


Figure 3.76 Section profiles of firescoop/oven 1870 and bin pit 1876

R10/1511 – Shell Midden (Context 3012)

A small shell midden deposit (context 3012) was exposed during preliminary works to extend the width of the access/haul road facilitating the main earthworks of the new SH1 motorway crossing the property at 3 Puhoi Road (Figure 3.34). The site was at the base of the eastern flanks of the large hill that formed the western boundary of the works area and was approximately 50m northeast of shell midden site R10/1500 (Figure 3.34). The shell midden deposit consisted predominantly of highly fragmented pipi (with some complete shells) and cockle, which was also highly fragmented. The midden deposit was within a greyish, dark brown silt matrix that contained moderate inclusions of charcoal and occasional heat fractured rock fragments (Figure 3.77). The midden was sealed beneath the modern topsoil under long grass (context 3011), and in turn sealed a yellowish brown clayey silt colluvial subsoil (context 3013). The midden had most likely been truncated by farm track formation at some point during the 20th century and survived only as a thin spread that was 2.18m in length, 0.95m wide and only 0.03m deep. A sample of the midden was taken for species analysis and dating purposes.

No artefacts were present within the deposit.

Figure 3.77 North facing view over the small midden deposit, site R10/1511

R10/1512 – Shell Midden (Context 3016) and Umu Tī (Context 3029)

Site R10/1512 was exposed during the initial topsoil stripping to create a yard area and platform for portacom offices for earthworks contractors engaged with the main cut for the Pūhoi to Warkworth section of the new SH1. The site was on flat ground at the base of the eastern flanks of the large hill that dominated the western half of the property at 3 Puhoi Road (Figure 3.34 and Figure 3.78). The site consisted of a very large sub-circular earth oven, an associated oven stone cache, a shell midden, and several postholes (Figure 3.79 and Figure 3.80). The large sub-circular cut of the earth oven (context 3029) had steep to vertical sides that broke to a flattish, slightly concave base, and was 2.98m in length by

2.68m wide and 0.43m deep (Figure 3.80, Figure 3.81 and Figure 3.82). The feature contained two fills (contexts 3030 and 3033). The lower fill (3033) consisted of a friable greenish and greyish-brown mottled sandy silt with moderate charcoal inclusions and occasional shell fragments and heat fractured water-rolled oven stone fragments. The upper fill (3030) consisted of a shell midden deposit predominantly comprising whole and fragmented pipi with a small amount of cockle that was within a dark greyish-black ashy matrix with moderate inclusions of charcoal and occasional small oven stone fragments. The size and nature of the feature tends to the interpretation that it was used as an umu ti for cooking the starch-rich roots of the cabbage tree (*Cordyline australis*). However, this larger and deeper form of earth oven was also used for cooking large quantities of other starch-rich foods such as kūmara (*Ipomoea batatas*) and the rhizomes of bracken (*Pteridium esculentum*). Samples of charcoal were taken from both fills of the large oven for species identification and dating purposes.

Situated immediately adjacent to the southeast part of the large earth oven was a cache of oven stones (context 3019) (Figure 3.80, Figure 3.82). The oven stones were concentrated in an area 1.35m by 1.3m and were predominantly of large scoria/basaltic cobbles which ranged in size from 0.27m x 0.15m down to smaller fist-sized specimens.

Adjacent to the northwestern part of the large oven, there was a large sub-circular posthole (context 3020) that measured 0.94m in length by 0.89m wide and 0.76m deep (Figure 3.80, Figure 3.81 and Figure 3.83). The posthole contained two fills, one of which (context 3021) consisted of medium sized cobbles of scoria/basaltic rock identical to those in the oven stone cache and which had been placed as packing stones around a timber upright that had once been housed within the posthole (Figure 3.83). Around the packing stones and backfilling the remainder of the posthole was a dark grey silt that contained occasional charcoal inclusions and heat fractured rock fragments (context 3022). It is considered likely that the posthole was contemporary with the large oven and may indicate that a raised storage structure such as a whata once stood there.

A shell midden deposit (context 3016) completely covered and therefore obscured the large earth oven/umu tī beneath, and also extended beyond the oven in all directions (Figure 3.79, Figure 3.80 and Figure 3.84). It consisted predominantly of pipi (90%) and cockle (10%), with fishbone (snapper and other unidentified species), in an ashy matrix that contained moderate inclusions of charcoal and occasional heat fractured rock fragments. The shell midden was 4.28m in length by 4.01m wide and was up to 0.20m deep in its centre, where it filled a hollow that had formed after the upper fill (context 3030) of the large earth oven had settled (Figure 3.84). A 20 litre sample of the midden was taken for species analysis and dating purposes.

Lastly, a west-southwest to east-northeast alignment of four oval postholes (contexts 3023, 3025, 3027 and 3031) over a length of 1.4m is interpreted as a drying rack and was almost certainly contemporary with the shell midden deposit (Figure 3.80 and Figure 3.81).

No artefacts were present within the midden deposit or in the fills of any features in site R10/1512.

Figure 3.78 East facing view across site R10/1512, located at the base of the eastern flanks of the large hill and showing the upper levels of midden deposit 3016 as it was first exposed by the initial topsoil strip

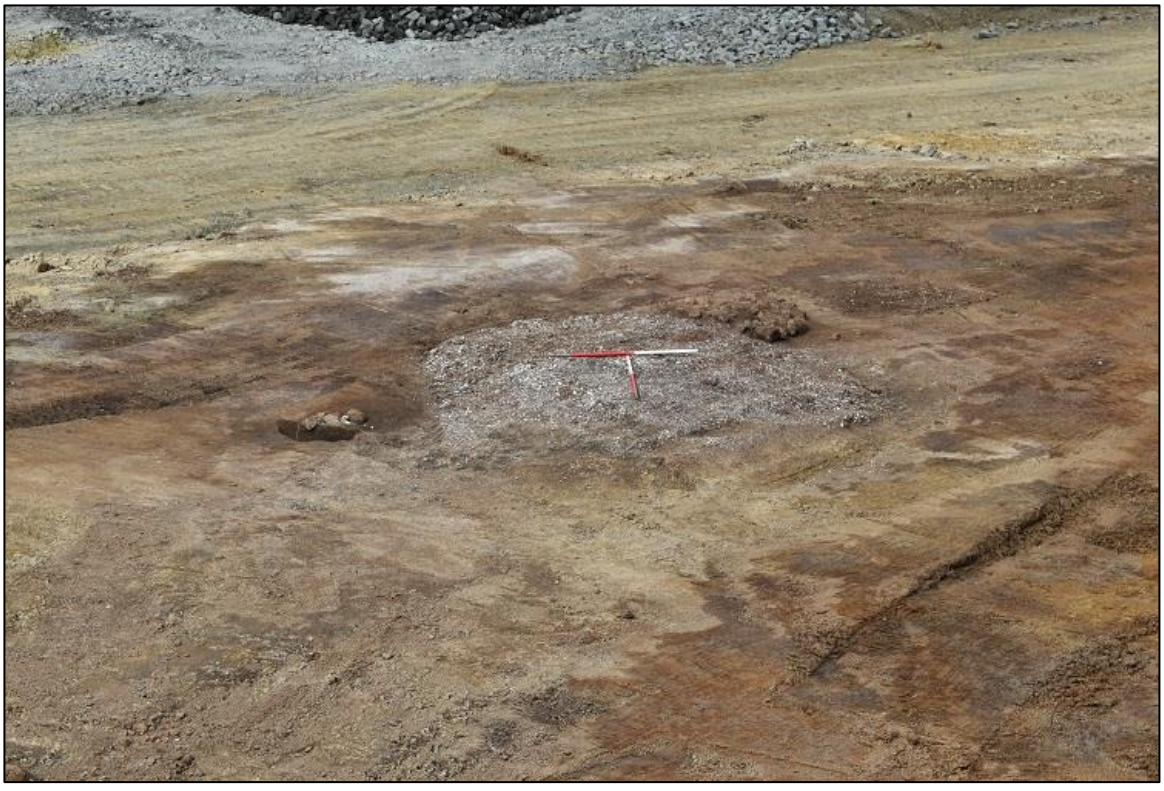


Figure 3.79 Pre-excavation view across site R10/1512, facing east. Scale: 2 x 1m

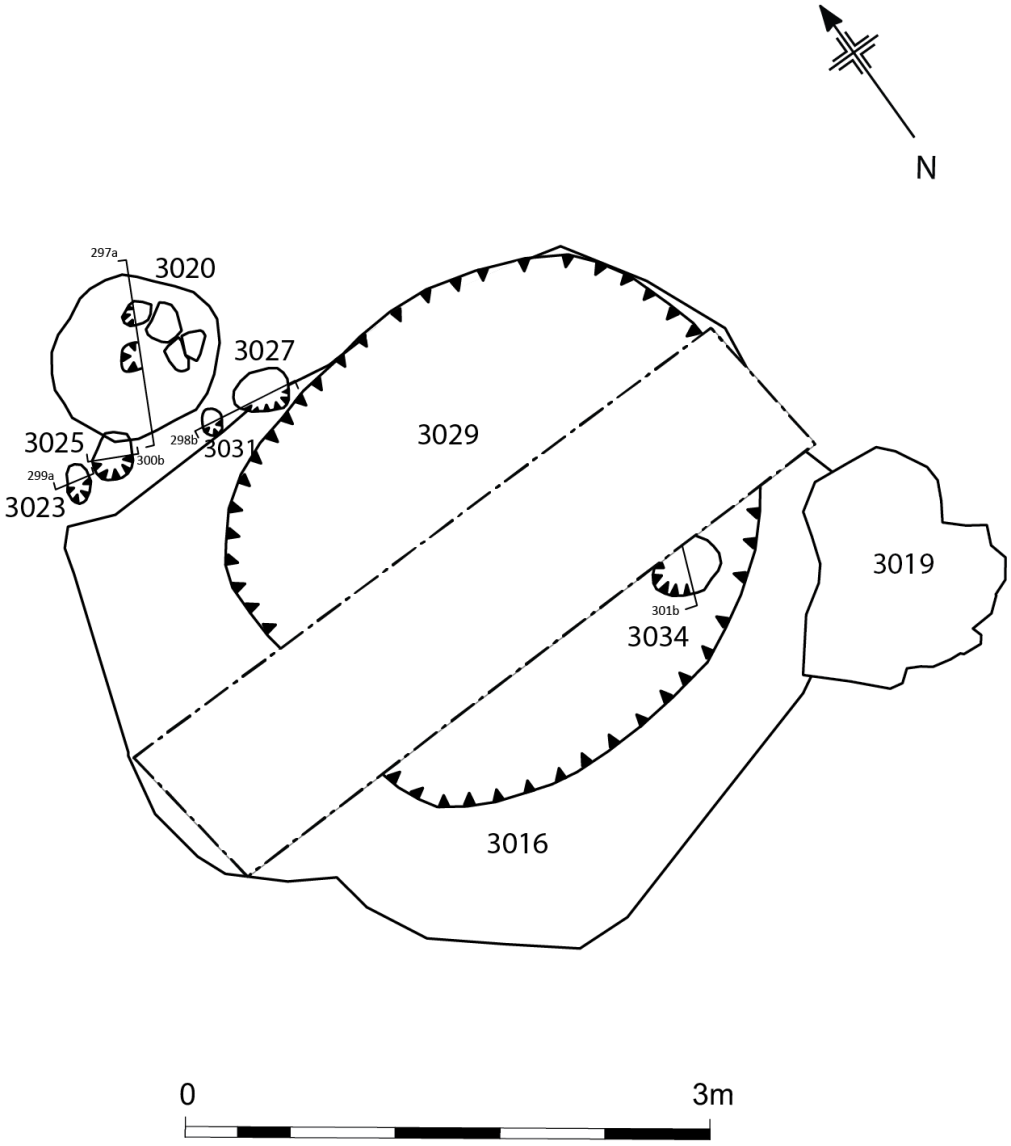


Figure 3.80 Survey plan of archaeological features in site R10/1512

Figure 3.81 Vertical plan view shot of the large earth oven (context 3029) following excavation. Scale: 2 x 1m

Figure 3.82 The large earth oven (context 3029) seen after excavation and the oven stone cache (context 3019) situated adjacent to the oven, facing northwest. Scale: 2 x 1m

Figure 3.83 Post-excavation plan view of the large posthole (context 3020) adjacent to the northwestern edge of the large earth oven, with the packing stones still in situ in the unexcavated half section, facing east. Scale: 0.5m

Figure 3.84 Excavated section through the midden deposit (context 3016) that sealed the upper fill (context 3030) of the large earth oven (context 3029). Facing southeast. Scale: 1 x 2m

R10/1514 – Shell Midden (Context 3038)

Site R10/1514 was situated on relatively flat to gently sloping ground at the base of a northwest to southeast trending spur that overlooked an inlet of the Pūhoi River (Figure 3.34). The spur upon which the site was situated descended from the southeastern flanks of the large hill that dominated the 3 Puhoi Road property (Figure 3.34). The site was exposed during the initial topsoil stripping of the area in advance of earthworks to create the batter for the western embankment of the northern carriageway of the new SH1 alignment. The site consisted of five distinct shell midden deposits across an area of 21m by 20m, along with two hāngi and a single firescoop (Figure 3.85, Figure 3.86 and Figure 3.87). The shell midden deposits (context 3038) were homogenous and consisted primarily of pipi (approximately 75%), cockle (15%), and 5% each of both mud snail and rock oyster, that were within a blackish dark brown silty, ashy matrix that contained occasional inclusions of charcoal and heat fractured sandstone fragments. The largest of the midden deposits was 5.44m by 5.34m and was up to 0.10m thick, while the smallest was just 2.61m by 0.65m and only up to 0.05m thick (Figure 3.87). A 20 litre sample of midden was taken from the largest of the midden deposits for species analysis and dating purposes.

The site had probably originally been continuous, but due to both natural erosion and farming activities had been vertically truncated, with the result that thinner deposits would have been lost in their entirety.

The two earth ovens (contexts 3041 and 3044) were oval in plan and both contained a single fill, which consisted of frequent midden shell (of similar composition to the main midden deposits), within a dark brown clayey silt that contained occasional charcoal and heat fractured sandstone inclusions. The larger of the two ovens (context 3044) was 1.55m in length by 1.11m wide but due to vertical truncation, and perhaps erosion, survived to a depth of just 0.03m. The firescoop (context 3046) was sub-circular in plan, had been cut with steeply sloping sides and had a concave base. The feature was 0.60m in diameter and contained a single fill which consisted of a blackish dark brown clayey silt (context 3045) that contained frequent whole and broken pipi and cockle shell, frequent heat fractured sandstone fragments (up to fist-sized pieces) and frequent charcoal (Figure 3.88). The fill of the firescoop was sampled for charcoal analysis and dating purposes.

No artefacts were present within the midden deposit or the fills of any of the features.

Figure 3.85 Southeast facing view across site R10/1514. Scale: 2 x 1m

Figure 3.86 Looking east across the main shell midden deposit (context 3038) of site R10/1514

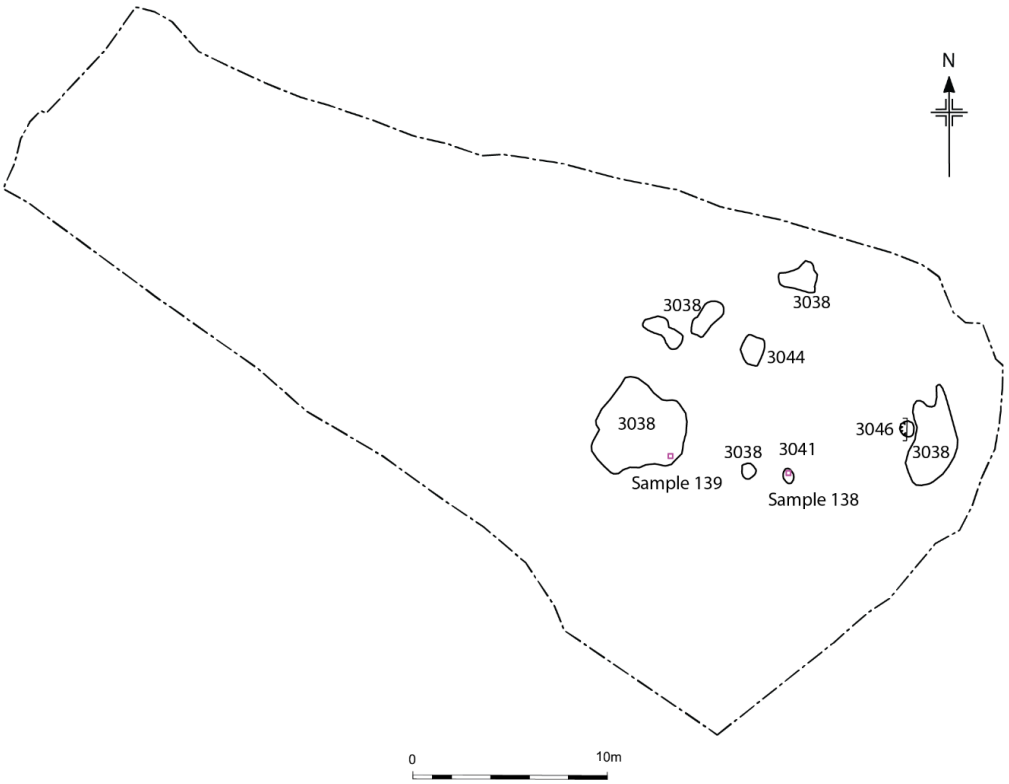


Figure 3.87 Survey plan of excavation area and archaeological features comprising site R10/1514

Figure 3.88 East facing post-excavation plan view of firescoop/oven 3046. Scale: 2 x 1m

R10/1513 – Midden/Oven

Site R10/1514 consisted of a single isolated earth oven feature located on the property at 3 Puhoi Road, located some 60m east of midden site R10/1507 and approximately 45m northwest of midden site R10/1500 (Figure 3.34). The feature was exposed by mechanical excavator during the topsoil strip which was being undertaken in advance of the main earthworks for the new motorway. The feature was subcircular in plan, and measured 0.42m in length by 0.34m wide and was filled by a greyish-brown silty clay deposit that contained frequent fragmented marine shell (predominantly of cockle but with pipi also present) and contained moderate inclusions of charcoal and occasional heat fractured rock (Figure 3.89). At the time other sites were in the process of being investigated so the contractors were instructed to fence the site off so it could be properly investigated as soon as possible. Unfortunately, due to a miscommunication between contractors this never eventuated, and the site was subsequently destroyed by a bulldozer undertaking the start of the main earthworks cut. This resulted in the feature not being excavated and therefore any post-excavation analyses of the fill of the feature, such as midden species composition and radiocarbon dating, could not take place. It is also probable that there may have been associated features present in the immediate surrounding area that were destroyed during the unmonitored earthworks.

Figure 3.89 Plan view of the single isolated earth oven feature backfilled with shell midden and heat fractured rock that comprised site R10/1514, facing north

R10/1485 – Shell Midden (Context 3053)

Site R10/1485 consisted of two shell midden deposits (context 3053) located 130m due west of the northern carriageway of the existing SH1. The site was situated on a low natural slumped terrace just above the southwestern bank of an inlet of the Pūhoi River in the far south of the 3 Puhoi Road property (Figure 3.34). The main deposit of the shell midden was 8.71m in length by up to 3.24m wide and up to 0.09m thick, and consisted predominantly of pipi (70%) and cockle 30% within a silty ashy matrix that contained occasional charcoal inclusions and heat fractured sandstone oven stone fragments (Figure 3.90). The second smaller deposit was just 1.19m in length by 1.04m wide, and just 0.03m thick. The smaller midden deposit was located some 1.3m to the north of northwestern end

of the main deposit. It consisted of the same species composition as the larger deposit, within a similar if not identical matrix. Both midden deposits had been sealed by the modern topsoil beneath turf (context 3052) and sealed a yellowish-brown colluvial clay subsoil (context 3054) that contained occasional charcoal flecks. A 20 litre sample of shell midden was taken for species analysis and dating purposes.

A sub-circular earth oven feature (context 3056) was located 9.68m to the southeast of the main midden (Figure 3.91). The feature was observed cut into the subsoil with gradual sloping sides and a concave base and contained a single fill (context 3057) that consisted of a mottled greyish-brown, yellowish-brown, and dark grey clayey silt that contained frequent sandstone oven stones and heat fractured rock fragments and occasional charcoal inclusions. A sample of charcoal present in the fill of the earth oven was taken for dating purposes.

A single angular fragment of argillite was retrieved from the shell midden deposit.

Figure 3.90 Looking northwest across shell midden site R10/1485. Scale: 2 x 1m

Figure 3.91 Post-excavation plan view of earth oven 3056, facing northwest. Scale: 1m

3.2.4 SAP 9 – 517 State Highway 1

The archaeological investigations of the 517 State Highway 1 property, located to the north of the Pūhoi River and west of Hikauae Creek (Hungry Creek) and the extant SH1 road, exposed four archaeological sites ranging from shell middens with associated oven features to a relatively large site (R10/1417) that was indicative of more complex and permanent settlement activities (Figure 3.92). A detailed investigation of R0/1417 was carried out, the results of which are presented in Chapter 4. Monitoring of the location of Wenzlick's House (R10/1437) and the Schollum House (R10/1436) did not record any subsurface archaeological remains of these sites.

A small shell midden (R10/1510) was the first archaeological site exposed on the property, during the initial monitoring of vegetation removal and the topsoil strip for silt control works on the western side of the main SAP 9 site compound. Sites R10/1417 and R10/1509 were exposed during earthworks connected with the main road cut: pier works associated with the northern end of the viaduct crossing the Pūhoi River and the batter for the western road embankment respectively. Site R10/1495, situated close to the northern bank of the Pūhoi River in the south of the property, was exposed during fencing works (Figure 3.92). However, the fencing activities were modified to avoid the in situ deposits and as such investigation of the shell midden site was not required.

Figure 3.92 Location of archaeological sites (red stars) exposed by the roading earthworks on the 517 State Highway 1 property

R10/1510 – Shell Midden (Context 1203)

Site R10/1510 was a shell midden deposit (context 1203) that was partially exposed within the cut of a trench for a silt bund, excavated as part of silt control works in the western part of the SAP 9 site (Figure 3.92). The midden deposit was located on an alluvial river terrace, approximately 15m east of the western bank of the Pūhoi River (Figure 3.92 and Figure 3.93). The shell midden was 0.06m thick and predominantly comprised crushed and fragmented cockle (80%) with pipi (20%) within a silty dark greyish-brown matrix, that contained occasional inclusions and small fragments of heat fractured rock and occasional charcoal (Figure 3.94). The midden was sealed by the modern topsoil under turf (context 1202), and itself sealed a colluvial clay subsoil (context 1203). The deposit was exposed for 2.10m by 1.86m within the silt control excavation but extended beyond the limit of excavation to the east, north and west. In addition to the shell midden deposit, a single oval posthole (context 1206) was exposed within the silt bund cut. The feature was cut with smooth, sloping sides and a concave base and was 0.48m in length by 0.38m wide and 0.27m deep (Figure 3.95). The posthole contained a single fill (context 1207) which consisted of a dark grey clayey silt that contained moderate inclusions of fragmented shell midden (derived from midden deposit 1203), charcoal, and occasional fragments of heat fractured rock.

A 10 litre sample of shell midden was taken for species analysis and dating purposes. No artefacts were present within midden deposit (1203) or the fill of the posthole.

Figure 3.93 View facing north showing the silt bund excavation in which part of site R10/1510 was located. The Pūhoi River is just visible at centre left

Figure 3.94 The partially exposed shell midden within the silt bund excavation at SAP 9, 517 State Highway 1, facing north. Scale: 2 x 0.50m

Figure 3.95 West facing section of posthole 1207 that formed part of site R10/1510. Scale: 0.50m

R10/1509 – Shell Midden (Context 2408)

Shell midden site R10/1509 was situated on a small terrace, in an elevated position on the steep southeast trending slopes that descended from the bush-clad ground high above the Pūhoi River and forming the western boundary of the property at 517 State Highway 1 (Figure 3.92 and Figure 3.96). The shell midden deposit was sealed by the modern topsoil under turf (context 2407) and itself sealed a clayey silt colluvial subsoil (context 2409). The deposit consisted of whole, fragmented and crushed shell predominantly of cockle and pipi in a silty, ashy matrix that contained moderate inclusions of charcoal and heat fractured rock fragments and was 2.32m long by 2.19m wide and up to 0.04m thick (Figure 3.97).

A 10 litre sample of shell midden was taken for species analysis and dating purposes. No artefacts were present within midden deposit.

Figure 3.96 View north from site R10/1502 in November 2018 to the high ground situated above the northern banks of the Pūhoi River, with the location of site R10/1509 in SAP 9, 517 State Highway 1 indicated by the arrow

Figure 3.97 Post-excavation view southeast across the small shell midden deposit (context 2408) that comprised site R10/1509. Scale: 2 x 1m

R10/1495 – Shell Midden

During fencing works undertaken on 24 October 2020 along the southern boundary of the 517 State Highway 1 property (SAP 9), a small shell midden deposit (site R10/1495) was exposed within a fencing posthole (Figure 3.92 and Figure 3.98). The midden deposit as approximately 0.30m thick and consisted of crushed and fragmented marine shell in a dark greyish-black silty matrix that was sealed beneath an accumulated build-up of alluvium, in turn sealed by the modern topsoil under turf. The shell was predominantly fragmented pipi and cockle, although there was more intact and whole shell towards the base. The midden deposit was 0.20m below the surface on the northern side and 0.60m beneath the surface on the southern side. Probing established that the midden was approximately 8m in length by 5m wide. The change in depth of the midden and the soil overburden likely indicates that the midden was deposited on a slope leading down to the river that has since been buried beneath an accumulation of alluvium derived from flooding, that has flattened the surface contours.

The posthole was subsequently backfilled (along with the small amount of midden material), and with the aid of probing with a spear probe any remaining shell midden was avoided by the fence line. As the site was avoided, archaeological investigation and sampling were not necessary.

Figure 3.98 Shell midden R10/1495 exposed within a fencing posthole at SAP 9, with the deep alluvium sealing the deposit clearly apparent. Scale: 0.60m

R10/1436 and R10/1437 – Schollum House and Wenzlick's House

There was potential for both these house sites to be affected by the borehole drilling and also by bulk earthworks for during construction. While the Schollum House (R10/1436) was originally planned to be demolished, a home was found for the house and it was relocated to the Schollum family property on Pukapuka Road in Pūhoi, with the move being monitored in April and May 2018 (Figure 3.99). The ground beneath and around the house was inspected for archaeology. However, as no additional digging was required here no features were exposed or recorded. Domestic debris that was derived from occupation of the house included 20th century medicine bottles, with some ceramics and also some bricks from the hearth observed. No additional analysis was undertaken.

Monitoring of earthworks in the vicinity of Wenzlick's House (R10/1437) in August 2018 also did not reveal any subsurface structural remains of the house and it is likely that the house itself was located further north and outside of the earthworks area.

Figure 3.99. Images of Schollum House being lifted – top, and placed onto flatbed trucks for relocation (bottom)

3.2.5 Northern Zone – Carran Road, Warkworth (SAP 2)

A site (R09/2247) was located approximately 2.5km to the west of Warkworth and only some 2.2km from the northern terminus of the new road corridor, and was the sole archaeological site exposed within the Northern Zone of the road construction works (Figure 3.100 and Figure 3.101). The site consisted of a cache of Māori artefacts consisting of wooden gardening implements, a post, and a handle from an unknown item.

R09/2247 – Waterlogged Wood Artefacts Cache

The cache of wooden artefacts was exposed during drainage works on the western edge of Carran Road, 24m north of its junction with Woodcocks Road, approximately 2.2km southwest of the northern terminus of the new road corridor (Figure 3.100, Figure 3.101 and Figure 3.102). The site consisted of a group of seven wooden artefacts that were present within an exceedingly rich waterlogged organic deposit that consisted of twigs, small branches and leaves in a blackish dark brown peaty silt that had been deposited in a small palaeochannel (Figure 3.102, Figure 3.103 and Figure 3.104). The seven wooden artefacts represented at least four digging sticks (kō), with one complete example present although partially broken; a kō footrest (teka); a carved post; and lastly a carved handle section of an unknown implement. The artefacts had been deposited within a poorly sorted flood deposit, and it was clear that a couple of the longer examples of the kō had become trapped in the relatively small infilled former stream channel at the apex of a meander. The seven wooden artefacts had therefore been deposited within the main flood deposit and had subsequently become deeply buried by further silt build-up within the waterlogged palaeochannel (Figure 3.102 to Figure 3.107). It is a matter of conjecture how the wooden artefacts came to be in the stream channel in the first place. It may be that they were close to the bank top and merely got caught up in a flood event and lost, or alternatively, were deliberately deposited into the stream channel. A sample of hinau seeds and kanuka twigs was taken for the purpose of radiocarbon dating of the flood deposit as well as a sample for environmental analysis.

Figure 3.100 Location of site R09/2247 (wooden artefacts cache) close to the junction between Carran Road (running north from centre) and Woodcocks Road (bottom)

Figure 3.101 Looking east towards the location of site R09/2247 (arrowed) adjacent and to the west of Carran Road and just north of its junction with Woodcocks Road

Figure 3.102 Looking west along the line of the boggy, mainly silted-up watercourse (arrowed) from which the wooden artefacts were recovered

Figure 3.103 The flood deposit as it was exposed by the mechanical excavator during drainage works situated to the immediate west of Carran Road, approximately 2.5km to the west of Warkworth

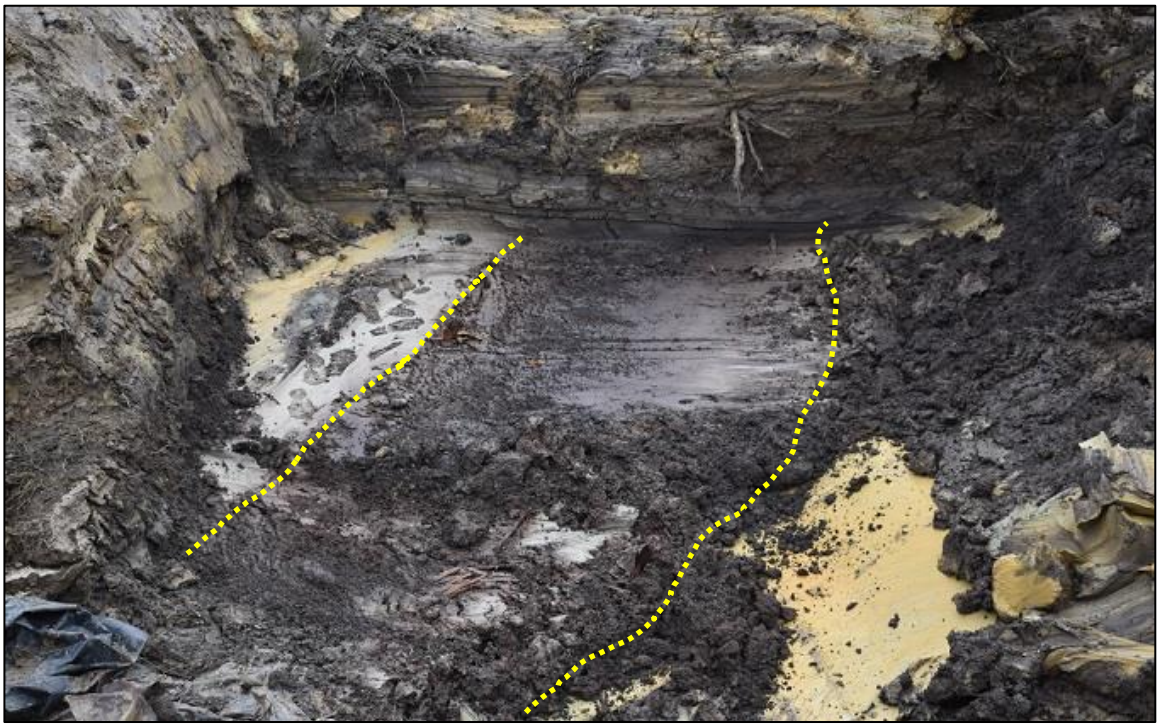


Figure 3.104 The extent of the palaeochannel (dashed lines) that was exposed within the drainage works at the Carran Road site

Figure 3.105 The southern bank of the meander in the palaeochannel where the wooden artefacts had become lodged during a flood event. Scale: 1m

Figure 3.106 One of the kō (digging stick) seen in situ as it was being excavated. Scale: 1m

Figure 3.107 Another kō, seen here immediately after recovery from the organic rich flood deposit (seen below baulk edge at top of photo). Scale: 1m

U.S. Military Camps

Archaeological monitoring of the World War II U.S. Military Camp sites that fell within the project area took place in 2017 (see Figure 3.108). These were Wylies Road Camps F and G (Auckland Council CHI 17007) and Wylies Road Camp E (CHI 17006, which also includes camps D1 and D2 but those were outside the road corridor). The results of the monitoring are provided in a separate report under the Council's consent conditions (see Phear 2023). In summary, subsurface remains of the military camps were limited to some potential surfaces, foundation trenches and postholes relating to use of the camps. The majority of works did not identify any subsurface remains of the camps.

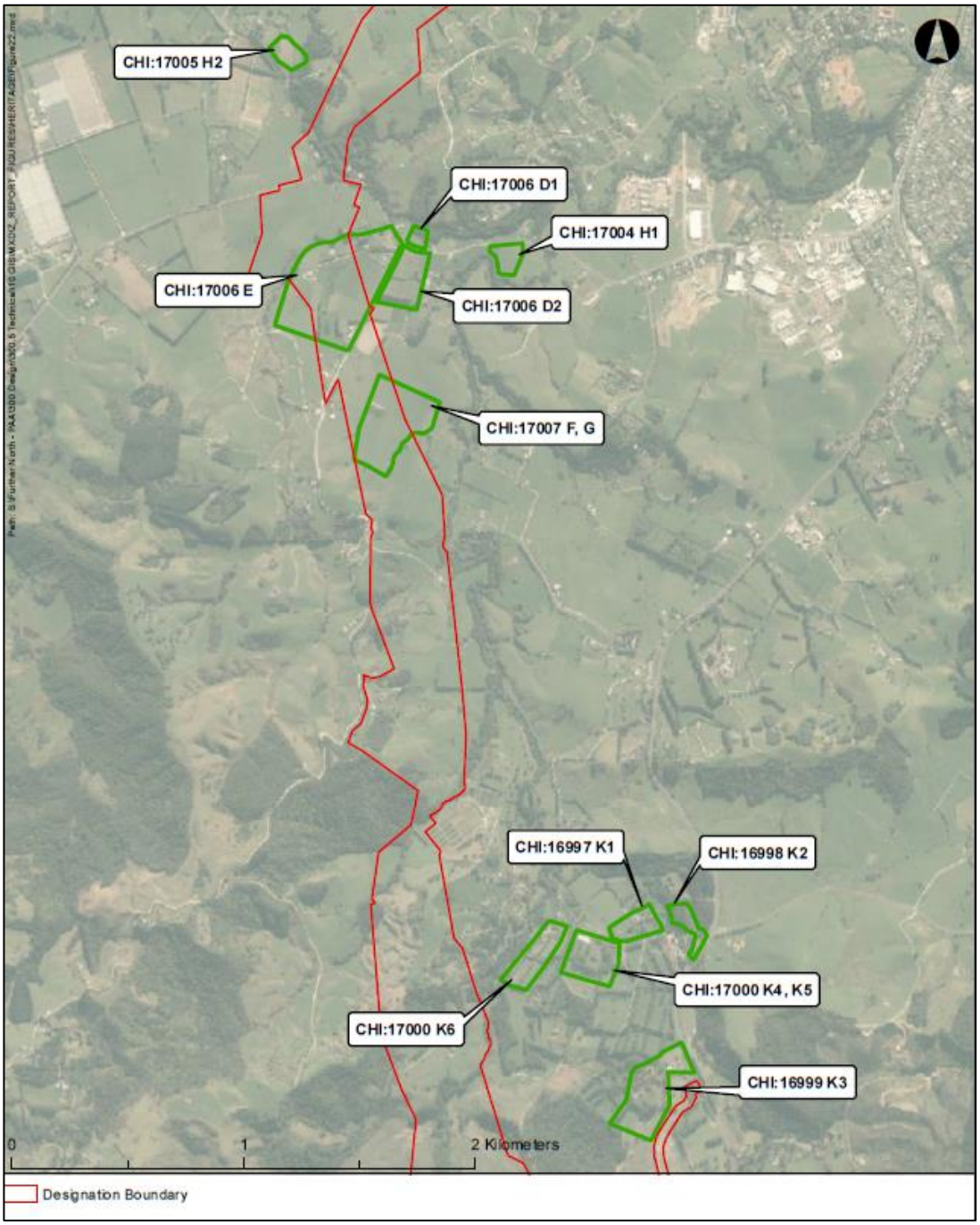


Figure 3.108. Location of military camps (green outline) in the Northern Zone in relation to the road corridor designation (red outline). Only camps E, F and G were within the wide project boundaries

4 ARCHAEOLOGICAL INVESTIGATIONS OF SITES R10/1484 AND R10/1417

4.1 Site R10/1484

4.1.1 Introduction

Site R10/1484 was situated on a flat natural terrace on top of the west-northwest to east-southeast trending ridge spur that descended from the eastern flanks of the large hill that dominated the 3 Puhoi Road site at SAP 10 (Figure 3.34, Figure 4.1). The natural terrace had likely been formed via erosion and subsequent landslips of the steep hillside above, and was offset to the north of the ridge spur where it held commanding views over the Pūhoi River and its floodplain to the east and south, while it also had an unobstructed view of the confluence of the Pūhoi River and Hikauae Creek to the north (Figure 4.1).

The initial works undertaken on the site consisted of the excavation of a linear trench with associated earth bund to capture any silt-laden runoff from the site. Within the earthworks cut a shell midden deposit was exposed, along with associated ovens, postholes, stakeholes and, lastly, a post-pit. The midden and associated features were excavated and recorded between 21 and 23 November 2017. As part of the shell midden and the post-pit feature extended beyond the footprint of the silt control works, it was determined that the wider area would be investigated in conjunction with earthworks associated with the embankment batter of the western side of the new road's carriageway. These works were scheduled to take place the following year (2018). The area surrounding the midden deposit was stripped utilising a 14 ton mechanical excavator equipped with a ditching bucket on 26 February 2018. The extent of the shell midden deposit was identified, and a number of associated features were also apparent, consisting of a large intercutting oven complex, post-pits, and a smaller midden deposit situated to the west. Of note was a buried soil horizon, relatively artefact rich, that extended across much of the eastern part of the site and indicated there was likely only minimal disturbance to the archaeology in that area. As such, it was decided that the site would undergo a comprehensive and rigorous archaeological investigation.

The site proved to be a very challenging one to excavate due to the archaeological features having been cut into a colluvial substratum. As most earth-cut pre-European contact period Māori archaeological features contain mottled intermixed subsoil and topsoil fills they are consequently readily identifiable owing to their contrast with the surrounding subsoil However, the archaeological features comprising site R10/1484 had been cut into a colluvial subsoil formed by both slopewash and landslips and which consisted of a completely intermixed topsoil, subsoil, and even natural colluvium clay. This resulted in the situation of having to identify earth-cut archaeological features containing mottled backfills against a background of mottled subsoil that was the same colour and had the same soil characteristics! However, methods were adopted to overcome this issue and the excavation continued with confidence that features were not being overlooked.

The excavation also proved to be extremely testing due to the increasingly and, ultimately, relentless bad weather in the form of heavy rain that extended from late summer through autumn and winter to mid-spring of 2018. As a result of the persistent wet weather, a large temporary marquee structure generously provided by the NX2 alliance was erected over the excavation area to enable the completion of the investigation within the timeframe of the works schedule. However, the delay in excavation and the enclosing of the site due to

the weather did enable the features to 'weather out' and eventually become more apparent, aiding the excavation. Without this temporary structure a comprehensive excavation of the site would not have been possible and much of the archaeological data would have been lost.

The archaeological investigation of site R10/1484 was undertaken from 26 February to 19 December 2018.

Figure 4.1 Aerial image from June 2017 prior to the commencement of the roading works at SAP 10 showing the location of site R10/1484 on the flat, offset natural terrace on the ridge spur descending from the eastern flanks of the large hill that dominated the western side of the Pūhoi River valley in this area

4.1.2 Excavation Methodology

The initial phase of excavation of site R10/1484 was undertaken from 21 to 23 November 2017 and the main phase from 26 February to 19 December 2018. Both 14 ton and 20 ton mechanical excavators were utilised to remove the turf and modern topsoil overburden until archaeological deposits and features were exposed. All machine work was carried out under continuous archaeological supervision until archaeological levels were reached. Archaeological surfaces and features were then cleaned with hand tools in advance of excavation.

The excavation of archaeological features was undertaken with trowel, mattock and spade. The archaeological features and/or deposits were then assessed, investigated, recorded and sampled in accordance with accepted archaeological practice and within the framework of the research strategy (Phear 2018) and the requirements of the HNZPT authority.

The single context recording system was used, with each cut, deposit, layer and structure given an individual context number and recorded on a tablet utilising a context recording application which enabled the determination of occupation phasing on site and the production of a site Harris Matrix (the context records are presented in Appendix 2). Individual features were planned at scales of 1:10, 1:20 and 1:50, and cuts and deposits were drawn in section or profile at scales of 1:10 or 1:20. A photographic record was compiled of all deposits and features with a digital SLR camera.

Artefacts discovered were recorded, retained and analysed as set out in the AMP/Research strategy (Phear 2018). In general they were recorded on plan (when appropriate); diagnostic, representative or otherwise significant artefacts recovered were retained for analysis by appropriate specialists; and selected artefacts were digitally photographed to include in the final report or as part of the site archive.

Faunal material related to Māori settlement of the site was collected, sorted and labelled per context number on site and retained for specialist analysis and radiocarbon dating purposes. Additionally, samples of deposits were also taken for environmental analyses to examine any pollen, phytolith and starch present to establish vegetation and cultivation practices during occupation of the site.

Additionally, a site survey of all the archaeological features exposed was undertaken by Wesley Maguire utilising both a total station and Real Time Kinematic GPS unit. The excavation was led by Richard Shakles assisted by Carly Mailhot, Doug Gaylard, Sarah Phear, Leah Harding, Helen Heath, Brooke Jamieson, Benjamin Jones and Simon Bickler and was carried out under the overall direction of Sarah Phear.

4.2 Archaeological Investigation of R10/1484

As stated above, the archaeological investigation of site R10/1484 (Figure 4.2) was undertaken in two stages, with the shell midden and associated features exposed within the silt control excavations investigated in November 2017, while the majority of the site was investigated between February and December of 2018.

The site consisted of some 861 cut features predominantly comprising postholes and stakeholes which related to three structures, although there were also four post-pits (two of which were extremely large), and two shell midden deposits with associated features such as earth ovens, providing a total of 1744 archaeological contexts (Figure 4.3; Appendix 2). The majority of the features were situated on the flat natural terrace on top of the west-

northwest to east-southeast trending ridge spur descending from the eastern flanks of the large hill that dominated the property (Figure 4.2) The site also produced a relatively varied assemblage of lithic material. There was no evidence of any 19th century European settlement activity within the investigation area.

Figure 4.2 Image captured from aerial drone showing the extent of the R10/1484 excavation area following initial topsoil stripping in March 2018 and prior to the excavation of features, facing east. Note that the shell midden and associated features had previously been excavated in November 2017

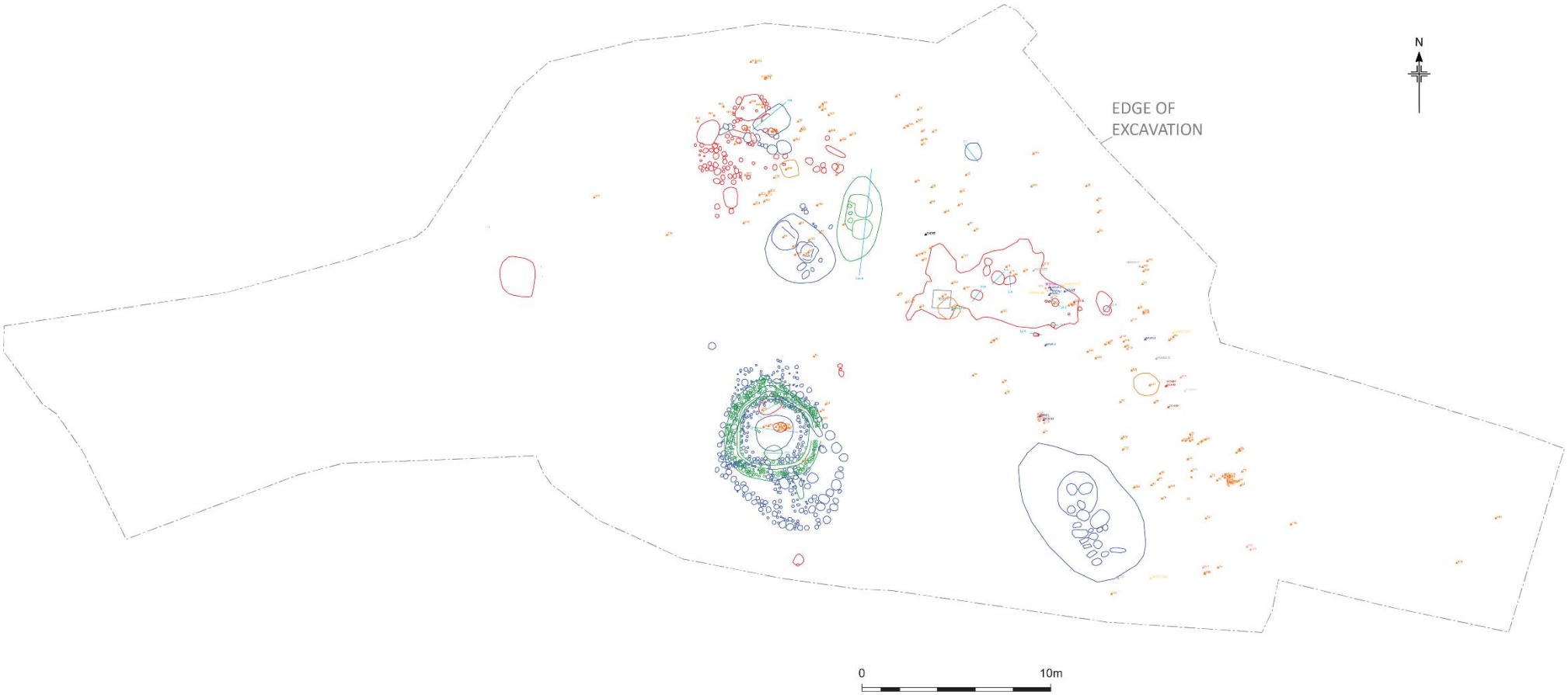


Figure 4.3 Survey plan of archaeological features comprising site R10/1484

4.3 Excavation Results – R10/1484

4.3.1 Phasing

The well-defined stratigraphy encountered during the excavation, in conjunction with the results of radiocarbon dating analysis (see Section 7.3), allowed the occupation sequence to be divided into three distinct phases. The results of the archaeological investigation of site R10/1484 are set out below and presented per phase, with plans and section diagrams included, while a list of context descriptions can be found in Appendix 2. Throughout the excavation results section of the report, the context numbers for features, cuts and structures are shown in square brackets – for instance [2115] – and those for deposits, layers and fills in parentheses.

4.3.2 Stratigraphy

The stratigraphy present across the majority of the excavation area consisted of a friable mid-brown clayey silt topsoil (1140) that was up to 0.16m thick and sealed a buried topsoil (1141) in the eastern half of the site and a colluvial subsoil (1142) in the west. The buried soil had been vertically truncated by land clearance/farming activity and was a brownish-grey silty clay up to 0.05m thick, which contained moderate inclusions of charcoal and occasional heat fractured rock fragments. A number of obsidian and chert artefacts were present within the deposit along with fragments of red, pinkish-red and yellow ochre. The buried soil abutted midden deposit (1050) (see Figure 4.4). In the eastern part of the site the buried soil itself sealed the yellowish orangey-brown clayey silt subsoil (1142) that contained occasional angular pieces of mudstone and microscopic rock fragments indicating that it was colluvial in origin. The subsoil in turn sealed a compacted yellowish light brown colluvial clay (1053) that contained weathered mudstone fragments as well as microscopic sandstone fragments. Some of the more substantial and deeper features situated in the western half of site R10/1484 also cut through a very firmly compacted whitish-grey very fine silt (1165) that was sealed by the colluvial clay (1053).

The identification of features that did not contain burnt material such as charcoal and heat fractured rock within their fills was difficult across the site, due to the colluvial nature of the subsoil and the underlying clay natural. Colluvium is formed by the weathering of steep slopes via processes of erosion that transport topsoil, subsoil and upper levels of natural strata, before redepositing the material in a completely intermixed and poorly sorted state. Many archaeological features connected with Māori settlement activities such as cooking and fire produce in-ground features with fills containing charcoal, heat fractured rock, and perhaps marine shell which are readily identifiable during topsoil stripping as they clearly contrast against the natural subsoil. However, features such as postholes, food storage pits, and bin pits, etc, are quite often only identifiable due to their mottled fills consisting of backfilled intermixed topsoil and subsoil contrasting against a homogenous, more sterile natural subsoil. The problem therefore faced during the excavation and in particular during the initial topsoil strip at site R10/1484 was, how does one identify features containing mottled fills consisting of intermixed topsoil and subsoil against a natural colluvial subsoil that to all intents and purposes appears the same! Ultimately through trial and error, it became apparent during topsoil stripping that any archaeological features present would be visible for a matter of moments before ‘fading back’ into the mottled background and ultimately lost. Subsequently, features were labelled with survey flags instantly as they

were exposed and this enabled the excavation to continue with the confidence that features were not being overlooked.

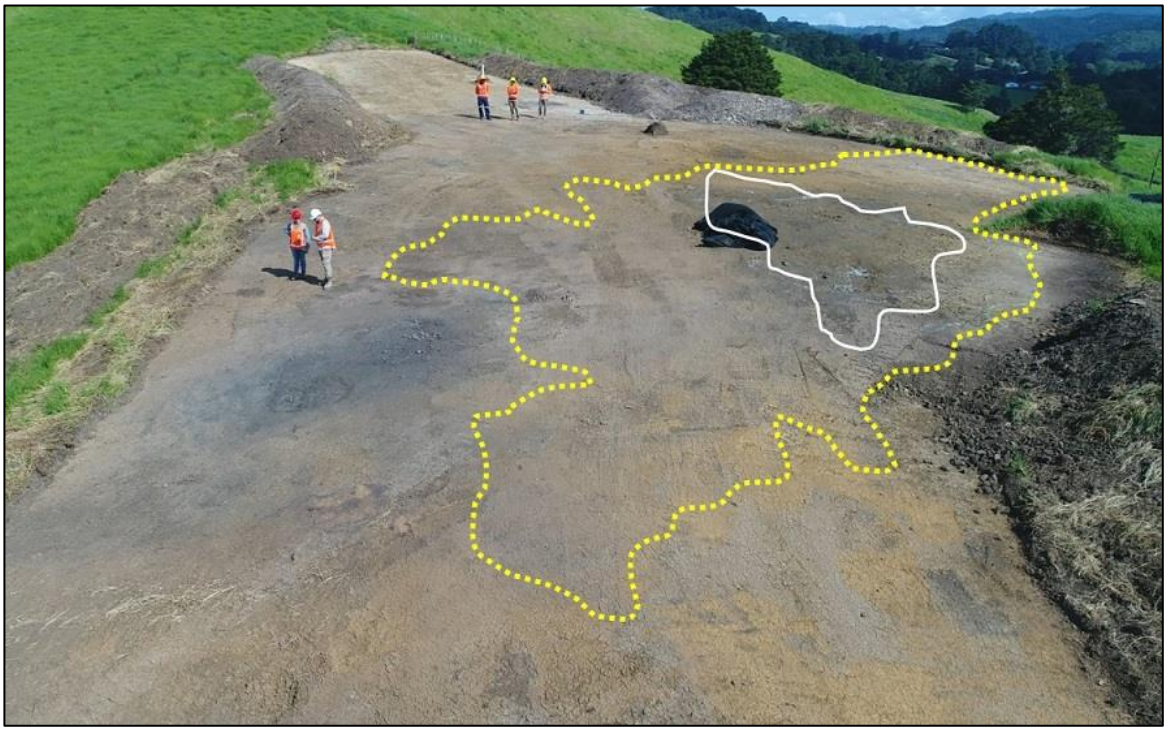


Figure 4.4 Aerial photo taken looking northwest across the R10/1484 excavation area. The yellow dashed line indicates the approximate extent of the artefact-rich buried soil, context (1141), while the white solid line shows where shell midden deposit 1050 had been situated prior to its excavation and removal in November 2017

4.3.3 Phase 1 – Sunken Floored Structure [2455] and Post-pit [1151]

Archaeological remains related to the initial occupation of the site consisted of a large post-pit [1151] with associated features and a partially sunken floored oval structure [2455], also with a significant number of associated features (see Figure 4.5; Appendix 2). The features were both positioned within the western half of the site, located upon a flat natural terrace situated on top of the west-northwest to east-southeast trending ridge spur (Figure 4.2 and Figure 4.3). The post-pit and sunken floored structure had both been deeply excavated and were cut through the subsoil (1142), and into the natural colluvial clay (1053) and on into a sterile whitish-grey silt natural (1165). The fills of both features and the fills of their associated postholes and stakeholes produced no artefacts, with only very small, and very rare pieces of charcoal present. This indicates that they were the first features excavated on the previously uninhabited area, with no residual cultural material able to be redeposited within the fills of the features. Radiocarbon dating (including Bayesian Analysis of the radiocarbon results) of the material from the fills of features immediately stratigraphically above these features, suggests that Phase 2 activities on the site occurred at some point from the late 1600s AD to the first quarter of the18th century (see Section 7.3). The Phase 1 features, although stratigraphically earlier, are also considered to fall within this date range.

Sunken Floored Structure [2455]

Structure [2455] was an oval almost ovoid-shaped feature that was partially subterranean in that its interior floor surface was up to some 0.36m beneath the contemporary ground surface (Figure 4.3 and Figure 4.5). The feature was aligned north-south and had been constructed by cutting an oval-shaped trench with a pointed end to the north [1518] that was 0.53m wide and 0.36m deep, although it flared out at the entrance to up to 0.64m wide (Figure 4.3). The trench contained some 261 predominantly small diameter postholes (between 0.08m to 0.14m) cut into its base and the lower sloping side of its outer face (Figure 4.5 to Figure 4.10; see Appendix 2). The fill of the trench (1519) consisted of a mottled yellowish-brown, orangey brown, whitish-grey and greyish-brown silty clay with occasional charcoal and ochre inclusions. The majority of the postholes in the base of the trench had been cut at an angle approximately up to 30º, so that the posts would have been sloping inward towards the centre of the structure, while a number were cut at 45º. From the diameter of the postholes it is interpreted that they would have held slender posts that would likely have been both flexible and pliable, and were likely tied together at the centre, forming a dome-like roof structure. The posthole fills were homogenous and consisted of a mottled yellowish-brown, whitish-grey and greyish-brown clayey silt, while some of the fills contained rare, very small inclusions of charcoal (see Appendix 2). The posts would have made a thick, dense wall and once the trench had been backfilled, would have formed a very strong and secure, domed hut-like structure. A drain feature [2919] had been cut at the lowest point of trench [1518] in the southwest of the structure (Figure 4.3 and Figure 4.11). The trench had been excavated in such a way that there was a continuous fall (slope) in either direction to the location of the drain to maximise drainage efficiency. The drain itself was cut with steep to vertical sides and a slightly sloping to concave base. The feature was visible for some 2.11m and was 0.38m wide and 0.39m deep, cut by later postholes of an enclosure structure [1516], and would have served to have kept trench [1518] from waterlogging that could have potentially rotted the posts situated within it, as well as making the interior of the structure damp. The feature contained two fills, (2920) and (3006), with context (3006) representing a primary silt deposit in the base, while context (2920) consisted of a mottled yellowish-brown and greyish-brown silty clay, and formed the upper fill.

The interior of the structure was sub-circular with a floor plan of 3.62m by 3.57m and, being sunken, meant that the lower 35cm of the interior wall would have consisted of the natural clay (1053) left as the inner face of trench [1518], and following the excavation of the interior formed a low earthen wall [2426] some 0.35m tall and 0.14m thick (Figure 4.8 to Figure 4.10).

The discrepancy in shape between the exterior and interior is due to the northern end of the structure flaring out to accommodate an entranceway (Figure 4.3, Figure 4.9 and Figure 4.10). There was also evidence of a realignment in the entranceway suggested by posthole positioning, along with a backfilled cut within the earthen wall. This realignment modified the entranceway from a straight access to an angled ‘dog leg’ arrangement, perhaps to prevent the prevailing northerly wind from entering the structure as it was funnelled down the river valley, or for some other unknown reason. There were also two cuts, [2999] and [3001], which were both ‘U’ shaped and observed in the low earthen wall that would have provided access to the interior of the structure (Figure 4.12) The original entranceway [2999] consisted of a wide, ‘U’-shaped cut through the earthen wall [2426] that had been later partially backfilled and replaced with another ‘U’-shaped cut [3001] that, following the reorganisation of the entranceway, was situated approximately 0.60m further to the east (Figure 4.12). Running along the interior low earthen wall were 35 sub-circular cut

postholes, although due to a sondage trench that had been excavated from a higher level and which had inadvertently cut through the earthen wall and floor of the structure, there would have been at least a few more examples (Figure 4.9 and Figure 4.10; see Appendix 2). These interior posts, along with two centrally located examples (contexts [2459] and [2917]), and three others (contexts [2465], [2467] and [2917]) situated on the same alignment as the central posts but closer to the wall, would have functioned as roof supports.

A trample layer/floor surface (2427) was also present within the interior of the structure. The layer consisted of a greyish light brown silty clay, with microscopic particles of charcoal and was only approximately 1 to 2cm thick. A sub-circular to oval pit feature [2463] was cut into the floor of the structure and was some 0.95m long by 0.80m wide and some 0.25m deep (Figure 4.8 to Figure 4.10 and Figure 4.13). The feature contained one fill (2464), which consisted of a mottled greyish light brown, yellowish-brown and orange silt that contained very occasional and very small flecks of charcoal. Initially it was considered that the feature represented a cleaned-out hearth feature, but the almost complete lack of charcoal in the fill coupled with no evidence of burning/heat within the sides and base of the feature rebuts this. The very silty nature of the fill perhaps lends support to the idea that the feature served as a basin to hold water.

The structure was likely abandoned because of issues with groundwater ingress, and at the time of excavation this was still an issue due to groundwater through-flow issuing from a number of spring lines situated above the site which continued to flow even during prolonged dry spells. Following the abandonment of the structure it was completely backfilled and covered with a thick colluvial deposit (2428) some 0.70m thick that was part of a wider made ground/levelling layer that raised the elevation of the natural terrace, and also created a broader flat area that would have been drier and more advantageous for occupation.

No artefacts were recovered from any of the fills of features associated with structure [2455]. Environmental samples were taken for plant microfossil analysis.

Figure 4.5 Survey plan of archaeological features relating to Phase 1 activities at site R10/1484

Figure 4.6 Pre-excavation photo of east facing section through trench [1518] that formed the base and lower level of the wall of the sunken floored structure [2455] (at left); and right posthole [2717] seen in section within the backfill (context 1519) of [1518]. Scale 0.5m (left) and 0.4m (right)

Figure 4.7 Working shots of the excavation of trench [1518] with excavated postholes seen in the base. Scale: 1m

Figure 4.8 Southwest facing post-excavation view looking across sunken floored structure [2455]. Scale: 4 x 1m. NB. The trench in the middle of the structure was an exploratory sondage excavated from a higher level before the presence of structure [2455] was ascertained

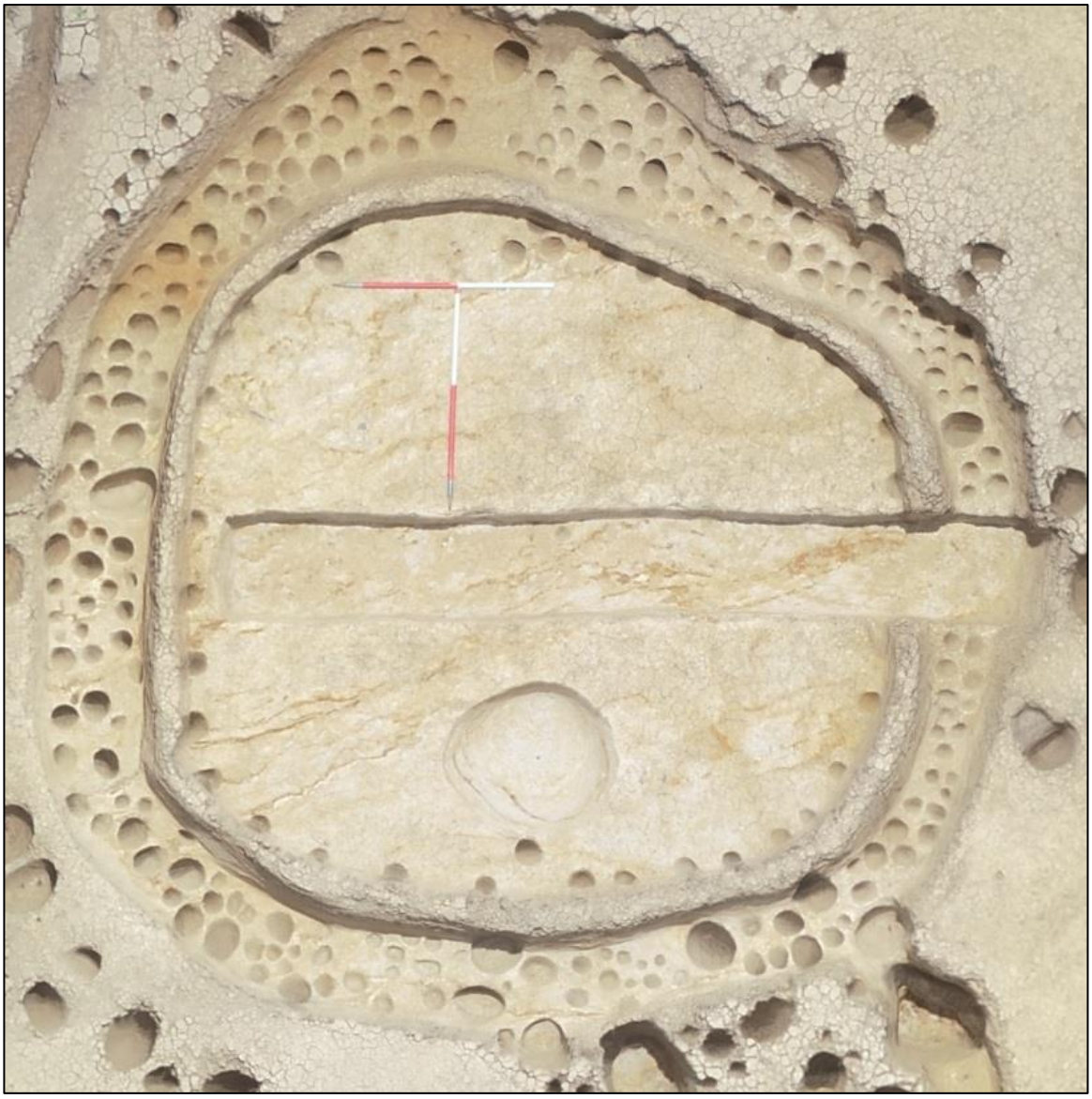


Figure 4.9 Aerial drone post-excavation view of structure [2455]. Scale: 2 x 1m. NB. The trench feature seen extending into the house from centre right is the base of an exploratory sondage excavated from a higher level prior to the exposure of [2455]. The trench truncated the earthen wall and postholes that would have been present within that area of footings in trench [1518]. Scale: 2 x 1m

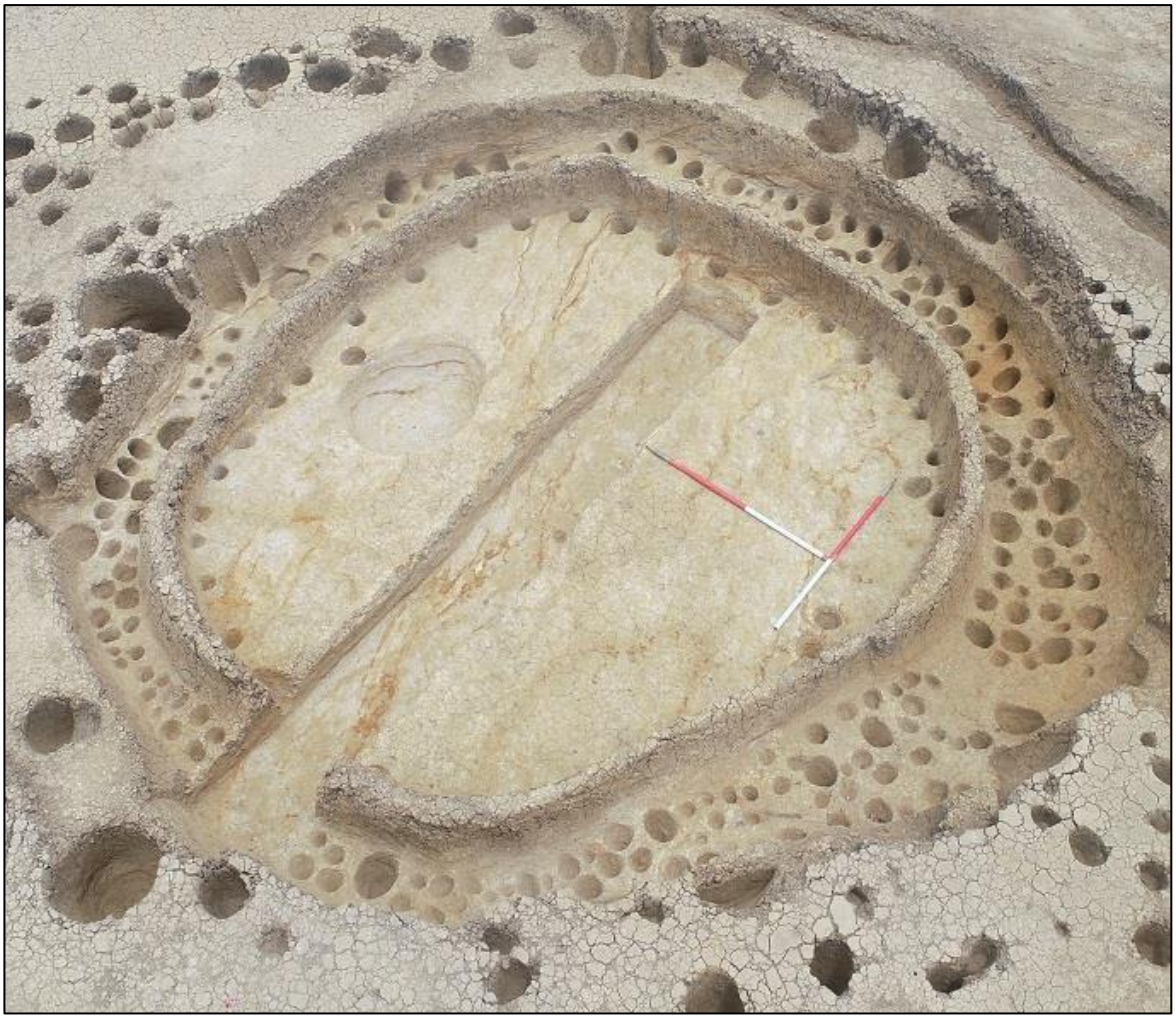


Figure 4.10 Oblique aerial drone-captured post-excavation image overlooking structure [2455], facing southwest. Scale: 2 x 1m

Figure 4.11 Post-excavation view looking across structure [2455] and the later enclosure [1516] with drain [2919] indicated by the arrow, facing north-northeast. Scale: 2 x 1m

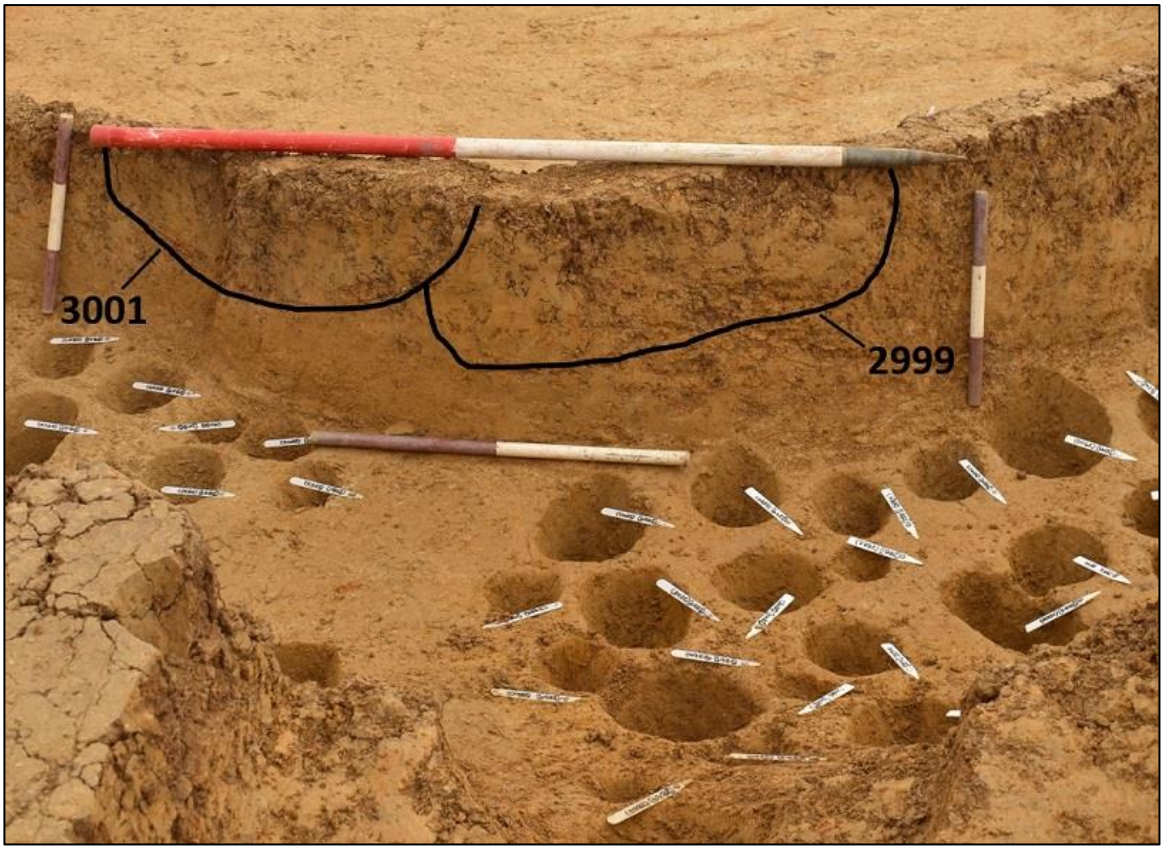


Figure 4.12 South facing image of the cut entrances through the earthen wall [2426], with cut [3001] replacing the original entrance [2999]. Scale: 2 x 0.3m and 1 x 1m

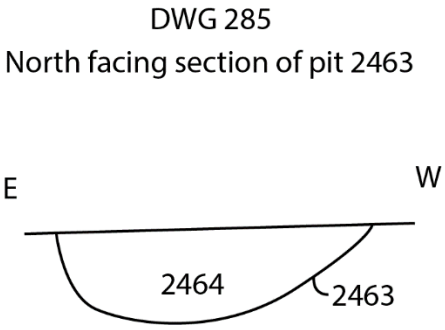


Figure 4.13 Section of pit/basin [2463] within structure [2455]

Post-pit [1151]

A large oval-shaped pit feature was situated approximately 8m to the northeast of structure [2455] (Figure 4.3, Figure 4.5 and Figure 4.14). The feature had been cut through the subsoil (1142), and into the natural colluvial clay (context 1053) and on into a sterile whitish-grey silt natural (1165). The feature was cut with very steep to vertical sides and a flat to very slightly concave base, and was some 4.59m in length by 2.24m wide and 0.81m deep (Figure 4.15, Figure 4.16 and Figure 4.23). The feature contained a single fill (1152) that consisted of an orangey, light brown clayey silt that was composed of intermixed

subsoil and natural clay and contained rare inclusions of topsoil and very occasional charcoal.

Two extremely large oval-shaped postholes, [1147] and [1149], had been cut through the base of the pit, on through the natural clay (1053), and on into a sterile whitish-grey fine silt (1165) that was present across the site at a depth of approximately 0.86mbs and was sealed by (1053) (Figure 4.15). The two postholes each contained a single homogeneous mottled orangey brown and whitish-grey fill, (1148) and (1150), that consisted of redeposited and intermixed natural (1053) and (1165), with very occasional and rare topsoil inclusions. The northernmost of the two postholes [1149] was cut with vertical sides that broke to a flattish, slightly concave base and which was 1.43m in length by 1.21m wide and 0.94m deep. However, when the depth of the pit above is taken into account the base of the timber upright would have been at 1.75mbs (Figure 4.16). The southern posthole [1147] had also been cut with vertical sides and a concave base and was slightly smaller than the cut for [1149], at 1.25m in length by 1.18m wide, and was also slightly shallower at 0.90m deep (Figure 4.16). Both postholes had narrow 'spiked' cuts in one part of the base, and it is inferred that this was to receive a 'tenon' like spike left on one side of the base of each post to 'key' into the ground to prevent the post from moving once in position. Posthole [1149] contained two very similar 'spike'-like features cut into the base on its eastern, central side and southern side. A circular orangey brown stained impression was present in the base of posthole [1147] which measured 0.93m in diameter (Figure 4.17). This at the least allows an estimate for the size of the base of the upright, if not for that portion of the post extending above ground. It is likely that the impression was formed by water running down the post and percolating through the soil to the base, where it left the stained impression (Figure 4.17). While the diameter of any timber upright held within the postholes cannot be exactly determined, the sheer scale and depth of the postholes suggest that they housed extremely substantial and likely tall posts, consistent with pou whenua or perhaps pou rahui. An oval cut pit/niche [1166] was also located beneath the base of the posthole [1149] (Figure 4.19). Its function is unclear.

Both postholes contained unusual features in their sidewalls, in the form of cut 'niches' that may have served to house items of taonga, such as mauri stone for example, or other such tapu items. Posthole [1147] contained three such features, with one example [1354] excavated in the form of an arch with a flat base and sloping ceiling, within the southern sidewall of the posthole (Figure 4.18). The feature was some 0.26m wide, 0.23m tall and extended back some 0.17m. A further niche-like feature [1153] had been cut with a split-level flat base and domed ceiling into the western side wall of posthole [1147] (Figure 4.19). The feature contained a single fill (1154) that consisted of a loosely compacted, friable silt comprising redeposited natural. The two large postholes were linked through an arched niche that had been excavated from the northwestern base and sidewall of posthole [1147] and which extended through to appear within the southwestern sidewall from the base of posthole [1149] (Figure 4.18). The function of this feature is not understood, but it was possibly of a symbolic or tapu nature. The northern large posthole [1149], meanwhile, contained four cut alcove/niche-like features (Figure 4.18 and Figure 4.19). Also of interest from posthole [1147] was a broken adze (Figure 4.20) within the posthole fill (1148), and another adze from posthole [1149] within the posthole fill (1150) (Figure 4.21). Their location within the fills is likely not coincidental.

In addition to the two large postholes, a further 24 smaller postholes had been excavated into the base of post-pit [1151] (Figure 4.18, Figure 4.19, Figure 4.22). All of these were cut with smooth sides which extended to narrow pointed concave bases, and had been cut at an angle so that timber posts placed into them would have projected towards the

extremely large posts held within postholes [1147] and [1149]; they presumably functioned as bracing posts (Figure 4.22).

A sub-circular firescoop [1145] had been cut into the backfill (1152) of post-pit [1151]. The firescoop had been cut with smooth, gradually sloping sides and a concave base (Figure 4.16). The feature contained one fill (1146) which consisted of a dark greyish-black ashy silt loam that contained moderate inclusions of charcoal and heat fractured rock fragments. A radiocarbon date obtained from a sample of hebe charcoal taken from (1146) dates the firescoop to the Phase 2 occupation of the site (mid- to late 1700s), and likely follows the decommissioning of the timber posts held in [1196] – see discussion below.

No artefacts were recovered from any of the fills of features associated with post-pit [1151]. Samples of selected fills were taken for environmental analysis.

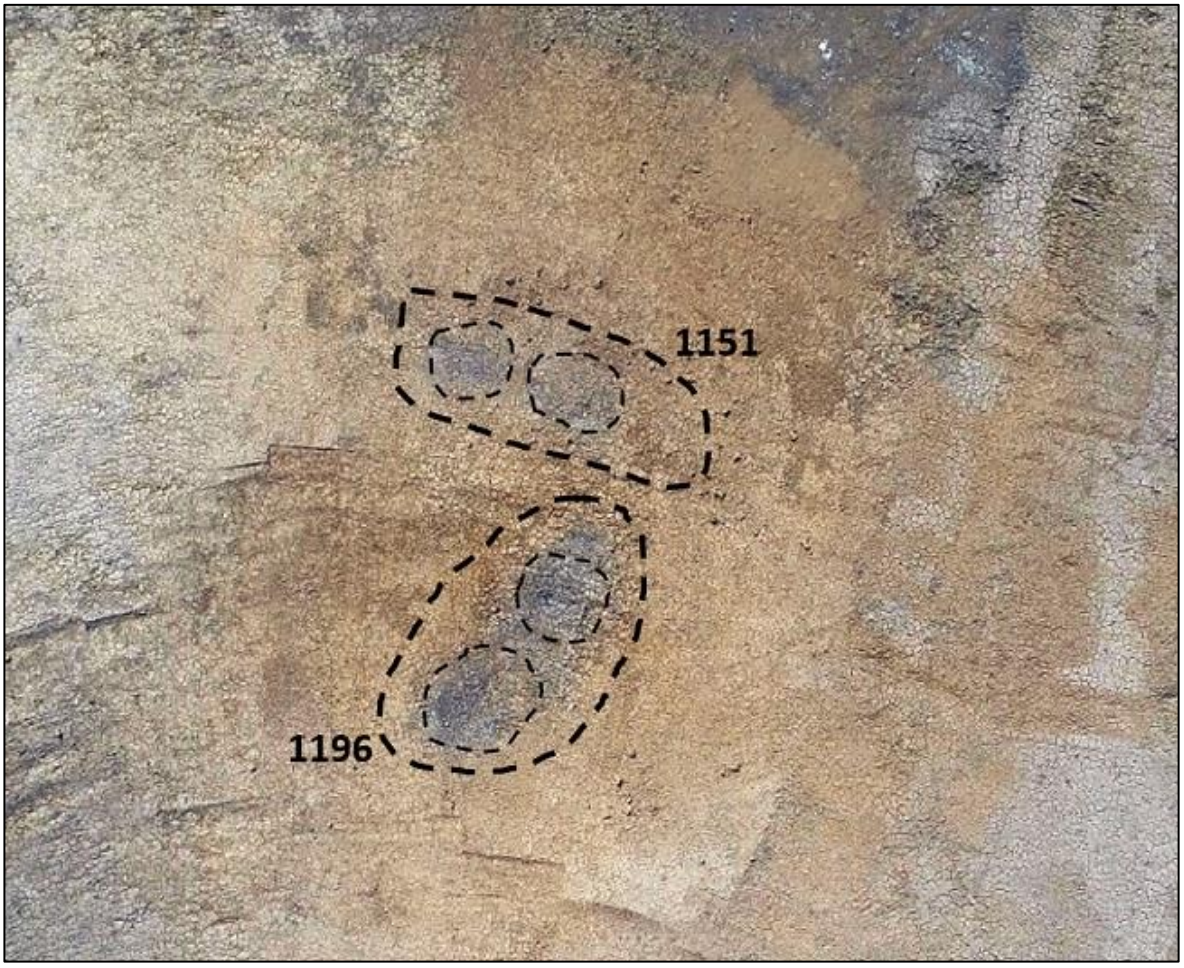


Figure 4.14 Aerial drone image showing the large post-pit [1151] situated northeast of the even larger (and later) post-pit [1196] prior to excavation (large oval rectangular dashed features). Both features had two large circular, dark greyish-black shapes within them that would prove to be extremely large postholes (smaller sub-circular dashed features)

Figure 4.15 Looking south-southwest across the partially excavated post-pit [1151] with the two large postholes [1149] (nearest) and [1147] seen cut through the base. Scale: 4 x 1m

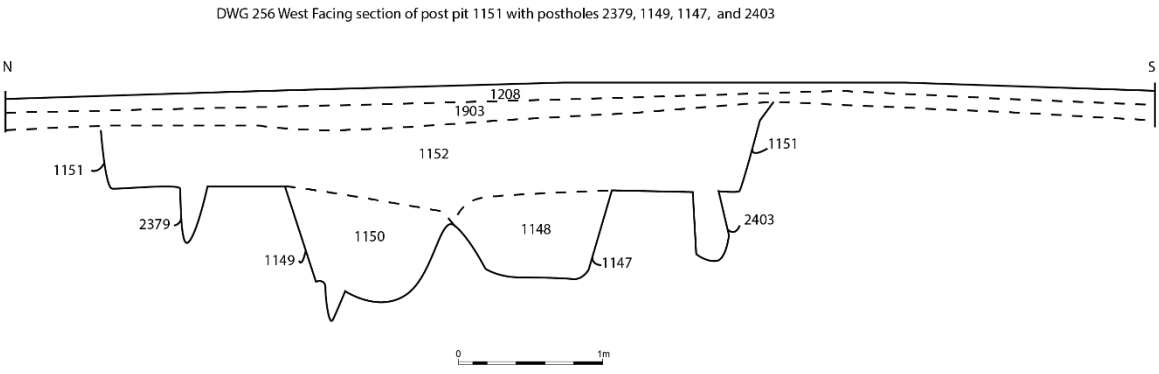


Figure 4.16 West facing section through post-pit [1151], large postholes [1147] and [1149] and postholes [2379] and [2403]. Note this section was completed prior to full excavation. Figure 4.23 illustrates all the features

Figure 4.17 The circular stained post impression (arrowed) in the base of posthole [1147], the southern posthole cut into the base of post-pit [1151], facing east. NB. Posthole [1149] (seen at left) had at that point yet to be excavated; its darker fill is visible against the orangey light brown natural

Figure 4.18 Post-excavation image of post-pit [1151], the large postholes [1147] and [1149] and the two niches [1354] (white arrow) and [1155] (yellow arrow); facing south. Scale: 4 x 1m and 1 x 0.5m

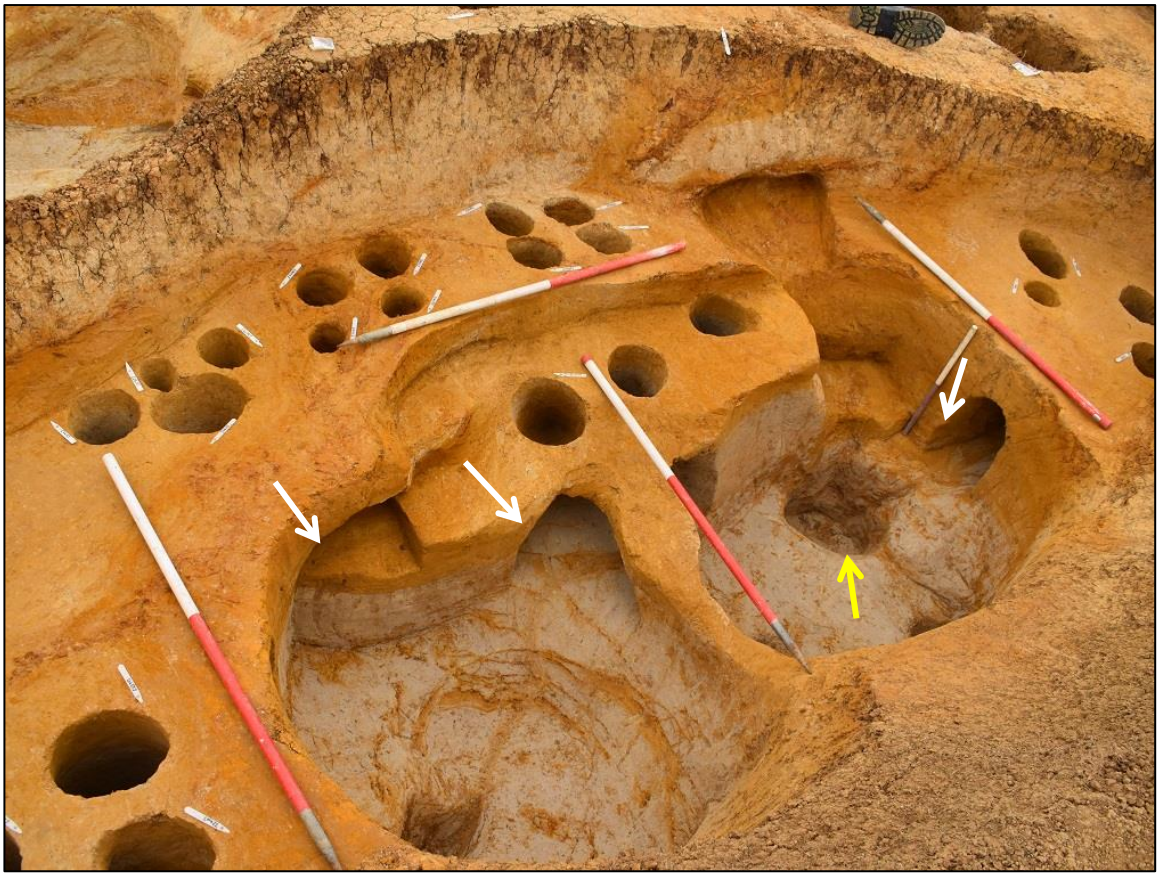


Figure 4.19 Post-excavation image of post-pit [1151], the large postholes [1147] and [1149] and the two niches within posthole [1147]: [1153] (left), [1155] (centre), and the arched niche [1167] cut into the north-eastern side of posthole [1149] (right), all arrowed in white; facing west-northwest. Scale: 4 x 1m and 1 x 0.5m. The yellow arrow indicates the oval pit-like feature [1166] that would have been situated beneath the base of the post held within the posthole [1149]

Figure 4.20 Large broken adze found within the fill (1148) of posthole [1147] within the post-pit [1151]

Figure 4.21 Large adze found within the fill (1150) of large posthole [1149] within the post-pit [1151]

Figure 4.22 Post-excavation image of post-pit [1151], the large postholes [1147] and [1149] and the two niches [1155] and [1169]; facing north. Also clearly visible are the 23 bracing postholes cut into the base of the pit Scale: 4 x 1m and 1 x 0.5m

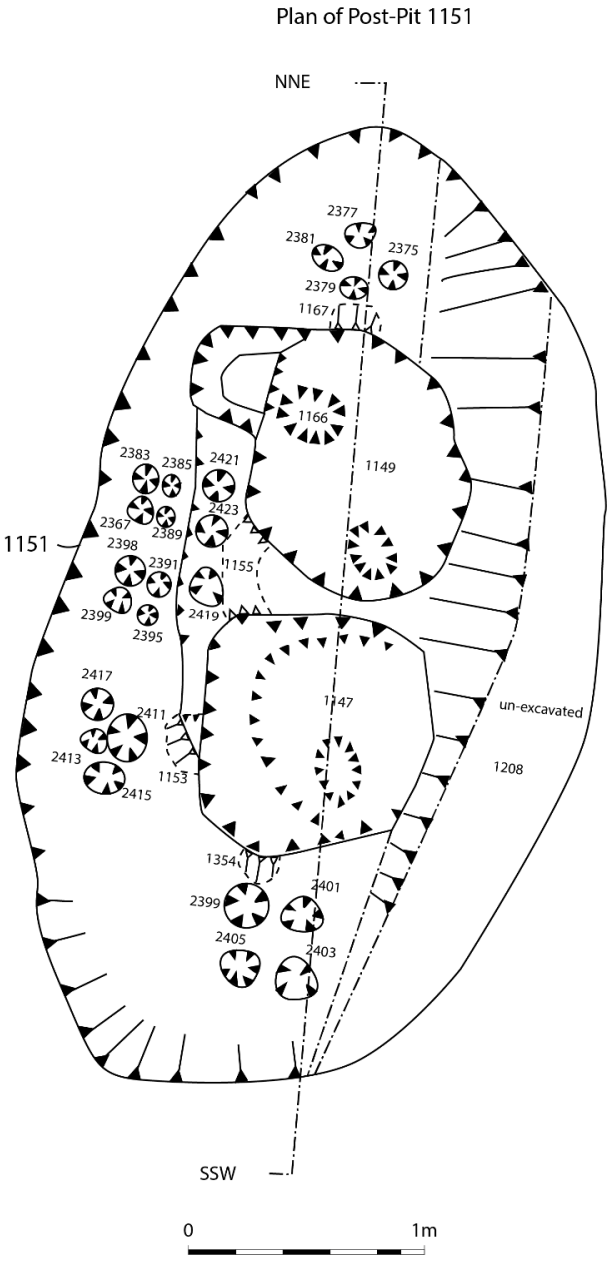


Figure 4.23 Plan of post-pit [1151] and archaeological features within it

4.3.4 Phase 2 – Enclosure [1516], Oval Structure [1517], Post-pits [1051], [1196] and [1298], Ochre Roasting Oven [1177] and Context Group [2456]

Archaeological remains related to the Phase 2 occupation of R10/1484 (the earliest radiocarbon dated phase of the site) consisted of a palisaded/fenced enclosure [1516] that surrounded an oval hut-like structure [1517]; three post-pits [1051], [1196] and [1298]; and a complex of at least 17 intercutting earth ovens/firescoops and three rake-out features, as well as an associated extremely charcoal-rich deposit/layer (1451) (context group 2456) (Figure 4.3 and Figure 4.24).

In contrast to the fills of the Phase 1 archaeological features, the fills of Phase 2 features contained cultural material in the form of charcoal and lithic material. The datable charcoal

recovered allowed a number of features to be dated securely. The radiocarbon data was further refined with a Bayesian Analysis, and as a result the Phase 2 activities on the site are considered to date from the late 1600s AD to the first quarter of the18th century.

Enclosure [1516] and Oval Structure [1517] and Associated Features

Structure [1517] was an oval-shaped feature with a pointed northern end, similar in plan to the earlier structure [2455], within the footprint of which structure [1517] was constructed, albeit some 0.70m above the floor level of [2455]. However, the area had been infilled and elevated with a made ground deposit (2428) by the deliberate infilling of the sunken floored structure with large amounts of the colluvial clay natural, creating a flattened, wider terrace-like area. This was perhaps necessitated by a landslip event in which the material descended from the steep slopes immediately above the site, perhaps damaging existing structures, or conversely it could be seen as an intentional remodelling of the feature and topography perhaps due to the wet nature of the site and issues with water ingress.

Structure [1517] itself consisted of some 147 structural features (144 postholes and 3 stakeholes) along with an associated curvilinear drainage ditch [1520] that ran adjacent to and around the northern, eastern and western sides of the structure (Figure 4.3, Figure 4.24 and Figure 4.25). The majority of the postholes were sub-circular in form with steep, smooth sides and narrow concave bases, although there were also oval postholes present, albeit also with narrow concave bases (see Appendix 2). The structure was built on a north-south axis with an external footprint of some 4.12m by 3.52m, enclosing an internal space of 2.98m by 2.66m (Figure 4.24 and Figure 4.25). As with the form of the earlier sunken floored structure [2455], the small diameter of the postholes of structure [1517] indicates that they would have held slender posts that would likely have been both flexible and pliable, and were likely tied together at the centre, forming a dome-like roof structure (Figure 4.25, Figure 4.26 and Figure 4.27). Although the posts may have been of relatively small diameter (nearly all the postholes were less than 0.20m in diameter), the nature of the structure, together with the likely use of green wood, as well as the sheer quantity and density of posts, would have resulted in an incredibly strong and resilient structure (Figure 4.25 to Figure 4.28). The posthole fills were homogenous and consisted of moderately compacted, greyish-brown and yellowish-brown silty clays with very occasional charcoal inclusions (see Appendix 2). An entrance to the structure was situated just to the east of true south, which corresponded with an offset (dog-legged) entranceway through the enclosure. The offset nature of the entrance would have meant that it would have been impossible to view it from at any point along the course of the palisaded enclosure structure [1516] (described below) (Figure 4.24 to Figure 4.28).

A further point of commonality with the earlier structure [2455] is the lack of a hearth feature inside. This suggests that the feature may not have been occupied permanently and was perhaps of only a short duration; or alternatively it that its function did not require a hearth.

The oval structure [1517] had an associated drain [1520] which was in the form of a curvilinear feature that ran adjacent to the north, east and western sides of the structure (Figure 4.24, Figure 4.25 and Figure 4.28). The drain was cut with steep, smooth sides and a concave base, and was some 8.76m in length by 0.34m wide and was 0.14m deep (Figure 4.24, Figure 4.25, Figure 4.28 and Figure 4.29). Six 0.50m slots were excavated into the drain which illustrated that the feature contained two fills, (1521) and (3011). The upper fill almost entirely filled the feature and consisted of a pinkish, orangey brown and light

greyish-brown mottled silt that contained abundant inclusions of charcoal as well as occasional fragments of heat fractured rock (Figure 4.29). The fill appeared to have been rapidly deposited in a single episode, with only the basal silty clay deposit (3011) indicating any primary silting of the feature during its use as a drain. The upper fill (1521) contained so much charcoal that it was possible to sample over 5 litres for charcoal analysis and radiocarbon dating purposes. It was initially considered that the fill could represent the burning of either the enclosure structure [1516] or oval structure [1517], however, when the postholes relating to these features were excavated there was no evidence of burning. The drain would have functioned in order to keep the interior of structure [1517] free from water.

Structure [1516] was a sub-rectangular shaped palisaded enclosure that surrounded structure [1517] (Figure 4.24). The enclosure was 9.02m in length and 6.08m wide and consisted of 183 features of which 161 were either sub-circular or oval postholes, with the remaining 23 features consisting of sub-circular and oval stakeholes (Figure 4.24; Figure 4.27 and Figure 4.28; see Appendix 2). The majority of the feature consisted of a double row of postholes, with the exception of the eastern and northwestern sides, which consisted of a single row of postholes (Figure 4.24). The postholes were all cut with very steep to vertical sides and concave bases (Figure 4.30; see Appendix 2). The eastern side of the enclosure in particular consisted of large postholes, some up to 0.60m in diameter and up to 0.98m deep, such as postholes [2143] and [2145] (see Appendix 2). It is likely that horizontal posts would also have been incorporated within the structure, perhaps weaved between the vertical posts, thus forming a strong screen.

Within the western part of the enclosure a screen-like partition – structure [2425] – extended between the southwestern side of structure [1517] and the enclosure palisade [1516] (Figure 4.24; Figure 4.25; Figure 4.26 and Figure 4.28). The partition consisted of 16 small postholes that were predominantly sub-circular, with a few oval examples as well as 8 sub-circular stakeholes. The features were cut with steep to vertical sides and had either concave or pointed bases and contained single fills consistent with those that filled the postholes within structure [1517]. The structure would seem to have represented a fence-like structure that would have served to have screened off an area of enclosure [1516] (Figure 4.25 to Figure 4.27).

As with its predecessor, the partially sunken floored structure [2455], structure [1517] is somewhat enigmatic when attempting to ascribe a function purely from its remaining archaeological features. However, the presence of the enclosure [1516] surrounding it, together with angled offset entranceway, clearly indicates that whatever activities were undertaken within structure [1517], they were restricted to the participants themselves.

No artefacts were recovered from any of the posthole fills associated with structures [1516] and [1517] or from the fills of drain [1520]. Samples of selected fills were taken for environmental analysis.

Figure 4.24 Survey plan of archaeological features relating to Phase 2 activities at site R10/1484

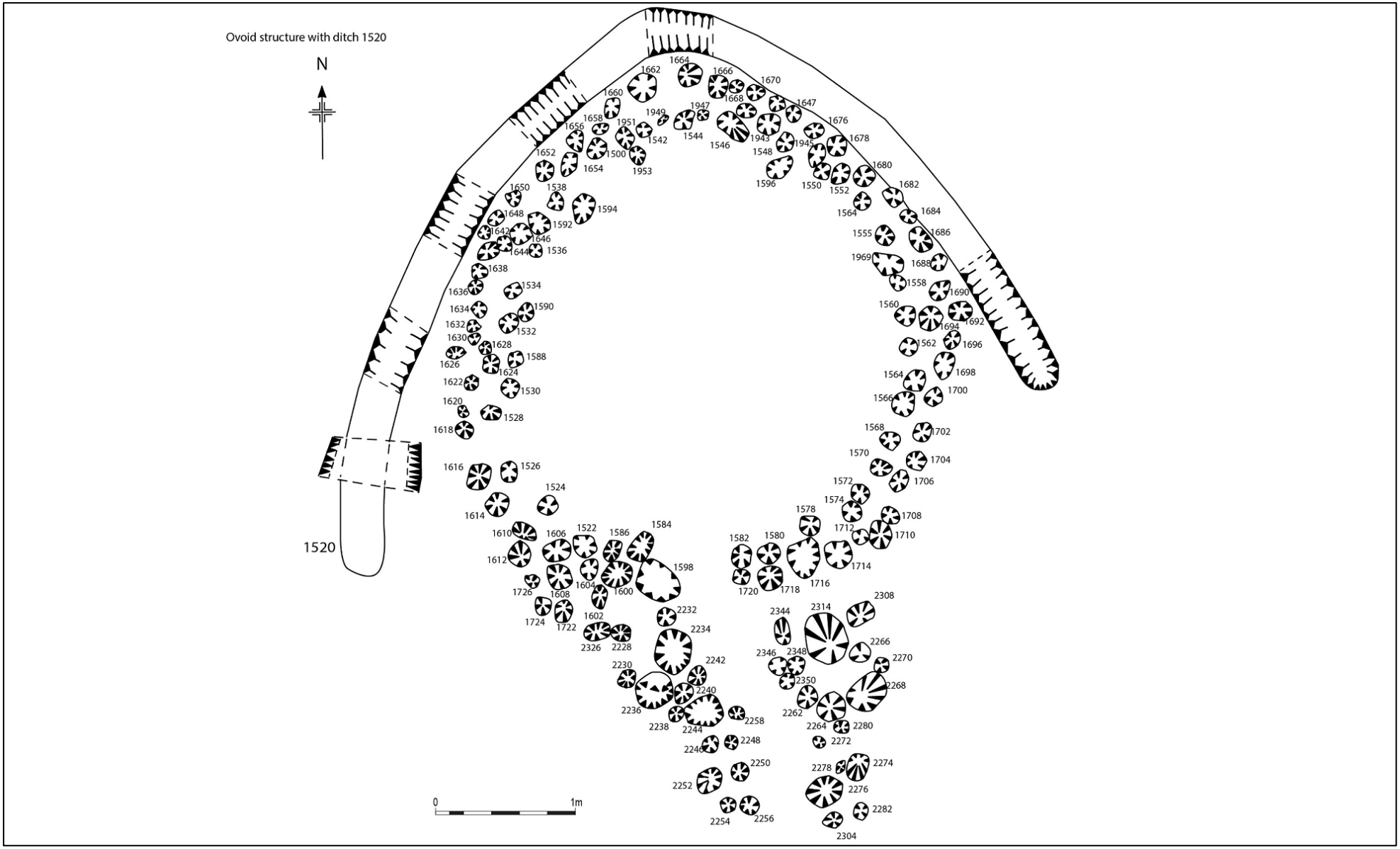


Figure 4.25 Plan of oval structure [1517] and drain [1520]

Figure 4.26 North-northeast view across the oval structure [1517], with drain [1520] seen running around three sides of the structure and the partition screen structure [2425] within enclosure [1516] seen extending to the southwest corner of the structure at bottom left. Scale: 2 x 1m

Figure 4.27 View northwest of the partially excavated enclosure [1516] with the smaller oval structure [1517] seen within and towards the rear of the enclosure. The large hearth structure is associated with the later Phase 3 activities after the abandonment of the oval structure. Scale: 2 x 1m

Figure 4.28 Looking south across enclosure [1516], oval structure [1517] and drain [1520]. The dense nature of the double circuit of posts can clearly be seen. Scale: 2 x 1m

Figure 4.29 South facing view during the early stages of the excavation of enclosure [1516] with the drain [1520] and its charcoal-rich fill clearly visible. Scale: 2 x 1m

Figure 4.30 Southeast facing section of posthole [1955] that was situated in the eastern side of enclosure [1516], with the oval shaped post-pipe indicating the substantial size of the timber upright that would have been housed in the posthole. Scale: 0.50m (upright) and 0.30m

Post-pit [1051]

During the excavation of a sediment diversion bund/channel, an oval feature was observed in plan cut through the subsoil (1142), and into the natural (1053) (Figure 4.24 and Figure 4.31). The feature was approximately 8.7m to the northeast of the large post-pit [1196] described below (Figure 4.24). The feature was oval in plan and had been cut with steep to vertical sides and a flat base (Figure 4.29 and Figure 4.30). The feature was 1.10m in length by 0.91m wide and survived to a depth of 0.40m, although it is noted that at least another 0.40m had been lost during the sediment channel works. The pit contained two fills – contexts (1052) and (1176). The upper fill (1052) consisted of a greyish-brown silty clay with occasional charcoal inclusions and had been affected by the action of plant roots. The primary fill (1176) consisted of an orangey brown and light grey mottled silt with occasional charcoal and also produced three grinding stones/abraders (hōanga) of sandstone and breccia composition. Two areas of the pit's sidewall had been cut into, in the north and northeast respectively (Figure 4.32 and Figure 4.33). Both of the features were cut at an angle so the bases sloped away from the centre of the feature in the direction of the pit wall. It is considered that these two features facilitated small posts acting as props to support the main timber upright held within the post-pit (Figure 4.32 and Figure 4.33). The post-pit dimensions and (estimated) depth are consistent with a single post supporting a pātaka (raised food larder).

Figure 4.31 Post-pit [1051] seen during the initial excavation in November 2017 after the feature had been exposed within the channel of a sediment diversion bund; facing north

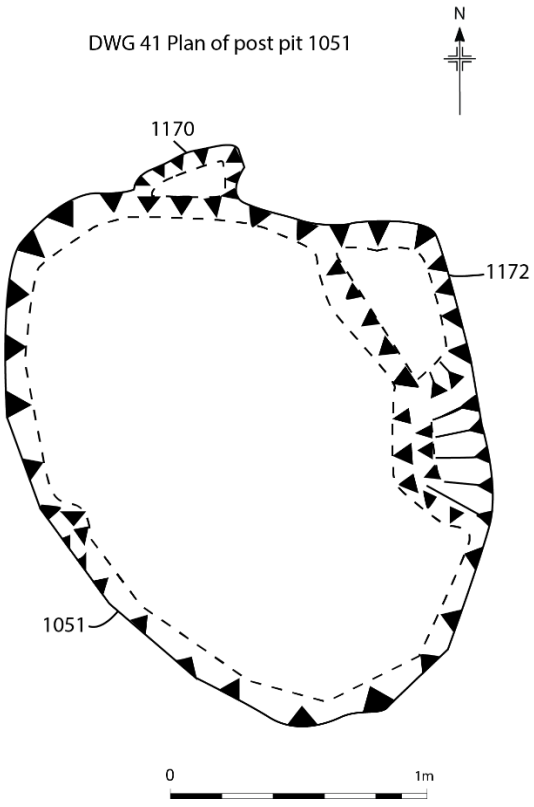


Figure 4.32 Plan of post-pit [1051]

Figure 4.33 Post-excavation shot of post-pit [1051] with the two cut areas in the north and northeast of the pit sidewall likely originally housing bracing posts to support the main timber upright; facing north. Scale: 2 x 1m

Post-pit [1196]

A large oval-shaped pit feature [1196] was situated adjacent and to the southwest of the earlier post-pit [1151] (Figure 4.3, Figure 4.14, and Figure 4.24). The feature had been cut through the subsoil (1142), and into the natural colluvial clay (1053) and on into a sterile whitish-grey silt natural (1165). The feature was cut with very steep sides to a flattish base, and was some 3.87m in length by 3.26m wide by 0.89m deep and contained two fills, (1197) and (1198), and a trample layer (1199) (Figure 4.34 to Figure 4.37). The upper fill (1197) backfilled the majority of the pit and consisted of an orangey brown, whitish-grey and greyish-brown clayey silt with occasional charcoal inclusions (Figure 4.35). The secondary fill (1198) consisted of a yellowish-brown and whitish-grey mottled silt which contained very occasional charcoal inclusions (Figure 4.35). Beneath the two fills a trample layer (1199) was present (Figure 4.35 and Figure 4.38). The layer covered most of the base of the pit and was a firmly compacted, mottled yellowish-brown and brownish-grey silty clay that contained occasional charcoal inclusions. Excavation of the trample layer also recovered seven small basalt flakes/angular fragments and two small pieces of argillite.

Two very large postholes, [1975] and [1976], had been cut through the trample layer and the base of post-pit [1196] into the sterile natural (1165) (Figure 4.24). The northwestern of the two postholes [1975] was sub-circular in plan and larger than the southeastern posthole [1976]. Posthole [1975] was sub-circular in plan, cut with steeply sloping sides and a concave, slightly undulating base (Figure 4.35 to Figure 4.37 and Figure 4.39). Posthole [1975] was 1.27m long by 1.26m wide and 0.53m deep, although when the depth of the pit above is taken into account the base of the posthole would be 1.42m below the

surface (Figure 4.35). Posthole [1976] was some 1.13m long by 1.01m wide and 0.47m deep, and with the pit depth, the posthole base would be at a depth of 1.36m beneath the surface (Figure 4.35). The two postholes each contained a single homogeneous mottled orangey brown, whitish-grey, and brownish light grey clayey silt fills (1197) and (1198) that consisted of redeposited and intermixed natural, (1053) and (1165), with very occasional and rare topsoil inclusions. As with post-pit [1151] the feature contained a number of unusual features. Twelve sub-circular to oval features had been cut into the sidewall of the pit and were spaced at irregular intervals and depths (Figure 4.37 and Figure 4.40). The features were cut with smooth sides, and extended to narrow concave bases and were consistent in form to postholes. The features were angled downwards so that any timber within would have extended upwards at an angle. It is interpreted that these features relate to bracing posts, possibly used to aid in erecting the very large timber uprights that would have been housed in postholes [1975] and [1976]. While the diameter of any timber upright held within the postholes cannot be exactly determined, the sheer scale and depth of the postholes, when taken into account with the depth of the pit above, suggest that they housed extremely substantial and likely tall posts, perhaps consistent with pou whenua or perhaps pou rahui.

The feature also had two oval scoop features cut into its base, [1576] and [1933], as well as two oval postholes [1935] and [1937] (see Appendix 2; Figure 4.39 and Figure 4.41). Feature [1576] was an oval pit that had been cut into the base of post-pit [1196] with steep to vertical sides and a shallow concave base (Figure 4.39 and Figure 4.41). The feature contained one fill (1577) which consisted of a friable mottled whitish-grey, yellowish-brown and pinkish-red clayey silt that contained occasional charcoal inclusions. The other three features cut into the base also each contained a single fill. Interestingly, the four features in the base were only identified as they retained more moisture than the surrounding pit base, and upon excavation it was discovered that they had been sealed by a layer (1932). Layer (1932) extended across the pit for some 3.2m to the west of postholes [1975] and [1976]. The layer was extremely sterile and appears to have been intentionally laid over the base of the pit sealing the fills of the four features. It is difficult to ascribe a function for layer (1932) beyond the intentional concealing of the features beneath, and perhaps the layer represents a tapu function.

Artefacts associated with post-pit [1196] were confined to the trample layer (1199). Samples of selected fills were taken for environmental analysis.

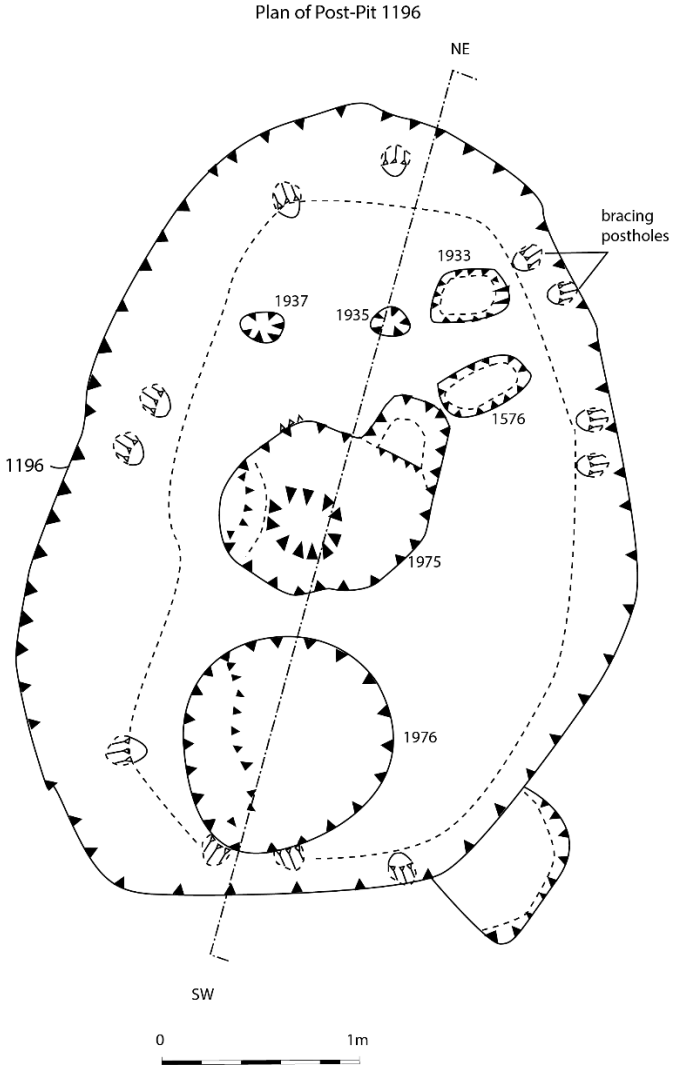


Figure 4.34 Plan of post-pit [1196]

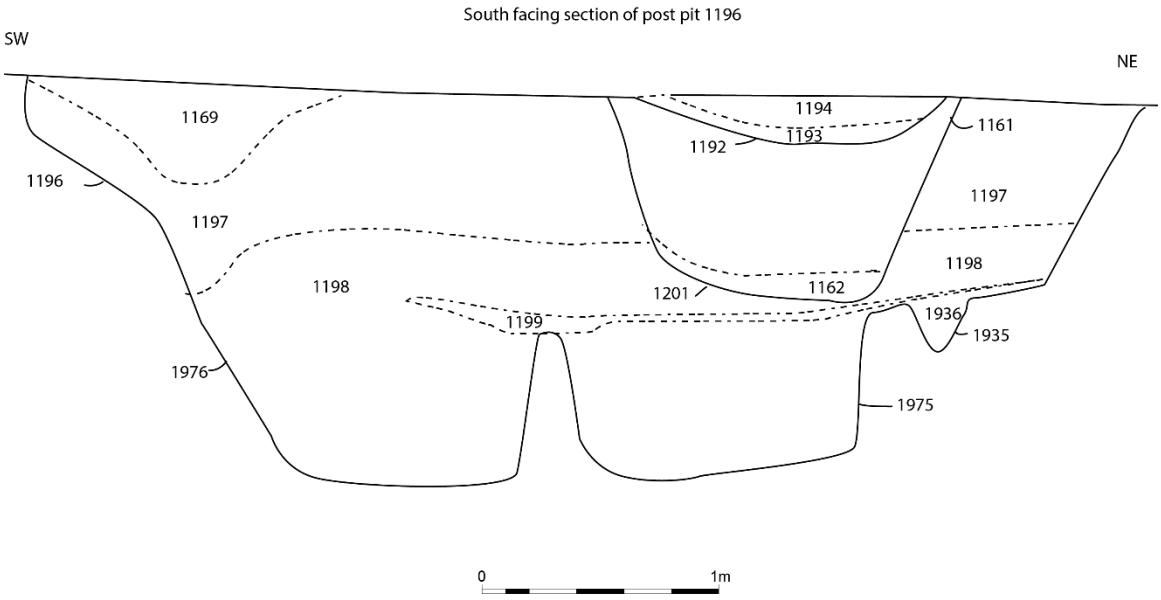


Figure 4.35 Southwest facing section of post-pit [1196]

Figure 4.36 Southeast facing view across the fully excavated post-pit [1196]. Scale: 2 x 1m

Figure 4.37 Post-excavation view northwest across post-pit [1196]

Figure 4.38 Working shot during the excavation of post-pit [1196] with posthole [1976] (arrowed) becoming apparent cut through layer (1199); facing north-northwest. Scale: 2 x 1m

Figure 4.39 North facing view showing the shallow scoop/pit feature [1576] and posthole [1935] prior to excavation (both indicated by arrow). Scale: 1 x 0.5m

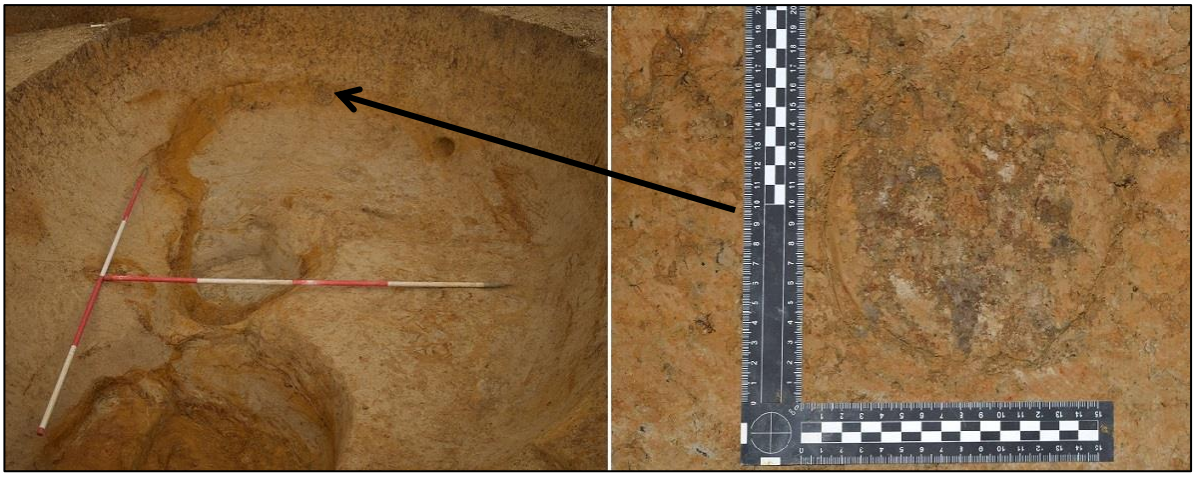


Figure 4.40 Working photo of the southern end of post-pit [1196] showing posthole [2202] prior to excavation, which was one of 12 postholes excavated into the sidewall of the post-pit. Scale: 2 x 2m and 0.15m x 0.20m photo scale

Figure 4.41 Pre-excavation view of scoop/pit feature [1576] on left, and half section of the same feature (right). Scale: 1 x o.5m (left) and 0.3m (right)

Post-pit [1298]

A large sub-oval post-pit [1298] was situated approximately 4.43m to the north of post-pit [1196] (Figure 4.3 and Figure 4.24; see Appendix 2). The feature was cut with vertical to undercut sides, that broke to a flattish slightly sloping step (or ledge) to the east and west of the feature, which then broke to a vertical oval cut to a concave base (Figure 4.42 and Figure 4.43). The feature was 1.97m in length and 1.31m wide and 1.56m deep and contained two fills contexts, (1299) and (1300) (Figure 4.42). The upper fill (1300) consisted of a yellowish-brown and orangey brown mottled clayey silt with occasional charcoal inclusions and very occasional basalt shatter, while the lower fill (1299) was a whitish-grey and brownish-orange mottled silty clay with very occasional charcoal inclusions (Figure 4.42). The concave base was 0.62m by 0.54m and indicated that the timber upright was of a very substantial size. A post-pipe formed after the post had been removed (context 1406) was observed in section and was some 0.45m wide, although the pit was excavated beyond the half section and therefore the post-pipe would have been significantly larger if the section had been placed further to the southeast (Figure 4.42).

The southeast side of the post-pit formed a near vertical wall from the surface to the base at a depth of 1.56m (Figure 4.42 and Figure 4.43). Three arch-like niches or alcoves, [1301], [1302] and [1303], had been excavated into this wall, along with a small oval brace posthole [1371] that had been cut on an angle into a small ledge on the same southeastern wall of the post-pit (Figure 4.44). The upper fill (1300) was later cut by the Phase 3 posthole [1286] (Figure 4.42).

As with post-pits [1151] and [1196] it is interpreted that the arched niches were likely excavated to house items of a tapu nature, as they defy the assigning of a merely functional use. Post-pit [1298] does differ from the two aforementioned post-pits, however, in that it clearly held only one, albeit substantial, timber upright. The sheer scale and depth of the post-pit perhaps precludes the notion that it was used in the erection of a structural feature such as a pātaka, although it is a possibility. However, when the form of the feature and its location overlooking the Pūhoi River and its valley are considered alongside the presence of the two larger post-pits, it again suggests that the feature held a large and significant timber upright consistent with a pou whenua or perhaps pou rahui.

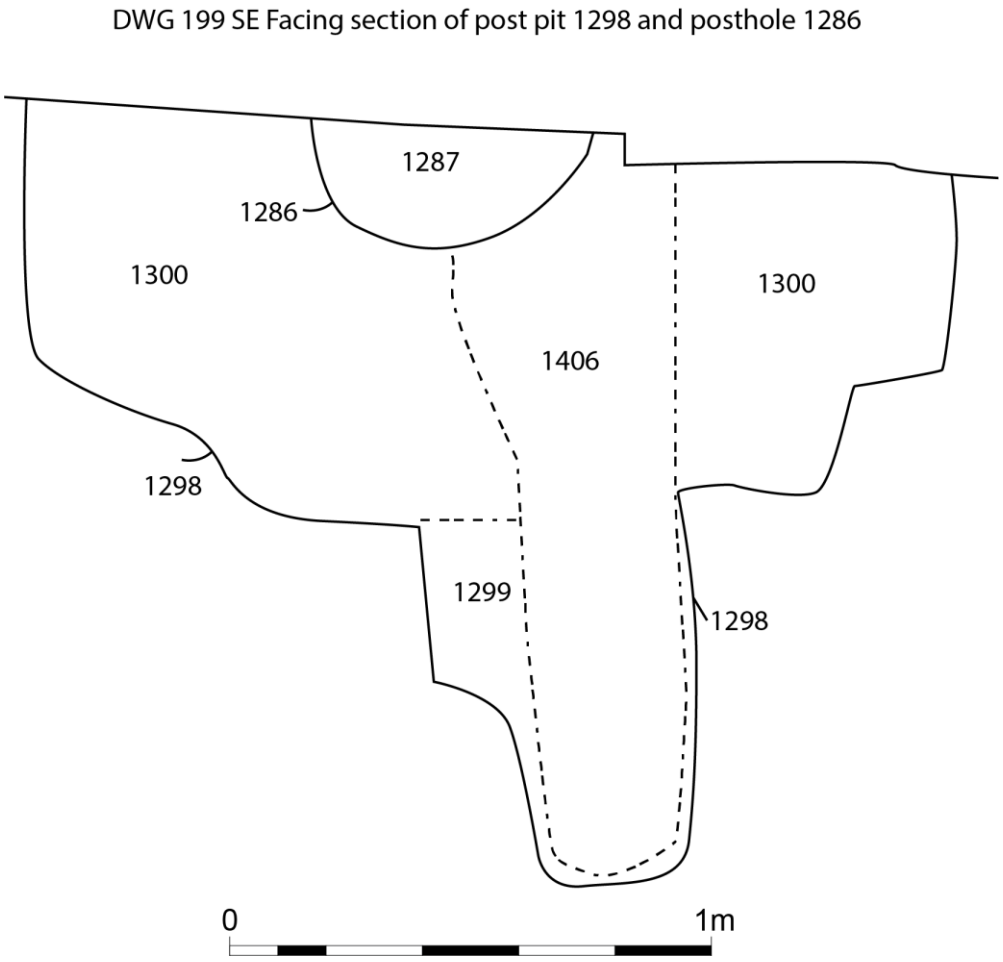


Figure 4.42 Southeast facing section of post-pit [1298] and later posthole [1286]

DWG 190 Plan of post pit 1298 and posthole 1286

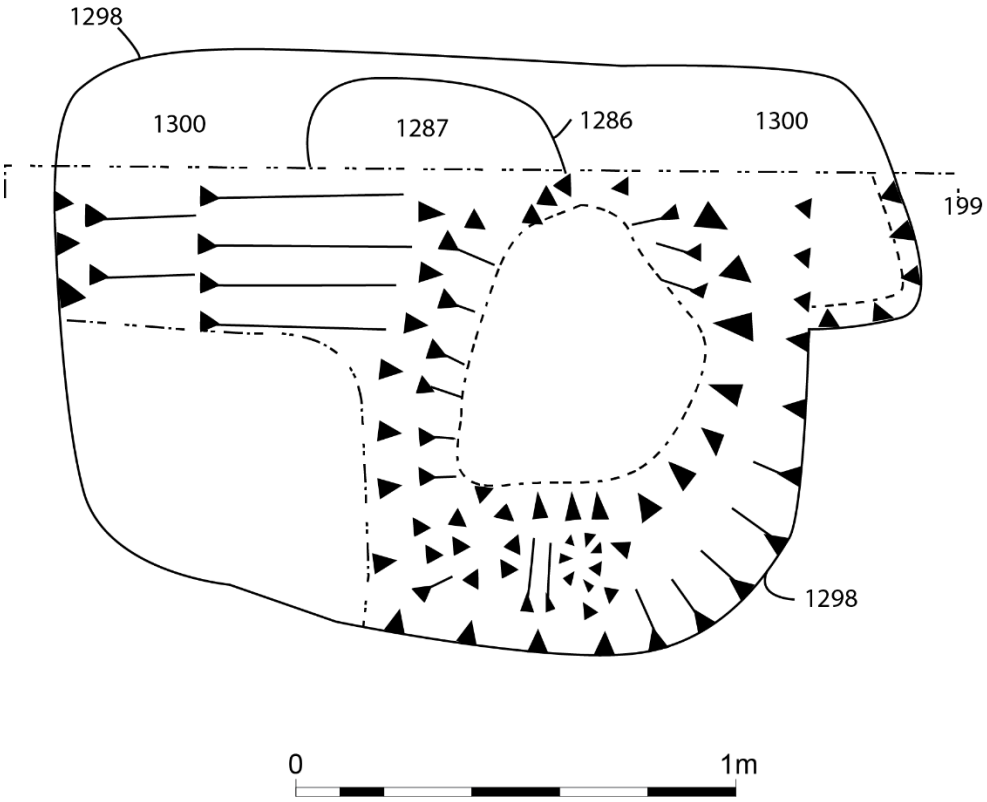


Figure 4.43 Plan of post-pit [1298] and later posthole [1286]

Figure 4.44 The three arched features [1301], [1302] and [1303] cut into the southeastern wall of post-pit [1298], with the brace posthole [1371] also seen at lower centre; facing southeast

Context Group [2456] – Intercutting Oven Complex

A blackish, dark grey ashy, charcoal-rich silt deposit (1451) that was up to 8.70m in length by up to 5.08m wide was situated 9.8m to the east of enclosure [1516] and some 14.5m to the southeast of post-pit [1196] (Figure 4.3, Figure 4.24, Figure 4.45 and Figure 4.46). The deposit contained super abundant inclusions of charcoal and frequent heat fractured rock derived from hāngi stones (Figure 4.46). The area was subsequently trowelled to define features and gain an understanding of the stratigraphy. It became evident almost from the outset that the area had been intensively and repeatedly used for the cutting of earth ovens (Figure 4.47). Cleaning via trowel of deposit (1451) defined 13 oval hāngi and one sub-circular firescoop/oven (see Appendix 2; Figure 4.47). The hāngi had all been cut with smooth, gradually sloping sides and with either concave or flat bases (see Appendix 2; Figure 4.47). The features' fills were consistent and formed of friable blackish to dark brown, ashy, silty clay with moderate inclusions of charcoal and heat fractured rock as well as occasional intact large oven stones (see Appendix 2). Interestingly, there was not even a fragment of marine shell or fishbone within the fills of the ovens, or within the wider deposit (1451). It seems likely, therefore, that vegetable cultivars such as kūmara, taro or yams were being cooked in the hāngi and the intercutting of the ovens suggests repeated re-use of that locale for cooking.

In addition to the 14 hāngi, three small rectilinear features, [1443], [1444] and [1445], represent rake-out of the ovens, and account in part, along with washout, for the spread of deposit (1451) beyond the confines of the ovens themselves (see Appendix 2; Figure 4.47).

Three samples from ovens [1448], [1449] and [1450] consisting of either hebe or manuka charcoal produced dates that placed the use of the hāngi within the Phase 2 occupation period from the mid- to late 1700s (see Section 7.3).

While 14 hāngi were identified along with the rake-out features, this only represents the final activity in the area, and there would in all likelihood have been earlier ovens obliterated by the continued use of the area.

No artefacts were found within the fills of the ovens or within deposit (1451).

Figure 4.45 Northwest facing aerial drone image of site R10/1484 seen after the extended topsoil strip had been completed in March 2018. The black ashy, charcoal-rich deposit (1451) is indicated by the arrow

Figure 4.46 Southeast facing oblique aerial drone photograph showing deposit (1451) prior to excavation

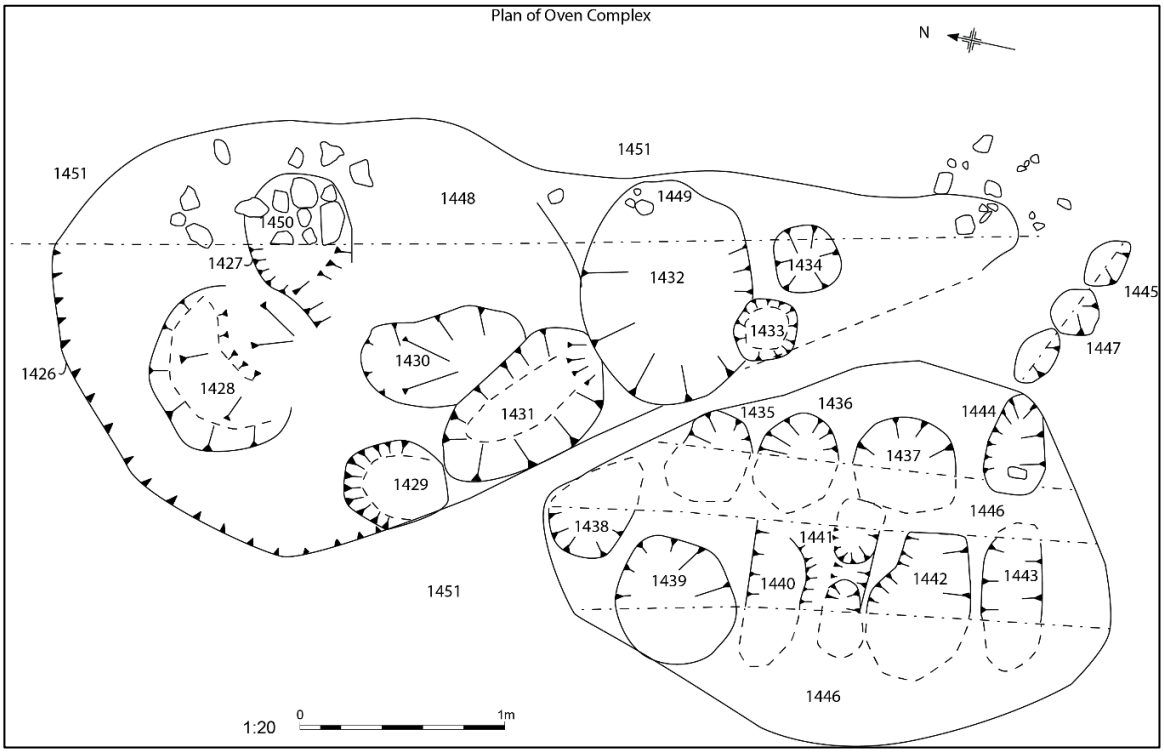


Figure 4.47 Plan of the intercutting hāngi within the area of the ashy, charcoal-rich deposit (1451)

Figure 4.48 Post-excavation view across the intercutting oven complex [2456]. Scale: 2 x 1m

Ochre Roasting Oven [1177]

A large sub-circular oven feature was situated within the oval structure [1517], but was of dimensions that are far too large for it to have been a hearth associated with the structure (Figure 4.24, Figure 4.46 to Figure 4.51). The feature was cut with steep sides and a concave base and was 1.92m by 1.84m with a depth of 0.52m (Figure 4.49 to Figure 4.51). The oven contained one fill (1178), a mottled greyish-brown and yellowish-brown silty clay with occasional pieces and flecks of charcoal and occasional ochre fragments. A sub-circular re-cut [1179] within the confines of the original oven feature was observed in section (Figure 4.49 and Figure 4.51).The re-cut oven was narrower than the original, and contained a single fill (1180) that was similar in composition to (1178). The lack of scorching to the sides and base of the oven suggest that any fire within it had been at lower temperatures than those associated with hāngi, for example. With the presence of ochre, which was also found in significant quantities around the site, it is interpreted that the feature represents an ochre roasting oven to process ochre for use in activities such as painting wood. To turn natural yellow ochre to a deep red or reddish-brown requires roasting at lower temperatures and an earth-covered oven with a reduced oxygen environment would be perfectly suited for this.

It is likely that oven [1177] and its re-cut [1179] either preceded or followed (in a short timeframe) the construction of the oval structure [1517], and was associated with the erection of the large pou in post-pits [1196] and [1298].

A sample of five finger charcoal (whauwhaupaku) from context (1180), the fill of the re-cut oven [1179], was submitted for radiocarbon dating analysis and produced a date that

placed the feature in the mid- to late part of the Phase 2 occupation, perhaps indicating that it was in use after the oval structure [1517] had been abandoned and taken down.

Figure 4.49 Looking north-northeast across the ochre roasting oven [1177] after excavation in half section. Scale: 1 x 2m

Figure 4.50 West-northwest facing post-excavation view of oven [1177]. Scale: 1 x 2m

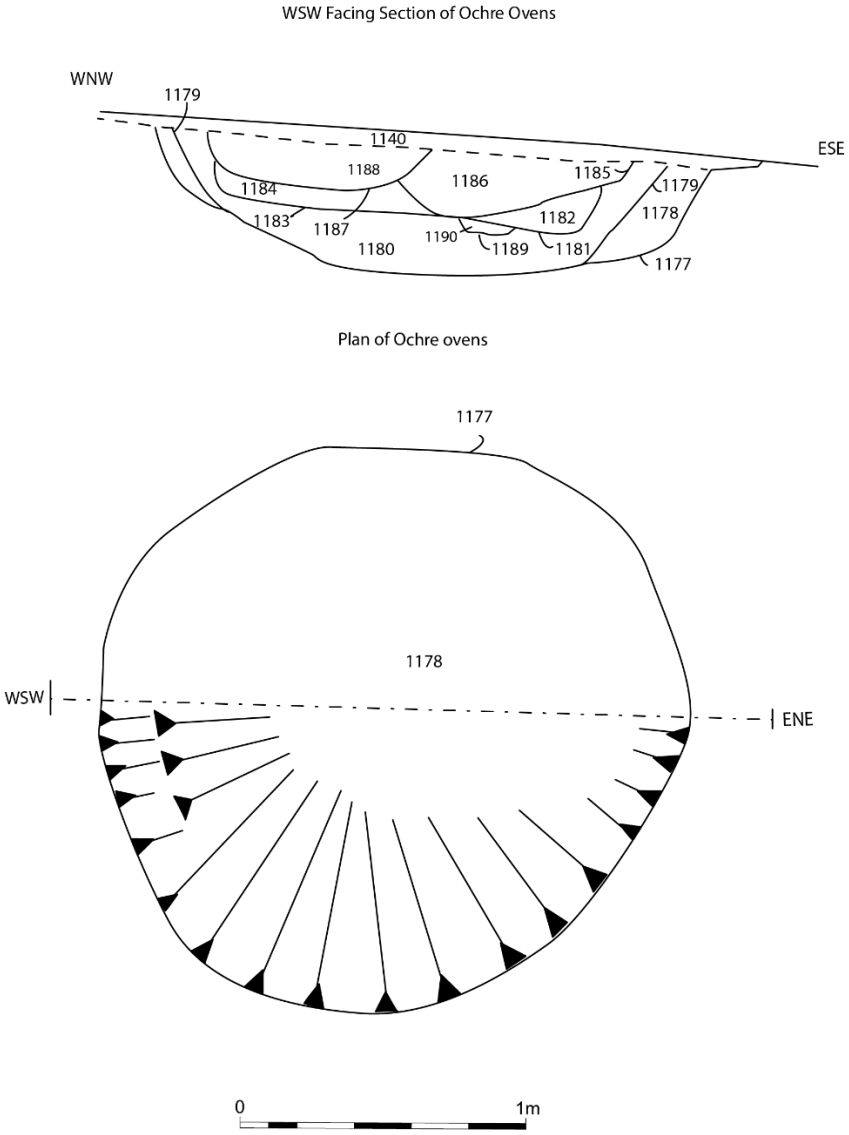


Figure 4.51 Section through the ochre roasting oven [1177] and re-cut oven [1179] with later Phase 3 re-cut ovens (top), and plan of half sectioned oven [1177] (bottom)

4.3.5 Phase 3 – Intercutting Ochre Ovens, Shell Middens (1050) and (1169) and Context Group [1385]

Archaeological remains related to the Phase 3 occupation which formed the final phase of activity at site R10/1484 consisted primarily of a sequence of five ochre roasting ovens within the earlier Phase 2 ochre roasting feature; a large oven [1174] to the north of the ochre ovens which also contained lithics; relatively sizeable shell midden deposit (1050) with associated earth ovens; a smaller isolated shell midden deposit (1169) and context group [1385] that consisted of a dense array of postholes and stakeholes that likely indicated the former presence of drying racks and shelters, with two associated occupation layers/surfaces, (1208) and (1285) (Figure 4.3 and Figure 4.52). Radiocarbon dating (including Bayesian Analysis of the results) indicates a date for Phase 3 from c.1750 AD and extending into the last quarter of the 18th century (see Section 7.3).

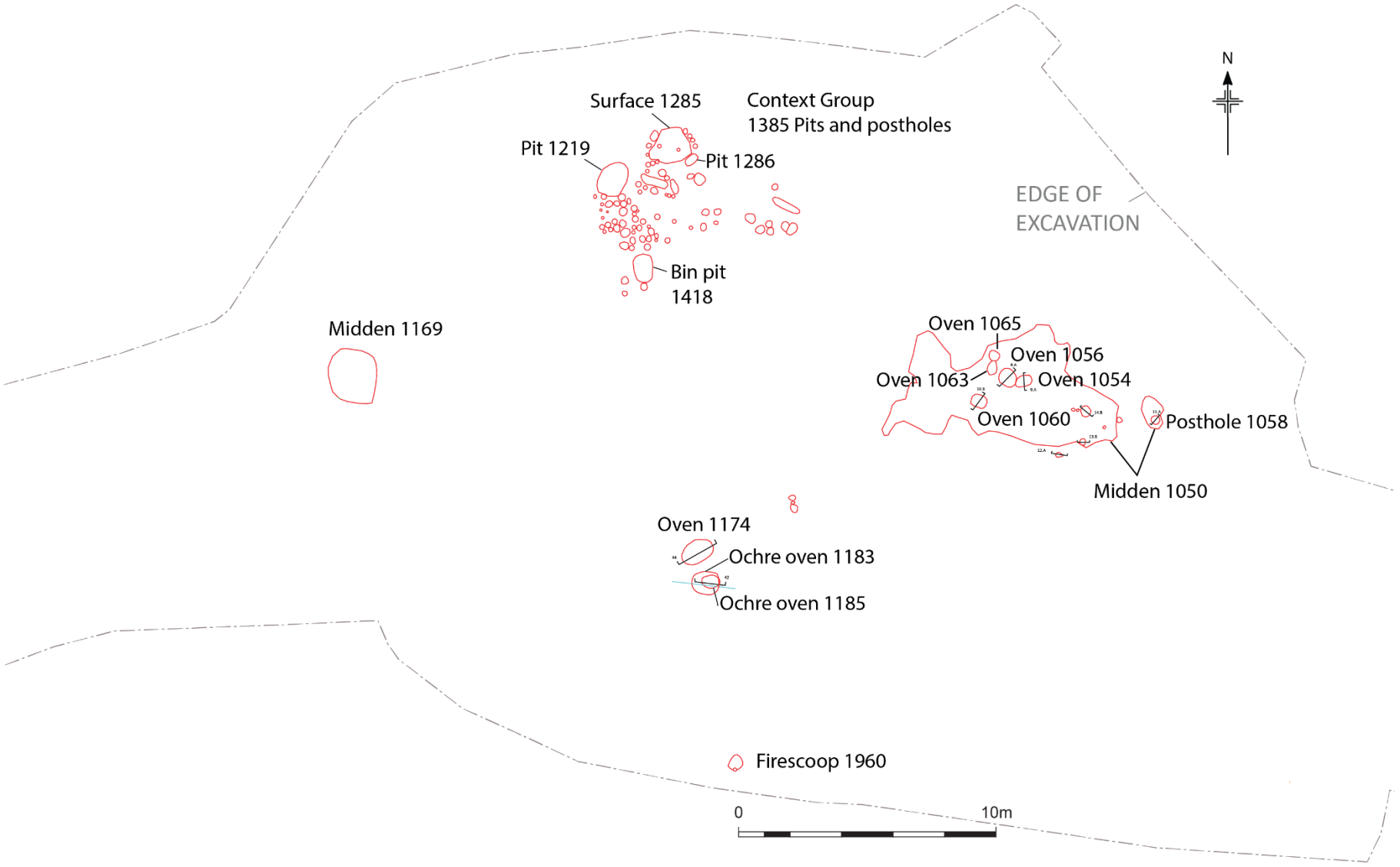


Figure 4.52 Survey plan of archaeological features relating to Phase 3 activities at site R10/1484

Ochre Roasting Ovens

A series of five oven features were intercut within the earlier Phase 2 oven feature [1177], which likely survived as a visible hollow (see Appendix 2; Figure 4.51 and Figure 4.52). The earliest in the sequence of the oven features [1189] was cut into the backfill (1180) of the earlier re-cut oven [1179] and was filled by a single deposit (1190) which consisted of mottled black and dark grey clayey silt with frequent inclusions of charcoal and occasional fragments of ochre (Figure 4.49 and Figure 4.51). Only a small part of the feature's concave base remained as it had been massively truncated by the re-cut oven [1181] which also cut the earlier fill (1180) (Figure 4.51). The three largest surviving ovens in the sequence were features [1183], [1185] and [1187], which were 0.75m, 0.79m and 0.79m wide, and survived to depths of between 0.15 and 0.23m respectively in the section face (see Appendix 2; Figure 4.51). The fills of the earlier ovens, as well as those of the later re-cut ovens [1183, 1185 and 1187] were homogenous for the most part, consisting of mottled black and dark grey clayey silts with frequent inclusions of charcoal and occasional fragments of ochre (Figure 4.49, above). The presence of fragments of ochre throughout the fills support the hypothesis of the earlier ochre roasting feature [1177] continuing in use into the final phase of occupation at site R10/1484. Samples of charcoal were obtained from the fills (contexts 1182, 1184, 1186 and 1188) of four of the ovens, [1181], [1183], [1185] and [1187] respectively. These consisted of manuka and puriri charcoal and were submitted for radiocarbon dating. The results clearly placed the activity firmly in the Phase 3 occupation period and indicated that the ochre roasting oven was re-used within the early 19th century, some 30 years or more after its original use.

Oven/Firescoop [1174]

An oval oven feature [1174] was situated within the footprint of structure [1517], adjacent and immediately to the north of the ochre roasting ovens (Figure 4.51). The feature had been cut with smooth, steeply sloping, sides and a concave base and was 1.35m long by 0.90m wide and 0.16 m deep. The oven contained one fill (1175) which consisted of a moderately compacted mottled dark greyish-brown and yellowish-brown silty clay with occasional charcoal inclusions and heat fractured rock present. The hearth cut a number of postholes comprising structure [1517], and therefore post-dates it. A sample consisting of five finger charcoal was submitted for radiocarbon dating analysis and indicates a date around the middle of the 18th century for the earth oven.

Shell Midden (1050)

A shell midden deposit (1050) was exposed during silt control works in November 2017, and was the first discovery of what came to be recorded as site R10/1484 (Figure 4.53). The shell midden was situated on the eastern edge of the terrace approximately 5m due east of the large post-pit [1196] (Figure 4.54). The shell midden deposit was sealed by the modern topsoil under turf (1140), and consisted predominantly of pipi with some cockle and small amounts of mud snail within an ashy silt matrix that contained moderate charcoal inclusions and occasional heat fractured rock fragments (Figure 4.52, Figure 4.53 to Figure 4.55). The deposit had maximum dimensions of 8.79m by 5.14m, although it was irregularly shaped, and had a maximum thickness of just 0.06m.

There were five hāngi associated with the midden, four of which were oval in shape – [1054], [1056], [1060] and [1063] – while the other was sub-circular [1065] (see Appendix 2; Figure 4.55 and Figure 4.56). The fills of the ovens were homogeneous and consisted of blackish to dark grey ashy silts that contained frequent inclusions of charcoal, crushed and fragmented shell and occasional oven stones, while the fill (1057) of oven [1056] produced two specimens of fishbone.

In addition to the earth ovens, there were a further 10 features (all postholes) which are also considered to relate to activities associated with the formation of the shell midden. The postholes were either oval (contexts [1058], [1069], [1071], [1077], [1079] and [1081]) or sub-circular in form ([1067], [1073], [1075]), and were present in alignments that were consistent with fish drying racks representing the processing (by curing) of fish and possibly other marine resources for preservation and subsequent consumption either in the vicinity or elsewhere at a later date (Figure 4.52).

A sample of charcoal from the fill (1057) of hāngi [1056] consisting of Corokia (Korokio Taranga) was submitted for radiocarbon dating. The date produced was firmly within the Phase 3 occupation period of the site and perhaps even at the latter end of the first quarter of the 19th century.

Figure 4.53 South-southwest facing view as the topsoil was stripped from the site exposing the midden deposit (1050)

Figure 4.54 Looking east-southeast across midden (1050) during excavation

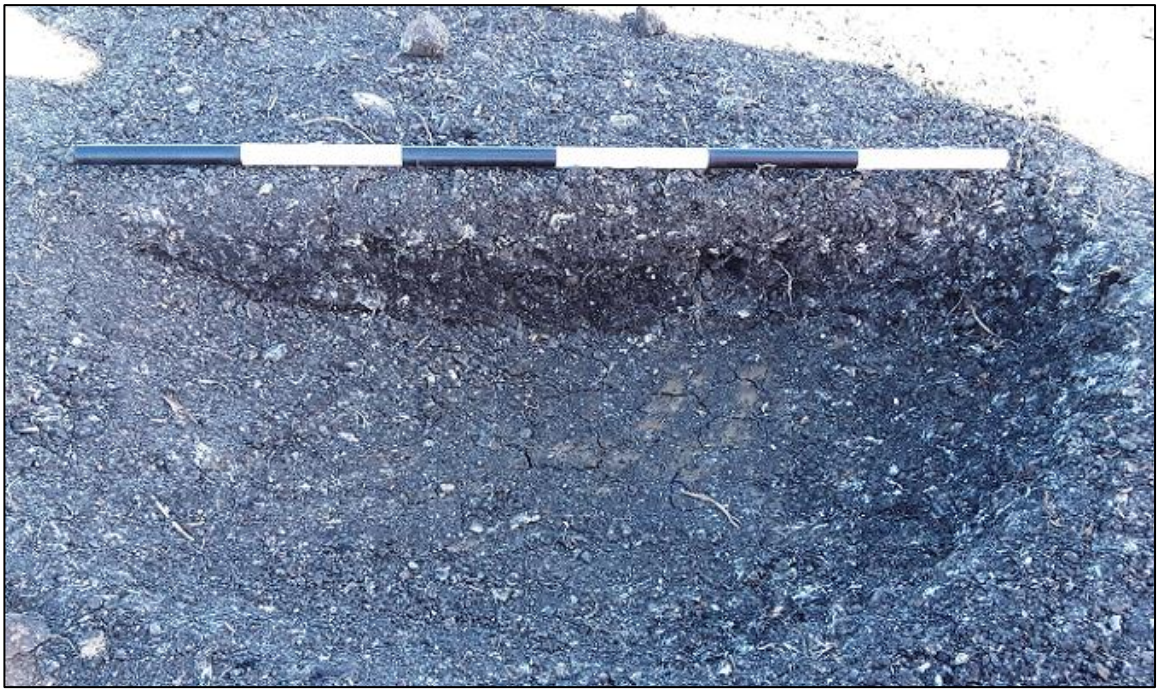


Figure 4.55 Southeast facing section of hāngi [1056]. Scale: 0.6m

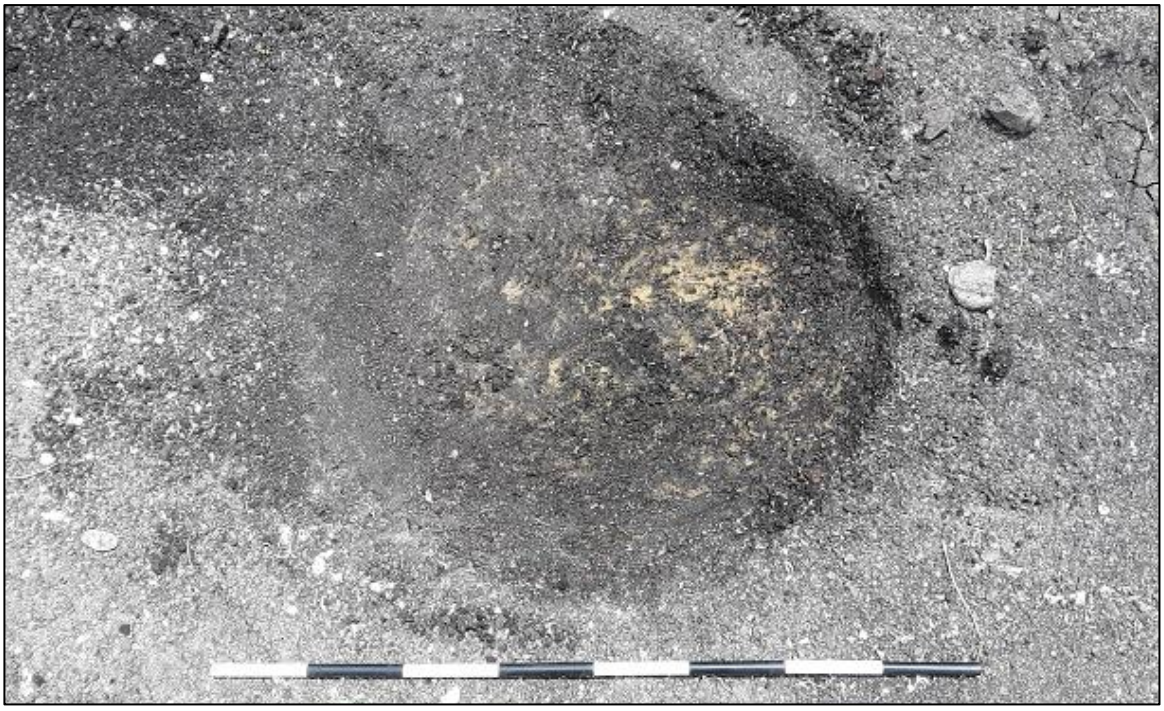


Figure 4.56 Post-excavation view of hāngi [1056]. Scale: 0.8m

Shell Midden (1169)

Shell midden deposit (1169) was a small, isolated deposit (Figure 4.52) situated some 12.6m to the west-southwest of the large post-pit [1196].The midden deposit was small, being only 2.27m in length by 1.90m wide and only 0.02m thick (Figure 4.52, Figure 4.57 and Figure 4.58). The deposit consisted of fragmented pipi, mud snail and cockle shell with some bird bone also present, and was within a compacted, black silty clay matrix that also contained small river rolled pebbles and moderate inclusions of charcoal and occasional pinkish-red ochre. Eight lithic artefacts including angular fragments of argillite, basalt, chert, breccia and a sandstone abrader were recovered from the midden deposit. A sample of manuka charcoal retrieved from midden (1169) was submitted for radiocarbon dating analysis, with the result that the deposit was firmly placed within the later stages of the Phase 3 occupation of the site toward the end of the first quarter of the 19th century.

Figure 4.57 Oblique aerial drone photograph of the small shell midden deposit (1169); facing west-southwest

Figure 4.58 Vertical aerial drone image of the shell midden deposit (1169) prior to excavation

Context Group [1385] and Surfaces (1208) and (1285)

Context group [1385] consisted of a dense concentration of features some 3m to the northwest of the two large post-pits [1151] and [1196] (Figure 4.52). The concentration consisted of 81 features predominantly comprising sub-circular or oval-shaped postholes which had been cut with steep to vertical sides and concave or pointed bases, while several pits, some stakeholes and a single board-slot were also present (see Appendix 2; Figure 4.52). Such was the density of features that it is possible to make an almost infinite number of alignments, which is obviously problematic. Therefore, the group is treated as a whole rather than trying to group certain features together. The fills of the features were in the main homogenous and consisted either of greyish orangey brown silt with very occasional charcoal inclusions, or yellowish-brown silts with occasional charcoal (see Appendix 2). The features were cut into the made ground layer (2428) and the presence of a preserved fish scale in one of the postholes lends credence to the view that the features are likely to indicate the presence of drying racks for curing fish, and perhaps shelters associated with such activities.

Associated with the posthole concentrations were two small occupation deposits, (1208) and (1285), that almost certainly represented the remnants of preserved surfaces (Figure 4.52). Surface (1208) was situated approximately 3m south-southwest of the post-pit [1298] and consisted of a firmly compacted greyish-brown clayey silt layer with occasional charcoal inclusions and lithic debitage, and was some 1.83m in length by 1.32m wide and approximately 3cm deep. Twenty-six lithic artefacts were recovered from this small surface deposit consisting of argillite, basalt (including a flake), chert, limestone, and an unidentified volcanic source.

The other surface (1285) was situated to the immediate northwest of post-pit [1286] (Figure 4.52) and actually sealed a very small part of the upper fill (1300) of the post-pit. The surface deposit consisted of a firmly compacted, mid- to dark brown clay with frequent small pieces and flecks of charcoal embedded within it, and produced five pieces of basalt debitage and one piece of argillite basalt.

Pits within the complex (Figure 4.52) included pit [1219], which was sub-oval in shape, 1.41m by 1.04m by 0.26m deep, with moderately steep sides breaking to a concave base. It was filled by (1220), a mottled yellowish-brown and mid-brown clay with occasional charcoal flecks and iron panning. The pit cut posthole [1304]. Context [1418] was a bin pit, oval in shape, 1.06m by 0.75m by 0.15 deep, with steep sides that broke to a flat base. It was filled by (1419), a moderately compact yellowish-brown silty clay with occasional roots and charcoal flecks.

A radiocarbon dating sample consisting of manuka charcoal from the fill (1236) of the single board-slot [1235] produced a date firmly within the Phase 3 occupation of the site. It is considered likely that context group [1385] and the two surfaces (1208) and (1285) are not only contemporary, but related to or were formed by the same activities that created the two shell midden deposits (1050) and (1169).

4.3.6 Permanent Settlement Features

The lack of rectangular posthole alignments indicating the presence of whare, or rectangular pits for the storage of kūmara, was conspicuous at site R10/1484. However, the part of the site excavated within the roading corridor works consisted solely of the far eastern end of a large natural terrace (Figure 4.59). The drain [2919] associated with the

Phase 1 structure [2455] extended beyond the western excavation boundary into the terraced area, which strongly suggests the presence of other archaeological features on the terrace beyond the excavation area. The terrace is large, being approximately 90m long and 30m wide, and oriented west-southwest to east-northeast with a small watercourse descending from the hill above at its western end. There is also a smaller terrace situated approximately 20m below on a northwest to southeast alignment which incorporates an area of some 15m by 7.5m (Figure 4.59). It is considered likely that whare, storage pits, drains and other features perhaps representing a kāinga are situated on the western half of the large terrace and perhaps also on the smaller terrace below. These areas would have been hidden from view from the river and the floodplain within the base of the valley (Figure 4.60). Conversely, the features excavated within the footprint of the embankment earthworks such as the large post-pits and unusual oval structures, were situated in an area that is (and would have been at the time of occupation) highly visible, 'sky lined' and extremely prominent in the landscape, especially when viewed by anyone transiting the Pūhoi River.

Figure 4.59 Aerial view taken before the roading works showing the large natural terrace (circled) on which site R10/1484 was situated (arrowed), the majority of which was outside of the footprint of works and not investigated. It is considered likely that a kāinga would have been situated on the terrace on the high ground above the R10/1484 site (arrowed)

Figure 4.60 West-northwest facing view across site R10/1484 with the large west-southwest to east-northeast aligned terrace (upper) and the northwest-southeast oriented terrace (lower) indicated by the dashed outlines. It is likely that these areas have archaeological remains relating to whare and storage pits and represent a kāinga

4.4 Site R10/1417

4.4.1 Introduction

Site R10/1417 was situated on two natural terraces (an upper and lower terrace) that were on a roughly north-south trending ridgeline that descended from the high ground to the north and northwest on the property at 517 State Highway 1 (SAP 9) (Figure 4.61). The site occupied two terraces on a roughly north-south trending ridgeline that descended from the high ground to the north and northwest. The site had commanding views to the southeast along the Pūhoi River valley and east over a section of the Hikauae Creek (Hungry Creek), including the confluence between the two navigable waterways only some 165m to the southeast (Figure 4.61). The site was situated to the east of and adjacent to a very steep (almost clifflike) scarp that formed the eastern bank of the Pūhoi River in this area, and overlooked a relatively large section of floodplain contained within a meander loop of the river (Figure 4.61).

The initial works undertaken on the site in early December 2017 consisted of the excavation of a linear trench with an associated earth bund as part of silt control works. The trench ran along the western part of site R10/1417 and began immediately below the southwestern part of the upper terrace, extending down past the western part of the lower terrace. While no archaeological features were exposed within the silt control works, there was a small quantity of heat fractured rock and occasional fragmented marine shell that suggested there were archaeological deposits in relatively close proximity.

Following the completion of the silt control works, the investigation of the site began on 16 December 2018 with the topsoil strip of the upper terrace, utilising a 20 ton mechanical excavator equipped with a ditching bucket, during which a large shell midden deposit was quickly exposed. The extent of the shell midden deposit was identified, and a number of associated features were also apparent, consisting of earth ovens, some of which were intercutting, and a stone-lined hearth. Subsequently, the remainder of the terrace was stripped to define any further archaeological features present. Following the Christmas and New Year period, the investigation recommenced in early January 2019 and with work on the lower terrace taking place from February, where two further shell midden deposits were exposed as well as several cut features consisting of intercutting hāngi, postholes, stakeholes, and two artefact-rich occupation surfaces. The archaeological investigation continued until 31 May 2019, when persistent wet weather compromised the integrity of the excavations. Following a two and a half month wait for the weather to improve, the archaeological investigation recommenced on 15 August 2019 and concluded on 10 September 2019. Of particular note was a buried soil horizon beneath the shell midden deposit on the upper terrace that in places was rich in lithic artefacts. The buried topsoil extended across much of the upper terrace and indicated there was likely to have been only minimal disturbance to the archaeology in that area. As such, it was decided that the site would undergo a comprehensive and rigorous archaeological investigation in advance of the roading earthworks and the construction of the viaduct abutment on the lower terrace.

The archaeological investigation of site R10/1417 was therefore undertaken in three stages between 16 December 2018 and 10 September 2019.

4.4.2 Excavation Methodology

The initial phase of excavation of site R10/1417 was undertaken from 16-21 December 2018, the main phase from 7 January to 31 May 2019, with a final stage from 15 August to 10 September 2019. A 20 ton mechanical excavator was utilised to remove the turf and modern topsoil overburden until archaeological deposits and features were exposed. All machine work was carried out under continuous archaeological supervision until archaeological levels were reached. Archaeological surfaces and features were then cleaned with hand tools in advance of excavation.

The excavation of archaeological features was undertaken with trowel, mattock and spade. The archaeological features and/or deposits were then assessed, investigated, recorded and sampled in accordance with accepted archaeological practice and within the framework of the research strategy (Phear 2017a, 2018) and the requirements of the HNZPT authority.

The single context recording system was used, with each cut, deposit, layer and structure given an individual context number and recorded on a tablet utilising a context recording application which enabled the determination of occupation phasing on site and the production of a site Harris Matrix (the context records are presented in digital format as Appendix 3). Individual features were planned at scales of 1:10, 1:20 and 1:50 and cuts and deposits were drawn in section or profile at scales of 1:10 or 1:20. A photographic record was compiled of all deposits and features with a digital SLR camera.

Artefacts discovered were recorded, retained and analysed as set out in the AMP/Research strategy (Phear 2017a, 2018). In general they were recorded on plan (when appropriate); diagnostic, representative or otherwise significant artefacts recovered were retained for analysis by appropriate specialists; and selected artefacts were digitally photographed to include in the final report or as part of the site archive.

Faunal material related to Māori settlement of the site was collected, sorted and labelled per context number on site and retained for specialist analysis and radiocarbon dating purposes. Additionally, samples of deposits were also taken for environmental analyses to examine any pollen, phytolith and starch present to establish vegetation and cultivation practices during occupation of the site.

Additionally, a site survey of all the archaeological features exposed was undertaken by Wesley Maguire utilising both a total station and Real Time Kinematic GPS unit. The excavation was led by Richard Shakles, with Simon Bickler leading the final stage. They were assisted by Carly Mailhot, Brooke Jamieson, Sarah Phear, Leah Harding, Helen Heath, Doug Gaylard, Tom Clough-Macready, Ellen Cameron, Jen Low, Jaime Grant, Ben Jones and Leela Moses. The investigation was carried out under the overall direction of Sarah Phear and Rod Clough.

4.5 Archaeological Investigation of R10/1417

Site R10/1417 consisted of two, natural terraces situated toward the lower part of a very steep north-northwest to south-southeast trending ridge spur, which descended from bush-clad high ground above where a precipitous cliff overlooked the Pūhoi River channel (Figure 4.61). As stated above, the archaeological investigation of site R10/1417 was undertaken in three stages, with the large shell midden and associated features on the upper terrace exposed during the topsoil strip in December 2018, while the majority of the site (both upper and lower terraces) was investigated between January and September of 2019.

The excavation of the site exposed 759 cut features spread over the two terraces, which predominantly consisted of postholes and stakeholes related to a palisaded enclosure, with 15 storage pits, two whare, as well as three shell midden deposits with associated features such as earth ovens, firescoops, and posthole alignments, providing a total of 1592 archaeological contexts (Figure 4.62; see Appendix 3). The majority of the features were situated on the flat, natural upper terrace within the palisaded enclosure. The western side of the upper terrace ran along the top of an extremely steep slope which fell away to the Pūhoi River channel, approximately 24m below (Figure 4.63). The excavation of the site also produced a relatively large and varied assemblage of lithic material. There was no evidence of any 19th century European settlement activity within the investigation area.

Figure 4.61 Aerial image from June 2017 prior to the commencement of the roading works at SAP 9 (517 State Highway 1) showing the location of site R10/1417, spread over two terraces overlooking the confluence of the Pūhoi River and Hikauae Creek (Hungry Creek)

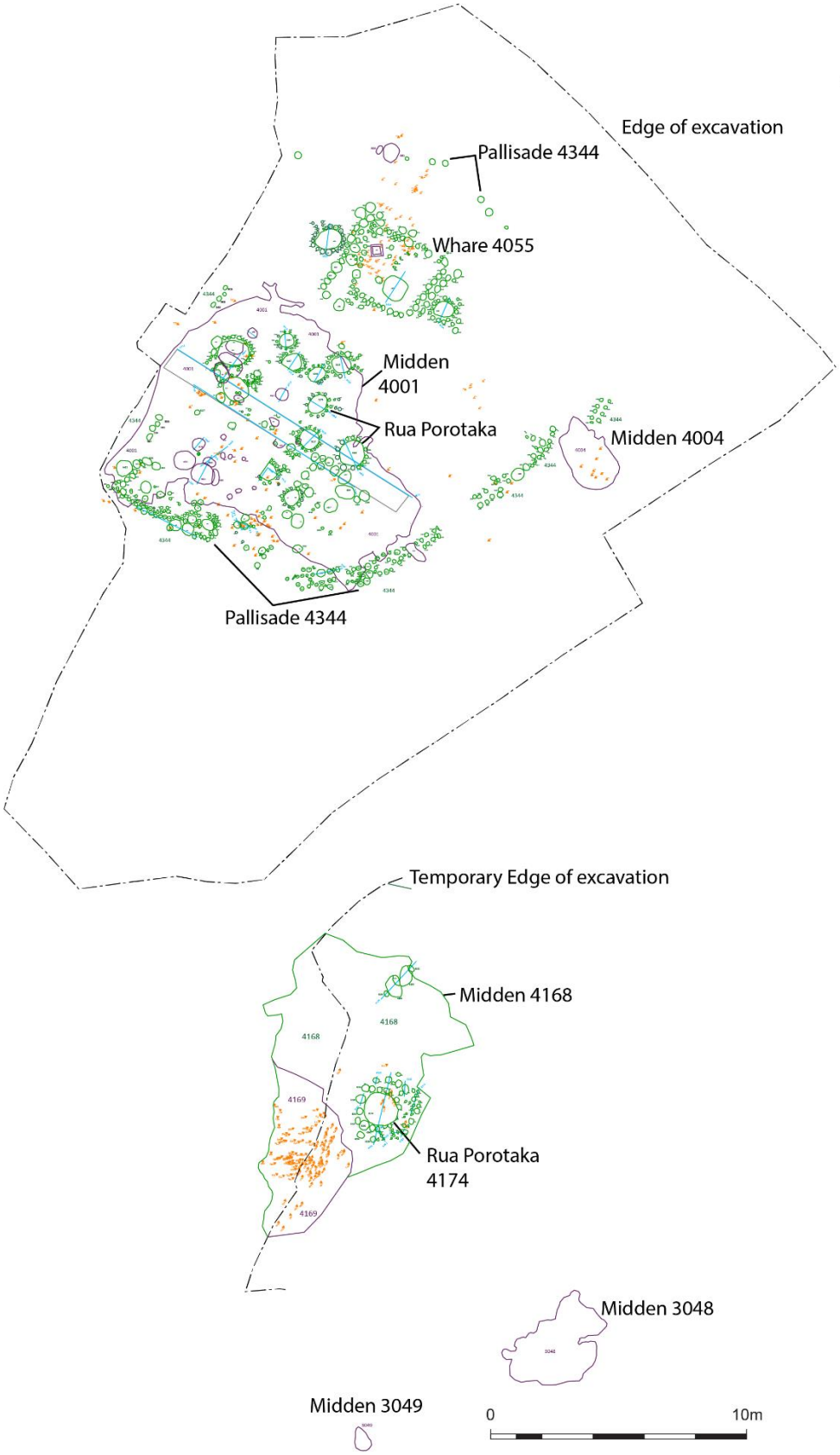


Figure 4.62 Survey plan of archaeological features comprising site R10/1417

Figure 4.63 South facing view from the high ground above the excavation area of the upper terrace of site R10/1417 (arrowed) and adjacent to a precipitous cliff above the Pūhoi River situated beyond the right of the captured image

4.6 Excavation Results – R10/1417

4.6.1 Phasing

The well-defined stratigraphy encountered during the excavation of the two terraces that comprised site R10/1417, in conjunction with the results of radiocarbon dating analysis (Section 7.3), allowed the occupation sequence to be divided into two distinct phases. The results of the archaeological investigation of site R10/1417 are set out below and presented per phase, with plans and section diagrams included, while a list of context descriptions can be found in Appendix 3. Throughout the excavation results section of the report, the context numbers for features, cuts and structures are shown in square brackets – for instance [4115] – and those for deposits, layers and fills in parentheses.

4.6.2 Stratigraphy

The stratigraphy present across the majority of the excavation area consisted of a friable mid-brown clayey silt loam that contained occasional charcoal inclusions (4000) that was up to 0.14m thick and on the upper terrace sealed a large shell midden deposit (4001) that covered much of the southern and western part of the terrace. The topsoil also sealed a buried soil/occupation deposit (4005) which extended to the north, east and south of the

shell midden (4001), as well as being sealed by midden deposit (4001) itself. Elsewhere, the buried soil sealed the subsoil (4002) that consisted of a mottled yellowish-brown and greyish-brown silty clay with occasional charcoal inclusions and which in turn sealed the natural yellowish-brown, colluvial sterile natural clay (4003). On the lower terrace, the topsoil (4000) sealed two small shell midden deposits, (3048) and (3049), towards the southeastern part of the site, and in the west sealed two relatively large occupation deposits, (4168) and (4169). Layer (4169) was an artefact-rich deposit which abutted deposit (4168) and which contained frequent burnt material, perhaps derived from cooking activities. This deposit also partly sealed an earlier large pit with an associated above ground roof structure [4292]. The deeper features on both terraces were cut through the subsoil and into the natural clay colluvium.

As was the case with the excavation of site R10/1484, the identification of features that did not contain burnt material such as charcoal and heat fractured rock within their fills was difficult across the site, due to the colluvial nature of the subsoil and the underlying clay natural. Colluvium is formed by the weathering of steep slopes via processes of erosion that transport topsoil, subsoil and upper levels of natural strata, before redepositing the material in a completely intermixed and poorly sorted state. This issue was most pronounced with features relating to the earlier stage of occupation of the two terraces and which were sealed beneath occupation layers as well as by the later shell midden deposits.

4.6.3 Phase 1 – Palisaded Enclosure [4344], Rua Porotaka Storage Pit Complex [4056], Rua Porotaka Storage Pit [4174], Pātaka [4305], Whare [4055] and Oven Features [4079] and [4081]

Archaeological remains related to the initial occupation of the site consisted of a ‘D’ shaped palisaded enclosure [4344] situated on the upper terrace that enclosed a whare (house) [4055] with an associated occupation surface (4035); a number of sub-circular storage pits with associated postholes [4056]; alignments of large, deep postholes that related to a large elevated pātaka (food storehouse) [4305], as well as a small number of earth ovens [4020, 4079, 4081] and other postholes (Figure 4.64, Figure 4.65, Figure 4.66 and Figure 4.67). A palaeosol/buried soil deposit (4005) contemporary with the occupation of the whare [4055], and confined within the boundaries of the palisaded enclosure [4344], produced more than 100 lithic artefacts, while an occupation layer/floor surface related to the occupation of whare [4055] also produced a number of lithics.

On the lower terrace, features relating to the Phase 1 occupation consisted of a large sub-circular storage pit feature [4174] with associated postholes relating to an above ground superstructure, and an occupation deposit/layer (4168) that produced a modest number of lithic artefacts and also contained burnt material such as charcoal and small fragments of heat fractured rock throughout (Figure 4.68).

The Phase 1 features on both terraces had been cut though the subsoil (4002) and into the colluvial clay natural (4003) and were sealed either by Phase 2 occupation deposits or the modern topsoil (4000). The fills of the whare postholes, the storage pit features and their associated postholes and stakeholes produced no artefacts, and for the most part only very small and rare pieces of charcoal were present.

Radiocarbon dating (including Bayesian Analysis of the radiocarbon determinations) of the material from the fills of features associated with the palisaded enclosure, storage pits, the

whare, and oven fills suggests that the Phase 1 activities on both terraces of the R10/1417 site occurred from the early 1500s century to the early 1600s AD.

Figure 4.64 Oblique aerial view north of the upper terrace of site R10/1417 (within the orange mesh fencing) situated above the eastern banks of the Pūhoi River

Figure 4.65 South facing oblique aerial showing the excavation area of the upper terrace of site R10/1417 (yellow arrow) situated above the confluence with the Pūhoi River and Hikauae Creek (red arrow) and with strategic views along the Pūhoi River valley

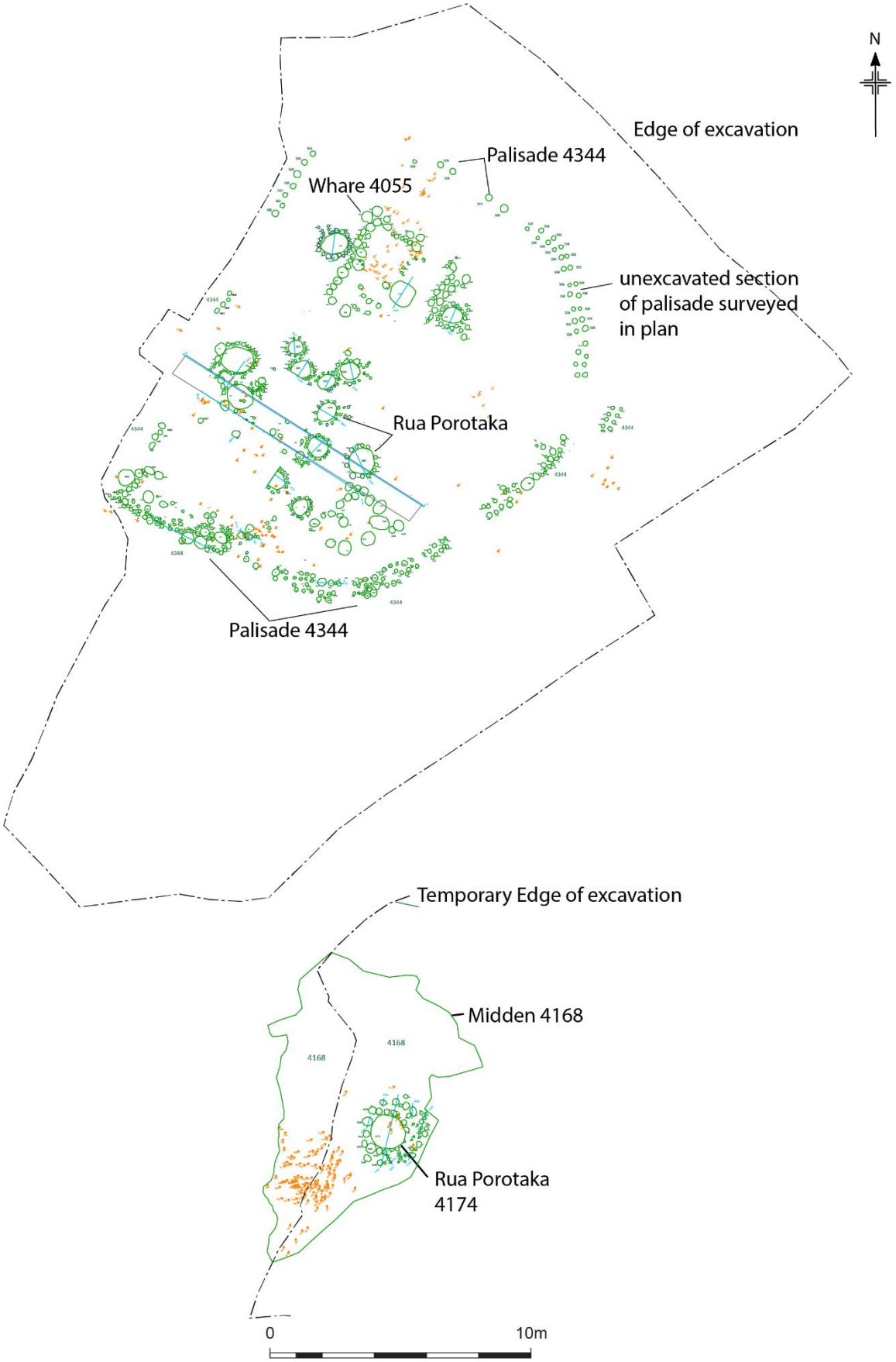


Figure 4.66 Survey plan of archaeological features relating to Phase 1 activities at site R10/1417. The orange points denote point locations of the lithics finds

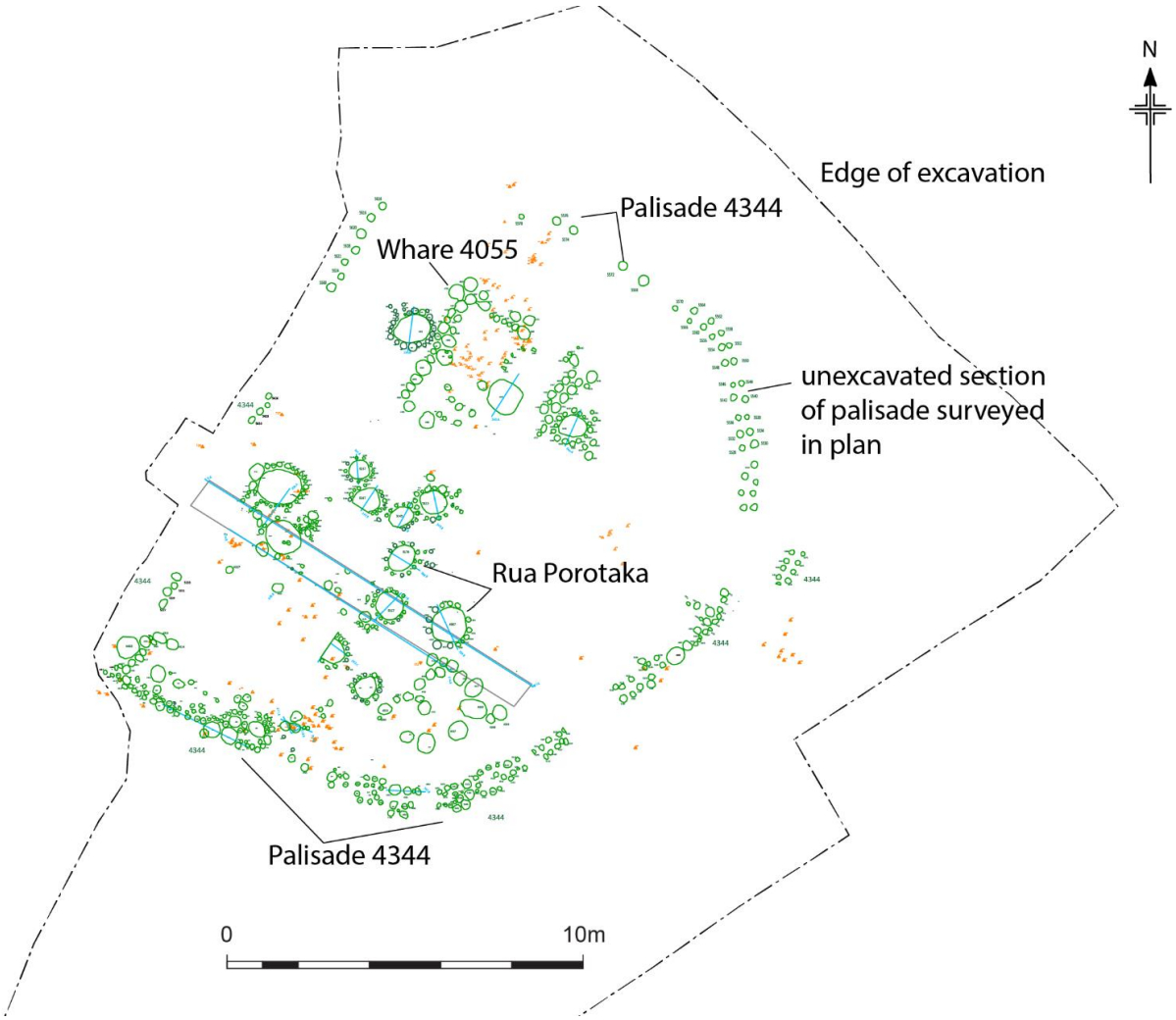


Figure 4.67 Survey plan of archaeological features on the upper terrace relating to Phase 1 activities at site R10/1417

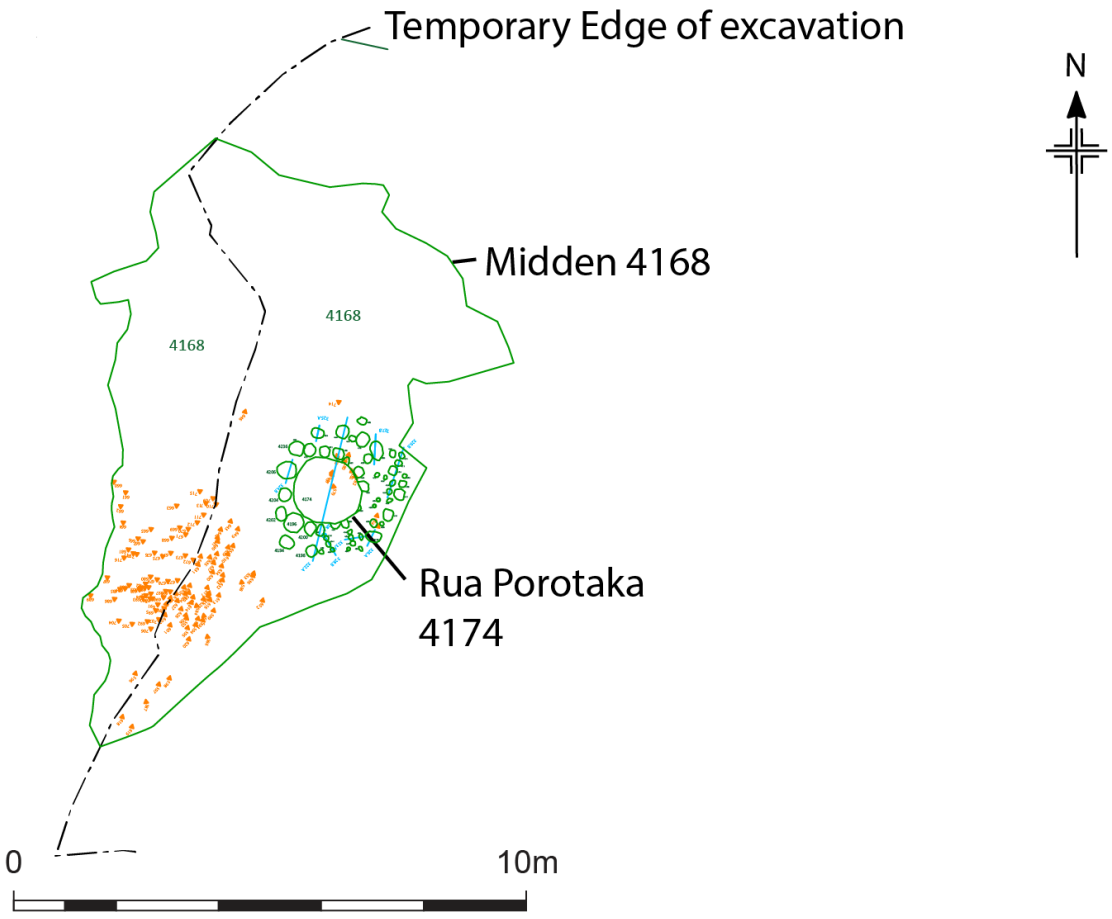


Figure 4.68 Survey plan of archaeological features on the lower terrace relating to Phase 1 activities at site R10/1417

Upper Terrace Palisaded Enclosure [4344]

Structure [4344] was a 'D'-shaped palisaded enclosure situated on the upper terrace of site R10/1417 (Figure 4.62, Figure 4.66, Figure 4.67 and Figure 4.69). The palisade was some 21.69m in length along its longest axis, and some 17.04m wide and enclosed an area of approximately 360m² (Figure 4.66, Figure 4.67 and Figure 4.69). The enclosure consisted of a minimum of 261 features (the whole course of the palisade was not excavated and therefore there would have been significantly more present) of which 259 were either sub-circular or oval postholes, with the remaining two features consisting of subcircular stakeholes (Figure 4.62, Figure 4.67; Figure 4.69; see Appendix 3). The palisade consisted of a double row of postholes along its southern, eastern and northern courses, but it consisted of only one row of postholes along its western side where it was situated in a naturally strong defensive position along the top of a high bank which descended at a very steep angle for some 23m to the Pūhoi River below (Figure 4.64 and Figure 4.66). The enclosure had two entrances on a northeast-southwest alignment with the main entrance positioned in the south overlooking the Pūhoi River and its valley, while the other was situated diagonally opposite within the northern course of postholes facing up hill (Figure 4.66, Figure 4.69 and Figure 4.70). The palisade postholes had been excavated through the subsoil (4002) and into the natural colluvial clay (4003) and varied in morphology from sub-circular to oval and in size from as little as 0.11m x 0.09m x 0.1m deep (posthole [4365]) to 0.70m x 0.51m x 0.87m deep (posthole [4409] in the east facing course), while the largest posthole [4435] was situated in the southwestern corner and was 0.75m in diameter and 1.02m deep (see Appendix 3). The fills of the palisade postholes were for the most part homogenous and consisted of moderately compacted yellowish-brown, mid-grey and brown mottled silty clays that had very small charcoal fragments or flecks and occasional small pieces of degraded sandstone or burnt sandstone (see Appendix 3).

A particular concentration of larger postholes ([4471], [4485], [4499] and [4063] – see Appendix 3) were situated in a configuration with a number of smaller examples on the western side of the main entranceway in the south of the enclosure (Figure 4.66, Figure 4.67 and Figure 4.70). From the size and depth of these four postholes (the shallowest was 0.75m and the deepest 1.10m) it is interpreted that the timber posts housed in them would have been of considerable size and height (Figure 4.67 and Figure 4.71). These large postholes were themselves encircled with a quite dense concentration of smaller associated sub-circular postholes in the order of sub-0.30m in diameter, the majority of which were between 0.35m and 0.45m deep, and relatively substantial in their own right (Figure 4.67 and Figure 4.71). The result of the placing of the large posts surrounded by the additional smaller posts, was that as opposed to the normal width of the palisade being approximately 0.50m, the entranceway extended inwards for approximately 1.60m and westwards along the palisade course for approximately 2m before returning to its normal form (Figure 4.67). As a result the palisade entranceway would have been strengthened as well as looking formidable to any potential adversaries seeking to gain access to the enclosure (Figure 4.70 and Figure 4.72).

The palisade enclosed some 14 sub-circular and oval kūmara storage pits referred to here as rua porotaka (round pits) (context group [4056]), as well as a single whare structure [4055], and likely served as a defended food storage complex, perhaps for a kāinga situated on the ridge top and protected by very steep slopes to the east, and south, and to the west by a high cliff that falls some 65m to 70m to the Pūhoi River below (Figure 4.64, Figure 4.73 and Figure 4.74).

Radiocarbon dating of a charcoal sample from the fill (4520) of posthole [4519] (one of the postholes comprising the western side of the main gateway/entrance), indicates a date between the late 1400s to the end of the first half of the 16th century for the construction and occupation phase of the palisaded enclosure.

Figure 4.69 Vertical aerial drone image of the partially excavated palisaded enclosure [4344] on the upper terrace of site R10/1417. NB. The trees visible at the top of the image are situated on the upper part of a bank that drops very steeply down to the Pūhoi River below

Figure 4.70 North facing oblique aerial drone image of palisaded enclosure [4344] with the entranceway prominent (arrowed)

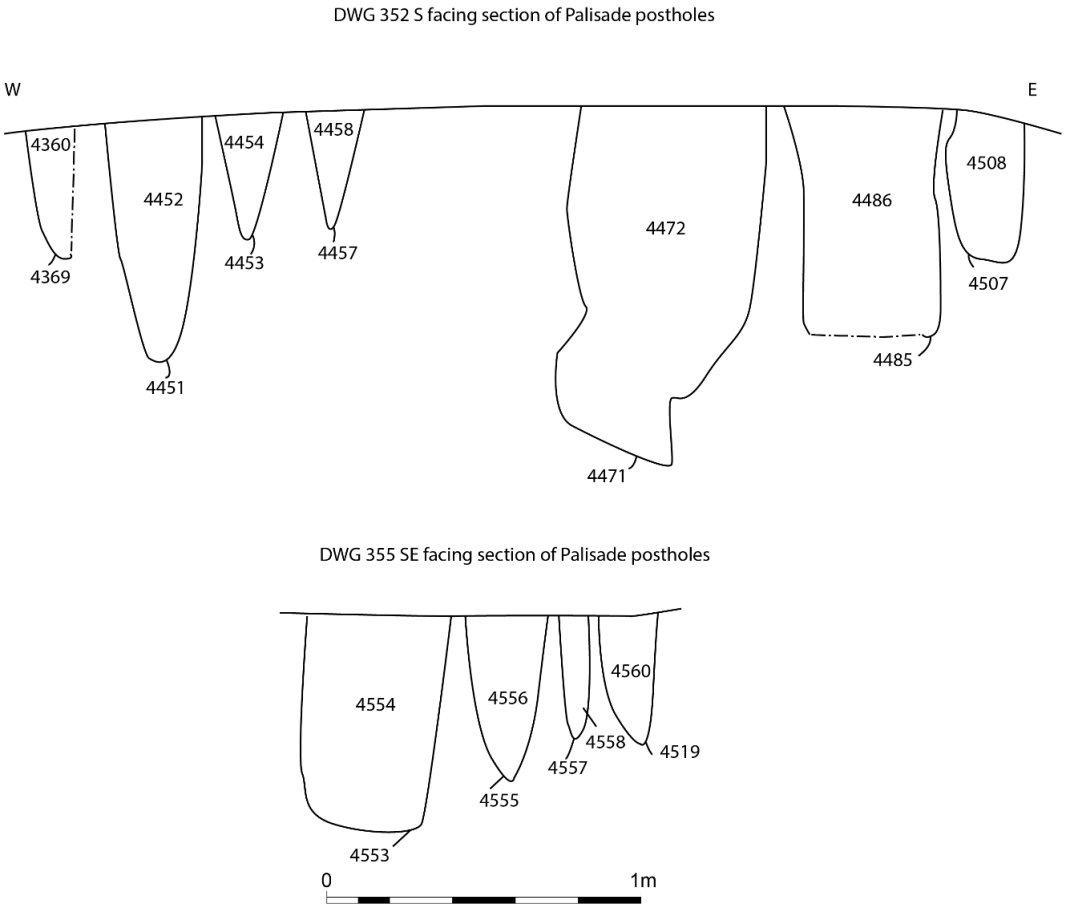


Figure 4.71 Section profiles of palisade postholes in the southern course and southeastern corner of the palisaded enclosure [4344]

Figure 4.72 Detail from oblique aerial showing the configuration of postholes on the western side of the main entrance into the palisaded enclosure [4344]

Figure 4.73 Aerial view taken before the roading works showing likely area of a kāinga (circled) on the high ground above site R10/1417 (arrowed)

Figure 4.74 Oblique drone-captured aerial image showing the R10/1417 upper terrace site and enclosure (centre bottom) following excavation, with the location of a possible kāinga at the top of the scarped embankment (arrowed)

Upper Terrace Rua Porotaka Storage Pit Complex [4056]

Context group [4056] consisted of a complex of 14 kūmara pits situated within the palisaded enclosure [4344] on the upper terrace (Figure 4.66, Figure 4.67, Figure 4.69, Figure 4.75). Of the pits situated on the upper terrace, 10 were sub-oval to sub-circular in form with the remaining four being clearly sub-circular (Figure 4.66 and Figure 4.67). The pits had all been cut through the subsoil (4002) and the colluvial sterile natural clay (4003). The features consisted of a subterranean chamber that had been cut into the former ground surface with smooth, vertical sides, which in the majority broke to pronounced sloped bases (pits [4565], [4847], [4697], [5035], [5125], [5145], [5179], [5287], [5317], [5343]). The remaining four pits had been cut with flat bases ([4124], [4174], [4871] and [5078]) (Figure 4.80 and Figure 4.81). With the sole exception of pit [5078], the three other pits with flat bases also contained a sump drainage feature which had been cut through and located to one side of the base, and would have served to keep any water ingress away from the pit chamber and the kūmara and/or taro contained within (Figure 4.76 and Figure 4.81). The pits on the upper terrace within the enclosure varied in size from as little as 0.73m x 0.64m x 0.76m deep – pit [5257] – to pit [4565], which was 1.45m x 1.20m by 0.90m deep (Figure 4.67 and Figure 4.80). A number of the pits had stakeholes present across the base in seemingly random configurations and it is probable that these represent small stake supports for some type of flooring, most likely to keep the kūmara baskets elevated and off the pit base away from any moisture (Figure 4.76). The pits for the most part contained two fills with the primary lower fills consisting of compacted mid-greyish-brown or reddish-brown silty clays, while the upper fills tended to consist of moderately compacted, yellowish-brown clays with occasional patches of grey silty clay, that contained occasional

small charcoal inclusions, with the fills representing deliberate infill after the storage pit had gone out of use (see Appendix 3). The fills of sumps present in some of the pits consisted of dark grey clayey silt deposits, that represent for the most part deposition of silt from water during the active use period of the features (Appendix 3).

As well as the below ground chambers, the excavation revealed that each pit was encircled by postholes and stakeholes, indicating that the pits all had above ground structures, most likely in the form of domed roofs (Figure 4.66, Figure 4.67, Figure 4.69 and Figure 4.75 and Figure 4.72). As the posts were positioned around the perimeter of each pit chamber, it is interpreted that the posts would have been bent over, above the centre of the pit and lashed together, therefore forming a dome shaped or, perhaps, a conical roof, most likely covered with raupo or perhaps nikau fronds to keep the pit watertight. Double alignments of small postholes extended out from the perimeter of postholes around the pit chambers (Figure 4.81). The entranceways consisted of double rows of either three or four postholes that were in parallel or diverging configurations and which extended for as little as 0.55m up to 0.76m in length and from as narrow as 0.36m, with some examples flaring out to as much as 0.65m wide at their outermost extent (Figure 4.66, Figure 4.67, Figure 4.75, Figure 4.78 and Figure 4.79).

Due to the form and size of the pits, together with the above ground structural elements as indicated by the posthole footprints, the features are consistent with and interpreted as rua porotaka kūmara storage pits. (As the form of the pits does not fit neatly into the existing nomenclature of kūmara storage pits, being sub-circular in shape, the pits are described as rua porotaka (round pit) as a purely descriptive classification for archaeological purposes.)

Radiocarbon analysis was undertaken on a charcoal sample obtained from the fill (4602) of posthole [4601] (one of the entranceway postholes for pit [4124]). The radiocarbon determination suggests a date around the turn of the 16th century for this particular pit.

Figure 4.75 Vertical post-excavation aerial drone image showing the pit complex [4056] situated within the palisaded enclosure on the upper terrace of site R10/1417

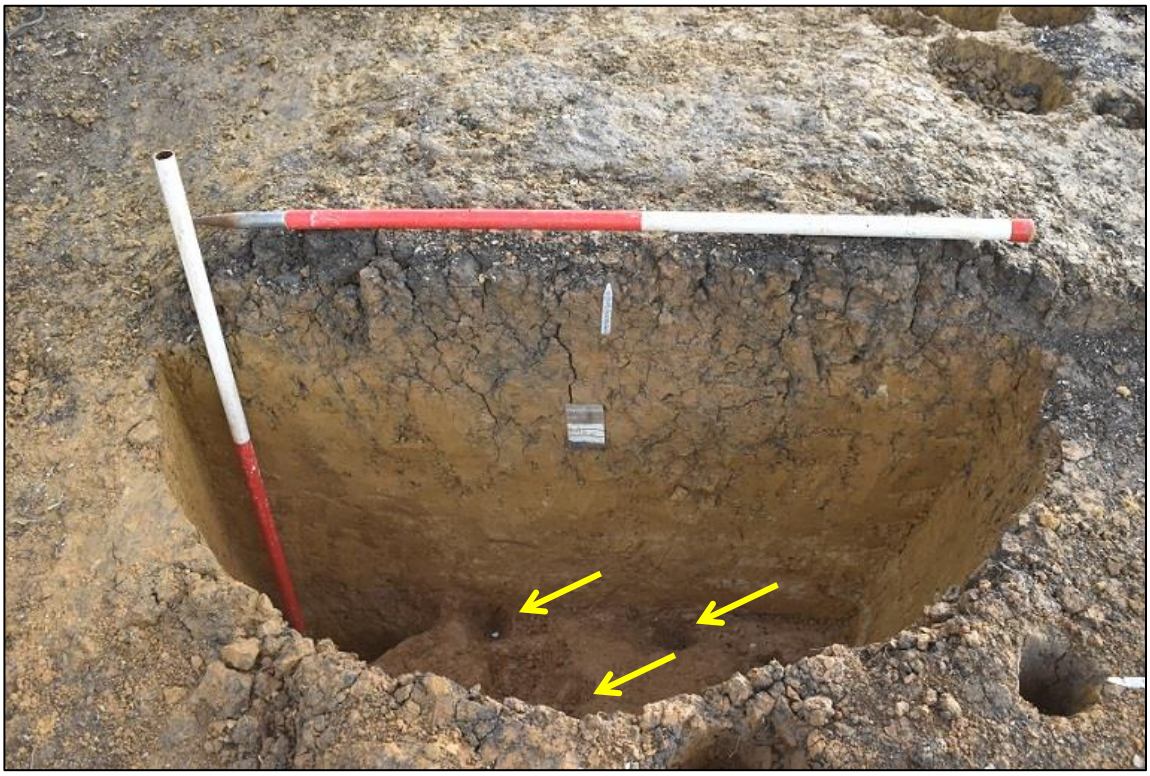


Figure 4.76 Southwest facing section of pit [4124] on the upper terrace of site R10/1417 with the drainage sump feature at left and some of the stakeholes in the base (likely to raise a false floor structure above the pit base) indicated by the arrows. Scale: 2 x 1m

Figure 4.77 Southwest facing post-excavation view across pit [4565] and the posthole footprint of its roof structure. Scale: 1m

Figure 4.78 Northeast facing post-excavation view of pit [4565] showing the footprint of its roof structure and the parallel posthole alignments of its entranceway. Scale: 1m

Figure 4.79 East facing view across pit [4871] after excavation of the roof structure postholes and flared entranceway. Scale: 1m

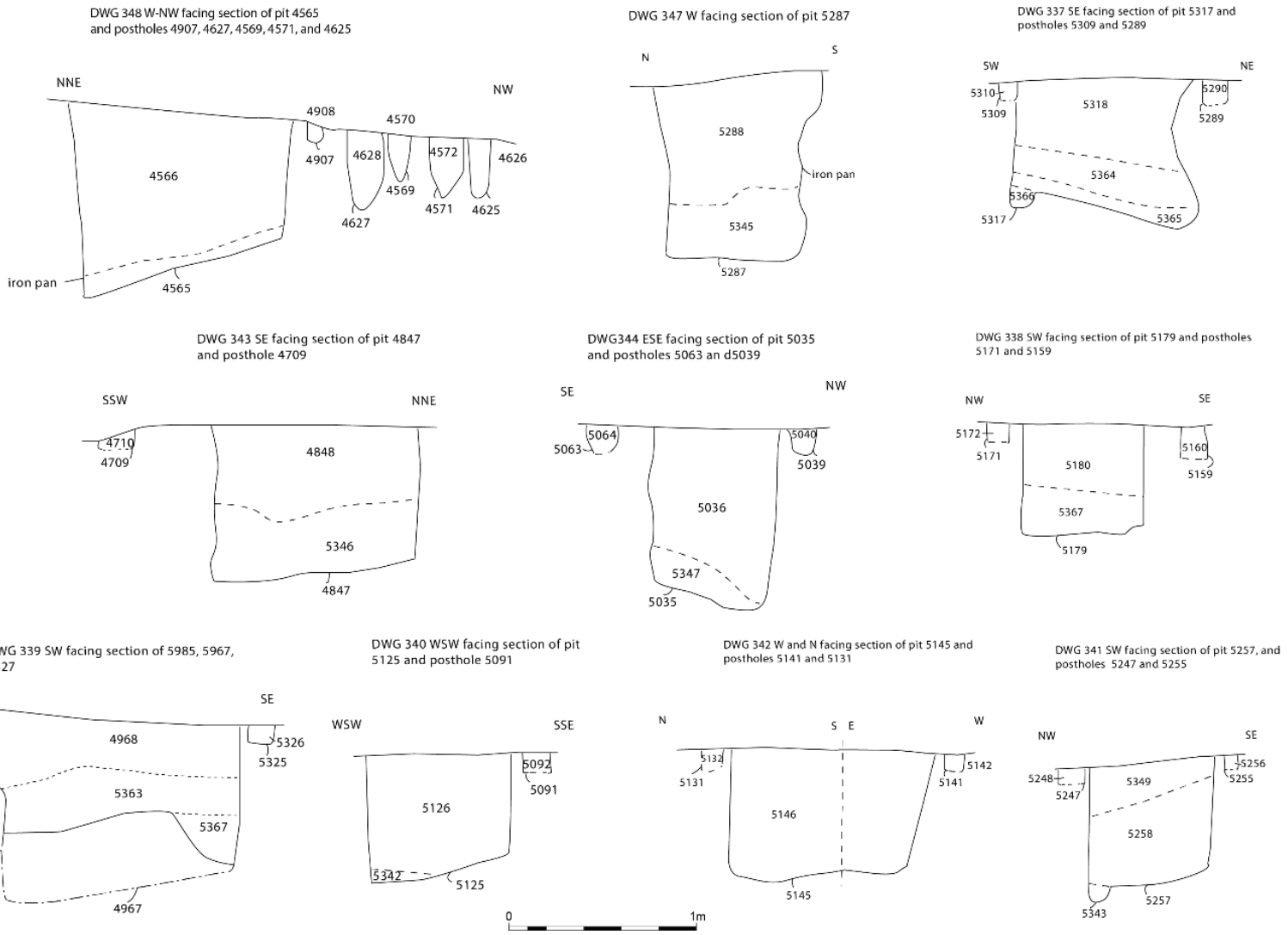


Figure 4.80 Section profiles of rua porotaka kūmara storage pits [4565], [4847], [4967], [5035], [5125], [5145], [5179], [5287], [5317] and [5343] situated within the palisaded enclosure [4344] on the upper terrace of site R10/1417

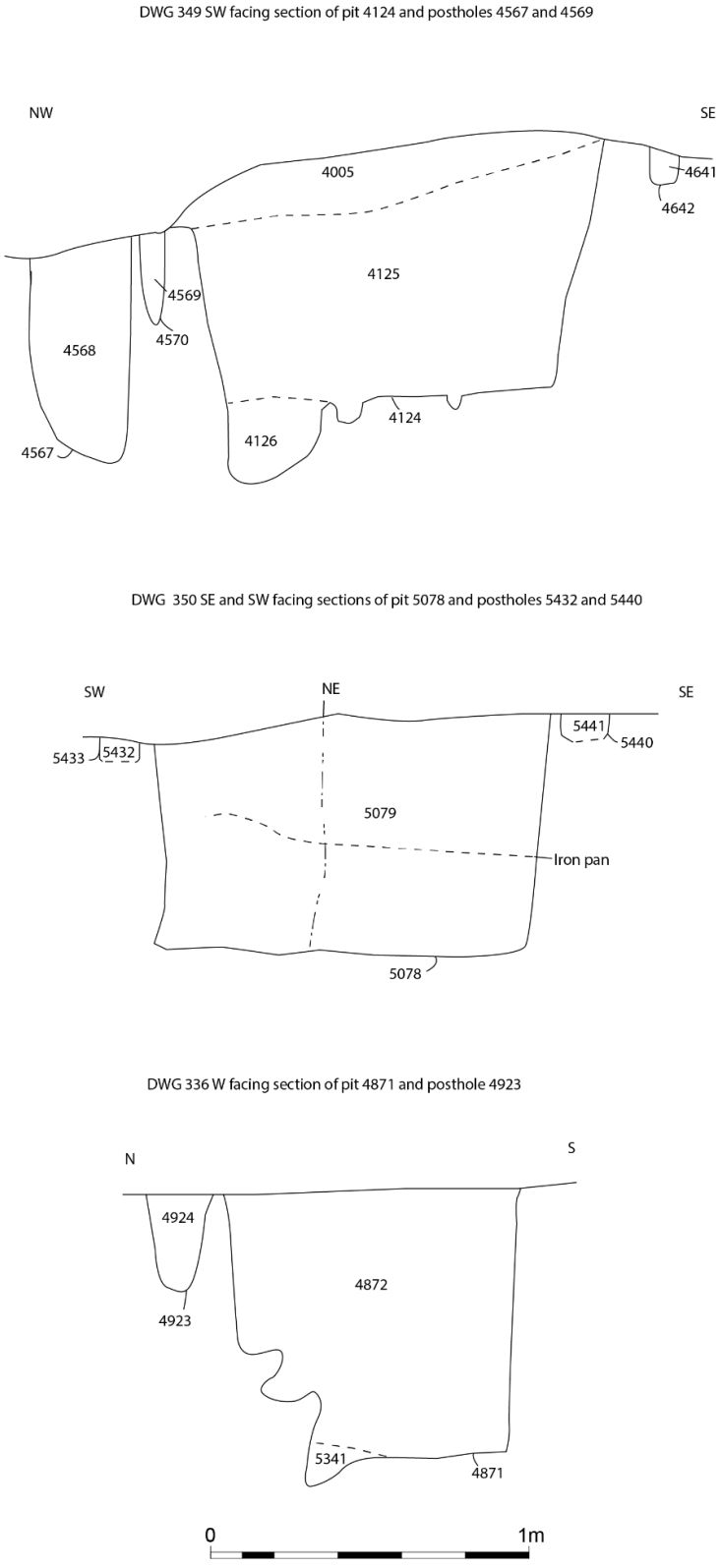


Figure 4.81 Section profiles of rua porotaka kūmara storage pits [4124], [4871] and [5078] on the upper terrace of site R10/1417

Lower Terrace – Rua Porotaka [4174] and Occupation Layer (4168)

The largest of the rua porotaka storage pits was feature [4174] which was situated on the lower terrace in a prominent position overlooking the Pūhoi River, its floodplain and its confluence with the Hikauae Creek (Figure 4.68, Figure 4.82 and Figure 4.83). Pit [4174] was cut with vertical sides and a flat base into which a drainage sump had been cut on its southern side. It measured some 1.66m x 1.54m and was 1.05m deep although the sump extended to a depth of 1.35m (Figure 4.66, Figure 4.68, Figure 4.84 and Figure 4.85). As well as being the largest of the pits, this feature was also unique amongst the rua porotaka, as it was the only one which had a double circuit of postholes and stakeholes encircling it (Figure 4.66, Figure 4.68, Figure 4.83 and Figure 4.84). The entranceway structure to access the pit chamber consisted of a double row of postholes some 0.74m in length and approximately 0.45m wide in a parallel configuration, that was aligned southeast along the Pūhoi River valley (Figure 4.68, Figure 4.83 and Figure 4.84). The pit contained three fills, including a trample layer (4293) which extended across the pit base (with the exception of the drainage sump), and consisted of a firmly compacted mottled grey, pinkish-brown and orangey brown clay, which was approximately 3cm thick and which contained occasional charcoal inclusions. The sump was filled by a greyish light brown clayey silt deposit (4294), while the main fill (4175) consisted of a firmly compacted mottled yellowish-brown, greyish-brown and orangey brown silty clay that contained occasional charcoal inclusions, and which represented the deliberate backfilling and closure of the feature (see Appendix 3). A later deposit rich in cultural material (4168) and which consisted of a compacted dark greyish-brown clayey silt which contained frequent inclusions of burnt earth patches, burnt rock, with occasional ochre, charcoal, and rare pumice pieces, sealed the pit and its associated postholes as well as filling the top 8cm of the feature and represented the infilling of a hollow that formed after the backfill had settled (Figure 4.84, Figure 4.85; see Appendix 3). This deposit formed a layer that extended across part of the lower terrace for some 10.84m by 9.10m, and was up to 0.08m thick and likely represented the rake-out of nearby cooking features, perhaps located on the upper terrace above (Figure 4.86; see Appendix 3). A radiocarbon determination from a charcoal sample retrieved from layer (4168) indicates a date of deposition during the first quarter of the 17th century, and likely at the end of the Phase 1 occupation of the site.

The scale of the [4174] pit chamber and the double perimeter of postholes surrounding it strongly suggest that the above ground roof structure would have been considerably larger than those associated with the other pits within the palisaded enclosure on the upper terrace. The fact that pit [4174] was constructed outside of the palisaded enclosure on the lower terrace would have ensured that the feature was conspicuous to anyone travelling up the Pūhoi River from the Hauraki Gulf or perhaps transiting downriver from the Hikauae Creek.

A charcoal sample from the fill (4203) of posthole [4202] which formed part of the posthole footprint of the roof structure for the large lower terrace pit [4174] was submitted for dating analysis. The radiocarbon determination was similar to that obtained from context (4203) on the upper terrace, and also suggests a date late in the 1400s or first quarter of the 1500s AD.

Figure 4.82 East facing view across the eastern part of the lower terrace with pit [4174] seen during excavation at lower centre right overlooking the Pūhoi River and the confluence with the Hikauae Creek (arrowed). Scale: 2 x 1m

Figure 4.83 East-northeast facing view across pit [4174] on the lower terrace of site R10/1417 during excavation, with the confluence of the Hikauae Creek with the Pūhoi River indicated by the arrow. Scale: 2 x 1m. NB. The dark charcoal-rich deposit filling the upper reaches of the pit and postholes is (4168), a layer associated with cooking activities

Figure 4.84 North-northwest facing post-excavation view across pit [4174] situated on the lower terrace of site R10/1417 with the entrance indicated by the arrow

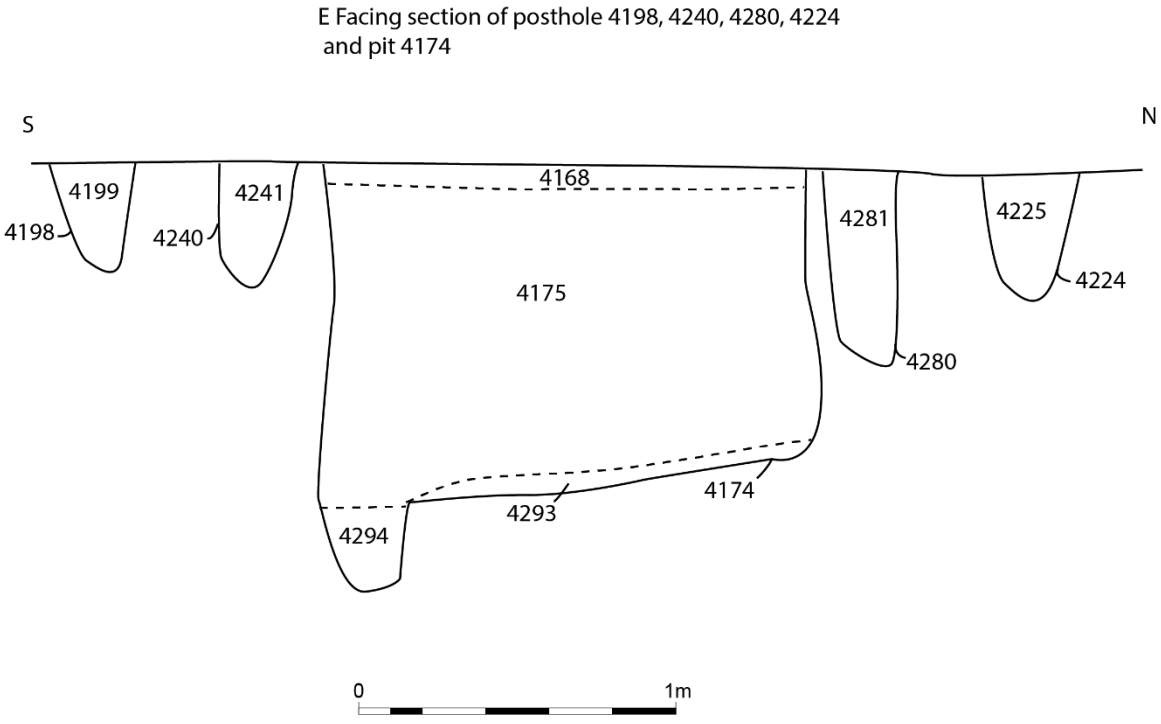


Figure 4.85 Section profile of the large storage pit [4174] located on the lower terrace of site R10/1417

Figure 4.86 Looking northwest across the dark charcoal-rich layer (4168) situated on the lower terrace of site R10/1417 and which sealed the large rua porotaka [4174]. Scale: 2 x 2m

Upper Terrace Elevated Storage House – Pātaka [4305]

Structure [4305] consisted of a concentration of 19 postholes in an approximately rectangular alignment, close to the southeast corner of the palisaded enclosure [4344] (Figure 4.62, Figure 4.66, Figure 4.67, Figure 4.87 and Figure 4.88; see Appendix 3). The postholes arrangement was on a northeast-southwest alignment and demarcated an area approximately 3.09m in length by 2.54m wide (Figure 4.66, Figure 4.67 and Figure 4.88). The postholes were cut through the subsoil (4002) and into the colluvial sterile natural clay (4003) and consisted of either subcircular or oval postholes that had been cut with smooth, vertical sides and narrow pointed concave bases (Appendix 3). The postholes varied in size with the three smallest examples (contexts [4300], [4615] and [4783]) being less than 0.35m in diameter and as shallow as 0.26m deep, although they were all associated with larger examples and probably represent bracing features (Appendix 3). The largest postholes, [4417], [4419], [4617] and [4609], were all situated on the longest axis on the east side of the structure on slightly sloping ground, just before it broke to run more steeply down to the palisade (Figure 4.67 and Figure 4.88). These postholes varied in size from the largest [4609], which was some 0.96m long by 0.59m wide and 0.89m deep, to the smallest [4419], which still had impressive dimensions of 0.60m x 0.57m and 0.71m deep (see Appendix 3). The large size of the postholes was probably necessitated by the soft nature of the colluvial subsoil, combined with the presence of the slope, to provide greater structural integrity and to prevent movement or slipping of the upright timber posts. The posthole fills were for the most part homogenous and consisted of mottled yellowish-brown and greyish-brown silty clays which contained occasional charcoal flecks (Appendix 3).

When the dimensions of the structure and the size and depth of the postholes are considered alongside its location in the southeastern corner of the palisaded enclosure (a spot that is

highly visible to and from the Pūhoi River and Hikauae Creek) it is interpreted that the feature likely represents a substantial sized pātaka (elevated storehouse). Pātaka were used in particular for storing preserved food such as cured fish, birds, kao (a kūmara preparation), or to keep the kūmara seed crop safe from Pacific rats (kiore) in winter. Pātaka were elaborately carved and painted and were entered via a ladder which provided access to the interior through a trapdoor in the floor. Posthole [4615] may well represent the ladder feature that would have been stepped to prevent rats climbing it and gaining access to the kai stored inside the pātaka.

Figure 4.87 Vertical aerial image captured by drone showing the location of pātaka [4305] (indicated by the arrow) in the southeastern corner of the palisaded enclosure [4344]. Scale: 2 x 2m

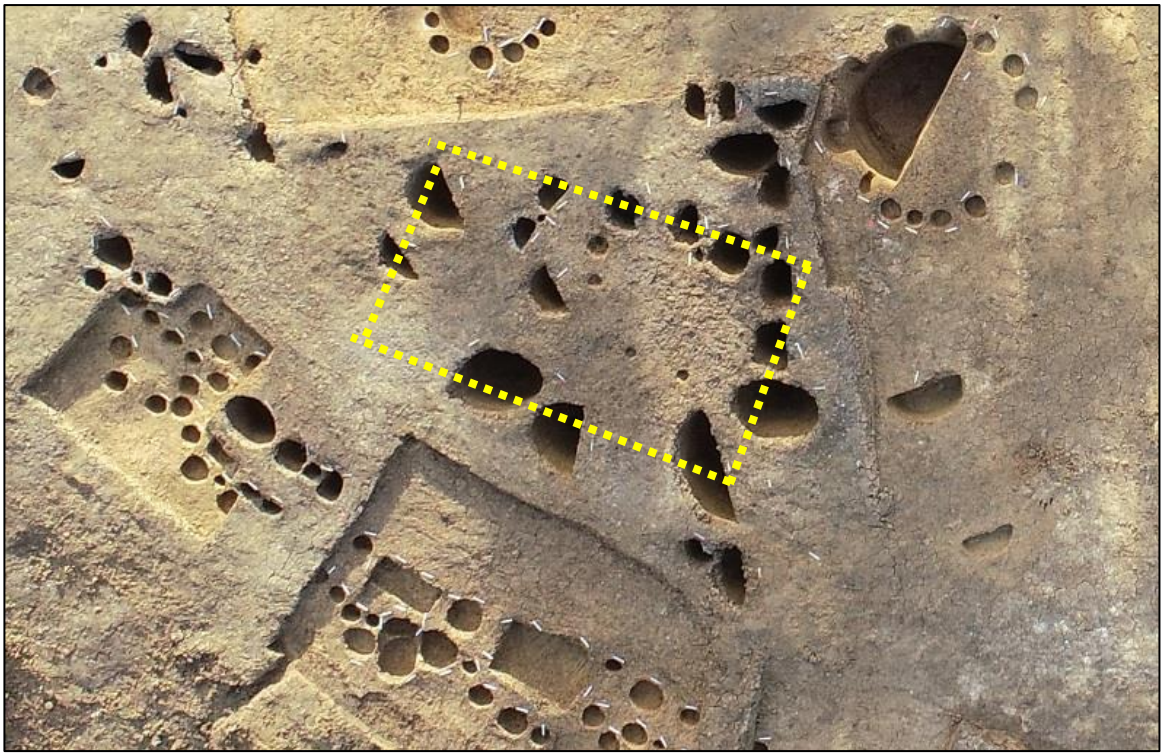


Figure 4.88 Detail from vertical aerial showing pātaka structure [4305] (overlain with dotted lines)

Upper Terrace Whare [4055] and Floor/Occupation Surface (4035)

A rectangular timber whare (house) structure [4055] was located in the northern part of the palisaded enclosure [4344] situated on flat, level ground (Figure 4.62, Figure 4.66, Figure 4.67 and Figure 4.89). The structure was aligned on a northwest-southeast axis and represented by some 60 postholes, five board-slots and a single stakehole; it is noted that there would have been further features present, but these were not identified due to the difficulty and lack of contrast with the colluvial subsoil (Figure 4.66, Figure 4.67 and Figure 4.89; see Appendix 3). The feature was 4.42m in length by 3.28m wide and enclosed an area of approximately 14.5m² (Figure 4.67, and Figure 4.89). A break in the northeast facing wall close to its eastern terminus is interpreted as being the original entranceway into the structure (Figure 4.67, Figure 4.89 and Figure 4.90). However, at some point it appears that the structure was realigned with a porched entrance in the south-western wall at its northern terminus and facing down the Pūhoi River and its valley (Figure 4.66 and Figure 4.90). The southeastern wall of the structure consisted of a double row of postholes, but whether this denotes the original construction or whether that wall was rebuilt cannot be known with certainty. However, as both rows of postholes respect one another with no intercutting, then perhaps it was built that way originally. It is possible that the entranceway was moved for protection from the north-easterly wind that often trends down the Hikauae Creek valley, or simply to have a commanding view along the course of the Pūhoi River and its valley and to better monitor any waka travelling upriver from the coast.

The whare's postholes were either sub-circular or oval in plan and of the postholes that were fully excavated, were characterised by having smooth, vertical to slightly undercut sides that descended to pointed, concave bases (Figure 4.91). The features comprising the whare had all been cut through the subsoil (4002) and into the colluvial clay natural (4003). The majority of the postholes were less than 0.40m in diameter (if sub-circular) and if oval

in shape, less than 0.40m by less than 0.30m in diameter, and up to 0.60m in depth (Figure 4.91; Appendix 3). However, there were some notable exceptions such as postholes [4679] and [4683], situated just inside the interior of the whare on its northwestern facing wall (Figure 4.91). These postholes were both large, being 0.58m x 0.51m and 0.91m deep and 0.52m x 0.40m and 0.97m deep respectively (see Appendix 3). Due to their positioning, size and depth, these postholes are interpreted as representing roof supporting timbers. Posthole [4811] was positioned approximately in the centre of the structure's footprint and had dimensions of 0.44m x 0.38m by 0.63m deep, and represents the location of the central timber roof support post (see Appendix 3). The postholes, board-slots and stakehole contained single fills that were in the main homogenous and which consisted of yellowish-brown clay and mid-greyish brown clayey silt with occasional to very occasional charcoal inclusions (see Appendix 3).

In addition to the structural remains of whare [4055], a contemporary occupation/floor deposit layer (4035) was present inside the whare footprint (Figure 4.67; Appendix 3). The deposit was 4.31m long by 3.18m wide, and was just 2cm thick, and consisted of a greyish, dark brown silt that contained occasional very small charcoal inclusions and also produced an assemblage of 36 lithic artefacts. The artefacts were concentrated in a single, small area that was just 1.61m by 1.05m in size (see Figure 4.67) and consisted predominantly of obsidian (n=31), but with chert (n=2), argillite (n=2) and basalt (n=1) also present.

Two radiocarbon determinations were produced from the dating of charcoal samples from the fills of postholes [4679] (one of the large roof supports situated along the northwestern wall) and [4845] (a posthole situated in the northeastern wall), with both firmly dating to the second half of the 1500s AD. A further radiocarbon determination was produced from a charcoal sample taken from the floor/occupation surface (4035), which also confirmed that whare [4055] was most likely occupied and in use at some point during the second half of the 16th century.

Figure 4.89 Vertical aerial via drone showing structure [4055] situated within the northern part of the palisaded enclosure [4344]. NB. The later Phase 2 whare [5077] situated within the footprint of the earlier structure is seen on a different alignment with the northern wall running on a diagonal angle immediately to the north of the stone-lined hearth. Scale: 2 x 2 m

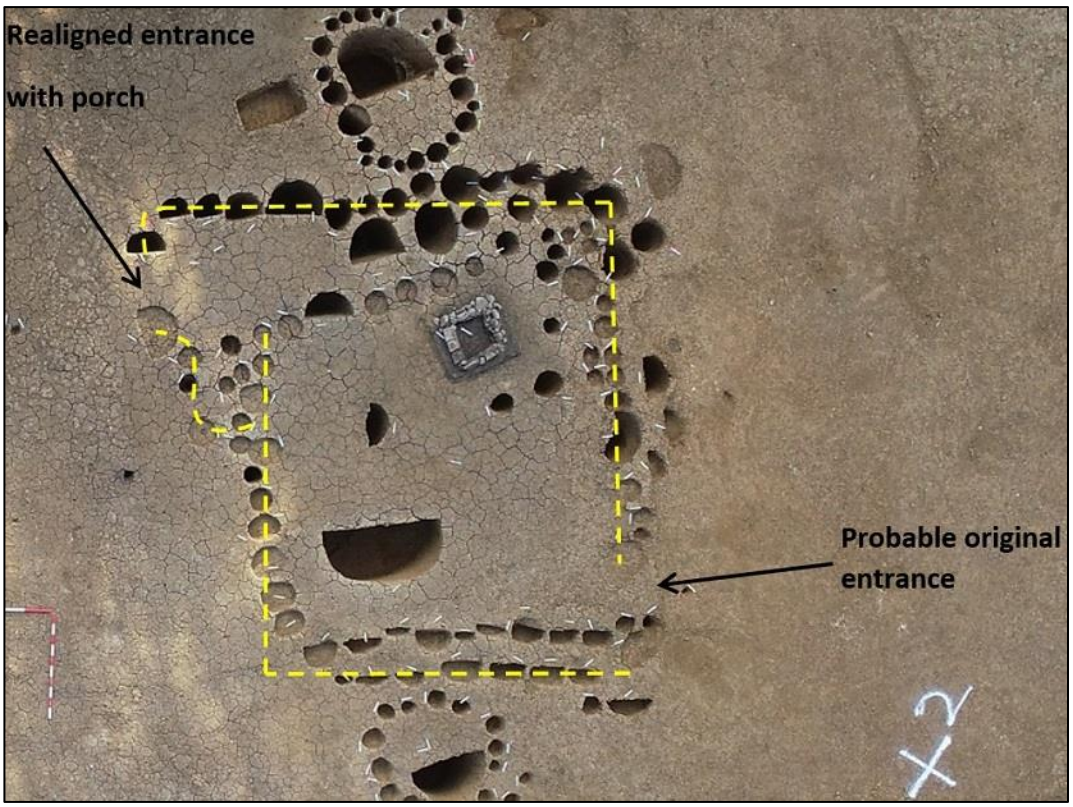


Figure 4.90 Detail from vertical aerial with overlay illustrating the Phase 1 whare [4055] outline, its likely original entranceway and the realigned entrance with porch structure on its southwest facing wall

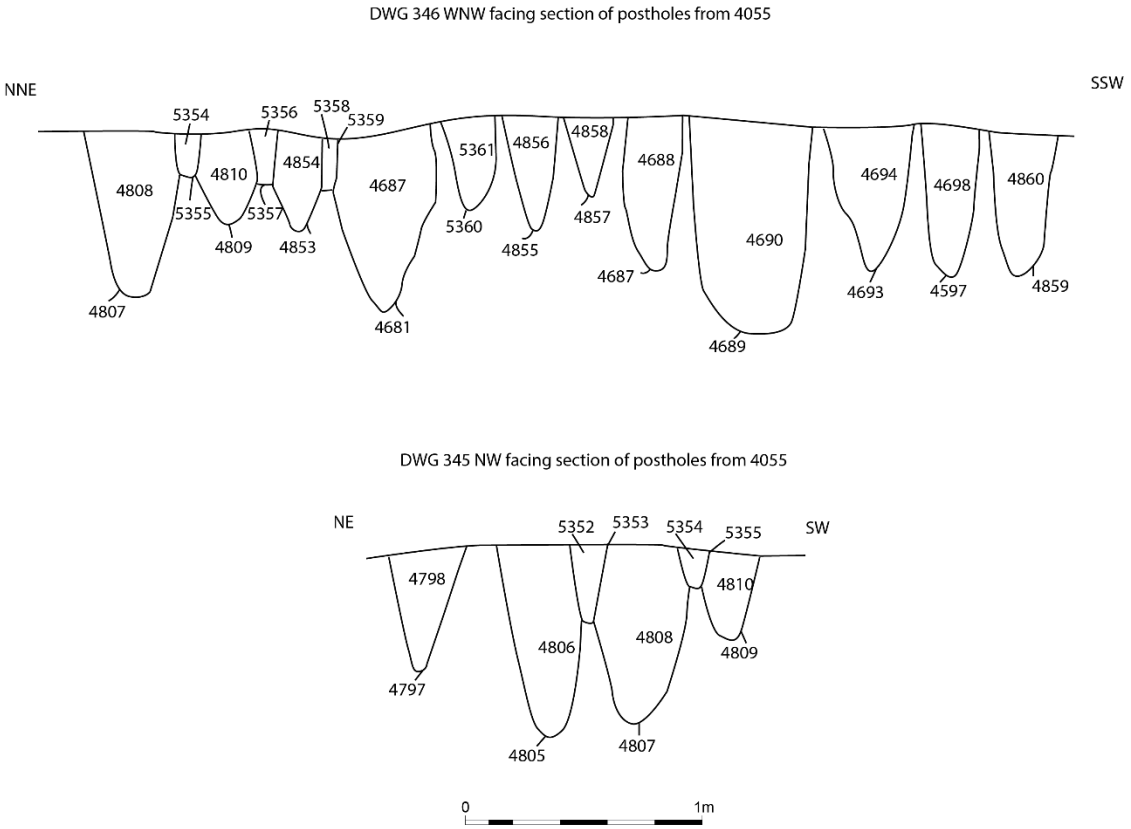


Figure 4.91 Section profiles of postholes in western and northern walls of whare [4055]

Upper Terrace Oven and Firescoop Features [4079] and [4081] and Layer (4005)

Two intercutting oval earth oven features [4079] and [4081] were located in the west of the palisaded enclosure approximately 5.5m southwest of the southwestern corner of whare [4055] (Figure 4.66, Figure 4.67 and Figure 4.92). Both of the hāngi had been cut through the subsoil (4002) and into the colluvial natural (4003), and their fills were sealed by layer (4005). The larger of the two ovens [4079] measured some 1.26m x 0.79m x 0.13m deep and was cut with smooth sides and a slightly concave, flattish base (Figure 4.92). The hāngi contained a single fill (4080) which consisted of roughly equal amounts of whole and fragmented pipi and cockle shell that was within an ashy silt matrix that contained moderate inclusions of charcoal and occasional burnt sandstone fragments (Appendix 3).The larger oven [4079] truncated a smaller, oval-shaped oven feature [4081] on its western side (Figure 4.66, Figure 4.67 and Figure 4.92). The hāngi was cut with steeply sloping sides that broke to a flattish, slightly concave base and was 0.90m x 0.66m in size and 0.12m deep (Figure 4.92; see Appendix 3). The feature contained one fill (4082) that consisted of a midden shell deposit consisting predominantly of pipi, with some cockle and lesser amounts of mud snail and tuatua that were within an ashy silt matrix that contained moderate charcoal inclusions (Figure 4.92; Appendix 3). There was no Phase 1 shell midden feature associated with the oven features, so it is likely that the majority of the shell midden produced via cooking activities was deposited down the steep banks above the Pūhoi River just over 4m to the west of the oven features, with only a small amount of midden from these cooking activities found in the features. Charcoal samples from the fills of both ovens were radiocarbon dated with the determinations produced indicating that oven [4081] was the earliest and in use at some point between the latter 1400s and first

quarter of the 1500s AD. The radiocarbon determination from the sample from the fill of the larger oven [4079] indicated that the feature was in use around the middle of, to perhaps the beginning of the last quarter of the 16th century.

The oven features and their fills were sealed by a buried soil layer (4005) that was present across the majority of the area enclosed by the palisade and consisted of a moderately compacted greyish-brown silt that contained occasional charcoal inclusions and small fragments of marine shell (see Appendix 3). This buried soil was up to 0.07m thick and was sealed by the later Phase 2 large shell midden deposit (4001) and elsewhere by the modern topsoil (4000). Over 110 lithic artefacts consisting predominantly of obsidian and chert, but with lesser quantities of basalt, greywacke and argillite, were recovered from the lower part of the buried soil (4005) within the palisaded enclosure, with notable concentrations close to the southwestern entranceway, within the Phase 1 whare [4055] and also outside its northeastern walls (see Figure 4.67).

It is interpreted that only the basal parts of the buried soil are contemporary with the occupation and use of the palisaded enclosure [4344] and that the remainder and majority of the layer developed from pedogenesis at some point after the abandonment of the site, most likely around the end of the first quarter of the 17th century.

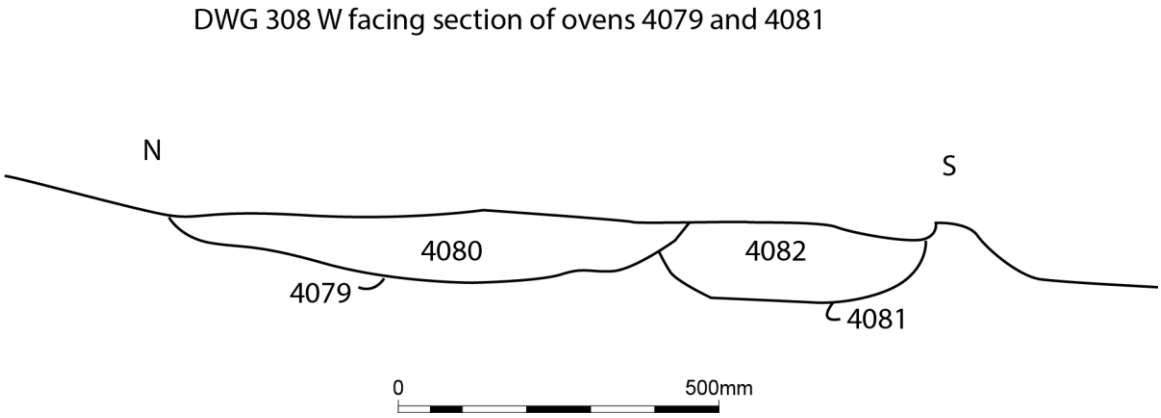


Figure 4.92 Section profile and plan of earth ovens [4079] and [4081] situated on the upper terrace of the R10/1417 site

4.6.4 Phase 2 – Upper Terrace Shell Midden Deposits (4001), (4004), (4028) and (4052) with Associated Oven Features and Whare [5077]; Lower Terrace Shell Midden Deposits (3048) and (3049) with Associated Oven Features and Occupation Deposit (4169)

Archaeological remains related to the Phase 2 occupation of the upper terrace of site R10/1417 consisted of the large and extensive shell midden deposit (4001) and a number of earth oven features, some of which were intercutting; a smaller shell midden (4004), and a whare [5077] which featured a stone-lined square hearth [4031] (Figure 4.93).

On the lower terrace, features relating to the Phase 2 occupation consisted of two shell midden deposits (3048) and (3049) on the southern edge of the terrace; a cooking area with intercutting earth oven features and associated postholes located on the northern part of the terrace and beneath the upper terrace, and, lastly, an occupation surface/working area

deposit (4169) which was rich in cultural material and produced an assemblage of more than 90 lithic artefacts (Figure 4.94).

On the upper terrace the Phase 2 archaeological features for the most part had been cut through the buried soil (4005), the greater extent of which had formed after the abandonment of the site after Phase 1 occupation activities ceased during the early 1600s. Outside of the former palisaded enclosure on the upper terrace, features were cut directly into the subsoil (4002) and colluvial natural clay (4003). On the lower terrace the Phase 2 features were cut into the subsoil and natural clay and/or through the earlier Phase 1 cultural deposit (4168). The fills of cut features for the most part did not produce artefacts, the sole exceptions being the fill (4033) of a sandstone-lined hearth [4031] within a whare [5077], the fill (4037) of posthole [4036] which was also connected with the occupation of the same whare, and the fill (4025) of an earth oven [4024] cut into the main shell midden deposit (4001). The vast majority of the Phase 2 lithic assemblage came from just three contexts, two of which were shell midden deposits on the upper terrace – (4001) and (4004) – while on the lower terrace the occupation layer (4169) was the sole feature that produced artefacts.

Radiocarbon dating (including Bayesian Analysis of the radiocarbon determinations) of the material from the shell midden deposits and associated features, the fills of the hearth and posthole that were related to the whare, as well as the occupation layers on both terraces, provided a tight chronology for the Phase 2 occupation of the site. The analyses suggest that the Phase 2 activities on both terraces of the R10/1417 site commenced around the beginning of the last quarter of the 17th century and extended to around the mid- to late 1700s AD, with the site subsequently being abandoned for the last time.

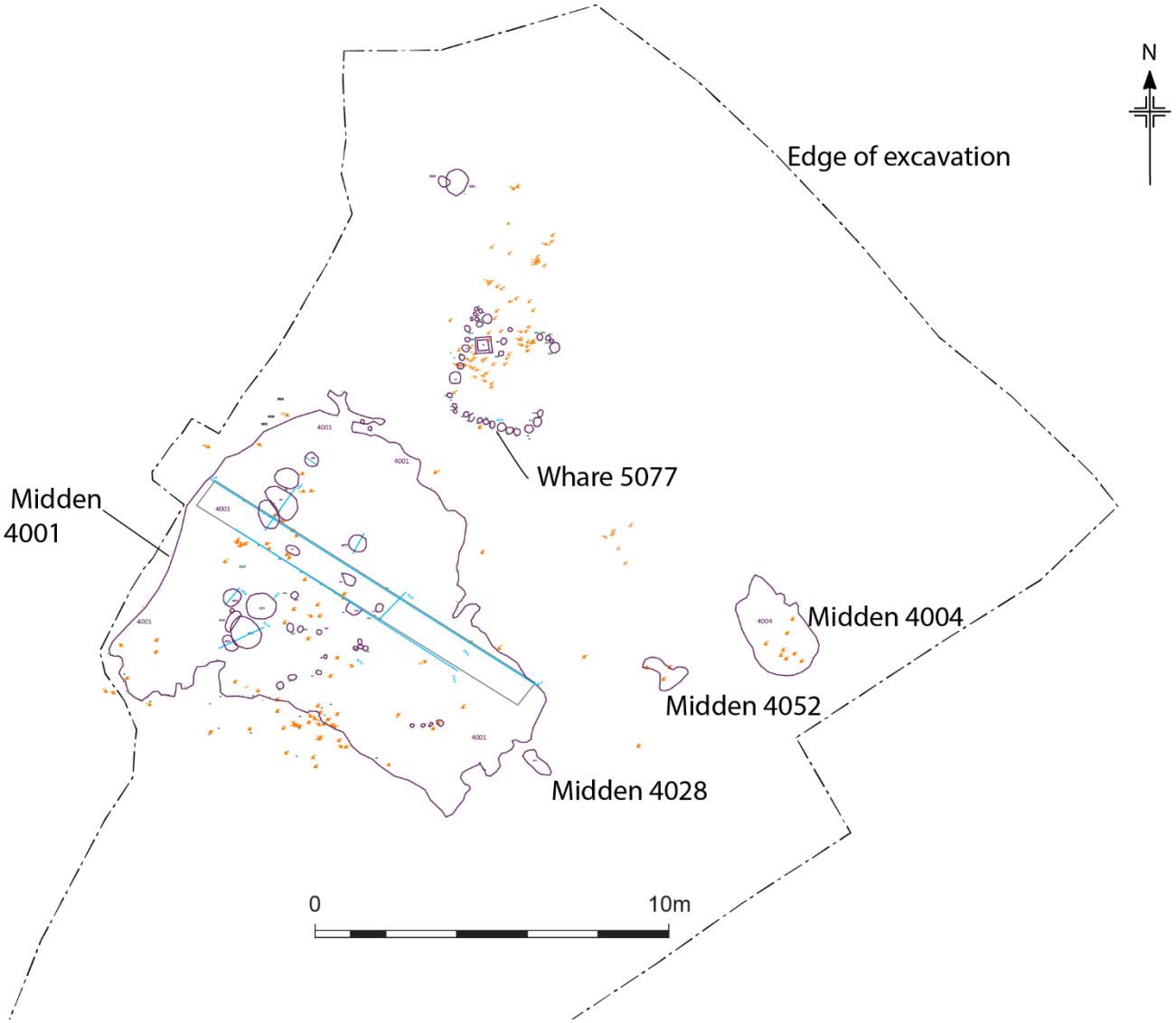


Figure 4.93 Survey plan of archaeological features on the upper terrace relating to Phase 2 activities at site R10/1417

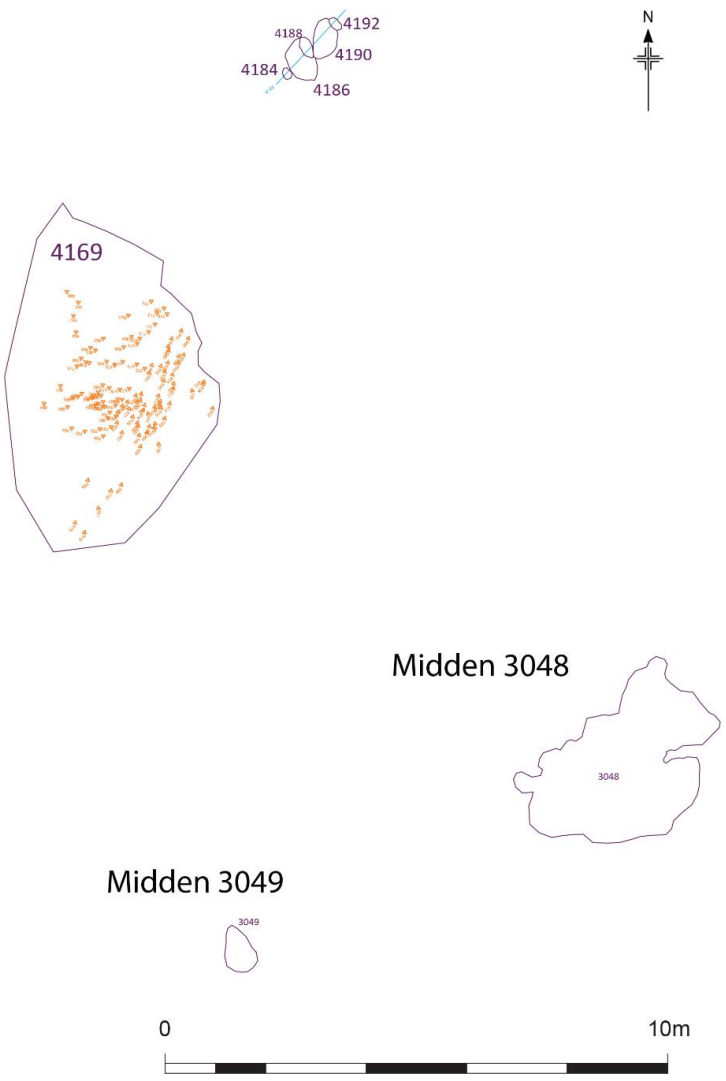


Figure 4.94 Survey plan of archaeological features on the lower terrace relating to Phase 2 activities at site R10/1417

Upper Terrace Shell Midden Deposits (4001), (4004), (4028) and (4052) and Associated Oven Features

A large shell midden deposit (4001) was exposed during the topsoil stripping of the upper terrace of site R10/1417 in mid-December 2018 (Figure 4.62, Figure 4.93, Figure 4.95 and Figure 4.96). The shell midden was situated on the southern half of the terrace, with elements of it spilling down the face of the terrace scarp to the east and southeast (Figure 4.93, Figure 4.95 and Figure 4.96). The shell midden deposit was sealed by the modern topsoil under turf (4000) and consisted predominantly of cockle and slightly lesser amounts of pipi with tuatua, mud snail and whelk also present, albeit in much lesser amounts, as well as very rare and poorly preserved fishbone. The shell was within a dark greyish-brown ashy silt matrix that contained moderate inclusions of charcoal and heat fractured rock fragments derived from oven stones of multiple geological types. The deposit had maximum dimensions of 14.64m by 13.08m, although it was irregularly shaped in places, and had a maximum thickness of 0.18m (Figure 4.93 and Figure 4.97). Artefacts recovered from shell midden (4001) consisted of 18 lithics including flakes of greywacke, basalt, chert and, of note, the bevel fragment of a nephrite (pounamu) chisel. Two shell scrapers were also retrieved from the deposit.

In addition to the main shell midden deposit (4001), there were a further three discrete shell midden deposits – contexts (4004), (4028) and (4052) – situated downslope and to the east and southeast of the main midden (Figure 4.93; see Appendix 3). The largest of these midden deposits was context (4004) which was situated approximately 9.5m due east of the midden (4001) and which was some 3.10m by 2.09m in extent and 0.05m deep (Figure 4.98). The midden deposit consisted of predominantly fragmented and crushed pipi and cockle shell (although some complete shells were present) within a greyish light brown silty matrix with moderate inclusions of heat fractured rock and occasional charcoal. The deposit produced seven lithic artefacts including specimens of greywacke, basalt, and a chert core. Of the two remaining midden deposits (4028) was a small deposit situated only some 0.54m to the southeast of the main midden (4001), and probably represents redeposition from slopewash. Lastly, midden deposit (4052) was situated 4.26m to the east of (4001) and was some 1.38m x 1.12m in size and 0.04m thick. Excavation of the deposit retrieved two artefacts, both of which were sandstone abraders.

There were a minimum of 16 hāngi associated with the main shell midden deposit (4001), 10 of which were oval in shape ([4024], [4026], [4029], [4085], [4087], [4131], [4163], [4621], [4623] and [5033]), while the remaining six were sub-circular ([4077], [4151], [4157], [4170], [4172] and [5033]) (see Appendix 3; Figure 4.93). Nine of the hāngi were excavated into deposited shell, already part of the growing main shell midden deposit (see Figure 4.99), while the remaining ovens had been cut through the buried soil (4005) and into the subsoil (4002) and/or into the natural colluvial clay (4003). A number of the features were intercutting, such as ovens [4163], [4623] and [4621], which were part of a wider cluster of five ovens along with [4170] and [4172] in an area less than 2.5m by 1.95m in size (Figure 4.93, Figure 4.100 and Figure 4.101). The earth ovens were cut with smooth, gradually sloping sides and with either concave or flattish bases (Appendix 3). The features ranged in size from the oval-shaped hāngi [4621] that was 1.14m long by 1.02m wide and 0.18m deep, down to the small sub-circular oven [4157] which was only 0.33m by 0.29m in size and just 0.06m deep (Appendix 3).

The fills of the earth ovens were in the main homogeneous and consisted of blackish dark grey ashy silts that contained super abundant inclusions of crushed and fragmented shell, frequent charcoal and moderate to occasional fragments of heat fractured rock derived from

oven stones. The excavations of the ovens produced a single artefact, a complete argillite adze (Duff type 2B) which was recovered from the fill (4025) of hāngi [4024], which was one of several ovens that had been cut through the surface of shell midden (4001).

In addition to the earth ovens, there were a further 23 features, 21 of which were postholes and the remaining two stakeholes (Figure 4.93; see Appendix 3). These features are also considered to relate to activities associated with the formation of the shell midden deposits.

The postholes were either oval or sub-circular in form, with a number forming alignments and which likely indicate the former presence of fish drying racks representing the processing (by curing) of fish and possibly other marine resources for preservation and subsequent consumption either in the vicinity or elsewhere at a later date. Within the footprint of the main midden deposit (4001) postholes [4006], [4022] and [4050] formed a east-northeast to west-southwest alignment 1.49m in length in the south of the midden site, while postholes [4057], [4059] and [4061] formed a roughly east-west alignment 1.22m in length in the centre of the midden, and in the east postholes [4067], [4069], [4071] and [4073] formed an east-west trending alignment some 1.17m in length (see Figure 4.93; Appendix 3). The postholes had all been cut with vertical sides and had pointed concave bases, and all contained single fills which consisted either of dark greyish-brown silty clays with occasional crushed shell or dark greyish-brown silty clays with frequent crushed and fragmented shell and moderate charcoal inclusions. It is interpreted that shell midden material was deposited within the posthole voids following the removal of the timber posts.

Seven samples consisting of either charcoal or cockle shell derived from shell midden deposits (4001) and (4004) as well as the fills of ovens [4024], [4026], [4170], [4172] and [4623] were submitted for radiocarbon dating. The radiocarbon determinations indicate that site R10/1417 was reoccupied during the last quarter of the 17th century with the shell midden being formed from that time through to the mid-18th century.

Figure 4.95 South-southwest facing view across the main shell midden deposit (4001) on the upper terrace of site R10/1417 seen during the early stages of the excavation. Scale: 2 x 2m

Figure 4.96 North facing view across the main shell midden deposit (4001) on the upper terrace of R10/1417. Scale: 2 x 2m

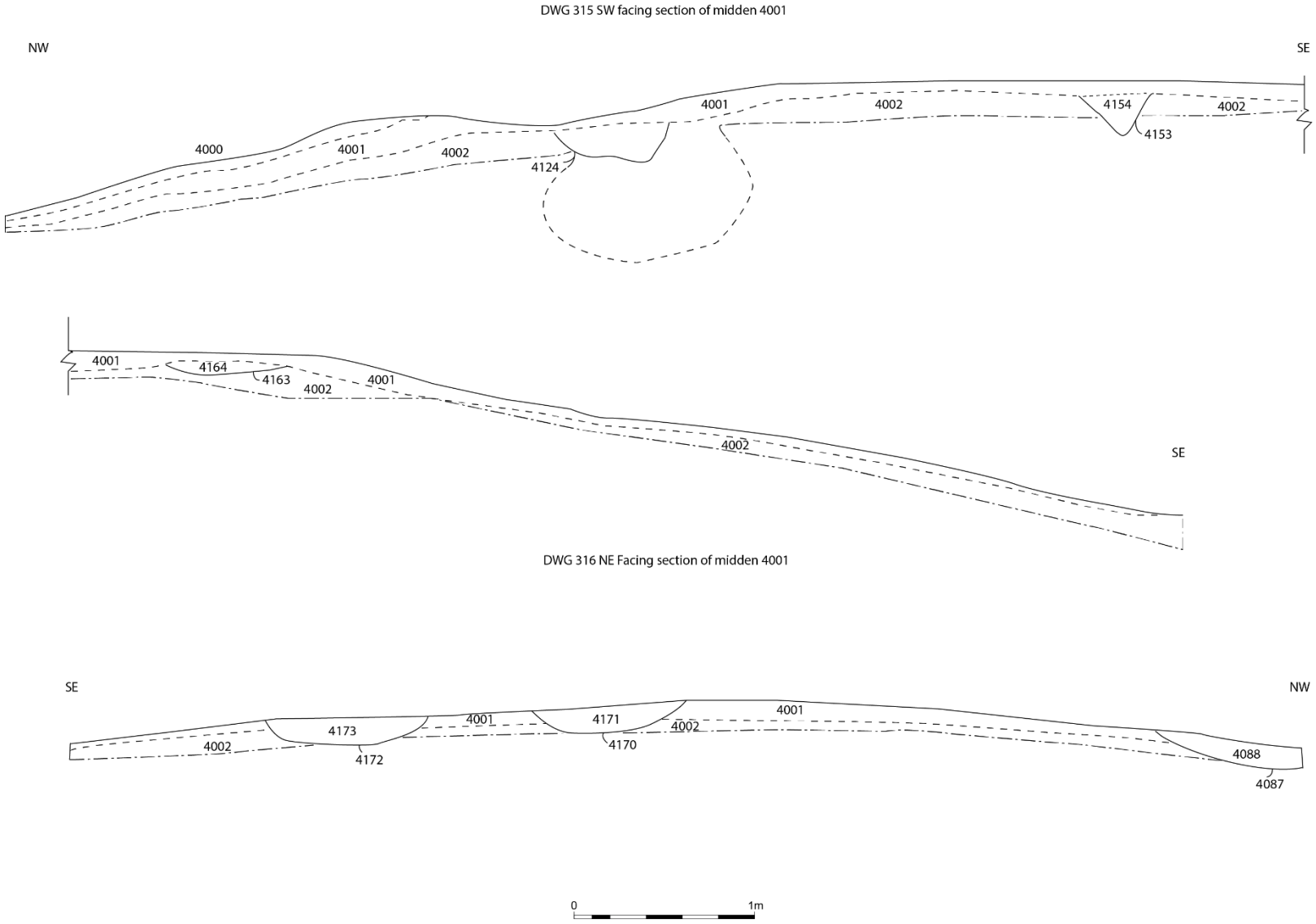


Figure 4.97 Section profiles from trenches excavated through the main shell midden deposit (4001) on the upper terrace of site R10/14174

Figure 4.98 Northeast facing view across shell midden deposit (4004) situated downslope and to the east of the main shell midden (4001) on the upper terrace of site R10/1417

Figure 4.99 Southwest facing post-excavation plan view of earth oven [4170] cut into shell midden (4001) (left); and the northwest facing section of the same feature (right). Scale: 0.5m

Figure 4.100 Southwest facing post-excavation plan view of intercutting hāngi [4621] (at centre, half sectioned), [4623] (at left, fully excavated) and [4163] partially excavated at top. The oven at far right is [4172]. Scale: 1m

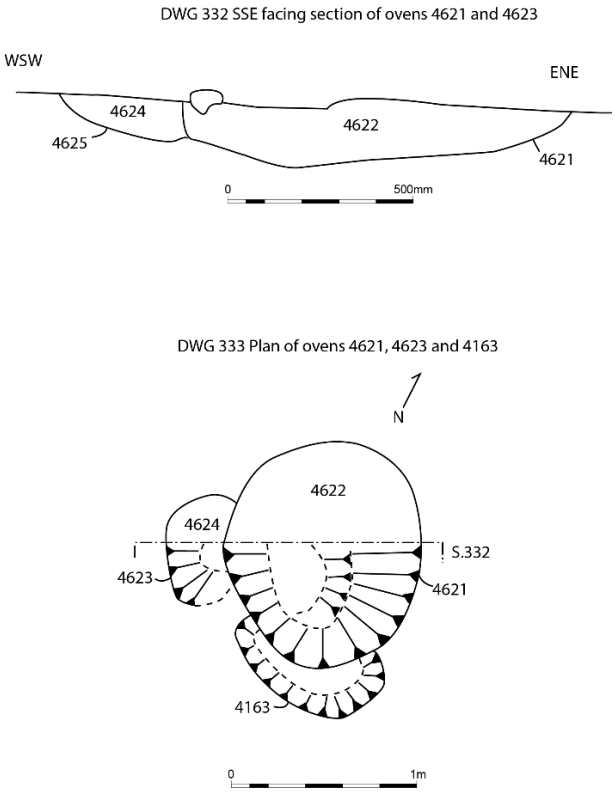


Figure 4.101 South-southeast facing section profile of intercutting ovens [4621] and [4623] (top); and plan of intercutting ovens [4163], [4621] and [4623] (bottom)

Upper Terrace Whare [5077]

A rectangular timber whare (house) structure [5077] was located just over 2.24m to the east-northeast of the northernmost extent of shell midden (4001) in the northern part of the upper terrace (Figure 4.62 and Figure 4.93). The structure was aligned on its longest axis north-northeast to south-southwest and was represented by some 37 postholes; it is noted that there would have been further features present, although these were not identified due to the lack of contrast with the feature's fills and the colluvial subsoil (4002) and natural (4003) (Figure 4.93 and Figure 4.102). The structure was 3.48m in length by 3.12m wide and enclosed an area of approximately 10.86m² (Figure 4.93 and Figure 4.102). The feature had an entranceway aligned east-southeast and overlooking the confluence of the Hikauae Creek with the Pūhoi River. A roughly square-shaped sandstone-lined hearth [4031] was situated inside and towards the northwest of the whare (Figure 4.93, Figure 4.102 and Figure 4.103). The hearth structure consisted of rectangular-shaped yellowish-grey sandstone slabs approximately 0.12m by 0.10m by 0.06m thick, set on edge forming a square, with some smaller angular and rounded pebbles filling in any gaps (Figure 4.103 and Figure 4.104). The structure was unfortunately damaged by the mechanical excavator bucket as the feature was only some 8-10cm beneath the surface. Soot and orangey-pink scorch marks present on the inner faces of the sandstone slabs attest to the fires once lit within the hearth (Figure 4.104). The hearth contained two fills, (4032) and (4033). The lower primary fill (4032) was just 2cm thick and consisted of a dark grey silty clay that contained frequent charcoal inclusions, while the upper fill (4033) was 0.06m thick and consisted of a friable dark greyish-brown silt with frequent charcoal inclusions (Figure 4.103, Figure 4.104; see Appendix 3). The upper fill (4033) also produced two angular pieces of obsidian, one with cortex present, which probably represents a snapshot of somebody sitting around the fire reducing an obsidian core into functional flakes and tools.

The whare postholes were either sub-circular or oval in plan and the postholes that were fully excavated were characterised by having smooth, vertical to slightly undercut sides that descended to pointed, concave bases (see Appendix 3). The features comprising the whare had all been cut through the buried soil (4005) into the subsoil (4002) and on into the colluvial clay natural (4003). The postholes ranged in size from sub-circular examples of 0.17m in diameter up to 0.44m in diameter, with depths from 0.18m to 0.52m, while the oval postholes varied in size from as little as 0.16m x 0.12m to 0.39m x 0.32m (see Appendix 3). The fills of the postholes were mainly homogenous and consisted of mottled yellowish-brown and mid-grey silty clay, often with no inclusions but occasionally with small pieces or flecks of charcoal present (Appendix 3). The fill (4037) of posthole [4036], situated in the west wall of whare [5077] produced three lithic artefacts consisting of two pieces of chert, one of which was a flake which displayed use wear, and the other being a struck angular fragment of obsidian.

In addition to the structural remains of whare [5077], a contemporary occupation surface/ deposit (4167) sealed the earlier Phase 1 occupation layer (4005) and all other Phase 1 features that were directly beneath the large shell midden (4001). Occupation deposit (4167) consisted of compacted greyish-brown silt that contained occasional charcoal inclusions and small fragments of burnt sandstone. It was moderately compacted and was up to 0.04m thick, and was sealed directly beneath the modern topsoil (4000). Surface (4167) extended within the footprint of whare [5077] and abutted the hearth [4031]. There were no artefacts recovered from the excavation of the surface, indicating that either the floor of the whare was swept clean, or that activities such as lithic tool production were occurring on another part of the site.

A sample taken from the primary fill (4032) of the hearth [4031] was submitted for dating analysis and produce a radiocarbon determination indicating that whare [5077] was occupied at some point during the second half of the 18th century.

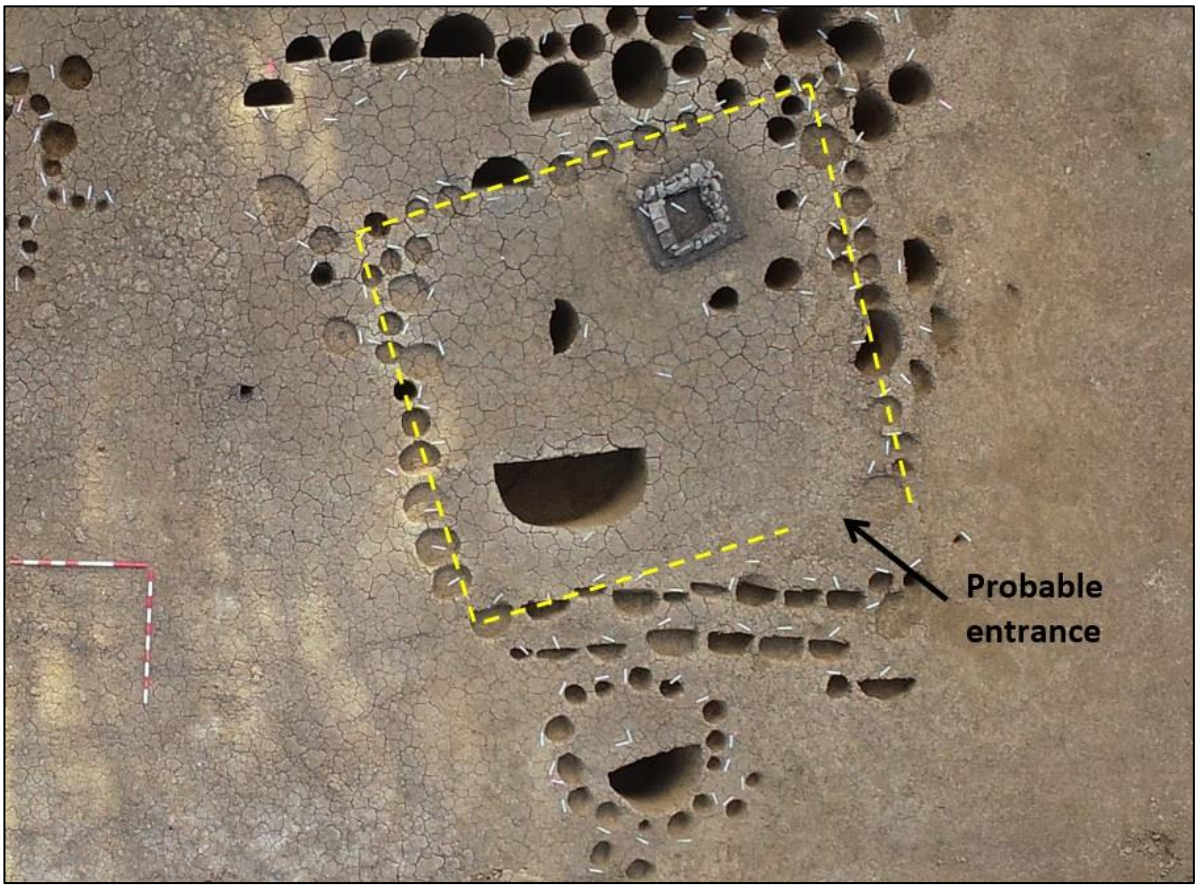


Figure 4.102 Detail from vertical aerial with overlay illustrating the Phase 2 whare [5077] outline, and its likely entrance. Scale: 2 x 1m

Figure 4.103 South-southeast facing pre-excavation view of hearth [4031] within whare [5077]. Scale: 0.5m

Figure 4.104 South facing post-excavation view of hearth [4031] with part of the occupation layer/ surface (4167) left around the structure. Scale: 1m

Lower Terrace Shell Midden Deposits (3048) and (3049)

During the topsoil strip of the lower terrace of site R10/1417 during February 2019, two discrete shell midden deposits, (3048) and (3049), were exposed towards the edge of the terrace scarp overlooking the Pūhoi River and Hikauae Creek (Figure 4.62, Figure 4.94). The shell middens sealed a buried soil (3052) that consisted of a greyish-brown silt loam that contained occasional charcoal inclusions, and were themselves sealed by the modern topsoil under turf (3047) (Figure 4.105; see Appendix 3). The easternmost and larger of the two midden deposits, (3048), consisted of tuatua, pipi and cockle shell in a greyish dark brown silt matrix with occasional charcoal and heat fractured rock fragments (Figure 4.105 and Figure 4.106). Shell midden deposit (3048) was 5.24m in length by up to 4.56m wide (although it was an irregular shape) and was up to 0.07m thick (Figure 4.94, Figure 4.105 and Figure 4.106). Shell midden deposit (3049) however, was much smaller, being only some 1.32m in length by 0.87m wide and only up to 0.04m thick (Figure 4.107). The midden deposit consisted of cockle, pipi and tuatua shells (both whole and fragmented) that were within a greyish dark brown silt matrix that contained occasional charcoal inclusions and heat fractured rock fragments (Figure 4.107). There were no additional archaeological features present within 12m of the two shell midden deposits with the nearest earth oven features located some 17m to the north-northwest close to the base of the upper terrace scarp (Figure 4.62 and Figure 4.94).

A cockle shell sample from shell midden (3048) was submitted for dating. The radiocarbon determination suggests that the shell midden was formed around either side of the turn of the 18th century.

Figure 4.105 Shell midden deposit (3048) on the lower terrace of site R10/1417 seen during topsoil stripping in February 2019; facing southeast

Figure 4.106 East facing view across shell midden deposit (3048) prior to excavation and sampling. Scale: 2 x 1m

Figure 4.107 South facing view overlooking the shell midden deposit (3049) during topsoil stripping of the lower terrace of site R10/1417. Scale: 2 x 1m

Lower Terrace Earth Ovens [4186], [4188] and [4190] and Postholes [4184] and [4192]

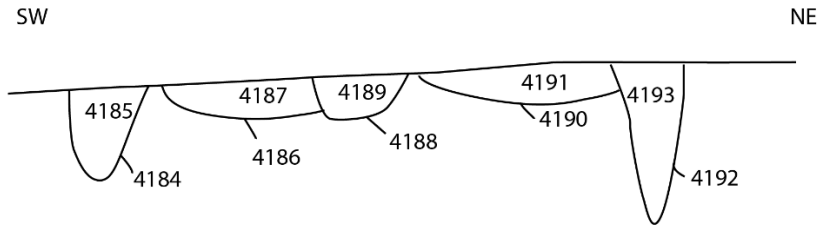
As stated above, while there were no oven features associated directly with the lower terrace shell midden deposits, there was a cluster of three intercutting hāngi, [4186], [4188] and [4190], located some 17m to the north-northwest, only a few metres from the base of the scarp of the upper terrace (Figure 4.94 and Figure 4.108). The hāngi were all oval in plan and had been cut through the earlier Phase 1 occupation layer (4168), and into the subsoil (3050), while the oven fills were sealed beneath the modern topsoil (3047). The features had been cut with gradual to steep, smoothly sloping sides and with either flat or concave bases (see Appendix 3). The largest of the ovens was [4186], which was 1.09m in length by 0.68m wide and 0.11m deep (Figure 4.109 and Figure 4.110). The oven contained one fill (4187) that consisted of a firmly compacted dark grey and mid-brown mottled silty clay that contained occasional charcoal and highly fragmented cockle and mud snail shell (Figure 4.109). The feature was truncated by another, much smaller oven feature [4188] which had been excavated within the backfilled oven [4186] in its northwestern corner and also contained a very similar fill (4189) to fill (4187) (Figure 4.94, Figure 4.109 and Figure 4.110; see Appendix 3). The final earth oven [4190] was situated adjacent to and immediately to the northeast of [4186] and was some 1.01m long by 0.60m wide and slightly shallower, at 0.09m deep (Figure 4.109 and Figure 4.110). The feature contained one fill (4191) which consisted of a firmly compacted dark grey and brown mottled silty clay that contained occasional charcoal inclusions and highly fragmented cockle and mud snail shell along with small heat fractured rock fragments (Figure 4.109).

Postholes [4184] and [4192] were situated to the southwest and northeast of the intercutting ovens respectively (Figure 4.94 and Figure 4.109 and Figure 4.110). Both features were oval, cut with very steep to vertical sides and narrow pointed concave bases (Figure 4.110). Posthole [4192] was the larger of the two features and also partly truncated the fill (4191) of oven [4190] on its northeastern side (Figure 4.94, Figure 4.109 and Figure 4.110). The posthole was 0.38m long by 0.22m wide and 0.45m deep. The other posthole [4184] was situated immediately adjacent to the southern edge of oven [4186] and was 0.27m in length by 0.20m wide and 0.31m deep. The fills of the two postholes were homogenous, consisting of firmly compacted dark grey and brown mottled silty clay with occasional charcoal flecks (see Appendix 3). Due to the location of the postholes either side of the oven/firescoop features and their size and depth, they are tentatively interpreted as representing drying racks for curing fish and/or perhaps other marine food resources.

Figure 4.108 North-northwest facing view with the area of the intercutting hāngi indicated by the arrow prior to excavation and with the upper terrace visible in the background. Scale: 2 x 2m

Figure 4.109 Northwest facing post-excavation view of ovens [4186], [4188], [4190] and postholes [4184] and [4192] on the lower terrace of site R10/1417. Scale: 1m

DWG 320 SE facing section of ovens 4186, 4188, 4190 and postholes 4184 and 4192



DWG 321 Plan of ovens 4186, 4188, 4190 and postholes 4184 and 4192

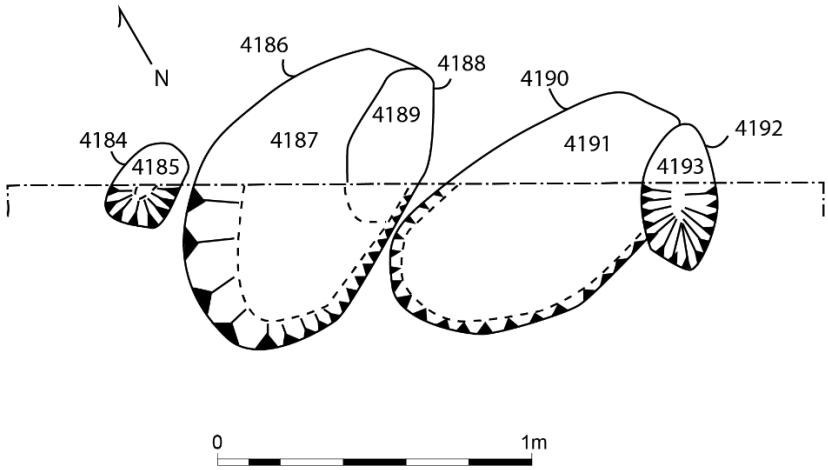


Figure 4.110 Section profiles and plan of ovens [4186], [4188], [4190] and postholes [4184] and [4192]

Lower Terrace Occupation Surface/Lithic Working Area (4169)

An occupation deposit (4169) was situated on the western and southwestern part of the lower terrace of site R10/1417 (Figure 4.62 and Figure 4.94). The deposit was spread over an area of 8.61m by 4.48m and was up to 0.05m thick (Figure 4.94 and Figure 4.111). The deposit consisted of a moderately compacted dark greyish-brown clayey silt which contained occasional inclusions of charcoal, fractured pieces of sandstone, and ochre (see Appendix 3). The deposit also produced an assemblage of 94 lithic artefacts that consisted predominantly of obsidian, with chert, basalt and sandstone artefacts also retrieved (Figure 4.112). It is interpreted that the area was used for processes related to the production of lithic tools, and it is also postulated that the sandstone fragments that were present across the area represent the waste produced by the use of sandstone abraders and hōanga (grindstones).

Two radiocarbon determinations from charcoal and wood sample retrieved from layer (4169) indicates a date of formation during from around the end of the first quarter to around the middle of the 18th century.

Figure 4.111 Northwest facing view taken in late February 2019 looking across the occupation deposit/ working surface (4169) (outlined by yellow dashed lines) with the earlier charcoal-rich deposit (4168) seen at right. When the silt bund was removed the layer was found to extend a further 2.5m to the west. Scale: 2 x 2m

Figure 4.112 Northeast facing view looking across the occupation/working floor deposit (4169) (foreground) seen during excavation. The white tags in the ground mark the location of already recovered lithic artefacts

5 ARTEFACT ANALYSIS

5.1 Introduction

The archaeological excavations at Pūhoi undertaken by Clough & Associates included the sampling of stone material from a number of archaeological sites for further analysis. Clough & Associates engaged Southern Pacific Archaeological Research (SPAR) to carry out the analysis of lithic and shell samples from sites R10/1417, R10/1484, R10/1509, R10/1506, R10/1106, R101514 and R10/1485. Two reports (Hurford et al. 2020a and 2020b) documenting the laboratory methods employed and the results of the laboratory analysis were produced by Jessie Hurford, Monica Tromp, Tristan Russell and Karen Greig of SPAR and are presented below per site. The original reports and quantitative data are provided in digital form in Appendices 4 and 5.

5.2 Lithic Analysis

5.2.1 Methodology

Analysis of the artefact assemblage was carried out using the Otago Archaeological Laboratories (OAL) reference collection in the Archaeology Programme (University of Otago). Artefacts underwent a primary qualitative analysis to establish the materials with ochre residues present. Artefacts were then cleaned in accordance with standard archaeological protocols in the OAL. All material was dried thoroughly in a humidity-controlled drying room to prevent residual moisture from causing mould growth.

The following sections outline the quantitative attributes and artefact classifications employed for the analysis.

5.2.2 Stone Tools

The stone material was identified by Jessie Hurford and Tristan Russell using the New Zealand Rock Reference Collection in the OAL. For the stone artefacts relating to stone working (i.e. flaking events), four artefact classes were adopted (*core*, *tool*, *flake*, and *angular fragment*). Artefact classes were identified according to the criteria presented in Table 5.1.

Stone artefact classes could then be further distinguished based on the presence of edge modification (retouch) or use wear (Table 5.2). Where applicable, samples were examined under an Olympus SZX7 stereo microscope for evidence of micro-scarring or abrasion.

The following primary dimensions were recorded for cores, flakes and, when applicable, angular fragments:[15] *maximum length* (mm), *percussion length* (mm), *maximum width* (mm), *maximum thickness* (mm) and *weight* (g). Table 5.3 describes the specific application of each of these measurements.

[15] Dimensions were recorded where applicable. In certain cases, these dimensions could not be taken due to the nature of the material (e.g. angular fragments without landmarks, or when flakes were incomplete).

Table 5.1 Defining criteria for stone artefact classes associated with flaking events

Variable	Attribute	Definition
Artefact Class	Core	A nuclear piece used as a source of flakes, displaying 1 + negative flake scars as evidence of flake removal. It does not usually contain a ventral surface unless it was used as a producer core after the ventral surface was produced (a flake core).
	Tool	A stone piece showing evidence of: a) manufacture or shaping into a specific tool form (e.g. adze, blade, drill point, knife), or b) use to aid in the manufacture of artefacts or processing of materials (e.g. hammer stone, pounder, abrader, file).
	Flake	A detached piece at time of discard, generated as a result of a flaking event. A complete flake comprises a platform, termination, and lateral margins. A broken flake may only display some of these landmarks. At least one complete landmark or margin is present to classify as flake.
	Angular fragment	Waste or by-product generated during a flaking event. Angular fragments do not contain any landmarks to distinguish as flake or core.

Table 5.2 Defining criteria for stone artefact retouch or use wear

Variable	Attribute	Definition
Edge	Worked	Piece contains micro-scarring as a result of edge modification (retouch) or use wear.
	Unworked	No evidence of micro-scarring that would indicate that the object was used.

Table 5.3 Basic dimensions recorded for stone cores, flakes, and angular fragments

Attribute	Definition
Maximum length	The longest measurement obtainable in any direction, from point to point using callipers. Recorded to 2 decimal places.
Percussion length	The length measured from point of percussion (on the platform's ventral edge) to the flake termination along the percussion axis. Using callipers to 2 decimal places. For flakes and cores only. For cores, this relates to the longest dorsal scar.
Maximum width	The longest measurement at right angles to the percussion length. Using callipers to 2 decimal places. For flakes only.
Maximum thickness	The longest measurement between the dorsal and ventral surfaces. Using callipers to 2 decimal places. For cores, this is measured between faces.
Weight	Recorded in grams using laboratory balance.

To gain a fuller understanding of the stone technology and reduction sequence, additional attributes were analysed for cores and flakes. While the ultimate goal of any stone tool technology is to produce stone tools for use, the strategies used to create and organise the technology go beyond reduction, involving broader processes affected by environment, economy, and socio-cultural factors. For example, the availability and knowledge of suitable local raw material will affect the manufacture and organization of stone tool technology, as well as the specific subsistence strategies pursued by a group, including their frequency of mobility. Consequently, the following attributes were analysed based on

the information they could provide regarding: a) the manufacturing technology employed; and b) the intensity of reduction for stone materials (Table 5.4).

Table 5.4 Additional attributes recorded for stone flakes and cores

Variable	Attribute	Definition
Flake	Flaking Fracture	The nature of the flaking fracture (e.g. conchoidal, bending, wedging).
	Termination	The nature of termination at the distal end of a flake (feather, step, hinge).
	Shape	The general shape of the flake (e.g. regular, elongate, expanding, irregular).
	Dorsal scars	The number of flake scars present on the dorsal surface (counted up to 10).
	Platform type	The nature of flaking on the platform (cortical, plain, dihedral, faceted, crushed, linear, punctiform, polished, hammer dressed).
	Platform width	Maximum distance across the platform surface between two lateral margins, at right angles to percussion thickness. Using callipers to 2 decimal places.
	Platform thickness	Maximum distance along the platform between dorsal and ventral surface, measured from percussion point in line with percussion axis. Using callipers to 2 decimal places.
Core	Core scars	The number of flake scars present on the core (counted up to 10).
	Platform	Number of discrete platforms used for flaking (counted up to 10).
Flake and Core	Cortex type	The nature of the cortex present on dorsal surface (natural cortex, gibber, block, polished, hammer dressed).
	Cortex	Percentage of cortex on the dorsal surface of flake, or surface of core (0%, 1-25%, 25-50%, 50-75%, 75-99%, 100%).
	Overhang removal	Small flake scars present under the platform on the dorsal surface indicating platform preparation by overhang removal. Can be stacked-step facture or scalar preparation. Recorded as present/absent.

The following dimensions were recorded for the remaining stone artefacts as appropriate (e.g. tools): *maximum length* (mm), *maximum width* (mm), *maximum thickness* (mm) and *weight* (g). Supplementary information was also recorded when applicable. This included a qualitative description, and quantitative analysis relating to: cortex (e.g. polish), cortex percentage, retouch patches, retouch percentage, use wear patches and use wear percentage.

5.2.3 Geochemical Analysis

In order to better understand aspects of raw material procurement and distribution, a secondary analysis was conducted for a sample of the obsidian artefacts. This involved a geochemical XRF analysis (X-ray fluorescence). This form of analysis is a non-destructive X-ray technique used to determine the elemental composition of materials. It returns chemical spectra that are unique to specific raw material sources, enabling some interpretation of where the obsidian material was first procured, and subsequently transported to. A Bruker Tracer III-SD pXRF was utilised in the OAL, with the machine optimised to identify mid-Z trace elements (Mn, Fe, Zn, Th, Rb, Sr, Y, Zr, Nb) with green

filter settings (40kV per channel, filament ADC= 30µA, filter= 12mi1Al + lmilTi +6mi1Cu, runtime= 300 seconds).

5.2.4 Shell Artefacts

For the bivalve shell artefacts, species were identified using the New Zealand Shell Reference Collection in the OAL. The lowest possible taxonomic level was recorded and a NISP quantified. A qualitative description was recorded and primary dimensions were measured. This included: *maximum length* (mm), measured perpendicular to the hinge from the posterior to anterior margins, *maximum width* (mm), measured from the hinge to the ventral margin, and *weight* (g).

5.3 Site R10/1484 Lithic Analysis

Site R10/1484 was located on farmland at 3 Puhoi Road on the east facing slope of the large hill that dominates the property and which has commanding views across the Pūhoi River and its floodplain. The site was situated on predominantly level ground, at the upper end of the narrow flat-topped ridge spur that trends west-northwest to east-southeast. The site consisted of a shell midden and associated features that overlay and sealed an occupation surface, that in turn sealed earlier features, some of which represented structures. (See Chapter 4).

5.3.1 Material Culture

Stone artefacts were the only form of material culture present among the samples analysed. The lithic assemblage consisted of 234 specimens that were recovered from a total of 23 individual contexts. Table 5.5 presents a summary of this information. The following sections report on the material culture classes separately.

Table 5.5 Site R10/1484: summary of material culture assemblage

Class	Count	Weight
Stone artefact	234	6.14 kg

5.3.2 Stone Artefacts

A total of 234 stone artefacts relating to tool manufacture were recovered from site R10/1484, of which 232 were analysed.[16] Forty-one stone artefacts displayed evidence of shaping or reduction into specific tool forms for use (i.e. adze, blade, knife, abrader, hammer stone, pounder, retouched fragment, utilised fragment). The assemblage included a small amount of sandstone, breccia and unidentifiable volcanic stone that was probably intended for use in abrading or sharpening of tools. The remaining artefacts were cores,

[16] The lithic assemblage analysed by SPAR did not include the two large broken adzes excavated from site R10/1484 in April of 2018 (Figure 4.20 and Figure 4.21) which were in the care of Hōkai Nuku, and were provided subsequently.

flake pieces or fragments of waste material from flaking events (Table 5.6; Figure 5.1 to Figure 5.5).

5.3.3 Flaked Tools

In total, there were 37 stone flakes (Table 5.6; Figure 5.2 and Figure 5.3). Most flakes (54.1%) were conchoidally fractured, demonstrating a stone tool tradition of hard hammer percussion. Regular flakes were the most common (35.1%), although irregular (8.1%), expanding (10.8%) and elongate (10.8%) flakes were also present in the assemblage. Generally, the process of flake production appears to be informal, with flaked stone selected solely for its sharp edge. To some extent, flake termination can provide information regarding success or 'skill' in the process of reduction, with feather terminations being the most desirable due to the fine edge generated. Of the flake pieces, 32.4% (n = 12) had a feather termination; the remaining pieces with a distal margin displayed hinge (29.7%) and step (27%) terminations.

Table 5.6 Site R10/1484: summary of lithic artefacts analysed

Stone type	Core	Tool[17]	Flake	Angular fragment	Total
Chert	5	1	9	58	73
Basalt	-	-	2	40	42
Obsidian[18]	5	-	19	14	38
Argillite	1	1	5	30	37
Sandstone	-	20	-	-	20
Breccia	1	7	1	6	15
Unidentified volcanic	-	3	1	2	6
Limestone	-	-	-	1	1
Total	**12**	**32**	**37**	**151**	**232**

The number of dorsal scars present on the flaked tools largely corresponds to the raw material utilised; the highest counts of dorsal scarring were noted on obsidian flakes. Only (10.8%) of flake platforms were cortical, suggesting that the primary flaking likely occurred elsewhere. There was also notable variability in flake platforms (types and dimensions), reinforcing the informal nature of the flake production. There was, however, evidence of platform overhang removal (on 64.8% of flakes), demonstrating platform preparation prior to striking.

Twenty-nine flakes did not show any evidence of edge modification (by use or retouch), while 9 of the flakes may be classified as 'tool' based on the presence of micro-scarring or retouch (13.5% showed evidence of use wear, and 8.1% were retouched) (Figure 5.3). As shown in Table 5.7 angular fragments also presented evidence of edge modification (5.3% of fragments displayed use wear).

[17] Displaying evidence of shaping or reduction into specific forms for use (e.g. adze, blade, knife, abrader, hammer stone, pounder).
[18] 25 obsidian samples were analysed using pXRF.

Table 5.7 Site R10/1484: evidence of edge modification on flakes and angular fragments

	Flakes		Angular Fragments		
Stone type	**Utilised edge**	**Retouched edge**	**Utilised edge**	**Retouched edge**	**Total**
Argillite	1	1	2	-	4
Obsidian	1	1	-	-	2
Basalt	-	1	2	-	3
Breccia	1	-	1	-	2
Chert	3	-	3	-	6
Total	**6**	**3**	**8**	**-**	**17**

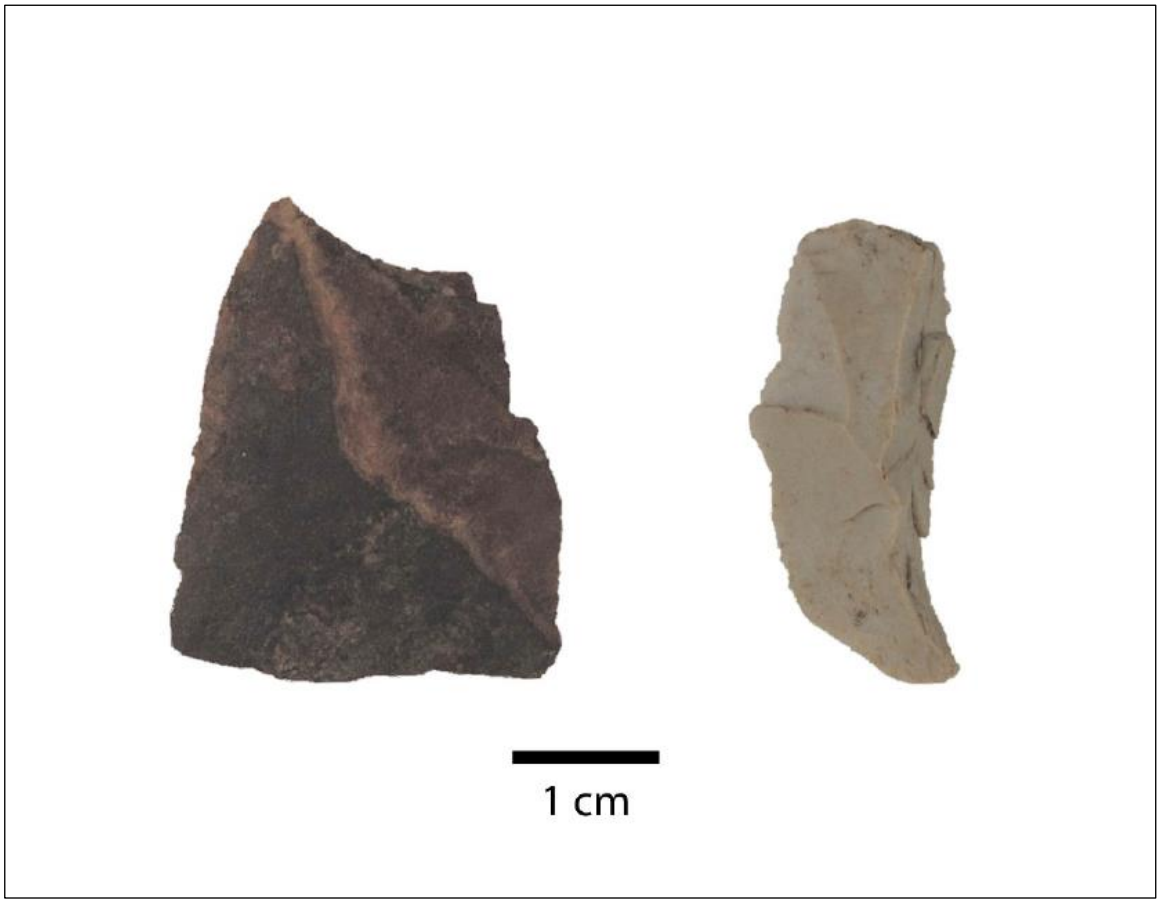


Figure 5.1 Site R10/1484 chert flake examples (samples 28 and 13), both retrieved from buried soil context 1141

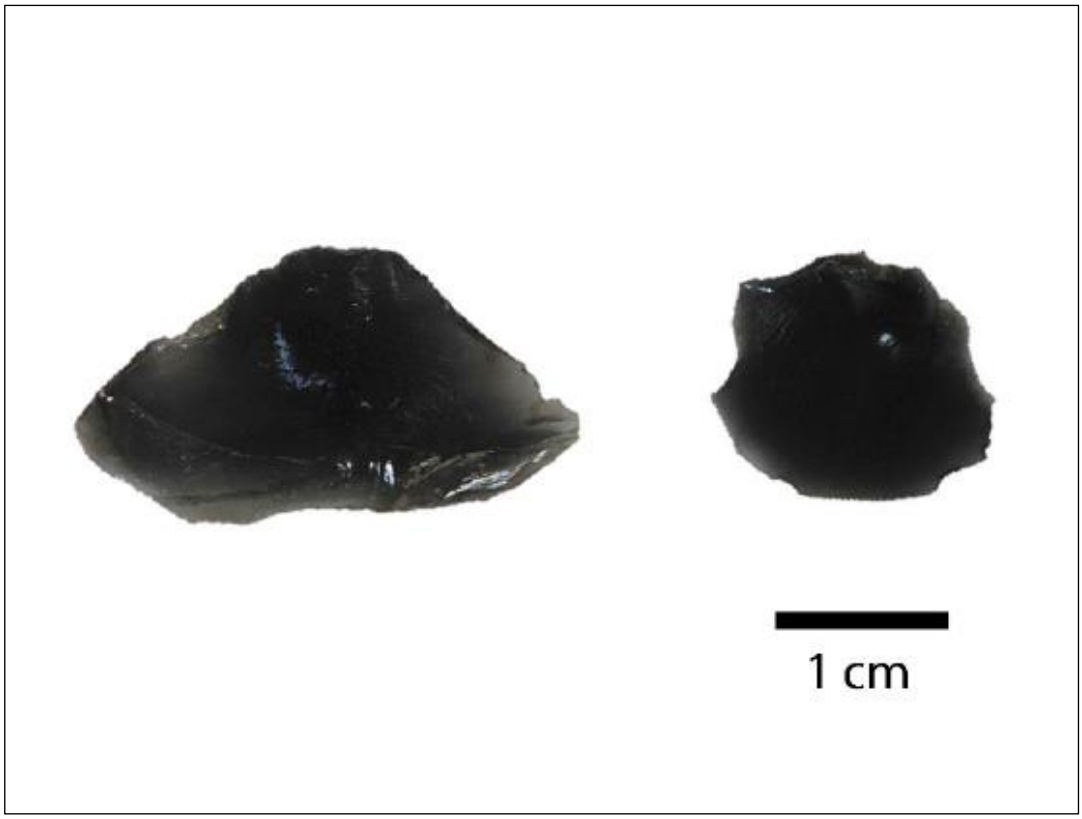


Figure 5.2 Site R10/1484 obsidian flake and tool examples (samples 24 and 278), both from buried soil context 1141

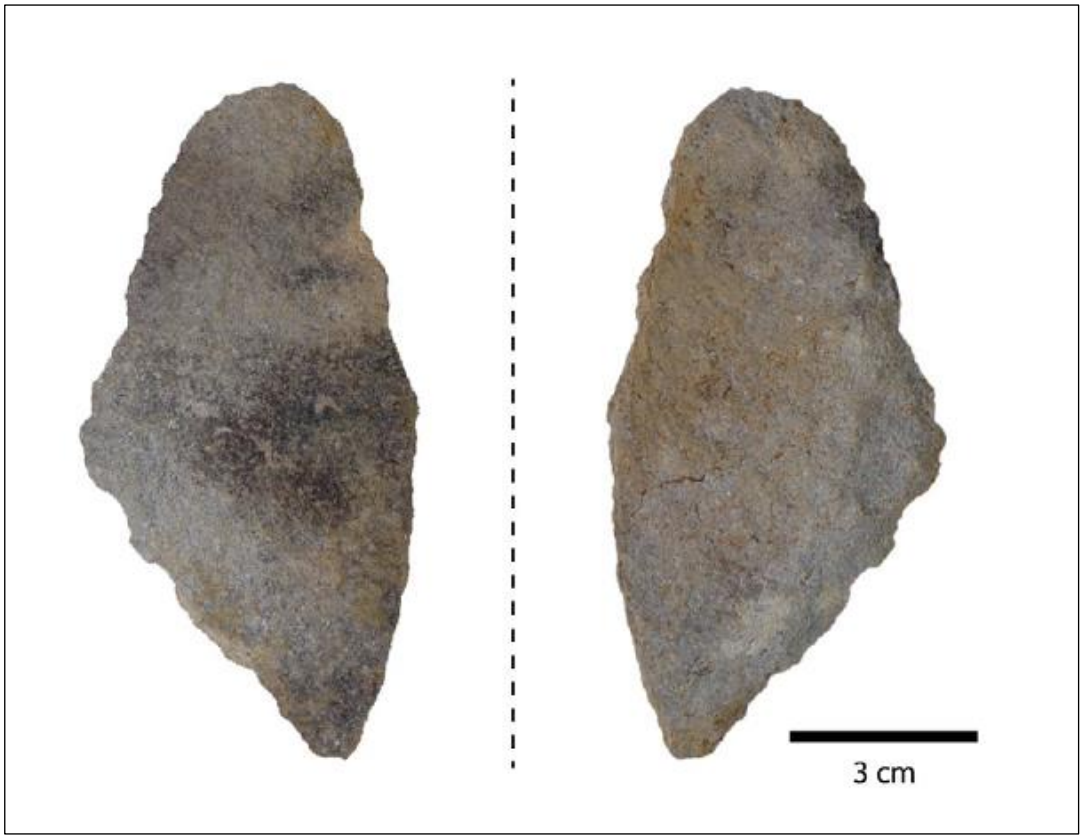


Figure 5.3 Site R10/1484 basalt flake with retouched edges (sample 280) from context 1195, the upper fill of cut 1161

Twelve cores were also present in the stone tool assemblage (e.g. Figure 5.4). The intensity of reduction was particularly evident for the obsidian cores (n = 5), all of which had more than one striking platform and weighed under 10 grams. Three of the obsidian cores also showed >7 core scars. Of the wider core assemblage, 8 cores showed evidence of cortex (identified on at least 1-25% of the core surface), reinforcing that primary flaking likely occurred elsewhere.

The presence of cortex hammer dressing or polish on flakes and angular fragments is generally indicative of sharpening and refurbishing activities for specific tools (e.g. adzes). However, there were no flakes or angular fragments from the site that displayed evidence of cortex polish or hammer dressing.

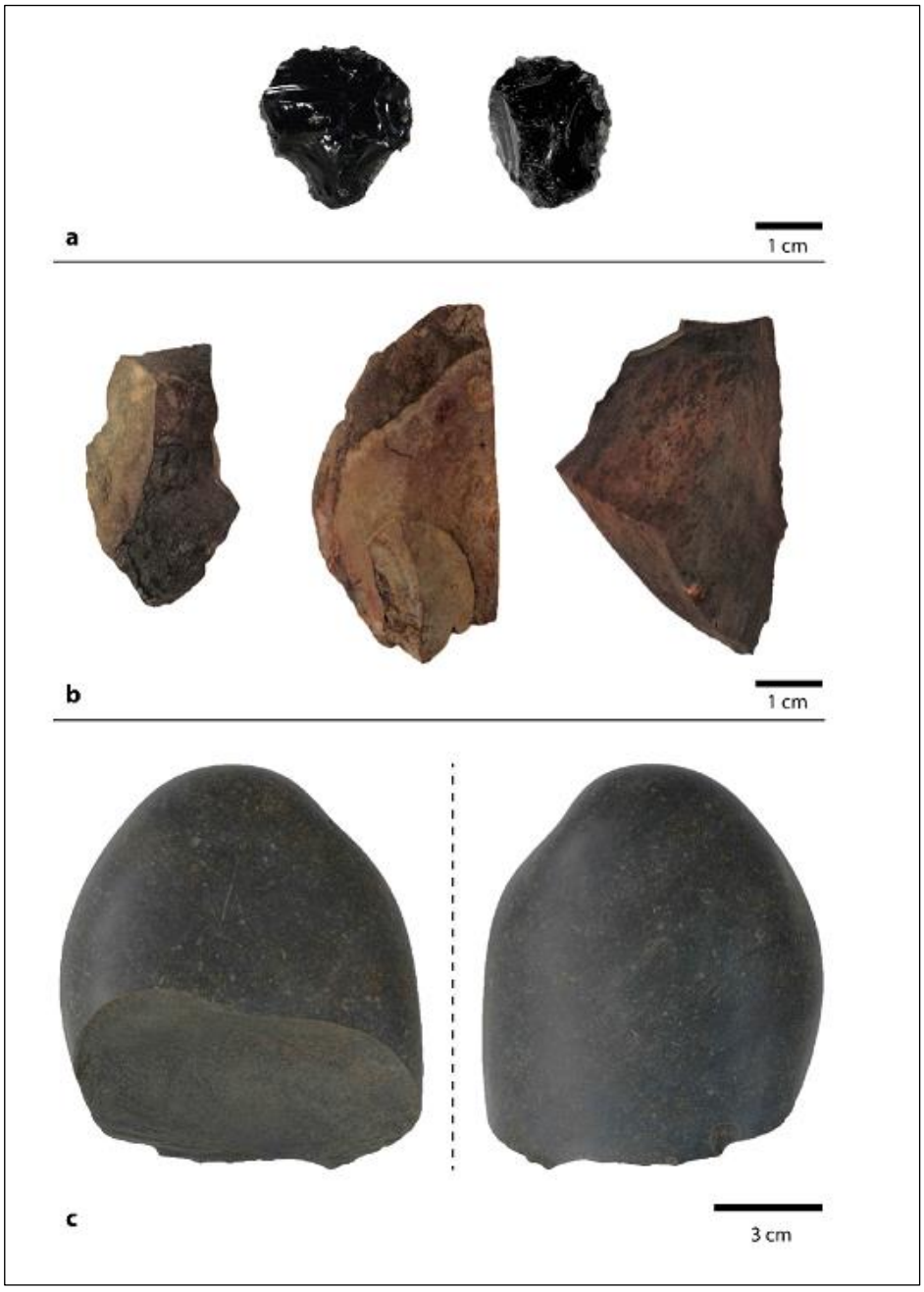


Figure 5.4 Site R10/1484 core examples: a) obsidian cores (samples 4 and 64 both from context 1141); b) chert cores (samples 10, 12 and 35, all from context 1141); c) argillite core (sample 138) retrieved from the fill (1158) of the post extraction cut [1157] within the fill (1152) of the large post-pit [1151]

5.3.4 Adzes and Chisels

The site R10/1484 assemblage included one argillite adze fragment, the butt end of a fractured polished adze and a mostly complete adze. The fragment displayed evidence of polish and retouching, and the likely argillite source is Mt Ears, on D'Urville Island, Nelson (Table 5.8; Figure 5.5). The two other examples (not analysed by SPAR – see footnote 16 p. 225) appeared to be of similar material. The first was a complete large, polished Duff 2B adze from fill context (1150) with signs of use damage on the blade and other reworking on the body (Figure 5.6). The adze had been flaked then hammer dressed, with some scarring on the poll for fitting to composite haft. It was mostly polished with some edge damage along half of the blade. The other, fractured adze was found in fill context (1148) and was also the remains of a large, polished quadrangular cross-sectioned adze that had been broken, probably after manufacture (Figure 5.7).

Table 5.8 R10/1484: adze and chisel summary

Bag #	Class	Material	Portion	Max Length (mm)	Max Width (mm)	Max Thickness (mm)	Weight (g)
139	Adze	Argillite (Mt Ears)	Fragment	117.38	34.52	-	133.6
Cxt 1150	Adze	Argillite	Complete	180	106	35.7	-
Cxt 1148	Adze	Argillite	Fractured	123.5	93	-	-

Figure 5.5 Site R10/1484: argillite adze fragment (sample 139) retrieved from fill 1158 in post-pit 1151

Figure 5.6 Site R10/1484: argillite adze retrieved from fill 1150 of posthole 1149 in post-pit 1151. Clockwise: front, side, back, blade, butt

Figure 5.7 Site R10/1484: argillite adze fragment retrieved from fill 1148 of posthole 1147 in post-pit 1151. Clockwise: front, side, back, blade, butt

5.3.5 Other Tools

Thirty other stone artefacts were classified as 'tool' from the assemblage. This included 26 stone abraders and four possible pounders (Table 5.9 and Figure 5.8). Three of the pounders displayed distinct patches of ochre staining. Among the raw materials utilised were two volcanic materials interpreted as local source materials (volcanic breccia and an unidentified volcanic stone). The obsidian knife was a broken flake that had been repurposed. It exhibited retouch and distinct use wear patches along the entire length of one margin.

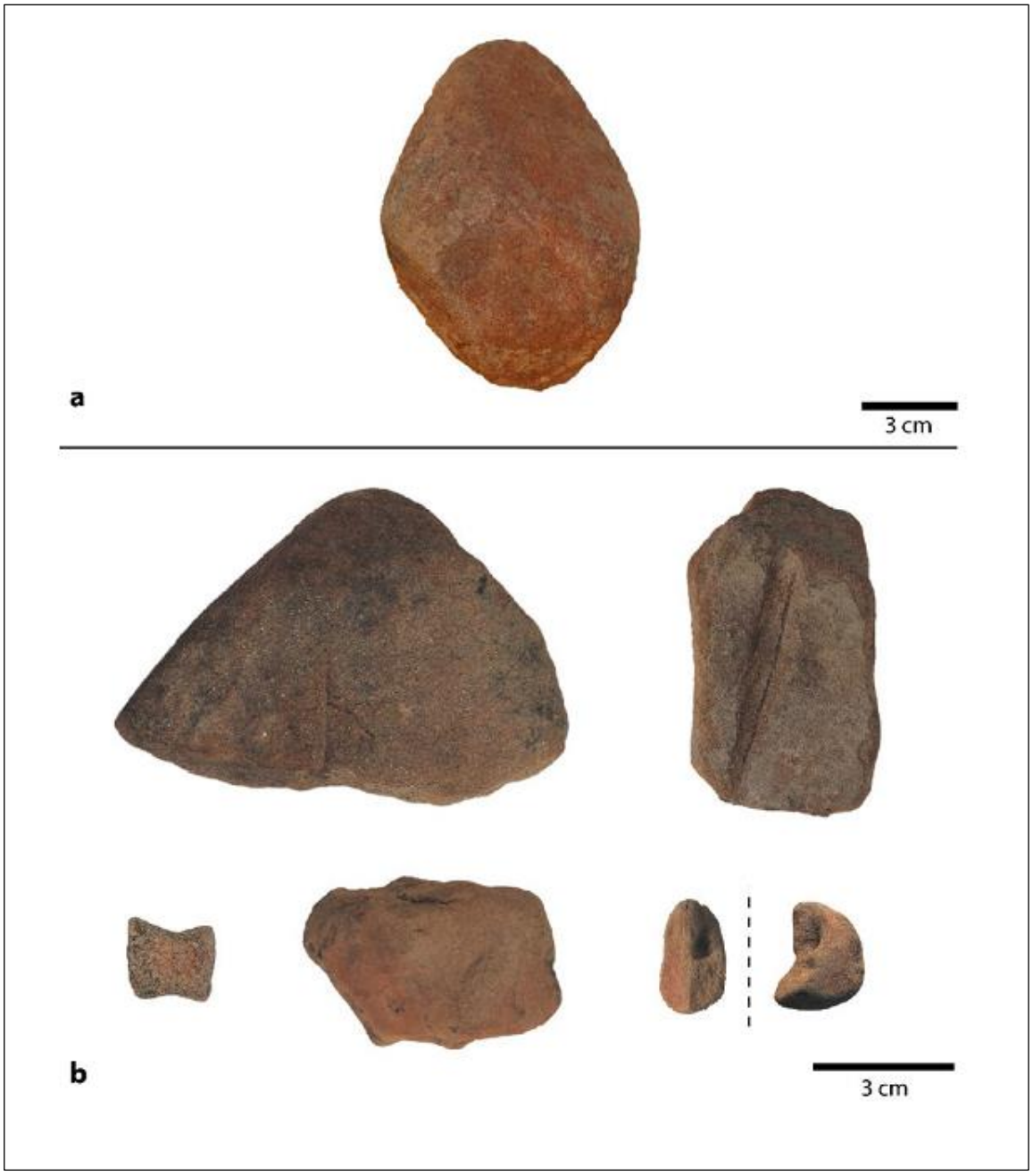


Figure 5.8 Tool examples recovered from site R10/1484: a) unidentified volcanic ochre-stained pounder (sample 194, context 1158; b) sandstone abraders (samples 57 (context 1169), 300 (context 1164), 221 (context 1158), 172 (context 1164), and 200 (context 1158)

Table 5.9 Site R10/1484: other tools

Material	Abrader or grinding stone	Pounder?	Hammer stone?	Knife	Total	Weight
Sandstone	20	-	-	-	20	1.76 kb
Breccia	4	3	-	-	7	1.61 kg
Unidentified volcanic	2	1	-	-	3	765.34 g
Total	**26**	**4**	**-**	**-**	**30**	**4.145 kg**

5.3.6 Raw Materials

The dominant raw stone materials were chert (n=73), basalt (n=42), obsidian (n=38) and argillite (n=37), all common materials used in stone tool making in Aotearoa (Table 5.6).

Chert and basalt sources are scattered and widespread throughout Aotearoa, from the top of the North Island to the lower South Island. Like obsidian, chert was known for its flaking properties and was a material commonly used in stone tool production. Basalt was also commonly used, particularly in the production of adze and scraper tools.

Obsidian was one of the most widely traded raw materials in pre-contact Aotearoa. It is of volcanic origin and is found in a number of locations in the Coromandel Peninsula, Northland, the Taupo Volcanic Zone and on Mayor Island in the Bay of Plenty. Obsidian can be sourced geochemically by looking at the proportions of different elements in the sample. This is done routinely in New Zealand using relatively cheap, non-destructive pXRF (portable X-ray fluorescence) technology. A geochemical analysis of a sub-set of the obsidian flakes was carried out in the OAL.

Argillite is one of the highest quality adze materials available in the country and derives from a number of sources. The quarries of the Nelson region were particularly favoured in the first two centuries of New Zealand settlement. Pinpointing the actual quarries from which the different flakes of argillite derive is not easy, but there is sufficient variation in colour and texture in hand specimen examination to assign tentative sources. It is our view that this assemblage contains argillite from quarries in the Nelson region and from Mt Ears (D'Urville Island).

5.3.7 Obsidian Geochemical Analysis

In order to better understand aspects of raw material procurement and distribution, a geochemical XRF (X-ray fluorescence) analysis was conducted for 25 of the obsidian artefacts. This form of analysis is a non-destructive X-ray technique used to determine the elemental composition of materials. It returns chemical spectra that are unique to specific raw material sources, enabling some interpretation of where the obsidian material was first procured, and subsequently transported to. A Bruker Tracer III-SD pXRF was utilised in the Otago Archaeological Lab (OAL), with the machine optimised to identify mid-Z trace elements (Mn, Fe, Zn, Th, Rb, Sr, Y, Zr, Nb) with green filter settings (40kV per channel, filament ADC= 30µA, filter= 12milAl + lmilTi +6milCu, runtime= 300 seconds).

Of the total obsidian assemblage from site R10/1484, 25 samples were selected to undergo geochemical analysis. Before running the samples through the pXRF the obsidian was sorted visually by colour into the groups grey and green based on the colour of the translucency. There were 20 grey obsidian and five green obsidian samples selected. Time and cost limitations meant that we were only able to run a select number of samples. This represents 65.7 of the total obsidian assemblage and is a higher proportion than is often achievable with archaeological collections. After colour, samples were selected primarily based on their size and surface flatness in order to obtain good quality data. Due to the small sample size, some of the samples were smaller and less flat than ideal.

The raw data was calibrated to parts per million (ppm) using the machine-specific quantification protocols for the Bruker Tracer III-SD #T3S2521, based on 40 known obsidian standards. A basalt standard (BHVO-2) was run at the beginning and end of the session as a quality control to assess accuracy of the data generated. This standard is used to check the consistency and calibration of the results as it has a known value. Table 5.10 shows the accuracy of the OAL pXRF in reproducing US Geological Survey (USGS) recommended results for the BHVO-2 standard, and indicates that it is particularly poor at producing accurate results for Zn. Despite this, the precision of the machine (i.e. its ability to consistently produce the same results irrespective of its accuracy) is relatively good for all elements.

Each sample was analysed twice (on different surfaces) and reported values are the means of the two analysis. Table 5.10 presents the results of mid-Z trace elements identified from the obsidian samples. Five elements are considered the most useful and indicative when discriminating between obsidian sources (Rb, Sr, Y, Zr, and Nb) (McCoy and Carpenter 2014).

Table 5.10 Basalt standard chemistry

	Mn	Fe	Zn	Ga	Th	Rb	Sr	Y	Zr	Nb
BHVO-2*	1290	86300	103	22	1	10	389	26	172	18
OAL	1087	79314	244	26	2	15	337	23	151	17
SD	144	4940	100	3	1	3	37	2	15	1
CV(%)	12	6	58	13	58	28	10	8	9	6

* USGS (United States Geological Survey) standard values. SD = standard deviation. CV = coefficient of variance

Following calibration, the artefacts were compared to geological reference sample spectra and values from known New Zealand sources to identify likely sources in the assemblage (McCoy and Carpenter 2014; Hermann and Forkel 2020; Herman et al. 2020). The OAL reference collection includes samples from the following major obsidian sources: Waiare, Huruiki, Te Ahumata (Great Barrier Island), Fanal Island, Cooks Bay, Hahei, Tairua, Waihi, Mayor Island, Rotorua, Maraetai, Ongaroto and Taupo. Following comparison with geological reference sample spectra and values (McCoy and Carpenter 2014; Hermann and Forkel 2020; Herman et al. 2020), 16 samples are likely from north of the Coromandel Peninsula (CVZ-N), and six are likely from Mayor Island (one of these was a core and as such was too thick to enable the green colour to be discerned during initial visual analysis

(Table 5.11). Source samples from Mayor Island, Wairau and Waihi are not included in the scatterplot (Figure 5.9) as they are major outliers with their Zr:Sr and Rb:Sr values in the range of 108–659 and 54–1100 respectively (as in McCoy and Carpenter 2014: figure 4). Of the 16 CVZ-N samples, most are likely to be from Great Barrier Island (Figure 5.9). Two of the samples are likely to be from the Coromandel Peninsula (CVZ-CP group). Finally the last one (19) is likely from Huruki (in the CVZ-N group) or Hahei (in the CVZ-CP group) and so was assigned to the CVZ group generally (Table 5.11 and Figure 5.9).

Table 5.11 Calibrated concentration values for obsidian samples (ppm) from R10/1484

Samples	Mn	Fe	Zn	Ga	Th	Rb	Sr	Y	Zr	Nb	Likely Source*
5	136	9008	147	21	19	190	21	37	127	10	CVZ-N
19	110	8974	119	21	19	199	45	33	159	10	CVZ
20	214	15756	220	27	25	229	37	50	275	13	CVZ-N
21	998	48105	612	37	21	182	2	144	1174	96	MI
22	520	14419	184	27	19	165	100	38	154	13	CVZ-CP
23	887	40236	534	33	18	160	2	132	1097	89	MI
25	232	11182	218	27	24	226	23	42	140	11	CVZ-N
47	152	9214	137	21	20	198	21	39	131	10	CVZ-N
52	271	17162	316	35	30	278	28	44	153	12	CVZ-N
61	181	9871	132	21	19	206	30	37	136	10	CVZ-N
62	669	33085	349	28	17	137	1	119	1009	86	MI
63	173	8972	118	20	21	196	21	39	131	10	CVZ-N
65	176	10035	145	24	23	217	23	41	137	11	CVZ-N
68	210	8852	151	22	18	195	14	46	125	12	CVZ-N
71	202	9187	134	21	20	195	21	38	128	10	CVZ-N
72	191	9610	130	20	18	196	30	35	133	9	CVZ-N
74	177	10880	188	23	21	215	23	41	137	10	CVZ-N
77	810	38266	472	32	20	156	2	130	1084	88	MI
82	182	10013	179	23	20	203	21	41	132	11	CVZ-N
83	729	21146	350	30	19	180	104	35	159	12	CVZ-CP
84	729	33372	339	28	16	146	1	131	1067	91	MI
97	745	34948	350	30	18	156	2	131	1109	92	MI
241	189	10688	167	23	21	210	30	37	139	11	CVZ-N
379	170	12673	200	27	22	235	51	35	179	12	CVZ-N
380	243	14056	338	27	22	222	25	39	137	11	CVZ-N

*Ml = Mayor Island; CVNZ-N = north of the Coromandel Volcanic Zone; CVZ-CP = Coromandel Peninsula

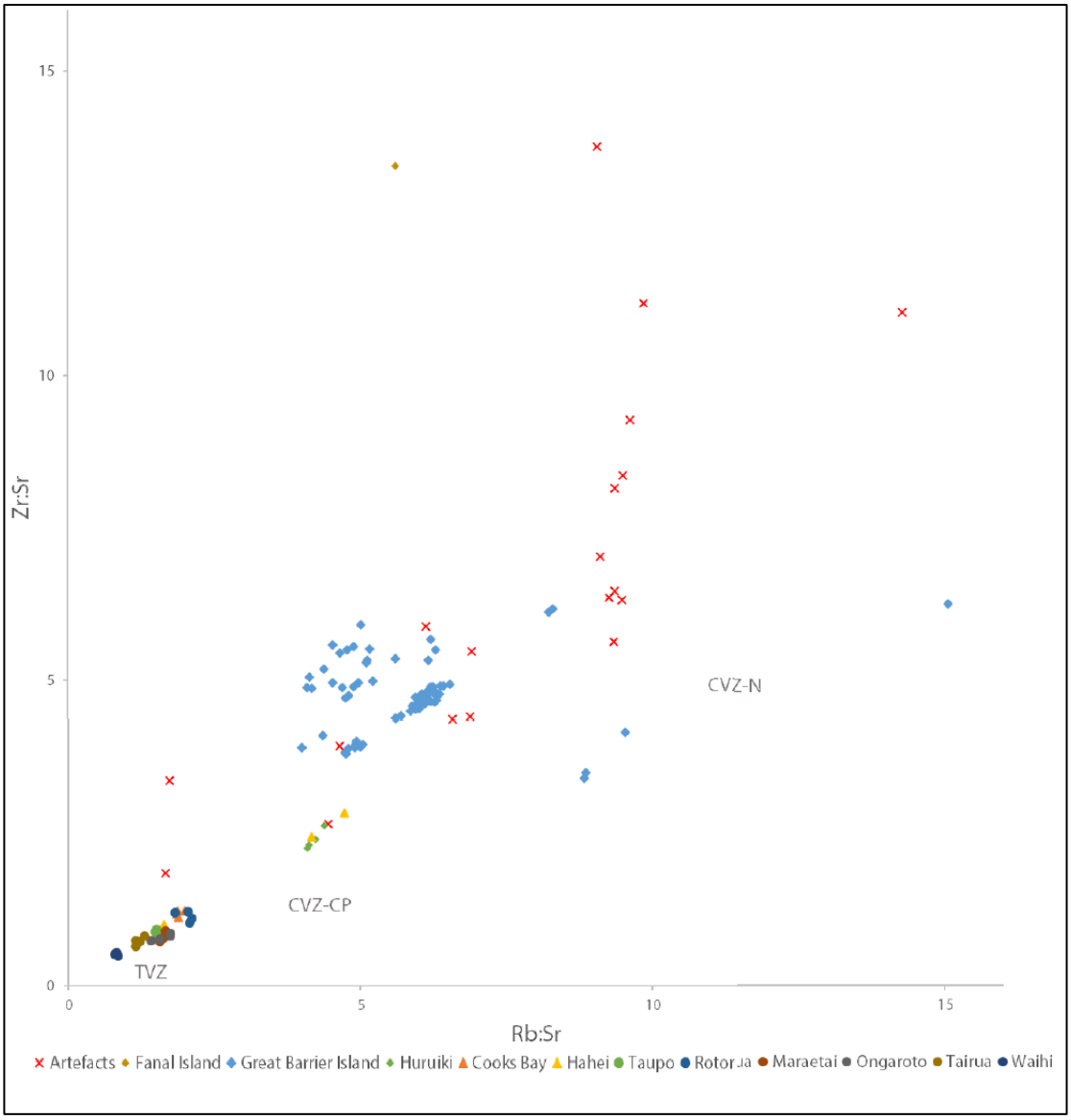


Figure 5.9 Scatter plot showing groupings of different sources compared with the artefacts (excluding major outliers from Waiare, Waihi, and Mayor Island source samples and artefacts). All samples fall within the range for the CVZ-N zone and several artefacts are likely from Great Barrier Island

5.3.8 Other

Other components of the Pūhoi R10/1484 assemblage were weighed (in grams). This included two pieces of ochre, two fire cracked rocks and 293 stone samples that were identified as non-archaeological, containing no evidence of working (Table 5.12).

Table 5.12 Site R10/1484: summary of other material

Class	Count	Weight
Ochre	2	2.5 g
Fire cracked rock	2	246.5 g
Non-archaeological stone	293	1.659 kg

5.3.9 Discussion of R10/1484 Assemblage

The material culture assemblage from site R10/1484 is predominantly made up of stone artefacts, with evidence of local and imported stone resources. This includes the use of local sedimentary and volcanic stone, and the import of obsidian from Mayor Island, the Coromandel Volcanic Zone and to the north of the Coromandel Volcanic Zone, and argillite from Nelson. The presence of the argillite adze fragment, and the partial and whole polished adzes, attests to the use and reworking of adzes at the site, although the absence of other stone samples displaying polished and hammer dressed cortex suggests these activities took place elsewhere on the site.

The majority of the artefacts (n=204) comprising the R10/1484 lithic assemblage were retrieved from 17 Phase 3 contexts and accounted for 87.17% of the assemblage, while the remainder (n=28) originated from just six Phase 2 contexts. No artefacts were recovered from Phase 1 contexts.

Of the 204 artefacts that comprised the Phase 3 assemblage, 72 were of chert, with the remainder consisting of basalt (n=33), obsidian (n=38), argillite (n=37), sandstone (n=13), and lesser amounts of breccia (n=9), limestone (=1) and unidentified volcanic rock (n=6). Of note, is the 124 artefacts that were retrieved from context 1141, an occupation layer that was associated with the shell midden and later phase activities. The layer sealed the Phase 2 features and also covered much of the R10/1484 site. The artefact assemblage overall consisted of 73 pieces of chert including 5 cores, nine flakes (two of which had been utilised) and a knife. Additionally, three angular pieces of chert debitage also displayed evidence of being utilised, while the remaining 44 pieces were classified as angular debitage. The occupation layer assemblage consisted of 33 pieces of obsidian which included 5 cores and 18 flakes, one of which displayed retouch, with another displaying evidence that it had been utilised as a cutting tool, while the remaining 15 specimens were classified as debitage. Of the 33 pieces of obsidian, 27 were grey in colour in transmitted light, while 6 (samples 21, 23, 62, 77, 84 and 97) were green. The obsidian geochemical analysis established that the chemical composition of the six green samples indicates that they originated from Mayor Island (Tūhua), with the majority of the remaining obsidian artefacts (n=14) being geochemically sourced to north of the Coromandel Peninsula and almost certainly Great Barrier Island (Aotea), while two of the remaining three specimens (samples 22 and 83) are likely to be from the Coromandel Peninsula and, lastly, sample 19 is from either Huruki or Hahei in the Coromandel Peninsula group.

The 23 argillite artefacts recovered from occupation layer 1141 most likely represent the re-working of argillite adzes on the site. The argillite assemblage included four flakes, one of which had been retouched, and another utilised, while a single angular fragment also displayed signs of having been utilised as an expedient tool. The remaining 18 specimens were classified as debitage. The majority of the argillite (n=19) from context 1141 had characteristics consistent with the Mt Ears source on D'Urville Island (Rangitoto ki te Tonga), while the remaining 4 were identified to the Nelson region in general.

Of the 42 pieces of basalt retrieved from site R10/1484, four pieces (all from different Phase 3 contexts) displayed evidence of modification. A flake retrieved from context 1195 (the fill of the extraction cut for one of the timber uprights in the large post-pit 1196, displayed evidence of being utilised as well as retouch. Utilised fragments were also retrieved from context 1175 (the fill of hearth 1174); from context 1164 (the fill of hāngi 1163 cut into the backfill of post-pit 1151), while a further flake was recovered from context 1208 (an occupation layer/surface associated with the drying racks. The remaining

38 pieces of basalt were classified as debitage. As with the argillite, the basalt assemblage likely indicates the re-working/sharpening of existing adzes on the site.

The smaller Phase 2 assemblage derived from six contexts ranging from an occupation/trample layer (context 1199) in the base of the large post-pit 1196, the lower fill (context 1176) of post-pit 1051, the fills (contexts 1158 and 1162) of the post extraction cuts within post-pits 1151 and 1196 respectively, a made ground deposit (context 1968) and the fill (context 1258) of a large posthole 1257.

The majority of the modest Phase 2 assemblage (n=14) was produced by context 1158, the fill of the post extraction cut within the large post-pit 1151. The assemblage consisted of six sandstone abraders/grindstones (hōanga) four of which had grooved, polished depressions indicative perhaps of sharpening an adze. Of note were four samples of rock identified tentatively as an igneous breccia, three of which were determined to be pounding implements (samples 193, 194 and 295). Samples 193 and 194 both had ochre staining with the ochre penetrated into the rock, strongly indicating that they had been used in the crushing and preparation of ochre, almost certainly for the painting of timber objects at the site. Sample 295 also displayed damage in the form of pecking, while sample 190 displayed a linear 'U'-shaped groove consistent with being used as a grindstone/abrader and also had ochre staining. The 1158 assemblage also produced three argillite artefacts including a complete polished adze, the butt-end of another polished adze and a fragment from a third large adze likely from Mt Ears, as well as a core consistent with being sourced from the Nelson region. Lastly, a single piece of chert debitage was also present. Three further abrader/grindstones were recovered from context 1176, the fill of post-pit 1051. The items consisted of a sandstone abrader with a polished, narrow 'U'-shaped groove, and two breccia specimens, one of which had a wide, polished groove, again consistent with being used as a grindstone/abrader.

Of the other Phase 2 contexts that produced artefacts, context 1199 is of note, which produced 8 pieces of basalt debitage and two of argillite and indicates the reworking of adzes in the vicinity of the large post-pits. The argillite has characteristics that are consistent with a Mt Ears source.

Lastly, context 1968 (a made ground layer sealing the earliest Phase 1 occupation features) produced a chert flake with cortex present on one side, an angular fragment of Mt Ears argillite along with three pieces of basalt debitage.

5.4 Site R10/1417 Lithic Analysis

Site R10/1417 incorporated features situated on two terraces that were located above and to the north of the Pūhoi River and Puhoi Road. The site consisted of a large shell midden deposit and associated features that overlay and sealed an occupation surface with structures, that in turn sealed earlier features consisting of a palisade enclosed pit complex. (See Chapter 4).

5.4.1 Material Culture

The material culture assemblage consisted of stone and shell artefacts. As shown in Table 5.13, a total of 316 stone artefacts and two shell artefacts were recovered from a total of 10 individual contexts across the two terraces that comprised site R10/1417. In the following sections, the total stone tool assemblage from the site is summarised.

Table 5.13 Site R10/1417: summary of material culture assemblage

Class	Count	Weight (Kg)
Stone artefact	314	3.463
Shell artefact	2	0.025
Total	**234**	**3.488 kg**

5.4.2 Stone Artefacts

A total of 314 stone artefacts relating to tool manufacture and two shell artefacts were recovered from R10/1417. Nineteen stone artefacts displayed evidence of shaping or reduction into specific tool forms for use (e.g. adze, chisel, knife, abrader, hammer stone, pounder, retouched fragment, utilised fragment). The assemblage included a small amount of sandstone and unidentifiable volcanic stone that was probably intended for use in abrading or sharpening of tools. The remaining artefacts were cores, flake pieces or fragments of waste material from flaking events (Table 5.14; Figure 5.10).

5.4.3 Flaked Tools

In total, there were 63 stone flakes (Table 5.14; Figure 5.10). Most flakes (84.1%) were conchoidally fractured, demonstrating a stone tool tradition of hard hammer percussion. Regular shaped flakes were the most common (39.7%), although expanding (15.9%), irregular (11.1%), and elongate (4.8%) flakes were also present in the assemblage. Generally, the process of flake production appears to be informal, with flaked stone selected solely for its sharp edge. To some extent, flake termination can provide information regarding success or 'skill' in the process of reduction, with feather terminations being the most desirable due to the fine edge generated. Of the flake pieces, 30.1% (n=19) had a feather termination; the remaining pieces displayed hinge (30.1%), step (31.7%), plunging (1.6%) or unknown (6.3%) terminations due to an absent distal margin.

The number of dorsal scars present on the flaked tools largely corresponds to the raw material utilised; the highest counts of dorsal scarring were noted on obsidian flakes. Only (10.8%) of flake platforms were cortical, suggesting that the primary flaking likely occurred elsewhere. There was also notable variability in flake platforms (types and dimensions), reinforcing the informal nature of the flake production. There was, however, evidence of platform overhang removal (on 53.9% of flakes), demonstrating platform preparation prior to striking.

Fifty-four flakes did not show any evidence of edge modification (by use or retouch), while 9 of the flakes may be classified as 'tool' based on the presence of micro-scarring or retouch (14.3% showed evidence of use wear, although there were no flakes with retouched edges). As shown in Table 5.15 and Table 5.16, angular fragments also presented evidence of edge modification (3.9% of fragments displayed use wear and 2.1% of fragments showed evidence of retouch).

Table 5.14 Site R10/1417: summary of lithic artefacts analysed

Stone type	Core	Tool[19]	Flake	Angular fragment	Total
Obsidian[20]	10	1	56	164	231
Chert	1	-	4	31	36
Unidentified volcanic	1	3	1	15	20
Greywacke	-	-	2	7	9
Basalt	1	1	-	6	8
Argillite	-	1	-	5	6
Sandstone	-	3	-	-	3
Nephrite	-	1	-	-	1
Total	**13**	**10**	**63**	**228**	**314**

Table 5.15 Site R10/1417: evidence of edge modification on flakes and angular fragments

	Flakes		Angular Fragments		
Stone type	**Utilised edge**	**Retouched edge**	**Utilised edge**	**Retouched edge**	**Total**
Obsidian	7	-	4	5	16
Chert	1	-	2	-	3
Greywacke	1	-	1	-	2
Unidentified Volcanic	-	-	2	-	2
Total	**9**	**0**	**9**	**5**	**23**

Thirteen cores were also present in the stone tool assemblage (e.g. Figure 5.11). The intensity of reduction was particularly evident for the obsidian cores (n=10), all of which had more than one striking platform and weighed under 10 grams. Three of the obsidian cores also showed >10 core scars. Of the wider core assemblage, two cores showed evidence of cortex (identified on at least 1-25% of the core surface), reinforcing that primary flaking likely occurred elsewhere.

A small selection of angular fragments (n=2, 1% of the stone tool assemblage from R10/1417) displayed evidence of cortex polish, indicating they had broken off a specialised tool (i.e. an adze). In this case, this implies that the fragments themselves were the result of adze sharpening and refurbishing activities. Of the angular fragments, one raw material showed evidence of cortex polish: basalt (Table 5.16).

[19] Displaying evidence of shaping or reduction into specific forms for use (e.g. adze, blade, knife, abrader, hammer stone, pounder).
[20] 108 obsidian samples were also analysed using pXRF see Section 5.4.7.

Figure 5.10 Flake examples from site R10/1417: obsidian (left) samples 662 and 628 (both from artefact-rich deposit 4169); chert (right) samples 536 (from posthole fill 4037) and 481 (from buried soil 4005)

Table 5.16 Site R10/1417: angular fragments displaying polish and hammer dressing

Raw material	Cortex polish present (#)	Cortex hammer dressing present (#)	% with polish or hammer dressing[21]
Basalt	2	-	1%

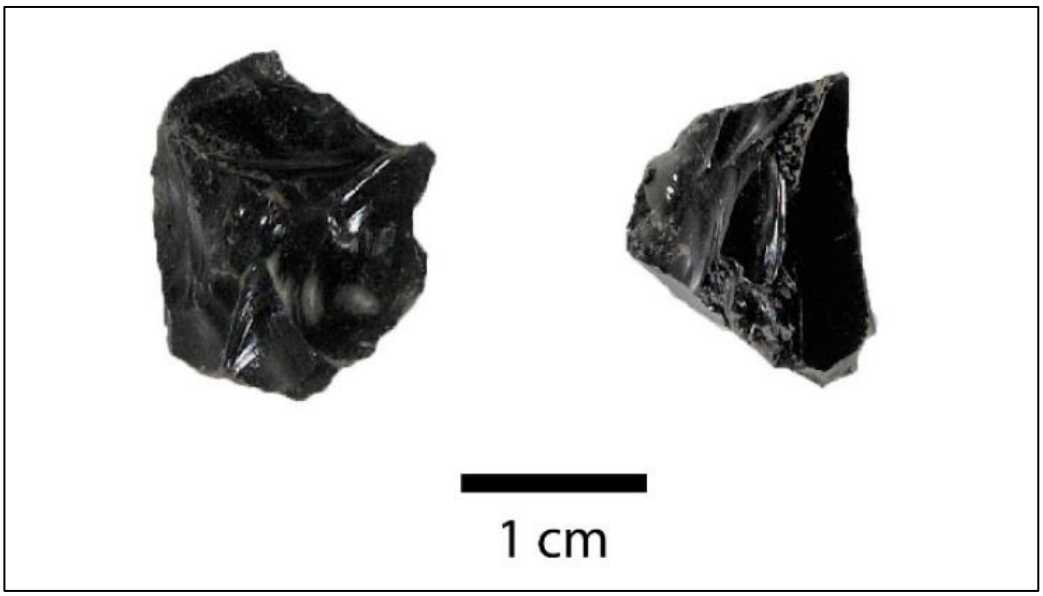


Figure 5.11 Site R10/1417 obsidian core examples (samples 586 and 589), both retrieved from the artefact-rich layer 4169

[21] Percentage derived from total number of angular fragments.

5.4.4 Adzes and Chisels

The assemblage included one complete argillite adze (Duff Type 2B) and the bevel fragment of a nephrite (pounamu) chisel. Each of these tools displayed evidence of polish (Table 5.17 and Figure 5.12). Sample 746 also showed hammer dressing, suggesting it was at an earlier stage of production prior to breaking.

Table 5.17 Site R10/1417: adze and chisel summary

Bag #	Class	Material	Portion	Max Length (mm)	Max Width (mm)	Max Thickness (mm)	Weight (g)
746	Adze	Argillite (Mt Ears)	Fragment	70.69	48.15	-	89.8
442	Chisel	Nephrite (pounamu)	Fragment (bevel)	13.73	-	-	0.3

Figure 5.12 Site R10/1417 chisel and adze examples: a) nephrite chisel fragment (sample 442 from midden 4001); b) Duff Type 2B argillite adze (sample 746 retrieved from oven fill 4025)

5.4.5 Other Tools

Eight other stone artefacts from the assemblage were classified as 'tool'. These consisted of four stone abraders, three possible hammer stones and one knife (Table 5.18 and Figure 5.13). Among the raw materials utilised was an unidentified volcanic stone interpreted as local source material. The obsidian knife was a broken flake that had been repurposed. It exhibited retouch and distinct use wear patches along the entire length of one margin.

Table 5.18 Site R10/1417: other tools

Material	Abrader or grinding stone	Hammer stone?	Knife	Total	Weight (g)
Sandstone	3	-	-	3	352
Unidentified volcanic	1	2	-	3	825.9
Basalt	-	1	-	1	74.2
Obsidian	-	-	1	1	1.84
Total	**4**	**3**	**1**	**8**	**1253.9**

Figure 5.13 Site R10/1417 basalt hammer stone tool examples (samples 693 from the artefact-rich layer 4169 and 731 from buried soil layer 4005)

5.4.6 Raw Materials

The dominant raw stone materials from site R10/1417 were obsidian (n=231) and chert (n=36), both common materials used in stone tool making in Aotearoa.

Obsidian was one of the most widely traded raw materials in pre-contact Aotearoa. It is of volcanic origin and is found in a number of locations in the Coromandel Peninsula, Northland, the Taupo Volcanic Zone and on Mayor Island in the Bay of Plenty. A geochemical analysis of a sub-set of the obsidian flakes was carried out in the OAL.

Chert sources are scattered and widespread throughout Aotearoa, from the top of the North Island to the lower South Island. Like obsidian, chert was known for its flaking properties and was a material commonly used in stone tool production.

While there was a relatively small amount of argillite (1.9%), it is one of the highest quality adze materials available in the country and derives from a number of sources. The quarries of the Nelson region were particularly favoured in the first two centuries of New Zealand settlement. Pinpointing the actual quarries from which the different flakes of argillite derive is not easy, but there is sufficient variation in colour and texture in hand specimen examination to assign tentative sources. It is our view that this assemblage contains argillite from quarries at Mt Ears (D'Urville Island) in the Nelson region.

5.4.7 Obsidian Geochemical Analysis

In order to better understand aspects of raw material procurement and distribution, a geochemical XRF (X-ray fluorescence) analysis was conducted for a subsample of the obsidian artefacts. This form of analysis is a non-destructive X-ray technique used to determine the elemental composition of materials. It returns chemical spectra that are unique to specific raw material sources, enabling some interpretation of where the obsidian material was first procured, and subsequently transported to. A Bruker Tracer III-SD pXRF was utilised in the Otago Archaeological Lab (OAL), with the machine optimised to identify mid-Z trace elements (Mn, Fe, Zn, Th, Rb, Sr, Y, Zr, Nb) with green filter settings (40kV per channel, filament ADC= 30µA, filter= 12milAl + lmilTi +6mi1Cu, runtime= 300 seconds).

Of the total obsidian assemblage, 108 samples were selected to undergo geochemical analysis. Before running the samples through the pXRF the obsidian was sorted visually by colour into the groups grey and green based on the colour of the translucency. There were 104 grey obsidian and four green obsidian samples selected. This represents 46.8% of the total obsidian assemblage. After colour, samples were selected primarily based on their size and surface flatness in order to obtain good quality data.

The raw data was calibrated to parts per million (ppm) using the machine-specific quantification protocols for the Bruker Tracer III-SD #T3S2521, based on 40 known obsidian standards. A basalt standard (BHV0-2) was run at the beginning and end of the session as a quality control to assess accuracy of the data generated. This standard is used to check the consistency and calibration of the results as it has a known value. Table 5.19 shows the accuracy of the OAL pXRF in reproducing US Geological Survey (USGS) recommended results for the BHV0-2 standard, and indicates that it is particularly poor at producing accurate results for Zn. Despite this, the precision of the machine (i.e. its ability to consistently produce the same results irrespective of its accuracy) is relatively good for all elements.

Each sample was analysed twice (on different surfaces) and reported values are the means of the two analyses. Table 5.20 presents the results mid-Z trace elements identified from the obsidian samples. Five elements are considered the most useful and indicative when discriminating between obsidian sources (Rb, Sr, Y, Zr, and Nb) (McCoy and Carpenter 2014).

Table 5.19 Basalt standard chemistry (ppm)

	Mn	Fe	Zn	Ga	Th	Rb	Sr	Y	Zr	Nb
BHVO-2*	1290	86300	103	22	1	10	389	26	172	18
OAL	1087	79314	244	26	2	15	337	23	151	17
SD	144	4940	100	3	1	3	37	2	15	1
CV(%)	12	6	58	13	58	28	10	8	9	6

* USGS (United States Geological Survey) standard values. SD = standard deviation. CV = coefficient of variance

Table 5.20 Calibrated concentration values for obsidian samples from R10/1417

Samples	Mn	Fe	Zn	Ga	Th	Rb	Sr	Y	ZR	Nb	Likely Source*
403	144	12044	134	21	22	191	32	44	243	11	CVZ-N
389	309	11751	142	20	17	163	31	48	207	14	CVZ-N
390	158	9137	138	21	19	201	20	37	130	11	CVZ-N
391	157	8093	114	17	18	178	19	36	119	8	CVZ-N
392	232	12140	239	27	24	237	33	39	149	12	CVZ-N
395	122	10243	159	22	22	217	22	42	138	10	CVZ-N
402	233	16969	254	31	29	244	39	47	268	14	CVZ-N
403	144	12044	134	21	22	191	32	44	243	11	CVZ-N
405	199	11353	174	26	22	227	32	37	46	11	CVZ-N
406	169	13531	169	26	21	213	35	45	254	12	CVZ-N
412	179	11563	141	21	21	191	32	43	240	12	CVZ-N
413	166	11162	129	20	19	180	31	40	233	12	CVZ-N
414	294	15930	204	30	25	247	41	52	287	15	CVZ-N
415	215	9634	147	22	21	206	22	40	134	10	CVZ-N
416	167	8175	113	19	17	178	20	38	120	9	CVZ-N
417	215	13814	147	25	24	212	34	45	267	13	CVZ-N
420	234	15969	211	29	25	236	39	51	270	13	CVZ-N
421	172	11546	121	21	20	187	30	43	243	11	CVZ-N
422	230	11621	171	25	21	233	33	39	149	10	CVZ-N
423	123	11817	127	22	22	195	32	44	245	11	CVZ-N
424	143	11450	138	20	20	186	31	41	240	11	CVZ-N

Samples	Mn	Fe	Zn	Ga	Th	Rb	Sr	Y	ZR	Nb	Likely Source*
425	154	13241	149	23	21	208	34	48	253	13	CVZ-N
426	203	12933	155	22	22	201	34	41	245	12	CVZ-N
427	185	13465	159	25	22	216	35	45	259	13	CVZ-N
428	173	11484	127	20	20	185	31	45	234	11	CVZ-N
429	207	16703	217	29	27	250	41	51	28	13	CVZ-N
431	653	30242	299	24	14	131	2	117	985	84	MI
432	120	13689	156	25	19	214	34	45	269	12	CVZ-N
433	195	9907	194	22	18	196	29	37	134	8	CVZ-N
434	177	14444	153	26	24	230	36	48	283	15	CVZ-N
435	169	14142	172	25	20	216	35	48	261	13	CVZ-N
437	160	11778	126	21	20	189	30	42	235	11	CVZ-N
438	139	12070	133	24	21	197	33	45	247	12	CVZ-N
441	187	12567	139	24	21	196	31	44	254	12	CVZ-N
443	143	8865	128	22	19	191	21	40	126	10	CVZ-N
446	128	9807	133	21	20	204	21	41	133	11	CVZ-N
449	168	11214	233	24	21	210	23	38	138	9	CVZ-N
450	199	13618	154	27	21	209	35	43	255	12	CVZ-N
451	861	43991	572	35	19	165	2	128	1087	89	MI
452	168	8587	119	17	18	183	25	32	126	9	CVZ-N
453	195	9477	161	21	19	193	20	39	129	11	CVZ-N
475	188	12519	134	20	19	181	31	40	233	11	CVZ-N
484	238	12346	194	28	22	248	25	44	146	12	CVZ-N
498	172	11732	132	19	18	187	33	42	235	11	CVZ-N
499	167	10675	231	26	22	213	32	39	133	10	CVZ-N
507	164	12269	137	21	19	189	22	44	243	11	CVZ-N
509	167	10817	153	23	21	200	31	35	142	10	CVZ-N
513	146	14123	165	24	20	217	36	45	264	13	CVZ-N
515	234	14585	172	28	22	225	40	47	279	13	CVZ-N
517	167	10864	160	23	22	212	30	37	141	10	CVZ-N
518	222	11813	138	22	20	192	32	42	253	11	CVZ-N
519	170	10265	132	23	21	211	32	37	141	10	CVZ-N
521	196	14918	163	26	24	234	39	51	278	13	CVZ-N
524	266	17393	201	30	29	251	43	52	290	14	CVZ-N
527	232	15234	193	25	23	232	38	49	275	14	CVZ-N
530	173	13202	144	22	21	204	34	46	247	11	CVZ-N
533	226	11925	143	22	20	192	32	42	249	11	CVZ-N

Samples	Mn	Fe	Zn	Ga	Th	Rb	Sr	Y	ZR	Nb	Likely Source*
534	219	17383	222	30	26	253	40	49	280	15	CVZ-N
545	194	10213	173	22	19	195	29	34	133	9	CVZ-N
578	175	9647	127	20	19	195	20	39	130	9	CVZ-N
579	549	12590	222	28	25	252	26	44	146	12	CVZ-N
581	188	10306	148	26	20	216	24	39	136	11	CVZ-N
586	181	8235	122	18	16	180	20	35	120	10	CVZ-N
587	203	88899	132	19	18	193	21	36	125	9	CVZ-N
588	208	10207	149	23	18	211	22	41	135	10	CVZ-N
589	222	9372	128	20	20	191	29	35	132	9	CVZ-N
592	179	11499	156	28	18	231	23	44	146	13	CVZ-N
596	178	9986	182	24	23	201	20	40	129	11	CVZ-N
597	175	10207	150	23	20	223	24	41	137	11	CVZ-N
598	175	11785	207	25	20	226	33	37	148	10	CVZ-N
603	477	11057	167	23	12	138	70	33	149	12	CVZ-CP
607	173	9519	122	21	19	193	20	37	128	10	CVZ-N
609	185	10101	147	23	21	219	24	42	140	11	CVZ-N
611	164	10180	136	23	21	215	23	43	135	11	CVZ-N
615	167	10549	153	26	22	224	24	43	143	11	CVZ-N
621	955	44137	431	33	20	162	2	153	1298	105	MI
623	234	12651	317	29	25	241	26	42	144	12	CVZ-N
633	236	11176	195	26	20	219	25	41	139	12	CVZ-N
634	150	10301	152	24	23	222	23	41	141	11	CVZ-N
637	311	13842	259	28	24	243	36	38	149	11	CVZ-N
640	218	11576	169	27	25	237	24	45	145	11	CVZ-N
643	826	39262	405	34	29	165	1	143	1164	95	MI
660	154	8843	130	20	17	191	20	37	128	10	CVZ-N
662	174	9113	133	21	20	199	22	39	130	10	CVZ-N
664	201	8365	128	18	18	182	19	36	121	9	CVZ-N
665	157	9448	143	23	21	200	23	41	131	10	CVZ-N
667	351	8963	126	17	11	116	61	29	131	10	CVZ-CP
668	165	10434	161	24	19	208	23	40	135	11	CVZ-N
670	176	10541	159	25	18	213	22	41	138	11	CVZ-N
671	191	9832	137	24	21	212	23	40	135	11	CVZ-N
672	187	10595	151	25	21	219	23	41	139	12	CVZ-N
674	182	9774	140	23	20	208	22	39	133	11	CVZ-N
681	165	8462	137	22	19	190	20	39	125	10	CVZ-N

Samples	Mn	Fe	Zn	Ga	Th	Rb	Sr	Y	ZR	Nb	Likely Source*
682	138	9094	134	21	19	196	21	39	128	10	CVZ-N
684	173	10531	168	24	21	221	22	42	137	10	CVZ-N
687	119	9099	128	20	20	193	21	40	127	10	CVZ-N
688	171	9880	138	26	23	214	23	40	136	11	CVZ-N
691	216	9757	167	23	20	199	21	37	128	10	CVZ-N
695	169	10618	152	27	22	222	23	41	140	12	CVZ-N
697	155	9255	159	22	20	187	21	37	127	10	CVZ-N
699	260	14443	214	33	28	273	28	45	151	12	CVZ-N
705	120	8829	135	20	17	189	20	38	125	10	CVZ-N
706	129	9346	143	23	19	206	22	40	134	10	CVZ-N
709	148	10024	149	23	21	2	22	41	136	11	CVZ-N
712	101	9784	185	24	21	200	21	38	133	9	CVZ-N
715	191	10558	166	24	21	218	23	42	140	11	CVZ-N
719	182	11040	179	25	22	226	22	41	141	11	CVZ-N
738	192	8950	138	19	18	179	28	33	128	8	CVZ-N
739	366	21659	322	34	33	285	45	54	298	15	CVZ-N

*Ml= Mayor Island; CVZ-N = north of the Coromandel Volcanic Zone; CVZ-CP = Coromandel Peninsula

Following calibration, the artefacts were compared to geological reference sample spectra and values from known New Zealand sources to identify likely sources in the assemblage (McCoy and Carpenter 2014; Hermann and Forkel 2020; Herman et al. 2020). The OAL reference collection includes samples from the following major obsidian sources: Waiare, Huruiki, Te Ahumata (Great Barrier Island), Fanal Island, Cooks Bay, Hahei, Tairua, Waihi, Mayor Island, Rotorua, Maraetai, Ongaroto and Taupo. Following comparison with geological reference sample spectra and values (McCoy and Carpenter 2014; Hermann and Forkel 2020; Herman et al. 2020), we found that four samples are likely from Mayor Island, two samples are likely from the Coromandel Peninsula (CVZ-CP), and the remaining 102 samples are likely from north of the Coromandel Peninsula (CVZ-N) (Table 5.20 and Figure 5.14). Source samples from Mayor Island, Wairau, Waihi are not included in the scatterplot as they are major outliers with their Zr:Sr and Rb:Sr values in the range of 108–659 and 54–1100 respectively (as in McCoy and Carpenter 2014: figure 4.13). Of the 102 CVZ-N samples, most are likely to be from Great Barrier Island (Figure 5.14).

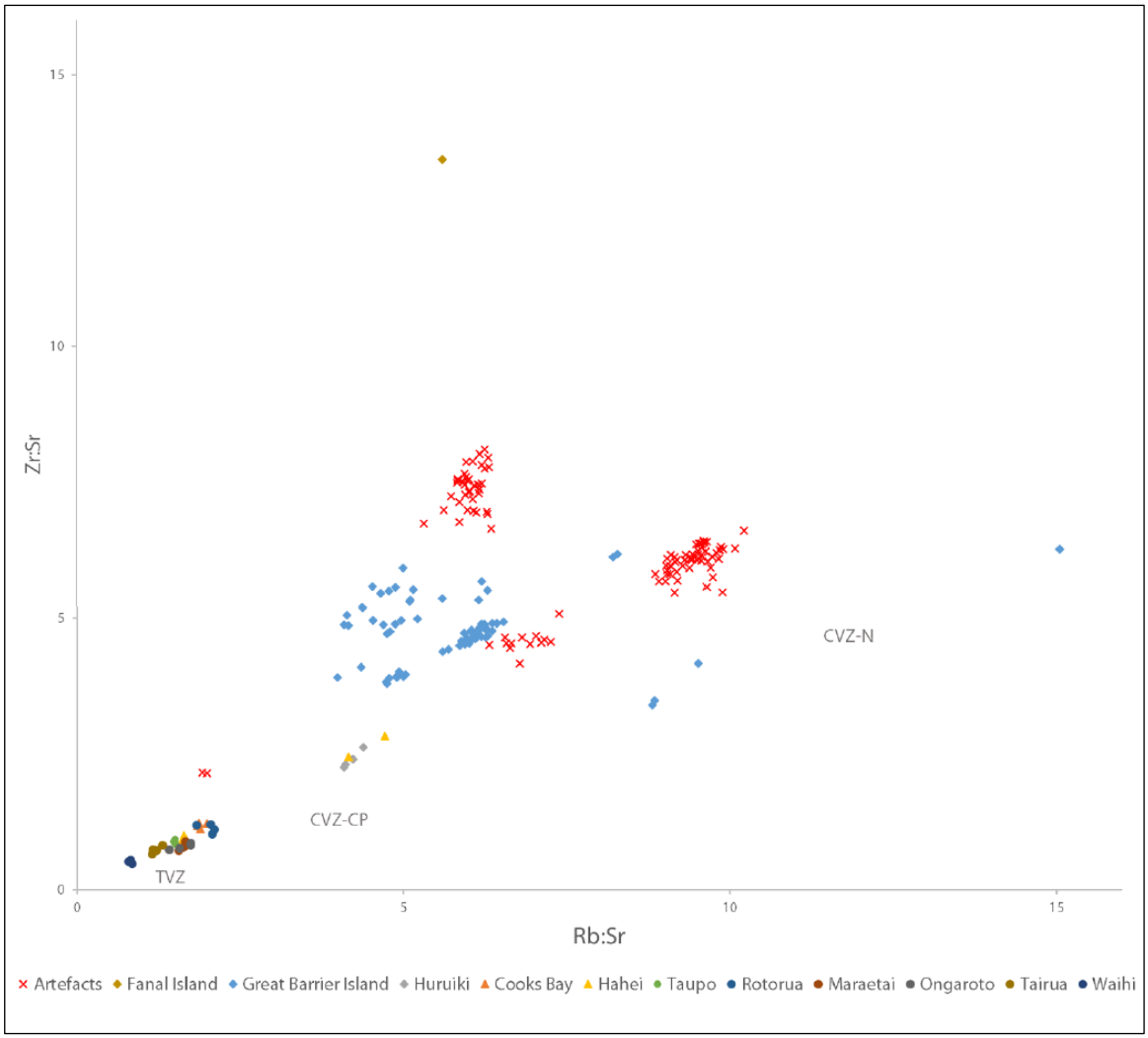


Figure 5.14 Scatter plot showing groupings of different sources compared with the artefacts from site R10/1417 (excluding major outliers from Waiare, Waihi, and Mayor Island source samples and artefacts). Most samples fall within the range for the CVZ-N zone and several artefacts are likely from Great Barrier Island. Two artefacts (603 and 667) fall within the CVZ-CP zone

5.4.8 Shell Artefacts

The shell artefact assemblage comprised two probable bivalve shell scrapers (Table 5.21; Figure 5.15). It is likely that these shells were used as scraper artefacts, evidenced by concave valve edges (cf. Leach et al. 2000: 17-18). It is important to note, however, that it is difficult to positively identify these tools, as damage similar in appearance to shell edge modification can occur during excavation and storage.

Table 5.21 Site R10/1417: summary of shell artefacts

Artefact	Count	Weight (g)
Worked shell	2	24.53

Figure 5.15 Site R10/1417 shell scraper examples (samples 725 and 724), both recovered from midden 4001)

5.4.9 Other

Other components of the site R10/1417 assemblage were weighed (in grams). This included 9 fire cracked rocks and 43 stone samples that were identified as non-archaeological, containing no evidence of working (Table 5.22).

Table 5.22 Site R10/1417: summary of other stone material

Class	Count	Weight (g)
Fire cracked rock	9	845.14
Non-archaeological stone	43	2864.3

5.4.10 Discussion of R10/1417 Assemblage

The material culture assemblage from site R10/1417 at Pūhoi is made up of stone artefacts (apart from two probable shell scrapers), with evidence of local and imported stone resources. This includes the use of local sedimentary and volcanic stone, and the import of obsidian from Mayor Island, the Coromandel Peninsula and to the north of the Coromandel Volcanic Zone (probably mainly Great Barrier Island), argillite from the Nelson region and nephrite jade (pounamu) from the west coast of the South Island. The presence of one adze, one chisel and the identification of polish on other stone specimens also attests to the reworking of adzes at the site, although the limited frequency of this suggests this was not done at a large scale. The majority of the obsidian is geochemically traced to a source that is from north of the Coromandel Peninsula, and which would most likely have been located on Great Barrier Island (Aotea).

The majority of the assemblage (n=187) was retrieved from just three Phase 1 contexts (59.55%), while the remainder (n=127) originated from seven Phase 2 contexts (40.45%). Of the 187 artefacts that comprised the Phase 1 assemblage, 144 were of obsidian, with the remainder consisting of chert, argillite, basalt, greywacke and unidentified volcanic rock. Of note is the 36 artefacts that were retrieved from context 4035, which was an occupation layer associated with the Phase 1 whare (context 4055) within the palisaded enclosure (context 4344) on the upper terrace. The artefacts consisted of 31 pieces of obsidian, of which four were flakes, 26 were pieces of debitage and one was a core. The remaining five items were all of debitage and consisted of two pieces of chert, two pieces of argillite and a single specimen of basalt. It is likely that the assemblage from context 4035 represents the production of a number of different tools, and it is plausible that the assemblage was produced during the construction of the whare, or enclosure, at some point during the occupation lifespan of the structure.

The buried soil layer (context 4005), the formation of which was contemporary with the active duration of the palisaded enclosure 4344, the rua porotaka, and the whare 4055, produced the largest portion of the assemblage with some 111 specimens. The assemblage from context 4005 was recovered from the base and lower levels of the buried soil, and consisted of 83 pieces of obsidian, 16 of which were flakes, with four cores and the remainder consisting of small angular pieces of debitage/shatter. Of note are samples 431 (a producer core) and 451 (an angular fragment with cortex present) that were both of green colour in transmitted light, as opposed to the grey of the vast majority of the obsidian assemblage from the site. The obsidian geochemical analysis established that the chemical composition of the two samples strongly suggests that they originated from Mayor Island (Tūhua). The remaining artefacts consisted of 20 pieces of chert, two of which were flakes, with the rest consisting of angular pieces of debitage; two pieces of argillite with characteristics consistent with the Mt Ears source on D'Urville Island (Rangitoto ki te Tonga); a single piece each of greywacke and basalt; and lastly a hammerstone of unidentified volcanic rock.

The remainder of the Phase 1 assemblage (n= 40) was collected during the excavation of the occupation layer 4168 on the lower terrace, which was related to cooking activities. Like the upper terrace contexts, the context 4168 assemblage was dominated by obsidian (n=30) of which 10 were flakes, with a single producer core and the balance consisting of angular fragments of debitage/shatter, although one of these (sample 668) had been utilised with clear evidence of retouch. Of note was a flake (sample 643), green in transmitted light, that the geochemical XRF analysis determined most likely originated from Mayor Island.

The smaller Phase 2 assemblage (n=127) was derived from seven contexts ranging from an occupation layer, shell midden deposits, oven fills and the fill of a posthole, situated on the upper terrace, and the occupation/lithic working surface 4169 situated on the lower terrace. Context 4169 produced the bulk of the Phase 2 assemblage (n=94), with the majority consisting of obsidian (n=84), and the remainder consisting of six pieces of chert debitage, a basalt hammerstone, a sandstone abrader/grinding stone, and two pieces of debitage from an unidentified volcanic rock. The obsidian assemblage consisted of a knife, 25 flakes (six of which had been utilised as cutting tools), four producer cores, with four utilised angular fragments (one of which displayed retouch) and the remainder consisted of angular fragments of debitage/shatter. One of the flakes (sample 621) was established by the geochemical XRF analysis as being of Mayor Island origin. The remainder of the Phase 2 lithic assemblage was recovered from deposits and features on the upper terrace. The main shell midden deposit, context 4001, and two smaller midden deposits, contexts 4004 and 4052, produced assemblages of 18, 7 and 2 artefacts respectively. In contrast to

the other contexts that produced lithic artefacts, no obsidian was recovered from the three midden deposits, which instead contained chert, basalt, argillite, sandstone, unidentified volcanics and, most notably, a small fragment of a nephrite (pounamu) chisel from the main midden, context 4001. Also of note was a basalt producer core and a utilised greywacke flake, both also from context 4001, a chert core from midden 4004, and two sandstone abraders from midden deposit 4052. Lastly, the complete argillite adze in Duff 2B form was recovered from context 4025, the fill of an earth oven cut into the main midden deposit 4001. The characteristics of the argillite are consistent with a Nelson region quarry.

5.5 Other Sites – Lithic Analysis

5.5.1 R10/1106

Site R10/1106 was a shell midden site with associated features situated on a relatively flat topped, west-east trending ridge spur which descended from the large hill that dominates the property at 3 Puhoi Road. Five stone samples were analysed from site R10/1106 (sample nos. 385, 386, 387, 10 and an unstratified surface find). Three of the samples represent stone artefacts relating to tool manufacture, consisting of one flake and two angular fragments (Table 5.23). The two remaining samples (the unstratified surface find and sample 10) were determined to be non-archaeological following microscopic examination.

Table 5.23 Site R10/1106: summary of flaked stone tools

Stone type	Core	Tool[22]	Flake	Angular fragment	Total	Weight (g)
Obsidian	-	-	1	-	1	0.04
Chert	-	-	-	1	1	1.1
Argillite	-	-	-	1	1	8
Total	**-**	**-**	**1**	**2**	**3**	**9.14**

The obsidian flake (sample 385) was conchoidally fractured with a hinge termination, faceted platform, and evidence of platform overhang removal. The sample was small with a maximum length of 9.03mm and weight of 0.04 grams and contained no evidence of micro-scarring.

Two angular fragments, one of argillite (sample 386) and one of chert (sample 387), were also identified from site R10/1106. The argillite sample displayed evidence of cortex polish, indicating that it had broken off a tool (e.g. adze) as a result of sharpening and refurbishing activities. It is our view that the source of the argillite sample is Mt Ears, from D'Urville Island, Nelson region.

[22] Displaying evidence of shaping or reduction into specific forms for use (e.g. adze, blade, knife, abrader, hammer stone, pounder).

5.5.2 R10/1485

Site R10/1485 was a shell midden site situated on a low natural slumped terrace just above the southwestern bank of an inlet of the Pūhoi River in the far south of the 3 Puhoi Road property.

One stone sample was analysed from site R10/1485 (sample 658). This was an angular fragment with a maximum length of 36.04mm and a weight of 7.4g. The raw material was argillite, and the likely argillite source is from a Nelson quarry. The fragment displayed hammer dressing and polish cortex on one surface, indicative of specialised tool sharpening and refurbishing activities.

5.5.3 R10/1506

Site R10/1506 consisted of two distinct shell midden deposits situated on the northern shoreline of the Ōkahu Inlet in the south of the Billing Road works area.

One stone sample was analysed from site R10/1506 (sample 757). This was a sandstone specimen containing no evidence of archaeological working. A 'U'-shaped groove present along one side appeared to be naturally produced when examined under an Olympus SZX7 stereo microscope.

5.5.4 R10/1514

Site R10/1514 was a shell midden site situated on relatively flat to gently sloping ground at the base of a northwest to southeast trending spur that overlooked an inlet of the Pūhoi River.

One stone sample was analysed from site R10/1514 (sample 745). This was a basalt specimen (weight: 10.lg) that contained no evidence of archaeological working following microscopic examination.

5.5.5 R10/921

An adze was found in a 1902 demolition deposit at Pā o Te Hēmara Tauhia (R10/921) during works and handed into Hōkai Nuku representatives (Figure 5.16).[23] It was a small adze with a quadrangular cross section, no tang and with slightly convex face. It may have been made from Motutapu greywacke or argillite. It had signs of grinding and hammer dressing visible at the poll and was well-polished. It was 65.1mm long, with a maximum blade width of 44.5mm, and a maximum thickness of 17.7mm.

5.5.6 Discussion

The small material culture assemblage from sites R10/1106, R10/1485, R10/1506 and R10/1514 is made up of stone artefacts, with evidence of local and imported stone resources. This includes the use of local sedimentary stone, and the import of obsidian from one of the volcanic zones, and argillite from the Nelson region. The single argillite fragments retrieved from sites R10/1106 and R10/1485 respectively, each displaying hammer dressing and cortex polish, attest to the reworking of adzes at these sites, although the limited frequency of remains suggest this was not done at a large scale.

[23] It was not among the lithic material analysed by SPAR.

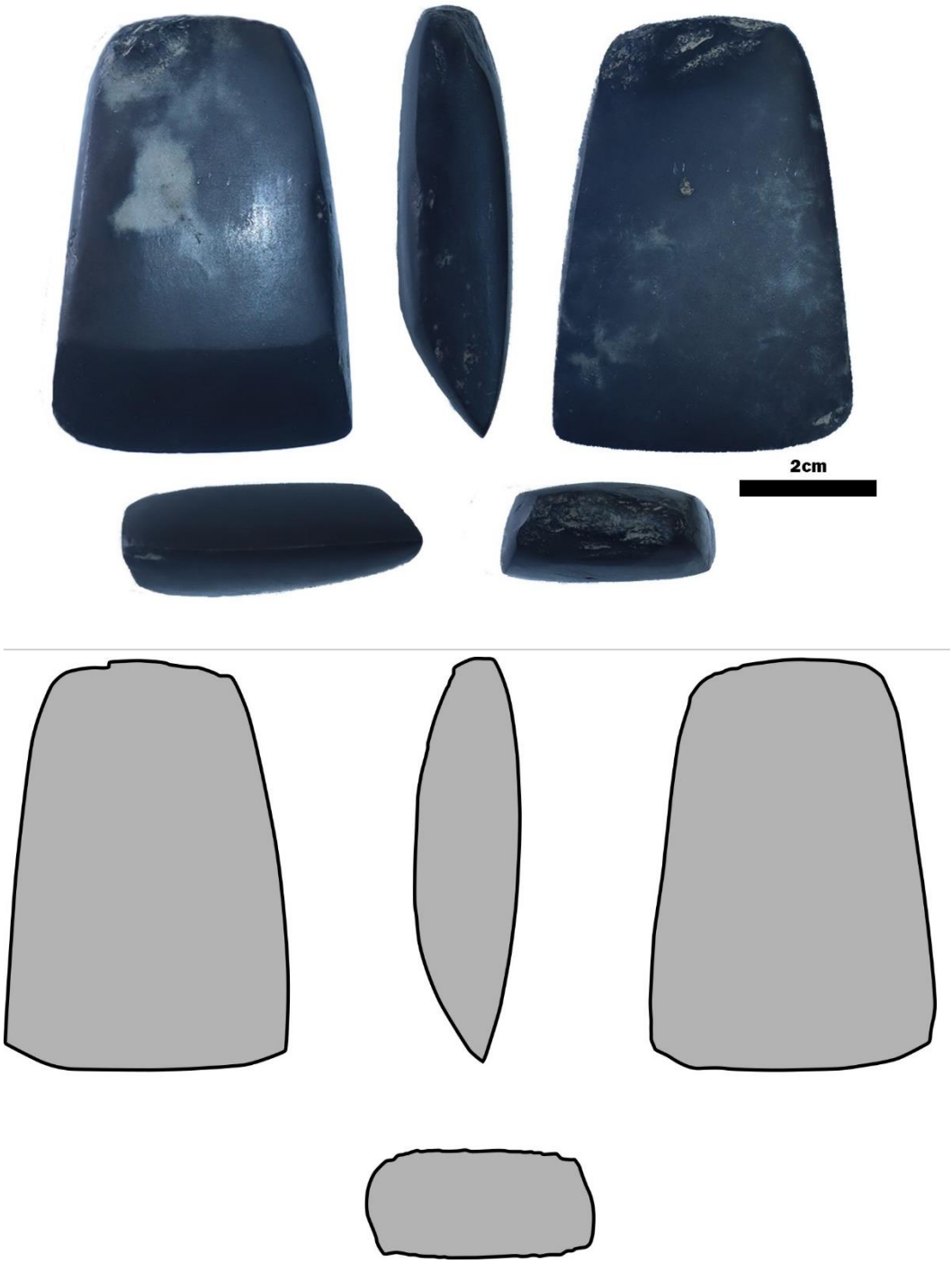


Figure 5.16 Adze from context 1098 (a 1902 demolition deposit) on R10/921. Clockwise: front, cross-section, back, butt, blade

Waterlogged Wooden Artefacts from Site R09/2247

A cache of wooden artefacts was exposed during drainage works at the western edge of Carran Road immediately before its junction with Woodcocks Road, approximately 2.2km southwest of the northern terminus of the new road corridor. The site consisted of a group of seven wooden artefacts that were present within an exceedingly rich waterlogged organic deposit consisting of twigs, small branches, and leaves in a blackish dark brown peaty silt that had been deposited in a small palaeochannel. The seven artefacts represented at least four digging sticks (kō), with one complete example present although partially broken; a kō footrest (teka); a carved post, and a carved handle section of an unknown implement (Table 5.24; Figure 5.17 to Figure 5.24). The chemical properties of the deposit together with its waterlogged nature had preserved the artefacts in a relatively good condition. As waterlogged wood requires treatment to prevent irreversible cracking, warping, delamination, and distortion during drying, conservation treatment was required to provide both current and future stability to enable either display or safe storage of the items. Therefore, the artefacts were deposited with the University of Auckland Wet Organic Archaeological Materials Conservation Laboratory on 5 June 2018, and were assessed and then treated with a range of wet organics conservation methods.

The following descriptions of the wooden artefacts from site R09/2247 are taken from the University of Auckland Wet Organic Archaeological Materials Conservation Laboratory pre-treatment report (see digital appendices, Appendix 6) and are presented with both Conservation (C) and Z registration numbers.

Table 5.24 Summary of wooden artefact assemblage from site R09/2247

Wood Id	Conservation and Z Nos.	Item	Max Length (mm)	Max Width (mm)	Max Thickness (mm)
Kanuka (*Kunzea ericoidies*)	C2041 / Z21200	Kō (complete)	2428	63	58
Kanuka (*Kunzea ericoidies*)	C2042 / Z21201	Kō tip large	1120	54	45
Kanuka (*Kunzea ericoidies*)	C2043 / Z21202	Kō tip (shaft and handle absent)	624	68	62
Puriri (*Vitex lucens*)	C2044 / Z21203	Teka (foot rest)	167	50	20
Rata (*Metrosiderous robusta*)	C2045 / Z21204	Post – adze sharpened point	1113	112	61
Kanuka (*Kunzea ericoidies*)	C2046 / Z21205	Kō in two pieces (larger piece)	1620	72	47
Kanuka (*Kunzea ericoidies*)	C2046 / Z21205	Kō in two pieces (smaller piece)	450	72	18
Manuka (*Leptospermum scoparium*)	C2047 / Z21206	Possible handle section of unknown item	720	20	31

5.5.7 Description of Artefacts

Object: Complete kō with break in centre (C2041 / Z21200)

Length = 2428mm. Width = 63mm. Depth = 58mm

Wood identification = Kanuka (*Kunzea ericoidies*)

Description: Break and split in the centre of the artefact which measures 250mm long by c.23mm wide, (see Figure 5.17). Clear manufacturing adze marks on the surface. One end has been shaped to a point; the opposite end is the handle with a slight protruding bulb. Quadrangular in cross-section with rounded edges and flat base. Clear adze marks on surface, more evident around the tip. Small area of loss on tip with some additional small areas of loss present on the surface of the artefact.

Figure 5.17 The complete but broken kanuka kō recovered from site R09/2247

Object: Kō tip (large) with broken shaft (C2042 / Z21201)

Length = 1120mm. Width = 54mm. Depth = 45mm

Wood identification = Kanuka (*Kunzea ericoidies*)

Description: Clear adze marks on surface. Distal end has been shaped into a point; the other end is broken (Figure 5.18). Quadrangular in cross-section with rounded edges and flat base. Slightly bowed in profile. Small areas of loss on the tip.

Figure 5.18 The large kanuka kō tip recovered from site R09/2247

Object: Kō tip broken shaft and handle missing (C2043 / Z21202)

Length = 624mm. Width = 68mm. Depth = 62mm

Wood identification = Kanuka (*Kunzea ericoidies*)

Description: One end has been shaped into a fine point, the other end is split and broken with the shaft and handle missing (Figure 5.19). Quadrangular in cross-section with rounded edges and flat base. Large areas of loss, particularly around the broken area. Central crack running from tip of artefact of 80mm in length and 1mm wide. Same crack is evident on opposite side, running 120mm in length.

Object: Teka, foot rest (C2044 / Z21203)

Length = 167mm. Width (of foot rest section) = 50mm. Depth = 20mm

Wood identification = Puriri (*Vitex lucens*)

Description: The section which would have been attached to the kō is broken with significant losses. The working surface is shaped and has a slight curve with a protrusion at the distal end, (see Figure 5.20). Clear adze marks are visible on this surface. The foot rest is extremely soft and degraded.

Figure 5.19 The kanuka kō tip with broken shaft and missing its handle – recovered from site R09/2247

Figure 5.20 The puriri teka recovered from site R09/2247

Object: Post with adzed point at one end (C2045 / Z21204)

Length = 1113mm. Width = 112mm. Depth = 61mm

Wood identification = Rata (*Metrosiderous robusta*)

Description: Distal end shaped to a point, either by an adze or possibly an axe (Figure 5.21). There are radial grooves along the surface of the artefact. Organic matter is packed into the cracks and grooves. Small areas of loss evident throughout the surface of the artefact.

Figure 5.21 The rata post with adzed point recovered from R09/2247

Object: Kō in two pieces (C2046 / Z21205)

C2046-A (larger piece)

Length = 1620mm. Width = 72mm. Depth = 47mm

Wood identification = Kanuka (*Kunzea ericoidies*)

Description: Fresh crack running the length of the artefact up to 1270mm (Figure 5.22) Cracks range in diameter from 1mm to 4mm. Handle end of the artefact broken and burnt. Evidence of adze marks on the surface. Degraded soft surface.

C2046-B (smaller detached piece)

Length = 450mm. Width = 72mm. Depth = 18mm

Wood identification = Kanuka (*Kunzea ericoidies*)

Description: Possibly broken by the mechanical excavator during initial exposure. Area detached from main body of the artefact (Figure 5.23). Evidence of adze marks on the surface. Very degraded.

Figure 5.22 The larger of the two pieces from the same kō (C0246-A) recovered from R09/2247

Figure 5.23 The smaller of the two pieces from the same kō (C0246-B) recovered from R09/2247

Object: Possible handle section of worked wood (C2047 / Z21206)

Length = 720mm. Width (minimum) = 20mm. Depth (maximum) = 31mm

Wood identification = Manuka (*Leptospermum scoparium*)

Description: Small areas of loss along surface. Both ends are broken. Smooth finished surface, circular in cross-section (Figure 5.24). Degraded surface.

Figure 5.24 The possible handle section of an unknown wooden implement recovered from R09/2247

5.5.8 Discussion of Wooden Artefact Assemblage

The waterlogged wooden artefact assemblage from site R09/2247 represents the use of gardening implements with at least four kanuka kō (digging sticks) present, and a carved puriri kō teka (footrest), a section of a carved manuka handle of an unidentified item, as well as a rata post. Most of the items display unequivocal evidence of native timber being carved with a stone adze to produce gardening implements, and almost certainly pre-date European settlement of the area. It is likely that the items were used in the surrounding area, to the west and northwest where alluvial soils and wetter low-lying areas would have provided suitable conditions for the cultivation of kūmara and taro respectively. The rata post may have been originally part of a fence around kūmara gardens, or intended to be used within one.

6 ENVIRONMENTAL ANALYSIS

6.1 Introduction

The archaeological excavations at Pūhoi undertaken by Clough & Associates included the sampling of environmental material from a number of archaeological sites for further analysis.

6.2 Faunal Analysis

6.2.1 Introduction

The archaeological excavations in the wider Pūhoi area undertaken by Clough & Associates included the sampling of faunal material from all archaeological sites for further analysis by both internal and external specialists. While all of the shell midden sample analyses were undertaken in house (see Section 6.3 below), Clough & Associates engaged Southern Pacific Archaeological Research (SPAR) to carry out the analysis of three specific samples containing unidentified bone from sites R10/1484, R10/1417 and R10/1512 (Russell and Greig 2020).

6.2.2 SPAR Faunal Analysis

The results of the faunal analysis undertaken by SPAR is presented below per site. The SPAR report is also provided digitally along with quantitative data as an Excel Workbook (see digital appendices – Appendix 7).

6.2.3 Methodology

Faunal remains were cleaned in the Otago Archaeological Laboratory (OAL) following standard practices. Bones recovered from wet or damp matrices were gently brushed under water, while specimens recovered from dry soils were dry brushed to ensure bone integrity was maintained prior to identification. All fauna was dried thoroughly in a humidity-controlled drying room to prevent residual moisture from causing mould growth.

Identification

Analysis of the Pūhoi fauna assemblage was conducted by Tristan Russell and Karen Greig using the OAL reference collection. Each specimen was identified to the lowest taxonomic level possible, with element, side and portion also recorded. When recording the portion for mammal bones, landmark features were used where available. When no landmark features were present, general morphological zones were used to describe the portion of bone present. This method allows for accurate identification and provides a conservative estimate of species abundance without over-estimating the presence of taxa (Lombacher et al. 2016). The presence or absence of taphonomic processes, such as burning, cut marks, gnawing and weathering, were also recorded.

Shell material was identified using landmark portions such as the hinge for bivalves, and the operculum, apex and aperture for gastropods. The fishbone assemblage was analysed using the five paired mouth bones, distinctive 'special bones' and otoliths.

Quantification

The faunal analysis utilised two measures for quantification: NISP (number of identified specimens) and MNE (minimum number of elements). A third measure, MNI (minimum number of individuals), was calculated using the MNE of the most frequently occurring diagnostic portion (Reitz and Wing 2008).

The faunal assemblage recovered from the Pūhoi samples submitted for analysis was small and had poor general preservation. The limited assemblage, with a total weight of 49.07 consisted of fish, shellfish, bird and mammal remains (Table 6.1). Fauna was recovered from five distinct contexts: contexts 1169 and 1141 from site R10/1484; 4001 and 4082 from site R10/1417; and 3030 from site R10/1512. The dominant class by NISP was fish (NISP=42), followed by mammal bone (NISP=26), then bird (NISP=5), with shellfish (NISP=2), and unidentifiable bone (NISP=2) also present in small quantities. Despite a NISPrnTAL of 77, the MNErnTAL was only 7, highlighting a high rate of fragmentation of the bone and poor preservation of identifiable landmark portions. Due to the fragmentary and fragile nature of the specimens, the majority of the assemblage could not be identified beyond class. Identified species fish and shellfish species were snapper (*Pagrus auratus*) and pipi (*Paphies australis*).

Table 6.1 Summary of combined faunal assemblage analysed by SPAR from sites R10/1484, R10/1417 and R10/1512

Taxon	NISP	MNE	MNI
Mammal			
Sheep (*Ovis aries)*	2	2	1
Unidentifiable mammal sp.	24	-	-
subtotal	26	2	1
Fish			
Snapper (*Pagrus auratus)*	21	1	1
Unidentifiable fish sp.	21	3	2
subtotal	42	4	3
Bird			
Unidentifiable bird sp.	5	1	1
subtotal	5	1	1
Shellfish			
Pipi (*Paphies australis)*	2	2	2
subtotal	2	2	2
Unidentifiable	2	-	-
Total	**77**	**9**	**7**

6.2.4 R10/1484

A very limited quantity of fauna was recovered from site R10/1484. A total of eight specimens were present including five bird fragments and a fish scale; however, no species could be identified. The five fragments of bird bone were possible long bone shaft fragments. Two fragments of bone could not be identified to class as they were too small, fragile and lacked diagnostic portions. One of the unidentifiable bone specimens was thin and may be cranial bone. The faunal remains recovered from R10/1484 are summarised in Table 6.2.

Table 6.2 Site R10/1484: summary of faunal assemblage (contexts 1169 and 1141)

Taxon	NISP	MNE	MNI
Fish			
Unidentifiable fish sp.	1	1	1
subtotal	1	1	1
Bird			
Unidentifiable bird sp.	5	1	1
subtotal	5	1	1
Unidentifiable	2	-	-
Total	**8**	**2**	**2**

6.2.5 R10/1417

Mammal and fish were the only classes of fauna identified in site R10/1417. Of the 26 mammal specimens, two were identified as sheep while species determinations for the remainder were not possible due to the fragmentary nature of the bone. In these instances, specific identification of element was also not possible; however, 79% of the unidentified mammal bone is likely to be either long bone or rib fragments. Possible gnawing was identified on the surface of these fragments. A possible distal/proximal portion of a long bone was also present. The specimen was very fragile and weathered, and no diagnostic features were identifiable. The sheep specimens recovered from R10/1417 were both foot bones (a metacarpal and a first phalanx). Possible gnawing was identified on the sheep metacarpal; however, due to the poor condition of the bone, interpretation of possible gnawing should be considered with caution.

Four fragments of fishbone were also identified. All fish specimens were very small and fragile, with three likely to be fragments of spines. No diagnostic portions were present in the R10/1417 assemblage. The faunal remains recovered from R10/1417 are summarised in Table 6.3.

Table 6.3 Site R10/1417: summary of faunal assemblage (contexts 4001 and 4082)

Taxon	NISP	MNE	MNI
Mammal			
Sheep (*Ovis aries)*	2	2	1
Unidentifiable mammal sp.	24	-	-
subtotal	26	2	1
FishUunidentifiable fish sp.	4	1	1
subtotal	4	1	1
Total	**30**	**3**	**1**

6.2.6 R10/1512

Approximately 50% of the Pūhoi fauna was recovered from site R10/1512, an extremely large oven or umu ti. Two species, pipi and snapper, were identified in the assemblage. Snapper was identified by the presence of various distinctive cranial and vertebral fragments. No diagnostic portions, paired mouthparts or special bones were present, and no element typically used for identification was found. The other non-diagnostic fish was very fragile and weathered. One otolith was also identified but was unable to be identified to species. The faunal remains recovered from R10/1512 are summarised in Table 6.4.

Table 6.4 Site R10/1512: summary of faunal assemblage (context 3030)

Taxon	NISP	MNE	MNI
Fish			
Snapper (*Pagrus auratus)*	21	1	1
Unidentifiable fish sp.	16	1	-
subtotal	37	2	1
Shellfish			
Pipi (*Paphies australis)*	2	2	2
subtotal	2	2	2
Total	**39**	**4**	**3**

6.2.7 Discussion

The faunal assemblage from Pūhoi was small and highly fragmented. Few diagnostic landmark portions were present, making identification to species or element difficult. While sheep, pipi and snapper were able to be positively identified, the majority of the assemblage was small, non-diagnostic fragments that could not be identified beyond class. The dominant class by NISP was fish (NISP=42), which included snapper, followed by mammal (NISP=26), which included sheep (the latter was likely derived from intrusive modern farming activities). However, such a limited sample size with poor identification potential limits the scope of archaeozoological interpretation.

6.3 Shell Midden Analysis

6.3.1 Introduction

The archaeological excavations undertaken in the western Pūhoi River valley included the sampling of all shell midden sites for post-excavation analyses by Tom Clough-Macready and Jennifer Low. Twenty-seven archaeological sites exposed during the roading works that consisted of or contained shell middens were sampled, with three sites (R10/1482, R10/1498, and R10/1518) not sampled as they were not impacted by works. A subsample of 11 shell midden samples relating to 10 of the remaining 27 sites were selected for analysis on the basis of the nature of the midden deposits and their information potential. This resulted in one sample analysed from the Stanaway property at 1457 Hibiscus Coast Highway (SAP 12), two samples from Billing Road (SAP 11), six samples from 3 Puhoi Road (SAP 10), and two samples were taken from the 517 State Highway 1 property (SAP 9) (see Figure 3.1 and Figure 3.2). The shell midden quantitative data is presented in the digital appendices within Appendix 7).

6.3.2 Methodology

All samples were sieved with a 1.5mm sieve and shells were sorted and analysed by taxon. Preferred habitat of taxon was also noted for further analysis. A list of all taxa identified in the analysis is presented in Table 6.5.

Taxon and Habitat Analysis

The composition of any midden sample assemblage can indicate the availability of certain species of shellfish and which particular environments were exploited in order to gather them. A point of interest is how these different environmental niches were made use of and how this may have changed over time.

To examine this, each individual species was separated (in each sample) in one of the following environmental niches:

- Muddy Shore
- Muddy and/or Sandy Shore
- Sandy Shore
- Rocky Shore
- Sandy, Rocky or Muddy Shore
- Coarse Sand/Gravel
- Shells/Rocks
- Other/Unknown

The shellfish species identified within the Pūhoi midden samples and their environmental niches are presented in Table 6.5.

Fragmentation Ratio

A fragmentation ratio was calculated to assess the level of fragmentation of shells for each individual sample. The reasoning for this follows the argument that greater quantities of broken shells indicate greater levels of damage to the deposit. Therefore, greater quantities of intact shells would indicate a deposit in ‘good/whole’ condition. Interpretation of this

ratio needs to take into account various taphonomic factors influencing the site, such as the level of plough damage, cattle trampling or vehicle movements across the site, or even environmental factors such as chemical weathering.

In order to calculate the ratio, all identifiable shells were separated into whole shell and fragmented shell with a hinge. The MNI of each portion was calculated and the fragmented portion was divided by the whole portion. This creates a ratio of broken shells to whole shells, with a higher number indicating more broken shells.

Shell Dimensions

Shell dimension is a variable that can reveal changes in the levels of predation over time. A dense occupation over a considerable period of time could harvest a particular species with great enthusiasm and thereby reduce the size of the individuals available to little more than juveniles. Conversely a targeted harvest conducted by individuals moving quickly across the landscape may select the largest available individuals.

The size ranges for cockle are as follows: juvenile (up to 10mm), pre-adult (10-20mm), young adults (18-25mm), adults (>25mm), with sexual maturity 18-20mm (www.gopi.org.nz). The size of pipi at maturity has been estimated at 40mm (Hooker and Creese 1995).

The shell midden analyses are presented below per property (work area) and per site.

Table 6.5 List of identified taxa by scientific, common names and preferred habitat, from all samples

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle/Tuangi	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Paphies subtriangulata	Tuatua	Sandy shore
Amphibola crenata	Mud Snail/Tītiko/Whetiko	Muddy shore
Cominella adspersa	Speckled Whelk/Kawari	Muddy shore
Cominella sp.	Unidentified	Unknown
Pecten novaezelandiae	Queen's Scallop/Tipa	Sandy shore
Protothaca crassicosta	Ribbed Venus Shell/Karoro	Muddy and/or sandy shore
Saccostrea glomerata	Rock Oyster/Tio	Rocky shore
Turbo smaragdus	Cat's Eye/Pūpū	Rocky shore
Xymene plebeius	Common Trophon	Muddy shore
Zeacumantus lutulentus	Horn Shell/Koeti	Muddy shore
Unidentified gastropod	Unidentified	Unknown

6.3.3 1457 Hibiscus Coast Highway/Stanaway Property (SAP 12), Site R10/1504

Of the four shell midden sites exposed on the Stanaway property, only site R10/1504 was selected for detailed shell midden analysis. Shell midden site R10/1504 (context 1099) was located approximately 65m south-southwest of the pā (R10/921, Pā o Te Hēmara Tauhia) at the base of a northeast trending slope (see Figure 3.3 for location). The midden deposit was only partially exposed as it extended both northward and north-westward beyond the edge of excavation.

R10/1504

A 10 litre bulk sample of midden material was collected from site R10/1504 (context 1099) at 1457 Hibiscus Coast Highway, Puhoi.

The sample from R10/1504 consisted of highly fragmented and crushed shell intermixed within a dark greyish-brown clayey silt matrix that contained occasional charcoal and heat fractured rock inclusions. While there was a reasonable number of shell fragments, the sample contained only four whole shell specimens, consisting of a single juvenile pipi and three cockle. Due to the highly fragmented nature of the shell within the sample, only 83 individual specimens (NISP) could be identified with confidence, which represented a minimum number of 42 individuals consisting of 30 cockle and 12 pipi (Table 6.6, Table 6.7 and Table 6.8). The fragmentation ratio (Table 6.8) indicates the midden was quite fragmented, likely post-deposition. While cockle formed the majority of the identified shellfish within the sample, and is found within a muddy shore environment, the only other shellfish in the sample consisted of pipi which will live in both muddy shore and sandy shore environments (Table 6.6). It is likely therefore that the shell midden deposit was produced by locally collected shellfish in the muddy environment of the lower reaches of the Pūhoi River and its estuary.

Table 6.6 List of identified taxa by scientific and common names and preferred habitat for R10/1504 (context 1099)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore

Table 6.7 NISP, MNI and percentage of MNI per taxa, R10/1504 (context 1099)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	60	30	71.4
Paphies australis	Pipi	23	12	28.6

Table 6.8 Fragmented and whole shell by taxa and fragmentation ratio for the sample from R10/1504 (context 1099)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	57	3	19
Pipi	23	1	23

6.3.4 11B and 22B Billing Road (SAP 11), Sites R10/1497 and R10/1516

Of the eight shell midden sites investigated at 11B and 22B Billing Road, bulk midden samples from sites R10/1497 and R10/1516 were selected for detailed shell midden analysis. Site R10/1497 was located at 22B Billing Rd, northeast of the house that was still present on the property at the commencement of works, while site R10/1516 was situated at just north of Billing Road itself overlooking the Ōkahu Inlet (see Figure 3.14 for location).

R10/1497

A 20 litre bulk sample of midden material was collected from R10/1497 (context 1012) at 22B Billing Road, Puhoi. The sample from R10/1497 (context 1012) consisted of whole and fragmented marine shell in a dark blackish-brown silt matrix with occasional heat cracked rock and charcoal inclusions.

A total of six species was identified, with an unidentified *Cominella* sp. also present (Table 6.9). Cockle was the dominant species in the R10/1497 sample and made up by far the largest proportion (both NISP and MNI) of shellfish species, accounting for 67.3% of the assemblage (Table 6.10). Pipi made up 25% of the assemblage, with mud snail third on 7.3% (Table 6.10). Other species present (and almost certainly representing bycatch) were rock oyster, horn shell and the unidentified *Cominella* sp. The shellfish species represent primarily a muddy shore environment for the source of the shellfish, although pipi can also be found in a sandy shore environment and rock oyster (as the name suggests), a rocky shore environment (Table 6.9, Figure 6.1). The fact that the majority of shellfish was collected from a muddy shore environment is unsurprising given the proximity of the lower estuarine reaches of the Pūhoi River.

Fragmentation analysis of the cockle sample from R10/1497 shows a low fragmentation ratio (2.04) whilst the pipi, conversely, displays a high fragmentation at 23.4 (Table 6.11).

Table 6.9 List of identified taxa by scientific and common names and preferred habitat for R10/1497 (context 1012)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Cominella sp.	Unidentified	Unknown
Amphibola crenata	Mud Snail	Muddy shore
Saccostrea glomerata	Rock Oyster	Rocky shore
Zeacumantus lutulentus	Horn Shell	Muddy shore

Table 6.10 NISP, MNI and percentage of MNI per taxa, R10/1497 (context 1012)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	1186	593	67.3
Paphies australis	Pipi	440	12	25
Cominella sp.	Unidentified	1	1	0.1
Amphibola crenata	Mud Snail	65	65	7.3
Saccostrea glomerata	Rock Oyster	1	1	0.1
Zeacumantus lutulentus	Horn Shell	1	1	0.1

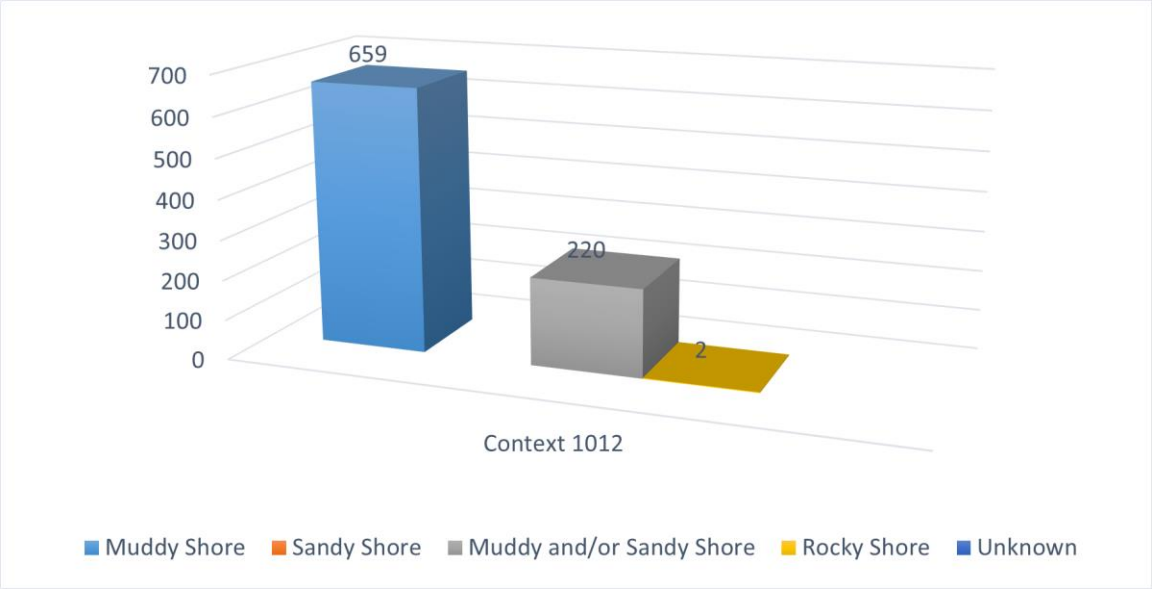


Figure 6.1 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for the sample from R10/1497 (context 1012)

Table 6.11 MNI of fragmented and whole pipi and cockle and fragmentation ratio for the sample from R10/1497 (context 1012)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	797	389	2.04
Pipi	422	18	23.4

One hundred examples of cockle from the R10/1497 bulk sample were measured to obtain data relating to the overall size range present, and general classifications were undertaken by visual observation of the remaining sample. For site R10/1497 the smallest cockle measured was 20.48mm and the largest 33.94mm (Table 6.12 and Figure 6.2), indicating predominantly adult sized cockle.

Table 6.12 Maximum cockle dimension mean, median, mode and standard deviation (in mm)

Site and Context	Count	Mean	Median	Mode	Standard Deviation
R10/1497 (1012)	100	27.55	27.61	27	2.85

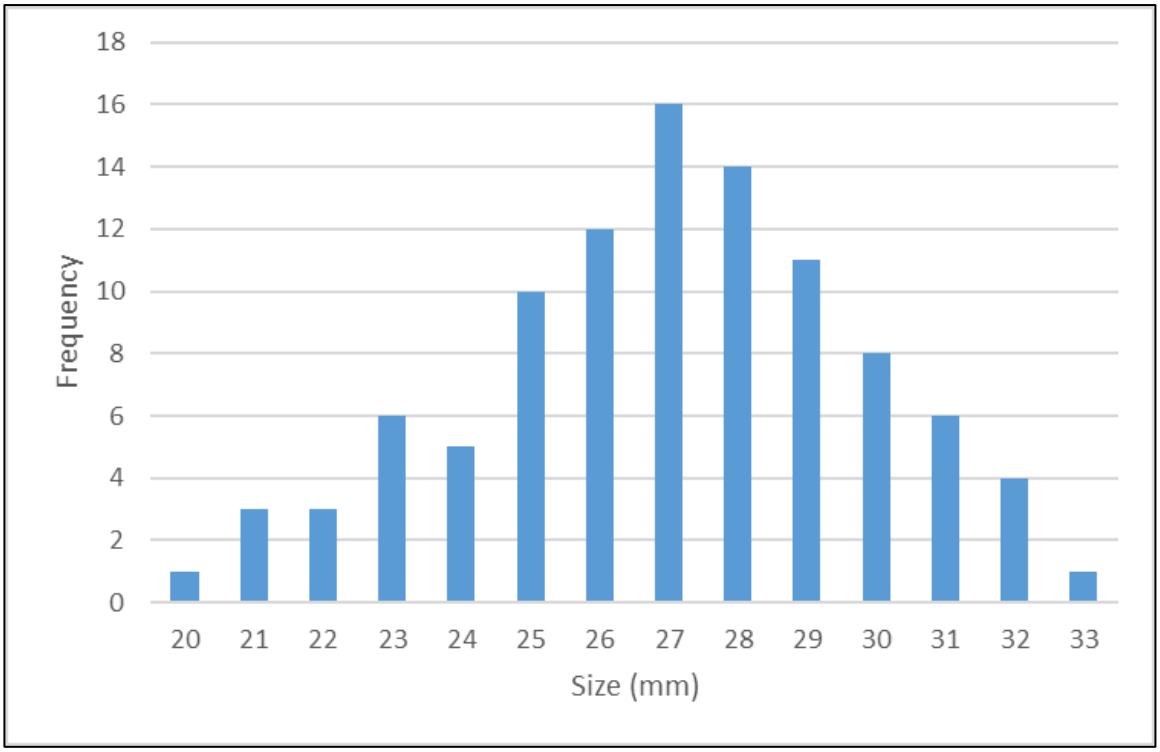


Figure 6.2 Histogram of cockle size from R10/1497 (context 1012)

R10/1516

A 10 litre bulk sample of midden material was collected from R10/1516 (context 3073) at 22B Billing Road. The shell midden deposit consisted of whole and fragmented shell within a silty clay matrix that contained occasional charcoal inclusions and fragments of heat fractured rock.

A total of four species were identified within the deposit (Table 6.13). *Amphibola crenata* (mud snail) was the dominant species in the R10/1516 sample and comprised virtually the whole assemblage (both NISP and MNI) of shellfish species, accounting for 95.6% of the assemblage (Table 6.14). Rock oyster made up 3.7% of the assemblage with very small amounts of cockle and pipi also present (Table 6.14).

The fact that the assemblage is dominated by mud snail indicates that the local muddy shore of the lower Pūhoi River and its tidal inlets would have been exploited for the mud snail, while the rock oyster was likely brought in from elsewhere, perhaps from the coast or closer to the river mouth (Table 6.13, Table 6.14 and Figure 6.3).

There were no suitable shells present within the sample for a fragmentation analysis to be undertaken.

Table 6.13 List of identified taxa by scientific and common names and preferred habitat for R10/1516 (context 3073)

Scientific Name	Common Name	Preferred Habitat
Amphibola crenata	Mud Snail	Muddy shore
Saccostrea glomerata	Rock Oyster	Rocky shore
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore

Table 6.14 NISP, MNI and percentage of MNI per taxa, R10/1516 (context 3073)

Scientific name	Common Name	NISP	MNI	MNI %
Amphibola crenata	Mud Snail	485	485	95.6
Saccostrea glomerata	Rock Oyster	19	19	3.7
Austrovenus stutchburyi	Cockle	4	2	0.4
Paphies australis	Pipi	2	1	0.2

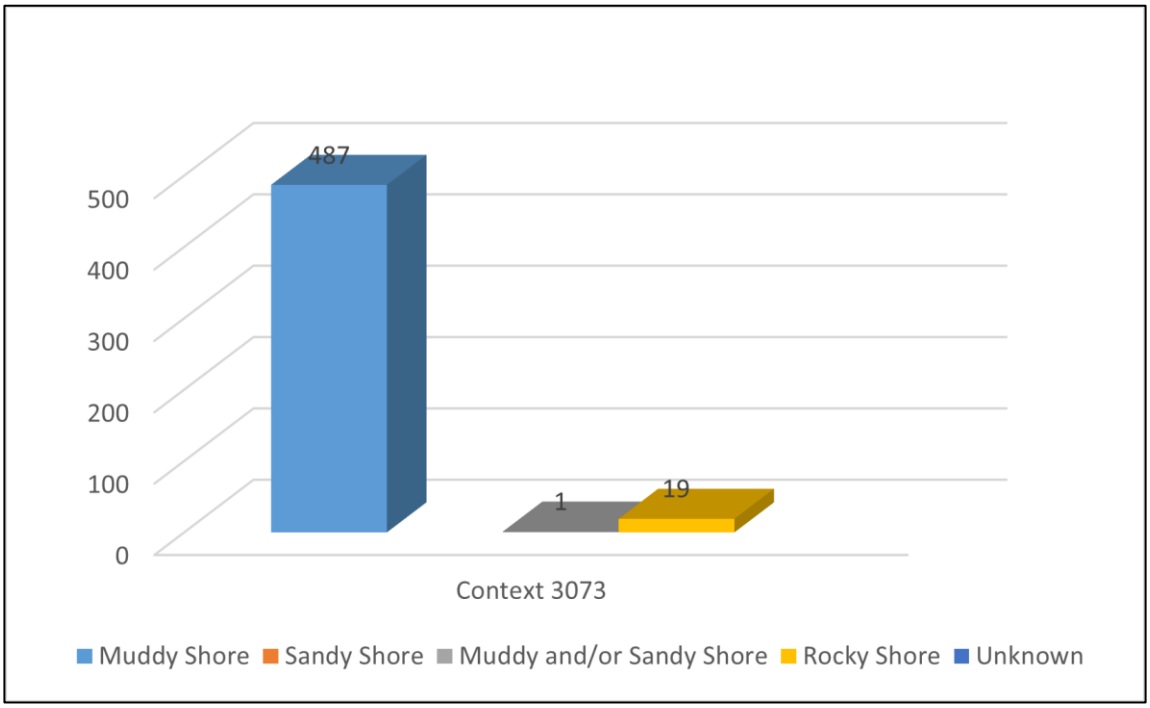


Figure 6.3 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1516 (context 3073)

6.3.5 3 Puhoi Road (SAP 10), Sites R10/1106, R10/1484, R10/1498, R10/1503, R10/1505 and R10/1512

Of the 15 shell midden sites investigated on the 3 Puhoi Road property, bulk midden samples from sites R10/1106, R10/1484, R10/1498, R10/1503, R10/1505 and R10/1512 were selected for detailed shell midden analysis. Site R10/1498 was located in the north of the property adjacent to the Puhoi Road and above the southern bank of the Pūhoi River, while sites R10/1503 and R10/1512 were situated in the west of the property at the base of the large hill overlooking the property (see Figure 3.34 for location). Sites R10/1484 and R10/1505 were both situated on top of a ridge spur that descended from the eastern flanks of the large hill, while site R10/1106 was situated on east trending ridge descending from the south hill but further to south (see Figure 3.34 for location).

R10/1106

A 10 litre bulk sample of midden material was collected from R10/1106 (context 1886) at 3 Puhoi Road. The midden deposit consisted of fragmented and marine shell within a greyish dark brown silty clay matrix.

A total of four species were identified within the deposit (Table 6.15). Pipi was the dominant species present in the R10/1106 sample and comprised the greater majority of the assemblage (both NISP and MNI) of shellfish species, accounting for 83% (Table 6.16). Cockle was the next most numerous species present, making up 9.8% of the assemblage, with small amounts of mud snail and rock oyster also present. As the majority of the midden sample from site R10/1106 consists of pipi, the analysis indicates that either a muddy or sandy shore environment was exploited to source the shellfish, with the lower courses of the Pūhoi River and its estuary the most likely (Table 6.16 and Figure 6.4).

Fragmentation analysis of the cockle from R10/1106 showed a low fragmentation ratio (6.3) whilst the pipi conversely, displays a very high fragmentation ratio at 45.25 (Table 6.17).

Table 6.15 List of identified taxa by scientific and common names and preferred habitat for samples from R10/1106 (context 1886)

Scientific Name	Common Name	Preferred Habitat
Paphies australis	Pipi	Muddy and/or sandy shore
Austrovenus stutchburyi	Cockle	Muddy shore
Amphibola crenata	Mud Snail	Muddy shore
Saccostrea glomerata	Rock Oyster	Rocky shore

Table 6.16 NISP, MNI and percentage of MNI per taxa, R10/1106 (context 1886)

Scientific name	Common Name	NISP	MNI	MNI %
Paphies australis	Pipi	185	93	83
Austrovenus stutchburyi	Cockle	22	11	9.8
Amphibola crenata	Mud Snail	5	5	4.5
Saccostrea glomerata	Rock Oyster	3	3	2.7

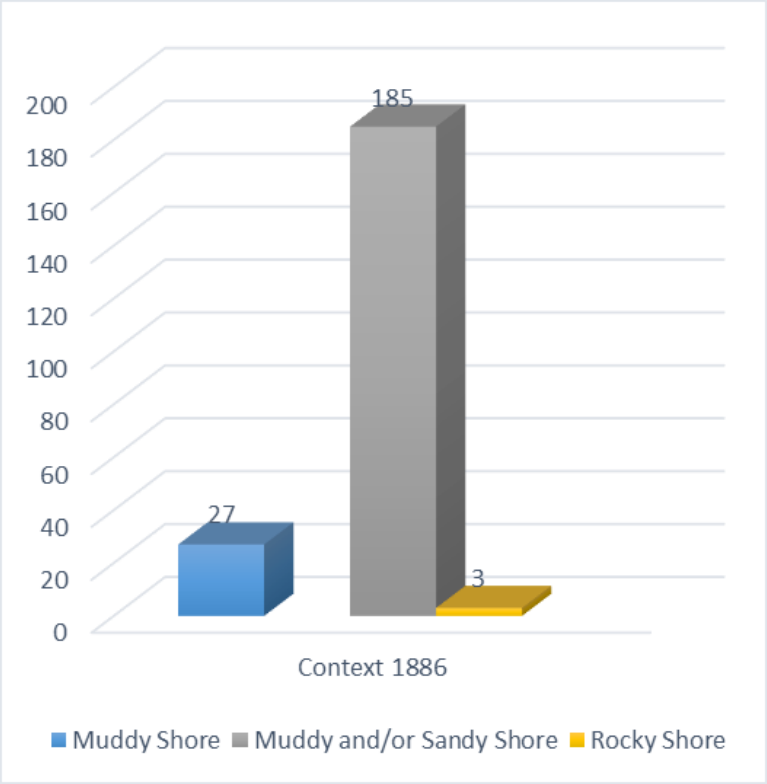


Figure 6.4 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1106 (context 1886)

Table 6.17 MNI of fragmented and whole pipi and cockle and the ratio for the midden samples from R10/1106 (context 1886)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	19	3	6.3
Pipi	181	4	45.25

R10/1484

A 20 litre bulk sample of midden material was collected from site R10/1484 (context 1050) at 3 Puhoi Road. The midden sample consisted of fragmented and whole marine shell within an ashy silt that contained moderate charcoal and occasional small heat fractured rock fragments.

A total of four species were identified within the deposit (Table 6.18). Pipi was the dominant species present in the R10/1484 sample and comprised the greater majority of the assemblage (both NISP and MNI) of shellfish species, accounting for 72.3% of the assemblage (Table 6.19). Cockle was the next most numerous species present, making up 23.8% of the assemblage, and there were small amounts of mud snail and queen's scallop also present.

As the majority of the midden sample from site R10/1484 consists of pipi with cockle also making up a significant part of the assemblage, the analysis indicates that the local muddy shore environment of the lower Pūhoi River and its inlets was exploited for the vast

majority of the shellfish present in the sample. However, the queen's scallop would have been sourced from a sandy shore environment, with the ocean-facing beach at Wenderholm being perhaps the most likely location exploited.

Fragmentation analysis of the assemblage indicates that both the cockle and pipi samples from R10/1484 display very low fragmentation ratios (2.92 and 3.01 respectively) indicating only light disturbance to the midden since its original deposition (Table 6.20).

Table 6.18 List of identified taxa by scientific and common names and preferred habitat for samples from R10/1484 (context 1050)

Scientific Name	Common Name	Preferred Habitat
Paphies australis	Pipi	Muddy and/or sandy shore
Austrovenus stutchburyi	Cockle	Muddy shore
Amphibola crenata	Mud Snail	Muddy shore
Pecten novaezelandiae	Queen's Scallop	Sandy shore

Table 6.19 NISP, MNI and percentage of MNI per taxa, R10/1484 (context 1050)

Scientific name	Common Name	NISP	MNI	MNI %
Paphies australis	Pipi	297	149	72.3
Austrovenus stutchburyi	Cockle	98	49	23.8
Amphibola crenata	Mud Snail	6	6	2.9
Saccostrea glomerata	Queen's Scallop	3	2	1

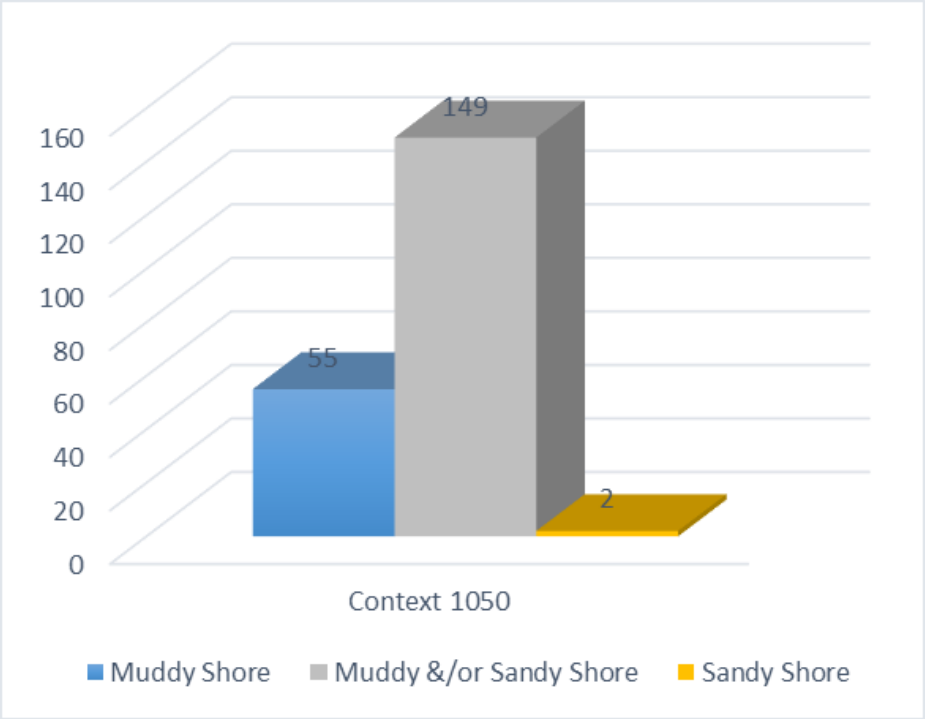


Figure 6.5 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1484 (context 1050)

Table 6.20 MNI of fragmented and whole pipi and cockle and the ratio for the midden samples from R10/1484 (context 1050)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	73	25	2.92
Pipi	223	74	3.01

R10/1498

A 20 litre bulk sample of midden material was collected from R10/1498 (context 1019) at 3 Puhoi Road. The midden sample consisted of fragmented and whole marine shell within a greyish-brown clayey silt matrix which contained moderate charcoal and occasional fragments of heat fractured rock.

A total of four species were identified within the deposit (Table 6.21). Cockle at 52.8% and pipi at 44.9% were the dominant species present in the R10/1498 sample and comprised the greater majority of the assemblage (both NISP and MNI) of shellfish species, together accounting for 97.7% of the assemblage (Table 6.22). The remainder of the assemblage consisted of small quantities of mud snail and speckled whelk, the latter almost certainly representing bycatch (Table 6.22).

As the majority of the midden sample from site R10/1498 consists of cockle and pipi, with mud snail also present, the analysis indicates that the local muddy shore environment of the lower Pūhoi River and its inlets was exploited for the vast majority of the shellfish present in the sample.

Fragmentation analysis of the assemblage indicates that the cockle sample from R10/1498 has a low fragmentation ratio (1.91) whilst the pipi displays a low to moderate fragmentation ratio at 14.3, perhaps indicating some taphonomic impact on the shell midden deposit (Table 6.23).

Additionally, 100 examples of cockle were measured to obtain data relating to the overall size range present, and general classifications were undertaken by visual observation of the remaining sample. The smallest cockle measured was 17.84mm and the largest 34.4mm with the majority of specimens present in the sample representing adult cockle (Table 6.24 and Figure 6.7).

Table 6.21 List of identified taxa by scientific and common names and preferred habitat for samples from R10/1498 (context 1019)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Amphibola crenata	Mud Snail	Muddy shore
Cominella adspersa	Speckled Whelk	Muddy shore

Table 6.22 NISP, MNI and percentage of MNI per taxa, R10/1498 (context 1019)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	534	267	52.8
Paphies australis	Pipi	453	227	44.9
Amphibola crenata	Mud Snail	11	11	2.2
Cominella adspersa	Speckled Whelk	1	1	0.1

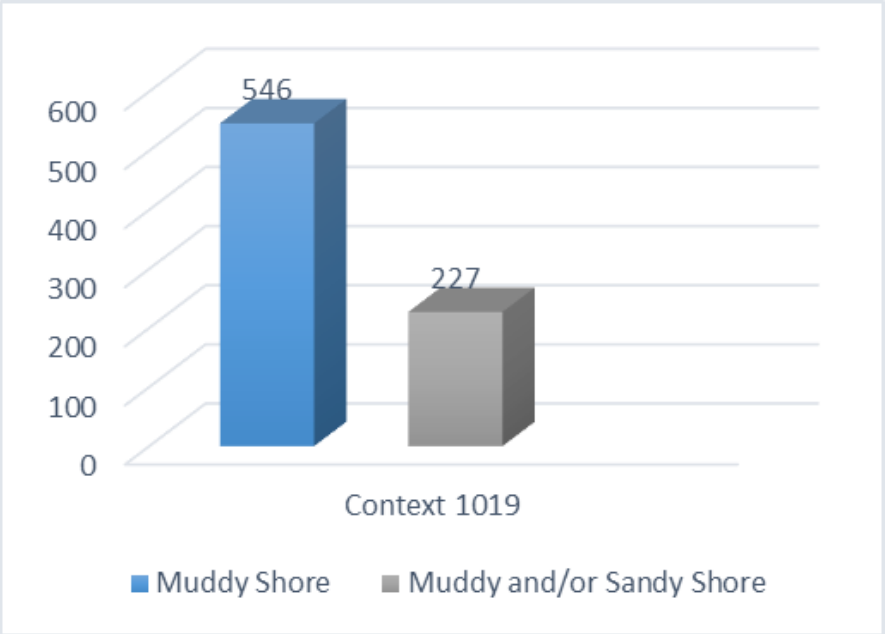


Figure 6.6 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1498 (context 1019)

Table 6.23 MNI of fragmented and whole pipi and cockle and the ratio for the midden sample from R10/1498 (context 1019)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	351	183	1.91
Pipi	366	87	14.3

Table 6.24 Maximum cockle dimension mean, median, mode and standard deviation (in mm)

Site and Context	Count	Mean	Median	Mode	Standard Deviation
R10/1498 (1019)	100	25.88	25.87	24	3.32

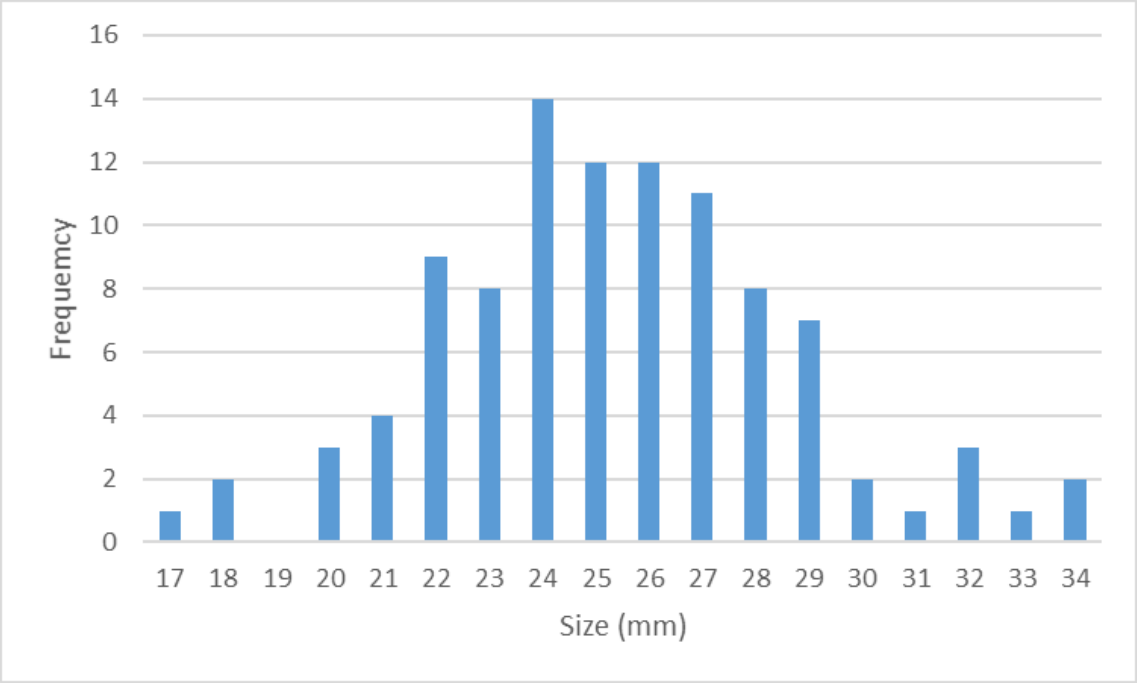


Figure 6.7 Histogram of cockle size from R10/1498 (context 1019)

R10/1503

A 20 litre bulk sample of midden material was collected from R10/1503 (context 1089) at 3 Puhoi Road. The midden sample consisted of super abundant fragmented and whole marine shell within a dark grey ashy silt matrix that contained moderate charcoal and occasional heat fractured rock inclusions.

A total of nine species were identified within the deposit (Table 6.25). Cockle was the dominant species present in the R10/1503 sample, and comprised the greater majority of the assemblage (both NISP and MNI) of shellfish species, accounting for 74.8% of the assemblage (Table 6.26). Pipi was the next most numerous species present comprising 15.6% of the assemblage, with mud snail also present, forming 8.8% of the sample, while some rock oyster was also present. The remainder of the assemblage consisted of negligible quantities of bycatch species (Table 6.26).

The assemblage is dominated by muddy shore environment species, with cockle and mud snail together comprising 83.6% of the assemblage and with pipi also likely being sourced from a muddy shore habitat, then this rises to 99.2% (Table 6.26 and Figure 6.8). The fact that the assemblage is almost completely dominated by muddy shore environment species indicates that the lower Pūhoi River and its tidal inlets was exploited for the catch, while the rock oyster was likely brought in from elsewhere, perhaps from the coast or closer to the river mouth at Wenderholm.

Fragmentation analysis of the assemblage showed that both cockle and pipi shells from R10/1503 were mostly intact and with very low fragmentation ratios (0.65 and 0.46 respectively), which indicates a very stable post-depositional environment (Table 6.27).

Additionally, 100 examples of both cockle and pipi were measured to obtain data relating to the overall size range present, and general classifications were undertaken by visual observation of the remaining sample. The smallest cockle measured was 12.26mm, and the largest 40.72mm, while for pipi the smallest was 14.72mm and the largest 56.88mm (Table

6.28, Figure 6.9 and Figure 6.10). This suggests the cockle were largely adult and in good numbers, while the majority of pipi were mature but with a sizeable minority of sub-adult shells.

Table 6.25 List of identified taxa by scientific and common names and preferred habitat for samples from R10/1503 (context 1089)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Amphibola crenata	Mud Snail	Muddy shore
Saccostrea glomerata	Rock Oyster	Rocky shore
Paphies subtriangulata	Tuatua	Sandy shore
Protothaca crassicosta	Ribbed Venus Shell	Muddy and/or sandy shore
Turbo smaragdus	Cat's Eye	Rocky shore
Zeacumantus lutulentus	Horn Shell	Muddy shore
Cominella sp.	Unknown	Unknown

Table 6.26 NISP, MNI and percentage of MNI per taxa, R10/1503 (context 1089)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	3101	1551	74.8
Paphies australis	Pipi	648	324	15.6
Amphibola crenata	Mud Snail	182	182	8.8
Saccostrea glomerata	Rock Oyster	8	8	0.3
Paphies subtriangulata	Tuatua	2	1	<0.1
Protothaca crassicosta	Ribbed Venus Shell	1	1	<0.1
Turbo smaragdus	Cat's Eye	1	1	<0.1
Zeacumantus lutulentus	Horn Shell	2	2	<0.1
Cominella sp.	Unknown	3	3	0.1

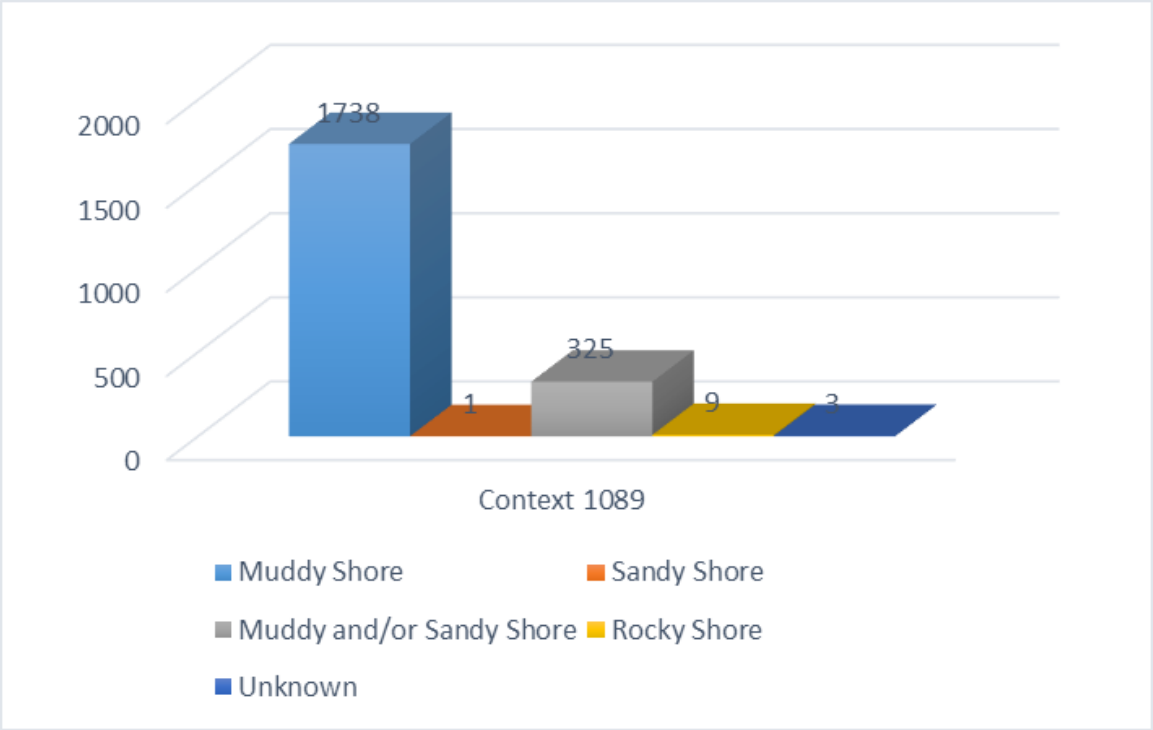


Figure 6.8 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1503 (context 1089)

Table 6.27 MNI of fragmented and whole pipi and cockle and the ratio for the midden samples from R10/1503 (context 1089)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	1229	1872	0.65
Pipi	205	443	0.46

Table 6.28 Maximum cockle and pipi dimension mean, median, mode and standard deviation (in mm) from R10/1503

Site and Context	Species	Count	Mean	Median	Mode	Standard Deviation
R10/1498 (1089)	Cockle	100	26.22	26.93	28	5.68
R10/1498 (1089)	Pipi	100	38.06	40.71	42	10.55

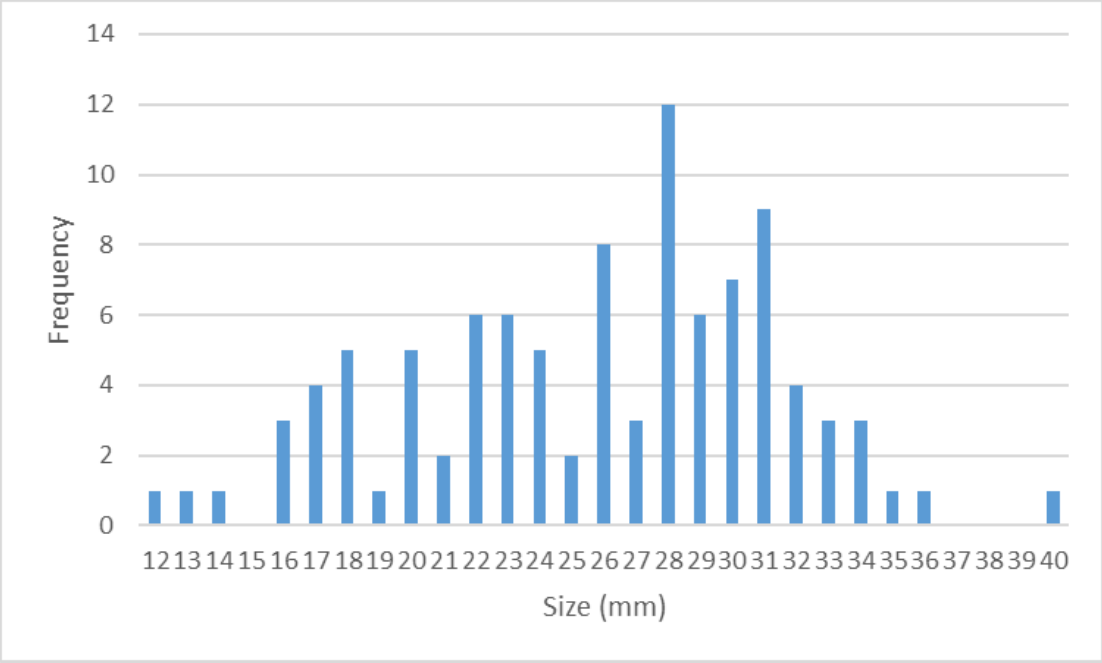


Figure 6.9 Histogram of cockle size from R10/1503 (context 1089)

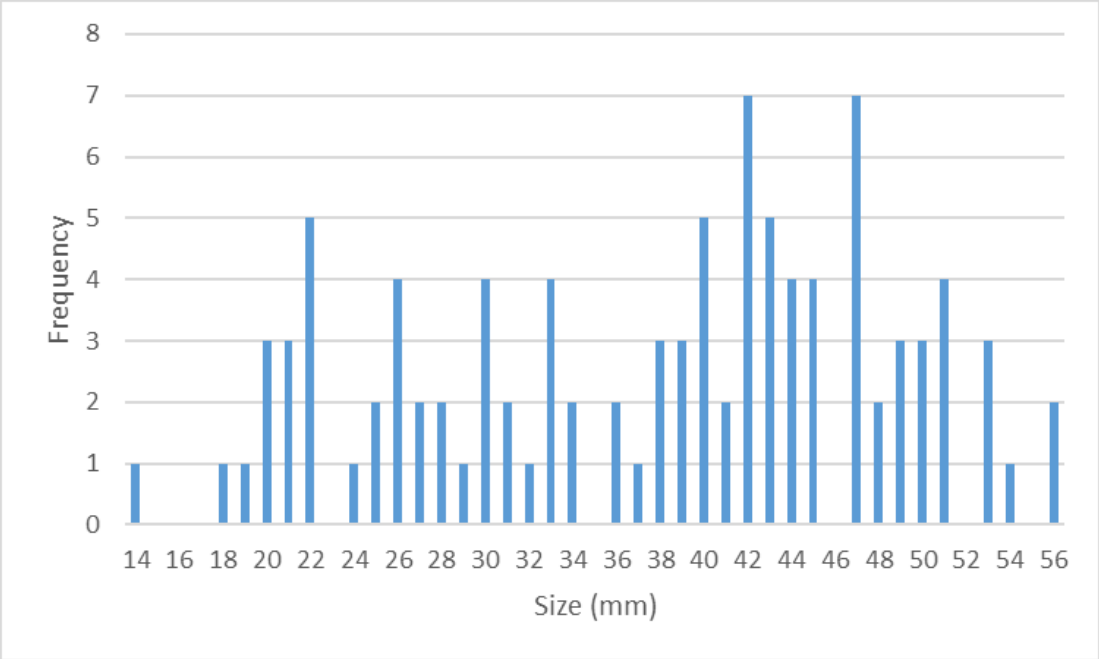


Figure 6.10 Histogram of pipi size from R10/1503 (context 1089)

R10/1505

A 10 litre bulk sample of midden material was collected from site R10/1505 (context 1119) at 3 Puhoi Road. The shell midden sample consisted of whole and fragmented marine shell within an ashy silt matrix that contained moderate inclusions of charcoal and heat fractured rock derived from oven stones, some of which were quite large.

A total of five species were identified within the sample (Table 6.29). Cockle was the dominant species present and comprised the greater majority of the assemblage (both NISP and MNI) of shellfish species, accounting for 70.7% (Table 6.30). Pipi was the next most numerous species present, comprising 15.6% of the assemblage, with mud snail contributing 6.5% of the sample, while the remainder of the assemblage consisted of single specimens of horn shell and common trophon, the presence of which represents bycatch (Table 6.30).

As the majority of the midden sample from site R10/1505 consists of cockle with pipi and mud snail also present (Figure 6.11), the analysis indicates that the local muddy shore environment of the lower Pūhoi River and its inlets was exploited for the shellfish catch present in the sample.

Fragmentation analysis of the assemblage indicates that the cockle sample from R10/1505 has a low fragmentation ratio (1.34) whilst the pipi displays a slightly higher but also low fragmentation ratio at 2.63, indicating negligible to low level taphonomic impact on the shell midden deposit (Table 6.31).

Additionally, 100 examples of cockle were measured to obtain data relating to the overall size range present, and general classifications were undertaken by visual observation of the remaining sample. The smallest cockle measured was 12.56mm, and the largest 40.51mm with the majority of specimens present in the sample representing adult cockle (Table 6.32 and Figure 6.12).

Table 6.29 List of identified taxa by scientific and common names and preferred habitat for samples from R10/1505 (context 1119)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Amphibola crenata	Mud Snail	Muddy shore
Xymene plebeius	Common Trophon	Muddy shore
Zeacumantus lutulentus	Horn Shell	Muddy shore

Table 6.30 NISP, MNI and percentage of MNI per taxa, R10/1505 (context 1119)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	260	130	70.7
Paphies australis	Pipi	80	40	21.8
Amphibola crenata	Mud Snail	12	12	6.5
Xymene plebeius	Common Trophon	1	1	0.5
Zeacumantus lutulentus	Horn Shell	1	1	0.5

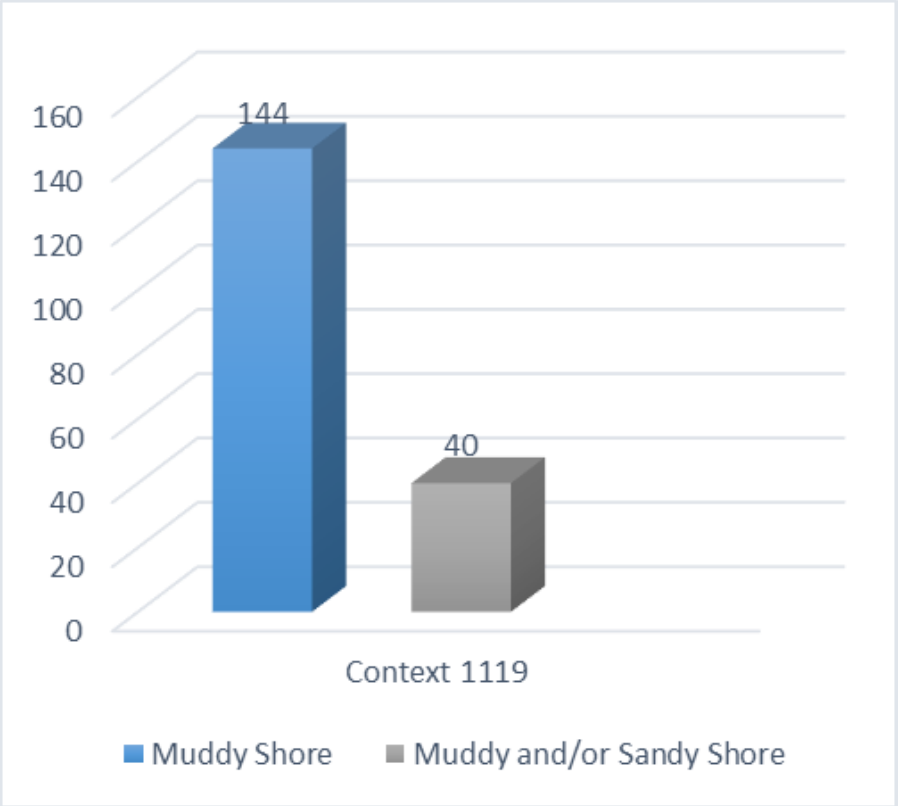


Figure 6.11 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1505 (context 1119)

Table 6.31 MNI of fragmented and whole pipi and cockle and the ratio for the midden samples from R10/1505 (context 1119)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	149	111	1.34
Pipi	58	22	2.63

Table 6.32 Maximum cockle dimension mean, median, mode and standard deviation (in mm)

Site and Context	Count	Mean	Median	Mode	Standard Deviation
R10/1498 (1089)	100	24.73	25.07	28	4.8

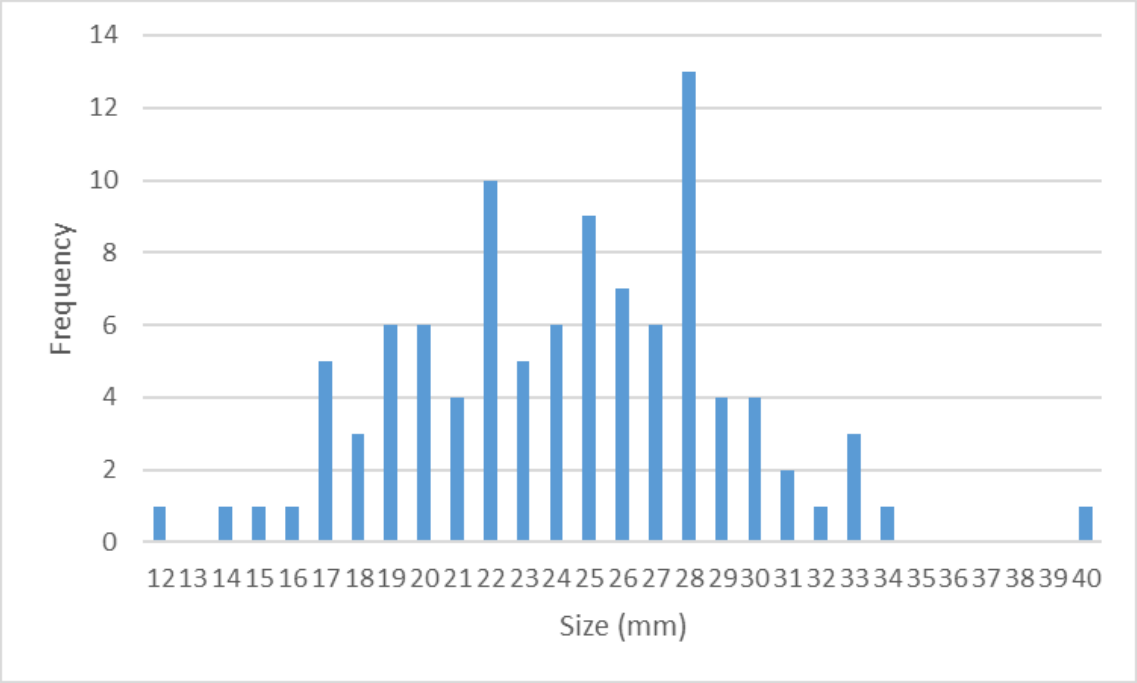


Figure 6.12 Histogram of cockle size from R10/1505 (context 1119)

6.3.6 517 State Highway 1 (SAP 9), Sites R10/1417, R10/1509 and R10/1510

Of the three shell midden sites investigated at 517 State Highway 1, bulk midden samples from sites R10/1417, R10/1509 and R10/1510 were selected for detailed shell midden analysis. Site R10/1417 was situated on two terraces on a roughly north-south trending ridgeline that descended from high ground to the north and northwest with commanding views down the Pūhoi River valley to the south and the Hikauae Creek (Hungry Creek) to the east (see Figure 3.92 for location). The site also overlooked the confluence of the Pūhoi River and Hikauae Creek. Site R10/1509 was situated on a small terrace in an elevated position some 95m north-northeast of the upper terrace of site R10/1417, while site R10/510 was located approximately 105m southwest of the lower terrace of site R10/1417 (see Figure 3.92 for locations).

R10/1417 – Main Shell Midden Deposit (Context 4001), Upper Terrace

A 20 litre bulk sample of midden material was collected from R10/1417 (context 4001) the main shell midden deposit that formed the uppermost archaeological horizon of the upper terrace of site R10/1417. The midden sample consisted of fragmented and whole marine shell within a greyish-brown ashy silt matrix that contained moderate inclusions of charcoal and oven stone fragments of multiple geological origins.

A total of seven species were identified within the deposit (Table 6.33). Cockle was the dominant species present in the sample, accounting for 46% of the assemblage, with pipi a close second at 39.6% of the assemblage (Table 6.34).There were also lesser amounts of tuatua and mud snail present in the assemblage (6.4% and 7.2% respectively), while the

very rare mud whelk, common trophon and many lined whelk represent unintended bycatch (Table 6.34). The fact that the assemblage is dominated by cockle along with pipi and mud snail indicates that the local muddy shore of the lower Pūhoi River and its tidal inlets would have been exploited for the majority of the catch, while the tuatua would have been brought in from elsewhere, perhaps from a sandy beach along the coastline from the river mouth (Figure 6.13).

Fragmentation analysis of the assemblage showed that both cockle and pipi shells from context 4001 were mostly intact and with low fragmentation ratios (1.12 and 0.99 respectively), which indicates a stable post-depositional environment (Table 6.35).

Additionally, 100 examples of both cockle and pipi were measured to obtain data relating to the overall size range present, and general classifications were undertaken by visual observation of the remaining sample. The smallest cockles measured were 18mm, and the largest 34mm, while for pipi the smallest was 23mm and the largest 52mm (Table 6.36, Figure 6.14 and Figure 6.15). While the large majority of the cockle had reached maturity, a little under half of the pipi had not.

Table 6.33 List of identified taxa by scientific and common names and preferred habitat for R10/1417 (context 4001)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Paphies subtriangulata	Tuatua	Sandy shore
Amphibola crenata	Mud Snail	Muddy shore
Xymene plebeius	Common Trophon	Muddy shore
Buccinulum linea linea	Many Lined Whelk	Rocky shore
Cominella glandiformis.	Mud Whelk	Muddy shore

Table 6.34 NISP, MNI and percentage of MNI per taxa, R10/1417 (context 4001)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	507	253	46
Paphies australis	Pipi	436	218	39.6
Paphies subtriangulata	Tuatua	71	35	6.4
Amphibola crenata	Mud Snail	39	39	7.2
Xymene plebeius	Common Trophon	2	2	0.3
Buccinulum linea linea	Many Lined Whelk	2	2	0.3
Cominella glandiformis.	Mud Whelk	1	1	0.2

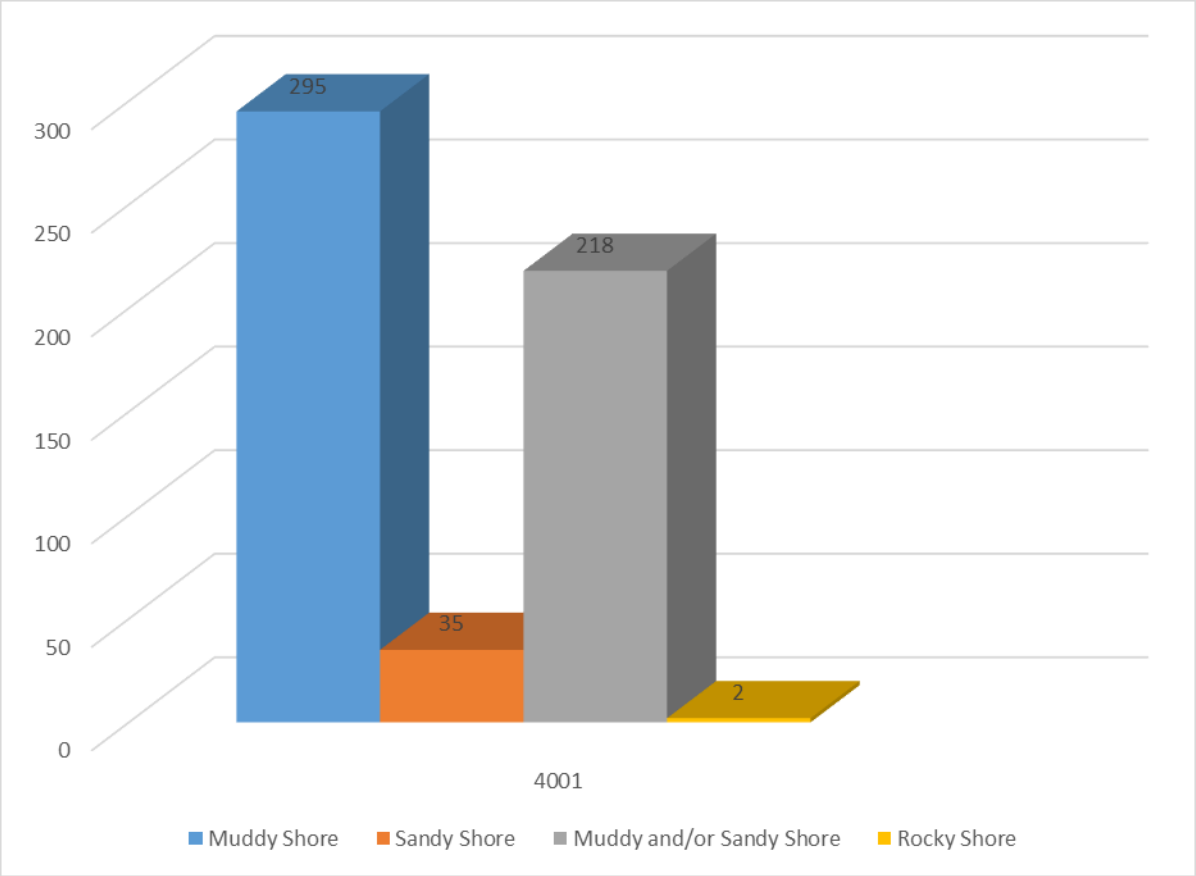


Figure 6.13 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1417 (context 4001)

Table 6.35 MNI of fragmented and whole cockle and pipi and the fragmentation ratio for the midden samples from R10/1417 (context 4001)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	268	239	1.12
Pipi	217	219	0.99

Table 6.36 Maximum cockle and pipi dimension mean, median, mode and standard deviation (in mm) from R10/1417 (context 4001)

Site and Context	Species	Count	Mean	Median	Mode	Standard Deviation
R10/1417 (4001)	Cockle	100	25.98	25.80	25	3.33
R10/1417 (4001)	Pipi	100	40.49	40.89	41	5.15

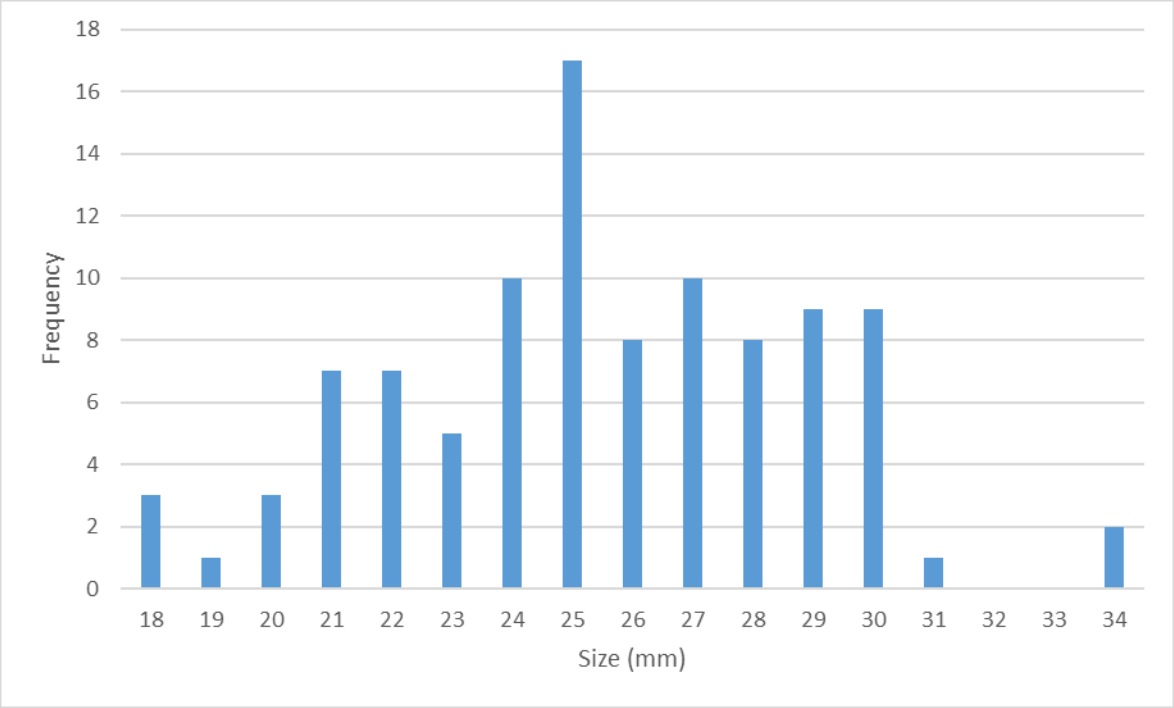


Figure 6.14 Histogram of cockle size from R10/1417 (context 4001)

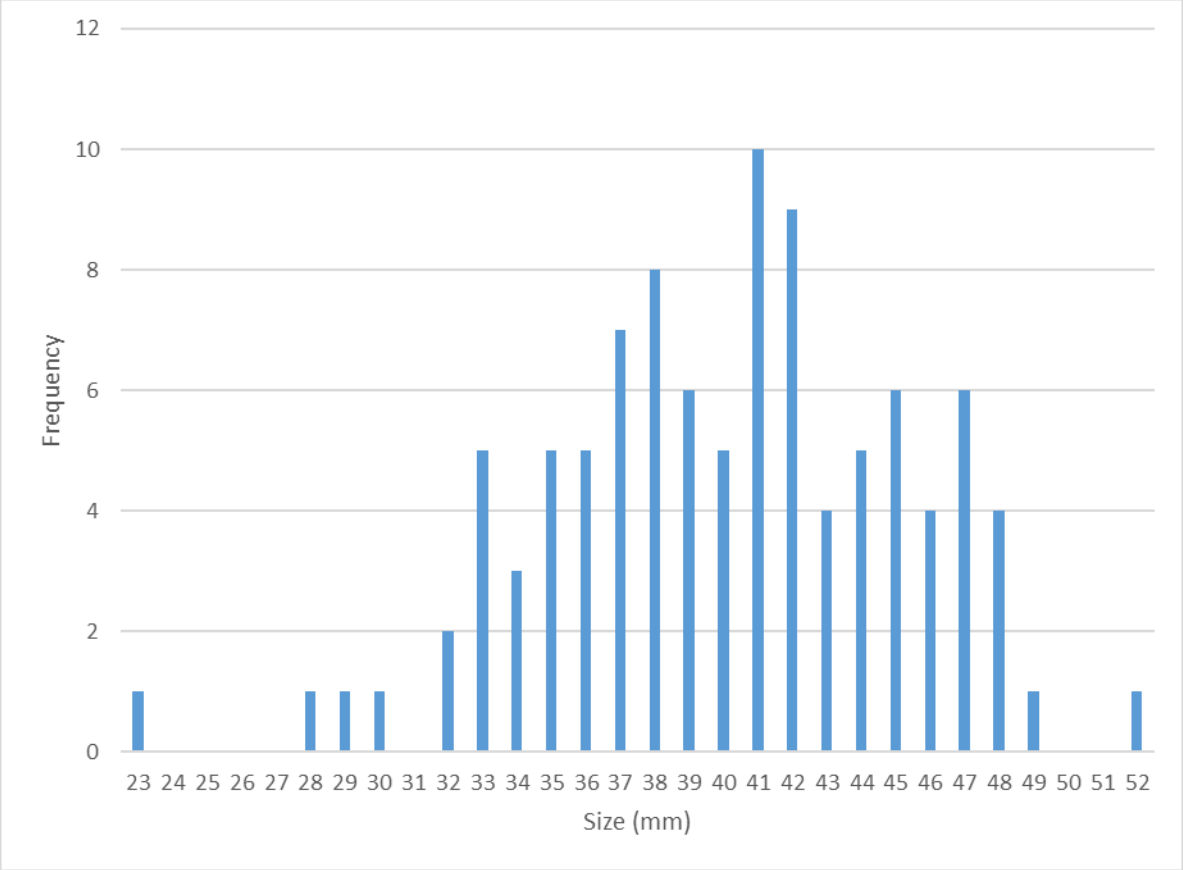


Figure 6.15 Histogram of pipi size from R10/1417 (context 4001)

R10/1417 – Small Shell Midden Deposit (Context 4004), Upper Terrace

A 20 litre bulk sample of midden material was collected from R10/1417 (context 4004), a discrete shell midden deposit approximately 10m due east and downslope of the main midden deposit on the upper terrace of site R10/1417. The midden sample consisted of fragmented and whole marine shell within a greyish light brown silt matrix with moderate inclusions of heat fractured rock and occasional charcoal.

A total of four species were identified within the deposit (Table 6.37). Cockle was the dominant species present in the sample and comprised the greater majority of the assemblage (both NISP and MNI) of shellfish species, accounting for 68.3% of the total, while pipi formed just over a quarter of the assemblage at 26.9% (Table 6.38). As with the sample from the main shell midden deposit (context 4001), there were also small amounts of mud snail and tuatua present (3.3% and 1.5% respectively) (Table 6.38). The fact that the assemblage is dominated by cockle and pipi along with mud snail indicates that the local muddy shore of the lower Pūhoi River and its tidal inlets would have been exploited for the majority of the catch, while the tuatua would have been brought in from elsewhere, perhaps from a sandy beach along the coastline from the river mouth (Table 6.37 and Figure 6.16).

Fragmentation analysis of the assemblage showed that both cockle and pipi shells from context 4004 showed ratios of 1.95 and 7.22 respectively, which indicate some level of post-depositional disturbance, but not of a significant scale (Table 6.39).

Additionally, 100 examples of cockle were measured to obtain data relating to the overall size range present, and general classifications were undertaken by visual observation of the remaining sample. The smallest cockles measured were 14mm, and the largest 38mm, (Table 6.40 and Figure 6.17), almost all being mature specimens, indicating good sized shellfish beds. There were not enough whole pipi present in the sample to undertake an analysis.

Table 6.37 List of identified taxa by scientific and common names and preferred habitat for R10/1417 (context 4004)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Paphies subtriangulata	Tuatua	Sandy shore
Amphibola crenata	Mud Snail	Muddy shore

Table 6.38 NISP, MNI and percentage of MNI per taxa, R10/1417 (context 4004)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	458	229	68.3
Paphies australis	Pipi	181	90	26.9
Paphies subtriangulata	Tuatua	10	5	1.5
Amphibola crenata	Mud Snail	11	11	3.3

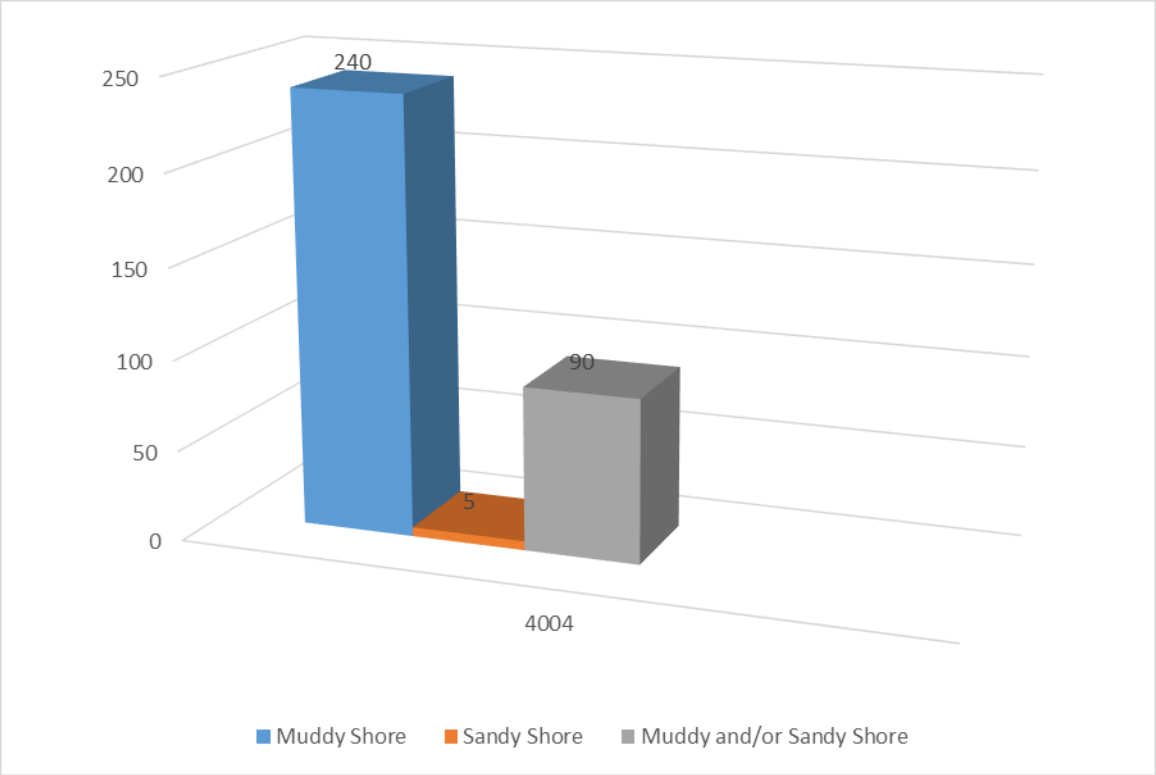


Figure 6.16 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1417 (context 4004)

Table 6.39 MNI of fragmented and whole cockle and pipi and the fragmentation ratio for the midden samples from R10/1417 (context 4004)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	303	155	1.95
Pipi	159	22	7.22

Table 6.40 Maximum cockle dimension mean, median, mode and standard deviation (in mm) from R10/1417 (context 4004)

Site and Context	Species	Count	Mean	Median	Mode	Standard Deviation
R10/1417 (4004)	Cockle	100	27.96	27.61	27	3.79

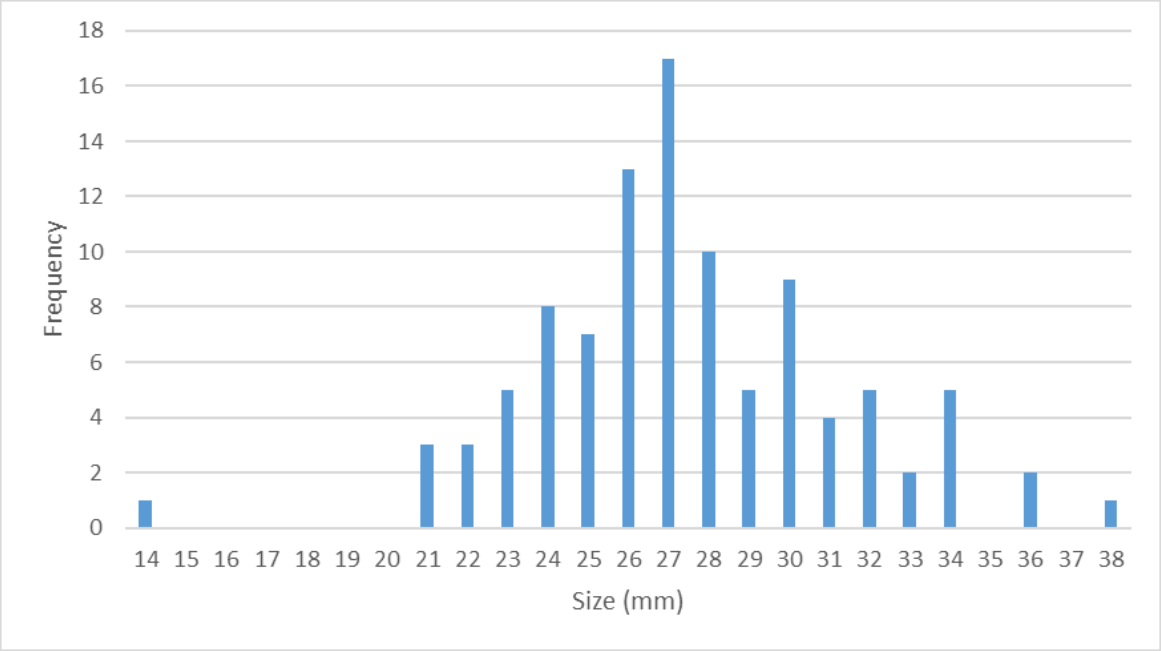


Figure 6.17 Histogram of cockle size from R10/1417 (context 4004)

R10/1417 – Oven Fill (Context 4082), Upper Terrace

A 20 litre bulk sample of midden material was collected from R10/1417 context 4082, the fill of hāngi 4081 that was sealed by and beneath the main shell midden deposit (context 4001) on the upper terrace of site R10/1417. The midden sample consisted of fragmented and whole marine shell within a greyish light brown silt matrix with moderate inclusions of heat fractured rock and occasional charcoal.

A total of five species were identified within the deposit (Table 6.41). Cockle was the dominant species present in the context 4082 sample, and comprised just over 50% of the assemblage (both NISP and MNI), while pipi was also present in significant amounts and formed some 40.24% of the assemblage (Table 6.42). There was a small quantity of mud snail present in the sample, which accounted for 8.78% of the assemblage, and single specimens of tuatua and rock oyster were also present. The fact that the assemblage is dominated by cockle and pipi with some mud snail indicates that the local muddy shore of the lower Pūhoi River and its tidal inlets would have been exploited, while the tuatua and rock oyster would have been brought in from elsewhere, perhaps from the coastline around the river mouth (Table 6.41, Table 6.42 and Figure 6.18).

Fragmentation analysis of the assemblage showed that both cockle and pipi shells from context 4082 were mostly intact and with low fragmentation ratios (0.29 and 1.71 respectively) which indicates a stable post-depositional environment (Table 6.43).

Additionally, 100 examples of both cockle and pipi were measured to obtain data relating to the overall size range present, and general classifications were undertaken by visual observation of the remaining sample. The smallest cockles measured were 19mm, and the largest 41mm, while for pipi the smallest was 33mm and the largest 56mm (Table 6.44, Figure 6.19 and Figure 6.20). Almost all the cockle and pipi had reached maturity, indicating well stocked shellfish beds.

Table 6.41 List of identified taxa by scientific and common names and preferred habitat for R10/1417 (context 4082)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Paphies subtriangulata	Tuatua	Sandy shore
Amphibola crenata	Mud Snail	Muddy shore
Saccostrea glomerata	Rock Oyster	Rocky shore

Table 6.42 NISP, MNI and percentage of MNI per taxa, R10/1417 (context 4082)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	415	207	50.49
Paphies australis	Pipi	330	165	40.24
Amphibola crenata	Mud Snail	36	36	8.78
Paphies subtriangulata	Tuatua	1	1	0.24
Saccostrea glomerata	Rock Oyster	1	1	0.24

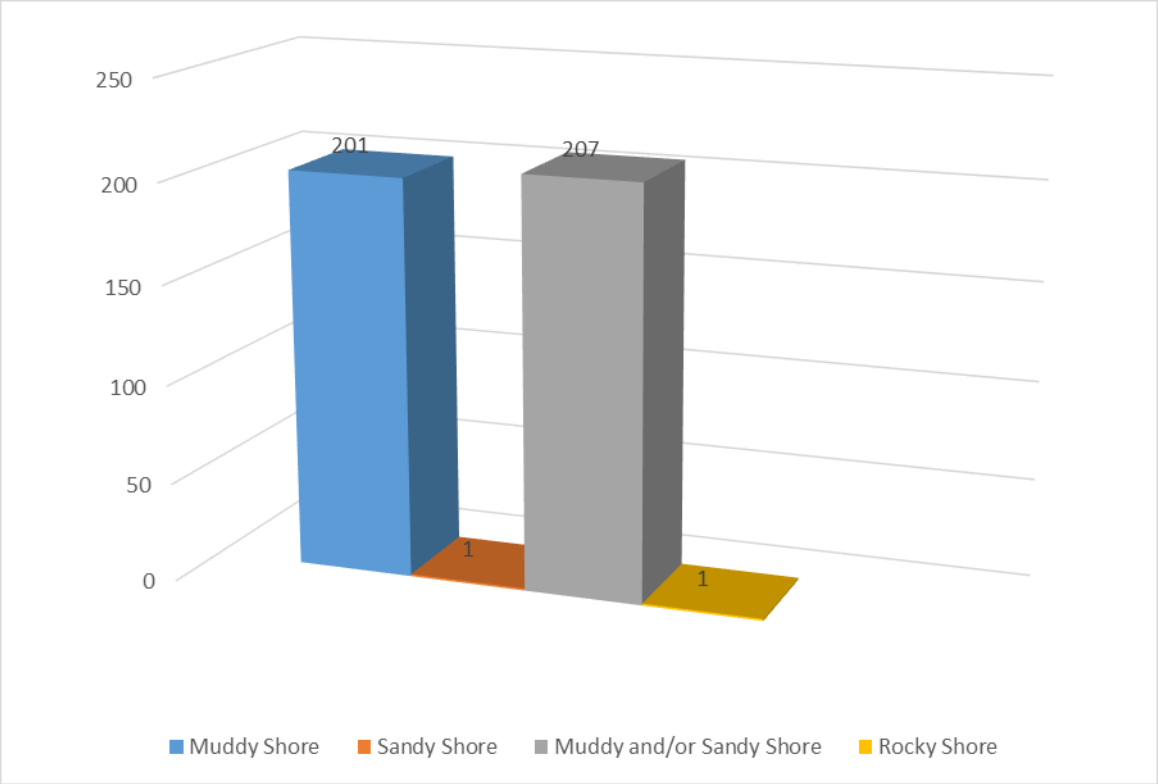


Figure 6.18 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1417 (context 4082)

Table 6.43 MNI of fragmented and whole cockle and pipi and the fragmentation ratio for the midden samples from R10/1417 (context 4082)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	75	255	0.29
Pipi	262	153	1.71

Table 6.44 Maximum cockle and pipi dimension mean, median, mode and standard deviation (in mm) R10/1417 (context 4082)

Site and Context	Species	Count	Mean	Median	Mode	Standard Deviation
R10/1417 (4082)	Cockle	100	26.70	26.58	27	3.55
R10/1417 (4082)	Pipi	100	44.06	43.37	43	5.60

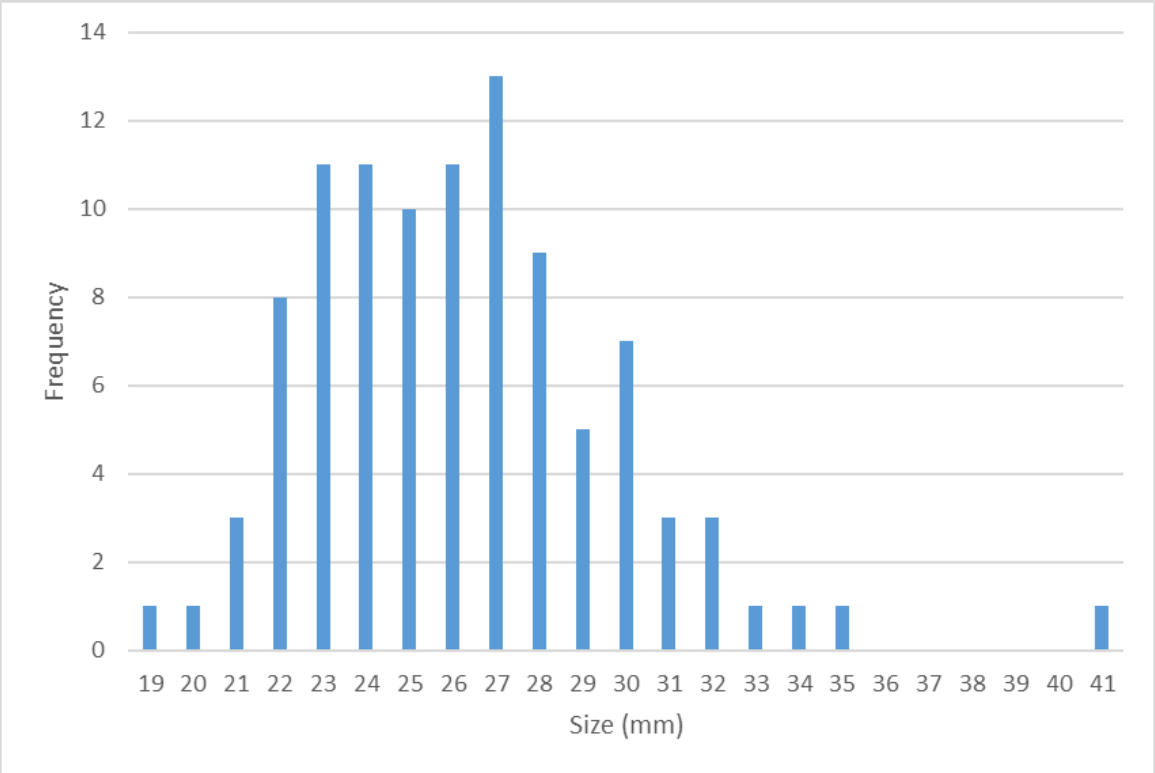


Figure 6.19 Histogram of cockle size from R10/1417 (context 4082)

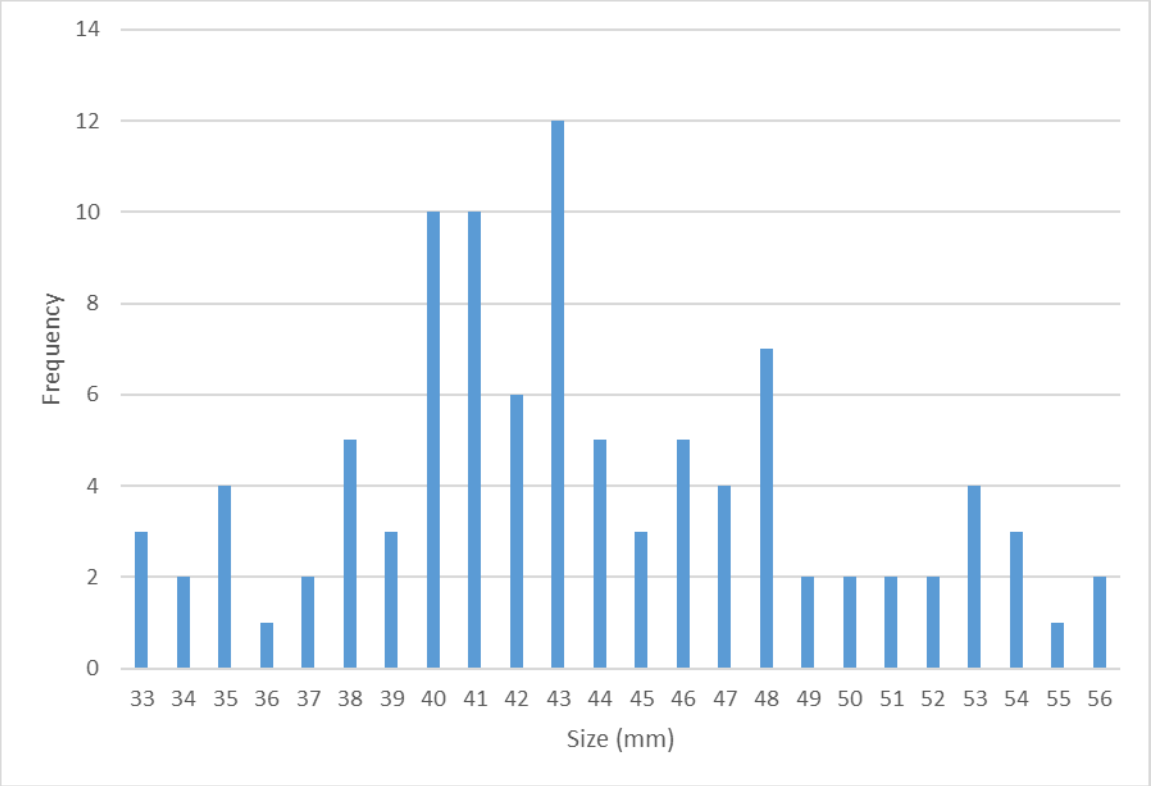


Figure 6.20 Histogram of pipi size from R10/1417 (context 4082)

R10/1509

A 10 litre bulk sample of midden material was collected from site R10/1509 (context 2408) at 517 State Highway 1. The shell midden sample consisted of whole and fragmented marine shell within an ashy silt matrix that contained moderate inclusions of charcoal and heat fractured rock fragments derived from oven stones.

A total of four species was present within the deposit (Table 6.45). Cockle and pipi were the dominant species (both NISP and MNI) present in the R10/1509 sample, comprising 49.85% and 47.15% of the assemblage respectively (Table 6.46). There was also a small quantity of mud snail present in the sample which accounted for 2.4% of the assemblage, while the remainder consisted of two specimens of an unidentified gastropod (Table 6.46). As the assemblage is dominated by cockle and pipi with some mud snail it likely indicates that the local muddy shore of the lower Pūhoi River and its tidal inlets would have been exploited, although the pipi could also have been gathered from a sandy beach along the coastline from the river mouth (Table 6.45, Table 6.46 and Figure 6.21).

Fragmentation analysis of the assemblage showed that both cockle and pipi shells from R10/1509 were mostly intact and with high fragmentation ratios (5.3 and 14.6 respectively), indicating that significant post-depositional disturbance had occurred, probably from production forestry activities (Table 6.47).

Table 6.45 List of identified taxa by scientific and common names and preferred habitat for sample from R10/1509 (context 2408)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore
Amphibola crenata	Mud Snail	Muddy shore
Unidentified *gastropoda*	Unidentified	Unknown

Table 6.46 NISP, MNI and percentage of MNI per taxa, R10/1509 (context 2408)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	332	166	49.85
Paphies australis	Pipi	313	157	47.15
Amphibola crenata	Mud Snail	8	8	2.4
Unidentified *gastropoda*	Unidentified	2	2	0.6

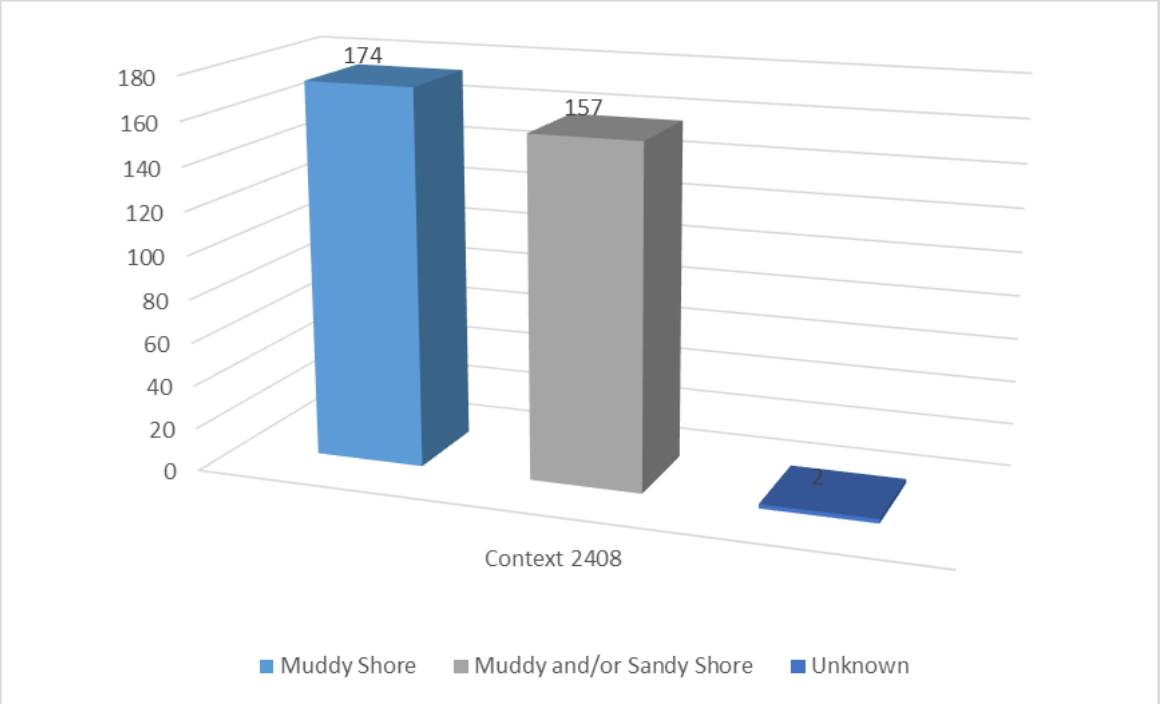


Figure 6.21 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1509 (context 2408)

Table 6.47 MNI of fragmented and whole cockle and pipi and the fragmentation ratio for the midden samples from R10/1509 (context 2408)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	139	26	5.3
Pipi	146	10	14.6

R10/1510

A 10 litre bulk sample of midden material was collected from site R10/1510 (context 1203) at 517 State Highway 1. The shell midden sample consisted of whole and fragmented marine shell within a greyish dark brown ashy silt matrix that contained moderate inclusions of charcoal and heat fractured rock fragments.

A total of two species were identified within the deposit (Table 6.48). Cockle and pipi were the only species present in the R10/1510 sample, comprising 67.88% and 32.12% of the assemblage respectively (Table 6.49). This indicates that the local muddy shore of the lower Pūhoi River and its tidal inlets would have been exploited for the catch (Table 6.48, Table 6.49 and Figure 6.22).

Fragmentation analysis of the assemblage showed that both cockle and pipi shells from R10/1510 were mostly intact and with low fragmentation ratios (0.48 and 1.78 respectively) indicating that very little post-depositional disturbance had occurred and that the burial environment was stable (Table 6.50).

Additionally, 100 examples of cockle were measured to obtain data relating to the overall size range present, and general classifications were undertaken by visual observation of the remaining sample. The smallest cockles measured were 16mm, and the largest 36mm, almost all being of adult size (Table 6.51 and Figure 6.23). There were not enough whole pipi present in the sample to undertake an analysis.

Table 6.48 List of identified taxa by scientific and common names and preferred habitat for sample from R10/1510 (context 1203)

Scientific Name	Common Name	Preferred Habitat
Austrovenus stutchburyi	Cockle	Muddy shore
Paphies australis	Pipi	Muddy and/or sandy shore

Table 6.49 NISP, MNI and percentage of MNI per taxa, R10/1510 (context 1203)

Scientific name	Common Name	NISP	MNI	MNI %
Austrovenus stutchburyi	Cockle	187	93	67.88
Paphies australis	Pipi	89	44	32.12

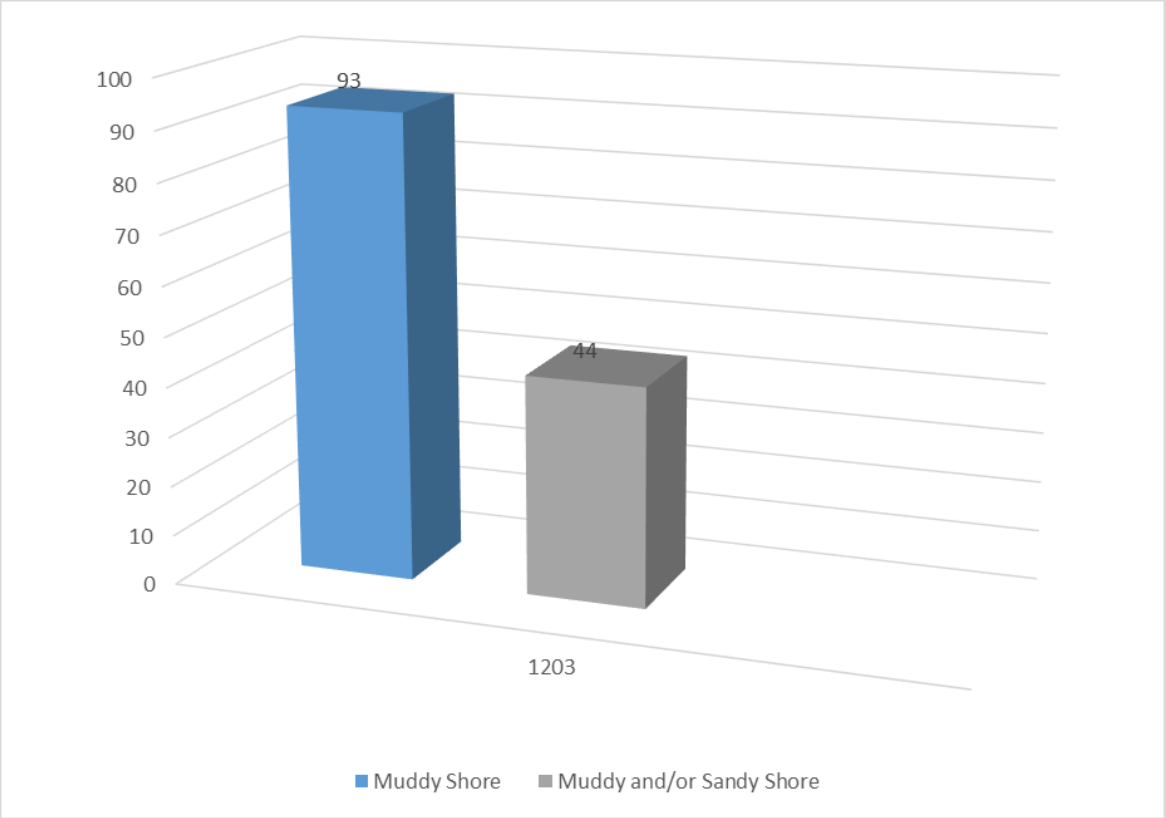


Figure 6.22 Sample environmental niche MNI as a percentage of the total sample environmental niche MNI for samples from R10/1510 (context 1203)

Table 6.50 MNI of fragmented and whole cockle and pipi and the fragmentation ratio for the midden samples from R10/1510 (context 1203)

Shellfish Species	Fragmented	Whole	Ratio
Cockle	61	126	0.48
Pipi	57	32	1.78

Table 6.51 Maximum cockle dimension mean, median, mode and standard deviation (in mm) from R10/1510 (context 1203)

Site and Context	Species	Count	Mean	Median	Mode	Standard Deviation
R10/1510 (1203)	Cockle	100	25.93	25.73	25	3.15

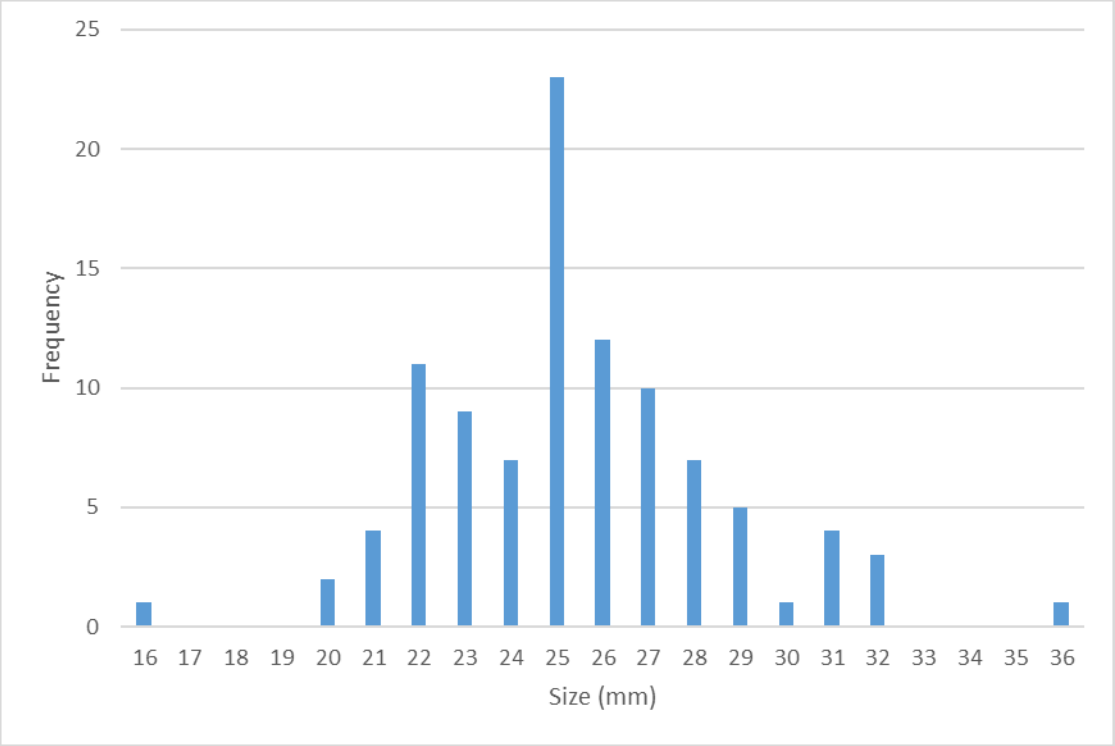


Figure 6.23 Histogram of cockle size from R10/1510 (context 1203)

6.4 Plant Microfossil Analysis

6.4.1 Introduction

A total of 26 environmental samples were taken from contexts from four archaeological sites (R10/1484, R10/1417, R10/1512 and R09/2247) and submitted for plant microfossil analysis. The plant microfossil analysis was undertaken by Dr Mark Horrocks of Microfossil Research Limited.

The full plant microfossil analysis reports for each of the four archaeological sites analysed are provided in the digital appendices as Appendix 8.

6.4.2 Methodology

Samples were taken from both vertical profiles (sites R10/1484 and R10/1417), as well as from discrete archaeological features within those sites. The sample obtained from site R10/1512 was taken from the primary fill of the large umu tī earth oven. The sample from R09/2247 was taken from flood deposit. The samples were analysed for pollen, phytoliths and starch to provide a record of past vegetation, environments and human activity. The upper samples from the vertical profiles obtained from sites R10/1484 and R10/1417 are thought to represent a time period younger than that of the samples from the discrete archaeological features. The samples were prepared for pollen analysis by the standard acetolysis method (Moore et al. 1991; Horrocks in press), while the samples were prepared for phytolith analysis by density separation (Horrocks in press). Lastly, starch and other

remains were prepared for analysis by density separation and presence/absence noted (Horrocks in press).

Analyses

Pollen analysis

Pollen analysis includes pollen grains of seed plants and spores of ferns and other plants. It provides insight into past vegetation and environments and in New Zealand allows the differentiation of sediments deposited in pre-settlement, early Māori and European times (McGlone et al. 1993; Hayward et al. 2004). Pollen can also provide evidence for Māori-introduced plants, for example bottle gourd and paper mulberry, and European-introduced crops such as maize (Horrocks 2004; Horrocks et al. 2008).

Phytolith analysis

Phytoliths are particles of silica formed in inflorescences, stems, leaves and roots of many plants (Kondo et al. 1994; Piperno 2006). Phytolith analysis complements pollen analysis and, like pollen, can provide evidence for Māori-introduced bottle gourd and paper mulberry (Horrocks 2004). Other types of microscopic biosilicates, notably diatoms, radiolarians and sponge spicules, are extracted along with phytoliths during preparation. Diatoms are unicellular algae and have cell walls composed of silica; radiolarians are a type of amoeboid protozoa with siliceous skeletons; sponges are multi-cellular animals with skeletons often composed of siliceous spicules. Diatoms are found in aquatic and sub-aquatic environments; radiolarians and sponges are exclusively aquatic. Diatoms and sponges are found in both marine and freshwater environments; radiolarians are exclusively of marine origin.

Analysis of starch and other plant material

This analysis includes starch grains and other plant material such as calcium oxalate crystals and xylem (Pearsall 2015). Starch is the main substance of food storage for plants and is mostly found in high concentrations of microscopic grains in underground stems (e.g., tubers and corms), and roots and seeds. The grains are synthesised and stored in amyloplasts; sub-cellular units specialised for this function. Calcium oxalate crystals, comprising raphides which are needle-like, and druses which are compound, are found in both the aerial and underground parts of many plant taxa. Xylem is a vascular tissue comprising elongated cells through which most of the water and minerals of a plant are conducted. Starch analysis can provide evidence for Māori-introduced starch crops, such as kūmara, taro and yam, and European-introduced crops such as potato (Horrocks and Weisler 2006; Horrocks et al. 2007, 2008). Recent advances in this method include the use of Fourier Transform InfraRed spectroscopy to positively identify degraded starch, often uncertain due to loss of distinguishing features, and the discovery of a new taro microfossil type, namely phenolic inclusions from the skin of the corm (Horrocks et al. 2012, 2014, 2017; Kahn et al. 2014).

Taphonomy

In ground substrates at archaeological sites such as in this study that have been subjected to human activity, mixing of plant microfossils of different ages can occur by erosion, percolation, bioturbation, or mechanical disturbance. Interpretations based on the microfossils should thus be made cautiously.

6.4.3 R10/1484 Results

Pollen and Spores

For 10 of the 11 samples, at least 150 pollen grains and spores were counted for each sample and slides were scanned for types not found during the counts (Figure 6.24). The remaining sample had insufficient pollen for meaningful counting. A slide was still scanned for this sample, however, and any pollen types noted. Microscopic fragments of charcoal were also extracted during pollen preparation, providing evidence for fire.

All the samples taken from site R10/1484 contained microscopic fragments of charcoal, reflecting fire activity by people at the site. The amounts of charcoal were generally very small, however, with some samples showing negligible amounts.

All samples except sample 82 contained sufficient pollen and spores for meaningful counting. Many pollen grains and spores were abraded and fragmented, reflecting colluvial transport. The assemblages were dominated by spores of *Cyathea* tree ferns (Figure 6.24). These large amounts likely partly reflect differential production and preservation. *Cyathea* spores can accumulate in ground substrates because of their high rate of production and high resistance to decay compared with many other spore and pollen types (Wilmshurst et al. 1999).

Tall forest trees were represented in the pollen assemblages mostly by two native podocarp pollen types, namely 'podocarpoid' and rimu (*Dacrydium*), and pohutukawa/rata (*Metrosideros*), with some moderate (as opposed to minor) amounts (Figure 6.24). The podocarpoid type comprised pollen grains of podocarps too fragmented or degraded to identify to any particular taxon. Most of this type, however, are probably from miro (*Prumnopitys ferruginea*) and especially matai (*P. taxifolia*), with the latter having higher pollen production and longer-distance pollen dispersal.

Pollen indicators of landscape disturbance found in the samples include tutu (*Coriaria*) and dandelion/pūhā (*Taraxacum/Sonchus*) (Figure 6.24). Tutu is an early successional small tree species following forest disturbance (Wilmshurst et al. 1999). Pūhā is indigenous to New Zealand while dandelion is European introduced; both are invasive herbaceous plants and pollen of the two can be difficult to differentiate. Leaves and shoots of pūhā and dandelion were cooked and eaten as greens by Māori (Colenso 1881; Best 1902).

Spore indicators of disturbance found in the samples include small amounts of bracken (*Pteridium esculentum*) and hornworts (*Anthocerotaceae*) (Figure 6.24). Bracken is an invasive, indigenous ground fern with widely dispersed spores, common in New Zealand pollen spectra since human settlement and almost always associated with large-scale repeated burning of forest by early Māori. It may form dense stands, averaging 1-2 m tall over extensive areas, and its rhizome was commonly harvested as a starch-rich food by Māori (Best 1902). Hornworts are small inconspicuous plants that commonly colonise freshly disturbed and exposed soils (Wilmshurst et al. 1999). As these two spore types are commonly associated in often large amounts with prolonged, large-scale Māori landscape and forest disturbance, their paucity in the Pūhoi samples, coupled with the sparse charcoal and some moderate pollen values for tall forest trees, suggests that such disturbance by Māori at the site represented by the sampled substrates was moderate rather than large scale.

Small amounts of pollen of Cook's scurvy grass (*Lepidium oleraceum*) were identified in several samples (Figure 6.24). The leaves of Cook's scurvy grass (not a true grass) are edible and high in vitamin C and can be eaten raw or cooked. The plant's common name

derives from Captain Cook's use of it as a remedy for scurvy. Crowe (1997) considered that some reports of it being used as a food plant by early Māori should be treated cautiously. Previously a very common coastal plant, this species is now rare.

Pollen of two Māori-introduced cultigens was identified in this study. A single pollen grain of bottle gourd (hue, *Lagenaria siceraria*) was found in sample 87, and a single pollen grain of taro (*Colocasia esculenta*) was found in each of samples 72 and 114.

Pollen of Dactylanthus (*Dactylanthus taylorii*) was found in samples 31, 87 and 114 (Figure 6.24). This species is rare in pollen spectra and is from a highly unusual plant – New Zealand's only fully parasitic flowering plant. Dactylanthus has no green leaves or roots of its own and grows as a root-like stem attached to the root of a host tree (Eckroyd 1996). Many species of trees may be hosts. In response, the host root moulds into the shape of a fluted wooden rose, which gives the plant its previous common name of wood rose. It is through this placenta-like attachment that Dactylanthus draws its nutrients. The Māori name for this plant, 'pua o te reinga' (flower of the underworld), alludes to the way its flowers emerge from below ground. It is pollinated by the short-tailed bat. Dactylanthus is currently in serious decline and classified as endangered.

Traces of pollen of *Casuarina*, a genus of Australian trees, was found in two of the discrete feature samples (Figure 6.24). This pollen type, often found in small amounts in New Zealand pollen spectra, has very long-distance dispersal on air currents.

Unequivocal European impacts, namely pollen of exotic pine (*Pinus*) trees and the invasive, herbaceous narrow-leaved plantain (*Plantago lanceolata*), were found in the two uppermost samples of the vertical profile, reflecting its younger age (Figure 6.24). Grass (*Poaceae*) pollen increased in these samples, with much of this likely exotic also, from European-introduced pasture grasses.

Phytoliths and Other Biosilicates

All samples except samples 82, 104 and 117 contained sufficient pollen and spores for meaningful counting. The phytolith assemblages were dominated by tree and shrub phytoliths, notably spherical verrucose type, and to a lesser extent grass leaf phytoliths (Figure 6.25). Spherical verrucose phytoliths originate from the wood and leaves of native trees, with the large amounts in this case almost certainly partly reflecting the pre-settlement forest in the phytolith spectra. Phytoliths, being non-organic, can accumulate in substrates for much longer than pollen and spores, due to their greater resistance to decay. The grass phytoliths recorded higher values in the vertical profile at the expense of tree and shrub phytoliths, presumably reflecting environmental changes associated with these younger samples. These changes could be related to the commencement in the area of European-style farming, including the introduction of exotic pasture grasses.

Phytoliths of nikau (*Rhopalostylis*) palm fronds also feature. The latter is one of the few taxa that can be identified to species level in the New Zealand phytolith flora (Kondo et al. 1994). Other biosilicates identified in the samples, namely small amounts of sponge spicule fragments, reflect the local coastal environment.

Starch and Other Plant Material

Starch grains from several Māori-introduced cultigens were identified in this study. The first type, identified in samples 86, 104, 106 and 117, comprised numerous individual starch grains consistent with the tuberous root of kūmara (*Ipomoea batatas*) (Figure 6.25). The second type of starch, identified in samples 86, 104, and 106, comprised small amounts of fragments of amyloplasts (sub-cellular units that synthesise and store starch grains) consistent with the corm of taro. The remaining type, identified in sample 106, comprised a very small amount (an apparent clump of two grains) tentatively consistent with the tuber of greater yam (uwhi, *Dioscorea alata*).

The starch material identified in this study showed a high degree of degradation, not unusual for starch and many other types of organic remains at archaeological sites. Given this effect and the small amounts of cf. taro and especially cf. yam starch identified, the starch evidence should be treated cautiously.

Origins of the Māori-introduced Cultigens

Bottle gourd, greater yam, kūmara and taro are part of the small group of six introduced species cultivated by Māori at the time of European contact in the late 18th century. Almost all the numerous plant species (70+) identified as intentionally introduced to Polynesia by early people, including greater yam and taro, are native to various regions within the broad area from Africa to Melanesia (Whistler 2009). Kūmara, however, known elsewhere as sweet potato, originated in South America, its introduction to the Pacific a result of Polynesian contact (Hather and Kirch 1991). Bottle gourd is native to the Old World Tropics, probably somewhere in Africa (Whistler 2009). Like kūmara, it is thought to have most likely been introduced to Polynesia from South America, but how it crossed the Atlantic to South America is a mystery.

Discussion

The plant microfossils provide evidence for several Māori-introduced cultigens, namely bottle gourd, cf. greater yam, cf. kūmara and cf. taro. Evidence for landscape disturbance by Māori suggests minor or moderate scale rather than large scale. This likely indicates that the occupation site of R10/1484 was within clearances perhaps on ridge-top terraces surrounded by still extant areas of bush/forest.

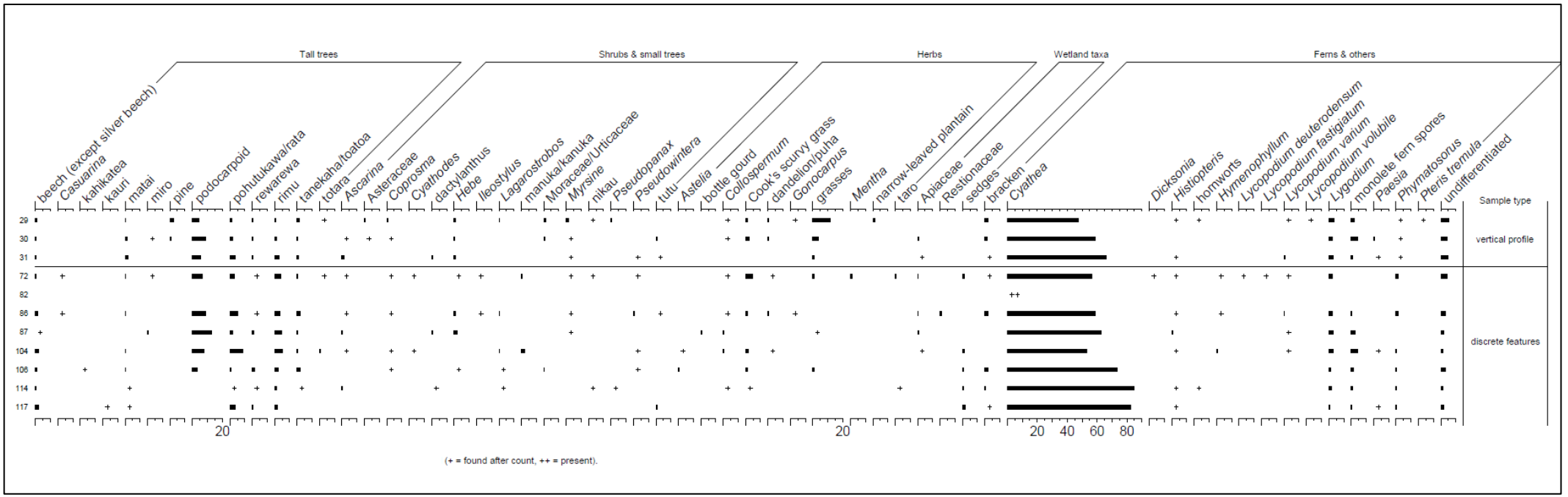


Figure 6.24 Pollen percentage diagram from site R10/1484 at 3 Puhoi Road. Samples are from the following contexts: 29 = modern topsoil 1140; 30 = buried topsoil 1141; 31 = colluvial subsoil 1142; 72 = fill 1577 of scoop feature 1576 in base of pit 1196; 82 = fill 1934 of oval scoop feature 1933 in base of pit 1196; 86 = fill 1521 of drain 1517 around ovoid house; 87 = fill 1519 of footings trench around sunken floored ovoid house 2455; 104 = fill 2460 of central posthole 2459 in house 2455; 106 = occupation surface 2427 in house; 114 = made ground layer 1902 from upcast material from large pit excavation; 115 = fill 2856 of posthole 2855 from wall of house 2455; 117 = trample layer 3005 in base of pit 1196

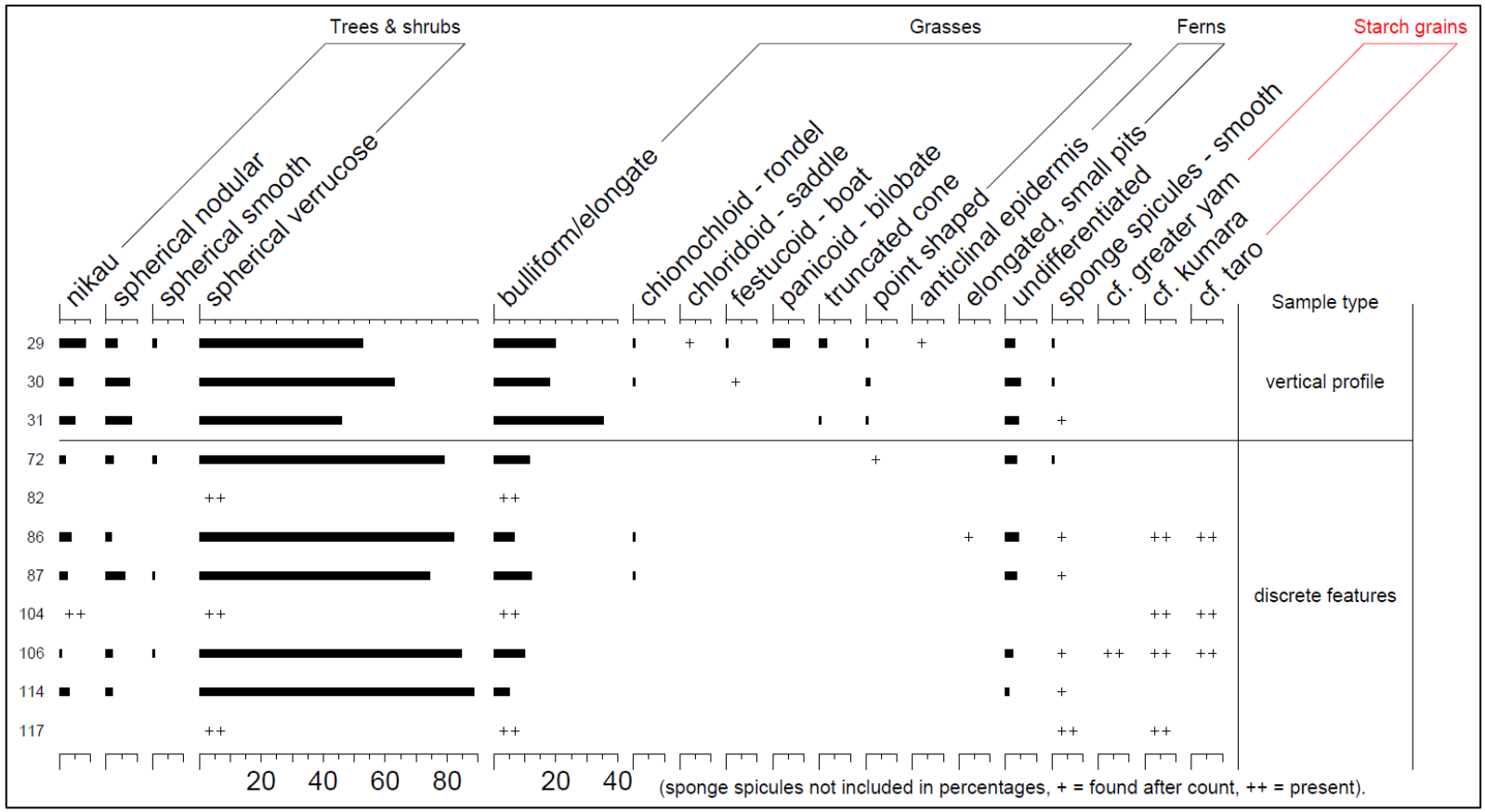


Figure 6.25 Phytolith and starch percentage diagram from site R10/1484 at 3 Puhoi Road (see Figure 6.24 for sample sources)

6.4.4 R10/1417 Results

Pollen and Spores

Samples 293, 294 and 295, from discrete archaeological features, contained negligible to very small amounts of microscopic fragments of charcoal. The remaining 10 samples contained moderate to large amounts, reflecting fire activity by people at the site. The pollen assemblages of samples 293, 294 and 295 were dominated by pollen of European-introduced pine (*Pinus*) trees, present in unusually large amounts (Figure 6.26). Two other samples from discrete features, namely samples 202 and 203, contained small amounts of pollen of pine, and of another exotic, the invasive, herbaceous narrow-leaved plantain (*Plantago lanceolata*). If the sampled features are of pre-European contact age, the exotic pollen is presumably a result of mixing of modern and older material.

The pollen assemblages of the remaining samples were variably dominated by pollen of native beech (*Fuscospora*) trees, and spores of bracken (*Pteridium esculentum*) and *Cyathea* tree ferns (Figure 6.26). The beech pollen reflects formerly more widespread regional 'kauri/hard beech forest' (McKelvey and Nicholls 1959). Hard beech (*Fuscospora truncata*) is now rare in north Auckland, but McKelvey and Nicholls (1959) concluded that locally it can occur in significant numbers, associated with kauri (*Agathis australis*). Hard beech has both a very high rate of pollen production and long-distance pollen dispersal, while kauri has the complete opposite on both counts, hence the extreme under-representation of kauri seen in Figure 6.26 (Macphail and McQueen 1983; Elliot 1999). Bracken is an invasive, indigenous ground fern with widely dispersed spores, common in New Zealand pollen spectra since human settlement and almost always associated with large-scale repeated burning of forest by early Māori. It may form dense stands, averaging 1-2m tall over extensive areas, and its rhizome was commonly harvested as a starch-rich food by Māori (Best 1902). The *Cyathea* spores in the samples likely partly reflect differential production and preservation. These spores can accumulate in ground substrates because of their high rate of production and high resistance to decay compared with many other spore and pollen types (Wilmshurst et al. 1999).

Other pollen indicators of landscape disturbance found in this study include pollen of tutu (*Coriaria*) and dandelion/pūhā (*Taraxacum/Sonchus*), and spores of hornworts (*Anthocerotaceae*) (Figure 6.26). Tutu is an early successional small tree species following forest disturbance (Wilmshurst et al. 1999). Pūhā is indigenous to New Zealand while dandelion is European introduced; both are invasive herbaceous plants and pollen of the two can be difficult to differentiate. Leaves and shoots of pūhā and dandelion were cooked and eaten as greens by Maori (Colenso 1881; Best 1902). Hornworts are small inconspicuous plants that commonly colonise freshly disturbed and exposed soils (Wilmshurst et al. 1999).

Small amounts of pollen of Cook's scurvy grass (*Lepidium oleraceum*) were identified in several samples (Figure 6.26). The leaves of Cook's scurvy grass (not a true grass) are edible and high in vitamin C and can be eaten raw or cooked. The plant's common name derives from Captain Cook's use of it as a remedy for scurvy. Crowe (1997) considered that some reports of it being used as a food plant by early Māori should be treated cautiously. Previously a very common coastal plant, this species is now rare.

Pollen of several Māori subsistence plants was identified in this study. Small amounts of pollen of the Māori-introduced cultigens bottle gourd (hue, *Lagenaria siceraria*) and cf. tī (*Cordyline fruticosa*) were found in samples 203 and 202, respectively (Figure 6.26). In addition, samples 203 and 125 contained small amounts of pollen of a native Māori

subsistence plant, not often found in New Zealand pollen spectra, namely rengarenga lily (*Arthropodium cirratum*). The fleshy rhizomes of rengarenga were cooked and eaten by Māori (Colenso 1881; Best 1902).

Pollen of Dactylanthus (*Dactylanthus taylorii*) was found in samples 203 and 229 (Figure 6.26). This species is rare in pollen spectra and is from a highly unusual plant – New Zealand's only fully parasitic flowering plant. Dactylanthus has no green leaves or roots of its own and grows as a root-like stem attached to the root of a host tree (Eckroyd 1996). Many species of trees may be hosts. In response, the host root moulds into the shape of a fluted wooden rose, which gives the plant its previous common name of wood rose. It is through this placenta-like attachment that Dactylanthus draws its nutrients. The Māori name for this plant, 'pua o te reinga' (flower of the underworld), alludes to the way its flowers emerge from below ground. It is pollinated by the short-tailed bat. Dactylanthus is currently in serious decline and classified as endangered.

The five samples comprising the vertical profile showed an up-profile increase in bracken spores at the expense of beech pollen, reflecting initial forest clearance by Māori and subsequently for European style farming (Figure 6.26). Pollen indicators of the latter include pine and narrow-leaved plantain in the two uppermost samples.

Phytoliths and Other Biosilicates

All samples except samples 293, 294 and 295 contained sufficient phytoliths for meaningful counting. The phytolith assemblages were overwhelmingly dominated by tree and shrub phytoliths, notably spherical verrucose type (Figure 6.27). Spherical verrucose phytoliths originate from the wood and leaves of native trees, with the large amounts in this case almost certainly largely reflecting the pre-settlement forest in the phytolith spectra (Kondo et al. 1994). Phytoliths, being non-organic, can accumulate in substrates for much longer than pollen and spores, due to their greater resistance to decay.

Small amounts of phytoliths of nikau (*Rhopalostylis*) palm fronds also feature (Figure 6.4). The latter is one of the few taxa that can be identified to species level in the New Zealand phytolith flora (Kondo et al. 1994). Other biosilicates identified in the samples, namely small amounts of diatom and sponge spicule and fragments, reflect the local coastal environment.

Starch and Other Plant Material

Starch grains from one Māori-introduced cultigen were identified in this study. This type, identified in sample 294, comprised a small amount of fragments of amyloplasts (sub-cellular units that synthesise and store starch grains) consistent with the corm of taro (*Colocasia esculenta*) (Figure 6.27).

The starch material showed a high degree of degradation, not unusual for starch and many other types of organic remains at archaeological sites. Given this effect and the small amount identified, the starch evidence should be treated cautiously.

Origins of the Māori-introduced Cultigens

Bottle gourd, taro and tī are part of the small group of six introduced species cultivated by Māori at the time of European contact in the late 18th century. Almost all the numerous plant species (70+) identified as intentionally introduced to Polynesia by early people, including taro and ti, are native to various regions within the broad area from Africa to Melanesia (Whistler 2009). Bottle gourd, however, is native to the Old World Tropics, probably somewhere in Africa (Whistler 2009). It is thought to have most likely been introduced to Polynesia from South America, but how it crossed the Atlantic to South America is a mystery.

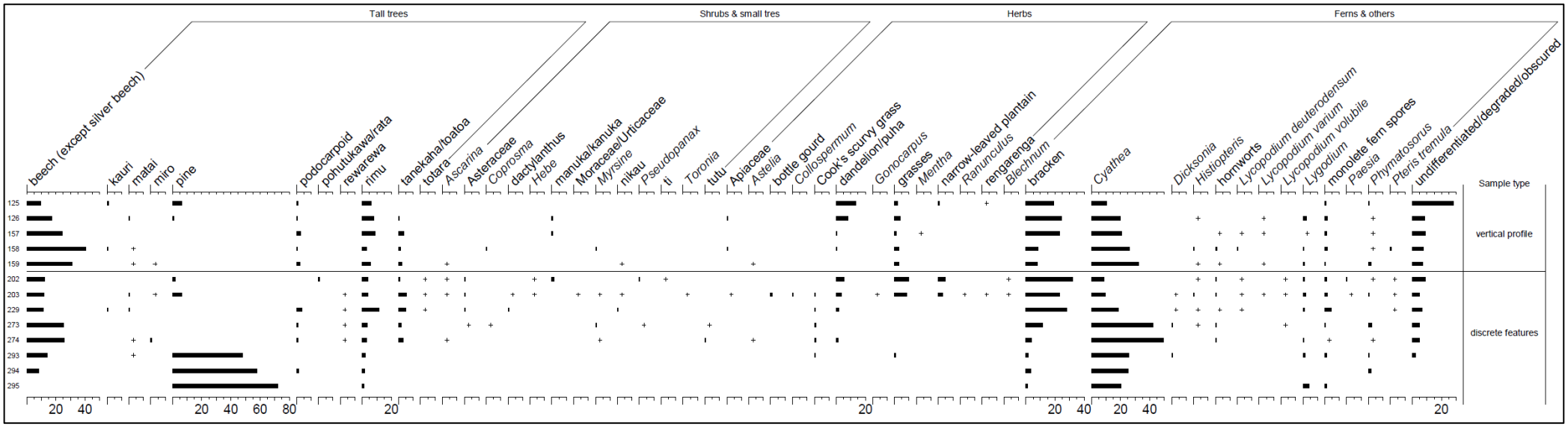


Figure 6.26 Pollen percentage diagram from site R10/1417 at 517 State Highway 1. Samples are from the following contexts: 125 = modern topsoil 4000; 126 = shell midden 4001; 157 = palaeosol 4005 sealed by shell midden; 158 = subsoil 4002; 159 = natural colluvial clay 4003; 193 = upper fill 4175 of pit 4174; 202 = cooking area 4168; 203 = occupation surface/lithic working area 4169; 229 = fill 4327 of posthole within palisade; 273 = trample layer 4125 in base of pit 4124; 274 = trample layer 4293 in base of pit 4174; 278 = fill 5036 of pit 5035; 279 = fill 4872 of pit 4871; 280 = fill 5079 of pit 5078; 282 = fill 5146 of pit 5145; 284 = upper fill 4968 of pit 4967; 291 = upper fill 4126 of pit 4124; 292 = fill 4566 of pit 4565; 293 = lower fill 5345 of pit 5287; 294 = fill 5343 of sump in pit 5257; 295 = lower fill 5347 of pit 5035

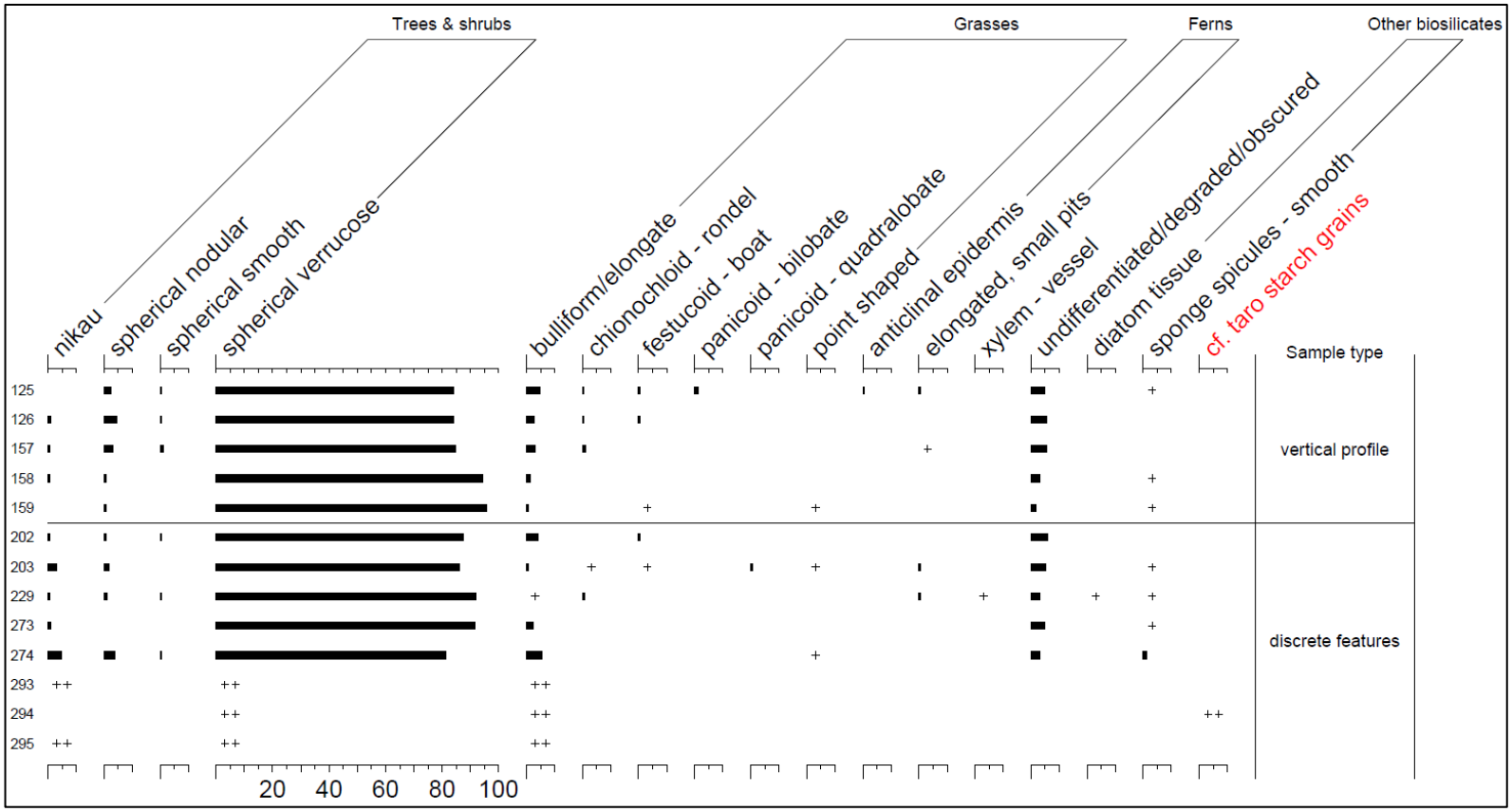


Figure 6.27 Phytolith and starch percentage diagram from site R10/1417 at 517 State Highway 1 (see Figure 6.26 for sample sources)

6.4.5 R10/1512 Results

Pollen and Spores

The sample taken from the primary fill of the large oven feature that was the main component of site R10/1512, contained abundant microscopic fragments of charcoal, reflecting fire activity by people at the site. The pollen and spore assemblage was dominated by ferns, especially bracken (*Pteridium esculentum*) (Figure 6.28). Bracken is an invasive, indigenous ground fern with widely dispersed spores, common in New Zealand pollen spectra since human settlement and almost always associated with large-scale repeated burning of forest by early Māori. It may form dense stands, averaging 1-2m tall over extensive areas, and its rhizome was commonly harvested as a starch-rich food by Māori (Best 1902).

Other spore indicators of landscape disturbance found in the sample include spores of more ground ferns, namely *Hypolepis* and ferns with monolete type spores, and of hornworts (*Anthocerotaceae*) (Figure 6.28). Hornworts are small inconspicuous plants that commonly colonise freshly disturbed and exposed soils (Wilmshurst et al. 1999). A pollen disturbance indicator noted was dandelion/pūhā (*Taraxacum/Sonchus*). Pūhā is indigenous to New Zealand while dandelion is European introduced; both are invasive herbaceous plants and pollen of the two can be difficult to differentiate. Leaves and shoots of pūhā and dandelion were cooked and eaten as greens by Māori (Colenso 1881; Best 1902). The preponderance of disturbance pollen and spore indicators, coupled with extreme under-representation of trees and the abundant charcoal, reflect large-scale forest clearance by early Māori.

A small amount of pollen of Cook's scurvy grass (*Lepidium oleraceum*) was identified in the sample (Figure 6.28). The leaves of Cook's scurvy grass (not a true grass) are edible and high in vitamin C and can be eaten raw or cooked. The plant's common name derives from Captain Cook's use of it as a remedy for scurvy. Crowe (1997) considered that some reports of it being used as a food plant early Māori should be treated cautiously. Previously a very common coastal plant, this species is now rare.

No unequivocal European-introduced pollen types were noted in the R10/1512 sample. This apparent absence strongly suggests that the sampled deposit is of an age prior to European activity in the area.

Phytoliths and Other Biosilicates

The phytolith assemblage of the sample from R10/1512 was dominated by grass leaf and tree/shrub phytoliths (Figure 6.29). The tree/shrub phytoliths comprise nikau palm frond phytoliths, and spherical nodular and verrucose types. Nikau is one of the few taxa that can be identified to species level in the New Zealand phytolith flora (Kondo et al. 1994). The spherical types originate from the wood and leaves of native trees. The large amounts of tree/shrub phytoliths could reflect use of fuel in the oven feature (Figure 6.29). The same applies to the grass phytoliths.

Other biosilicates identified in the samples, namely a small amount of sponge spicule fragments, reflect the local coastal environment.

Starch and Other Plant Material

Starch grains and associated material from one Māori-introduced cultigen was identified in this study. The starch comprised individual starch grains consistent with the tuberous

root of kūmara (*Ipomoea batatas*) (Figure 6.29). In addition, fragments of xylem cells (vascular tissue) consistent with kūmara root were noted. The starch and associated material showed a high degree of degradation, not unusual for plant remains at archaeological sites (Horrocks et al. 2007). Given this effect, this evidence should be treated cautiously.

Kūmara is part of the small group of six introduced species cultivated by Māori at the time of European contact in the late 18th century. Almost all the numerous plant species (70+) identified as intentionally introduced to Polynesia by early people are native to various regions within the broad area from Africa to Melanesia (Whistler 2009). Kūmara, however, known elsewhere as sweet potato, originated in South America, its introduction to the Pacific a result of Polynesian contact (Hather and Kirch 1991).

Discussion

The plant microfossils provide evidence of large-scale landscape disturbance by early Māori. The microfossils in the form of starch grains also provide evidence for cf. kūmara, a Māori-introduced cultigen, and the presence of starch grains within the primary fill of the oven suggests that kūmara were one of the foods cooked within the large oven. The large amounts of tree/shrub phytoliths may well reflect the large quantity of fuel required to heat the relatively large amounts of oven stones such a large oven feature would have required.

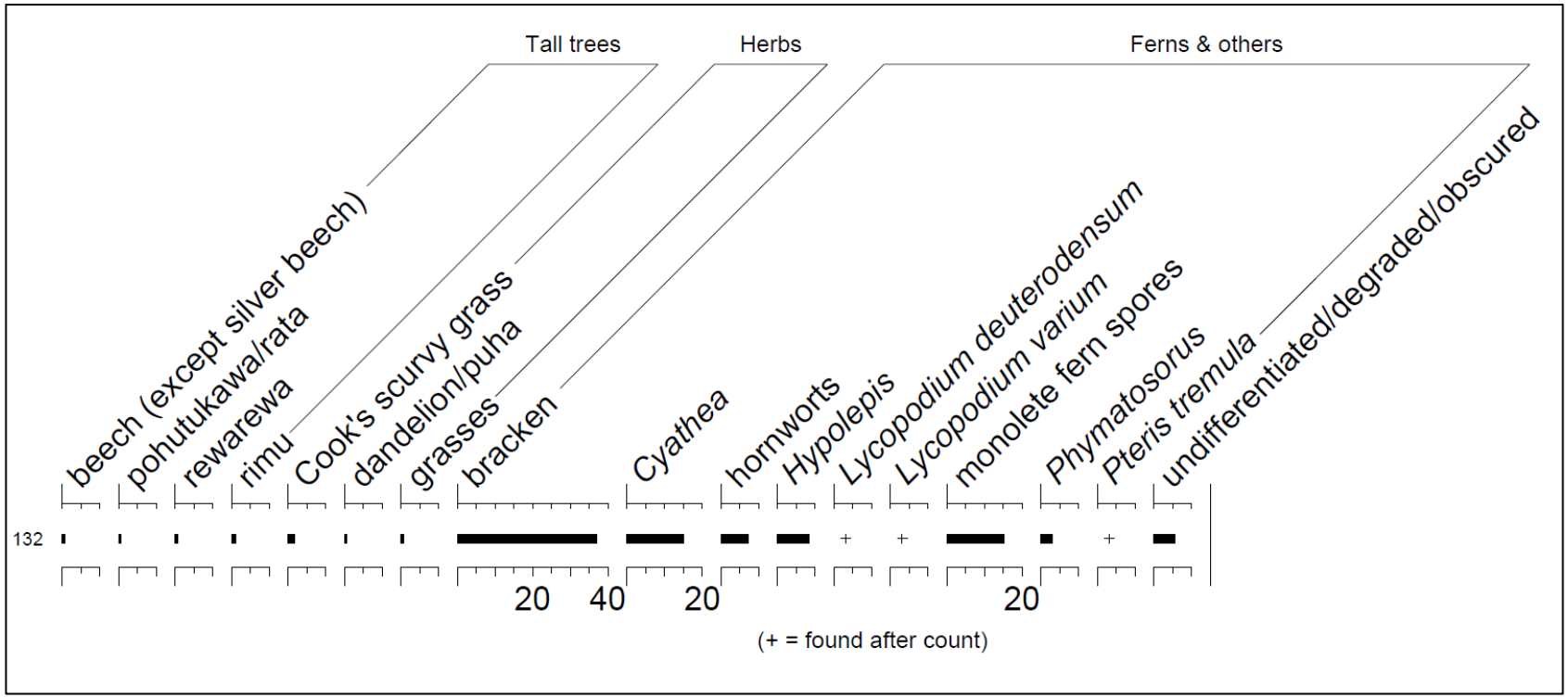


Figure 6.28 Pollen percentage diagram from site R10/1512 at 3 Puhoi Road

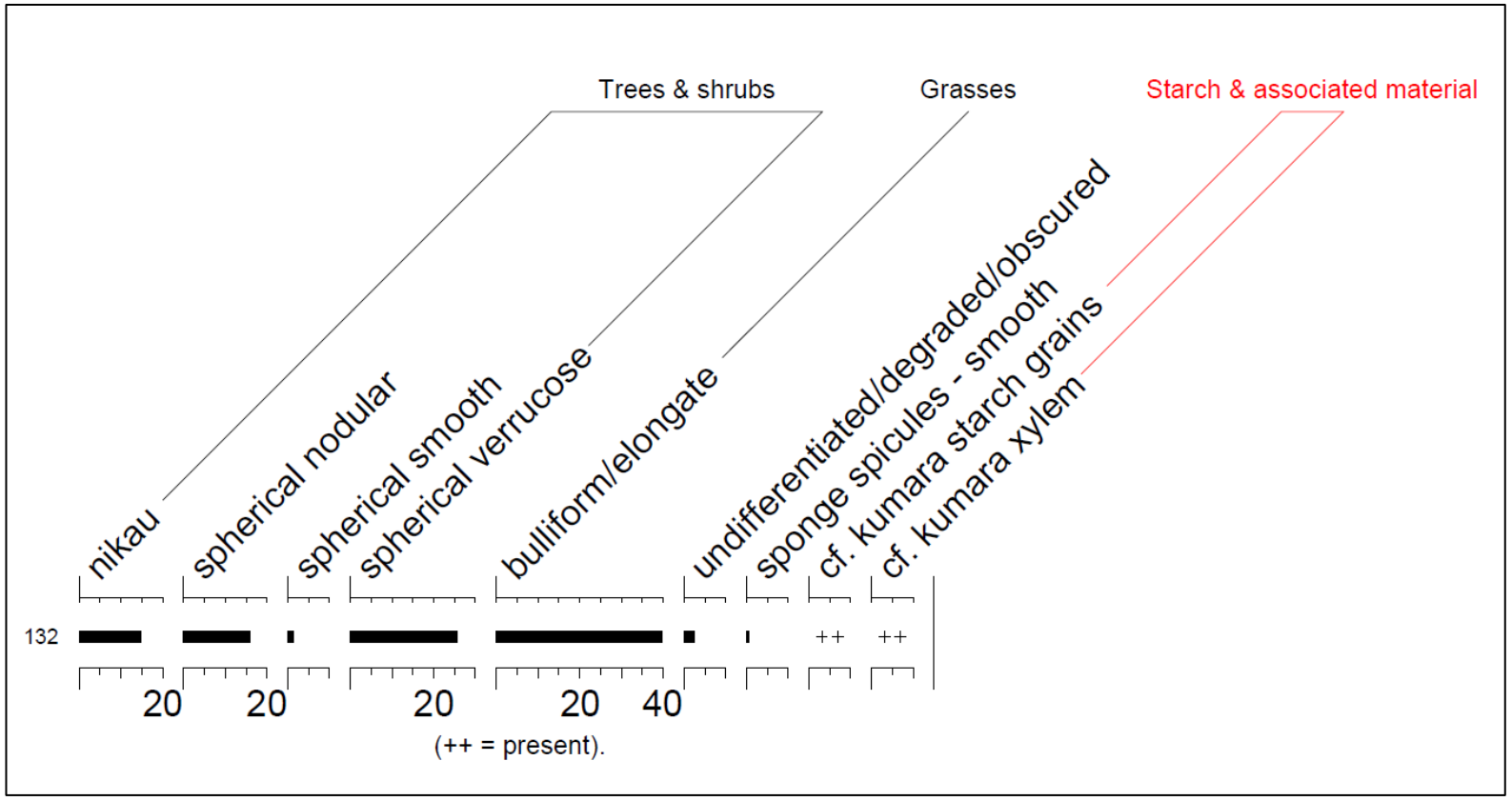


Figure 6.29 Phytolith and starch percentage diagram from site R10/1512 at 3 Puhoi Road

6.4.6 R09/2247 Results

Pollen and Spores

The sample taken from the palaeochannel from which the wooden artefact cache was recovered consisted almost entirely of plant material, with very little soil or mineral component. This effect can be expected in a stream context, with restricted aeration resulting in a reduced rate of decomposition and accumulation of plant material.

The pollen and spore assemblage was dominated by forest types, notably pollen of trees of beech (*Fuscospora*), rimu (*Dacrydium*) and *Halocarpus*, and spores of *Cyathea* tree ferns (Figure 6.30). The beech pollen reflects formerly more widespread regional 'kauri/hard beech forest' (McKelvey and Nicholls 1959). Hard beech (*Fuscospora truncata*) is now rare in north Auckland, but McKelvey and Nicholls (1959) concluded that locally it can occur in significant numbers, associated with kauri (*Agathis australis*). Hard beech has both a very high rate of pollen production and long-distance pollen dispersal, while kauri has the complete opposite on both counts, hence the extreme under-representation of kauri seen in Figure 6.30 (Macphail and McQueen 1983; Elliot 1999). Rimu also has high rates of pollen production and dispersal.

The sample contained microscopic fragments of charcoal, reflecting fires in the region. Also indicating fires, spores of bracken (*Pteridium esculentum*) featured, although in a very small amount (Figure 6.30). Bracken is an invasive, indigenous ground fern with widely dispersed spores, common in New Zealand pollen spectra since human settlement and almost always associated with large-scale repeated burning of forest by early Māori (McGlone 1983).

The large amounts of forest pollen and spore types, coupled with the small amount of bracken spores and lack of other obvious indicators of landscape disturbance, appear to reflect a time period with possibly considerable forest cover in the area, with minimal human activity (Figure 6.30). No European-introduced pollen types, such as pine (*Pinus*), were noted, strongly suggesting that the sampled deposit is of an age prior to European activity in the area.

Pollen of Dactylanthus (*Dactylanthus taylorii*) was found in the sample (Figure 6.30). This species is rare in pollen spectra and is from a highly unusual plant – New Zealand's only fully parasitic flowering plant. Dactylanthus has no green leaves or roots of its own and grows as a root-like stem attached to the root of a host tree (Eckroyd 1996). Many species of trees may be hosts. In response, the host root moulds into the shape of a fluted wooden rose, which gives the plant its previous common name of wood rose. It is through this placenta-like attachment that Dactylanthus draws its nutrients. The Māori name for this plant, 'pua o te reinga' (flower of the underworld), alludes to the way its flowers emerge from below ground. It is pollinated by the short-tailed bat. Dactylanthus is currently in serious decline and classified as endangered.

Pollen of *Restionaceae* (a family of rush-like plants) and spores of *Gleichenia* ground fern also feature in the sample. In New Zealand pollen spectra, these types generally reflect local wetland conditions.

Phytoliths and Other Biosilicates

The phytolith assemblage of the Warkworth sample was dominated by tree and shrub phytoliths (Figure 6.31). These phytoliths comprise spherical nodular and verrucose types, with a small amount of nikau (*Rhopalostylus*) palm frond phytoliths. The latter is one of the few taxa that can be identified to species level in the New Zealand phytolith flora (Kondo et al. 1994). The spherical and nodular types originate from the wood and leaves of native trees, with their large amounts reflecting forest conditions in the catchment.

Other biosilicates identified in the sample, namely a small amount of sponge spicule fragments, reflect the local coastal environment located nearby.

Starch and other plant material

No cultigen starch or associated material was identified in the R09/2247 sample.

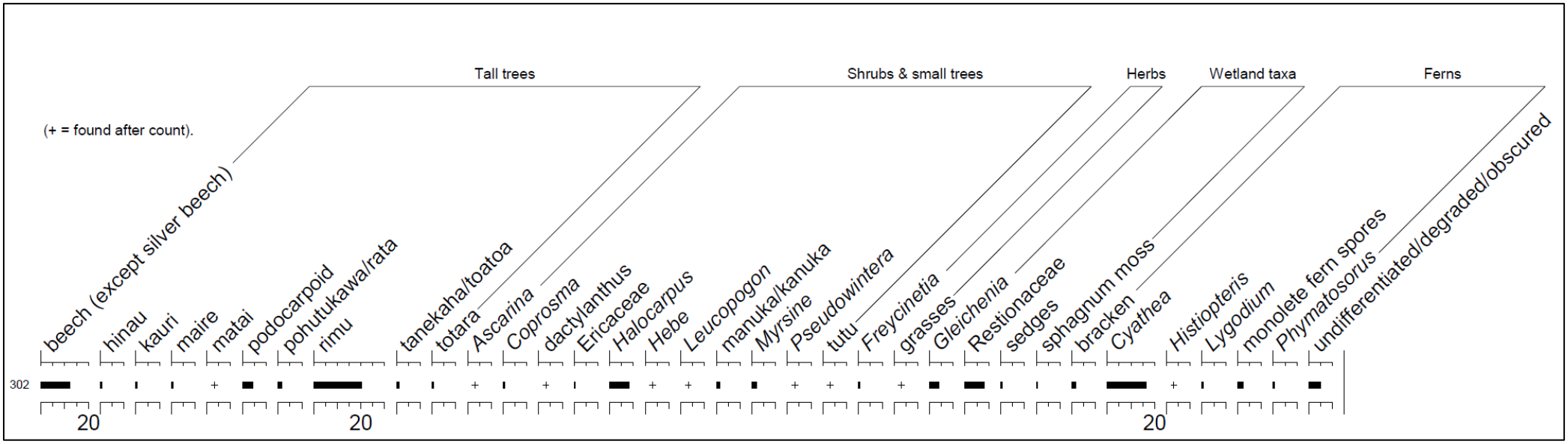


Figure 6.30 Pollen percentage diagram from site R09/2247, Warkworth

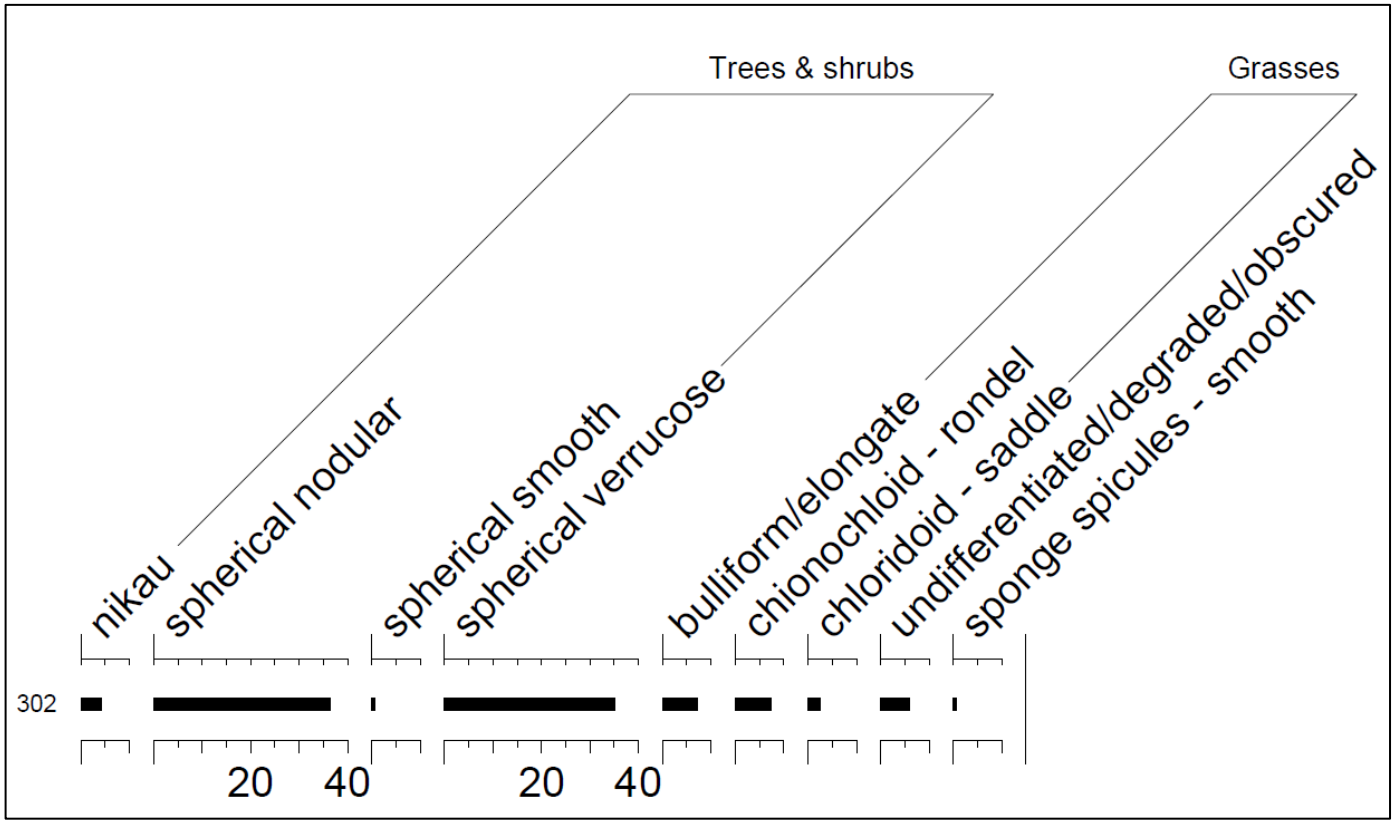


Figure 6.31 Phytolith percentage diagram from site R09/2247, Warkworth

6.5 Charcoal Analysis

6.5.1 Introduction

A total of 56 charcoal samples were taken from contexts from 10 sites for species identification and for the selection of samples suitable for radiocarbon dating analysis. The charcoal analysis was undertaken by Dr Rod Wallace of the University of Auckland.

6.5.2 R10/1484

Forty-seven charcoal samples taken from the pre-European Māori occupation of site R10/1484, situated on a ridgeline above the western side of the Pūhoi River floodplain, were submitted for identification and C14 dating sample selection. Twelve contained no identifiable pieces. The raw results are provided in the digital appendices as Appendix 9 and are summarised in Table 6.52 below.

The charcoal assemblage was dominated by manuka and kanuka (45%) with small shrubs, mainly hebe, and five finger, pittosporum, toro and coprosma species, contributing a further 23% of the assemblage. Broadleaf trees, almost all pohutukawa and puriri, contributed 32% of the assemblage. No conifer species at all were present. Mangrove occurred in only one sample.

Discussion

The charcoal data shows that the vegetation in the local area at the time the site was occupied was completely dominated by tea tree scrub accompanied by shrubs and puriri and pohutukawa. The latter are still abundant on local farmland and do not indicate forest. The complete absence of conifers is especially notable as frames of houses and other structures were often made from these species even when these were not locally present. For this vegetation pattern to have existed the local forests had to have been thoroughly cleared long before the site was occupied. There is only minimal evidence of the mangroves that currently nearly choke the local tidal waterways.

Abundant material suitable for C14 dating was present in most samples.

Table 6.52 Summary of charcoal results from site R10/1484 at 3 Puhoi Road

Species	Plant type	# Pieces	%	# Occurrences	%
Cabbage tree?	Monocot.	1	0.23%	1	0.88%
Hebe	Small shrub Spp.	21	23%	5	32.74%
Coprosma		13		9	
Pittosporum		26		6	
Toro		8		6	
Five finger		5		5	
Corokia		2		2	
Hangehange		10		1	
Akeake		11		2	
Olearia		1		1	
Manuka	Scrub Spp.	164	44.80%	25	33.63%
Kanuka		25		13	
Mahoe	Broadleaf trees	3	31.74%	2	31.96%
Rewarewa		1		1	
Pohutakawa		27		12	
Puriri		103		21	
Mangrove	Estuarine	1	0.23%	1	0.88%
Total		**422**		**113**	
# Samples		**35**		**35**	

No. of pieces = number of pieces of each species

No. of occurrences = number of samples (out of 35) each species occurs in

6.5.3 R10/1417

Sixty-eight charcoal samples taken from the pre-European Māori occupation of site R10/1417 situated above the confluence of the Pūhoi River and Hikauae Creek (Hungry Creek) were submitted for identification and C14 dating sample selection. Of the 68 samples submitted, only 52 contained identifiable pieces. The raw results are listed in Appendix 9 and are summarised in Table 6.53 below.

The charcoal assemblage was dominated (45%) by manuka and kanuka. Small shrubs, mainly hebe, coprosma and pittosporum species, contributed a further 23%. Broadleaf trees, mainly kowhai, pohutukawa and mahoe, contributed 26% of the total charcoal with only the first presenting significant amounts. Only 3% of the charcoal was from conifers, kauri being the most abundant. The kauri was mainly in the form of highly resinous root or branch material which, being very durable, will survive in and on the ground long after forest clearance. Mangrove occurred in one sample.

Table 6.53 Summary of charcoal results from site R10/1417 at 517 State Highway 1, Pūhoi

Species	Plant type	# Pieces	%	# Occurrences	%
Supplejack	Monocot.	1	0.23%	1	0.88%
Tutu	Small shrub Spp.	7	23%	2	21%
Hebe		14		3	
Coprosma		13		8	
Pittosporum		11		6	
Five finger		3		3	
Corokia		1		1	
Ribbonwood		2		2	
Akeake		1		1	
Manuka	Scrub Spp.	157	44.80%	40	43%
Kanuka		36		13	
Mahoe	Broadleaf trees	11	26%	6	27%
Kowhai		55		15	
Pohutakawa		20		8	
Puriri		5		3	
Titoki		1		1	
Mangrove	Estuarine	3	1%	1	1%
Totara	Conifer	1	3%	1	8%
Matai		1		1	
Kauri		9		8	
Total		**352**		**124**	
# Samples		**52**		**52**	

No. of pieces = number of pieces of each species

No. of occurrences = number of samples (out of 52) each species occurs in

Discussion

The species composition of the charcoal assemblage suggests that it was mainly derived from firewood collected by the inhabitants of the site from the immediate area. Manuka (with some kanuka) at 45% is by far the most abundant taxon. The second most abundant is kowhai, a small tree of stream banks and shorelines along with pohutukawa. Mahoe occurs in secondary vegetation and scrub while puriri persists on landscapes long after forest clearance and remains common in farmland today.

In short, the charcoal data show no evidence of extant local forest at the time the site was occupied. Instead, the vegetation in the area was almost completely dominated by tea tree scrub with other larger woody species limited to a fringe of kowhai and pohutukawa along the river and stream banks. There is minimal evidence of the mangroves that currently nearly choke the local tidal waterways. For this vegetation pattern to have existed the kauri-

dominated forests that occupied the local area must have been cleared before this site was occupied. Abundant material suitable for C14 dating was present in most samples.

6.5.4 Charcoal Results from Other Sites

Charcoal samples from nine pre-European Māori middens at Pūhoi were submitted for identification and radiocarbon dating sample selection. It is considered likely that the charcoal assemblage was mainly derived from firewood collected by the inhabitants of the sites from the immediate area. Material suitable for C14 dating was present in most samples. The raw results are provided in the digital appendices (Appendix 9) and are summarised in Table 6.54 below.

Table 6.54 Summary of charcoal results from other archaeological sites investigated at Pūhoi

Species	Plant Type	Archaeological Site Number (all with R10 prefix)								
		1511	**1502**	**1508**	**1485**	**1512**	**1498**	**1514**	**1503**	**1501**
Tutu	Small Shrubs					6				
Hebe						10	5			
Coprosma					1	5	2		1	
Olearia			2	1		3				
Pittosporum			1							
Five finger					7		2	2		
Ribbonwood										
Akeake			1							
Toro					1				1	
Manuka	Scrub Spp.		9	3	12		9			
Kanuka			8		2	1	1	4		
Mahoe	Broadleaf Trees	1	1			2	1		2	2
Kohekohe						3			3	
Tawa								8		13
Taraire									1	
Rewarewa					1		5			
Maire							1			
Rata									11	
Pohutukawa							4	8		2
Puriri						14	1		3	5
Mangrove	Estuary			4						
Kahikatea?	Conifer									
Matai						1			1	2
Kauri				8	10					
Total	**222**	**1**	**22**	**16**	**34**	**45**	**31**	**22**	**23**	**24**

Discussion

Only between 1 and 3 samples were collected from each site, therefore enabling only limited botanical reconstructions to be made. Compared to results from site R10/1484 (see above) which was dominated by scrub species along with pohutukawa and puriri, some of the samples from the smaller sites (e.g. R10/1498, R10/1501, R10/1503, R10/1522 and R10/1514) have a wider range of broadleaf tree species, implying more developed bush was present at various times and places.

7 CHRONOLOGY

7.1 C14 Dating

7.1.1 Introduction

Prior to the new Pūhoi to Warkworth motorway construction works, there was no radiocarbon dating evidence relating to the Pūhoi River valley, while in the wider area there were only six radiocarbon determinations, five of which were located to the south of the Johnstones Hill Tunnels. The six dates all came from samples taken from shell midden sites exposed during earthworks undertaken for the State Highway 1 Northern Toll Road between 2005 and 2006. Four of the five sites from south of the Johnstones Hill Tunnels were situated in the Waiwera River valley, either on flat-topped ridges or on land overlooking the southern banks of the Waiwera River, while the other was located further south on a ridge in the Chin Hill area to the west of Hatfields Beach (Foster 2009: 11-12). The solitary site located to the north of the Johnstones Hill Tunnels was site R10/1163 which was a shell midden site situated approximately 180m northeast of the south-bound tunnel entrance on land overlooking the Pūhoi River (Foster 2009: 15). The site of the shell midden is also only some 260m due east of midden site R10/1482, close to the southern boundary of the project area on the Stanaway property. The midden site consisted of pipi, cockle and some rock oyster and radiocarbon dating of cockle shell from the site produced a calibrated calendar age range of 1470-1690 AD (Wk-25285) for the site's formation (Foster 2009: 17).

During the archaeological monitoring and investigations of sites exposed during the Pūhoi to Warkworth motorway works, some 25 sites were sampled for radiocarbon dating purposes. The samples consisted of either marine shell or identified and suitable charcoal pieces, and together provided 78 radiocarbon determinations for the Pūhoi River valley area extending from the 517 State Highway 1 property in the north, to the Stanaway Property at 1457 Hibiscus Coast Highway in the south. The samples were dated utilising either the Standard Radiocarbon Dating process or the Accelerator Mass Spectrometry (AMS) method. The majority of sites (17) produced one radiocarbon determination each, while six others produced either two or three, with the vast bulk produced by sites R10/1484 and R10/1417. Both of these sites were relatively large, stratified and complex. Samples taken from site R10/1484, which was situated on a broad ridge top descending from the eastern flanks of the large hill at 3 Puhoi Road, produced 24 radiocarbon determinations. Samples submitted from site R10/1417, the multi-terrace site at 517 State Highway 1 and overlooking the Pūhoi River and Hikauae Creek (Hungry Creek), produced 23 radiocarbon determinations. The original University of Waikato Radiocarbon Dating Laboratory determinations are presented in the digital appendices as Appendix 10 (for small sites); Appendix 11 (for site R10/1484) and Appendix 12 (for site R10/1417).

Additionally, a Bayesian statistical analysis of the radiocarbon determinations obtained from sites R10/1484 and R10/1417 was undertaken. The extremely meticulous excavations undertaken at both the sites produced a thorough understanding of the formation and stratigraphy of each site. The comprehensive stratigraphic control meant that it was possible to refine the radiocarbon chronologies of the sites using Bayesian analysis and produce a statistically consistent and robust chronology of each site.

The results of the radiocarbon dating analysis are presented below per property and per site, with the Bayesian analysis of sites R10/1484 and R10/1417 following in each respective section.

7.2 Results from Monitoring Excavations

7.2.1 Stanaway Property (1457 Hibiscus Coast Highway – SAP 12), R10/1496 and R10/1504

Four shell midden sites were exposed during earthworks undertaken on the Stanaway property, all of which were located to the south of the recorded pa site R10/921 –Pā o Te Hēmara Tauhia (Figure 3.3). Of the four shell midden sites, two (R10/1482 and R10/1518) were exposed during fencing and tree planting works respectively. As the sites were subsequently avoided and therefore remained intact and in situ, they were not sampled. Consequently, of the four sites located on the Stanaway property only samples from sites R10/1496 and R10/1504 were submitted for radiocarbon dating analysis (Figure 7.1 and Table 7.1).

Figure 7.1 Location of radiocarbon samples taken from midden sites R10/1496 and R10/1504 at the Stanaway property (SAP 12)

R10/1496

Midden site R10/1496 was located on a relatively flat to gently sloping area a few metres to the west of a narrow, flat topped-ridge, some 110m south-southwest of the recorded pā site R10/921 and approximately 55m southwest of shell midden site R10/1504 (Figure 3.3 and Figure 7.1). A sample of cockle shell (*Austrovenus stutchburyi*) from R10/1496 (context 1006) was submitted for standard radiocarbon dating analysis and produced a result of 617 ± 22 BP (Wk-50520), with a calibrated radiocarbon date range of 1540-1810 AD (2σ) (Figure 7.2; Table 7.1). The radiocarbon data suggest that site R10/1496 (context 1006) was formed around the last quarter of the 17th century.

Table 7.1 Details of the radiocarbon determinations for samples taken from midden sites at SAP 12

			CRA		Years AD			
Lab No	**Sample**	**Material**	**Years BP**	**Error**	**-1σ**	**-2σ**	**2σ**	**1σ**
Wk-50520	R10/1496 - 1006	Cockle shell	617	22	1620	1540	1830	1810
Wk-50527	R10/1504 - 1099	Cockle shell	686	22	1550	1490	1700	1670

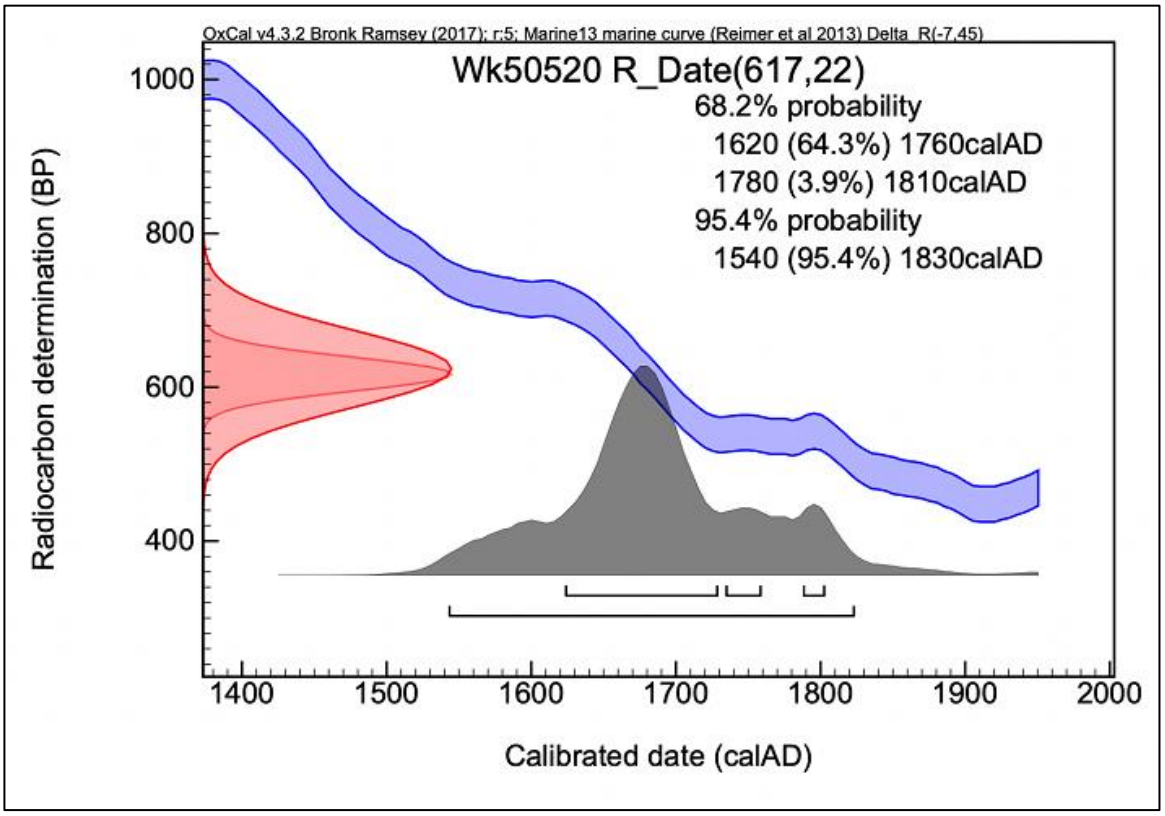


Figure 7.2 Calibrated radiocarbon date range from shell midden site R10/1496 (context 1006)

R10/1504

Shell midden site R10/1504 was located approximately 65m south-southwest of pā site R10/921 at the base of a northeast trending slope that descended from the flat-topped ridge (Figure 3.3 and Figure 7.1). A sample of cockle shell (*Austrovenus stutchburyi*) from R10/1504 (context 1099) was submitted for standard radiocarbon dating analysis and produced a result of 686 ± 22 BP (Wk-50527), with a calibrated radiocarbon date range of

1490-1700 AD (2σ) (Figure 7.3 and Table 7.1). The radiocarbon data suggest that site R10/1504 (context 1099) was formed around the middle of the 17th century.

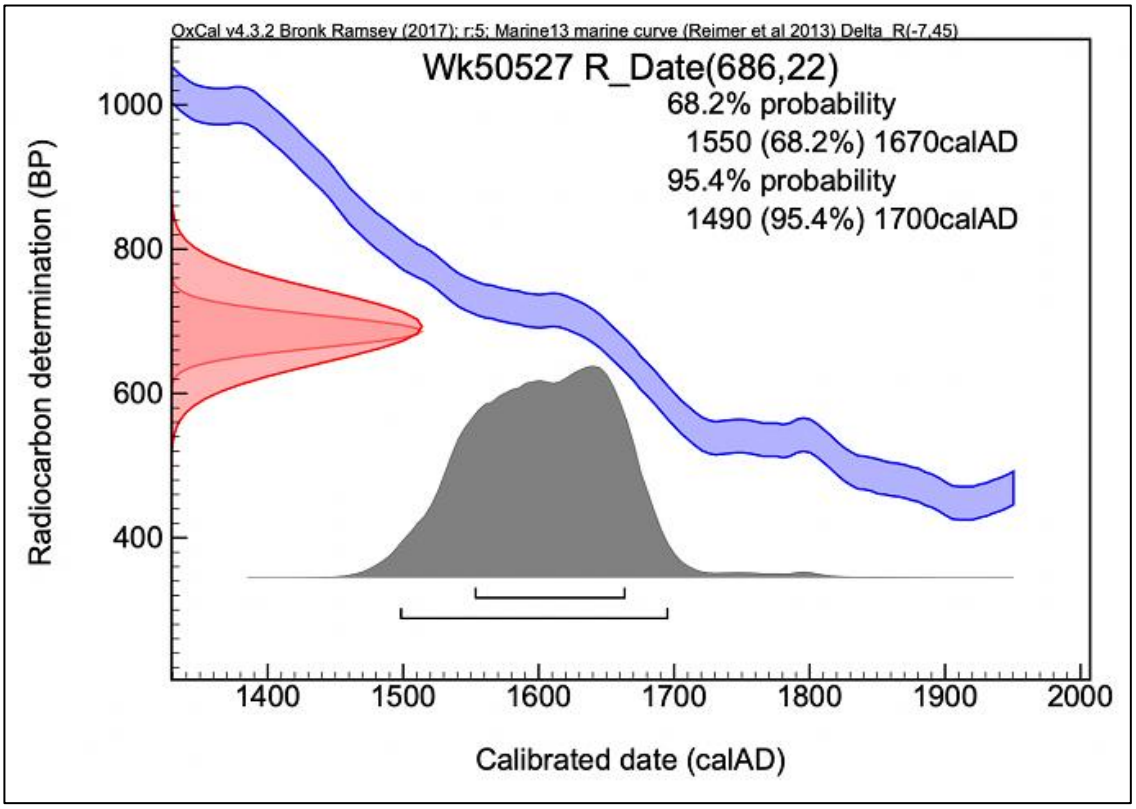


Figure 7.3 Calibrated radiocarbon date range from shell midden site R10/1504 (context 1099)

7.2.2 11B and 22B Billing Road (SAP 11), Sites R10/1497, R10/1506, R10/1508, R10/1515, R10/1516 and R10 1517

Eight shell midden sites were exposed during the earthworks undertaken on the 11B and 22B Billing Road properties which incorporated the northern banks of the Ōkahu Inlet (Figure 3.14). A total of seven samples from six of the sites were selected to be submitted for radiocarbon dating analysis (Figure 7.4 and Table 7.2). The two sites that were not dated were R10/1486 and R10/1519, the latter of which was truncated and much disturbed by large macrocarpa roots.

R10/1497

Shell midden site R10/1497) was located at 22B Billing Rd, northeast of the then extant single-level house (Figure 3.14 and Figure 7.4) A sample of pipi shell *(Paphies australis*) from R10/1497 (context 1012) was submitted for radiocarbon dating analysis and produced a result of 599 ± 30 BP (Wk-50521), with a calibrated radiocarbon date range of 1550-1870 AD (2σ) (Figure 7.5 and Table 7.2). The radiocarbon data suggest that site R10/1497 (context 1012) was formed during the last quarter of the 17th century.

R10/1506

Site R10/1506 consisted of two small shell midden deposits situated on the northern banks of the Ōkahu Inlet at SAP 11 (Figure 3.14 and Figure 7.4). A sample of cockle shell (*Austrovenus stutchburyi*) from R10/1506 (context 1371) was submitted for Accelerator Mass Spectrometry (AMS) radiocarbon dating analysis and produced a result of 639 ± 24 BP (Wk-49925), with a calibrated radiocarbon date range of 1530-1810 AD (2σ) (Figure 7.6 and Table 7.2). The radiocarbon data suggest that site R10/1506 (context 1371) was formed around the close of the 17th century.

Figure 7.4 Location of radiocarbon samples taken from midden/oven sites R10/1497, R10/1506, R10/1508, R10/1514, R10/1515, R10/1516 and R10/1517 at SAP 11

Table 7.2 Details of the radiocarbon determinations for samples taken from midden sites at SAP 11

			CRA		Years AD			
Lab No	**Sample**	**Material**	**Years BP**	**Error**	**-1σ**	**-2σ**	**2σ**	**1σ**
Wk-50521	R10/1497 - 1012	Pipi shell	599	30	1650	1550	1870	1810
Wk-49925	R10/1506 - 1371	Cockle shell	639	24	1570	1530	1810	1710
Wk-50530	R10/1508 - 2353	Charcoal	421	26	1450	1440	1630	1620
Wk-52433	R10/1515 - 3063	Pipi shell	595	29	1657	1574	1953	1829
Wk-52434	R10/1516 - 3073	Pipi shell	723	31	1524	1462	1782	1680
Wk-50541	R10/1517 -3076	Pipi shell	569	21	1670	1640	1930	1810
Wk-50542	R10/1517 -3079	Pipi Shell	558	24	1680	1650	1900	1820

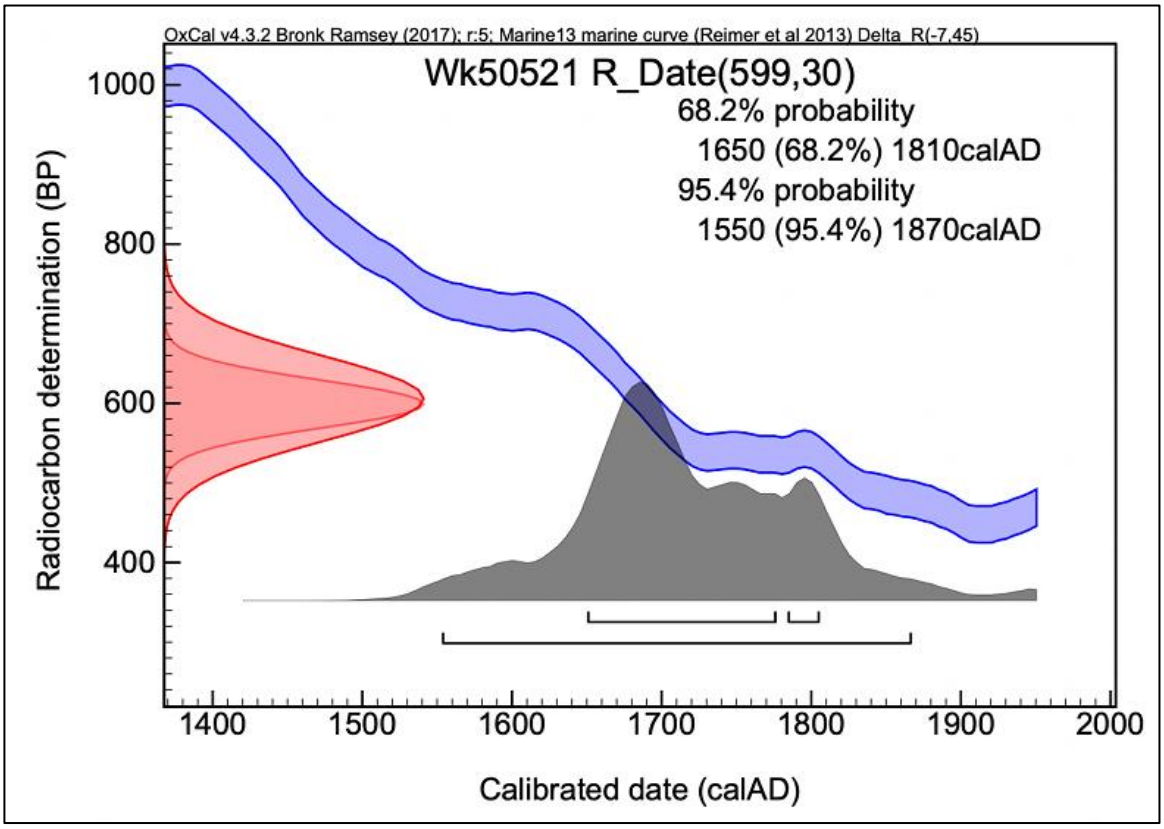


Figure 7.5 Calibrated radiocarbon date range from shell midden site R10/1497 (context 1012)

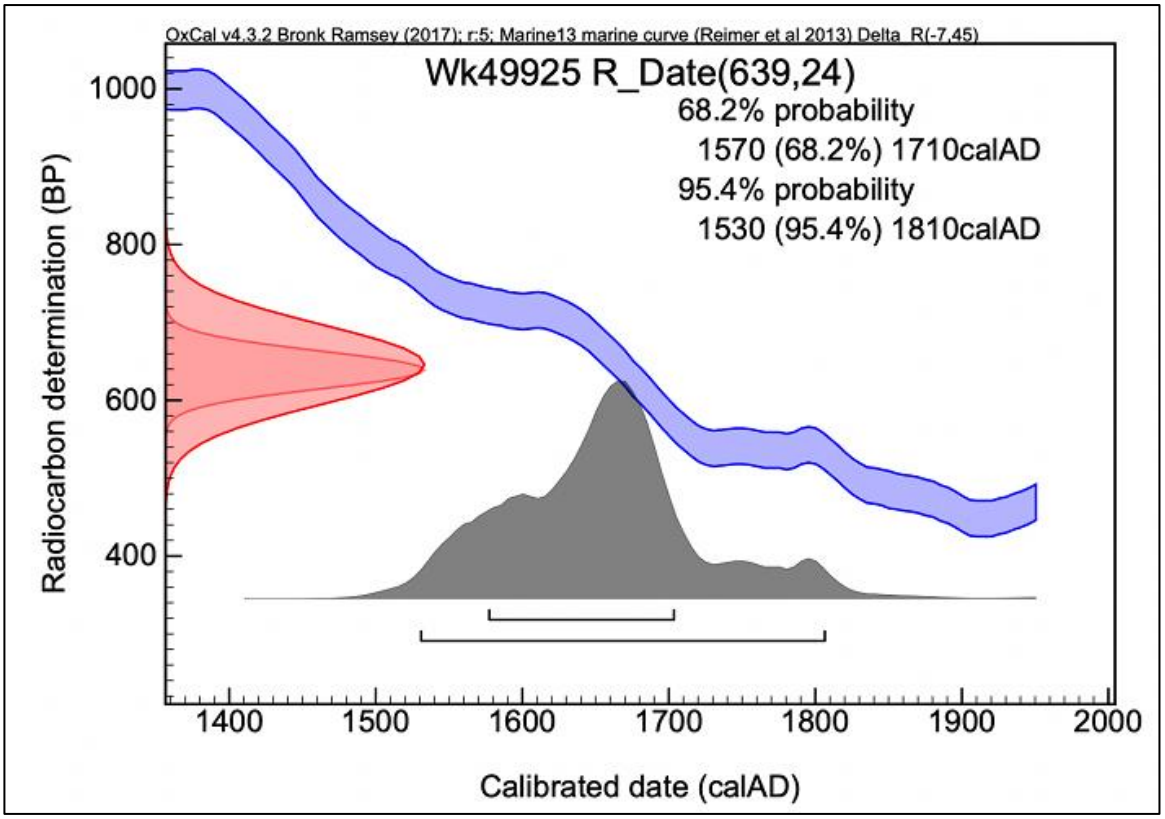


Figure 7.6 Calibrated radiocarbon date range from shell midden site R10/1506 (context 1371)

R10/1508

Site R10/1508 was situated adjacent to and just above the northern bank of the Ōkahu Inlet, to the east of the former dwelling at 22A Billing Road (Figure 3.14 and Figure 7.4) One sample from site R10/1508, consisting of *Olearia solandri* (coastal tree daisy) charcoal recovered from the fill (context 2353) of an earth oven [2352], was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis (Figure 7.7 and Table 7.2). The Olearia charcoal sample produced a result of 421 ± 26 BP (Wk-50530), with a calibrated radiocarbon date range of 1440-1630 AD (2σ) (Figure 7.7; Table 7.2). The radiocarbon data suggest that the site was in use at some point during the second half of the 15th century.

R10/1515

Shell midden site R10/1515 was located on a southwest-northeast trending ridge overlooking an inlet of the Pūhoi River at 22B Billing Road (Figure 3.14 and Figure 7.4). A sample of pipi shell (*Paphies australis*) from R10/1515 (context 3063) was submitted for standard radiocarbon dating analysis and produced a result of 595 ± 29 BP (Wk-52433), with a modelled radiocarbon date range of 1574-1953 AD (2σ) (Figure 7.8 and Table 7.2). The radiocarbon data suggest that site R10/1515 (context 3063) was formed at some point during the second half of the 18th century to the turn of the 19th century.

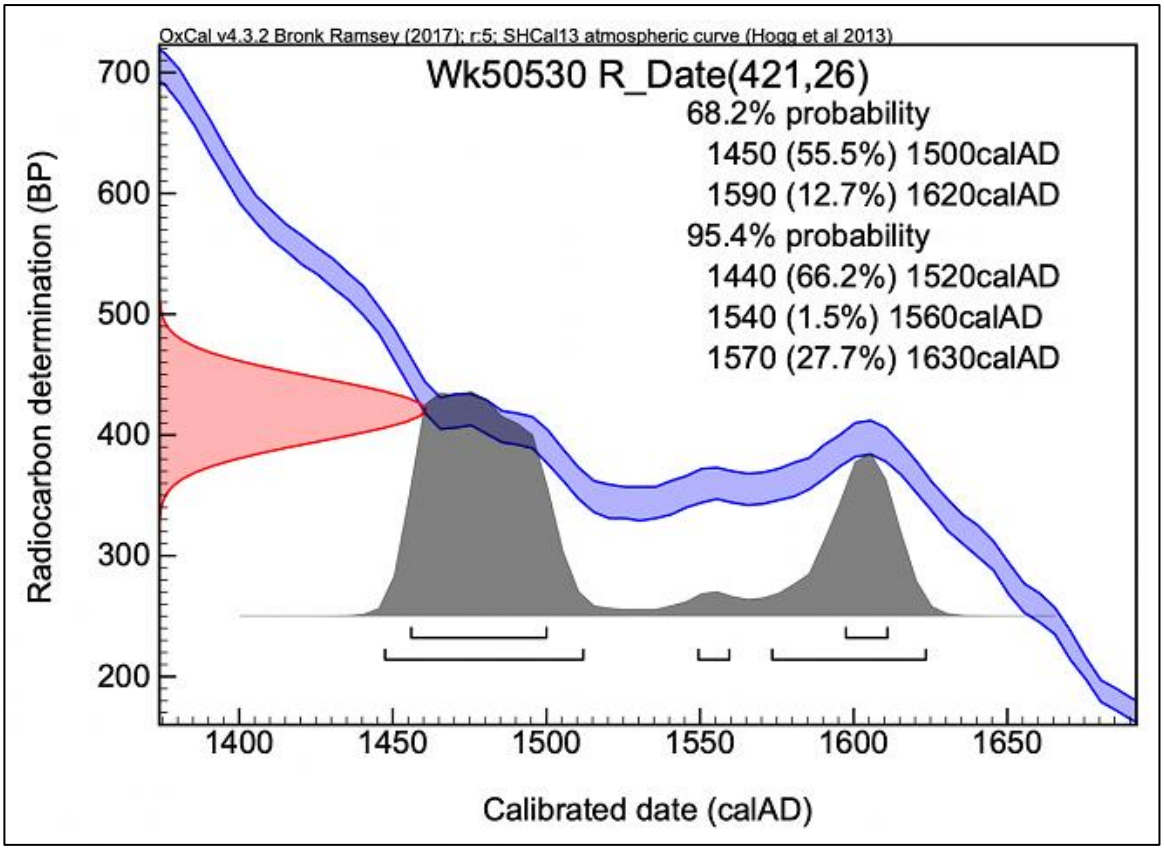


Figure 7.7 Calibrated radiocarbon date range from shell midden site R10/1508 (context 2352)

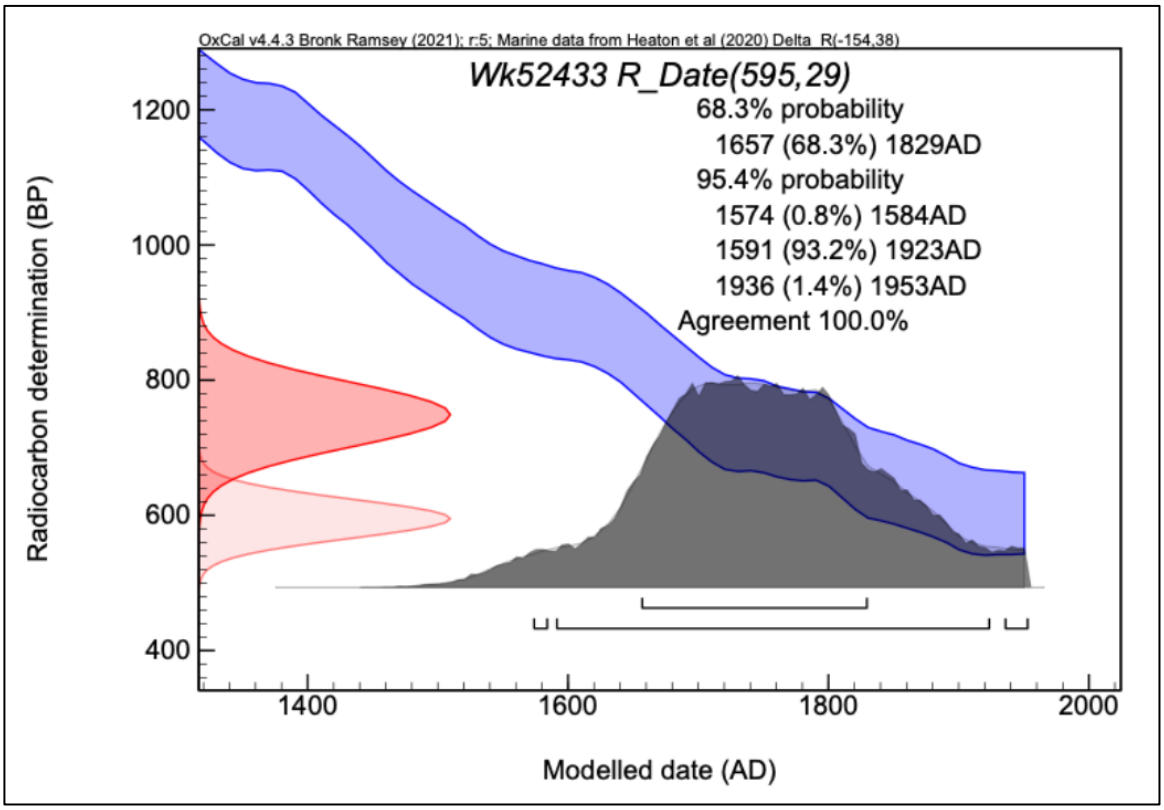


Figure 7.8 Modelled radiocarbon date range from shell midden site R10/1515 (context 3063)

R10/1516

Shell midden site R10/1516 was located just north of Billing Road and approximately 100m north of the northern banks of the Ōkahu Inlet of the Pūhoi River, at 22B Billing Road (Figure 3.14 and Figure 7.4). A sample of pipi shell (*Paphies australis*) from R10/1516 (context 3073) was submitted for standard radiocarbon dating analysis and produced a result of 723 ± 31 BP (Wk-52434), with a modelled radiocarbon date range of 1462-1782 AD (2σ) (Figure 7.9 and Table 7.2). The radiocarbon data suggest that site R10/1516 (context 3073) was formed at some point either side of the turn of the 17th century.

R10/1517

Site R10/1517 was located beneath what had been the back lawn and to the north of the former dwelling at 22B Billing Road, approximately 125m due west of the northbound carriageway of the existing SH1 on flat ground situated above and to the south of an inlet of the Pūhoi River (Figure 3.14 and Figure 7.4). A sample of pipi shell (*Paphies australis*) from R10/1517 (context 3076) was submitted for standard radiocarbon dating analysis and produced a result of 569 ± 21 BP (Wk-50541), with a calibrated radiocarbon date range of 1640-1930 AD (2σ) (Figure 7.10 and Table 7.2). A further sample of pipi shell from R10/1517 (context 3079) produced a result of 558 ± 24 BP (Wk-50542), with a calibrated radiocarbon date range of 1650-1900 AD (2σ) (Figure 7.11 and Table 7.2). The radiocarbon data suggest that site R10/1517 (context 3076) was formed at some point around the turn of the 18th century.

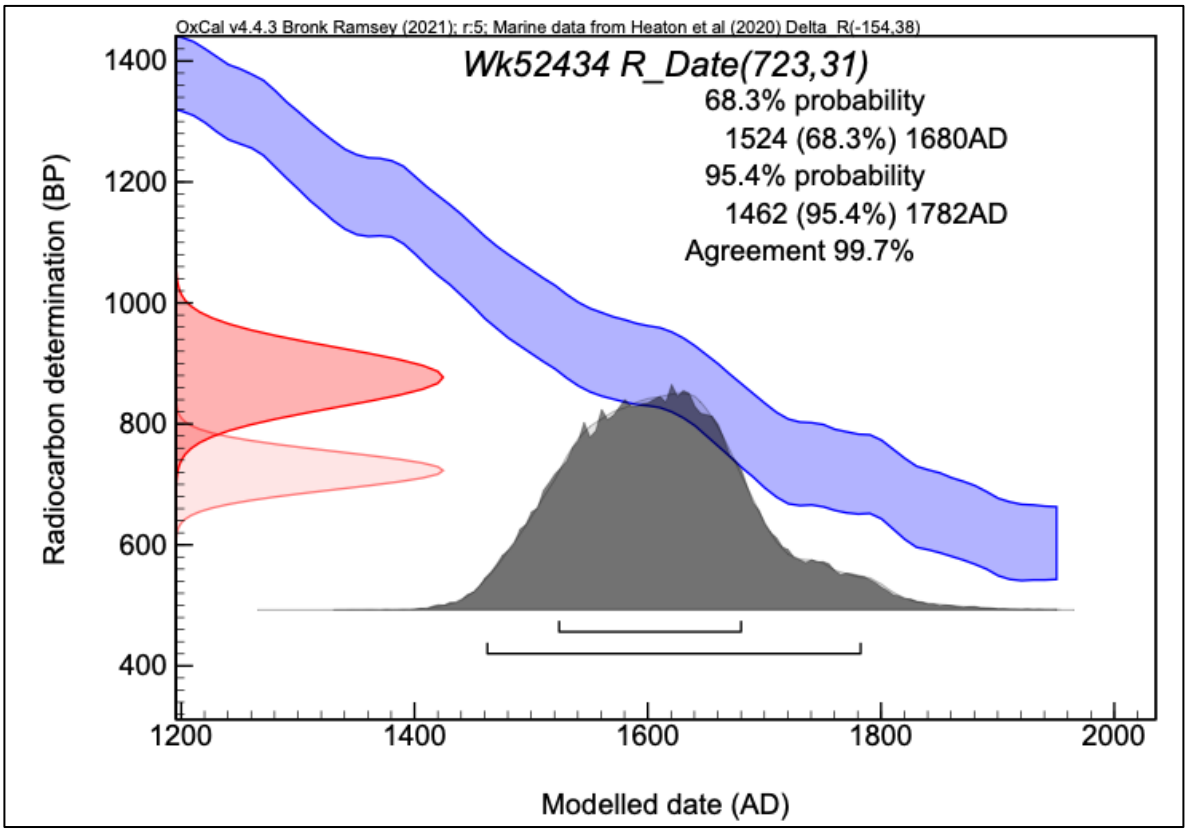


Figure 7.9 Modelled radiocarbon date range from shell midden site R10/1516 (context 3073)

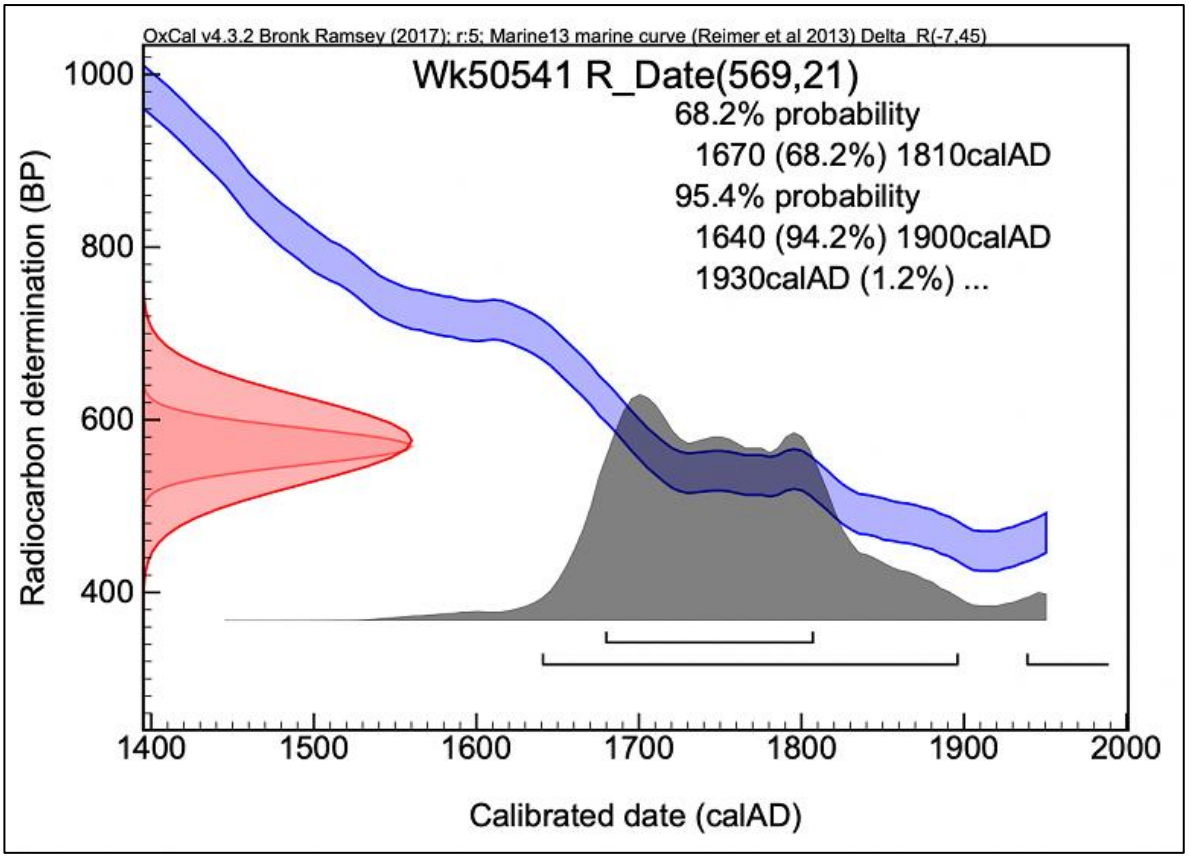


Figure 7.10 Calibrated radiocarbon date range from shell midden site R10/1517 (context 3076)

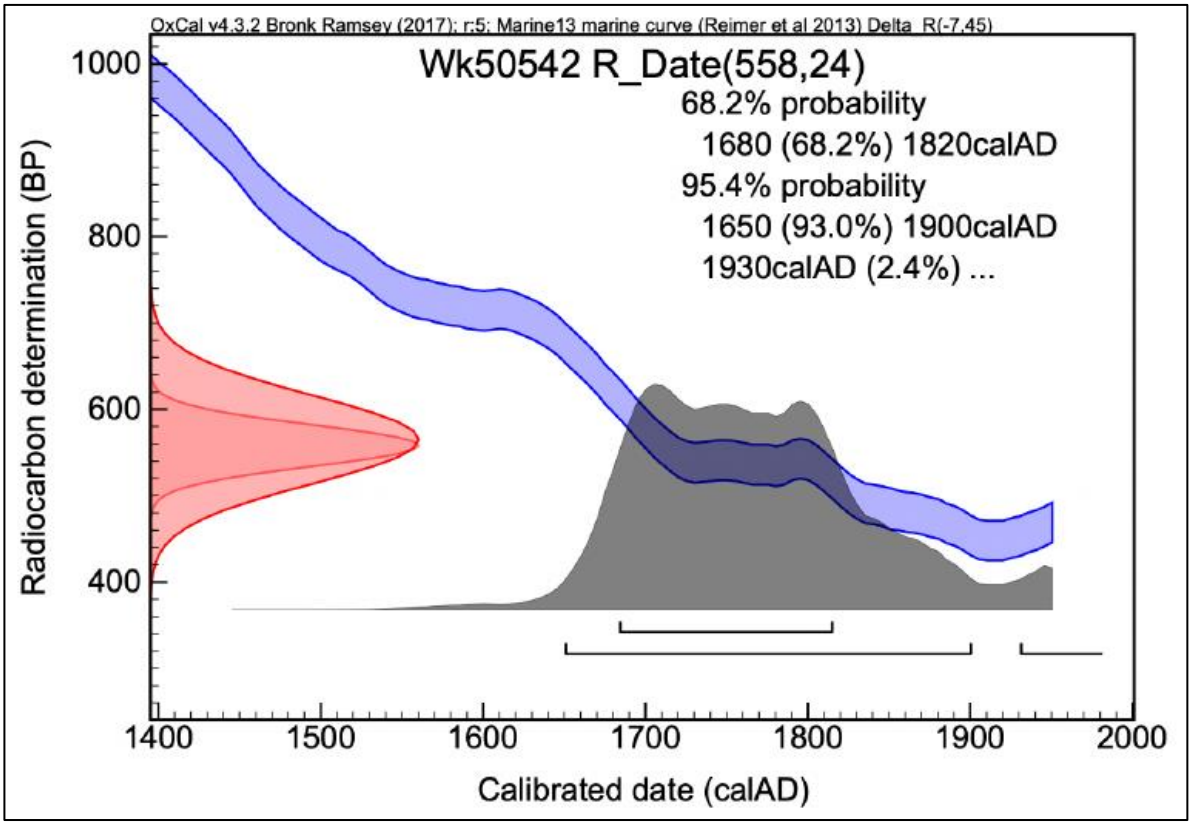


Figure 7.11 Calibrated radiocarbon date range from shell midden site R10/1517 (context 3079)

7.2.3 3 Puhoi Road (SAP 10), Sites R10/1106, R10/1485, R10/1498, R10/1499, R10/1500, R10/1501, R10/1502, R10/1503, R10/1505, R10/1507, R10/1511, R10/ 1512 and R10/1514

The archaeological investigations of the 3 Puhoi Road site located to the south the Pūhoi River and west of the extant State Highway 1 road, exposed 15 archaeological sites that consisted of shell middens with associated oven features with the sole exception of the complex multi-phased site occupation site R10/1484 (Figure 3.34 and Figure 7.12). Fourteen of the sites were sampled for radiocarbon dating analysis, with the exception being site R10/1513 that was regrettably destroyed by contractors before it could be sampled. Excluding site R10/1484 (the dating analysis of which is reported in Section 7.3 below) a total of 20 samples from 13 shell midden/earth oven sites were submitted for radiocarbon dating analysis (Figure 7.12 and Table 7.3).

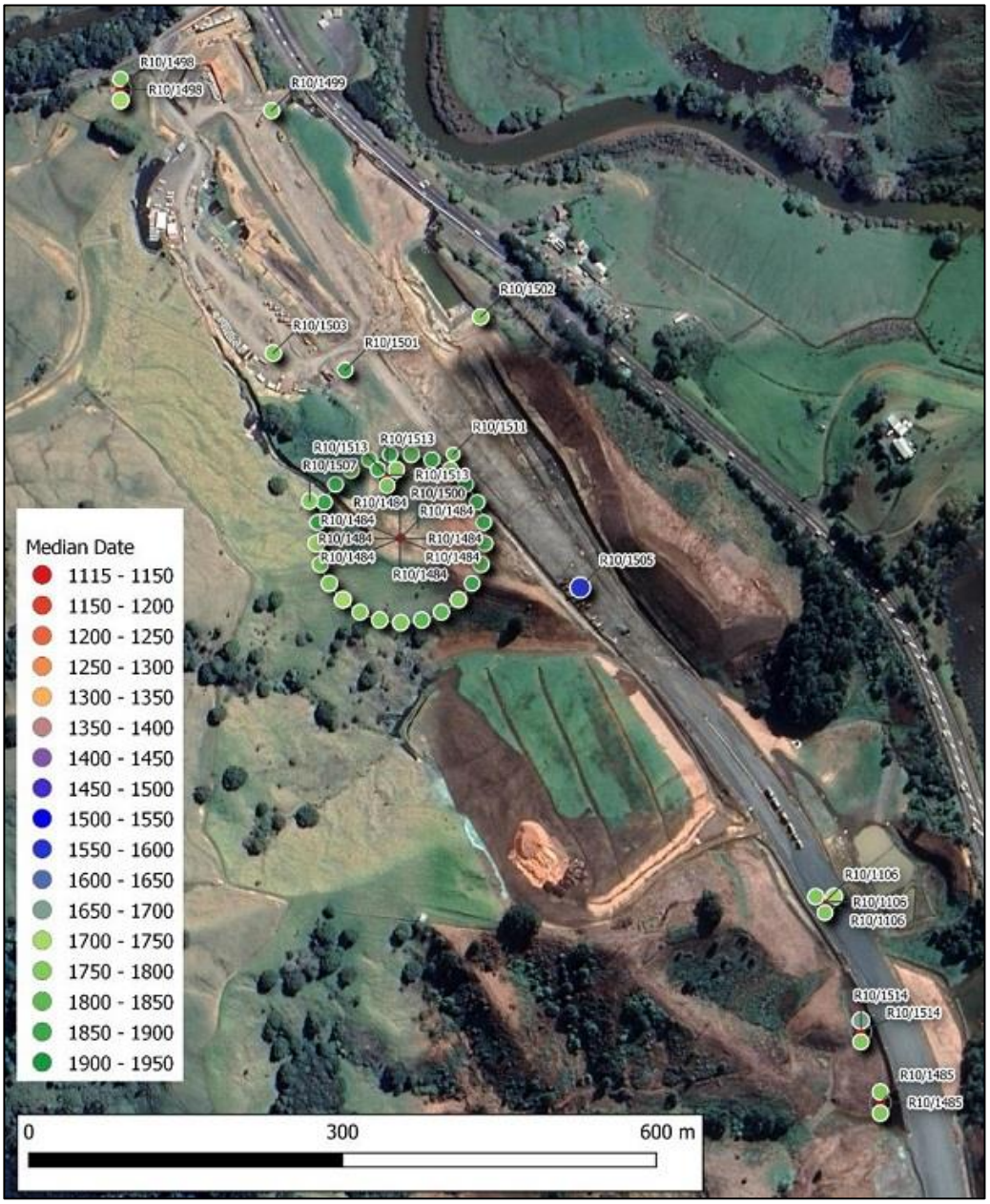


Figure 7.12 Location of radiocarbon samples taken from midden/oven sites R10/1106, R10/1484, R10/1485, R10/1498, R10/1499, R10/1500, R10/1501, R10/1502, R10/1503, R10/1505, R10/1507, R10/1511, R10/1512 and R10/1514 at 3 Puhoi Road (SAP 10)

Table 7.3 Details of the radiocarbon determinations for samples taken from midden sites at SAP 10 (excluding R10/1484)

			CRA		Years AD			
Lab No	Sample	Material	Years BP	Error	-1σ	-2σ	2σ	1σ
Wk-52430	R10/1106 - 1871	Pipi shell	579	29	1673	1619	1953	1846
Wk-52431	R10/1106 - 1881	Pipi shell	641	29	1617	1520	1875	1803
Wk-52432	R10/1106 - 1886	Pipi shell	605	30	1649	1555	1928	1823
Wk-50539	R10/1485 - 3053	Charcoal	194	26	1660	1660	1920	1880
Wk-50540	R10/1485 - 3057	Charcoal	185	27	1670	1660	1920	1950
Wk-50522	R10/1498 - 1019	Charcoal	255	27	1640	1630	1800	1800
Wk-50523	R10/1498 - 1045	Pipi shell	570	22	1670	1630	1930	1810
Wk-50524	R10/1499 - 1048	Cockle Shell	598	22	1650	1560	1860	1810
Wk-50525	R10/1500 - 1049	Pipi shell	614	30	1620	1530	1840	1810
Wk-50519	R10/1501 - 1084	Charcoal	134	25	1700	1690	1950	1950
Wk-50526	R10/1502 - 1087	Charcoal	200	26	1660	1660	1920	1810
Wk-50518	R10/1503 - 1089	Charcoal	228	26	1660	1640	1810	1800
Wk-50528	R10/1505 - 1119	Cockle Shell	776	31	1460	1440	1650	1590
Wk-50529	R10/1507 - 1456	Pipi shell	603	30	1640	1540	1860	1810
Wk-50532	R10/1511 - 3012	Pipi shell	538	22	1690	1670	1920	1840
Wk-50533	R10/1512 - 3016	Pipi shell	583	28	1660	1580	1950	1810
Wk-50534	R10/1512 - 3030	Charcoal	183	26	1670	1660	1920	1920
Wk-50535	R10/1512 - 3033	Charcoal	127	26	1700	1690	1800	1930
Wk-50536	R10/1514 - 3038	Cockle Shell	593	29	1650	1560	1880	1810
Wk-50537	R10/1514 - 3045	Charcoal	280	26	1630	1510	1800	1800

R10/1106

Site R10/1106 consisted of three shell midden deposits and associated features on two terraces that were situated on a relatively flat-topped, west-east trending ridge spur approximately 40m due west of the present State Highway 1 carriageway (Figure 3.34 and Figure 7.12). Three samples of pipi shell (*Paphies australis*) from different contexts across site R10/1106 were submitted for standard radiocarbon dating analysis. The sample of pipi from context 1871 (the fill of firescoop 1870 on the lower terrace) produced a result of 579 ± 29 BP (Wk-52430), with a modelled radiocarbon date range of 1619-1953 AD (2σ) (Figure 7.13 and Table 7.3). The radiocarbon data suggest that context 1871 was formed at some point during the second half of the 18th century to the early 19th century (Figure 7.13 and Table 7.3). The sample of pipi from context 1881 (the fill of firescoop 1880 on the upper terrace) produced a result of 641 ± 29 BP (Wk-52431), with a modelled radiocarbon date range of 1520-1875 AD (2σ) (Figure 7.14 and Table 7.3). The radiocarbon data suggest that context 1881 was deposited at some point during the first quarter of the 18th century. Lastly, the sample of pipi from context 1886 (the largest of the three shell midden deposits on the upper terrace) produced a result of 605 ± 30 BP (Wk-52432), with a modelled radiocarbon date range of 1555-1928 AD (2σ) (Figure 7.15 and Table 7.3). The radiocarbon data suggest that the shell midden deposit was being formed during the first half of the 18th century.

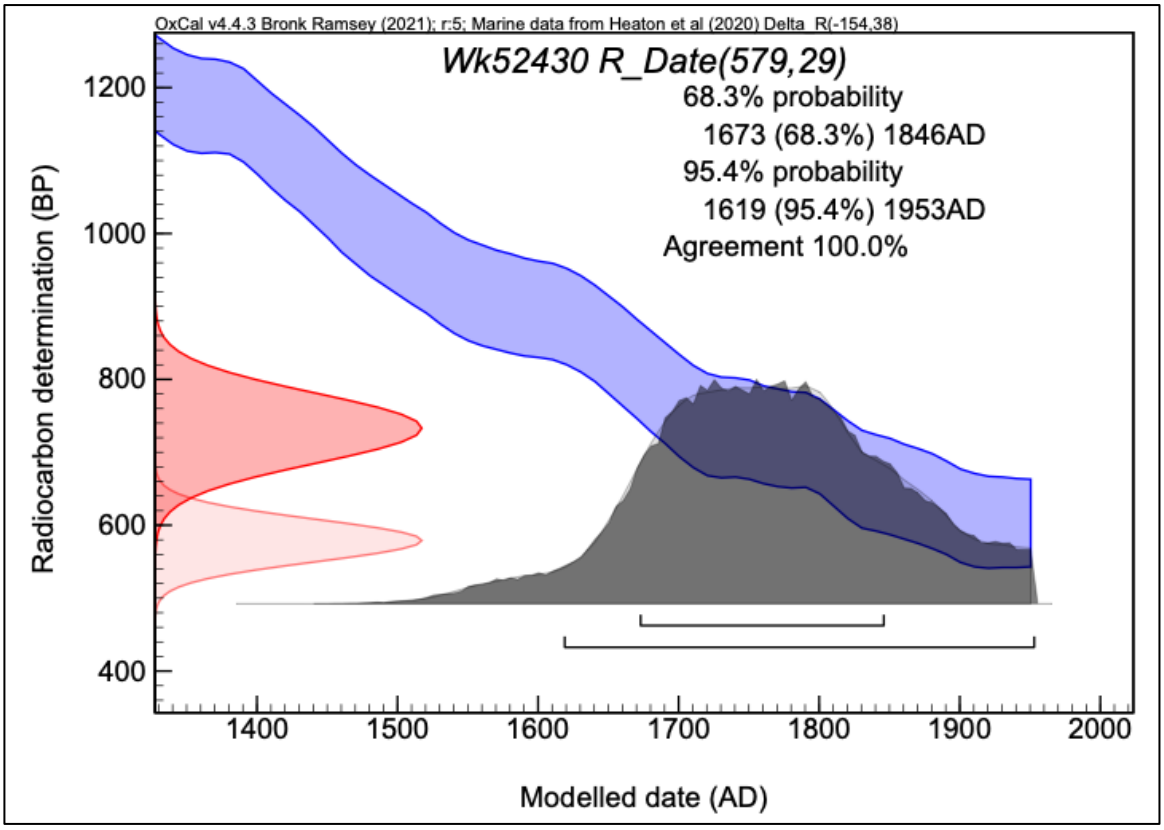


Figure 7.13 Modelled radiocarbon date range from shell midden site R10/1106 (context 1871)

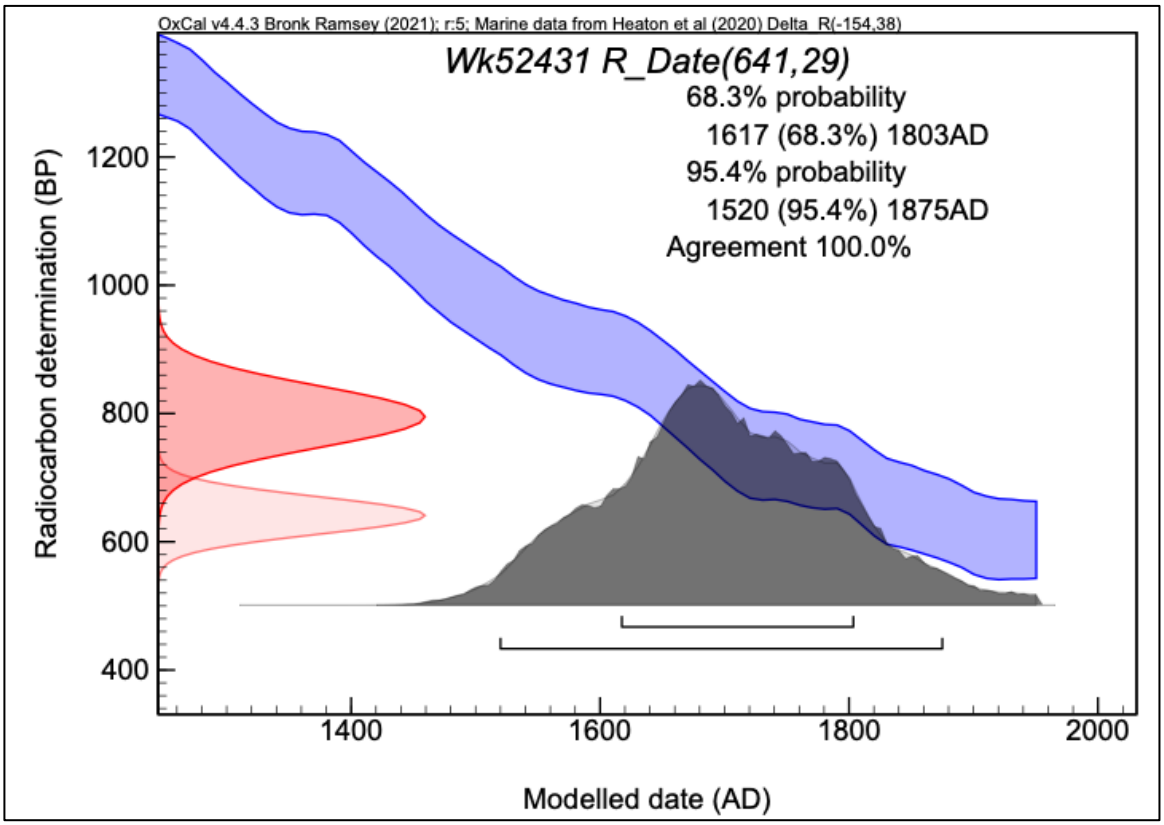


Figure 7.14 Modelled radiocarbon date range from shell midden site R10/1106 (context 1881)

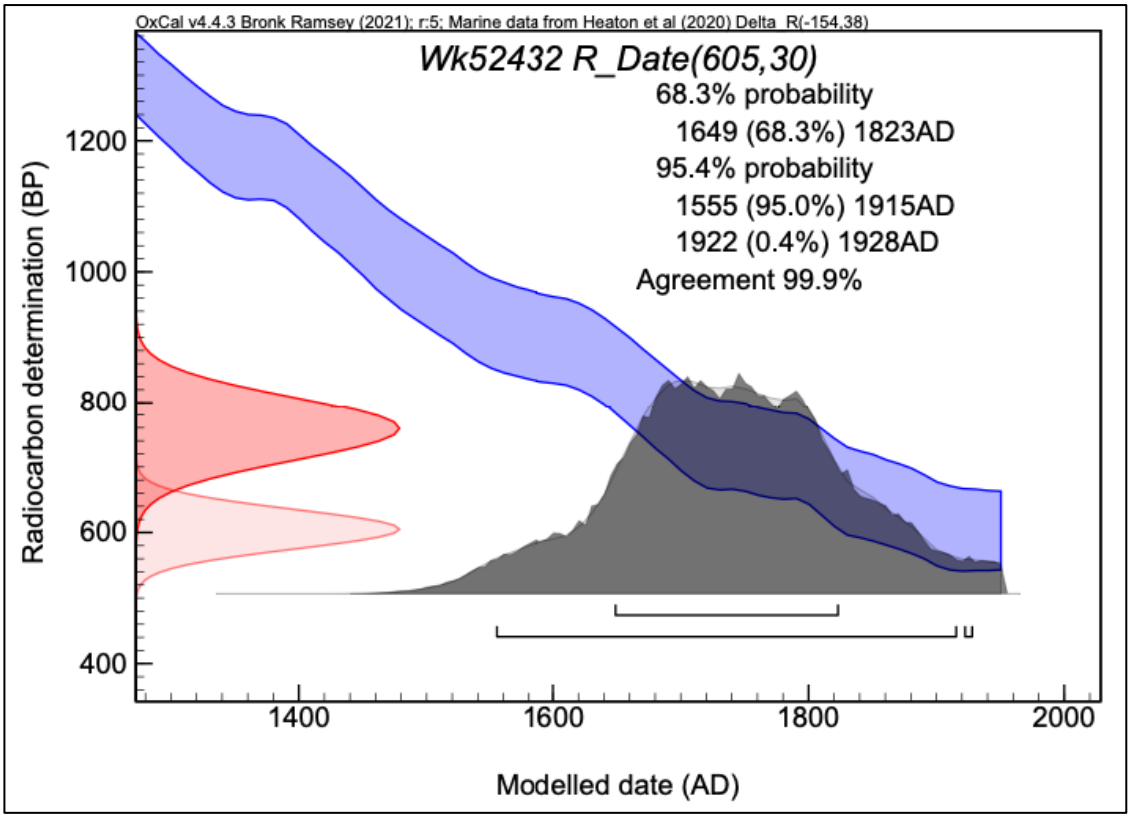


Figure 7.15 Modelled radiocarbon date range from shell midden site R10/1106 (context 1886)

R10/1485

Site R10/1485 consisted of two shell midden deposits with associated oven features that were situated on a low natural slumped terrace just above the southwestern bank of an inlet of the Pūhoi River, some 130m due west of the northern carriageway of the existing State Highway 1 (Figure 3.34 and Figure 7.12). Two samples of charcoal from site R10/1485 were submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis. A sample of five finger charcoal (*Pseudopanax arboreus*) from context 3053 (a shell midden deposit) produced a result of 194 ± 26 BP (Wk-50539), with a calibrated radiocarbon date range of 1660-1920 AD (2σ) (Figure 7.16 and Table 7.3). The radiocarbon data suggest that shell midden deposit 3053 was being formed at some point from the late 17th century to the mid-18th century. A sample of manuka charcoal (*Leptospermum scoparium*) from context 3057 (the fill of earth oven 3056) was submitted for AMS radiocarbon dating analysis and produced a result of 185 ± 27 BP (Wk-50540), with a calibrated radiocarbon date range of 1660-1920 AD (2σ) (Figure 7.17 and Table 7.3). As with the midden sample from 3053, the radiocarbon data suggest a date range from the late 17th century to the mid-18th century for the formation of context 3057. The radiocarbon dating analysis of site R10/1485 suggests that the site was likely formed during a single, most likely short-lived occupation.

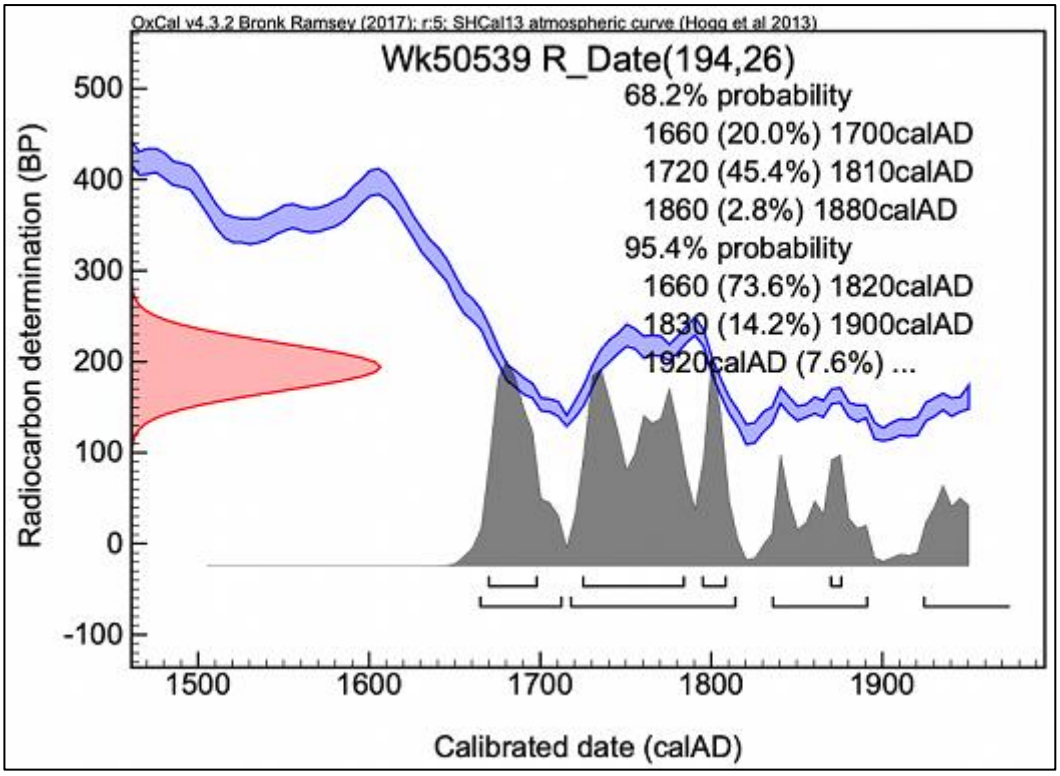


Figure 7.16 Calibrated radiocarbon date range from shell midden site R10/1485 (context 3053)

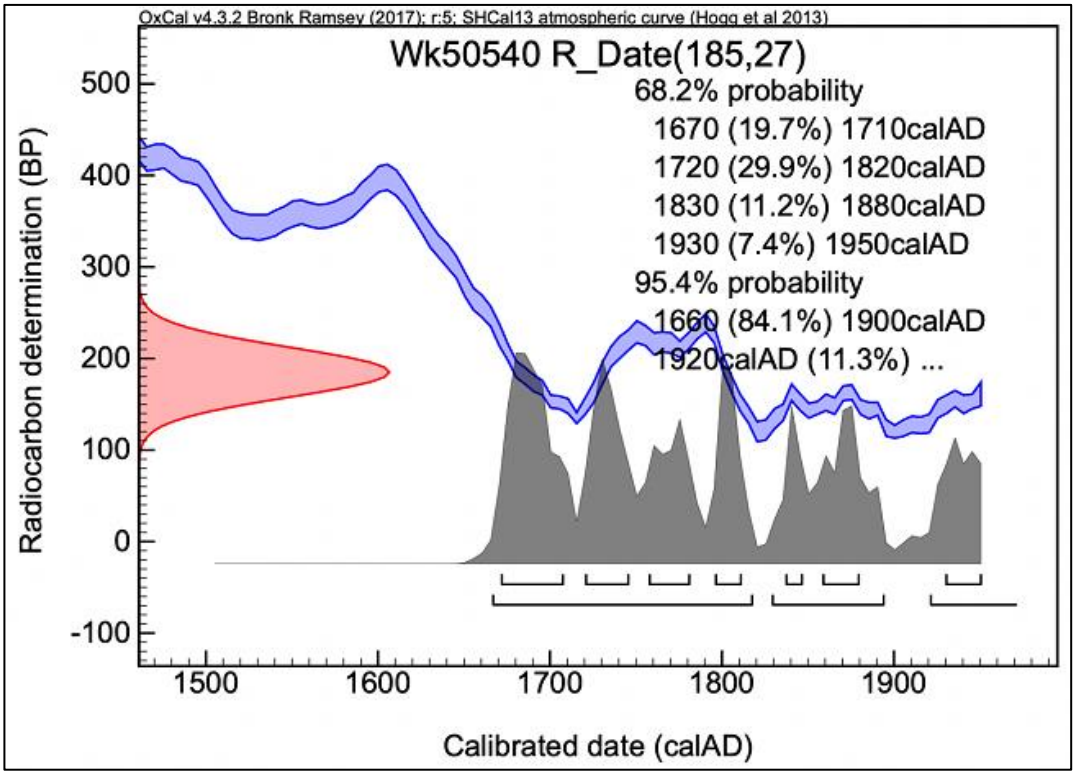


Figure 7.17 Calibrated radiocarbon date range from shell midden site R10/1485 (context 3057)

R10/1498

Shell midden site R10/1498 was located very close to the northern border of the 3 Puhoi Road property on a moderate to gentle slope approximately 10m to the south of and above Puhoi Road, and overlooking the southern bank of the Pūhoi River (Figure 3.34 and Figure 7.12). Two samples (one of pipi shell and the other charcoal) were submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis. The charcoal sample consisted of five finger (*Pseudopanax arboreus*) from context 1019 (shell midden deposit) and produced a result of 194 ± 26 BP (Wk-50522), with a calibrated radiocarbon date range of 1630-1800 AD (2σ) (Figure 7.18 and Table 7.3). The radiocarbon data suggest a date of formation for shell midden deposit 1019 during the latter half of the 17th century. The pipi shell (*Paphies australis*) sample from context 1045 (the fill of hāngi 1044) produced a result of 570 ± 22 BP (Wk-50523), with a calibrated radiocarbon date range of 1630-1930 AD (2σ) (Figure 7.19 and Table 7.3). The radiocarbon data suggest a date during the early 18th century for the deposition of context 1045.

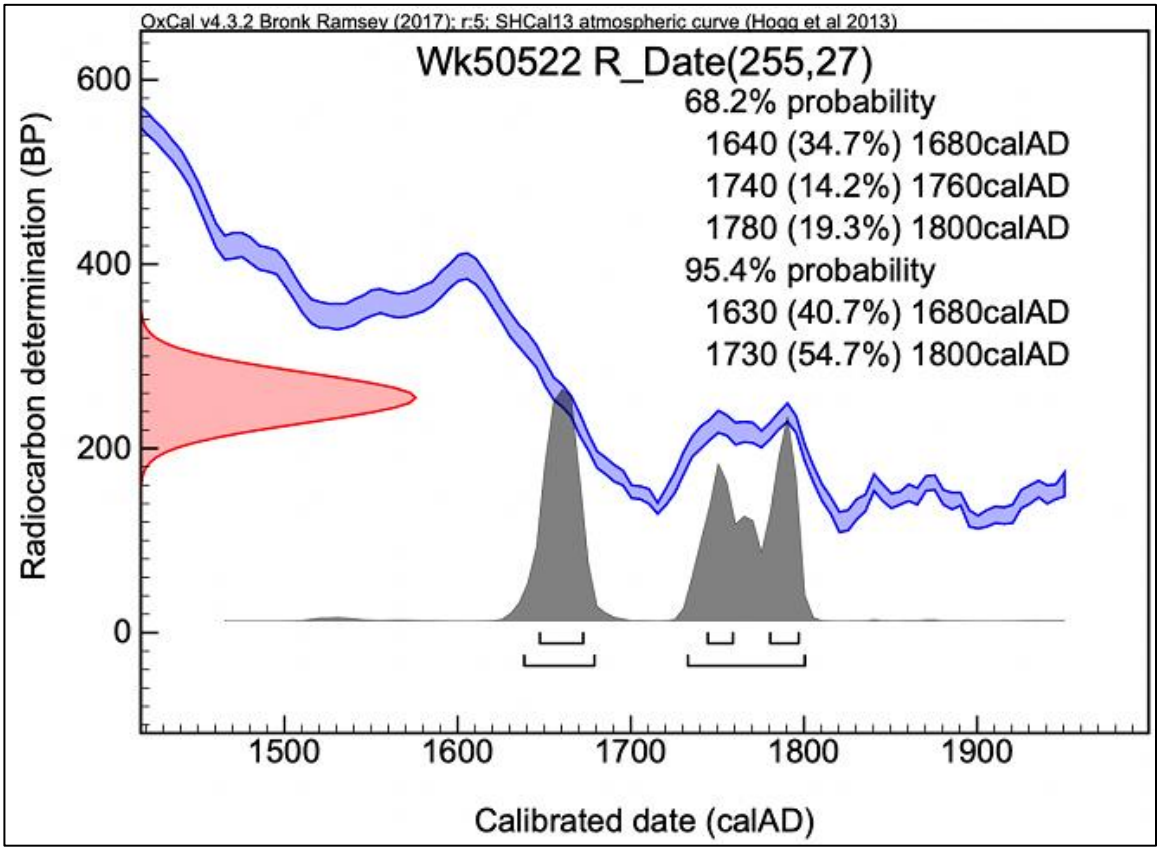


Figure 7.18 Calibrated radiocarbon date range from shell midden site R10/1498 (context 1019)

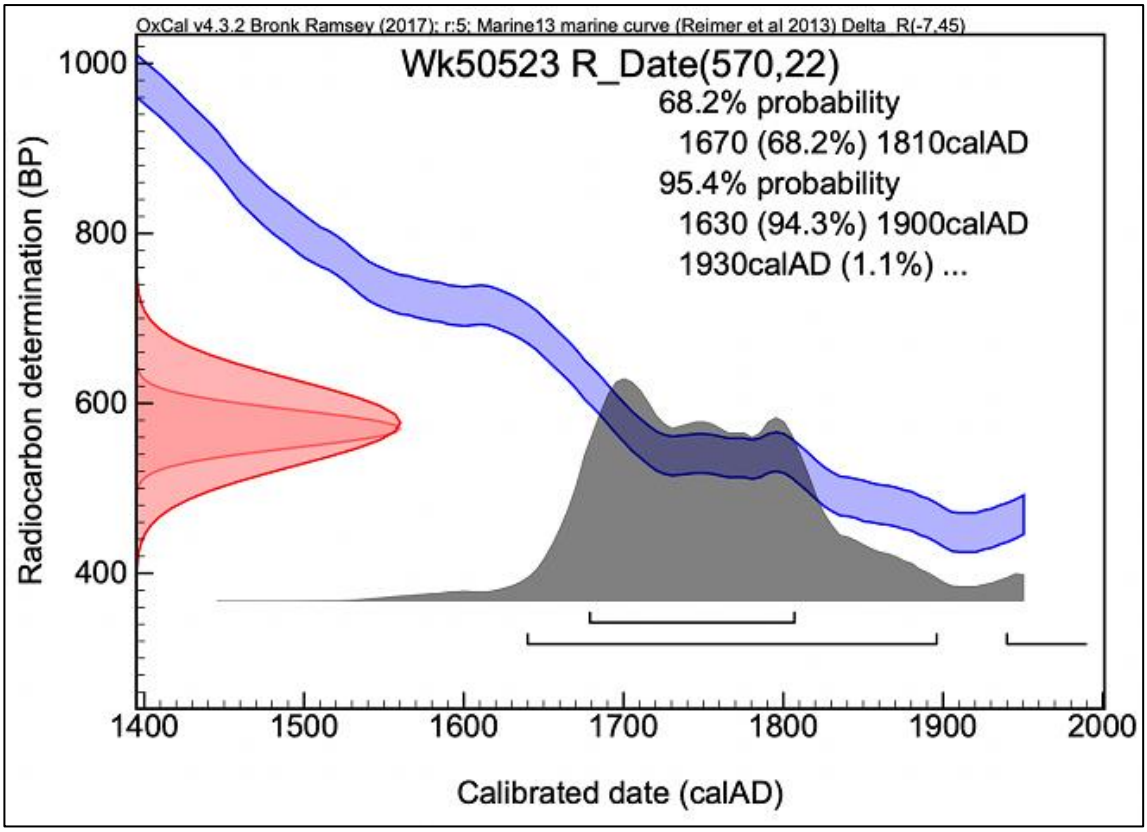


Figure 7.19 Calibrated radiocarbon date range from shell midden site R10/1498 (context 1045)

R10/1499

Shell midden site R10/1499 was located in the north of the 3 Puhoi Road property some 35m due west of the existing State Highway 1 and some 115m east-southeast of R10/1498 (Figure 3.34 and Figure 7.12). A sample of cockle shell (*Austrovenus stutchburyi*) was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis and produced a result of 598 ± 22 BP (Wk– 50524), with a calibrated radiocarbon date range of 1560-1860 AD (2σ) (Figure 7.20 and Table 7.3). The radiocarbon data suggest a date of formation for shell midden site R10/1499 around the turn of the 18th century.

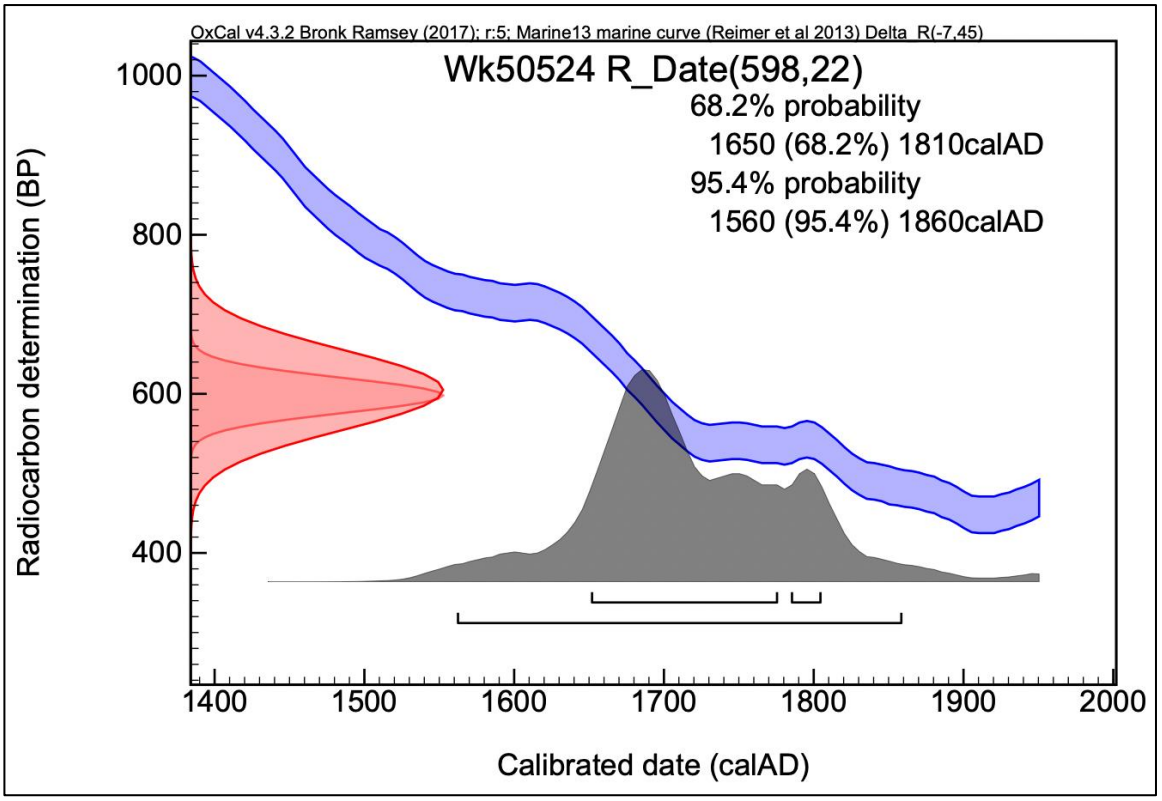


Figure 7.20 Calibrated radiocarbon date range from shell midden site R10/1499 (context 1048)

R10/1500

Shell midden site R10/1500 was located on a flattish slumped natural terrace, in an elevated position on the eastern slopes of the large hill that dominated the 3 Puhoi Road site (Figure 3.34 and Figure 7.12). A sample of pipi shell (*Paphies australis*) from R10/1500 (context 1049) was submitted for standard radiocarbon dating analysis and produced a result of 614 ± 30 BP (Wk-50525), with a calibrated radiocarbon date range of 1530-1840 AD (2σ) (Figure 7.21 and Table 7.3). The radiocarbon data suggest that site R10/1500 was formed during the last quarter of the 17th century.

R10/1501

Site R10/1501 was located on the eastern toe end of a historical (pre-European contact period) landslide lobe feature that trended southwest-northeast near the base of the eastern flanks of the large hill at 3 Puhoi Road (Figure 3.34 and Figure 7.12). A charcoal sample of mahoe (*Melicytus ramiflorus*) from context 1084 (the fill of firescoop 1083) was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis and produced a result of 134 ± 25 BP (Wk-50519), with a calibrated radiocarbon date range of 1690-1950 AD (2σ) (Figure 7.22 and Table 7.3). The radiocarbon data, together with the known history of the area, suggest that context 1084 was formed during the first quarter of the 18th century.

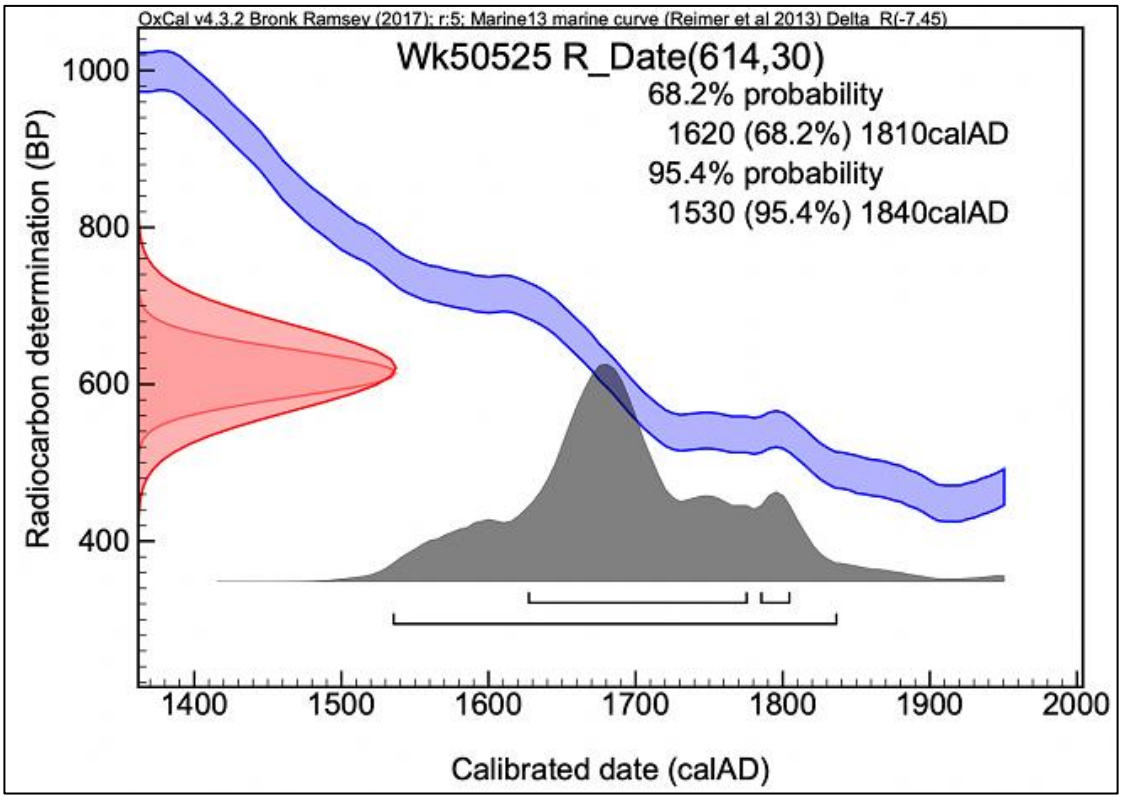


Figure 7.21 Calibrated radiocarbon date range from shell midden site R10/1500 (context 1049)

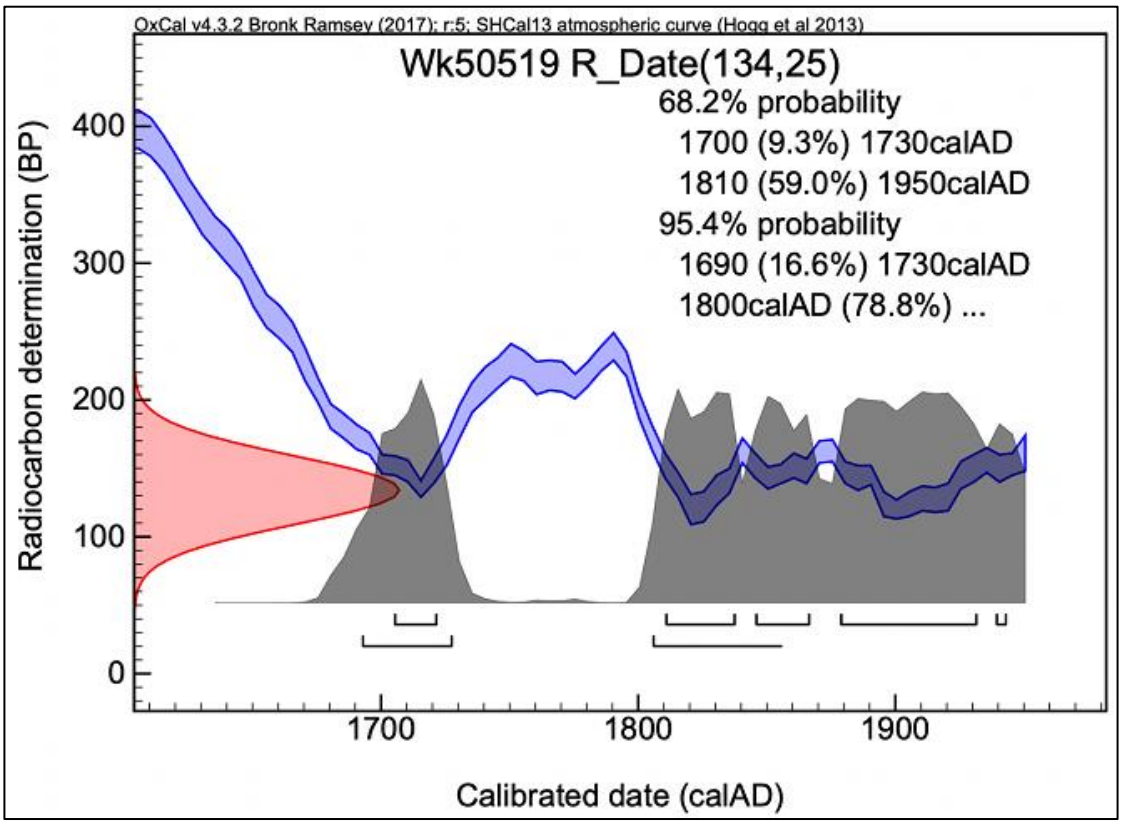


Figure 7.22 Calibrated radiocarbon date range from shell midden site R10/1501 (context 1084)

R10/1502

Shell midden site R10/1502 was situated on the northern edge of a small natural terrace that would originally have been situated overlooking a meander of the former course of the Pūhoi River (Figure 3.34 and Figure 7.12). One sample from site R10/1502, consisting of *Olearia solandri* (coastal tree daisy) charcoal recovered from the shell midden deposit (context 1087), was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis (Figure 7.23 and Table 7.3). The Olearia charcoal sample produced a result of 200 ± 26 BP (Wk-50526), with a calibrated radiocarbon date range of 1660-1920 AD (2σ) (Figure 7.23; Table 7.3). The radiocarbon data suggest that the site was in use at some point during the first half of the 18th century.

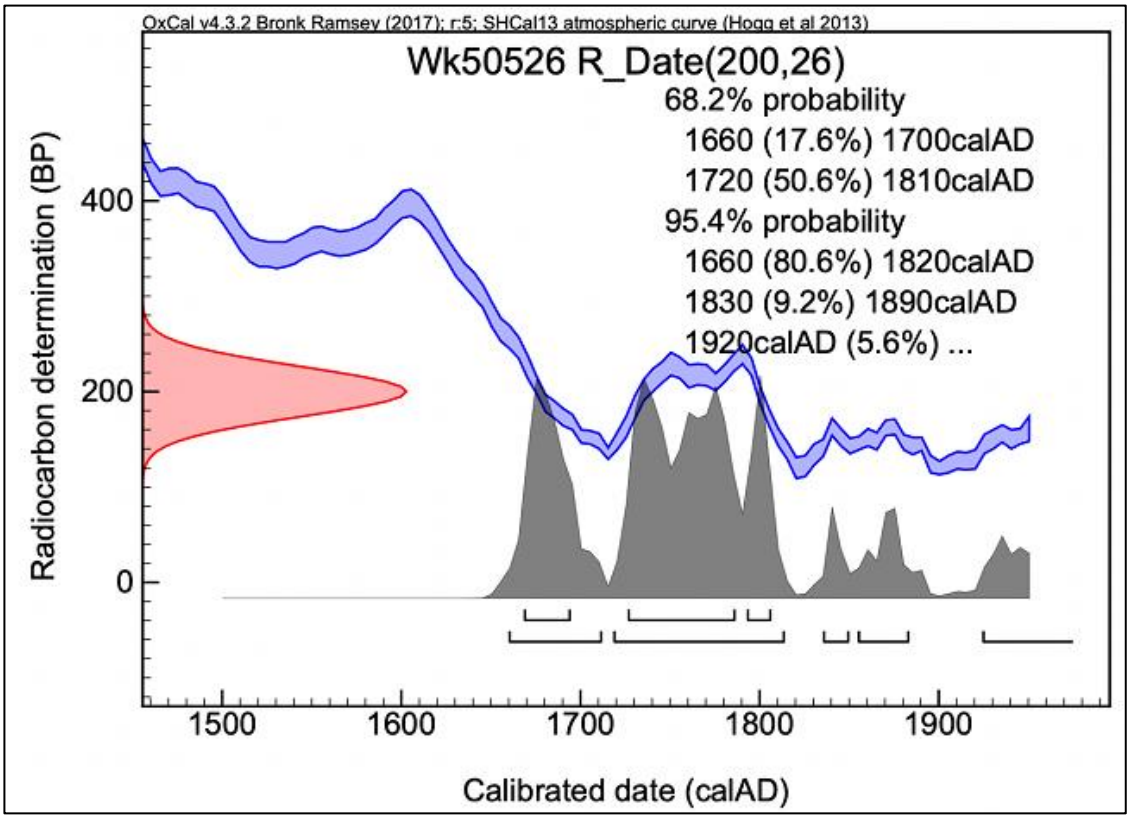


Figure 7.23 Calibrated radiocarbon date range from shell midden site R10/1502 (context 1087)

R10/1503

Site R10/1503 consisted of a number of intercutting hāngi and a firescoop, backfilled with shell midden material. The site was situated on the eastern edge of a natural terrace on the lower slopes of the eastern flank of the large hill that forms the western boundary of the project area at the 3 Puhoi Road site (Figure 3.34 and Figure 7.12). One sample from site R10/1503, consisting of toro (*Myrsine salicina*) charcoal recovered from context 1089 (the fill of earth oven 1088),was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis (Figure 7.24 and Table 7.3). The toro charcoal sample produced a result of 228 ± 26 BP (Wk-50518), with a calibrated radiocarbon date range of 1640-1810 AD (2σ) (Figure 7.24; Table 7.3). The radiocarbon data suggest that the site was in use at some point during the mid- to second half of the 18th century.

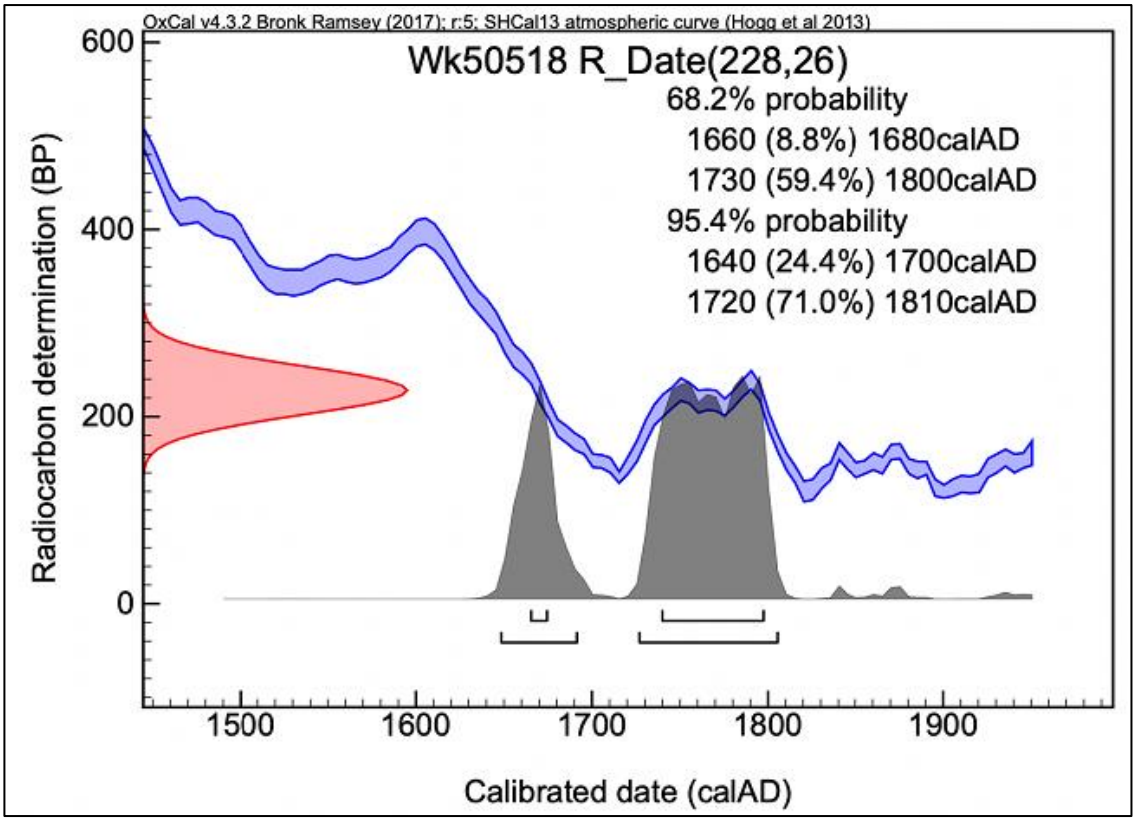


Figure 7.24 Calibrated radiocarbon date range from shell midden site R10/1503 (context 1089)

R10/1505

Site R10/1505 consisted of shell midden and associated features in two distinct groups situated on top of a west-northwest to east-southeast trending spur that descended from the eastern flanks of the large hill at 3 Puhoi Road (Figure 3.34 and Figure 7.12). A sample of cockle shell (*Austrovenus stutchburyi*) from the shell midden deposit (context 1119) was submitted for standard radiocarbon dating analysis and produced a result of 776 ± 31 BP (Wk-50528), with a calibrated radiocarbon date range of 1440-1650 AD (2σ) (Figure 7.25 and Table 7.3). The radiocarbon data suggest that the site was in use at some point during the first quarter of the 16th century.

R10/1507

Shell midden site R10/1507 was situated close to the western boundary of the project area, on slightly sloping ground on the eastern flanks of the large hill that dominates the property at 3 Puhoi Road (Figure 3.34 and Figure 7.12). A sample of pipi shell (*Paphies australis*) from R10/1507 (context 1456) was submitted for standard radiocarbon dating analysis and produced a result of 603 ± 30 BP (Wk-50529), with a calibrated radiocarbon date range of 1540-1860 AD (2σ) (Figure 7.26 and Table 7.3). The radiocarbon data suggest that site R10/1507 was formed during the last quarter of the 17th century.

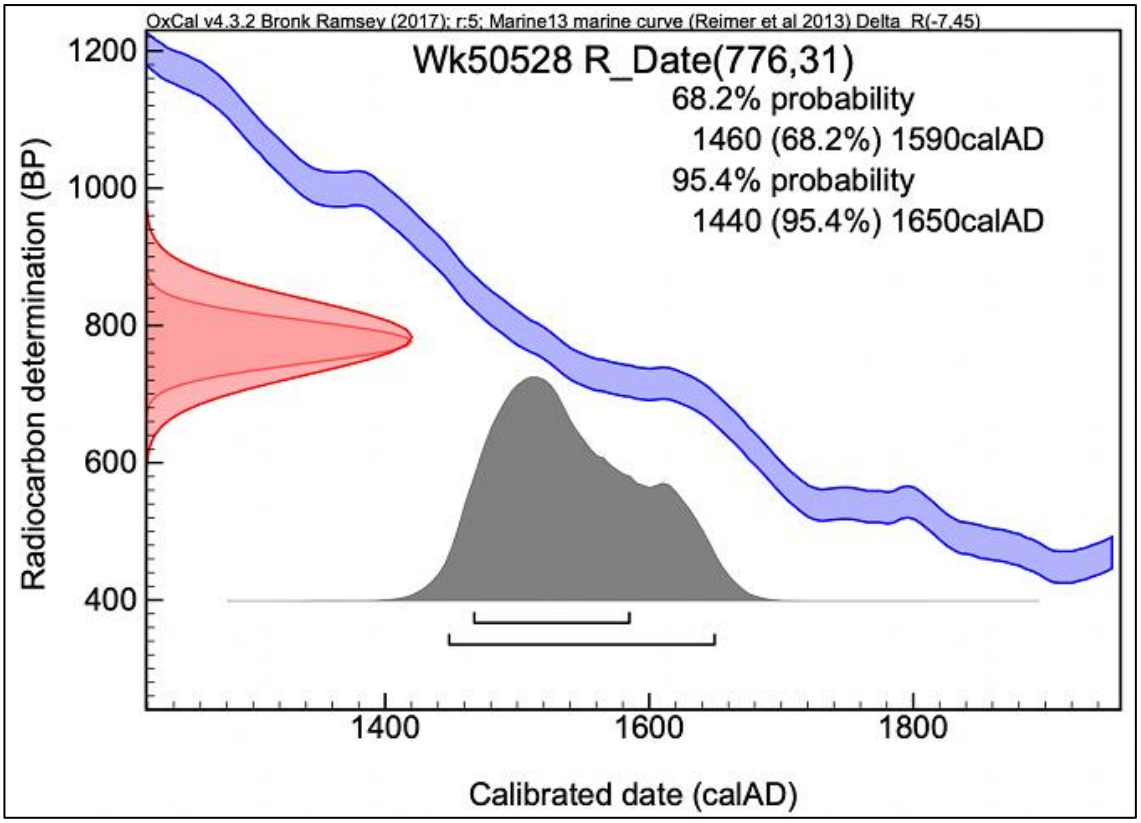


Figure 7.25 Calibrated radiocarbon date range from shell midden site R10/1505 (context 1119)

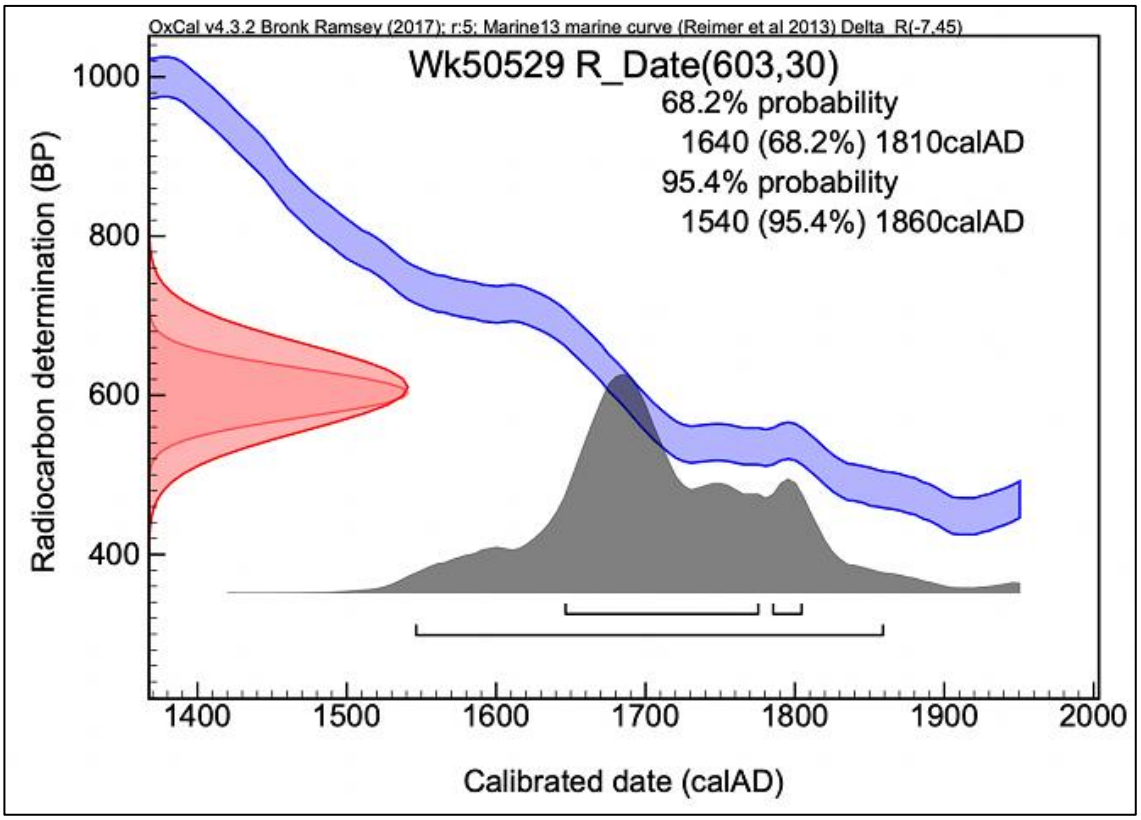


Figure 7.26 Calibrated radiocarbon date range from shell midden site R10/1507 (context 1456)

R10/1511

Shell midden site R10/1511 was situated at the base of the eastern flanks of the large hill that formed the western boundary of SAP 10, and approximately 50m northeast of shell midden site R10/1500 (Figure 3.34 and Figure 7.12). A sample of pipi shell (*Paphies australis*) from context 3012 was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis and produced a result of 538 ± 22 BP (Wk-50532), with a calibrated radiocarbon date range of 1670-1920 AD (2σ) (Figure 7.27 and Table 7.3). The radiocarbon data suggest a date of formation for shell midden site R10/1511 from the mid-18th century to the early 19th century.

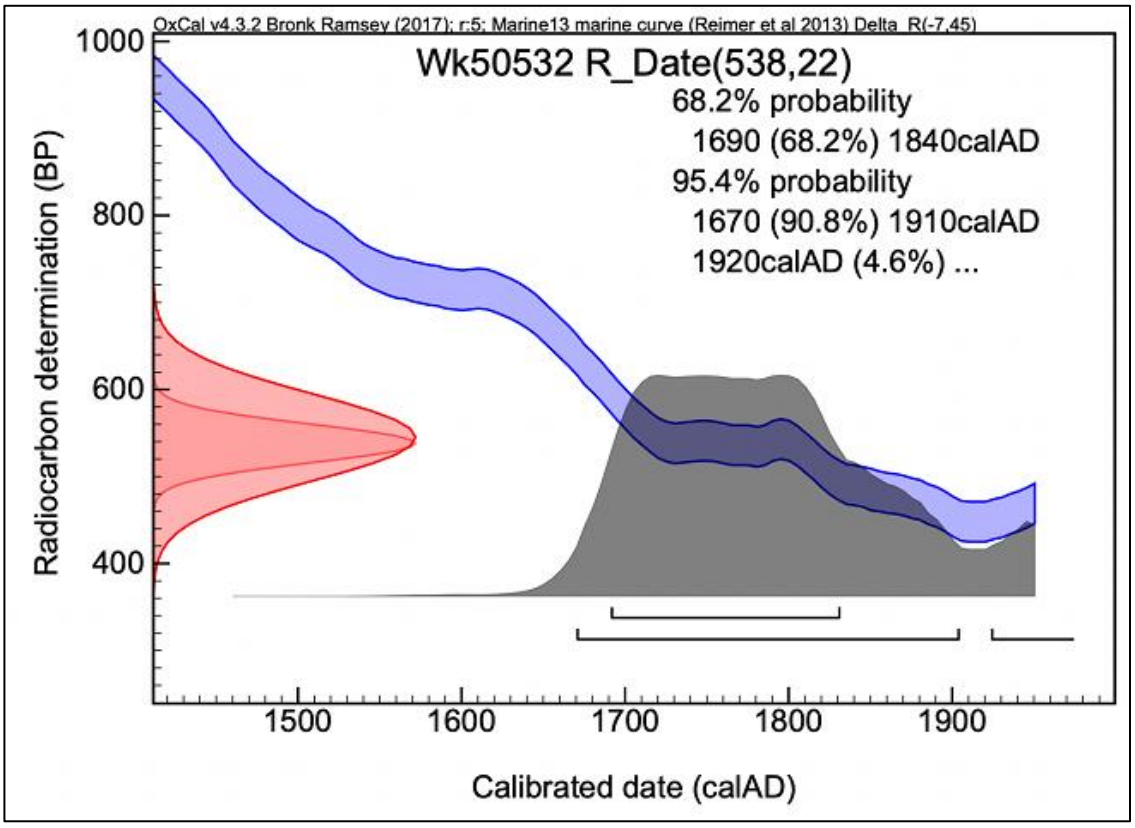


Figure 7.27 Calibrated radiocarbon date range from shell midden site R10/1511 (context 3012)

R10/1512

Site R10/1512 was situated on flat ground at the base of the eastern flanks of the large hill and overlooking a former meander/infilled inlet of the Pūhoi River at 3 Puhoi Road (Figure 3.34 and Figure 7.12). The site consisted of a very large sub-circular earth oven interpreted as an umu tī, along with an associated oven stone cache, a shell midden, and several postholes. Three samples (one of shell, two of charcoal) from site R10/1512 were submitted for Standard Radiocarbon and AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis respectively.

A sample of pipi shell (*Paphies australis*) taken from context 3016 (shell midden deposit that sealed the large earth oven) was submitted for standard radiocarbon dating analysis and produced a result of 583 ± 28 BP (Wk-50533), with a calibrated radiocarbon date range

of 1580-1950 AD (2σ) (Figure 7.28 and Table 7.3). The radiocarbon data suggest a date of deposition of the shell midden deposit 3016 during the first quarter of the 18th century.

A sample of hebe (*Veronica* sp.) taken from context 3030 (the upper fill of the large earth oven 3029), was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis and produced a result of 183 ± 26 BP (Wk-50534), with a calibrated radiocarbon date range of 1660-1920 AD (2σ) (Figure 7.29 and Table 7.3). The radiocarbon data together with stratigraphic information suggest a date of deposition for context 3030 at some point from the late 17th century to the turn of the 18th century.

A sample of coastal tree daisy (*Olearia solandri*) charcoal recovered from context 3033 (the lower fill of the large earth oven 3029) was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis and produced a result of 127 ± 26 BP (Wk-50535), with a calibrated radiocarbon date range of 1690-1800 AD (2σ) (Figure 7.30 and Table 7.3). The radiocarbon data together with stratigraphic information suggest a date of deposition for context 3033 at some point during the early 18th century.

Taken together, the three dates seem to suggest a date range from the last quarter of the 17th century to the early 18th century for the construction and use of the umu tī, with the deposition of the shell midden sealing the upper fill, completing the activity associated with the site.

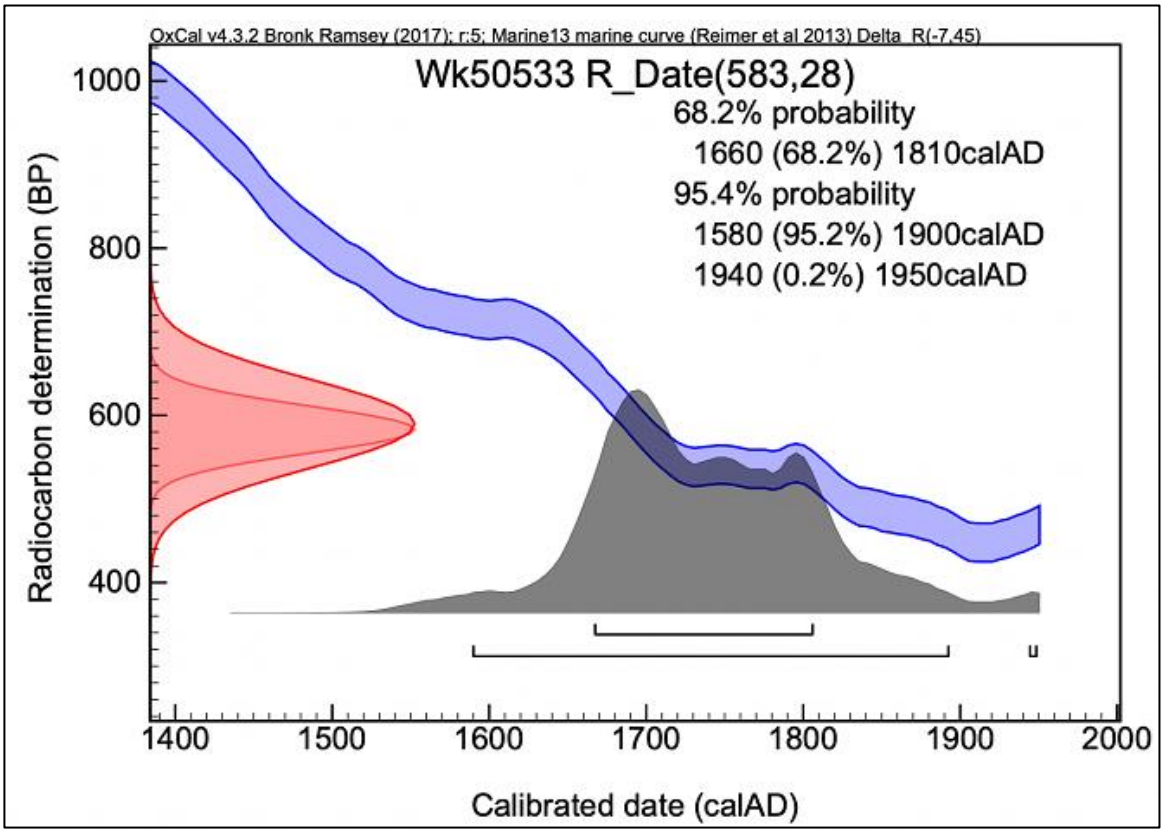


Figure 7.28 Calibrated radiocarbon date range from the shell midden deposit at site R10/1512 (context 3016)

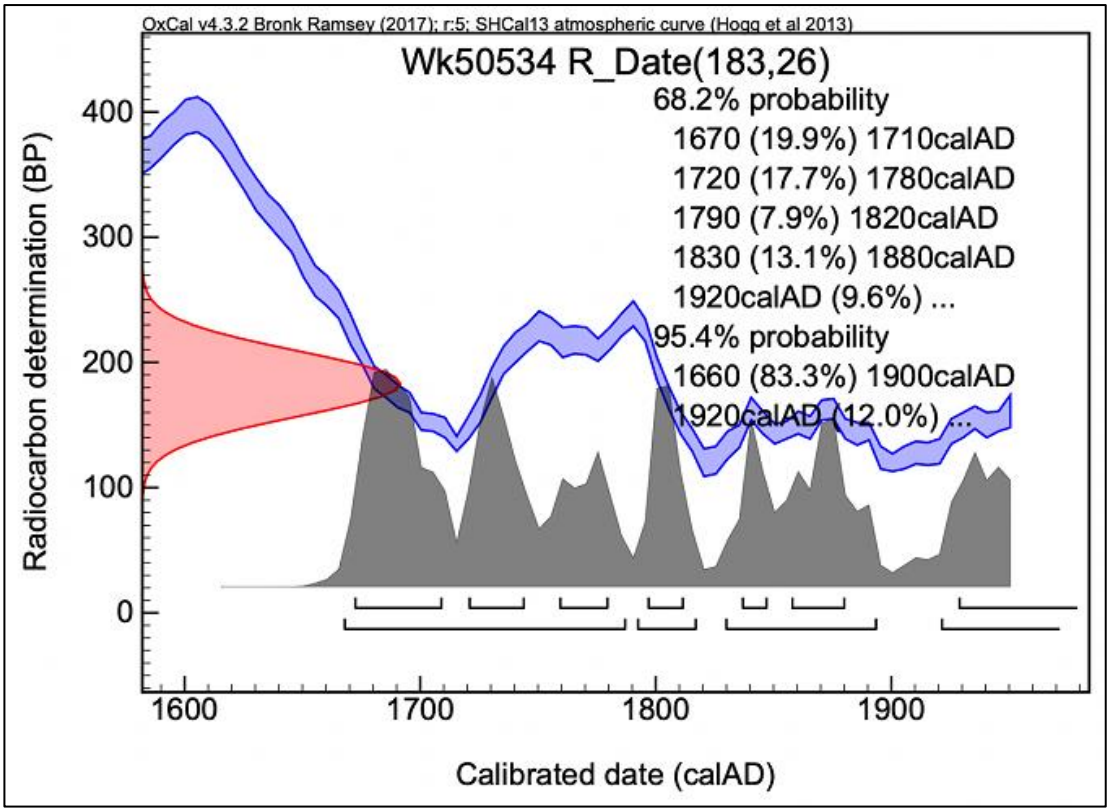


Figure 7.29 Calibrated radiocarbon date range from the upper fill of oven 3029 at R10/1512 (context 3030)

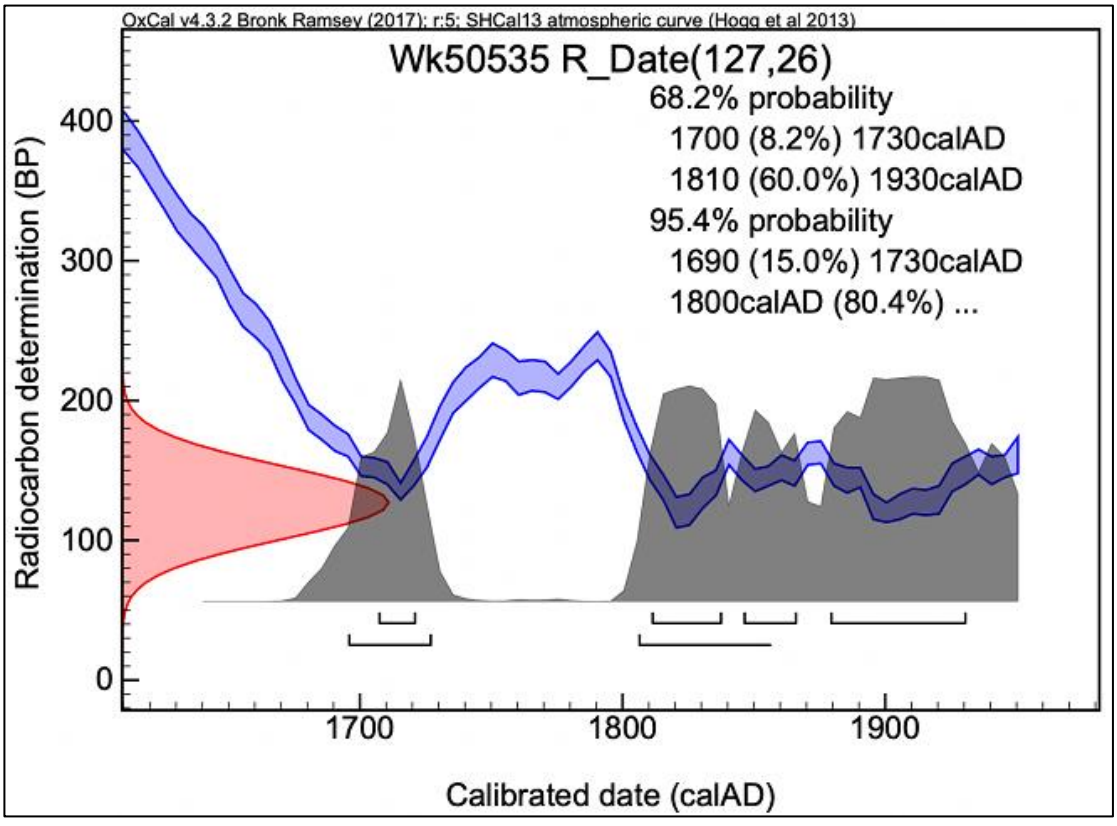


Figure 7.30 Calibrated radiocarbon date range from the lower fill of oven 3029 at R10/1512 (context 3033)

R10/1514

Shell midden site R10/1514 was situated on relatively flat ground at the base of a northwest to southeast trending spur that descended from the southeastern flanks of the large hill that dominates the 3 Puhoi Road property (Figure 3.34 and Figure 7.12). Two samples (one of cockle shell and the other charcoal) were submitted for Standard and AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis respectively.

A sample of pipi shell (*Paphies australis*) taken from context 3038 (shell midden deposit) was submitted for standard radiocarbon dating analysis and produced a result of 593 ± 29 BP (Wk-50536), with a calibrated radiocarbon date range of 1560-1880 AD (2σ) (Figure 7.31 and Table 7.3). The radiocarbon data suggest a date around the turn of the 18th century.

A charcoal sample consisting of five finger (*Pseudopanax arboreus*) from context 3045 (fill of firescoop 3046) was submitted for AMS radiocarbon dating analysis and produced a result of 280 ± 26 BP (Wk-50537), with a calibrated radiocarbon date range of 1510-1800 AD (2σ) (Figure 7.32 and Table 7.3). The radiocarbon data suggest a date of formation for context 3045 during or just after the mid-17th century.

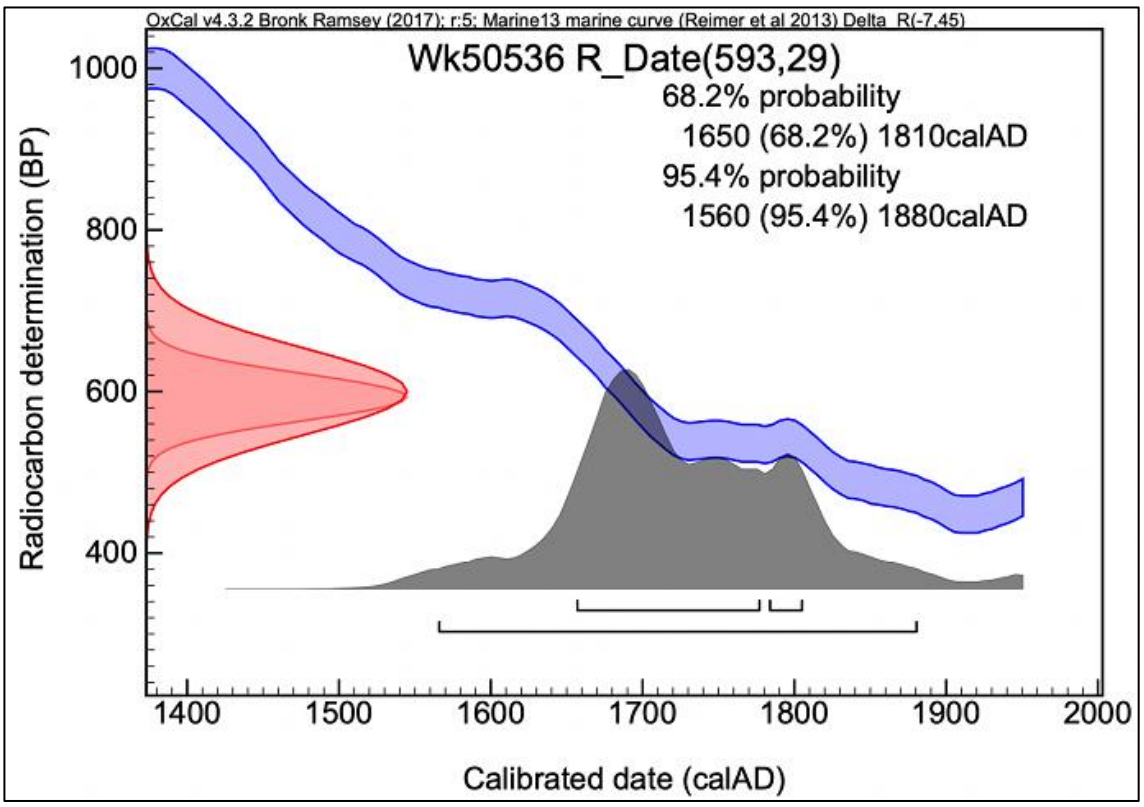


Figure 7.31 Calibrated radiocarbon date range from fill of firescoop 3044 at site R10/1514 (context 3038)

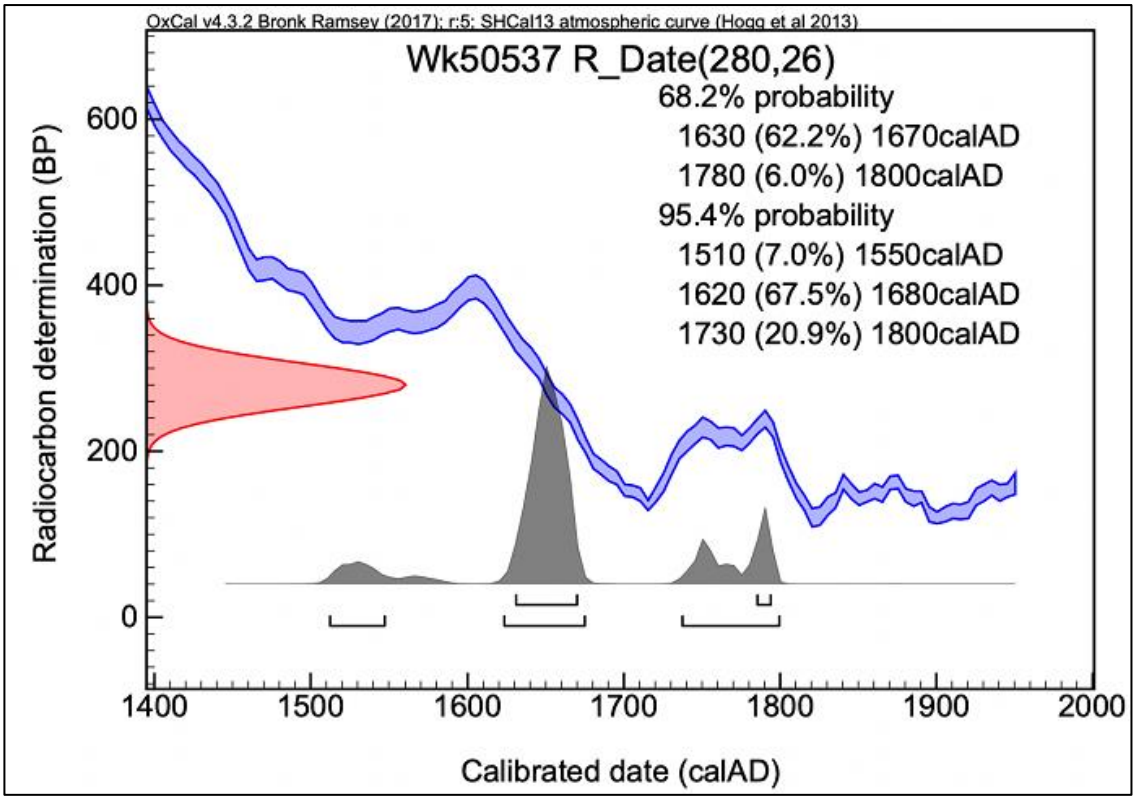


Figure 7.32 Calibrated radiocarbon date range from shell midden site R10/1514 (context 3045)

7.2.4 517 State Highway 1 (SAP 9), Sites R10/1509 and R10/1510

The archaeological investigations of the 517 State Highway 1 property located to the north of the Pūhoi River and west of Hikauae Creek (Hungry Creek) and the extant State Highway 1 road, exposed four archaeological sites ranging from shell middens with associated oven features to the large multi-phased occupation site R10/1417. One of the four sites situated close to the northern bank of the Pūhoi River in the south of the property (R10/1495) was exposed during fencing works (Figure 3.92 and Figure 7.33). As the site was subsequently avoided and therefore remained intact and in situ, it was not investigated or sampled. Excluding site R10/1417 (the dating analysis of which is reported in Section 7.4 below) a total of two samples from two shell midden/earth oven sites (R10/1509 and R10/1510) were submitted for radiocarbon dating analysis (Figure 7.33 and Table 7.4).

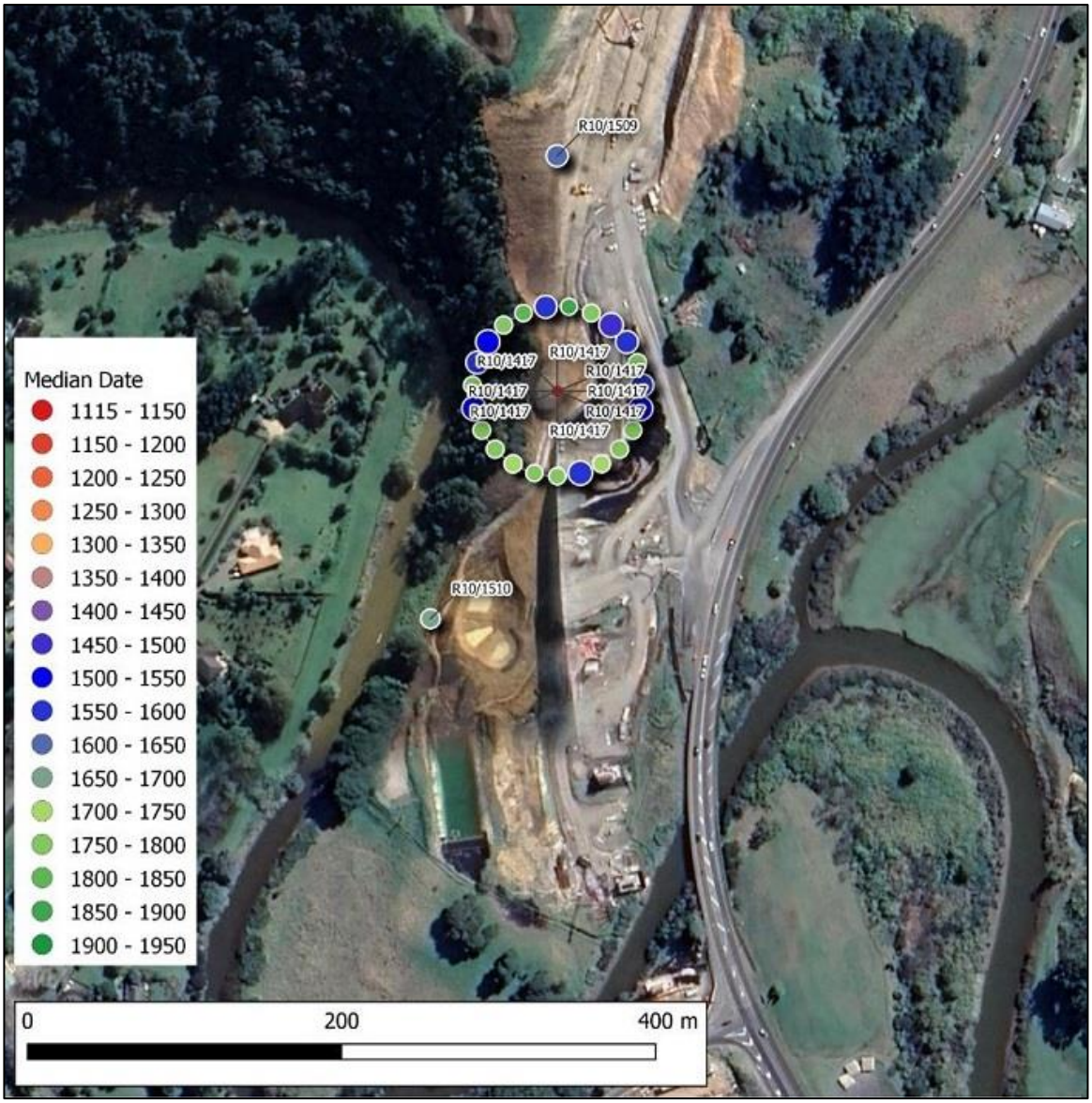


Figure 7.33 Location of radiocarbon samples taken from midden/oven sites R10/1417, R10/1509 and R10/1510 at 517 State Highway 1, Pūhoi (SAP 9)

Table 7.4 Details of the radiocarbon determinations for samples taken from midden sites at SAP 9 (excluding site R10/1417)

			CRA		Years AD			
Lab No	**Sample**	**Material**	**Years BP**	**Error**	**-1σ**	**-2σ**	**2σ**	**1σ**
Wk-50531	R10/1509 - 2408	Cockle shell	737	29	1510	1470	1670	1630
Wk-51896	R10/1510 - 1203	Pipi shell	648	25	1611	1516	1866	1796

R10/1509

Shell midden site R10/1509 was situated on a small terrace in an elevated position on the steep slopes descending from the high bush-clad ground in the west of the property at 517 State Highway 1 (Figure 3.92 and Figure 7.33). A sample of cockle shell (*Austrovenus stutchburyi*) from R10/1509 (context 2408) was submitted for standard radiocarbon dating analysis and produced a result of 737 ± 29 BP (Wk-50531), with a calibrated radiocarbon date range of 1470-1670 AD (2σ) (Figure 7.34 and Table 7.4). The radiocarbon data suggest that site R10/1509 was formed during the last half of the 16th century.

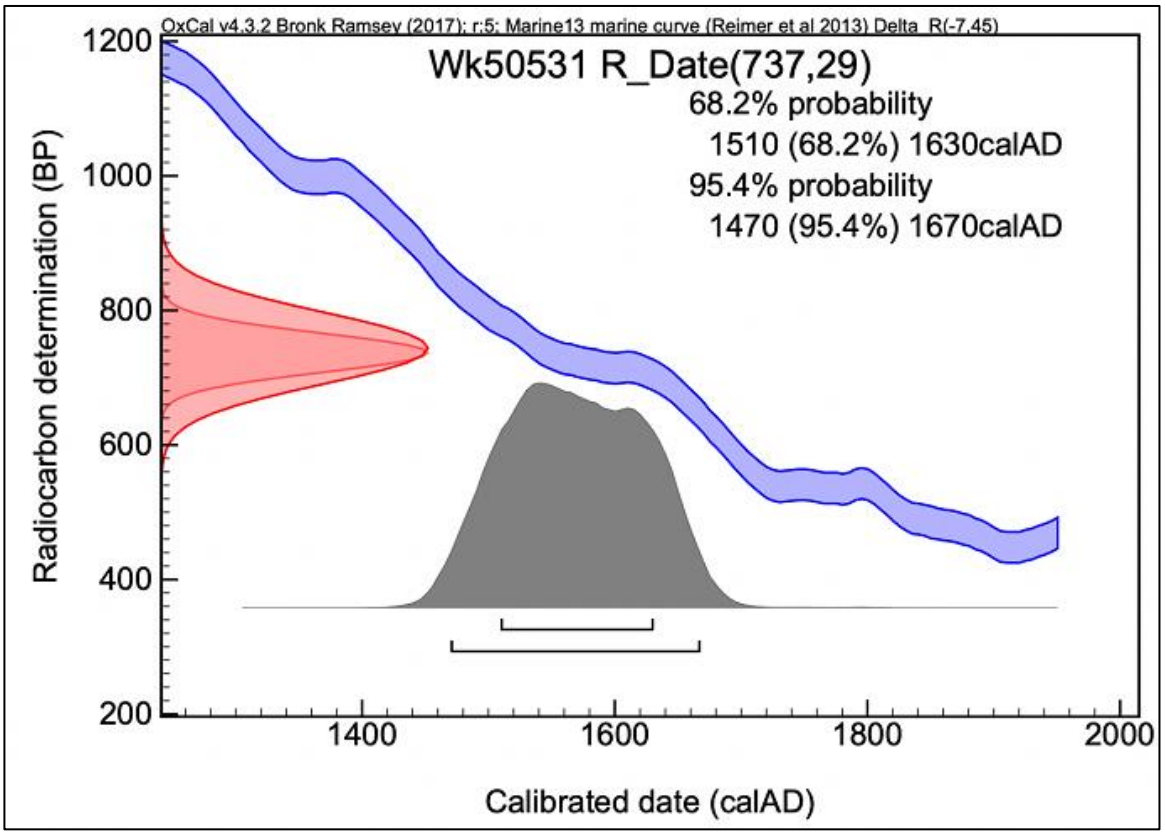


Figure 7.34 Calibrated radiocarbon date range from shell midden site R10/1509 (context 2408)

R10/1510

Shell midden site R10/1510 was situated on level ground approximately 25m due east of the eastern bank of the Pūhoi River, at 517 State Highway 1 (Figure 3.92 and Figure 7.33). A sample of pipi shell (*Paphies australis*) taken from context 1203 (shell midden deposit) was submitted for standard radiocarbon dating analysis and produced a result of 648 ± 25 BP (Wk-51896), with a calibrated radiocarbon date range of 1516-1866 AD (2σ) (Figure 7.35 and Table 7.4). The radiocarbon data suggest a date around the turn of the 18th century (Figure 7.35 and Table 7.4).

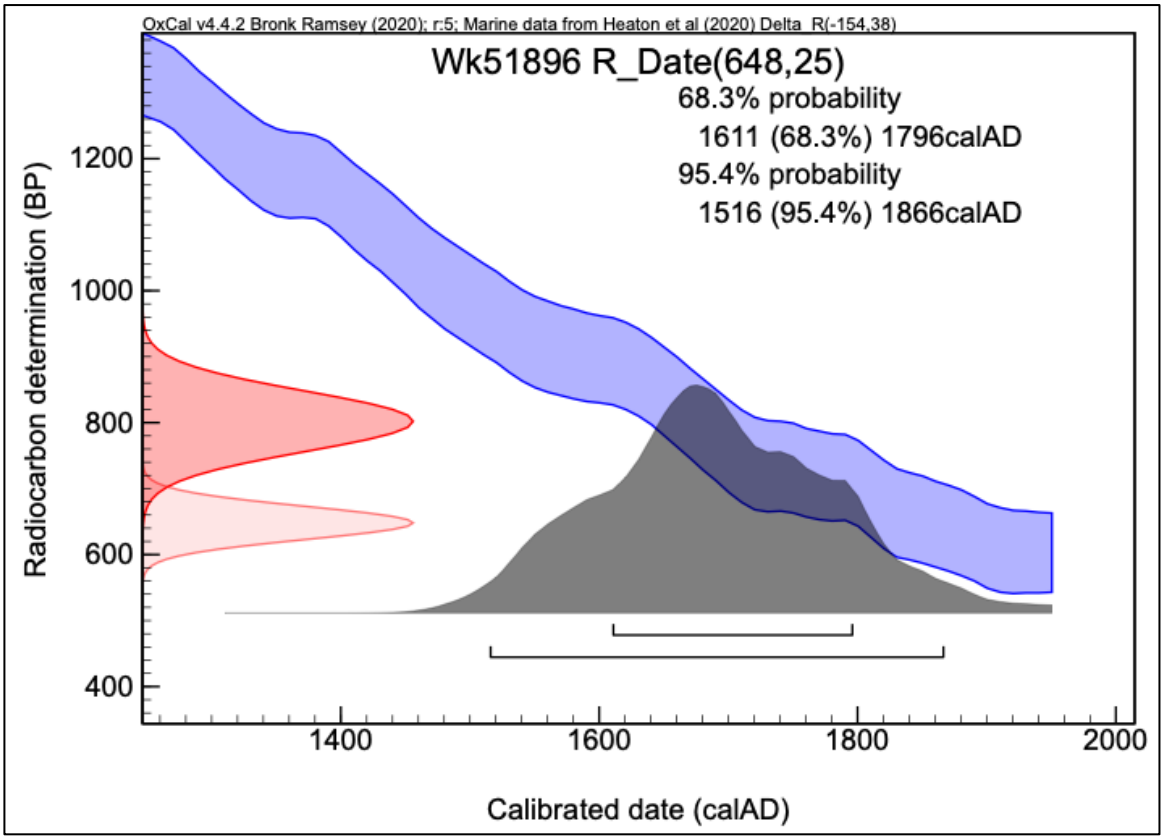


Figure 7.35 Calibrated radiocarbon date range from shell midden site R10/1510 (context 1203)

7.3 Site R10/1484

7.3.1 Introduction

Site R10/1484 was a multi-phased occupation site situated on a flat natural terrace on top of the west-northwest to east-southeast trending ridge spur that descended from the eastern flanks of the large hill that dominated the 3 Puhoi Road, Pūhoi site at SAP 10 (Figure 4.1 and Figure 7.36). Twenty-four samples taken from individual contexts from a number of excavated features across site R10/1484 were submitted for radiocarbon dating analysis (Figure 7.36 and Table 7.5). Twenty-three of the samples consisted of charcoal, while the other consisted of cockle shell (Table 7.5). The samples were recovered from layers and fills from the large post-pits, shell midden deposits, earth ovens, firescoops, and structural features such as postholes and beam-slots.

The results are presented below per feature type.

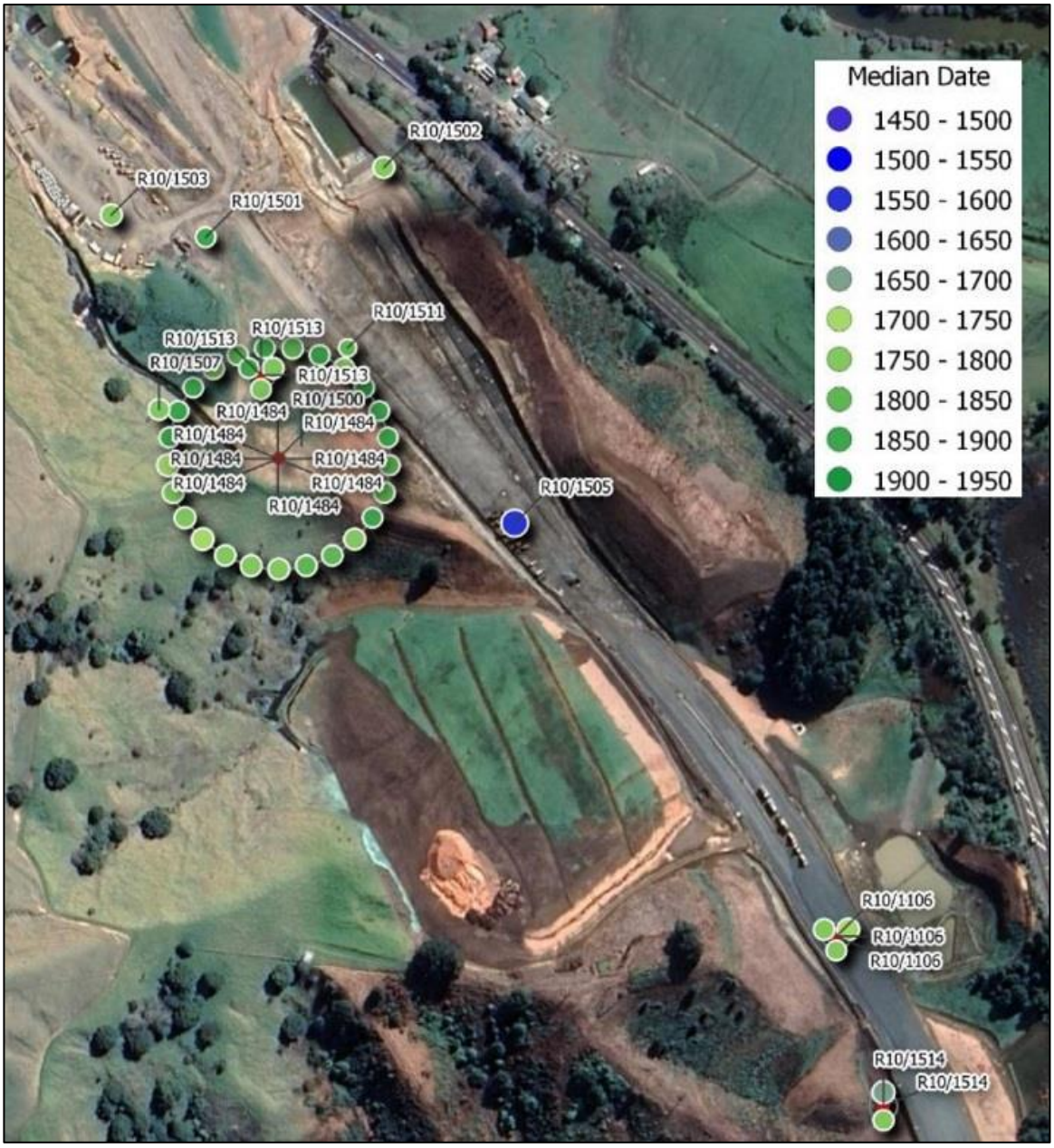


Figure 7.36 Location of site R10/1484 with radiocarbon sample date ranges, with other nearby dated sites shown at 3 Puhoi Road (SAP 10)

Table 7.5 Details of the radiocarbon determinations for samples taken from site R10/1484

			CRA		Years AD			
Lab No	Sample	Material	Years BP	Error	-1σ	-2σ	2σ	1σ
Wk-50202	R10/1484 - 1052	Charcoal	177	21	1675	1670	1950	1928
Wk-50203	R10/1484 - 1057	Charcoal	167	22	1680	1674	1950	1927
Wk-50204	R10/1484 - 1158	Charcoal	222	21	1669	1655	1804	1797
Wk-50205	R10/1484 - 1169	Charcoal	122	21	1710	1697	1950	1928
Wk-50206	R10/1484 - 1175	Charcoal	178	21	1675	1670	1950	1929
Wk-50207	R10/1484 - 1162	Charcoal	155	22	1695	1680	1950	1925
Wk-50208	R10/1484 - 1193	Charcoal	121	21	1710	1697	1950	1928
Wk-50209	R10/1484 - 1199	Charcoal	122	22	1710	1697	1950	1928
Wk-50210	R10/1484 - 1236	Charcoal	116	21	1711	1698	1950	1927
Wk-50211	R10/1484 - 1146	Charcoal	204	21	1670	1659	1947	1803
Wk-50212	R10/1484 - 1577	Charcoal	150	21	1697	1685	1950	1923
Wk-50213	R10/1484 - 1521	Charcoal	179	21	1675	1670	1950	1929
Wk-50214	R10/1484 - 1188	Charcoal	137	20	1703	1696	1950	1944
Wk-50215	R10/1484 - 1184	Charcoal	165	21	1683	1675	1950	1926
Wk-50216	R10/1484 - 1186	Charcoal	198	21	1670	1663	1950	1806
Wk-50217	R10/1484 - 2174	Charcoal	116	21	1711	1698	1950	1927
Wk-50218	R10/1484 - 1190	Charcoal	150	21	1697	1685	1950	1923
Wk-50219	R10/1484 - 1182	Charcoal	145	19	1698	1692	1950	1950
Wk-50220	R10/1484 - 1180	Charcoal	258	20	1647	1642	1799	1795
Wk-50221	R10/1484 - 1449	Charcoal	226	20	1667	1655	1803	1797
Wk-50222	R10/1484 - 1450	Charcoal	213	21	1670	1655	1808	1799
Wk-50223	R10/1484 - 1448	Charcoal	258	20	1647	1642	1799	1795
Wk-50516	R10/1484 - 1050	Cockle Shell	592	29	1650	1560	1890	1810
Wk-50517	R10/1484 - 1198	Charcoal	218	26	1660	1640	1880	1800

7.3.2 Site R10/1484 Results

Shell Midden Deposits and Cooking Features

A number of features related to the cooking and consumption of food on site R10/1484 such as hāngi (earth ovens), firescoops and shell midden deposits were sampled for radiocarbon dating purposes. Samples of either marine shell or charcoal from six features on the site were submitted for radiocarbon dating analysis.

Shell Midden 1050

The main shell midden deposit (context 1050) was situated to the east of the two large post-pits and was sealed beneath the modern topsoil. A sample of cockle shell (*Austrovenus stutchburyi*) taken from context 1050 was submitted for standard radiocarbon dating analysis and produced a result of 592 ± 29 BP (Wk-50516), with a calibrated radiocarbon date range of 1560-1890 AD (2σ) (Figure 7.37 and Table 7.5). The radiocarbon data suggest that the shell midden deposit was being formed around the turn of the 18th century.

Oven 1056

Earth oven 1056 was cut through shell midden 1050 and into the colluvial subsoil (context 1145). A charcoal sample consisting of Corokia (*Corokia buddleioides*) from context 1057 (the fill of oven 1056) was submitted for AMS radiocarbon dating analysis and produced a result of 167 ± 22 BP(Wk-50203), with a calibrated radiocarbon date range of 1674-1950 AD (2σ) (Figure 7.38 and Table 7.5). The radiocarbon data suggest that context 1057 was deposited at some point during the last quarter of the 17th century to the beginning of the 18th century.

Shell Midden 1169

A small shell midden deposit was situated approximately 12.5m west of post-pit 1196. The feature was in isolation with no associated oven or firescoop features. A charcoal sample consisting of manuka (*Leptospermum scoparium*) from shell midden 1169 was submitted for AMS radiocarbon dating analysis and produced a result of 122 ± 21 BP (Wk-50205), with a calibrated radiocarbon date range of 1697-1950 AD (2σ) (Figure 7.39 and Table 7.5). The radiocarbon data suggest that context 1169 was formed around the end of the first quarter of the 19th century.

Firescoop/Oven 1192

An oval firescoop/earth oven feature (context 1192) was cut into the top of the large post-pit feature (context 1196). A charcoal sample consisting of manuka (*Leptospermum scoparium*) taken from the primary fill (context 1193) of the feature was submitted for AMS radiocarbon dating analysis which produced a result of 121 ± 21 BP (Wk-50208), with a calibrated radiocarbon date range of 1697-1950 AD (2σ) (Figure 7.40 and Table 7.5). The radiocarbon data suggest that context 1193 was formed around the end of the first quarter of the 19th century. The result is essentially a perfect match to that produced by the small shell midden deposit (context 1169), and strongly suggests that the midden deposit was formed at the same time as the firescoop/oven feature was in use, and it is entirely plausible, even likely, that the small midden deposit was generated by use of the oven feature (Figure 7.39 and Figure 7.40 and Table 7.5).

Firescoop 1145

A sub-circular firescoop feature was cut into the top of the backfill (context 1152) of the large post-pit feature 1151. A charcoal sample consisting of hebe (*Hebe* sp.) taken from the fill of the firescoop 1145 (context 1146) was submitted for AMS radiocarbon dating analysis, which produced a result of 204 ± 21 BP (Wk-50211), with a calibrated radiocarbon date range of 1659-1947 AD (2σ) (Figure 7.41 and Table 7.5). The radiocarbon data suggest that context 1146 was formed at some point from the mid-18th century to the early 19th century.

Hearth 1174

A charcoal sample consisting of five finger (*Pseudopanax arboreus*) from context 1175 (fill of hearth 1174) was submitted for AMS radiocarbon dating analysis and produced a result of 178 ± 21 BP (Wk-50206), with a calibrated radiocarbon date range of 1670-1950

AD (2σ) (Figure 7.42 and Table 7.5). The radiocarbon data suggest a date of deposition for context 1175 from the last quarter of the 17th century to the earlier part of the first quarter of the 18th century.

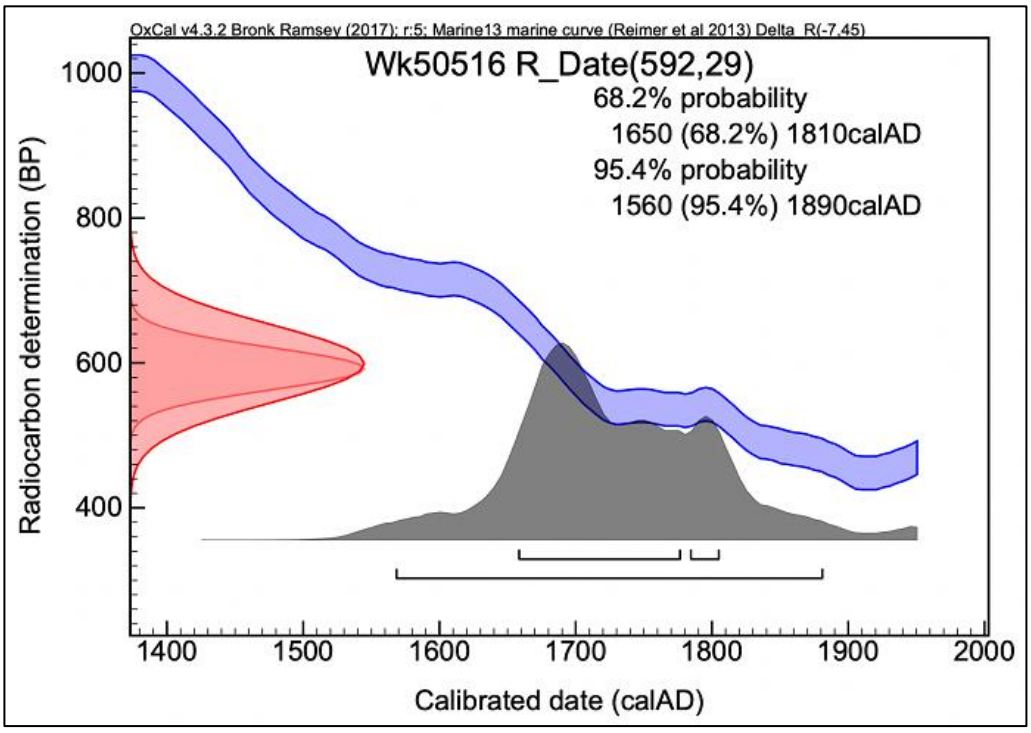


Figure 7.37 Calibrated radiocarbon date range from the main shell midden deposit at site R10/1484 (context 1050)

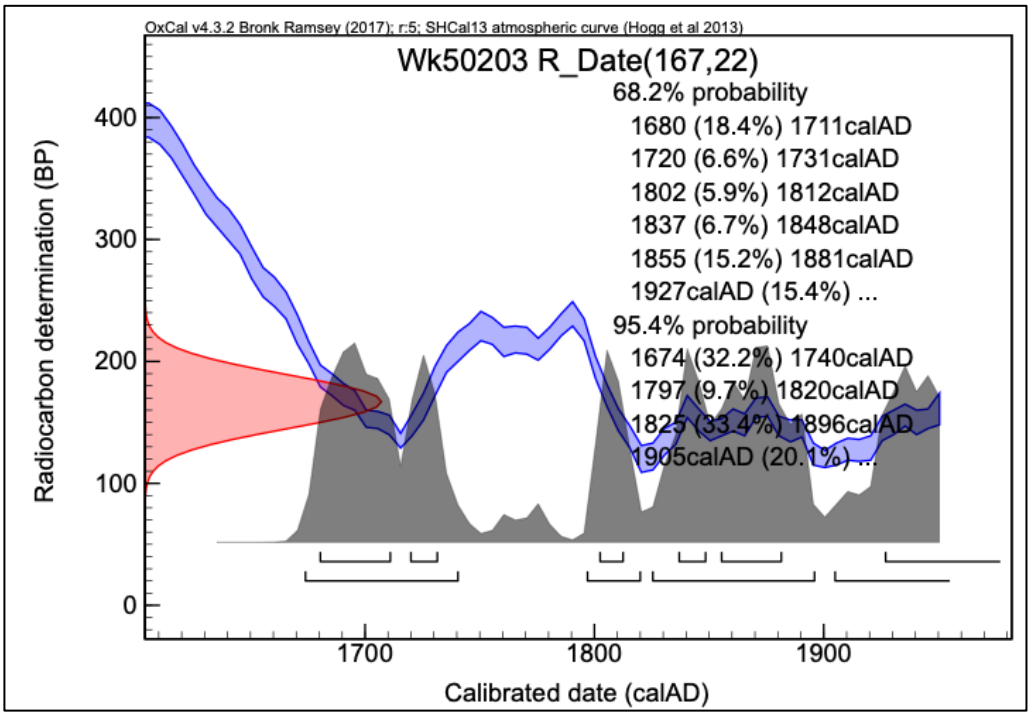


Figure 7.38 Calibrated radiocarbon date range from context 1057 (the fill of oven 1057) at site R10/1484

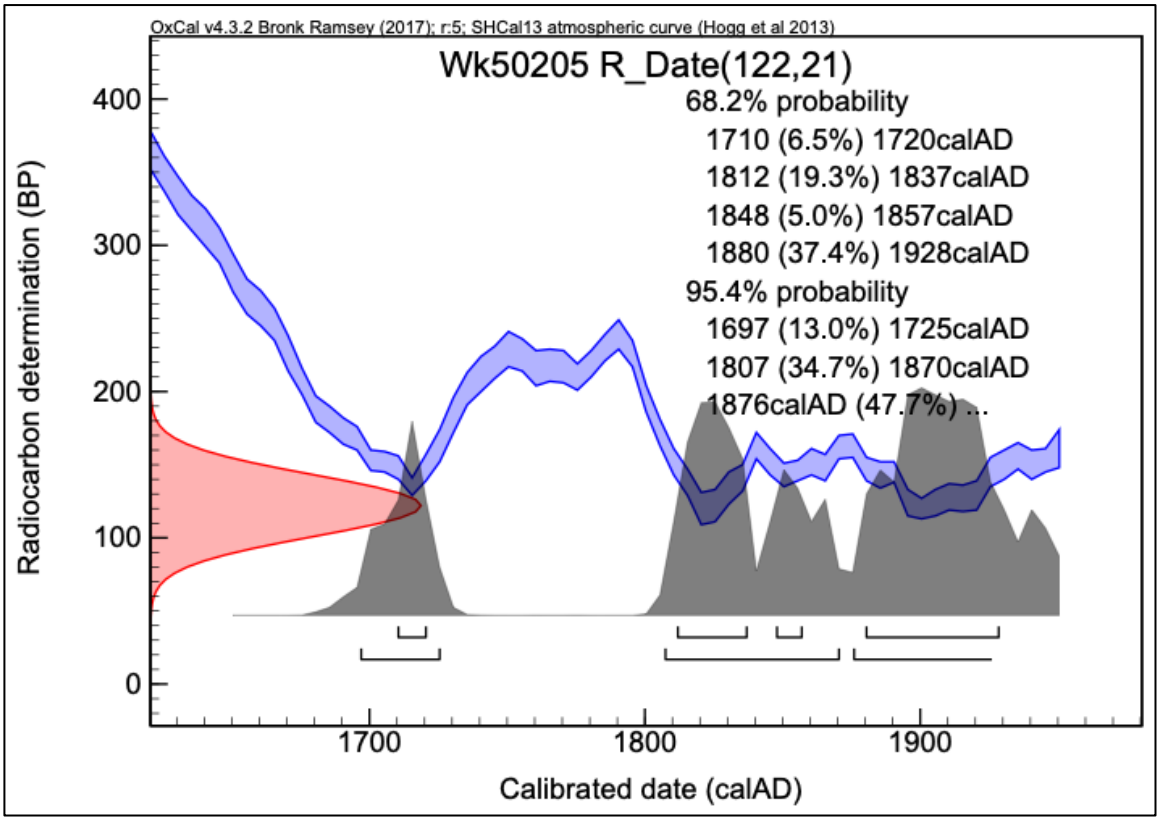


Figure 7.39 Calibrated radiocarbon date range from shell midden deposit (context 1169) at site R10/1484

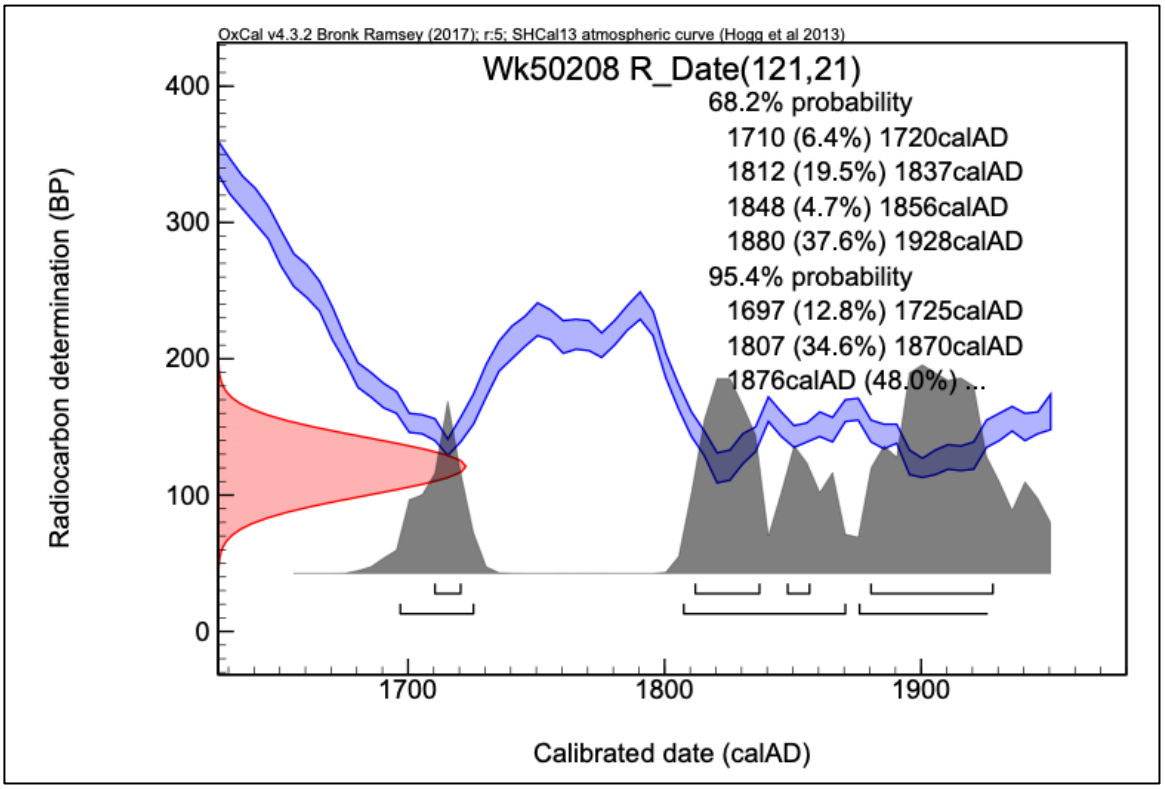


Figure 7.40 Calibrated radiocarbon date range from context 1193, the fill of firescoop/earth oven 1192 at site R10/1484

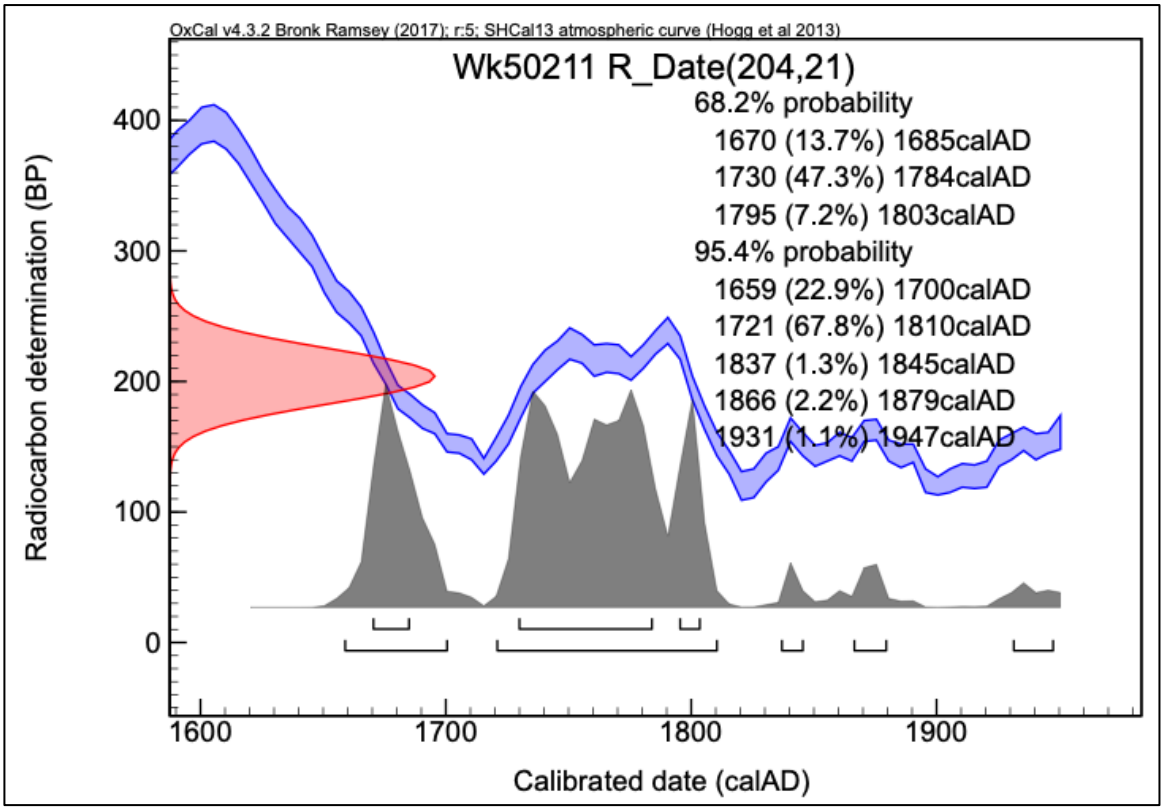


Figure 7.41 Calibrated radiocarbon date range from context 1146, the fill of firescoop 1145 at site R10/1484

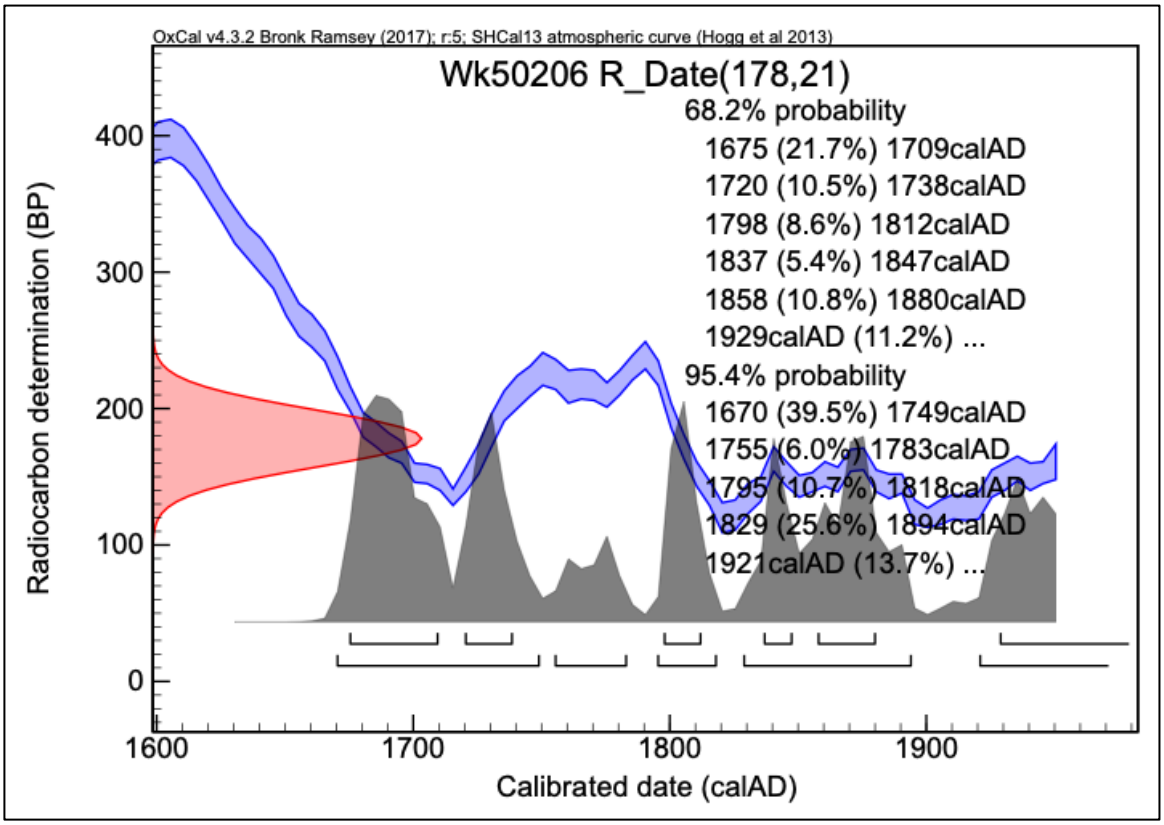


Figure 7.42 Calibrated radiocarbon date range from context 1175, the fill of earth oven 1174 at site R10/1484

Intercutting Oven Complex

A complex of some 19 hāngi (earth ovens), many of which were truncated by or truncated other ovens, were situated approximately 17m to the southeast of the large post-pits 1151 and 1196.

Oven 1426

Earth oven 1482 was a sub-circular oven feature filled by context 1448. A charcoal sample consisting of manuka (*Leptospermum scoparium*) taken from context 1448 was submitted for AMS radiocarbon dating analysis which produced a result of 258 ± 20 BP (Wk-50223), with a calibrated radiocarbon date range of 1642-1799 AD (2σ) (Figure 7.43 and Table 7.5). The radiocarbon data suggest that context 1448 was formed from around the middle of to the last quarter of the 17th century.

Oven 1432

Hāngi 1432 was a relatively large, oval earth oven feature that was filled by context 1449. A charcoal sample consisting of hebe (*Hebe* spp.) taken from context 1449 was submitted for AMS radiocarbon dating analysis, which produced a result of 226 ± 20 BP (Wk-50221), with a calibrated radiocarbon date range of 1655-1803 AD (2σ) (Figure 7.44 and Table 7.5). The radiocarbon data suggest that context 1449 was formed at some point during the second half of the 18th century.

Oven 1427

Earth oven 1427 was an oval feature, filled by context 1450. A sample of unidentified very small diameter twig charcoal was submitted for AMS radiocarbon dating analysis, which produced a result of 213 ± 21 BP (Wk-50222), with a calibrated radiocarbon date range of 1655-1808 AD (1σ) (Figure 7.45 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1450 was formed at some point from around the middle of to the last quarter of the 18th century.

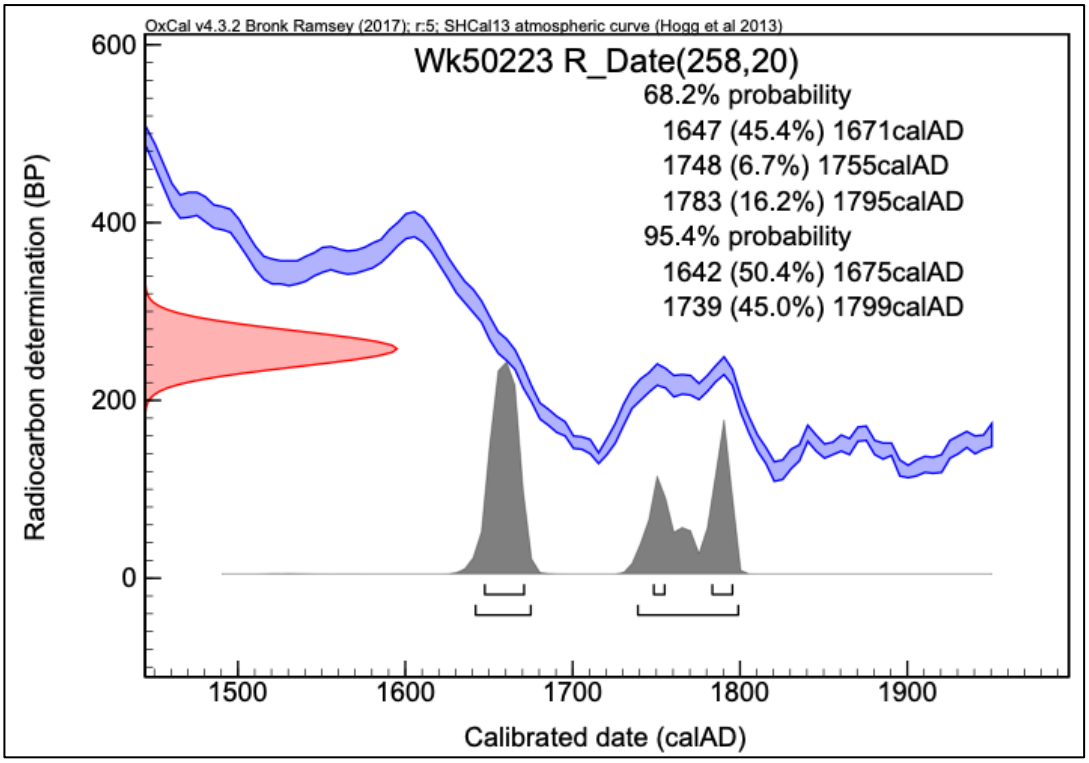


Figure 7.43 Calibrated radiocarbon date range from context 1448, the fill of earth oven 1426 at site R10/1484

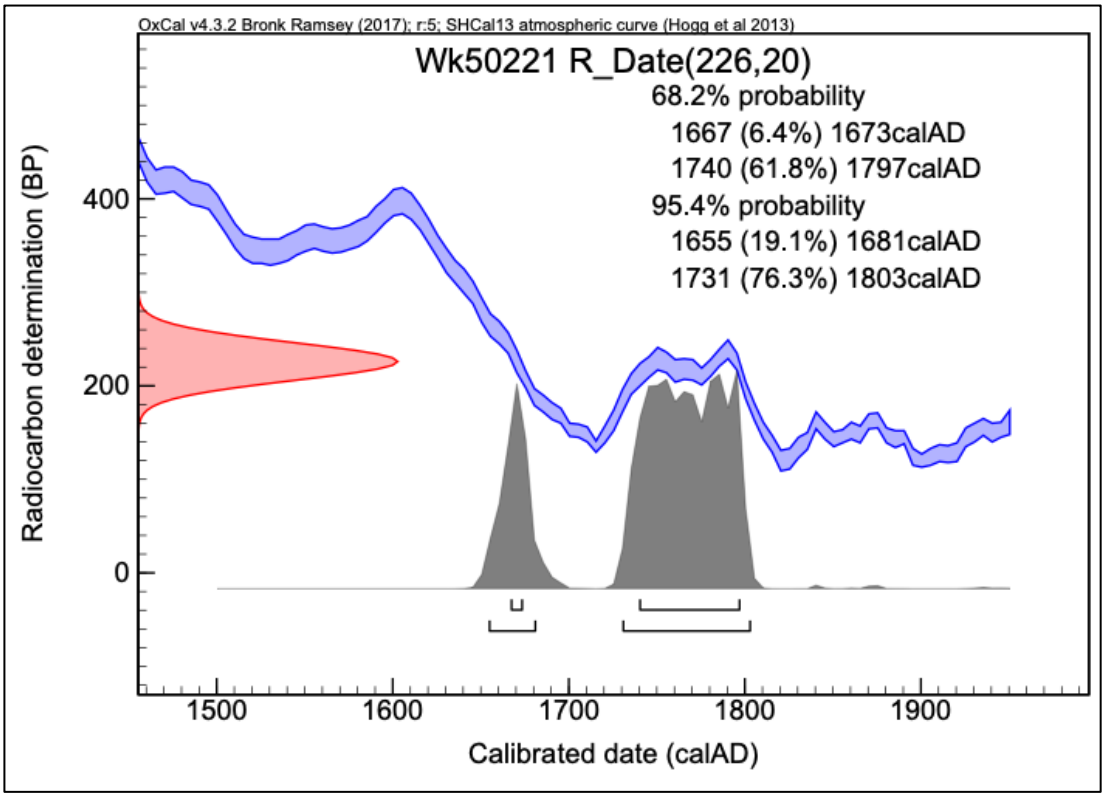


Figure 7.44 Calibrated radiocarbon date range from context 1449, the fill of earth oven 1432 at site R10/1484

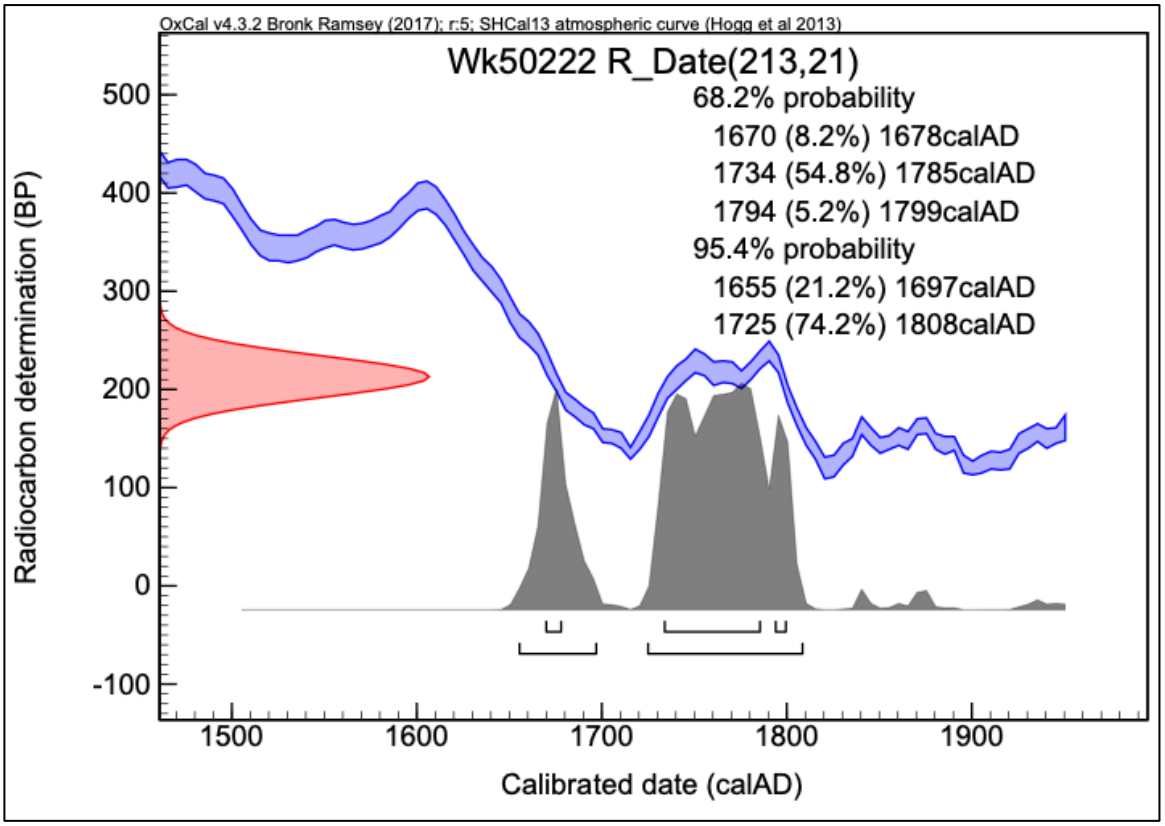


Figure 7.45 Calibrated radiocarbon date range from context 1450, the fill of earth oven 1427 at site R10/1484

Post-Pits 1051, 1151 and 1196

There were four deeply excavated post-pit features within the northern central area of site R10/1484. Of these, three produced charcoal samples that were suitable for dating.

Post-Pit 1051

Post-pit 1051 was an oval feature filled by two fills (contexts 1052 and 1176). A charcoal sample consisting of manuka (*Leptospermum scoparium*) taken from context 1052 (the upper fill of post-pit 1051) was submitted for AMS radiocarbon dating analysis, which produced a result of 177 ± 21 BP (Wk-50202), with a calibrated radiocarbon date range of 1670-1950 AD (2σ) (Figure 7.46 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1052 was formed at some point during the last quarter of the 17th century to the first half the 18th century.

Post-Pit 1151

Post-pit 1151 was a large, deep, oval-shaped feature that housed two very large postholes. The feature had been backfilled with a single fill (context 1152). Unfortunately, no viable charcoal samples for radiocarbon dating were retrieved from context 1152. However, a later feature (context 1157) cut from the top of the backfill and corresponding to the positions of the postholes was backfilled by a single deposit (context 1158). A charcoal sample consisting of twig manuka (*Leptospermum scoparium*), hebe (*Veronica* spp.) and

pohutakawa (*Metrosideros excelsa*) was submitted for AMS radiocarbon dating analysis and produced a result of 222 ± 21 BP (Wk-50204), with a calibrated radiocarbon date range of 1655-1804 AD (2σ) (Figure 7.47 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1152 was formed at some point from the second quarter to the end of the 18th century.

Post-Pit 1196

Feature 1196 was a large, deep, oval-shaped feature that housed two very large postholes, and contained three fills (contexts 1197, 1198 and 1199). The feature also had four oval scoop features cut into its base (contexts 1576, 1933, 1935 and 1937). In total four dates were obtained from post-pit 1196 relating to the backfills of the pit itself as well as the fills of features cut within the pit.

A charcoal sample of manuka (*Leptospermum scoparium*) from context 1198 (a fill within the main backfill (1197) of the post-pit) was submitted for AMS radiocarbon dating analysis, which produced a result of 218 ± 26 BP (Wk-50517), with a calibrated radiocarbon date range of 1640-1880 AD (2σ) (Figure 7.48 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1198 was formed at some point toward the end of the first quarter of the 18th century to the beginning of the 19th century.

A charcoal sample comprised of twig manuka (*Leptospermum scoparium*) from context 1199 (a trample layer within the main backfill (1197) of the post-pit) was submitted for AMS radiocarbon dating analysis, which produced a result of 122 ± 22 BP (Wk-50209), with a calibrated radiocarbon date range of 1697-1950 AD (2σ) (Figure 7.49 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy and known history of the site suggest that context 1198 was formed at some point during the first quarter of the 19th century.

A charcoal sample of manuka (*Leptospermum scoparium*) retrieved from context 1577 (the fill of an oval scoop feature 1576 cut into the base of post-pit 1196) was submitted for AMS radiocarbon dating analysis, which produced a result of 150 ± 21 BP (Wk-50212), with a calibrated radiocarbon date range of 1685-1950 AD (2σ) (Figure 7.50 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy and known history of the site suggest that context 1577 was deposited at some point toward the end of the first quarter of the 18th century.

Lastly, a charcoal sample of manuka (*Leptospermum scoparium*) retrieved from context 1162 (the fill of cut feature (context 1161) cut into the backfill (context 1197) of post-pit 1196) was submitted for AMS radiocarbon dating analysis, which produced a result of 155 ± 22 BP (Wk-50207), with a calibrated radiocarbon date range of 1680-1950 AD (2σ) (Figure 7.51 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy and known history of the site suggest that context 1577 was deposited at some point during the first few decades of the 19th century.

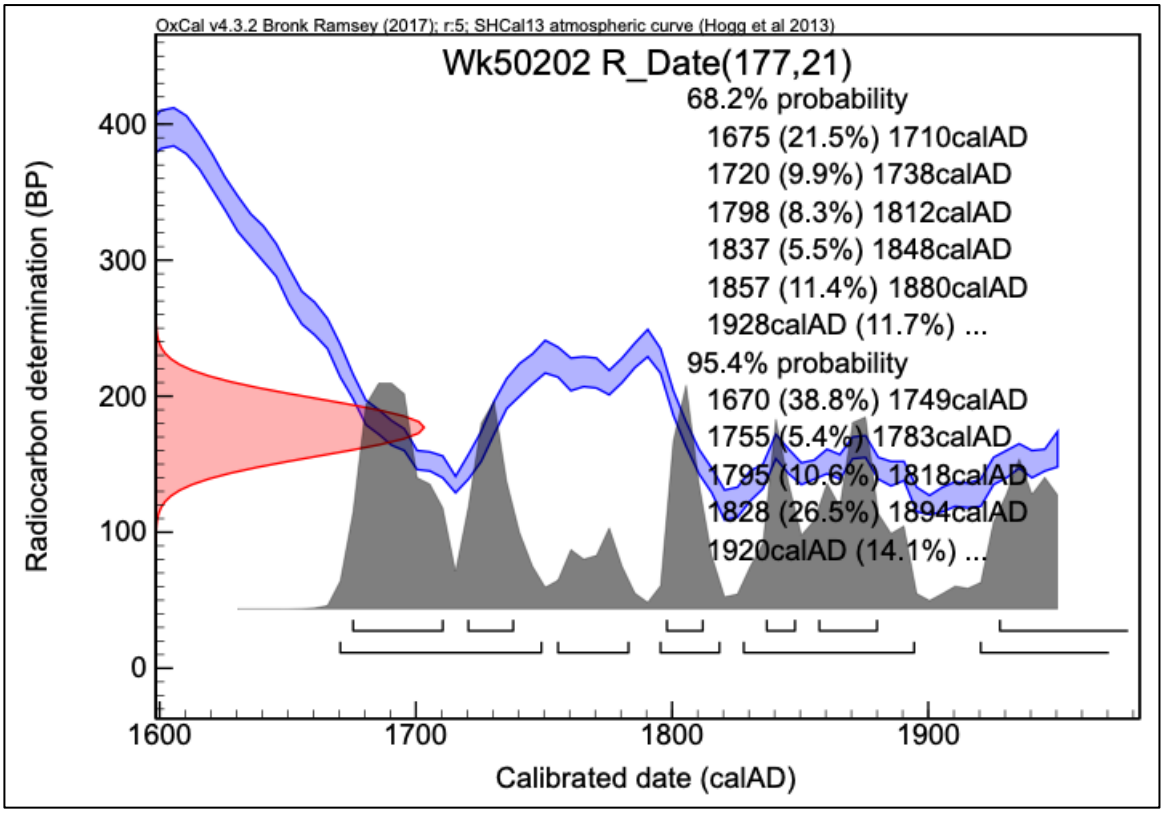


Figure 7.46 Calibrated radiocarbon date range from context 1052, the upper fill of post-pit 1051 at site R10/1484

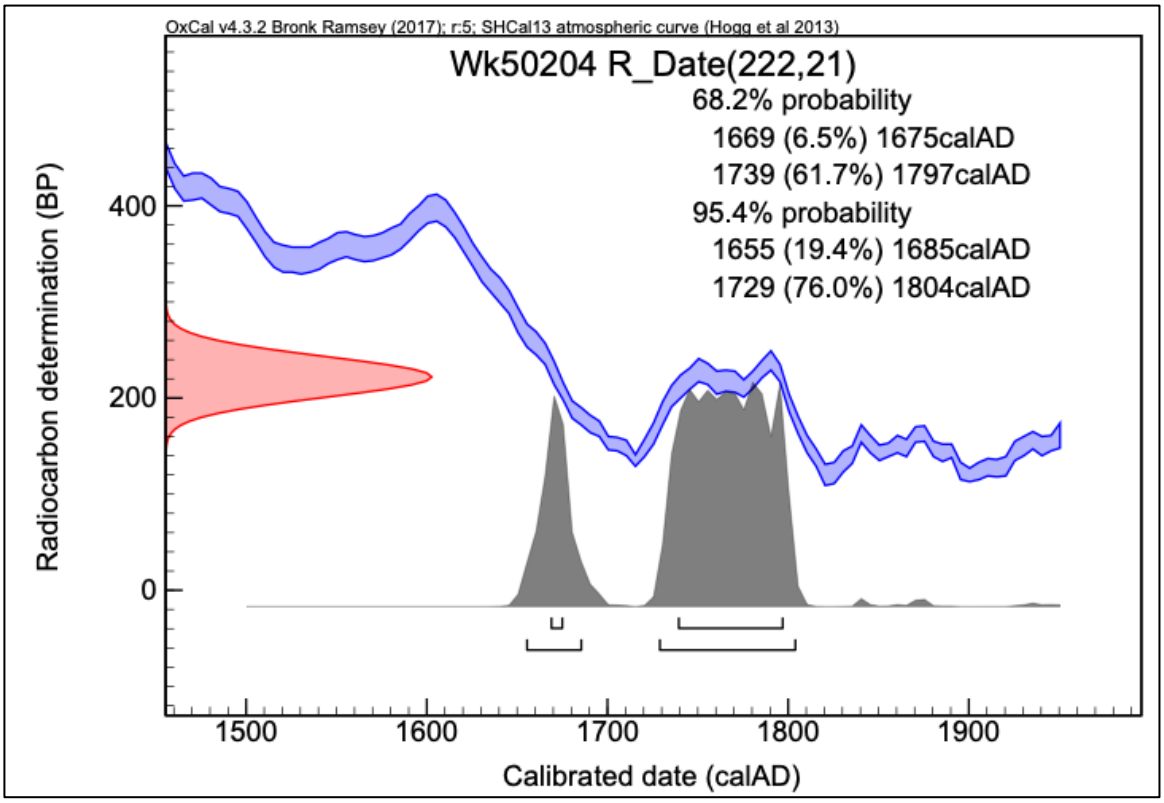


Figure 7.47 Calibrated radiocarbon date range from context 1158, the fill of feature 1157 at site R10/1484

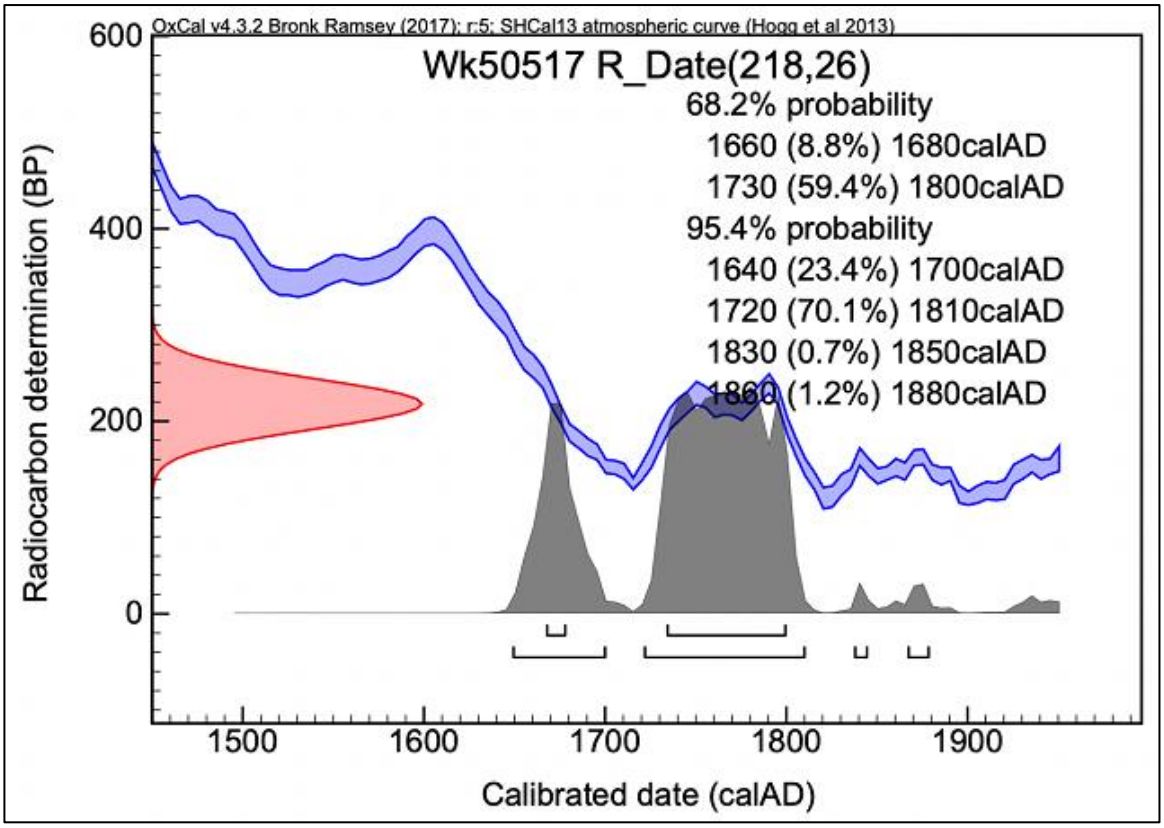


Figure 7.48 Calibrated radiocarbon date range from context 1198, a fill of post-pit 1196 at site R10/1484

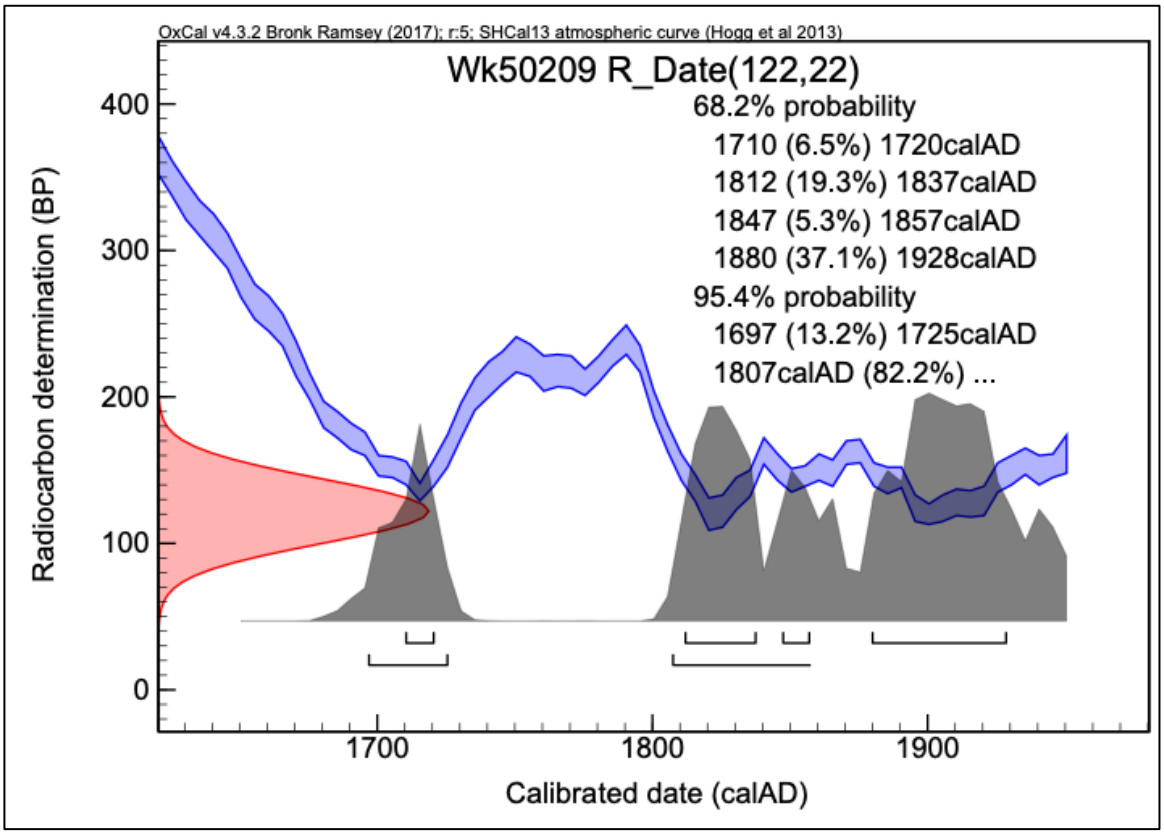


Figure 7.49 Calibrated radiocarbon date range from context 1199, a trample layer within fill 1197 of post-pit 1196 at site R10/1484

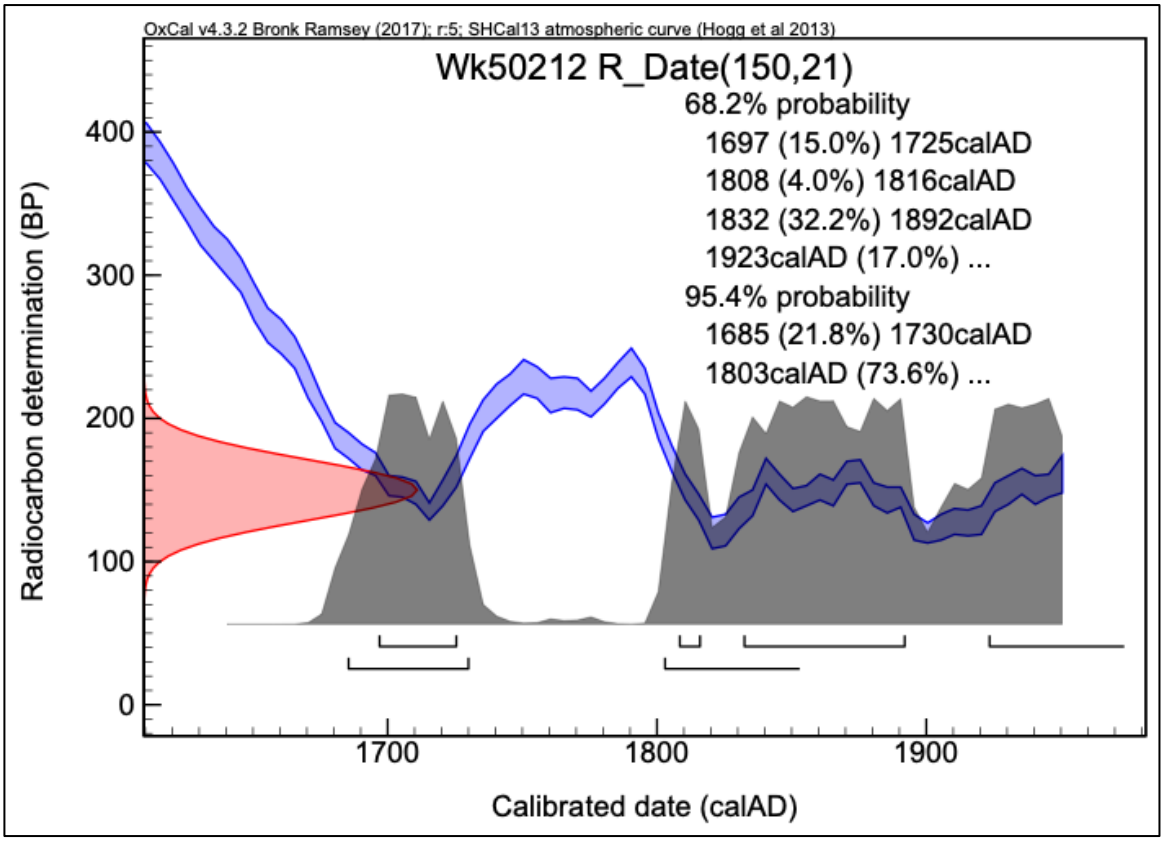


Figure 7.50 Calibrated radiocarbon date range from context 1577, the fill of scoop feature 1576 cut into the base of post-pit 1196 at site R10/1484

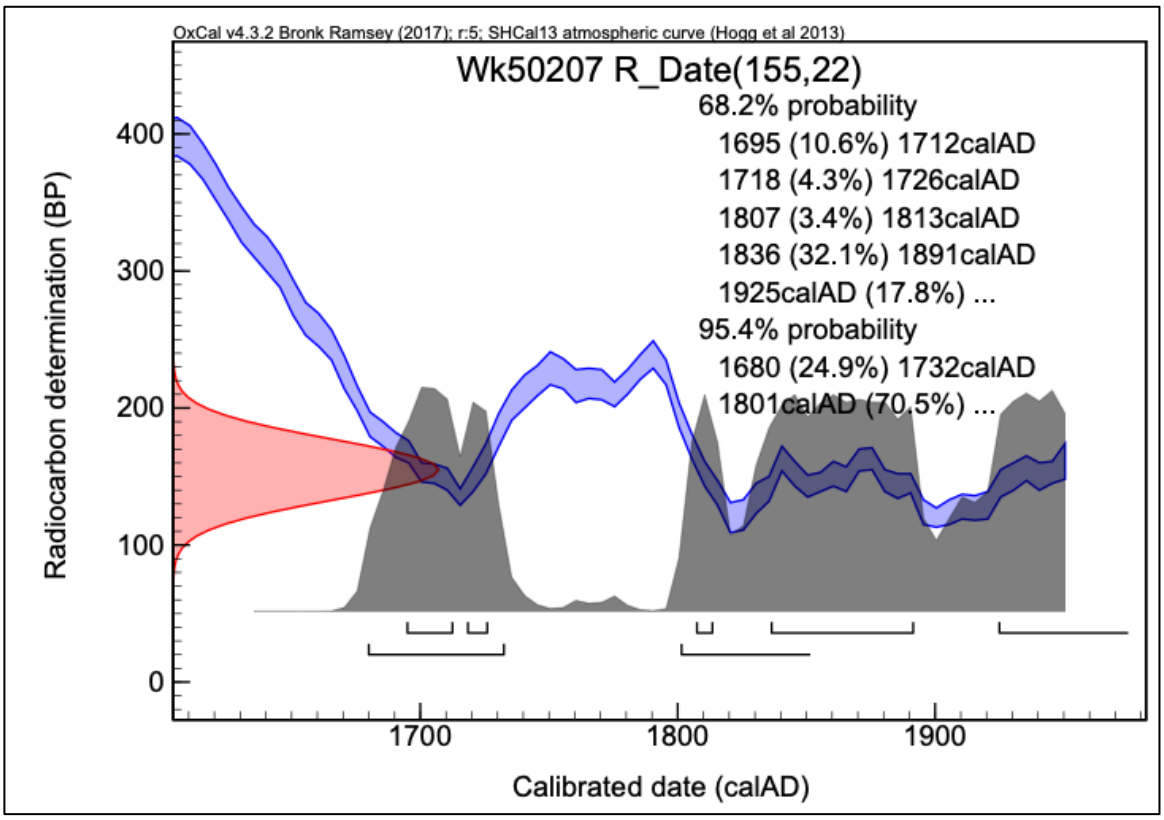


Figure 7.51 Calibrated radiocarbon date range from context 1162, the fill of feature 1161, cut into the fill 1197 of post-pit 1196 at site R10/1484

Ochre Roasting Hearths

A large, sub-circular hearth (context 1177) was utilised for roasting ochre and was situated approximately 8m south of post-pit 1196. The feature had a number of recuts within it evidencing a number of episodes of use.

Ochre Roasting Hearth 1179

Context 1179 was the first recut ochre roasting hearth and was filled by context 1180. A charcoal sample consisting of five finger (*Pseudopanax arboreus*) from context 1180 was submitted for AMS radiocarbon dating analysis and produced a result of 258 ± 20 BP (Wk–50220), with a calibrated radiocarbon date range of 1642-1799 AD (2σ) (Figure 7.52 and Table 7.5). The radiocarbon data suggest a date of deposition for context 1180 from the mid-17th century to the start of the last quarter of the 17th century.

Ochre Roasting Hearth 1181

Context 1181 was the third recut ochre roasting hearth and was filled by context 1182. The feature cut an earlier recut hearth (context 1189). A charcoal sample consisting of manuka (*Leptospermum scoparium*) taken from context 1182 was submitted for AMS radiocarbon dating analysis, which produced a result of 145 ± 19 BP (Wk-50219), with a calibrated radiocarbon date range of 1692-1950 AD (2σ) (Figure 7.53 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1182 was formed from around the turn of the 18th century to the first quarter of the 18th century.

Ochre Roasting Hearth 1183

Context 1183 was stratigraphically the fifth in the sequence of hearths, and cut hearth 1181. The feature was filled by context 1184. A charcoal sample consisting of puriri twigs (*Vitex lucens*) from context 1184 was submitted for AMS radiocarbon dating analysis, which produced a result of 165 ± 21 BP (Wk-50215), with a calibrated radiocarbon date range of 1675-1950 AD (2σ) (Figure 7.54 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1184 was deposited at some point during the last quarter of the 17th century and the first quarter of the 18th century.

Ochre Roasting Hearth 1185

Context 1185 was stratigraphically the sixth in the sequence of ochre roasting hearths and was filled by context 1186. A charcoal sample consisting of manuka (*Leptospermum scoparium*) taken from context 1186 was submitted for AMS radiocarbon dating analysis, which produced a result of 198 ± 21 BP (Wk-50216), with a calibrated radiocarbon date range of 1663-1950 AD (2σ) (Figure 7.55 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1186 was deposited at some point from the early to second quarter of the 18th century.

Ochre Roasting Hearth 1187

Context 1187 was stratigraphically the seventh in the sequence of ochre roasting hearths and was filled by context 1188. A charcoal sample consisting of manuka twigs

(*Leptospermum scoparium*) taken from context 1188 was submitted for AMS radiocarbon dating analysis, which produced a result of 137 ± 20 BP (Wk-50214), with a calibrated radiocarbon date range of 1696-1950 AD (2σ) (Figure 7.56 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1188 was deposited toward the end of the first quarter of the 18th century.

Ochre Roasting Hearth 1189

Context 1189 was the second recut ochre roasting hearth and was filled by context 1190. A charcoal sample consisting of manuka (*Leptospermum scoparium*) taken from context 1190 was submitted for AMS radiocarbon dating analysis, which produced a result of 150 ± 21 BP (Wk-50218), with a calibrated radiocarbon date range of 1685-1950 AD (2σ) (Figure 7.57 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1190 was deposited during the early stages of the 18th century.

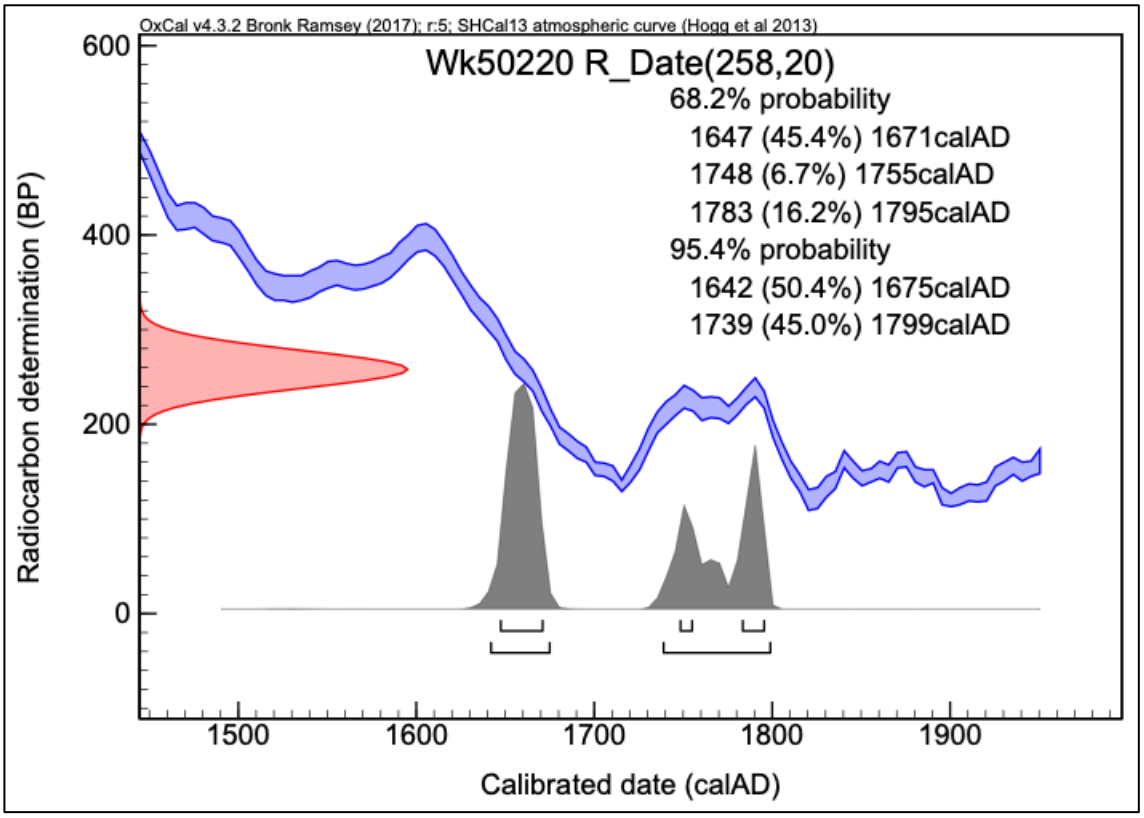


Figure 7.52 Calibrated radiocarbon date range from context 1180, the fill of ochre roasting hearth 1179 at site R10/1484

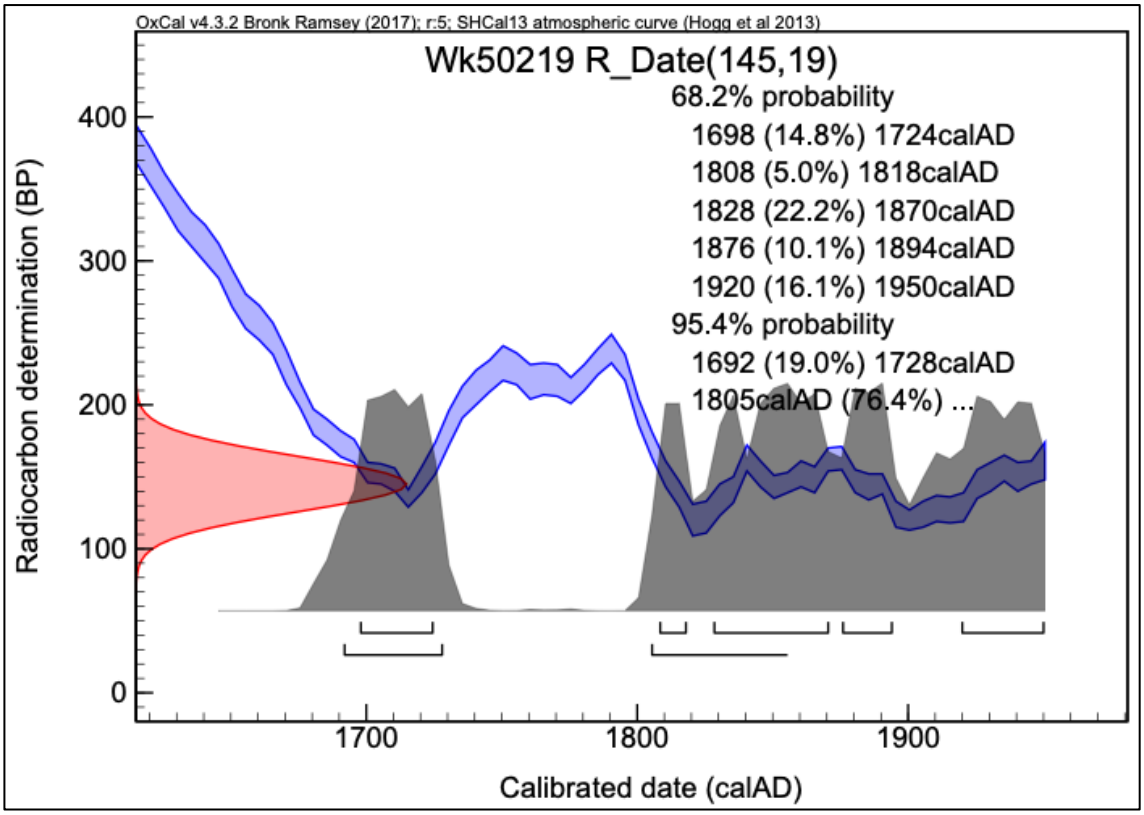


Figure 7.53 Calibrated radiocarbon date range from context 1182, the fill of ochre roasting hearth 1181 at site R10/1484

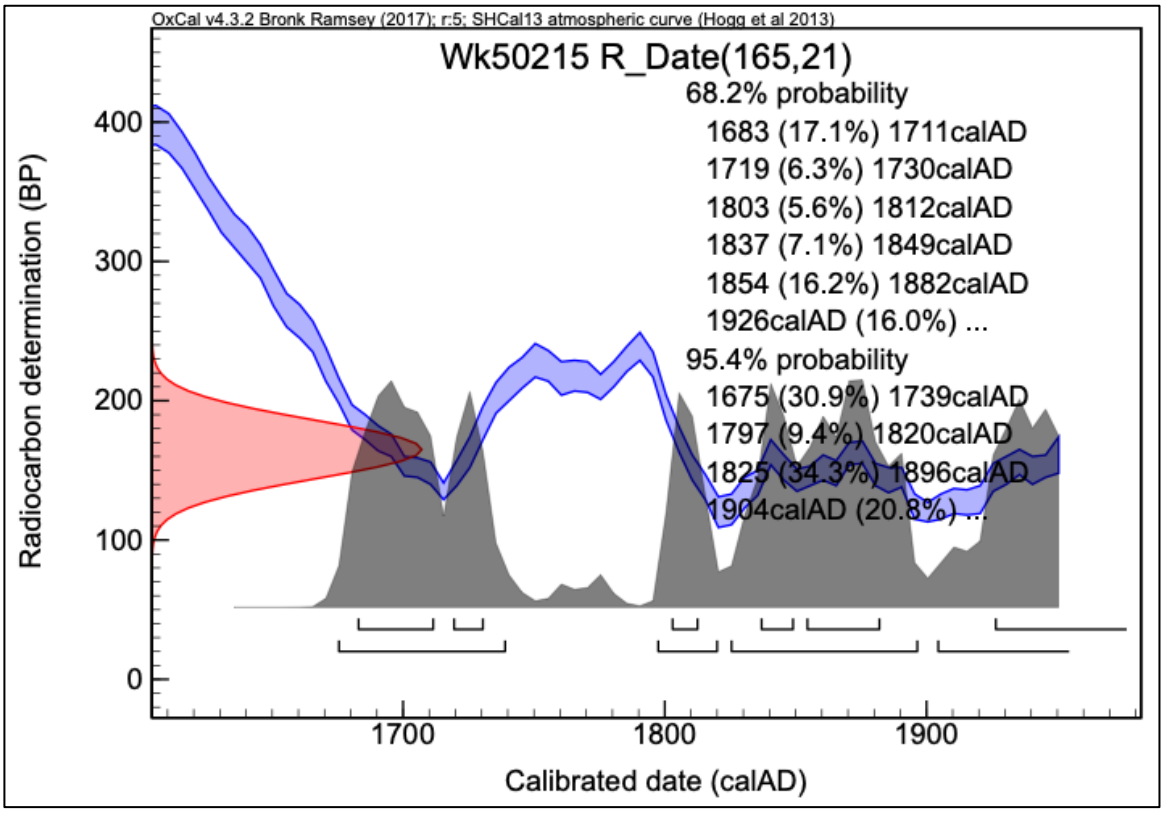


Figure 7.54 Calibrated radiocarbon date range from context 1184, the fill of ochre roasting hearth 1183 at site R10/1484

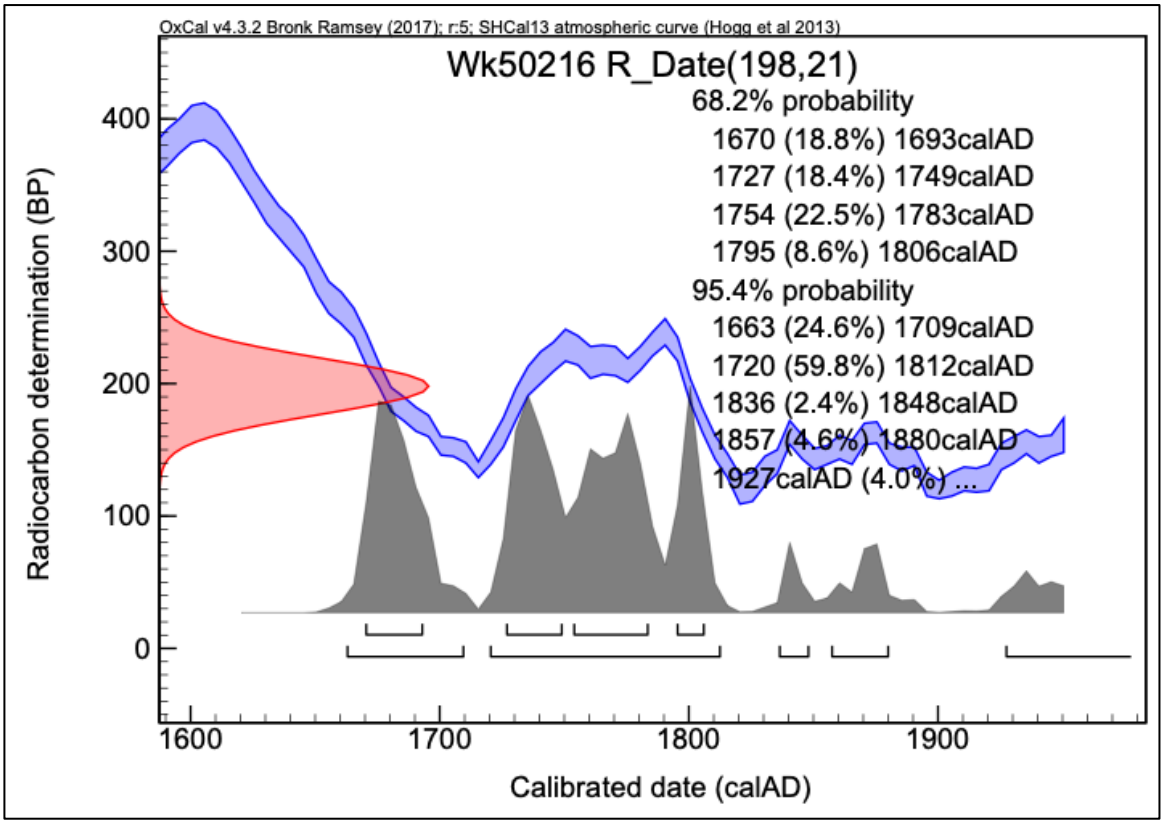


Figure 7.55 Calibrated radiocarbon date range from context 1186, the fill of ochre roasting hearth 1185 at site R10/1484

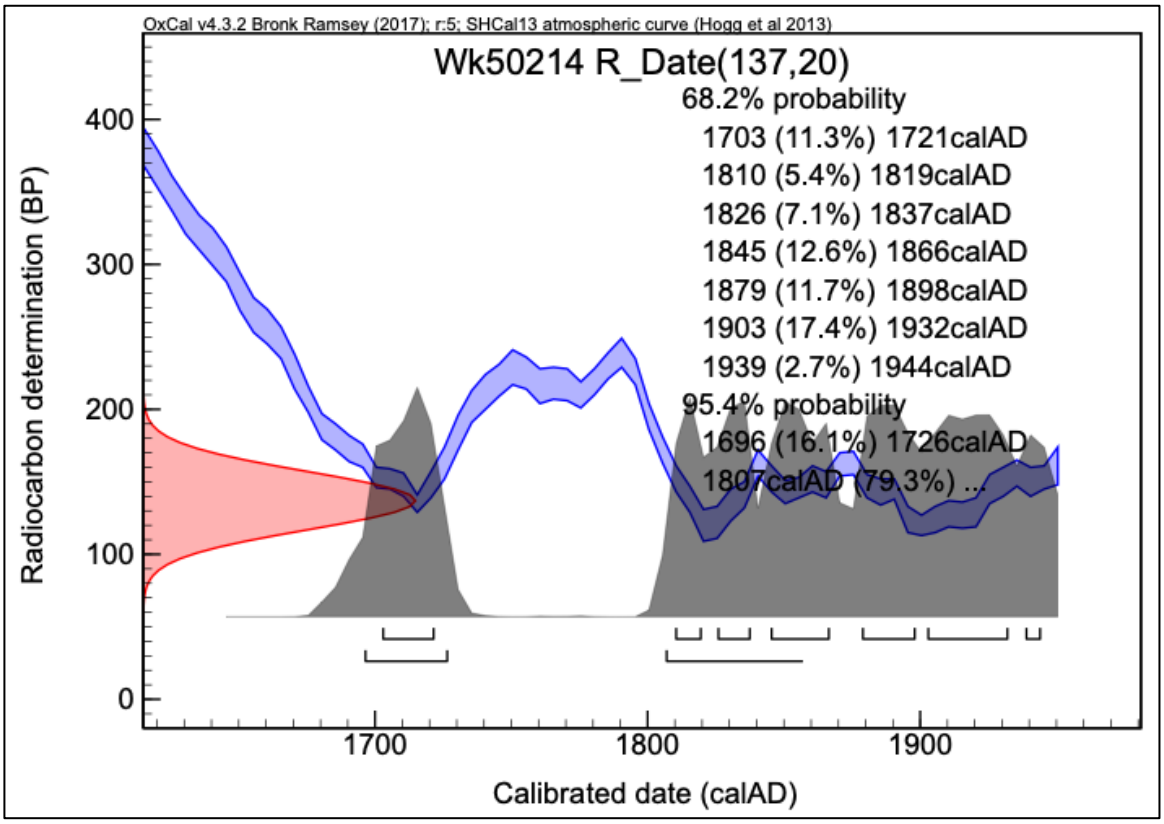


Figure 7.56 Calibrated radiocarbon date range from context 1188, the fill of ochre roasting hearth 1187 at site R10/1484

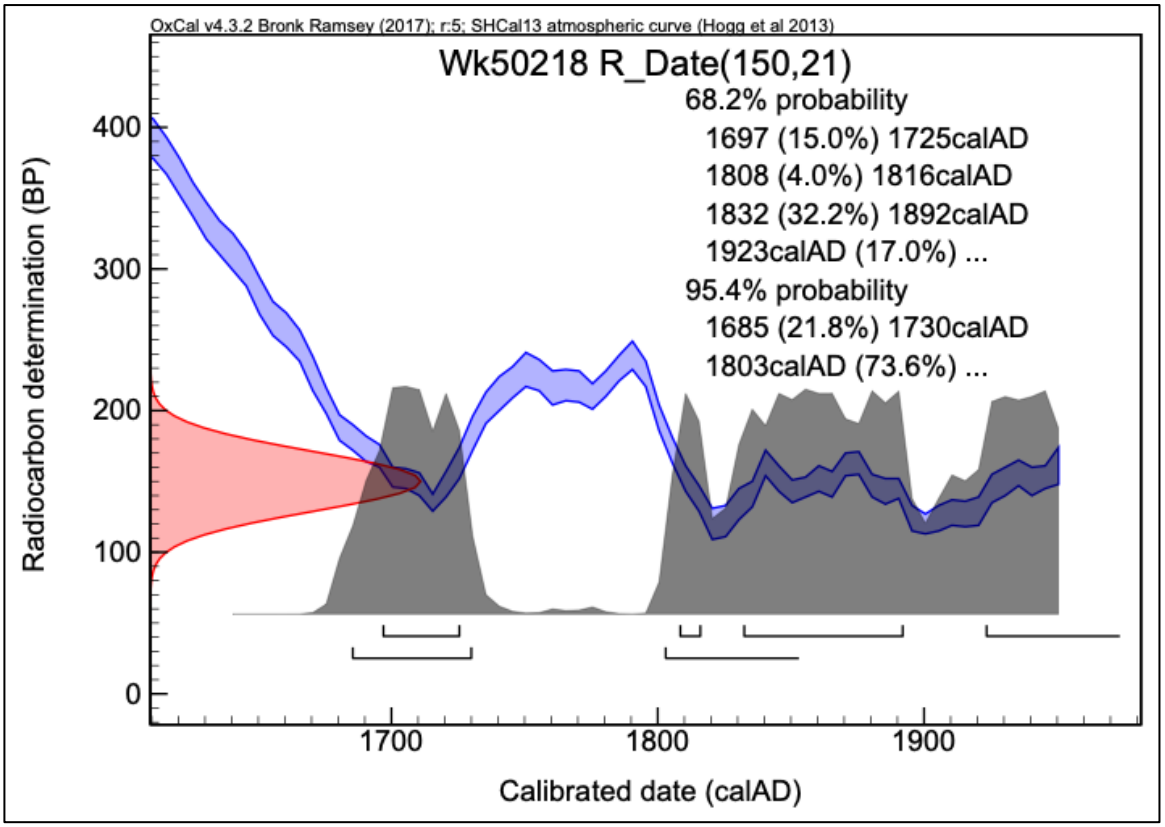


Figure 7.57 Calibrated radiocarbon date range from context 1190, the fill of ochre roasting hearth 1189 at site R10/1484

Features Related to Structures

A number of charcoal samples suitable for radiocarbon dating purposes were retrieved from the fills of a number of features related to former structures present on site R10/1484. Three of these features were dated that consisted of the fills of a board-slot, a posthole, and a drain that drained the northern, eastern and western sides of structure 1517.

Board-Slot 1235

Context 1235 was a rectilinear board-slot feature associated with a concentration of postholes in the northwest of site R10/1484 that are interpreted as drying racks and perhaps shelters. The feature contained a single fill (context 1236). A charcoal sample consisting of twig manuka (*Leptospermum scoparium*) from context 1236 was submitted for AMS radiocarbon dating analysis, which produced a result of 116 ± 21 BP (Wk-50210), with a calibrated radiocarbon date range of 1698-1950 AD (2σ) (Figure 7.58 and Table 7.5). The radiocarbon data together with the known history of the area suggest that context 1235 was formed during the first quarter of the 19th century.

Posthole 2173

Posthole 2173 was seen in section in the area to the northwest of the large post-pits 1151 and 1196 and was among a relatively large quantity of postholes. The feature cut layer 1141, which sealed many of the archaeological features on site and contained a single fill

(context 2174). A charcoal sample consisting of five finger (*Pseudopanax arboreus*) from context 2174 was submitted for AMS radiocarbon dating analysis and produced a result of 116 ± 21 BP (Wk-50217), with a calibrated radiocarbon date range of 1698-1950 AD (2σ) (Figure 7.59 and Table 7.5). The radiocarbon data together with the known history of the area suggest that context 2174 was formed during the first quarter of the 19th century. The result is effectively a perfect match to that produced by the board-slot 1235, and strongly suggests that the concentration of structural features relating to shelters and processing of marine resources in the northwest of the site, represents very late activity on the site (Figure 7.58, Figure 7.59 and Table 7.5).

Drain 1520

Context 1520 was a curvilinear drain feature that would have served to drain the area around the oval structure 1517, and contained a single fil1 (context 1521). A charcoal sample recovered from context 1521 and consisting of small diameter pohutakawa (*Metrosideros excelsa*) was submitted for AMS radiocarbon dating analysis and produced a result of 179 ± 21 BP (Wk-50213), with a calibrated radiocarbon date range of 1670-1950 AD (2σ) (Figure 7.60 and Table 7.5). The radiocarbon data together with the archaeological stratigraphy suggest that context 1521 was formed at some point from the last quarter of the 17th century to the first half 18th century.

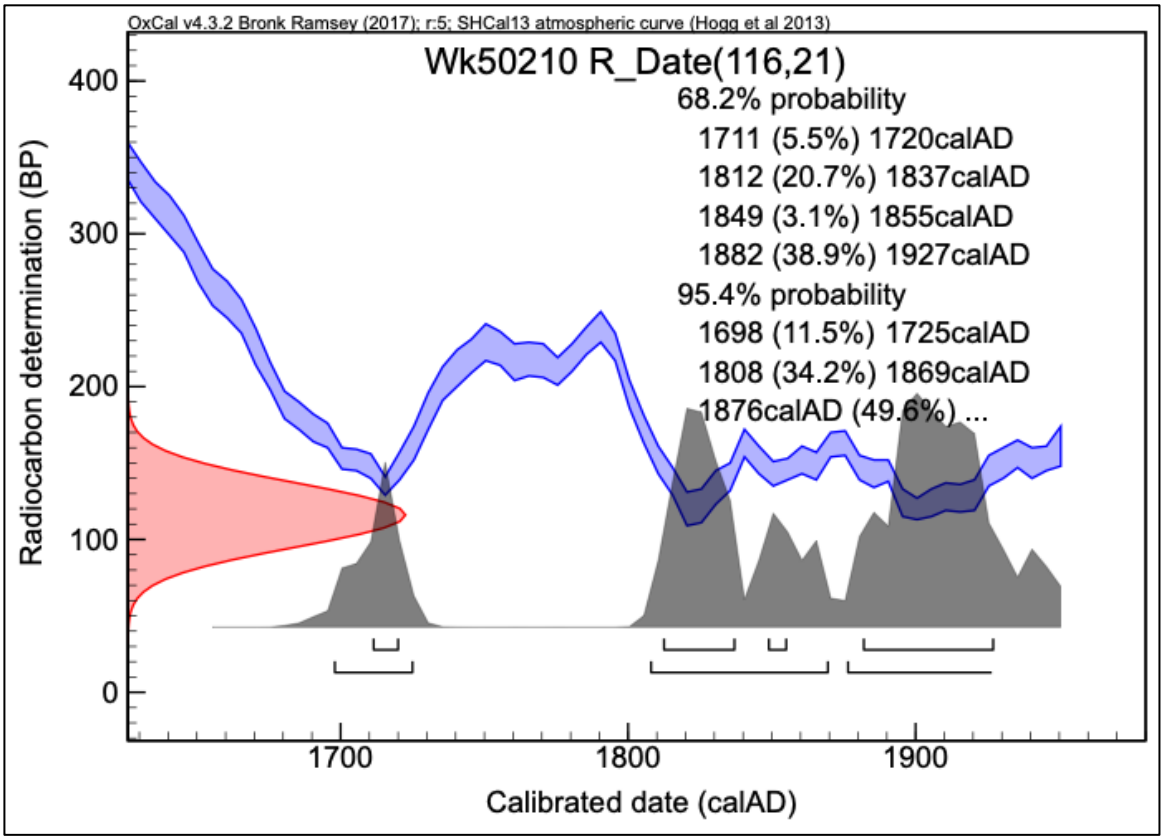


Figure 7.58 Calibrated radiocarbon date range from context 1236, the fill of board-slot 1235 at site R10/1484

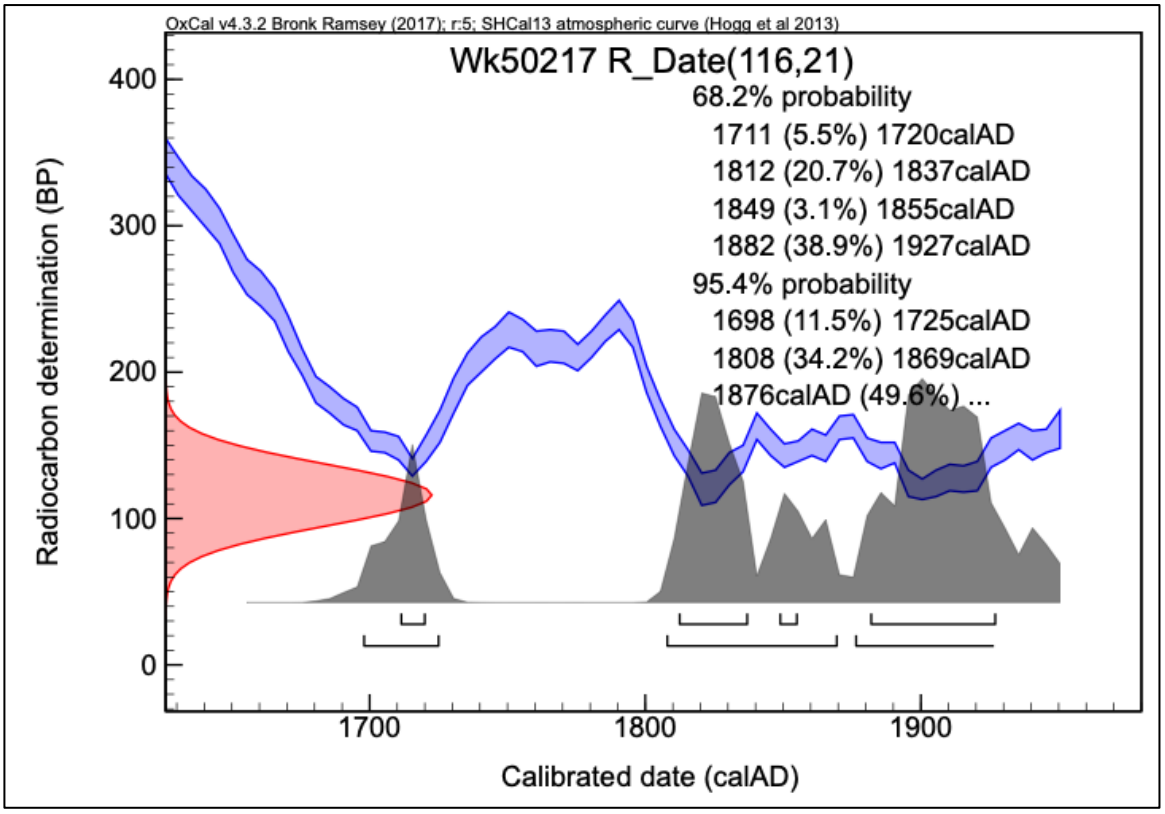


Figure 7.59 Calibrated radiocarbon date range from context 2174, the fill of posthole 2173 at site R10/1484

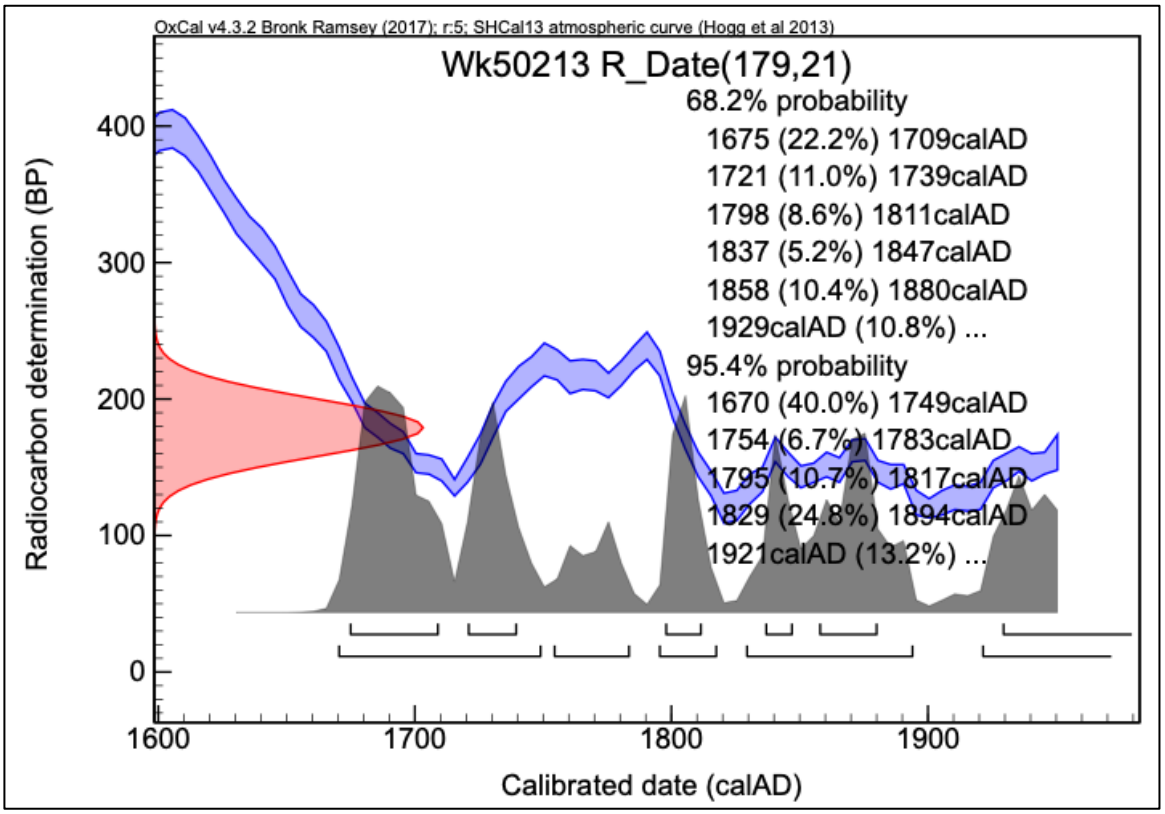


Figure 7.60 Calibrated radiocarbon date range from context 1521, the fill of drain 1520 at site R10/1484

7.3.3 Bayesian Analysis of Site R10/1484 C14 Dates

Introduction

Site R10/1484 was a complex site that underwent methodical, fine-grained excavation and the comprehensive stratigraphic control it allowed meant that it was possible to refine the radiocarbon chronology for the site with Bayesian analysis. The process took the radiocarbon dates from the site and, using the stratigraphic information, the dates could be constrained to limit the calibrated spread of the radiocarbon date range, and produce a statistically consistent and robust chronology for site R10/1484.

Methodology

The contexts from site R10/1484 were organised into a Harris Matrix and then the Bayesian model of the dates was created to match the Matrix as much as possible with additional refinements to provide a robust result calibration in OxCal 4.4. Two minor adjustments were made in the analysis. The marine calibration for New Zealand was switched to Marine13 on the basis that this seemed more reliable for New Zealand (Petchey and Schmid 2020), and a general outlier model was applied to dates that appeared to be inconsistent with the stratigraphic model presented. However, as the charcoal was identified in detail, most dates were calibrated as relatively secure.

Details of the contexts are provided but clarifications to the stratigraphic model to produce the site chronologies are discussed below.

R10/1484 Stratigraphic Information on Dated Contexts

Context 1050 (Wk-50516): Shell midden 1050 was the main midden deposit, the westernmost edge of which was situated some 3.5m to the southeast of the very large pou whenua post-pit 1151, and some 5m to the south of the smaller post-pit 1051. Midden deposit 1050 was sealed by the modern topsoil (context 1140), abutted the occupation layer (context 1141) and sealed colluvial subsoil (context 1142).

Context 1057 (Wk-50203): Context 1057 was the fill of earth oven (hāngi) 1056, which cut both the main midden deposit (context 1050) and the fill (context 1054) of oven 1055 (which also cut the main midden deposit). It was sealed by topsoil 1140.

Context 1169 (Wk-50205): Midden deposit 1169 was a small, discrete, isolated midden deposit located some 14m due west of the large pou whenua post-pit 1196. There were no features in association with it and it appeared to be a very late feature stratigraphically. The deposit sealed subsoil 1142 and was itself sealed by topsoil 1140.

Context 1193 (Wk-50208): Context 1193 was the fill of an oval firescoop 1192 which was cut into the fill (context 1162) of a cut feature 1161 that had been cut within the top of the large pou whenua post-pit 1196. The feature was sealed by the modern topsoil.

Context 1146 (Wk-50211): Context 1146 was the fill of firescoop/oven 1145 cut into the top of the backfill (context 1152) of pou whenua post-pit 1151. The feature was sealed by the modern topsoil (context 1140).

Context 1175 (Wk-50206): Context 1175 was the fill of oval-shaped hearth/earth oven 1174, which was located within the footprint of enclosure structure 1516 (the sub-rectangular enclosure of large postholes enclosing the second, smaller oval structure). The hearth/oven truncated a number of postholes of the second oval structure and therefore postdates it. The feature was sealed by context 1141.

Context 1449 (Wk-50221): Context 1449 was the fill of oven 1432, which had been cut into the colluvial subsoil (context 1142) and was sealed by the modern topsoil 1140.

Context 1450 (Wk-50222): Context 1450 was the fill of oven 1427 which had been cut into the colluvial subsoil (context 1142) and was sealed by the modern topsoil 1140.

Context 1448 (Wk-50223): Context 1448 was the fill of oven 1426, which had been cut into the colluvial subsoil (context 1142) and was sealed by the modern topsoil 1140.

Context 1052 (Wk-50202): Context 1052 was the upper fill of post-pit 1051 and sealed the lower fill 1176. It was sealed by context 1141 (late occupation layer).

Context 1158 (Wk-50204): Context 1158 was the fill of an oval feature (context 1157) cut into the backfill (context 1152) of post-pit 1151, most likely to facilitate the removal of the two large timber uprights that were housed within the pit. The feature was sealed by context 1140 (modern topsoil).

Context 1162 (Wk-50207): Context 1162 was the fill of an oval cut feature (context 1161) that was cut into the fill (context 1197) of post-pit 1196, most likely to facilitate the removal of the two large timber uprights that were housed within the pit. It was sealed by context 1140 (modern topsoil).

Context 1199 (Wk-5209): Context 1199 was a trample layer within the backfill (context 1197) of the pou whenua pit 1196. The layer was discontinuous and was present to either side of the base of cut 1161.

Context 1577 (Wk-50212): Context 1577 was the fill of an oval scoop feature (context 1576) that had been cut into the base of post-pit 1196. The feature was sealed beneath a floor/trample layer 2132.

Context 1198 (Wk-50517): Context 1198 was a fill within the main backfill (context 1197) of the large post-pit 1196. 1198 was sealed by 1197 (in part) as well as by a part of trample layer 1199.

Context 1180 (Wk-50220): Context 1180 was the fill of the first re-cut hearth (context 1179), itself a large feature but within the even larger original hearth 1177. Context 1180 was sealed by fills 1182, 1184, 1186, 1190 and by occupation layer 1141. The fill was cut by hearths 1181, 1183, 1190, 1186 and 1189.

Context 1182 (Wk-50219): Context 1182 was the fill of re-cut hearth 1181 (the second re-cut in the sequence). Context 1182 was truncated by hearth 1185 and itself cut context 1190, the fill of hearth 1189. Context 1182 was sealed by context 1186.

Context 1184 (Wk-50215): Context 1184 was the fill of the third hearth in the sequence (context 1183). It truncated 1180 (the fill of re-cut hearth 1179), and was cut by hearth re-cuts 1185 and 1187 and sealed by their fills 1186 and 1188 respectively.

Context 1186 (Wk-50216): Context 1186 was the fill of hearth 1185 (the fifth and penultimate recut in the sequence of hearths). Context 1186 was cut by hearth 1187 and sealed by context 1141 (the occupation layer) and partially by the fill (context 1188) of hearth 1187. Context 1186 sealed fill 1182 (of hearth 1181) and part of 1184 (fill of hearth 1185) and a small part of fill 1180 (fill of hearth 1179).

Context 1188 (Wk-50214): Context 1188 was the fill of the final re-cut (context 1187) of the six re-cut hearths within context 1177. The fill was sealed by occupation layer 1141. Feature 1187 cut context 1186 (fill of 1185) and context 1184 (fill of 1183).

Context 1190 (Wk-50218): Context 1190 was the fill of truncated hearth 1189 which was the second re-cut within the very large hearth feature (context 1177). Hearth 1189 truncated the fill (context 1180) of the first re-cut hearth (context 1179) and was itself truncated by later re-cut hearths 1181 and 1183. Context 1190 was sealed by context 1182 (fill of hearth 1181) and just partially by 1186 (fill of hearth 1185).

Context 1236 (Wk-50210): Context 1236 was the fill of board-slot 1235 which was associated with a number of postholes situated to the northwest of the pou whenua post-pits and possibly related to drying racks and shelter screens associated with midden deposit 1169.

Context 2174 (Wk-50217): Context 2174 was the fill of a posthole (context 2173) which cut the occupation layer 1141 in the area immediately north of where the oval structures had been situated.

Context 1521 (Wk-50213): Context 1521 was the fill of drain 1520 that ran around and drained the second oval house (context 1517) in the structure sequence. It cut through colluvial soil (context 1142) and was sealed by occupation layer 1141, which in turn was sealed by the modern topsoil 1140.

R10/1484 Harris Matrix – Dated Contexts

The Harris Matrix for R10/1484 used for the radiocarbon calibration is shown in Figure 7.61. The main elements related to the concentration of oval firescoops/hāngi, that returned the earliest of the dates from the site. These overlapped with other early dates from feature 1177, which consisted of several intercutting firescoop/oven features. These all dated to below occupation layer 1141.

The radiocarbon dates generally fit this model quite well, with some minor exceptions. Firstly, fill 1186 from the lower intercutting set of features was stratigraphically younger than two other features with fills 1182 and 1184, but the CRA date was older. However, given that these were all similar features from a relatively short-lived phased, this is not necessarily surprising. However, the base layer of this set of features (1180) appeared to be earlier than 1141, but the features cut into it were all more likely dated to after layer 1141 as they were consistently over 50-80 CRA years younger. As a result, 1180 was placed before 1141 and the other fills after. A General Outlier Model was used to account from some of the discrepancies (Bronk Ramsey 2009).

Furthermore, dates from the pit fills associated with the large post-pit 1196 (relating to possible large pou features) including fills 1577, 1198 and 1199 were all relatively young (and in stratigraphic sequence) and unlikely to have been sealed by occupation layer 1141.

Finally, while charcoal sampled from fills 1158 and 1146 was associated with the backfill of the other large post-pit 1151, they appeared to be too old to post-date occupation layer 1141. It seemed likely that the charcoal in these fills was earlier than material from the features that post-dated 1141. The dates were therefore made earlier than the 1141 occupation layer and the model was re-run (Figure 7.62).

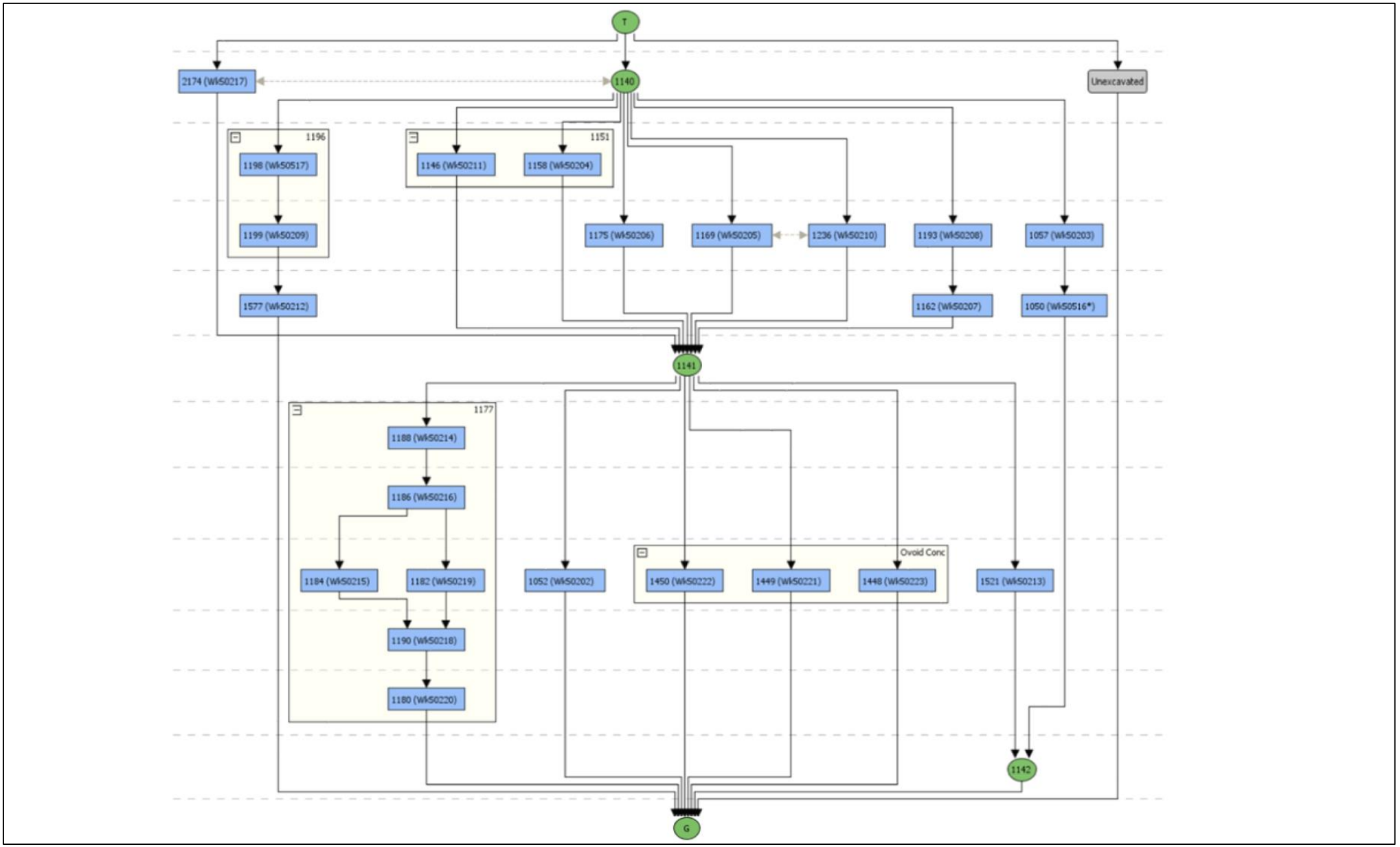


Figure 7.61 Harris Matrix of dated features from site R10/1484

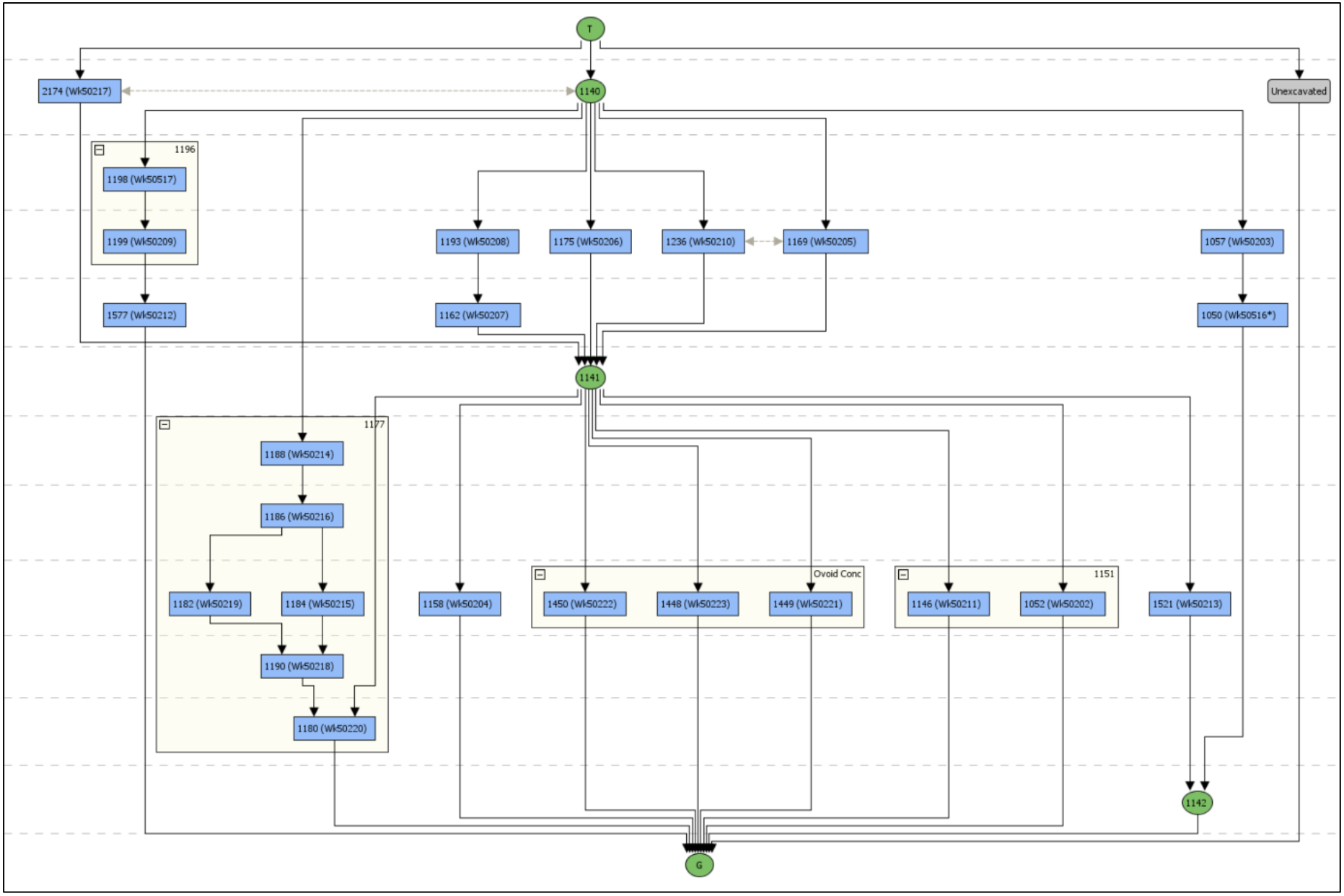


Figure 7.62 Refined Harris Matrix of dated contexts in site R10/1484

7.3.4 R10/1484 Bayesian Model Calibration Results

The final model of the calibration is shown in Figure 7.63 and Figure 7.64 and the results summarised in Table 7.6. There were two main phases identified (although the initial cutting of post-pit 1151 and the sunken floored structure 2455 could not be dated and stratigraphically pre-dates the two dated phases). An Early Phase perhaps started from the late 1600s AD and lasted for around 40 to 50 years to the end of the first quarter of the 18th century. This included the large post-pits that would have housed two large upright timber posts each, the two phases of oval structures, as well as the intercutting hāngi/firescoop features in the southeast of the site.

The site appears to have been abandoned for only a few decades at the most, as the formation of the occupation layer 1141, shell midden deposits 1050 and 1169, as well as the various features cut into it all date to the first quarter of the 1800s and potentially into the colonial period (Late Phase). However, when the complete lack of any European artefacts is factored in together with the known Māori settlement history of the area, it is extremely unlikely that the R10/1484 site was occupied any later than the early 1820s, when the area is known to have been abandoned in the wake of devastating Ngāpuhi raiding during the Musket Wars. The area was subsequently not repopulated by Māori until the 1860s, and if site R10/1484 had been re-occupied at that time, then the presence of European artefacts on the site would certainly be expected. Therefore, this part of the model is considered problematic, if not erroneous, and it is more likely that the final phase of activity occurred during the last quarter of the 18th century and lasted until towards the end of the first quarter of the 19th century.

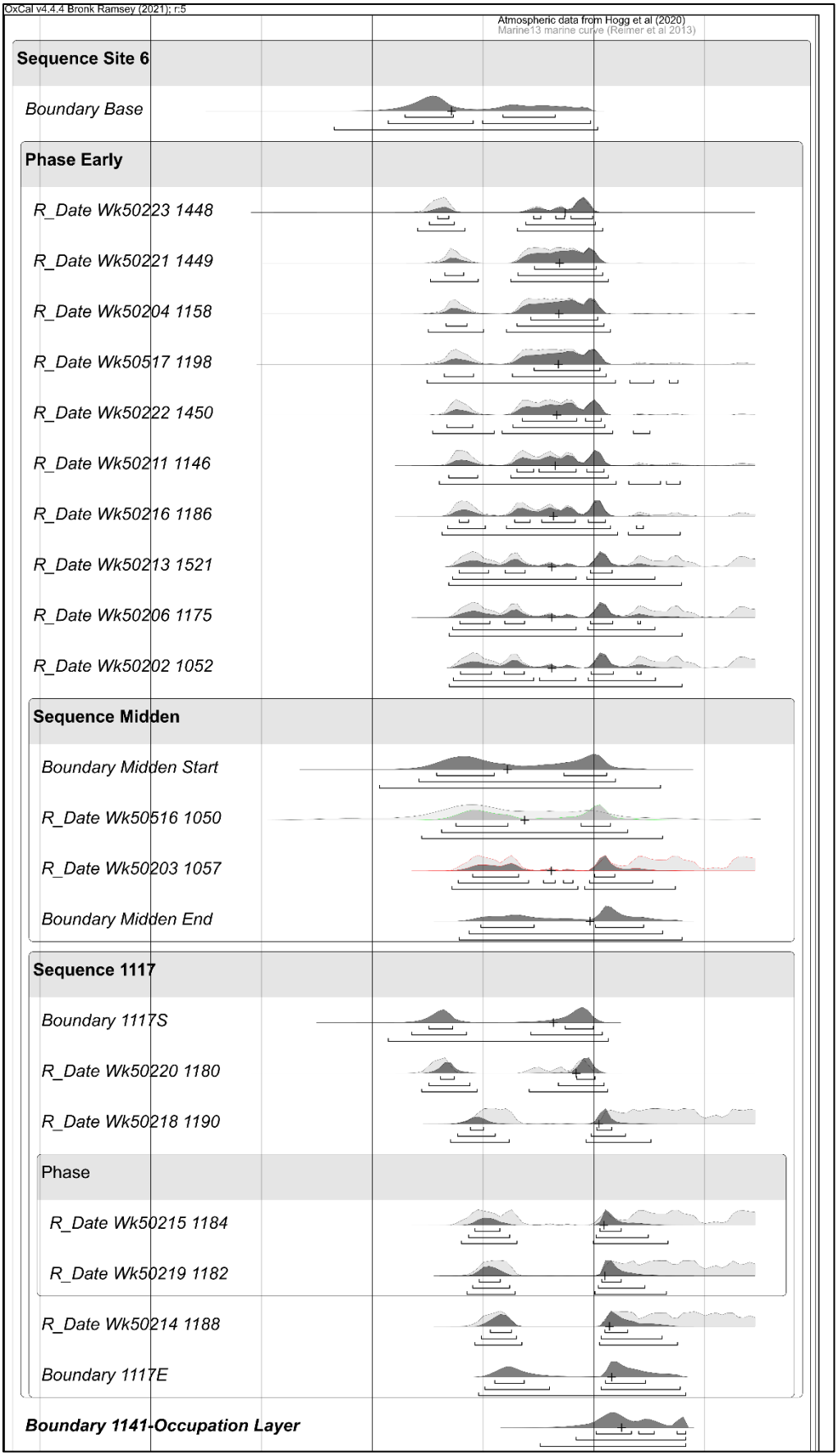


Figure 7.63 Bayesian calibrated dates of the Early Phase from R10/1484 prior to the formation of occupation layer 1141

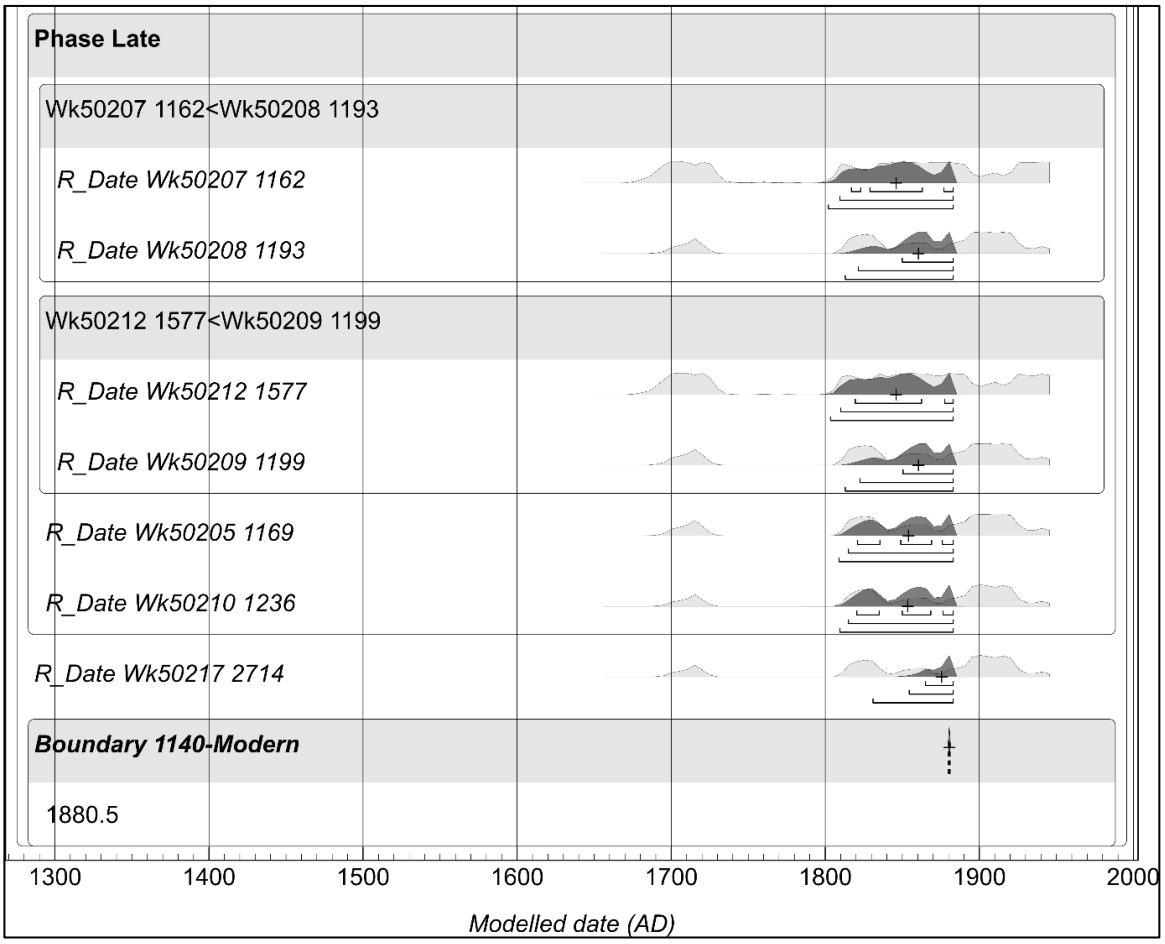


Figure 7.64 Bayesian calibrated dates of the Late Phase from R10/1484 and subsequent to the formation of occupation layer 1141

Table 7.6 Modelled calibrated age ranges (AD) for R10/1484

Sample	Phase	Context No.	-1σ	1σ	-2σ	2σ	Median
Wk-50202	Early	1052	1773	1814	1690	1818	1800
Wk-50203	Late	1057	1804	1830	1802	1883	1817
Wk-50204	Early	1158	1770	1805	1739	1809	1786
Wk-50205	Late	1169	1809	1830	1806	1906	1820
Wk-50206	Late	1175	1803	1826	1801	1882	1816
Wk-50207	Late	1162	1807	1828	1805	1887	1818
Wk-50208	Late	1193	1809	1832	1806	1901	1820
Wk-50209	Late	1199	1810	1835	1807	1912	1822
Wk-50210	Late	1236	1810	1830	1806	1910	1821
Wk-50211	Early	1146	1759	1809	1733	1811	1790
Wk-50212	Late	1577	1806	1825	1803	1875	1816
Wk-50213	Early	1521	1773	1814	1691	1817	1800
Wk-50214	Late	1188	1807	1854	1806	1891	1820
Wk-50215	Late	1184	1806	1843	1806	1876	1817
Wk-50216	Late	1186	1807	1853	1806	1883	1819
Wk-50217	Modern	2174	1812	1906	1811	1927	1828
Wk-50218	Late	1190	1806	1825	1805	1870	1816
Wk-50219	Late	1182	1806	1837	1806	1876	1817
Wk-50220	Early	1180	1780	1800	1741	1804	1788
Wk-50221	Early	1449	1770	1804	1741	1808	1786
Wk-50222	Early	1450	1770	1808	1735	1810	1787
Wk-50223	Early	1448	1780	1800	1741	1804	1788
Wk-50516	Late	1050	1805	1828	1796	1883	1817
Wk-50517	Unknown	1198	1772	1807	1735	1810	1787

7.4 Site R10/1417 Results

7.4.1 Introduction

Site R10/1417 was a multi-phased occupation site above the eastern banks of the Pūhoi River, on the 517 State Highway 1 site at SAP 9 (Figure 3.92, Figure 7.65). The site occupied two terraces on a roughly north-south trending ridgeline that descended from the high ground to the north and northwest. The site had commanding views down the Pūhoi River valley to the south and the Hikauae Creek (Hungry Creek) to the east, and overlooked the confluence of the two waterways (Figure 7.65). Twenty-three samples taken from individual contexts from a number of excavated features across site R10/1417 were submitted for radiocarbon dating analysis (Figure 7.65 and Table 7.7). Nineteen of the samples consisted of charcoal, one was preserved wood, while the other three consisted of cockle shell (Table 7.7). The samples were recovered from shell midden deposits and firescoop/earth ovens, and the fills of postholes related to the palisade, whare and the above ground structure of pits as well as from occupation surfaces and layers.

The results are presented below per feature type.

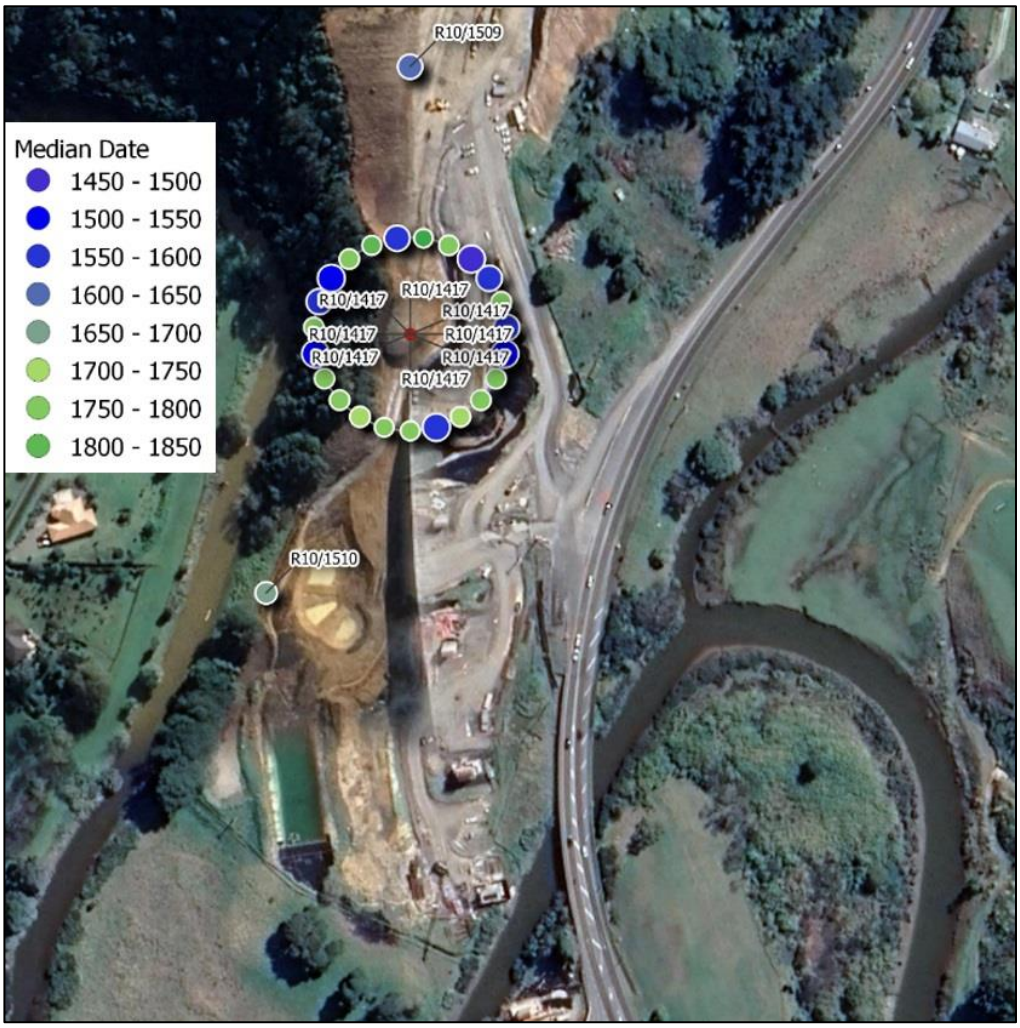


Figure 7.65 Location of site R10/1417 with radiocarbon sample date ranges, with other nearby dated sites shown at 517 State Highway 1, Pūhoi (SAP 9)

Table 7.7 Details of the radiocarbon determinations for samples taken from site R10/1417

			CRA		Years AD			
Lab No	Sample	Material	Years BP	Error	-1σ	-2σ	2σ	1σ
Wk-49636	R10/1417 - 4171	Cockle Shell	577	24	1670	1620	1950	1810
Wk-49676	R10/1417 - 4025	Cockle Shell	630	28	1570	1530	1820	1720
Wk-49926	R10/1417 - 3048	Cockle Shell	584	24	1660	1590	1890	1810
Wk-49982	R10/1417 - 4025	Charcoal	186	16	1670	1660	1950	1880
Wk-49983	R10/1417 - 4624	Charcoal	231	15	1660	1650	1800	1800
Wk-49984	R10/1417 - 4173	Charcoal	227	16	1660	1650	1800	1800
Wk-49985	R10/1417 - 4602	Charcoal	405	21	1460	1450	1630	1620
Wk-49986	R10/1417 - 4680	Charcoal	360	21	1500	1490	1640	1630
Wk-49987	R10/1417 - 4032	Charcoal	215	20	1660	1650	1810	1800
Wk-49988	R10/1417 - 4846	Charcoal	356	21	1500	1490	1640	1630
Wk-49989	R10/1417 - 4203	Charcoal	414	20	1450	1450	1630	1610
Wk-49990	R10/1417 - 4400	Charcoal	208	21	1660	1650	1880	1810
Wk-49991	R10/1417 - 4169	Wood	124	20	1710	1690	1950	1930
Wk-49992	R10/1417 - 4168	Charcoal	343	21	1510	1500	1650	1640
Wk-49993	R10/1417 - 4001	Charcoal	162	23	1680	1670	1950	1950
Wk-49994	R10/1417 - 4027	Charcoal	197	20	1670	1660	1950	1810
Wk-49995	R10/1417 - 4035	Charcoal	398	21	1460	1450	1630	1620
Wk-49996	R10/1417 - 4080	Charcoal	342	22	1510	1500	1650	1640
Wk-49997	R10/1417 - 4004	Charcoal	200	21	1660	1660	1950	1810
Wk-49998	R10/1417 - 4082	Charcoal	402	18	1460	1450	1630	1620
Wk-49999	R10/1417 - 4207	Charcoal	218	18	1660	1660	1810	1800
Wk-50000	R10/1417 - 4169	Charcoal	194	20	1670	1660	1950	1810
Wk-50515	R10/1417 - 4520	Charcoal	392	24	1460	1450	1630	1630

7.4.2 R10/1417 – Results

Shell Midden Deposits

A number of shell midden deposits related to the consumption of food and disposal of food waste on site R10/1417 were sampled for radiocarbon dating purposes. Two samples of charcoal and one of marine shell from three shell midden deposits situated on both the lower and upper terraces of the site were submitted for radiocarbon dating analysis.

Midden 3048

Context 3048 was the easternmost and larger of the two shell midden deposits situated on the lower terrace of site R10/1417. The shell midden deposit sealed the subsoil and was sealed by the modern topsoil. A sample of cockle shell (*Austrovenus stutchburyi*) taken from context 3048 was submitted for AMS (Accelerator Mass Spectrometry) radiocarbon dating analysis and produced a result of 584 ± 24 BP (Wk-49926), with a calibrated radiocarbon date range of 1590-1890 AD (2σ) (Figure 7.66 and Table 7.7). The radiocarbon data suggest that the shell midden deposit was being formed during the early 18th century.

Midden 4001

Context 4001 was the main shell midden deposit on the upper terrace of site R10/1417. The deposit sealed a buried soil and was itself sealed by the modern topsoil. A sample of hebe charcoal (*Veronica* spp.) taken from context 4001, was submitted for AMS radiocarbon dating analysis and produced a result of 162 ± 23 BP (Wk-49993), with a calibrated radiocarbon date range of 1670-1950 AD (2σ) (Figure 7.67 and Table 7.7). The radiocarbon data suggest that the shell midden deposit was being formed during the early 18th century.

Midden 4004

Context 4004 was a small shell midden deposit that was situated 9m to the east of shell midden 4001 and on the upper terrace of site R10/1417. The shell midden sealed a buried soil and was itself sealed by the modern topsoil. A sample of manuka charcoal (*Leptospermum scoparium*) taken from context 4004 was submitted for AMS radiocarbon dating analysis and produced a result of 200 ± 21 BP (Wk-49997), with a calibrated radiocarbon date range of 1660-1950 AD (2σ) (Figure 7.68 and Table 7.7). The radiocarbon data suggest that the shell midden deposit was being formed at some point between the second quarter of the 18th century and the beginning of the 19th century.

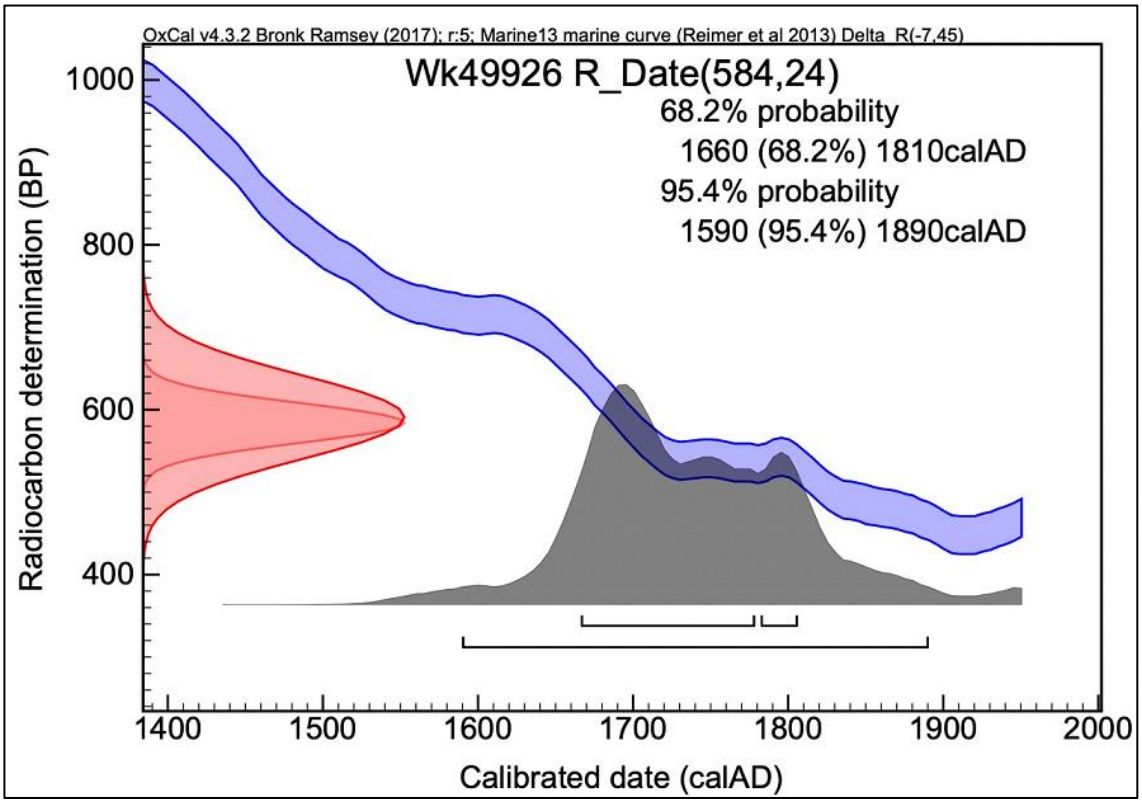


Figure 7.66 Calibrated radiocarbon date range from shell midden deposit 3048 on the lower terrace of site R10/1417

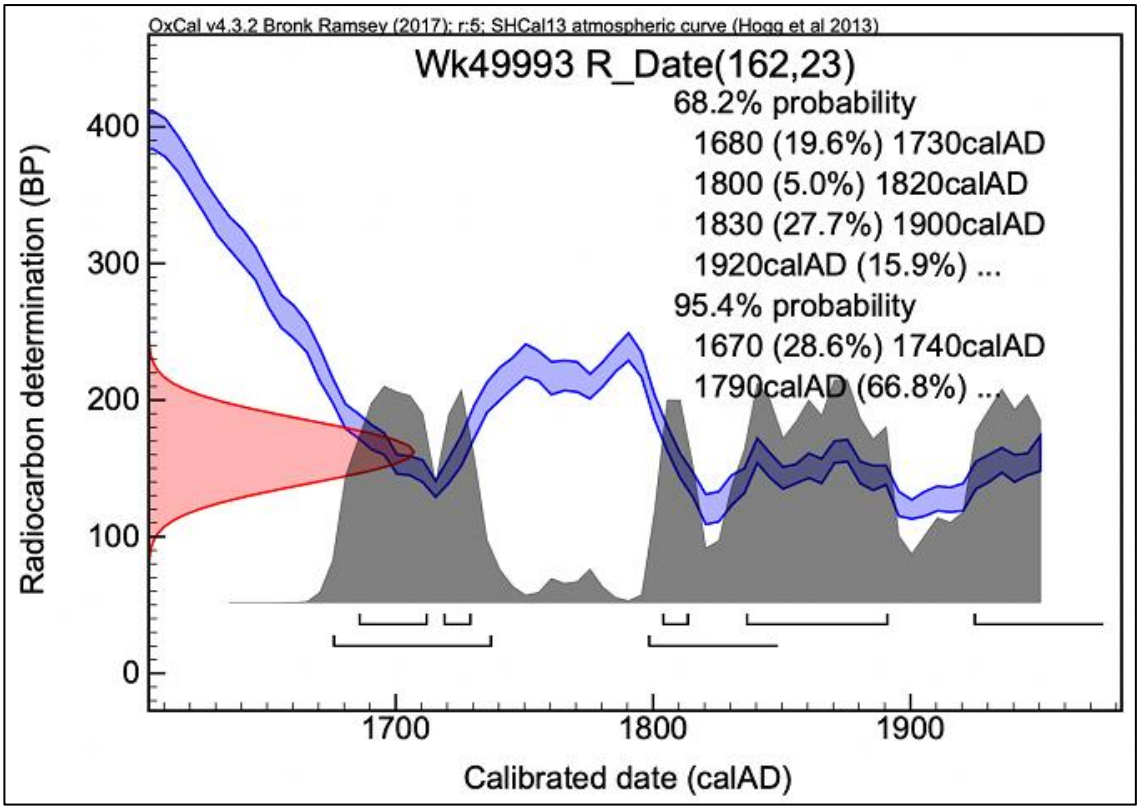


Figure 7.67 Calibrated radiocarbon date range from the main shell midden deposit (context 4001) on the upper terrace of site R10/1417

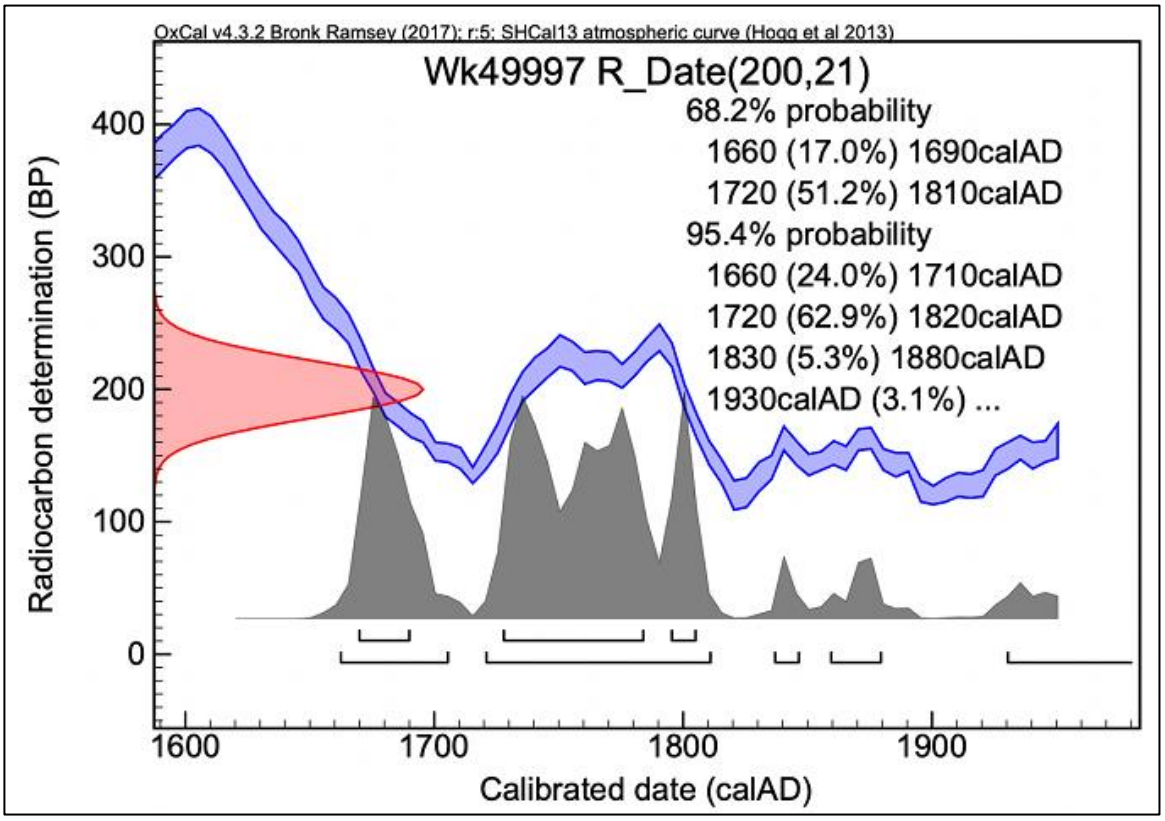


Figure 7.68 Calibrated radiocarbon date range from shell midden deposit 4004 on the upper terrace of site R10/1417

Cooking Features

A number of firescoop/earth oven features which related to the cooking of food on site R10/1417 were sampled for radiocarbon dating purposes. Eight samples (six of charcoal and two of marine shell) from seven earth ovens from the upper terrace of site R10/1417 were submitted for radiocarbon dating analysis.

Oven 4024

Context 4024 was an oval earth oven that was cut into the main shell midden 4001 on the upper terrace of site R10/1417. It was filled by context 4025, from which two samples (one of charcoal and one of marine shell) were submitted for AMS radiocarbon dating analysis. A sample of cockle shell (*Austrovenus stutchburyi*) produced a result of 630 ± 28 BP (Wk-49676), with a calibrated radiocarbon date range of 1530-1820 AD (2σ) (Figure 7.69 and Table 7.7). The radiocarbon data suggest that context 4025 was deposited during the last quarter of the 17th century, although as it is known that earth oven 4024 cuts a late feature (shell midden 4001) it is considered more likely that context 4025 was deposited during the late 18th to early 19th centuries. A sample of hebe (*Veronica* spp.) produced a result of 186 ± 16 BP (Wk-49982), with a calibrated radiocarbon date range of 1660-1950 AD (2σ) (Figure 7.70 and Table 7.7). The radiocarbon data suggest that context 4025 was deposited at some point between the late 17th century and the early 19th century. Again, as with the cockle shell sample, when the stratigraphy is taken into account it is considered that the feature dates to around the turn of the 19th century.

Oven 4623

Context 4623 was an oval earth oven that was cut into the main shell midden 4001 situated on the upper terrace of site R10/1417. A sample of manuka charcoal (*Leptospermum scoparium*) taken from its fill (context 4624) was submitted for AMS radiocarbon dating analysis and produced a result of 231 ± 15 BP (Wk-49983), with a calibrated radiocarbon date range of 1650-1800 AD (2σ) (Figure 7.71 and Table 7.7). The radiocarbon data suggest that context 4624 was deposited at some point between the mid- and late 1700s.

Oven 4172

Context 4172 was an oval earth oven that was cut into the main shell midden 4001 situated on the upper terrace of site R10/1417. A sample of manuka charcoal (*Leptospermum scoparium*) and kauri charcoal (*Agathis australis*) taken from its fill (context 4173) was submitted for AMS radiocarbon dating analysis and produced a result of 227 ± 16 BP (Wk-49984), with a calibrated radiocarbon date range of 1650-1800 AD (2σ) (Figure 7.72 and Table 7.7). The radiocarbon data suggest that context 4173 was being deposited at some point between the mid- and late 1700s.

Oven 4170

Context 4170 was an oval earth oven that was cut into the main shell midden 4001 situated on the upper terrace of site R10/1417. A sample of cockle shell (*Austrovenus stutchburyi*) taken from its fill (context 4171) was submitted for AMS radiocarbon dating analysis and produced a result of 577 ± 24 BP (Wk-49636), with a calibrated radiocarbon date range of

1620-1950 AD (2σ) (Figure 7.73 and Table 7.7). The radiocarbon data suggest that context 4171 was being deposited at some point between the turn of the 18th century and the early 1800s.

Oven 4026

Context 4026 was an oval earth oven that was cut into the main shell midden 4001 situated on the upper terrace of site R10/1417. A sample of tutu charcoal (*Coriaria* spp.) taken from its fill (context 4027), was submitted for AMS radiocarbon dating analysis and produced a result of 197 ± 20 BP (Wk-49984), with a calibrated radiocarbon date range of 1660-1950 AD (2σ) (Figure 7.74 and Table 7.7). The radiocarbon data suggest that context 4027 was being deposited at some point between the end of the first quarter of the 18th century and the early 1800s.

Context 4079

Context 4079 was an oval earth oven that was cut into the subsoil and sealed beneath shell midden 4001 on the upper terrace of site R10/1417. The feature also truncated oven 4081. A sample of manuka charcoal (*Leptospermum scoparium*) taken from its fill (context 4080) was submitted for AMS radiocarbon dating analysis and produced a result of 342 ± 22 BP (Wk-49996), with a calibrated radiocarbon date range of 1500-1650 AD (2σ) (Figure 7.75 and Table 7.7). The radiocarbon data suggest that context 4080 was being deposited at some point during the first half of the 16th century.

Oven 4081

Context 4081 was an oval earth oven that was cut into the subsoil and was truncated by the cut of earth oven 4079 and sealed beneath shell midden 4001, on the upper terrace of site R10/1417. A sample of manuka charcoal (*Leptospermum scoparium*) taken from its fill (context 4082) was submitted for AMS radiocarbon dating analysis and produced a result of 402 ± 18 BP (Wk-49998), with a calibrated radiocarbon date range of 1450-1630 AD (2σ) (Figure 7.76 and Table 7.7). The radiocarbon data suggest that context 4082 was being deposited at some point between the last quarter of the 15th century and the first quarter of the 16th century.

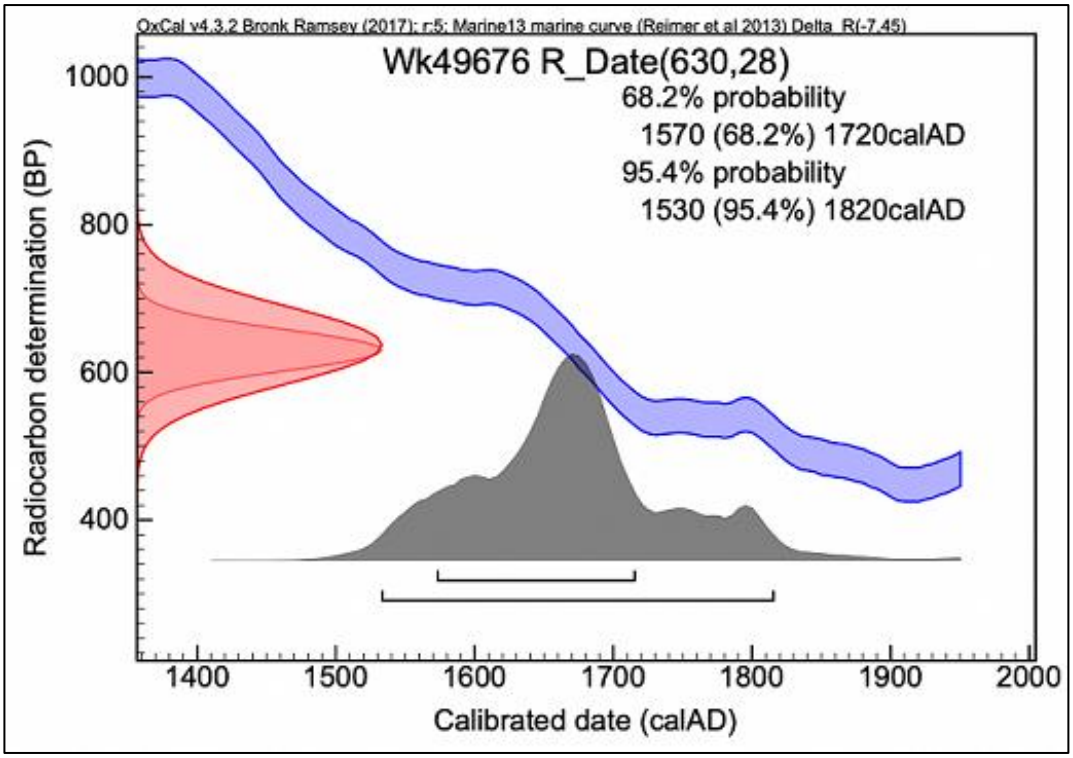


Figure 7.69 Calibrated radiocarbon date range from cockle shell sample from context 4024, the fill of earth oven 4025 at site R10/1417

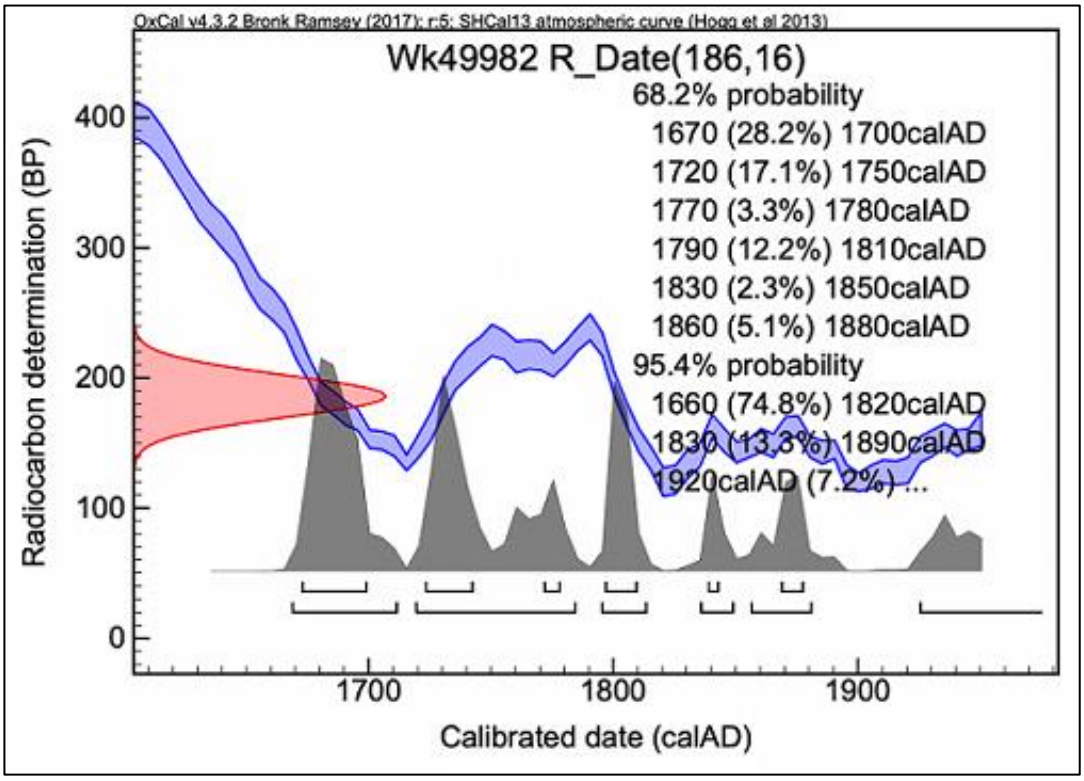


Figure 7.70 Calibrated radiocarbon date range from sample of hebe charcoal from context 4024, the fill of earth oven 4025 at site R10/1417

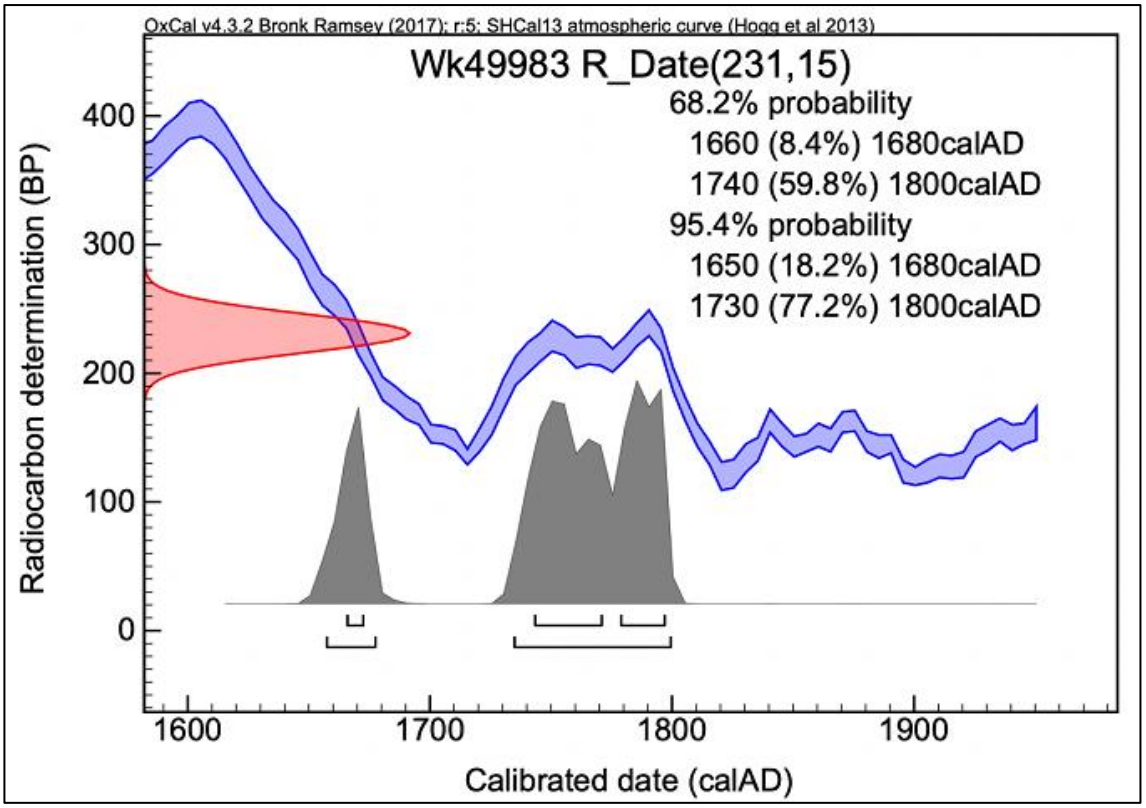


Figure 7.71 Calibrated radiocarbon date range from context 4624, the fill of earth oven 4623 at site R10/1417

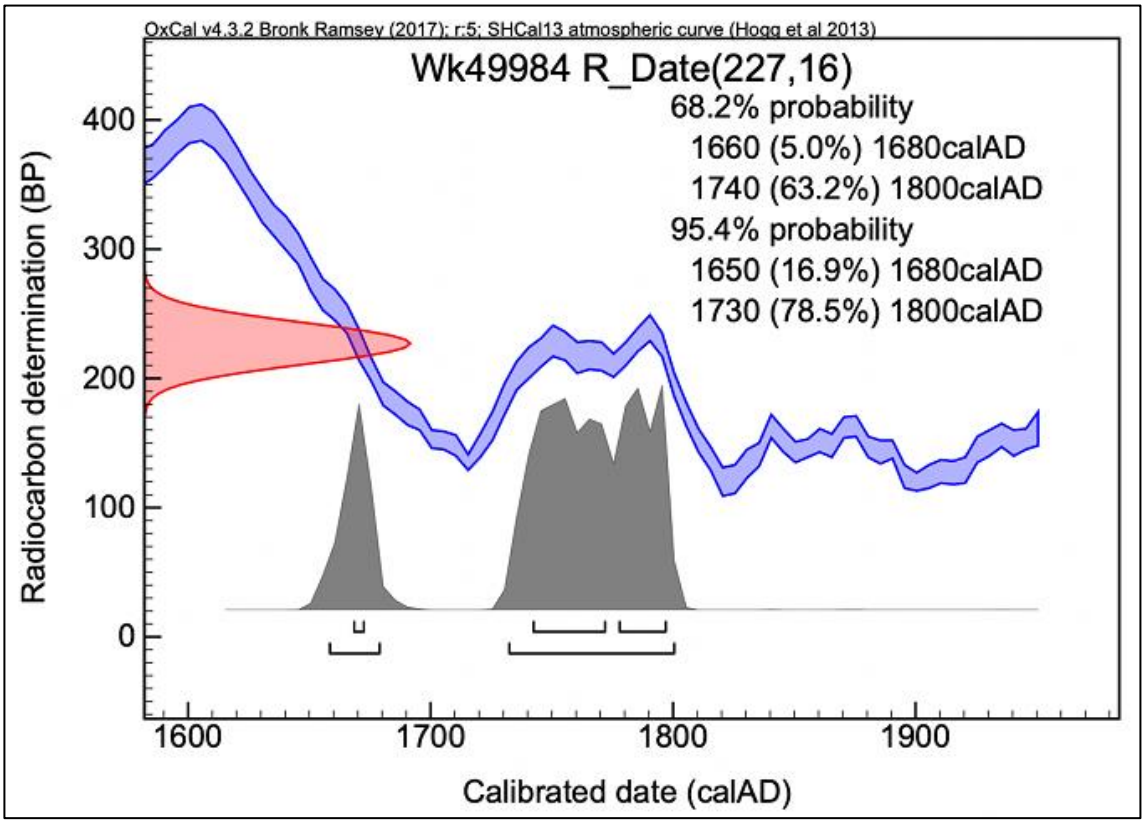


Figure 7.72 Calibrated radiocarbon date range from context 4173, the fill of earth oven 4172 at site R10/1417

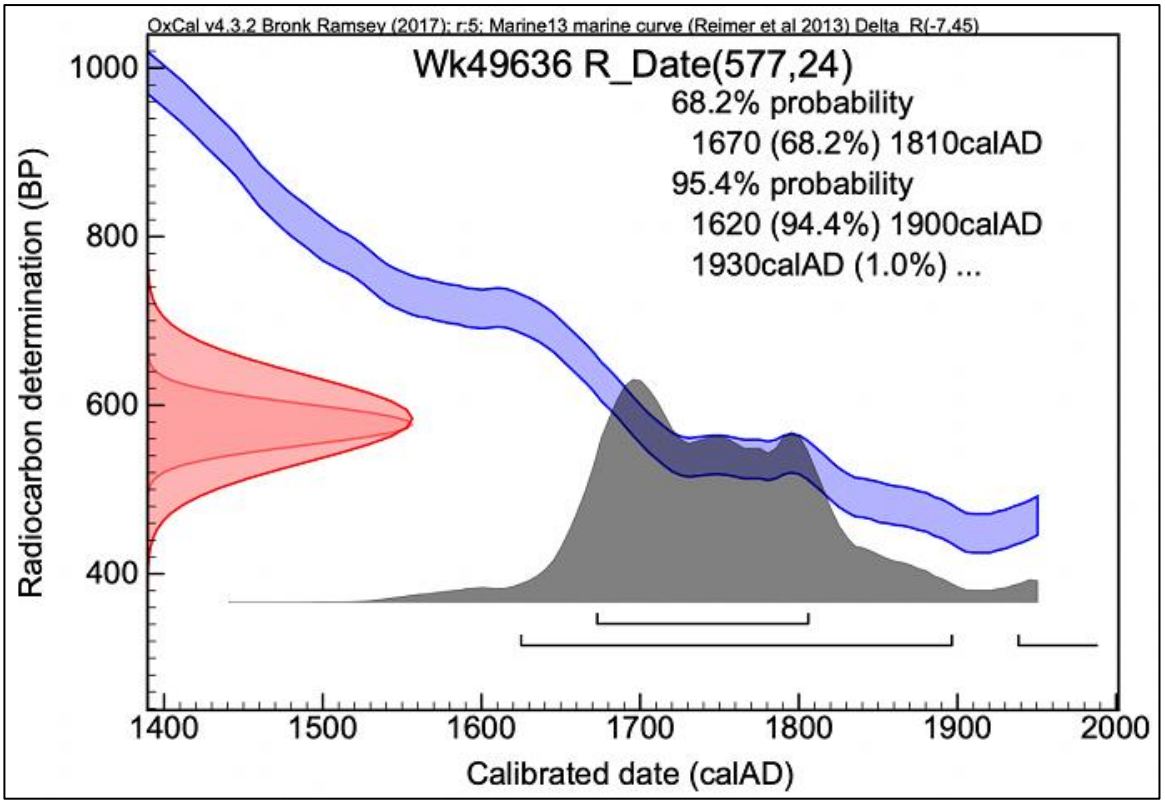


Figure 7.73 Calibrated radiocarbon date range from context 4171, the fill of earth oven 4170 at site R10/1417

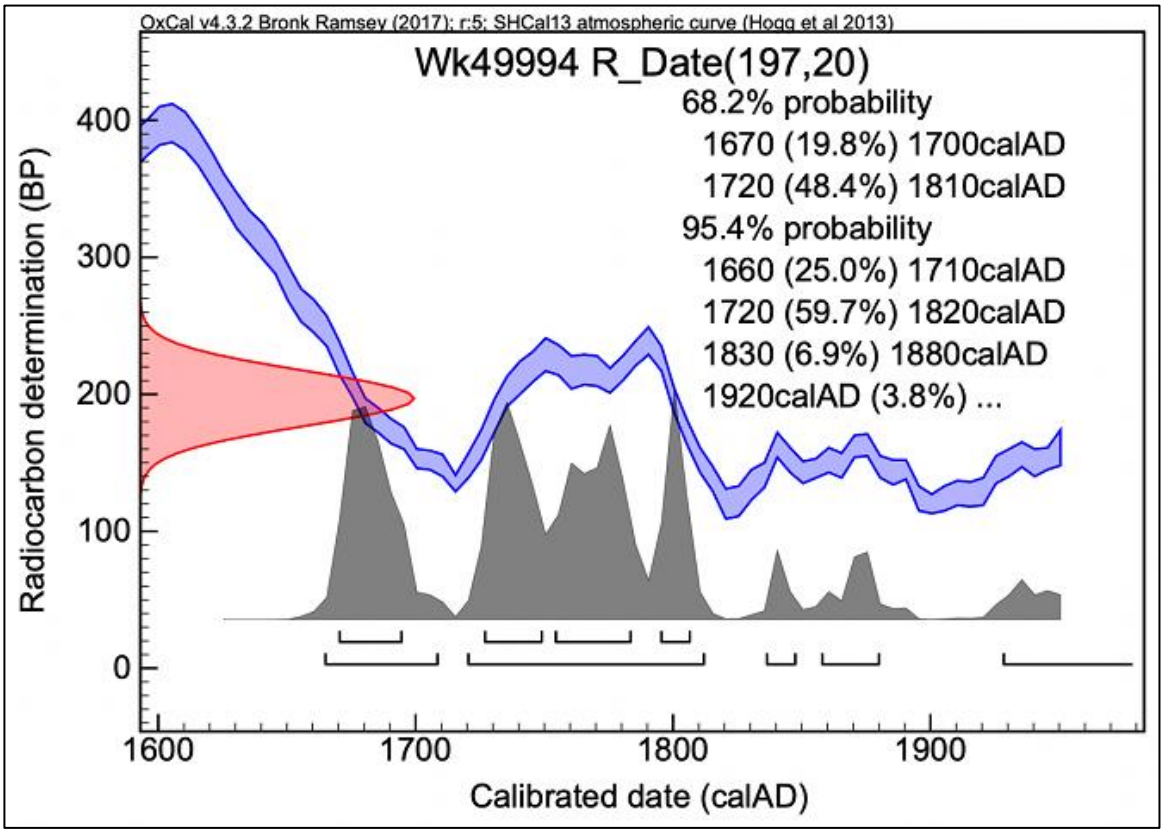


Figure 7.74 Calibrated radiocarbon date range from context 4027, the fill of earth oven 4026 at site R10/1417

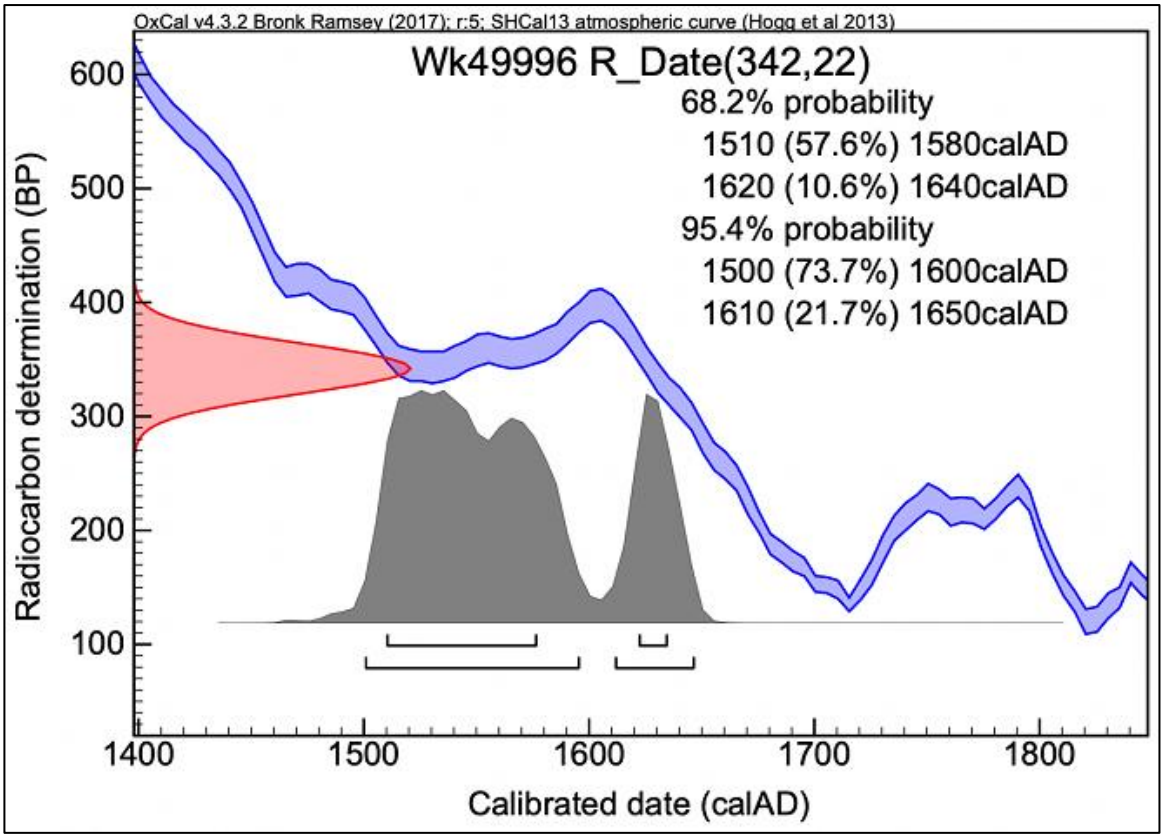


Figure 7.75 Calibrated radiocarbon date range from context 4080, the fill of earth oven 4079 at site R10/1417

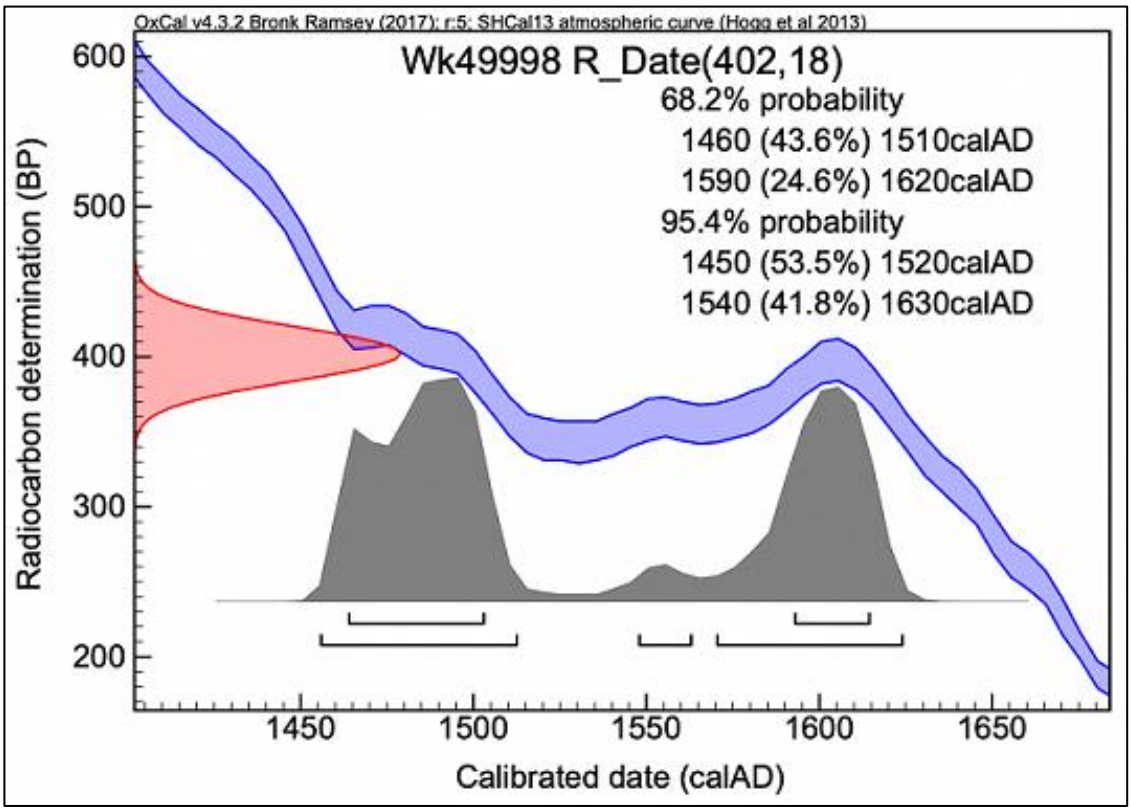


Figure 7.76 Calibrated radiocarbon date range from context 4082, the fill of earth oven 4081 at site R10/1417

Upper Terrace Palisade

Unfortunately only one fill of a single posthole within the course of the palisade (context 4344) situated on the upper terrace of site R10/1417 produced a charcoal sample that was suitable for radiocarbon dating.

Palisade Posthole 4519

Posthole 4519 was one of a number of postholes that formed the western side of the southwest facing entranceway through palisade 4344 on the upper terrace of site R10/1417. A charcoal sample consisting of five finger (*Pseudopanax arboreus*) from the fill of the posthole (context 4520) was submitted for AMS radiocarbon dating analysis and produced a result of 392 ± 24 BP (Wk-50515), with a calibrated radiocarbon date range of 1450-1630 AD (2σ) (Figure 7.77 and Table 7.7). The radiocarbon data suggest a date for context 4520 from the late 1400s to the first quarter of the 16th century.

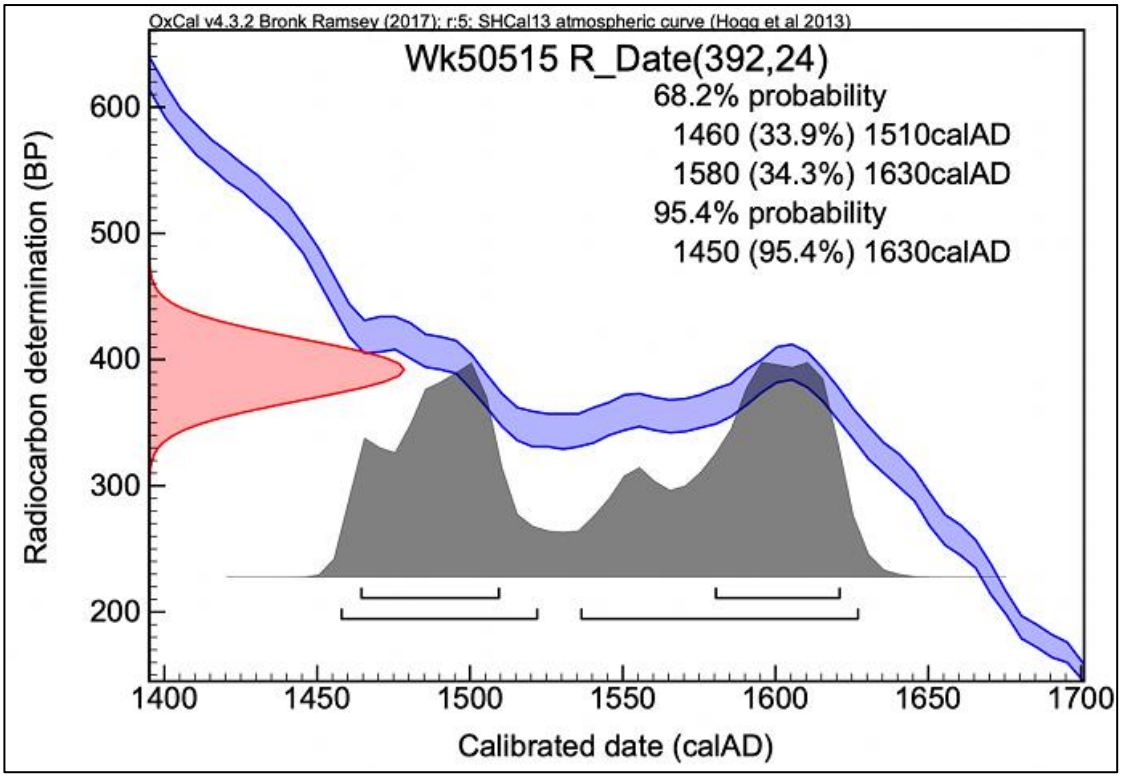


Figure 7.77 Calibrated radiocarbon date range from context 4520, the fill of posthole 4519 which was part of the southwestern entranceway through palisade 4344 on the upper terrace of site R10/1417

Rua Porotaka – Storage Pits

Environmental samples were taken from the majority of the rua porotaka storage pits, but only two postholes related to the above ground structure of the largest of the rua porotaka storage pits (context 4292) situated on the lower terrace and the fill of a posthole from the entrance structure to pit 4124 on the upper terrace produced suitable charcoal samples for radiocarbon dating.

Storage Pit Posthole 4202

Posthole 4202 would have contained a post that formed part of the superstructure of storage pit 4292 on the lower terrace of site R10/1417. A charcoal sample of mangrove (*Avicennia marina*) from the posthole fill (context 4203) was submitted for AMS radiocarbon dating analysis and produced a result of 414 ± 20 BP (Wk-49989), with a calibrated radiocarbon date range of 1450-1630 AD (2σ) (Figure 7.78 and Table 7.7). The radiocarbon data suggest a date for context 4203 from the mid- to late 1400s.

Storage Pit Posthole 4206

Posthole 4206 was situated within the footprint of the structure associated with pit 4292 on the lower terrace of R10/1417. A sample of manuka charcoal (*Leptospermum scoparium*) taken from its fill (context 4207) was submitted for AMS radiocarbon dating analysis and produced a result of 218 ± 18 BP (Wk-49999), with a calibrated radiocarbon date range of 1660-1810 AD (2σ) (Figure 7.79 and Table 7.7). The radiocarbon data suggest that context 4207 was being deposited at some point between the end of the first quarter of the 18th century and the turn of the 19th century. This is anomalous when compared to the date obtained from the sample from context 4203 (above). However, the date is a good match for that of the occupation layer (context 4169) on the lower terrace that had covered the postholes and the pit itself of storage pit 4292. It is therefore interpreted that either the posthole is later and intrusive and coincidentally situated within the footprint of the superstructure of pit 4292, or that the charcoal sample was taken from the top of the feature and was in fact intrusive charcoal from layer 4169.

Storage Pit Posthole 4601

Posthole 4601 formed part of the entranceway structure that provided access to rua porotaka storage pit 4124. A sample of manuka charcoal (*Leptospermum scoparium*) taken from its fill (context 4602) was submitted for AMS radiocarbon dating analysis and produced a result of 405 ± 21 BP (Wk-49985), with a calibrated radiocarbon date range of 1450-1630 AD (2σ) (Figure 7.80 and Table 7.7). The radiocarbon data suggest that context 4602 dates to some point between the mid-15th century and the turn of the 16th century.

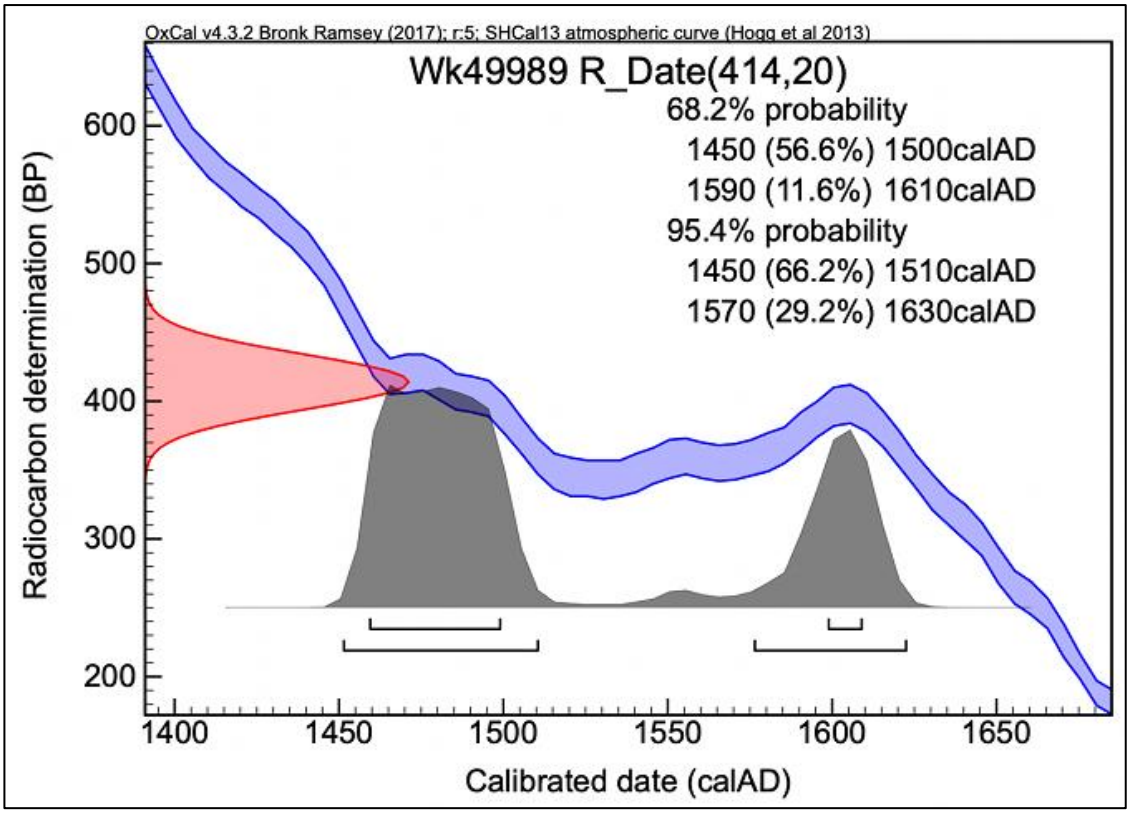


Figure 7.78 Calibrated radiocarbon date range from context 4203, the fill of posthole 4202 which was part of the structure of rua porotaka storage pit 4292 on the lower terrace of site R10/1417

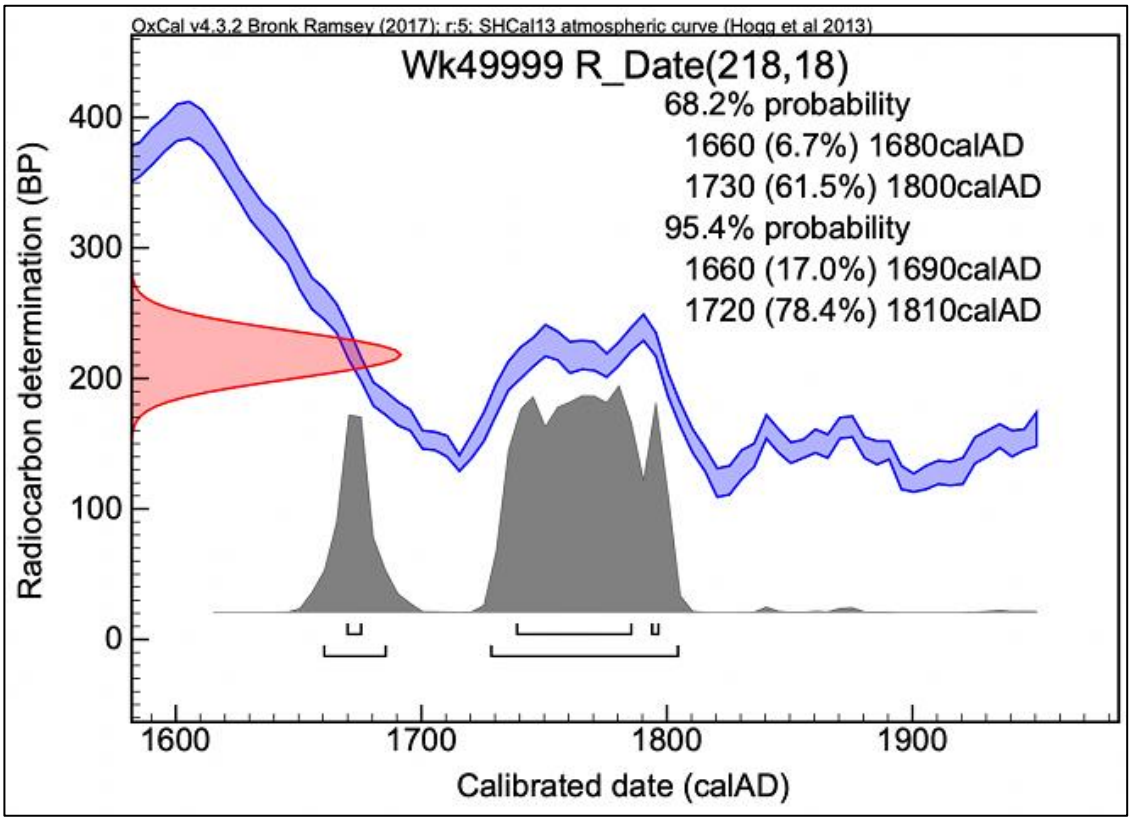


Figure 7.79 Calibrated radiocarbon date range from context 4207, the fill of posthole 4206, probably associated with activities that formed the occupation layer 4169 on the lower terrace of site R10/1417

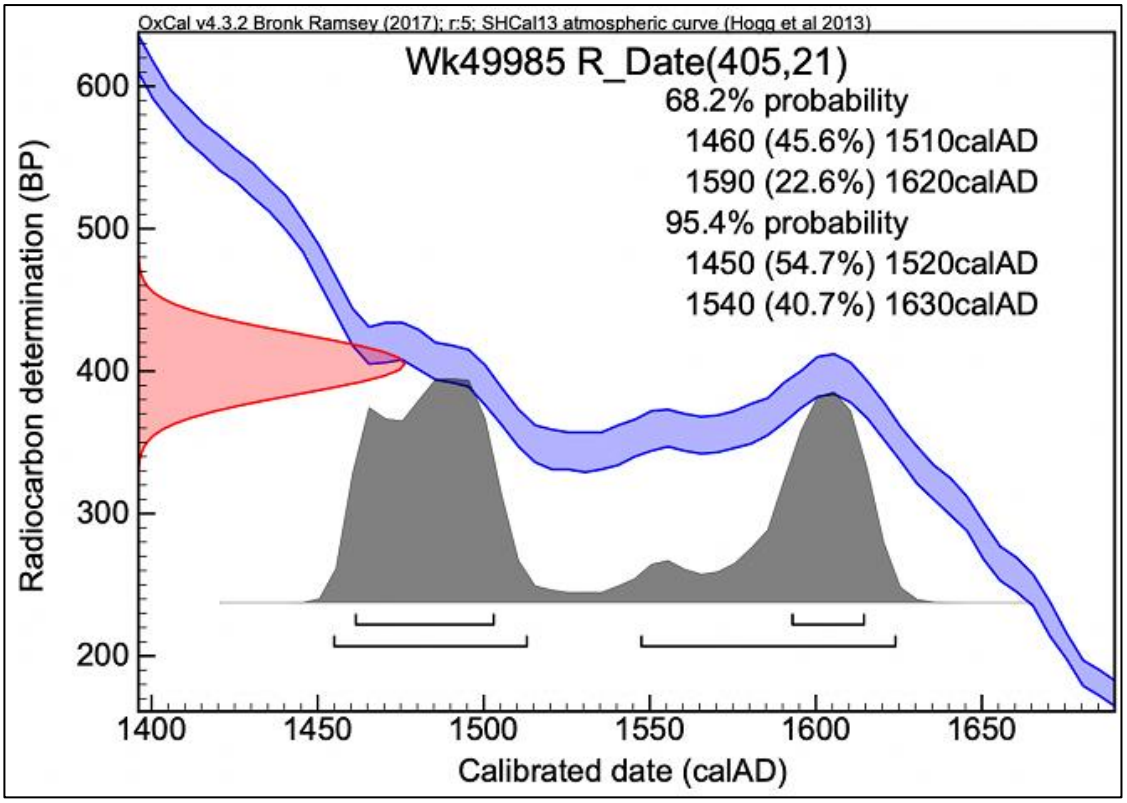


Figure 7.80 Calibrated radiocarbon date range from context 4602, the fill of posthole 4601, part of the superstructure for rua porotaka storage pit 4124 on the upper terrace of site R10/1417

Occupation Layers/Surfaces – Lower Terrace

There were two occupation layers/surfaces that were present on the lower terrace of site R10/1417. Three charcoal samples relating to two contexts were submitted for radiocarbon dating analysis.

Occupation Layer 4168

Context 4168 was an occupation layer/surface that contained frequent burnt material such as charcoal, heat fractured rock fragments and burnt patches of clay, probably produced by cooking activities. The layer abutted and was partially sealed by layer/surface 4169. A sample of manuka charcoal (*Leptospermum scoparium*) taken from context 4168 was submitted for AMS radiocarbon dating analysis and produced a result of 343 ± 21 BP (Wk-49992), with a calibrated radiocarbon date range of 1500-1650 AD (2σ) (Figure 7.81 and Table 7.7). The radiocarbon data suggest that context 4168 was being formed at some point during the first half of the 16th century.

Occupation Layer 4169

Context 4169 was an occupation layer/surface that contained lithic debitage and artefacts. The layer abutted and sealed part of layer/surface 4168. Two charcoal samples were submitted for AMS radiocarbon dating analysis. A sample of unidentified preserved wood produced a result of 124 ± 20 BP (Wk-49991), with a calibrated radiocarbon date range of 1690-1950 AD (2σ) (Figure 7.82 and Table 7.7). The radiocarbon data suggest that context

4169 was being deposited either during the first quarter of the 18th century or the first quarter of the 19th century. A sample of manuka charcoal (*Leptospermum scoparium*) produced a result of 194 ± 20 BP (Wk-50000), with a calibrated radiocarbon date range of 1660-1950 AD (2σ) (Figure 7.83 and Table 7.7). The radiocarbon data suggest that context 4169 was being formed at some point between the last quarter of the 17th century and the first half of the 18th century.

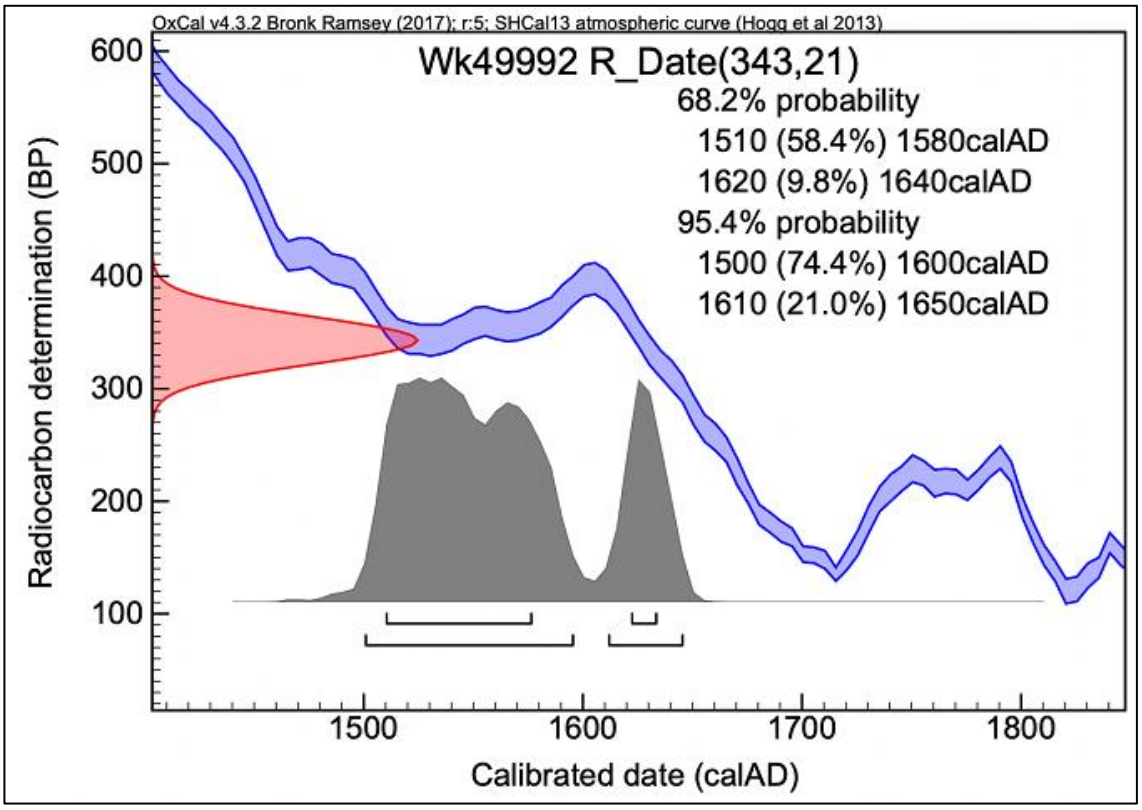


Figure 7.81 Calibrated radiocarbon date range from layer 4168 on the lower terrace of site R10/1417

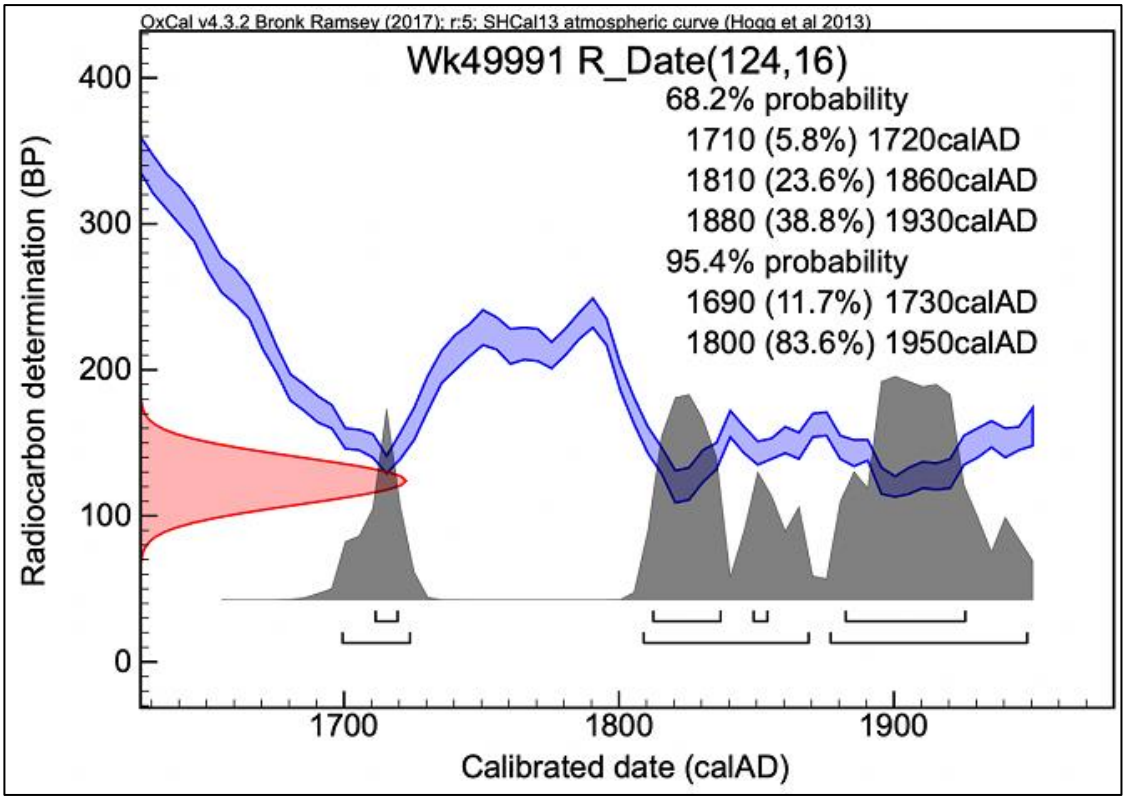


Figure 7.82 Calibrated radiocarbon date range from wood sample from layer 4169 on the lower terrace of site R10/1417

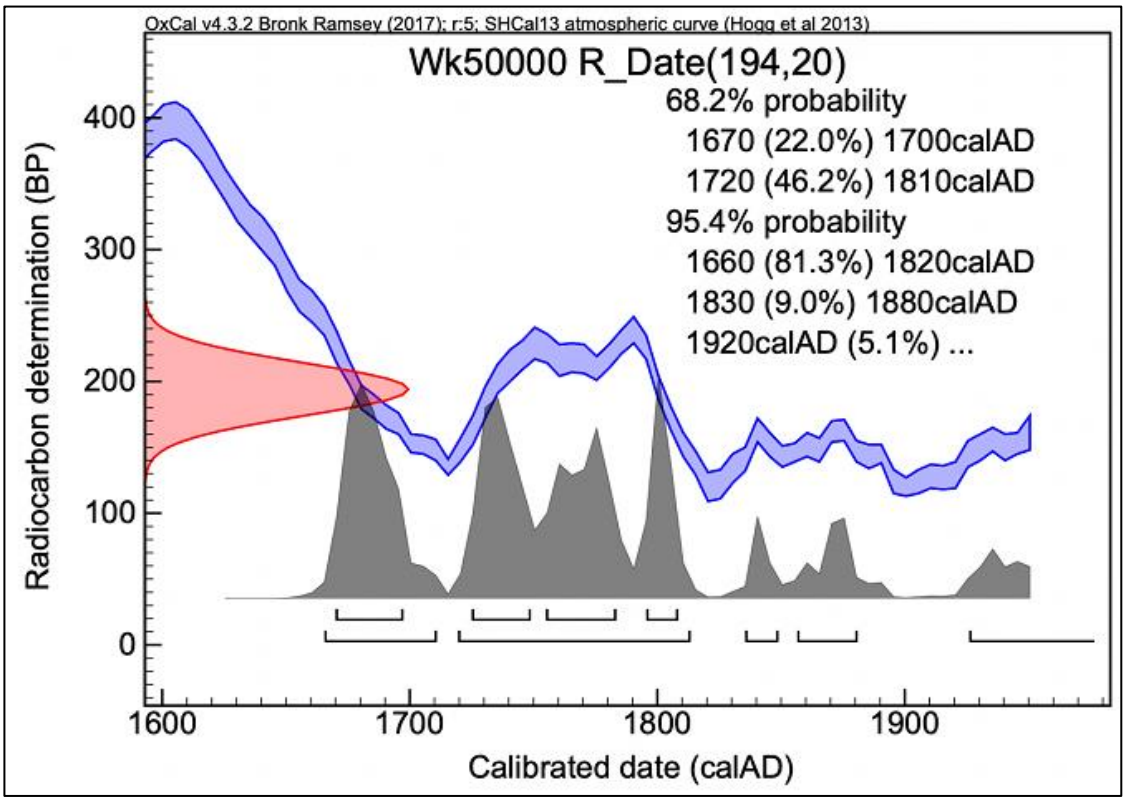


Figure 7.83 Calibrated radiocarbon date range from manuka charcoal sample from layer 4169 on the lower terrace of site R10/1417

Structural Features

A number of postholes, occupation surface and a stone-lined hearth related to a number of phases of whare (houses) and associated structures on the upper terrace of site R10/1417. Five samples relating to five contexts were submitted for radiocarbon dating.

Whare Posthole 4679

Posthole 4679 was the western internal roof support of the first phase of the whare (context 4055) on the upper terrace of site R10/1417. A sample of manuka (*Leptospermum scoparium*) and coprosma (*Coprosma* spp.) taken from its fill (context 4680) was submitted for AMS radiocarbon dating analysis and produced a result of 360 ± 21 BP (Wk-49986), with a calibrated radiocarbon date range of 1490-1640 AD (2σ) (Figure 7.84 and Table 7.7). The radiocarbon data suggest that context 4680 dates to the 1500s.

Stone-lined Hearth 4031

Context 4031 the stone-lined hearth associated with a small whare (context 5077) on the upper terrace of R10/1417. A sample of manuka (*Leptospermum scoparium*) taken from its primary fill (context 4032) was submitted for AMS radiocarbon dating analysis and produced a result of 215 ± 20 BP (Wk-49987), with a calibrated radiocarbon date range of 1650-1810 AD (2σ) (Figure 7.85 and Table 7.7). The radiocarbon data suggest that context 4032 was formed at some point from the end of the first quarter of the 18th century to the turn of the 19th century.

Whare Posthole 4845

Posthole 4845 was part of the northern wall of whare 4055, the earlier, larger house situated on the upper terrace of site R10/1417. A sample of manuka (*Leptospermum scoparium*) from its fill (context 4846) was submitted for AMS radiocarbon dating analysis and produced a result of 356 ± 21 BP (Wk-49988), with a calibrated radiocarbon date range of 1490-1640 AD (2σ) (Figure 7.86 and Table 7.7). The radiocarbon data suggest that context 4846 dates to the 16th century.

Living Surface 4035

Context 4035 was an occupation/living surface associated with the whare (context 5077) on the upper terrace of R10/1417. A sample of manuka (*Leptospermum scoparium*) was submitted for AMS radiocarbon dating analysis and produced a result of 398 ± 21 BP (Wk-49995), with a calibrated radiocarbon date range of 1450-1630 AD (2σ) (Figure 7.87 and Table 7.7). The radiocarbon data suggest that context 4035 was formed between the latter half of the 15th century and the early 1500s.

Posthole 4399

Posthole 4399 formed part of a curving alignment within the palisaded enclosure 4344 that possibly related to a shelter screen or drying rack. A sample of coprosma charcoal (*Coprosma* spp.) and manuka charcoal (*Leptospermum scoparium*) from its fill (context 4400) was submitted for AMS radiocarbon dating analysis and produced a result of 208 ±

21 BP (Wk-49990), with a calibrated radiocarbon date range of 1650-1880 AD (2σ) (Figure 7.88 and Table 7.7). The radiocarbon data suggest that context 4400 dates to between the end of the first quarter of the 18th century and the beginning of the 19th century.

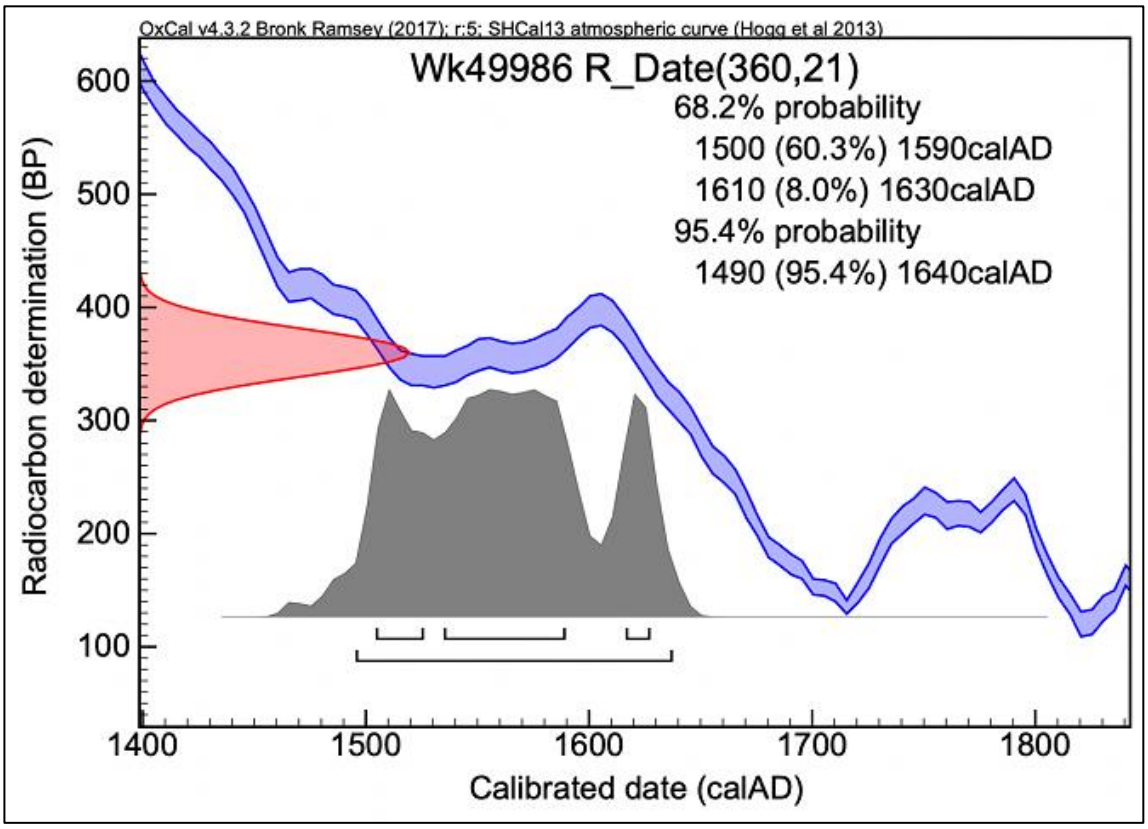


Figure 7.84 Calibrated radiocarbon date range from sample from context 4680, the fill of posthole 4679 and part of whare 4055 on the upper terrace of site R10/1417

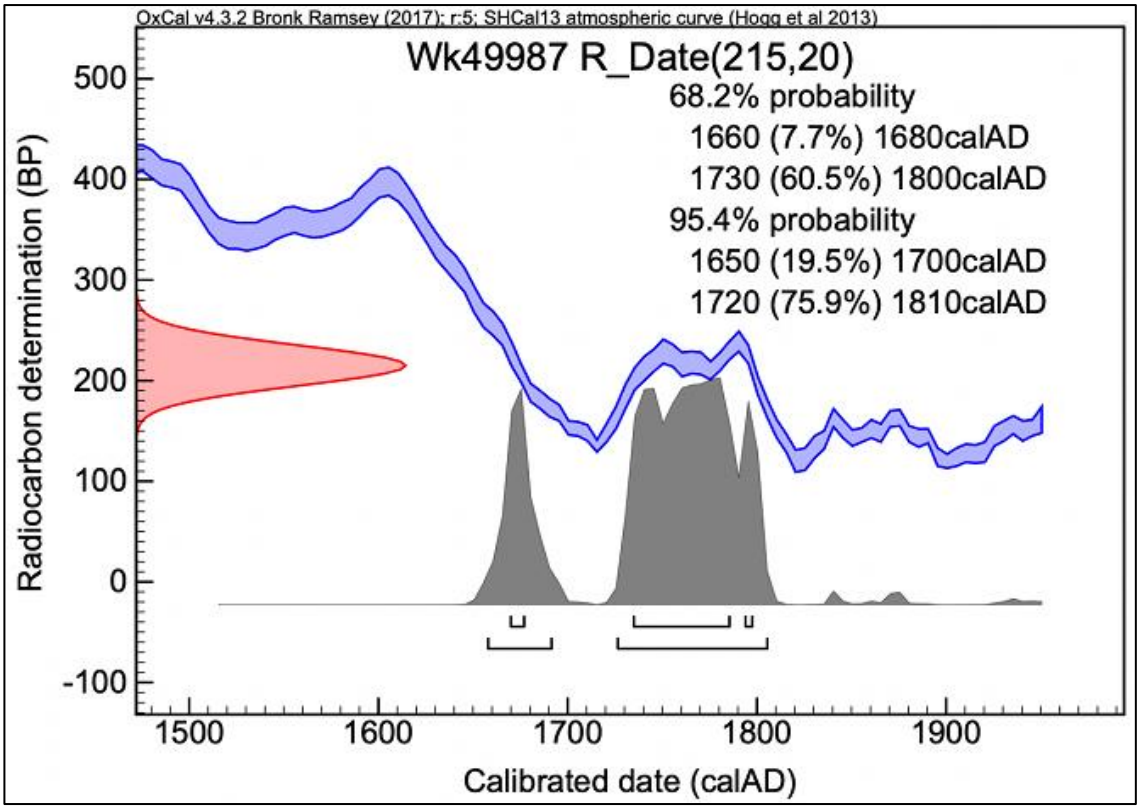


Figure 7.85 Calibrated radiocarbon date range from sample from context 4032, the primary fill of the stone-lined hearth 4031 and part of whare 5077 on the upper terrace of site R10/1417

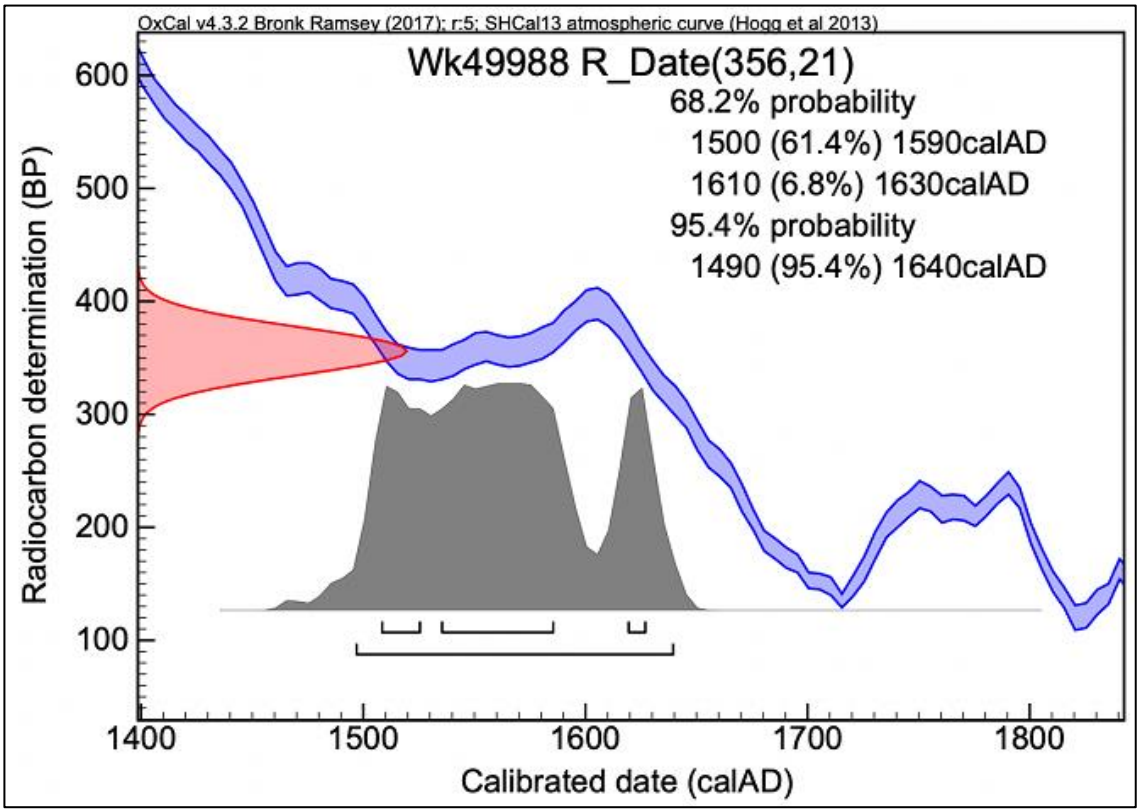


Figure 7.86 Calibrated radiocarbon date range from sample from context 4846, the fill of posthole 4845 and part of whare 4055 on the upper terrace of site R10/1417

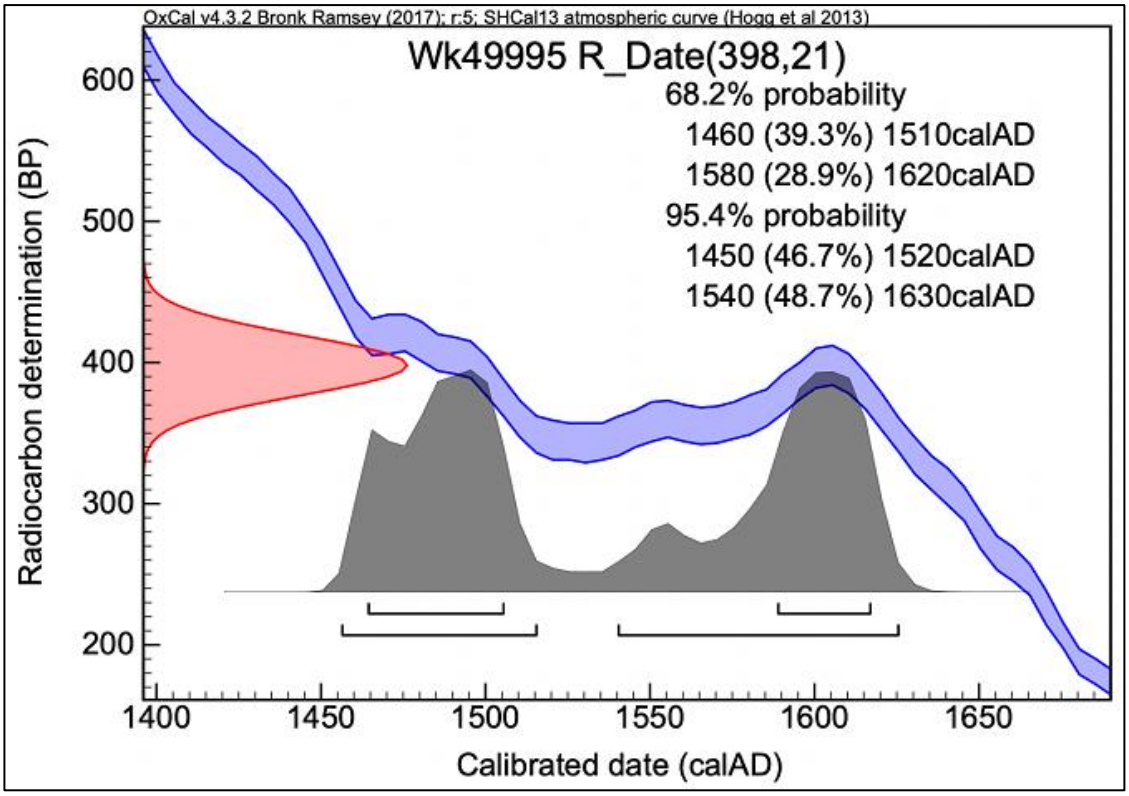


Figure 7.87 Calibrated radiocarbon date range from the occupation surface 4035 associated with the earliest whare 4055 on the upper terrace of site R10/1417

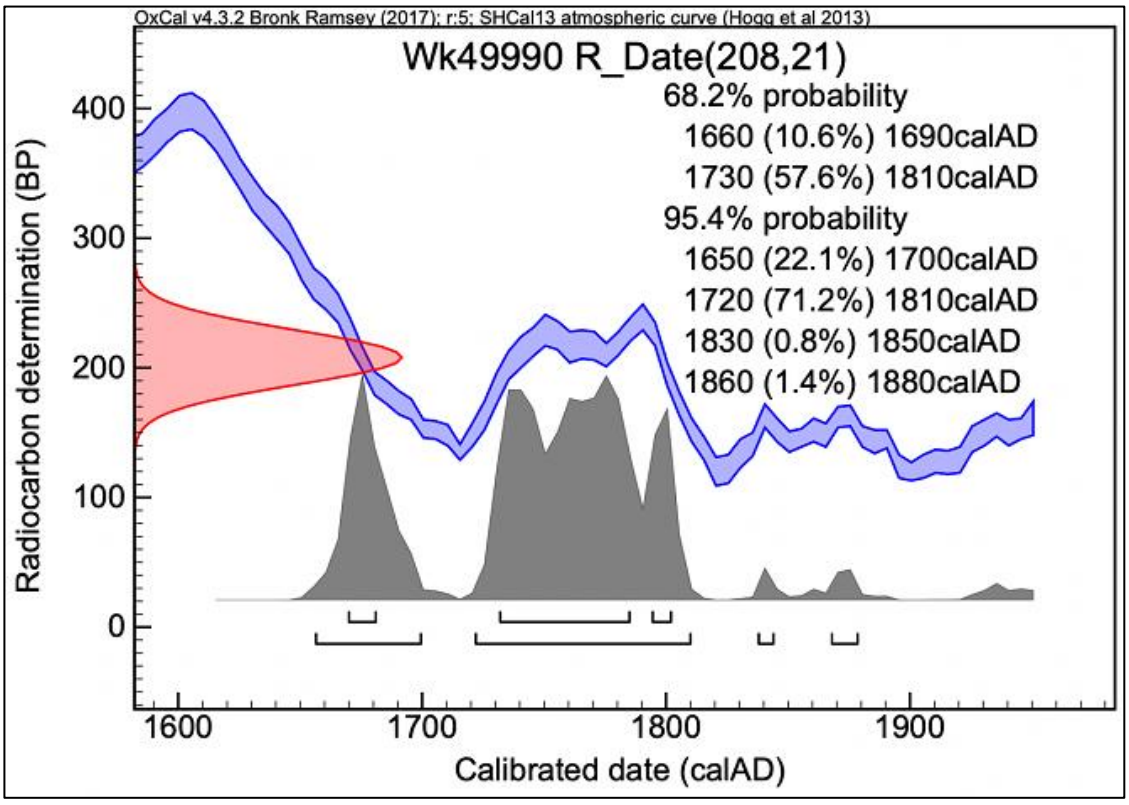


Figure 7.88 Calibrated radiocarbon date range from sample from context 4400, the fill of posthole 4399 and related to a shelter or drying rack on the upper terrace of site R10/1417

7.4.3 Bayesian Analysis of Site R10/1417 C14 Dates

Introduction

Site R10/1417 was a complex site consisting of archaeological features that were situated on an upper and lower terrace, that underwent a detailed and methodical excavation. The comprehensive stratigraphic control this provided meant that it was possible to refine the radiocarbon chronology for the site with Bayesian analysis. The process took the radiocarbon dates from the site and using the stratigraphic information the dates could be constrained to limit the calibrated spread of the radiocarbon date range and produce a statistically consistent and robust chronology for site R10/1417.

Methodology

The contexts from site R10/1417 were organised into a Harris Matrix and then the Bayesian model of the dates was created to match the Matrix as much as possible with additional refinements to provide a robust result calibration in OxCal 4.4. Two minor adjustments were made in the analysis. The marine calibration for New Zealand was switched to Marine13 on the basis that this seemed more reliable for New Zealand (Petchey and Schmid 2020), and a general outlier model was applied to dates that appeared to be inconsistent with the stratigraphic model presented. However, as the charcoal was identified in detail, most dates were calibrated as relatively secure.

Details of the contexts are provided but clarifications to the stratigraphic model to produce the site chronologies are discussed below.

R10/1417 Stratigraphic Information for Dated Contexts

The stratigraphy of the R10/1417 dated contexts is shown below in Figure 7.89. The Bayesian analysis was separated between the Upper Terrace features and the Lower Terrace features (see Figure 7.90 and Figure 7.91). There was not a direct stratigraphic relationship between the two terraces, so the calibrated models were designed to determine which phase the Lower Terrace activities were more likely to be associated with.

Upper Terrace Dated Contexts

Context 4520 (Wk-50515): Context 4520 was the fill of a large posthole 4519 that formed part of the southern entrance to the palisaded enclosure (context 4344). The fill was sealed by the palaeosol/buried former topsoil layer (context 4005), itself sealed by the main shell midden deposit (context 4001), which in turn, was sealed by the modern topsoil under turf (context 4000).

Context 4025 (Wk-49982 and Wk-49676): Context 4025 was the fill of an oven (context 4024) cut into the top of the large, main shell midden deposit (context 4001). The deposit was sealed by the modern topsoil beneath turf (context 4000).

Context 4624 (Wk-49983): Context 4624 was the fill of earth oven (context 4623) which had been cut into the top of the main shell midden deposit (context 4001). The deposit was sealed by the modern topsoil beneath turf (context 4000).

Context 4173 (Wk-49984): Context 4173 was the fill of an earth oven (context 4172) which had been cut into the top of the main shell midden deposit (context 4001). The deposit was sealed by the modern topsoil beneath turf (context 4000).

Context 4602 (Wk-49985): Context 4602 was the fill of posthole 4601, which formed part of the northern side of the entrance structure to the rua porotaka pit 4184 situated within the palisaded enclosure on the upper terrace. The fill was sealed by the former topsoil layer (context 4005) which itself was sealed by the main shell midden deposit (context 4001), which in turn was sealed by the modern topsoil under turf (context 4000).

Context 4680 (Wk-49986): Context 4680 was the fill of posthole 4679, a part of one of the sequence of whare structures on the upper terrace (but not the one with the hearth, which was later). The fill was sealed by the buried topsoil layer (context 4005) which in turn was sealed by the main shell midden deposit (context 4001), which itself was sealed by the modern topsoil under turf (context 4000).

Context 4032 (Wk-49987): Context 4032 was the primary fill of the rectangular sandstone-lined hearth 4031, the hearth of a stratigraphically late whare structure situated on the upper terrace. Context 4032 was sealed by topsoil 4000.

Context 4846 (Wk-4988): Context 4846 was the fill of posthole 4845 which was part of a line of postholes that formed the eastern wall of one of the house structures associated with the enclosure. The fill was sealed by the former topsoil layer (context 4005), which in turn was sealed by the main shell midden deposit (context 4001), itself sealed by the modern topsoil under turf (context 4000).

Context 4400 (Wk-49990): Context 4400 was the fill of posthole 4399 that was one of an alignment of 14 postholes that formed an enigmatic structure within the eastern part of the upper terrace enclosure. The fill was sealed by the buried topsoil layer (context 4005), which in turn was sealed by the main shell midden deposit (context 4001), which itself was sealed by the modern topsoil under turf (context 4000).

Context 4001 (Wk-49993): Context 4001 was the main shell midden deposit that covered more than half of the upper terrace. The midden deposit sealed the palaeosol/buried former topsoil layer (context 4005) and in turn was sealed by the modern topsoil under turf (context 4000).

Context 4027 (Wk-49994): Context 4027 was the fill of an earth oven (context 4026) cut into the top of the large, main midden deposit (context 4001) present across the top terrace of the site. The deposit was sealed by the modern topsoil beneath turf (context 4000).

Context 4035 (Wk-49995): Context 4035 was an occupation surface related to the earlier whare structure within the palisaded enclosure 4344. The layer was sealed by the palaeosol/buried topsoil layer (context 4005) and the main shell midden (context 4001), which in turn was sealed by the modern topsoil under turf (context 4000).

Context 4080 (Wk-49996): Context 4080 was the fill of oven 4079 that was cut into oven 4081. The fill was sealed by the main shell midden deposit 4001, which in turn was sealed by topsoil 4000.

Context 4004 (Wk-49997): Context 4004 was a small, discrete shell midden deposit which sealed context 4005 (palaeosol/buried former topsoil) and was in turn sealed by topsoil 4000.

Context 4082 (Wk-49998): Context 4082 was the fill of oven 4081 and was cut by oven 4079 and sealed by main midden deposit 4001, which in turn was sealed by topsoil 4000.

Context 4171 (Wk-49636): Context 4171 was the fill of oven 4170, which was cut into main midden deposit 4001 and was sealed by topsoil 4000.

Lower Terrace Dated Contexts

Context 3048 (Wk-49926): Context 3048 was a shell midden deposit situated on the southeastern edge of the lower terrace. The deposit sealed the subsoil (context 3050) and was itself sealed by the topsoil under turf (context 3047).

Context 4203 (Wk-49989): Context 4203 was the fill of posthole 4202, which was one of a number of postholes forming the above ground structure of the large rua porotaka pit (context 4292) situated on the lower terrace beneath the main midden site. The fill (4203) and the pit superstructure postholes were sealed beneath an occupation/cooking area (context 4168), which itself was partly sealed (remainder abutted) by another occupation/lithic working layer (context 4169). Context 4169 itself was sealed by the modern topsoil.

Context 4169 (Wk-49991 and Wk-50000): Context 4169 was an artefact-rich occupation layer/lithic working surface which was situated on the lower terrace. The layer partially sealed layer 4168 and was itself sealed by the modern topsoil (4000).

Context 4168 (Wk-49992): Context 4168 was an occupation layer /cooking area that was charcoal rich with associated burning of the former ground surface also evident. The layer was situated on the northern area of the lower terrace and was partially sealed by layer 4169 and was also sealed by the modern topsoil (4000).

Context 4207 (Wk-49999): Context 4207 was the fill of posthole 4206, which was one of several postholes forming the above ground structure of the large rua porotaka pit (context 4292) situated on the lower terrace beneath the main midden site. The fill (4207) and indeed the pit itself were sealed by an occupation/cooking area (context 4168), which itself was partly sealed (remainder abutted) by the lithic working occupation layer (context 4169). Context 4169 in turn was sealed by the modern topsoil (4000).

R10/1417 Harris Matrix – Dated Contexts

The suggested phasing for the Upper Terrace zone indicated that this part of the site consisted of a series of sub-circular covered rua cut through the subsoil and into the colluvial clay natural and surrounded by a palisade that, at least in part, included two rows of posts with an entrance gateway to the south. Above that was a probable occupation surface (4035) which covered much of the northern and northeastern part of the site and was likely formed during occupation activities related to a relatively large whare, that would have been contemporary with the rua enclosure.

In the southern part of the Upper Terrace, a palaeosol/buried soil (4005) was present which had sealed the earlier occupation levels of the rua enclosure. This layer was subsequently covered by the sizeable shell midden deposit 4001. A large number of firescoop/oven features were cut into midden 4001 which provided a range of dates, as well as the hearth of another possible and smaller whare-like structure to the north in the vicinity of the earlier larger whare (Figure 7.89 and Figure 7.90).

Preliminary examination of the Harris Matrix and the radiocarbon data suggested that one date from context 4400 (the fill of posthole 4399 situated within the line of the pit enclosure palisade) appeared to be a lot later than the stratigraphic information and dates obtained from other features in the earlier phase suggested. It is likely that the date obtained from posthole 4399 represents a later feature cut into this part of the site and then backfilled. The date was therefore moved to the later phase rather than being included as part of dating the palisade.

Two dates from samples of oven fills, context 4080 (the fill of oven 4079) and context 4082 (the fill of oven 4081) respectively, were not sealed by layer 4005 but the raw radiocarbon dating data strongly suggest that they related to the earlier occupation phase rather than the later one, and as such were included with the earlier phase of dates.

The other adjustment reflected the dating material associated with the sample from midden deposit 4001 itself. This was not included as part of a ‘boundary’ date associated with the Bayesian model but as another sample relating to the formation of this midden layer, including the samples of oven features cut into the midden surface, or beneath it. The dating sample from 4001 itself was from a bulk shell sample associated with the layer, and was of similar age to the other features. As the bulk sample was obtained from a single location it did not therefore, stratigraphically represent the ‘layer’ 4001 being cut into by features specifically, as the shell midden deposit itself was relatively substantial at some 14.64m in length by 13.08m wide.

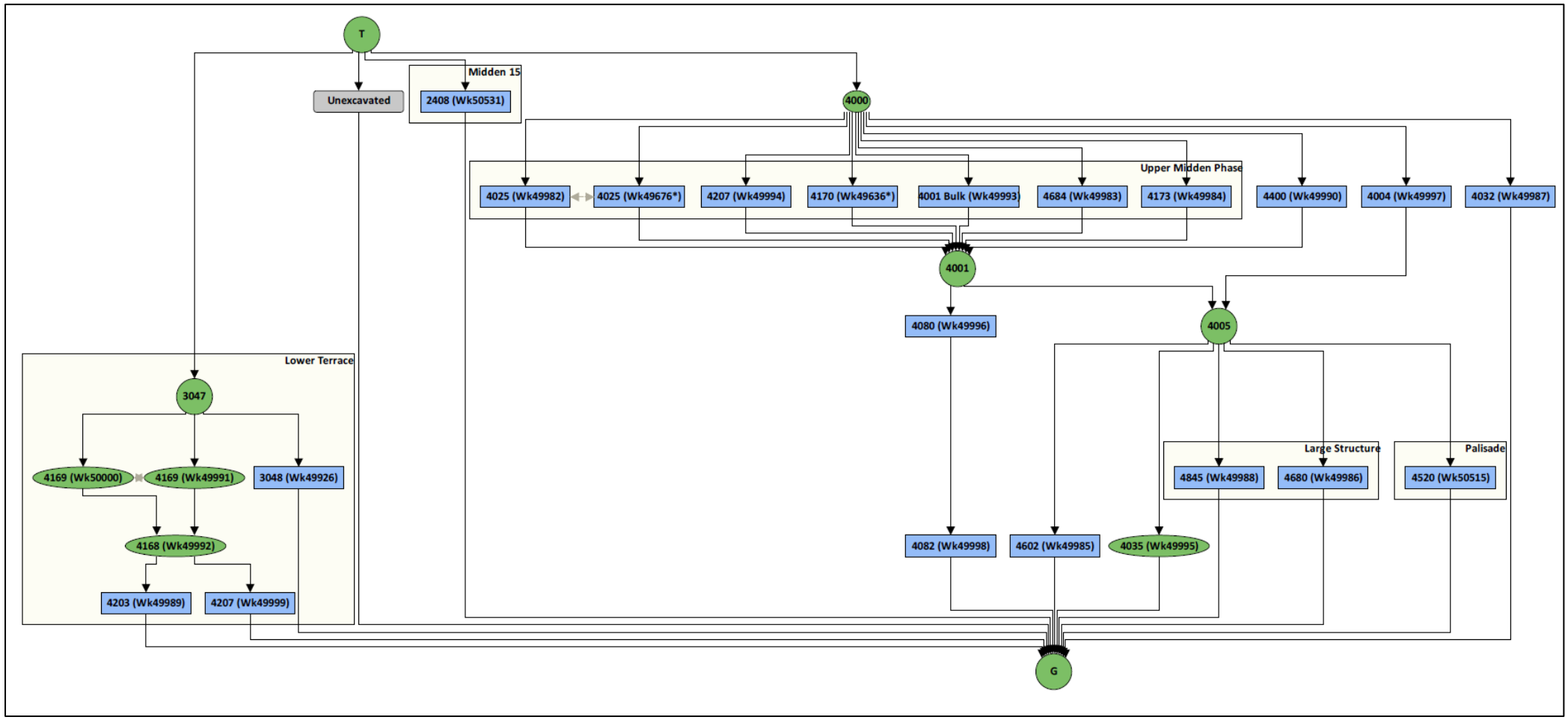


Figure 7.89 Harris Matrix of dated features from site R10/1417

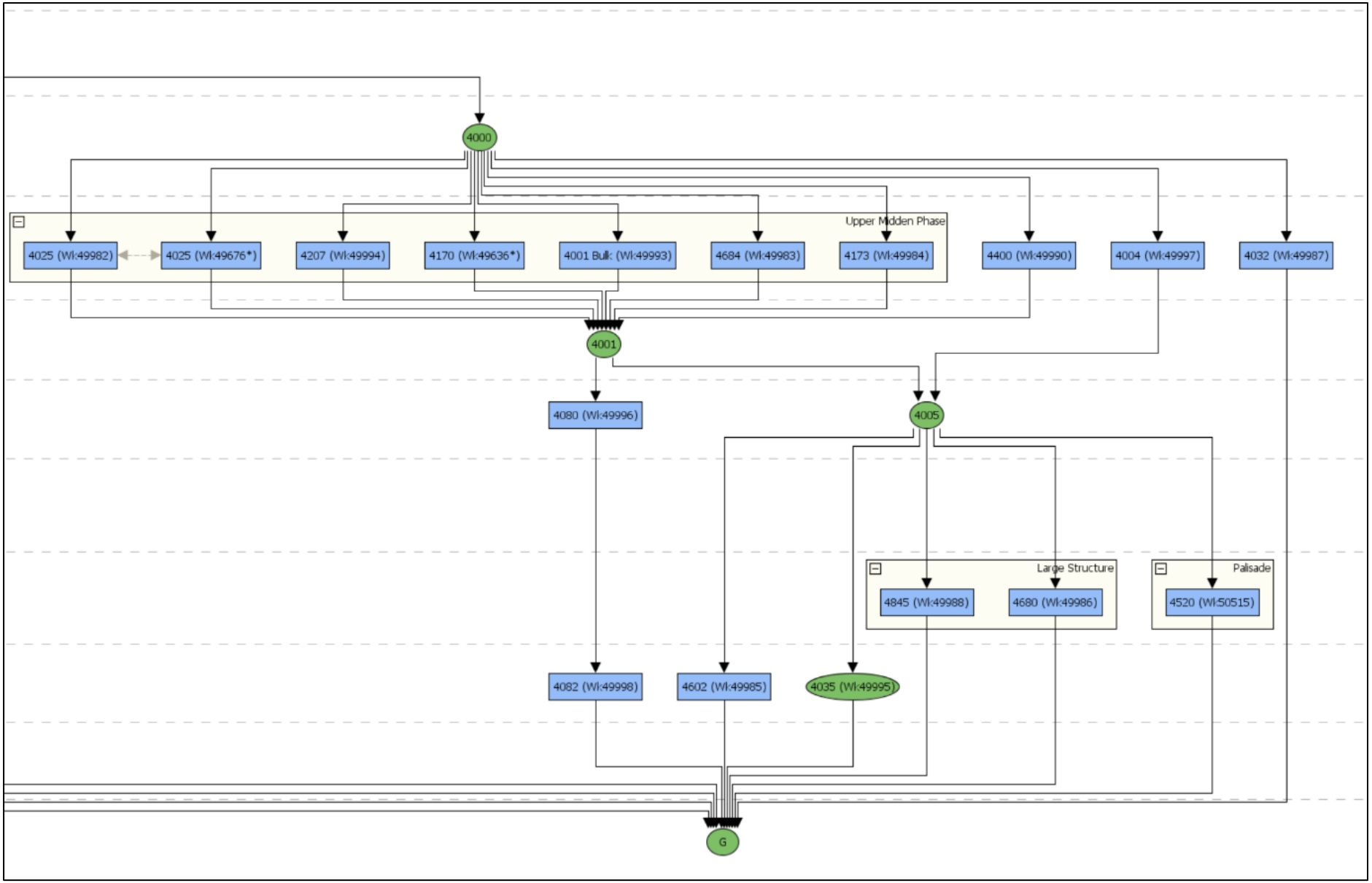


Figure 7.90 Detailed close-up of the Harris Matrix of dated contexts from the Upper Terrace of site R10/1417

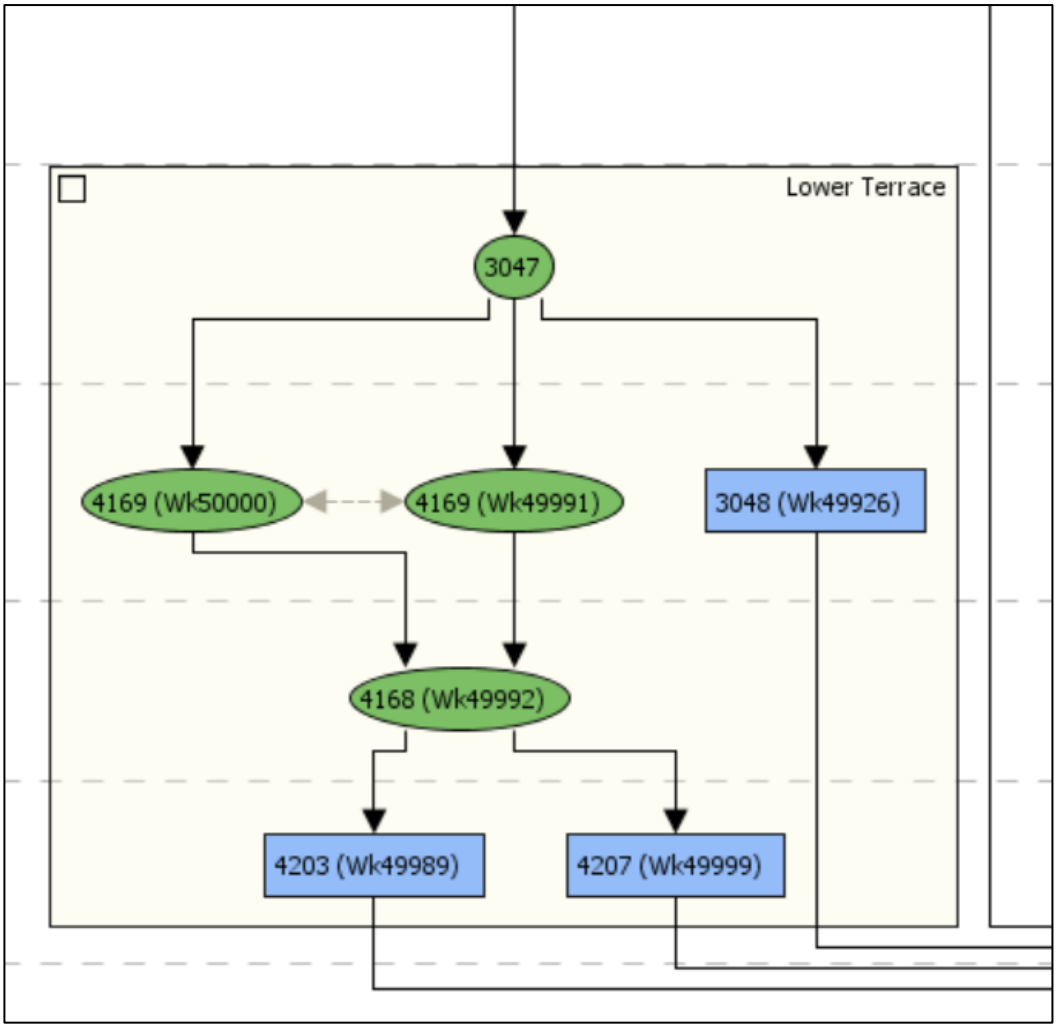


Figure 7.91 Detailed close-up of the Harris Matrix of dated contexts from the Lower Terrace of site R10/1417

7.4.4 R10/1417 Upper Terrace Bayesian Analysis Results

The results of the calibration are shown in Figure 7.92 and Table 7.8. The early phase of the site dates between 1460 and 1620 AD based on the model, although probably most of the occupation took place towards the mid-late 1500s AD. It is likely that this phase incorporated the building of the palisade and successive excavation and building of the rua and the whare.

The buried soil layer 4005 appears to have formed between 1670 and 1720 AD with the later phase consisting of the large shell midden, associated oven and firescoop features and the small whare with the stone-lined hearth dating in some areas during and in others subsequent to the buried soil's formation. The midden deposit 4001 itself was likely formed from activities associated with successive seasonal occupations from the 1720s onwards and throughout much of the remainder of the 18th century, with the site probably unoccupied permanently prior to the turn of the 19th century AD.

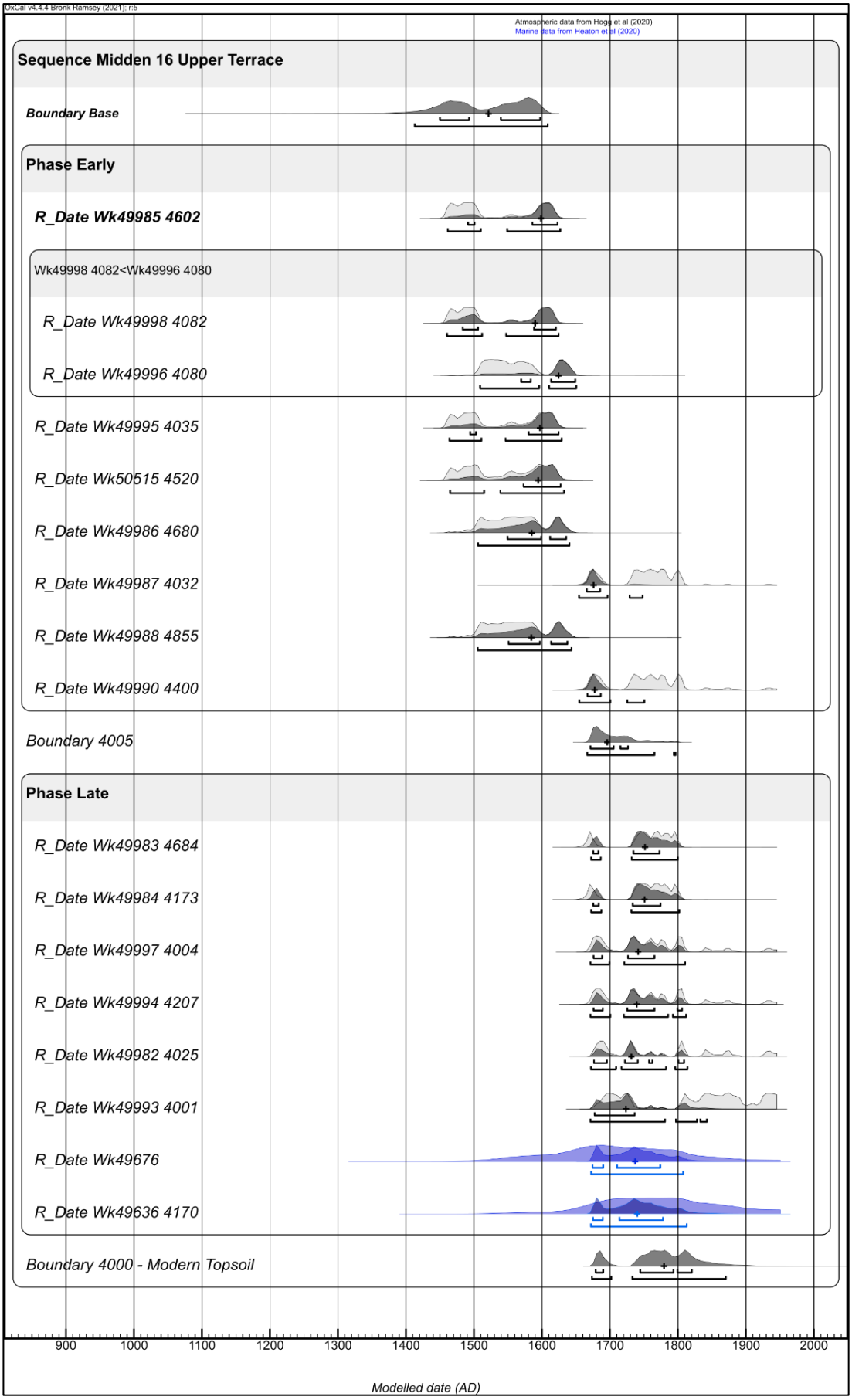


Figure 7.92 Bayesian calibrated dates from the Upper Terrace of site R10/1417 (blue – marine shell)

7.4.5 R10/1417 Lower Terrace Bayesian Analysis Results

The results of the calibration are shown in Figure 7.93 and Table 7.8. The anomalously late date associated with context 4207 (Wk-49999) appeared to be intrusive, being younger than both Wk-29989 and Wk-49992, and was marked in the analysis as a possible outlier. The sample from 4169 (Wk-49991) also appeared later than the other dates associated with that phase, although given that it represented a layer and not a feature, this was not unusual.

The results suggested that the large rua porotaka probably dated from around 1600 AD and perhaps even a bit earlier, with two later occupation surfaces dating to around 1600-1650 AD (layer 4168) and around 1670-1800 AD (layer 4169). It is highly likely, and perhaps almost certain, that layer 4169 is associated with the later phase activities on the Upper Terrace, rather than representing a separate event on the Lower Terrace.

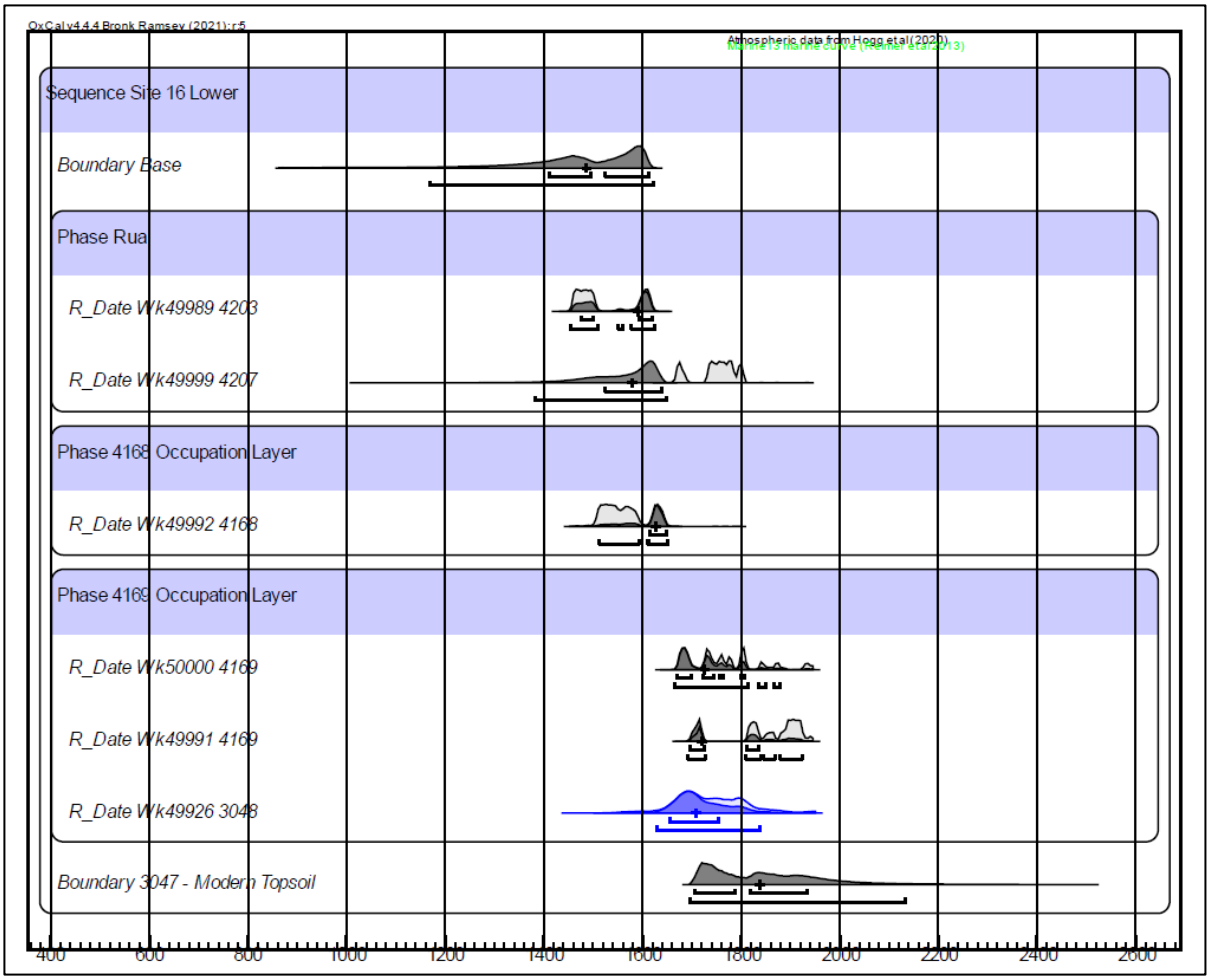


Figure 7.93 Bayesian calibrated dates from the Lower Terrace of site R10/1417 (blue – marine shell)

Table 7.8 Modelled Calibrated age ranges (AD) for R10/1417

Sample	Phase & Terrace Location	Context No.	-1σ	1σ	-2σ	2σ	Median
Wk-49636	Upper Late	4171	1673	1769	1671	1809	1732
Wk-49676	Upper Late	4025	1672	1758	1671	1805	1715
Wk-49926	Lower Early	3048	1655	1754	1630	1837	1708
Wk-49982	Upper Late	4025	1674	1807	1671	1813	1727
Wk-49983	Upper Late	4624	1673	1769	1671	1800	1746
Wk-49984	Upper Late	4173	1673	1767	1671	1802	1745
Wk-49985	Upper Early	4602	1496	1623	1462	1627	1599
Wk-49986	Upper Early	4680	1553	1636	1507	1641	1588
Wk-49987	Upper Early	4032	1666	1683	1653	1745	1674
Wk-49988	Upper Early	4846	1553	1639	1508	1643	1587
Wk-49989	Lower Early	4203	1476	1619	1454	1625	1591
Wk-49990	Upper Early	4400	1666	1685	1653	1744	1676
Wk-49991	Lower Late	4169	1696	1835	1692	1925	1721
Wk-49992	Lower Early	4168	1614	1649	1513	1652	1627
Wk-49993	Upper Late	4001	1675	1734	1671	1838	1715
Wk-49994	Upper Late	4027	1673	1765	1671	1811	1734
Wk-49995	Upper Early	4035	1580	1625	1465	1629	1598
Wk-49996	Upper Early	4080	1574	1649	1510	1650	1625
Wk-49997	Upper Late	4004	1673	1765	1671	1810	1735
Wk-49998	Upper Early	4082	1485	1621	1461	1625	1594
Wk-49999	Lower Early	4207	1525	1638	1382	1648	1579
Wk-50000	Lower Late	4169	1671	1808	1666	1878	1726
Wk-50515	Upper Early	4520	1574	1627	1465	1633	1596

7.5 Chronology Discussion

The Bayesian analysis of the radiocarbon dates from sites R10/1484 and R10/1417 has narrowed the likely time ranges for the occupation of both sites, from those which the radiocarbon dating results alone suggested (Table 7.7 and Table 7.8, above).

In the case of R10/1484 on the ridge spur at 3 Puhoi Road, the initial phase of occupation of the site was pushed back approximately 90 to 100 years (Figure 7.63 and Figure 7.94), with the early phase (including both Phase 1 and Phase 2) dating to the late 1600s to the end of the first quarter of the 18th century. Following what was probably a brief hiatus of no more than two decades at the most, the site was occupied again, with the shell midden and associated features being formed at this time, prior to the permanent abandonment of the site during the 1820s in the face of Ngāpuhi raids (Figure 7.64 and Figure 7.94). The conventional radiocarbon determinations from site R10/1417 suggested that the initial phase of occupation with the rua porotaka and palisade enclosure was established during the second half of the 15th century AD. While it is possible that the initial phase of activity

occurred during the latter 1400s AD, it is considered when the samples from other early phase features are taken into account that the site was first occupied at some point from the beginning of the second quarter of the 1500s (Figure 7.92 and Figure 7.93). The large rua porotaka on the Lower Terrace also dated during the main part of the activity on the Upper Terrace while the occupation layer 4168 formed a bit later but was still contemporary with the Early Phase of the Upper Terrace occupation sequence (Figure 7.95). The site was possibly then left largely abandoned for at least 50 to 60 years or so, with both Lower and Upper terraces being occupied from around 1670 through to the mid-1700s AD (Figure 7.95). At some point during the final quarter of the 18th century, site R10/1417 seems to have been abandoned permanently.

The Bayesian modelling data clearly demonstrate that there was no contemporary occupation at site R10/1484 during the primary phase of site R10/1417 when the palisaded enclosure was erected around the rua porotaka on the Upper Terrace.

Essentially, the Bayesian analysis data suggest that for the most part, sites R10/1417 and R10/1484 were probably not occupied at the same time (Figure 7.96). The early dateable occupation phase at R10/1484 would have been contemporary with activities associated with successive seasonal occupations at R10/1417 that formed the large shell midden deposit on the Upper Terrace from the 1720s onward and throughout much of the remainder of the 18th century. The late phase of occupation at R10/1484 that formed the two midden deposits and associated features would have occurred following the likely abandonment of site R10/1417 in the closing stages of the 18th century.

Several of the other single phase, short-duration sites across the landscape at Pūhoi are dated less securely during this period, so it is possible that these two larger sites acted as hubs at different times with smaller settlements/activity areas dispersed across the landscape.

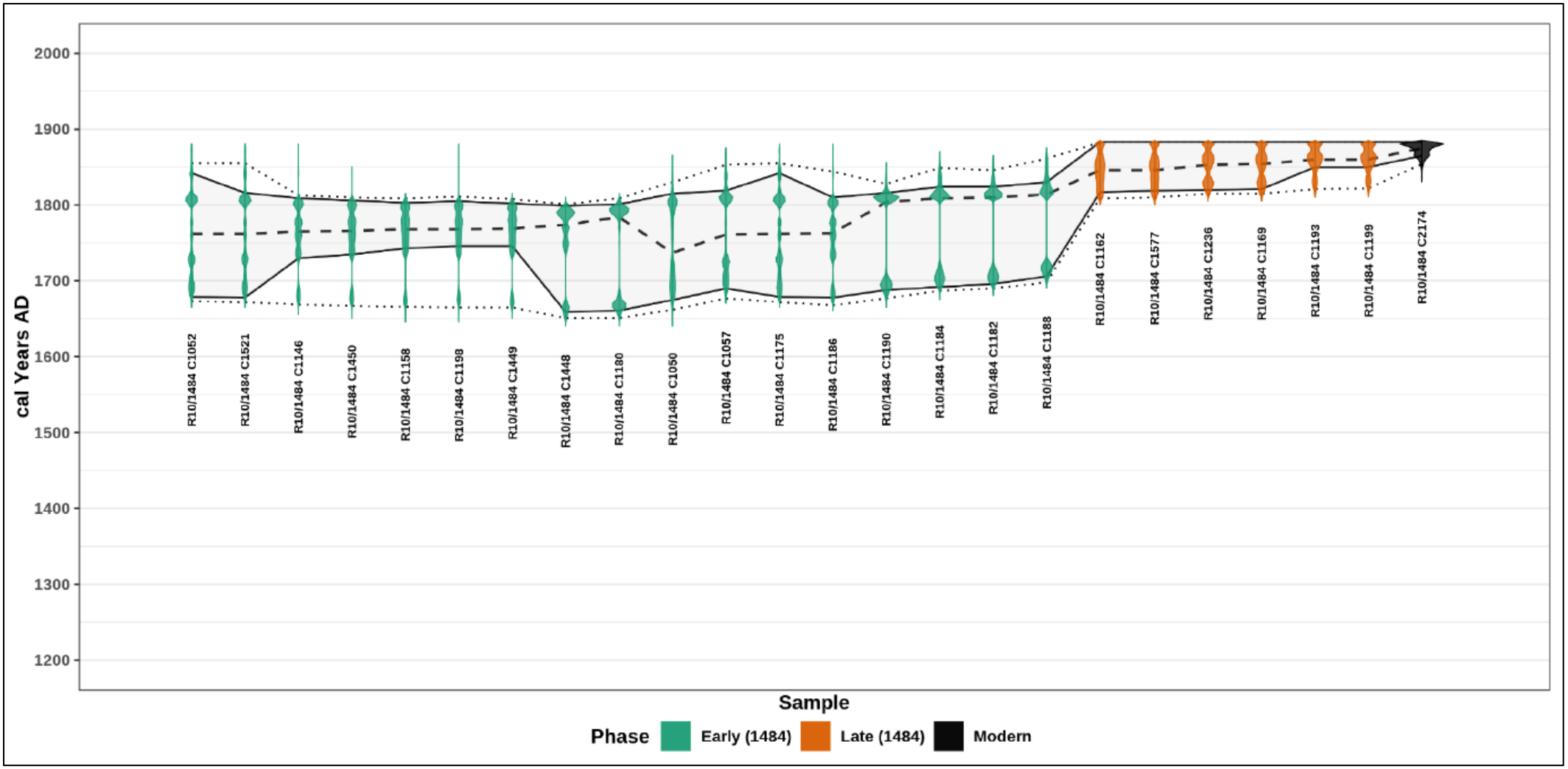


Figure 7.94 Bayesian Modelled dates from site R10/1484 showing the different phases of occupation

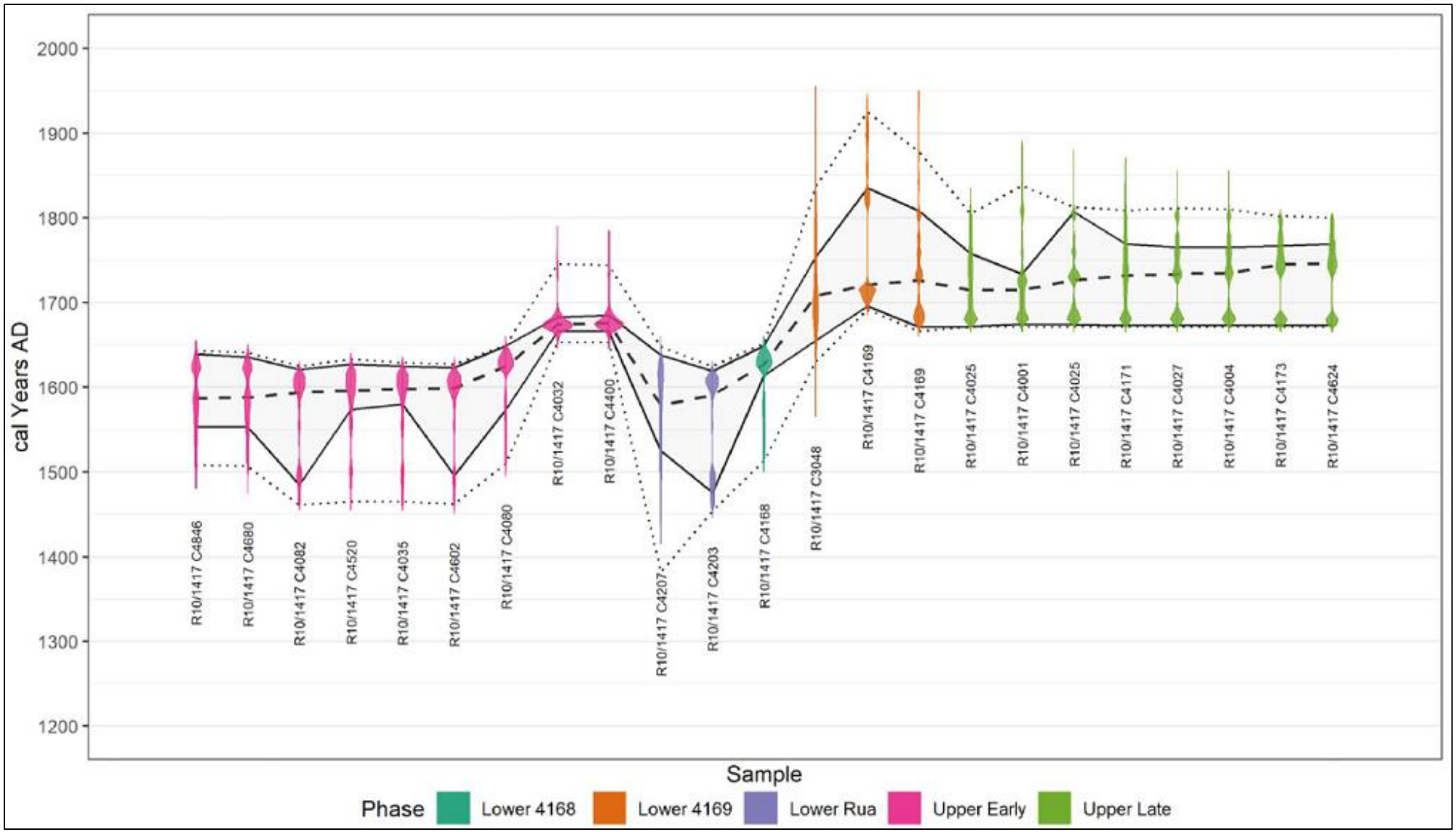


Figure 7.95 Bayesian Modelled dates from site R10/1417 showing the different phases of occupation on both the Upper and Lower Terraces

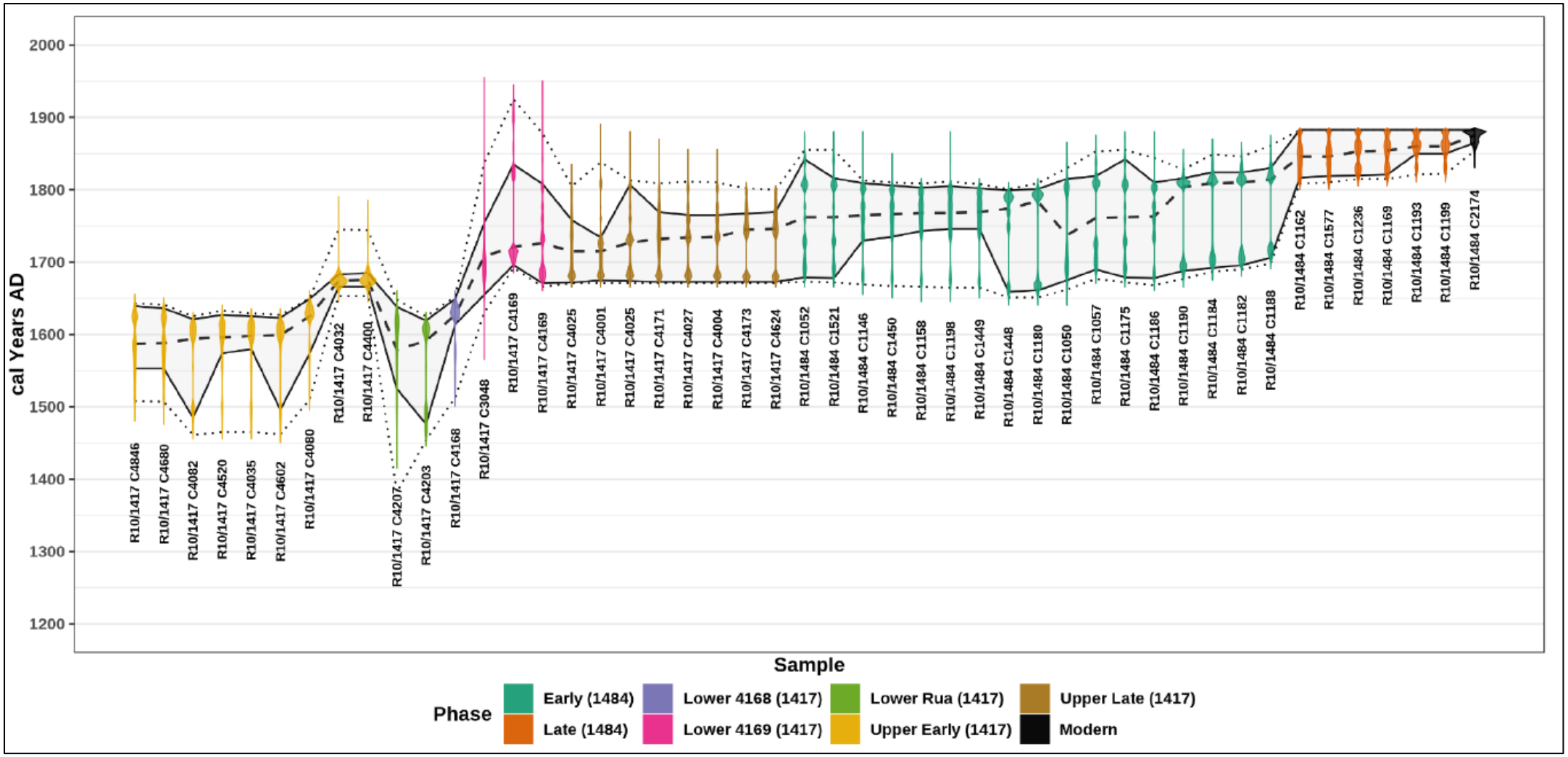


Figure 7.96 Combined phase model for sites R10/1417 and R10/1484

8 DISCUSSION

8.1 Introduction

During the works for the Ara Tūhono – Pūhoi to Warkworth section Road of National Significance five archaeological sites that had been recorded during the assessment phase and 29 previously unrecorded archaeological sites were affected. Three of the new sites could be avoided and were left in situ. All but seven of the sites were situated within the western reaches of the Pūhoi River valley south of the existing Puhoi Road and north of the Johnstones Hill Tunnels. Of the seven remaining sites, six were situated just north of the Pūhoi River, on the floodplain and on three terraces above the northern banks of the river. The final archaeological site was exposed by drainage works at the intersection of Woodcocks and Carran Roads (some 2.5km to the west of Warkworth) and consisted of a cache of Māori cultivation implements that were well preserved inside a flood deposit within a meander of a buried palaeochannel. All except three of the sites related to Māori settlement activities.

No in situ archaeological remains relating to the 19th century European settlement period were exposed by the works. Monitoring in the recorded location of one early European house site (Wenzlick's House north of Pūhoi River) did not reveal any archaeological deposits or features; and the site of another (Schollum's House) only revealed evidence of 20th century settlement. Monitoring of a recorded log skid revealed no archaeological remains. However, an early 20th historic artefact-rich deposit found at the property at 1457 Hibiscus Coast Highway, just north of the Johnstones Hill Tunnels, related to a hitherto unknown small late 19th century cottage on the property that had been demolished in 1902. There is a strong likelihood that the cottage would have been built by the early European settler Gregor Wenzlick in the 1880s. As the deposit dated to the early 1900s and no in situ features or deposits remained, the site was not recorded as an archaeological site.

In addition, two pā sites identified within the designated road corridor at the assessment stage (R10/921, Pā o Te Hēmara Tauhia and R10/1369, Kāinga Tawhito Ngā Tupuna) were avoided by the works, with their management during and post-construction guided by a Pā Management Plan.

8.2 Summary of Archaeological Investigations

The vast majority of the archaeological sites investigated during the roading earthworks consisted of shell middens with associated cooking and marine resource processing features situated in elevated positions on terraces and ridge spurs overlooking the Pūhoi River Valley. Of particular note was an extremely large earth oven some 2.98m in length by 2.68m wide and almost half a metre deep (site R10/1512) that was located at the 3 Puhoi Road property and is interpreted as an umu tī.

However, the principal archaeological excavations focused on two complex, stratified occupation sites, one situated at 3 Puhoi Road west of the Pūhoi River (R10/1484) and the existing State Highway 1; and the other (R10/1417) at 517 State Highway 1 to the north of the river and to the west of Hikauae Creek. These sites, both multi-phased, produced a large

volume of archaeological data including artefactual, ecofactual and environmental materials.

Site R10/1484 consisted of two large post-pits and some smaller features, ovoid/oval structures, ochre pits and evidence of processing, large intercutting ovens and posthole and midden deposits as well as a cultural layer containing lithics. The lithic assemblage numbered some 234 artefacts relating to tool manufacture. The assemblage consisted predominantly of obsidian, chert, basalt and argillite, with 41 of the items displaying evidence of shaping or reduction into specific tool forms such as adzes, blades, abraders, hammer stones and pounders, as well as retouched flakes. The assemblage also included a small amount of sandstone, breccia and unidentifiable volcanic stone that was probably intended for use in abrading or sharpening of tools. X-ray fluorescence analysis of obsidian from site R10/1484 established that the majority of the obsidian was sourced from north of the Coromandel Peninsula, most likely from Great Barrier Island, although there were examples from Mayor Island and Huruki or Hahei in the Coromandel.

Site R10/1417 was spread over two terraces and consisted of a palisaded enclosure containing food storage pits and a whare, a large storage pit on the lower terrace, occupation surfaces and large midden deposits. The site produced the largest artefact assemblage of the archaeological investigations with a lithic assemblage consisting of some 314 stone artefacts relating to tool manufacture. The assemblage predominantly comprised obsidian, chert, basalt, argillite and greywacke, with some sandstone and one fragment of a nephrite (pounamu) chisel, with 19 items displaying evidence of shaping or reduction into specific tool forms, while 63 items were classified as flakes and 13 as cores. X-ray fluorescence analysis of almost half of the 228 obsidian specimens from site R10/1417 determined that the vast majority of the obsidian was sourced from north of the Coromandel Peninsula, most likely from Great Barrier Island, although some specimens originated in the Coromandel Peninsula and Mayor Island.

Of the smaller sites investigated, R10/1106 produced obsidian, chert and, together with site R10/1485, fragments of argillite, each displaying hammer dressing and cortex polish attesting to the reworking of adzes at these sites.

The assemblage as a whole demonstrates lithic trade networks between the Pūhoi region and a number of North Island volcanic zones, as well as argillite from Nelson and also the use of locally sourced stone.

Plant microfossil analysis of samples taken from R10/1484, situated at the eastern end of a broad flat terrace, provided evidence of several Māori-introduced cultigens, namely bottle gourd, greater yam, kūmara and taro and suggested moderate scale landscape disturbance. Analysis of charcoal samples from site R10/1484 suggests that the vegetation surrounding the site during its occupation was dominated by scrub species along with pohutukawa and puriri, while many of the smaller dispersed shell midden sites across the rest of the property at 3 Puhoi Road, such as sites R10/1498, R10/1501, R10/1503, R10/1512 and R10/1514, had a wider range of broadleaf tree species, implying that more developed bush was present at various times across the landscape.

Plant microfossil analysis of samples taken from R10/1417 also indicated evidence of Māori introduced cultigens, namely bottle gourd, and also, unusually, rengarenga lily, with starch grains from taro also present. Charcoal analysis indicated a disturbed environment (bracken spores), and also evidence for manuka and kanuka, and forest species in the wider environment (including pohutakawa, kowhai and mahoe). Small shrubs were also noted (mostly hebe).

Evidence of gardening to the north near Warkworth came in the form of the kō cache within a palaeochannel. While gardening would have taken place along the floodplains of the Pūhoi River no specific gardening artefacts werefound; in contrast near Warkworth the cache of kō suggests gardening likely took place nearby, possibly within the floodplain as well.

Analysis of shell midden samples taken from the sites illustrates that the inhabitants at Pūhoi exploited both the local tidal river and its muddy inlets, as well as the estuarine and sandy shore environments on the Hauraki Gulf, with cockle, pipi and mud snail being particularly well represented. Snapper, unidentified fishbone and unidentified avian bone were also present in samples from two of the sites at the 3 Puhoi Road property.

The 78 radiocarbon samples taken from the sites investigated in the Pūhoi River valley enable a valuable understanding of the chronology of Māori settlement within the area, as prior to the project there was only a single extant radiocarbon determination (from a site near the Johnstone Hills Tunnels to the south of the current project area). The dates demonstrate that the landscape on the western side of the river was being utilised, transited through, and at times settled from the late 15th century to the end of the first quarter of the 1800s, when the area was abandoned as a result of Ngāpuhi raiding in the Musket Wars period. Bayesian statistical analysis of the radiocarbon determinations from sites R10/1417 and R10/1484 further refined the date ranges and developed a robust chronology of each site, and indicated that occupation of the two sites was not contemporaneous.

8.3 Short Duration Single Phase Sites

A research strategy incorporating a range of research questions was originally developed within the Archaeological Management Plan which accompanied the archaeological authority application (Phear 2017a). This research strategy related specifically to the recorded midden sites which were going to be modified or destroyed as part of the project earthworks. The research strategy noted the while shell midden sites are ubiquitous across coastal Auckland, and along the coastline north of Auckland, there was a paucity of such sites recorded within the project corridor generally, and of those already recorded as archaeological sites, none had been subject to archaeological investigation. The smaller, single phased, shell midden sites that comprised the majority of the archaeological sites exposed by the roading earthworks, are discussed in this section of the report via property and collectively rather than individually, although with particular focus on site locations and chronology.

A number of specific research questions were incorporated into the research framework for the two shell midden sites that had already been recorded prior to the commencement of the earthworks stage of the project – R10/1106 and R10/1417 – the results of which are presented below in Section 8.4. The research strategy was updated in June 2018 (Phear 2018) following the discovery of the multi-phased occupation site R10/1484 on the 3 Puhoi Road property. Discussion of the targeted research aims relating to the site R10/1484 is presented after the discussion of sites R10/1106 and R10/1484, in Section 8.5.

8.3.1 Summary of Archaeology of Single Phase Shell Midden Sites

1457 Hibiscus Coast Highway (Stanaway Property) (SAP 12)

Although four shell midden sites were exposed in works on the Stanaway Property, two of the sites (R10/1482 and R10/1518) are not discussed as they were only impacted during minor fencing works outside of the roading footprint of works and as such were not subject to archaeological investigations. The other two midden sites were both situated close to and to the south of recorded pā site R10/921 (Pā o Te Hēmara Tauhia) on a promontory that extended north-northeast into the Ōkahu Inlet of the Pūhoi River. Of these, site R10/1496 consisted of a small discrete shell midden deposit comprising mainly cockle with some pipi, with no associated oven features present, at least within the earthworks area. The radiocarbon data suggest that the deposit was formed around the last quarter of the 17th century.

Site R10/1504 was a partially exposed, larger shell midden deposit close to the pā site and consisting predominantly of cockle with the remainder being pipi. A number of associated hāngi were situated close by as well as four postholes likely to be indicative of drying racks for curing fish, and/or other marine resources. Radiocarbon data suggest the midden deposit was formed around the middle of the 17th century.

Both the cockle and pipi shell present within the two investigated sites attest to the procurement and consumption of locally available shellfish species within the Pūhoi River estuary environment, including the adjacent Ōkahu Inlet.

11B and 22B Billing Road (SAP 11)

Eight shell midden/oven sites were exposed during roading and viaduct construction works on the 11B and 22B Billing Road properties. Five of the sites (R10/1486, R10/1506, R10/1508, R10/1516 and R10/1519) were situated on or in close proximity to the northern banks of the Ōkahu Inlet. Two of these sites (R10/1486 and R10/1508) consisted solely of oven features backfilled with shells, oven stones and charcoal. Pipi shell dominated in R10/1486, while the fills of the six ovens comprising site R10/1508 consisted solely of mud snail, a species that is still present in large numbers in the Ōkahu Inlet today. Site R10/1508 represented the earliest dateable use of the inlet, with the hāngi being used at some point during the latter half of the 1400s AD.

Site R10/1506 was situated on the banks of the Ōkahu Inlet and consisted of two vastly differing midden shell deposits. One consisted almost entirely of cockle with a few pipi, whereas the other consisted almost entirely of pipi with a little cockle. Radiocarbon dating suggests that site R10/1506 was formed around the close of the 17th century.

Site R10/1516 meanwhile consisted of a single midden shell deposit consisting predominantly of mud snail, with some cockle and rock oyster. The radiocarbon date acquired from the site suggests that the midden was formed at some point during the first half of the 17th century.

R10/1519 was situated on a promontory overlooking the inlet and consisted of three shell midden deposits that contained pipi, cockle, mud snail and rock oyster in differing quantities.

Approximately 250m to the north of the Ōkahu Inlet, site R10/1515 consisted of six discrete shell midden deposits comprising cockle, pipi and mud snail, that radiocarbon

dating suggests were formed at some point between the later 18th century and the turn of the 19th century.

Sites R10/1497 and R10/1517 were situated on level ground overlooking an inlet of the Pūhoi River estuary situated some 140m to the north and the main river channel some 100m to the east. R10/1497 consisted of a shell midden deposit containing cockle, pipi, mud snail and rock oyster, which radiocarbon dating indicates was deposited during the last quarter of the 17th century. Site R10/1517 consisted of two shell midden deposits (predominantly of pipi, with some cockle) and an associated earth oven. Radiocarbon dating of the larger of the two shell midden deposits suggests that it was formed during the during the first half of the 17th century.

With the exception of the rock oyster present in sites R10/1497, R10/1516 and R10/1519, all of these shellfish species could have been harvested from the Ōkahu Inlet and the Pūhoi River estuary. The rock oyster could have been procured from a rocky shoreline outside the estuary on the Hauraki Gulf coastline in the surrounding area.

3 Puhoi Road (SAP 10)

Thirteen single phase shell midden/oven sites were situated on the 3 Puhoi Road property. Starting in the south, site R10/1485 was situated on ground immediately above the western banks of an inlet of the Pūhoi River estuary and consisted of two shell midden deposits composed predominantly of pipi, along with some cockle, and an associated hāngi. Radiocarbon dating of the larger of the two midden deposits and the fill of the hāngi suggests that the site probably formed during a single, short duration occupation from the late 17th century to the mid-18th century.

Site R10/1514 was situated on relatively flat to gently sloping ground at the base of a northwest to southeast trending spur that overlooked an inlet of the Pūhoi River. The site consisted of five distinct shell midden deposits, two hāngi and a single firescoop. The midden deposits consisted predominantly of pipi, with lesser amounts of cockle, mud snail and rock oyster. Radiocarbon dating of one of the midden deposits and the fill of an earth oven indicates that the area was used for the cooking and consumption of shellfish from around the mid-17th century to the turn of the 18th century.

Site R10/1505 consisted of two distinct groups of archaeological features situated on top of a west-northwest to east-southeast trending spur that descended from the eastern flanks of the large hill at 3 Puhoi Road. In the west these features consisted of a kūmara storage pit, postholes and hāngi, while in the east a shell midden deposit with associated hāngi was dominated by cockle with some pipi also present and small amounts of mud snail and oyster. Radiocarbon dating suggests that the deposition of the shell midden occurred during the first quarter of the 16th century.

Some six shell midden/oven sites were situated on and at the base of the east facing slopes of the large hill on the 3 Puhoi Road property, overlooking an infilled/silted up inlet. Site R10/1511 was situated at the base of the hill and to the south of the former inlet, and consisted of a shell midden deposit comprising pipi and cockle shell which radiocarbon data indicate was deposited at some point between the mid-18th century and early 19th century. Site R10/1500 was situated on a slumped natural terrace, in an elevated position on the eastern slopes of the large hill and consisted of a single shell midden deposit containing pipi and mud snail. Radiocarbon dating suggests a date of deposition for the shell midden during the last quarter of the 17th century. Site R10/1507 was a single shell

midden deposit situated close to the western boundary of the project area in an elevated position on the slopes of the large hill overlooking the former inlet and the Pūhoi River valley. The midden consisted mainly of pipi with some cockle and radiocarbon dating suggests the midden was formed during the last quarter of the 17th century. Site R10/1501 consisted of a large firescoop and earth oven situated on a natural terrace formed on the eastern end of a landslip. The fills of both the oven and firescoop contained midden shell with pipi, cockle and whelk present. The radiocarbon data, together with the known history of the area, suggest that the site was occupied at some point during the first quarter of the 18th century. Site R10/1503 was situated on the eastern edge of a natural terrace approximately 65m to the west of site R10/1501 overlooking the silted up inlet. The site comprised three intercutting hāngi and a firescoop with the features backfilled with dense shell midden deposits consisting of pipi, cockle and mud snail. The radiocarbon data suggest that the site was in use at some point during the mid- to second half of the 18th century. Lastly, site R10/1512 was situated approximately 30m to the south of R10/1503 on a broad, natural terrace at the base of the eastern slopes of the large hill, overlooking the former inlet and the Pūhoi River. The site consisted of an extremely large umu tī oven, an associated drying rack indicated by an alignment of four postholes, a cache of oven stones and two shell midden deposits that partly infilled the large oven. The shell midden deposits consisted almost exclusively of pipi, although there were small amounts of cockle shell and bones from snapper, as well as unidentified fishbone. Plant microfossil analysis of environmental samples taken from the fills of the umu tī provided evidence of large-scale landscape disturbance and starch grains also provided evidence that kūmara had been cooked in the large oven. Radiocarbon dating of three samples from pipi shell and charcoal indicates that the site was in use during the first quarter of the 18th century.

Site R10/1502 was a shell midden deposit situated in isolation in the east of the 3 Puhoi Road property approximately 40m west of the northbound carriageway of the former SH1. The shell midden consisted of pipi and cockle with radiocarbon dating suggesting a date of deposition during the first half of the 18th century.

Site R10/1499 was also situated toward the east and in the north of the 3 Puhoi Road property some 80m from the Puhoi Road and SH1 junction. The site consisted of a discontinuous and patchy shell midden deposit of pipi and cockle which radiocarbon dating indicates was deposited around the turn of the 18th century.

Midden R10/1106 was situated on two terraces on a spur 40m west of the former SH1. The site consisted of three midden deposits with associated features (e.g. firescoops and postholes). Dates from the midden deposits and firescoop suggest occupation from the first half of the 18th century to early 19th century.

Lastly, site R10/1498 was situated very close to the northern boundary of the 3 Puhoi Road property, overlooking Puhoi Road and the Pūhoi River to the north. The site consisted of a moderately sized shell midden deposit and a number of associated hāngi as well as a number of postholes and a stakehole that likely attest to the presence of drying racks for curing and preserving fish. Radiocarbon dating suggests that the site was utilised from the latter half of the 17th century to the early 18th century.

With the exception of the rock oyster present in sites R10/1505 and R10/1514, all of these shellfish species could have been harvested from the Pūhoi River estuary and the sandy shore at nearby Wenderholm. The rock oyster could have been procured from a rocky shoreline outside the estuary on the Hauraki Gulf coastline in the surrounding area.

517 State Highway 1 (SAP 9)

There were three single phase shell midden sites located on the 517 State Highway 1 property north of the Pūhoi River (R10/1495, R10/1509 and R10/1510). Site R10/1495 is not discussed as the site was only exposed within a fencing posthole which was subsequently moved to avoid the midden and, as such, the site was not investigated. Site R10/1510 was situated on flat ground overlooking the eastern banks of the Pūhoi River and the alluvial floodplain within a large meander loop of the river. The site consisted of a shell midden, only partially impacted by the works, that consisted predominantly of cockle with pipi also present and which radiocarbon dating indicates was deposited around the turn of the 18th century. This is contemporary with the Phase 2 occupation of site R10/1417 approximately 120m to the north-northwest (see Section 8.4). Lastly, site R10/1509 was situated on a small terrace on the steep southeast trending slopes that descended from the high ground above the Pūhoi River and close to the western boundary of the project area. The site consisted of a single, small shell midden deposit of cockle and pipi which radiocarbon dating indicates was deposited during the last half of the 16th century, contemporary with Phase 1 of site R10/1417 below and to the south.

8.3.2 Discussion of Single Phase Shell Midden/Oven Sites

The results of the archaeological excavations of the smaller, single phase shell midden sites, together with radiocarbon dating analysis, strongly suggest that the sites were formed by short duration visits, for the most part likely to be in the order of days up to a few weeks, and perhaps in some cases, such as site R10/1498 in the north of the 3 Puhoi Road property, simply reflecting an advantageous and attractive area to stop and camp when transiting up or down the river that was revisited regularly by a group over a number of years.

The shell middens and associated ovens attest to the procurement, processing, cooking and consumption of marine resources across the landscape of the lower Pūhoi River valley.

Resource Procurement Strategies

Analysis of shell midden samples provided evidence of the use of the estuarine environment of the lower reaches of the Pūhoi River and its inlets in the procurement of shellfish, with cockle (tuangi) and pipi being the main species exploited. Bickler et al. (2003: 143) noted that on the east coast area north of Auckland exploitation of pipi and cockle occurred more regularly when compared to other marine resources. The analysis of the midden samples taken from almost all of the shell midden sites at Pūhoi also strongly suggests that the Māori occupants of the area clearly targeted cockle and pipi, when utilising the rich shellfish resources found in the tidal inlets and flats of the lower Pūhoi River Valley and estuary. With the exception of rock oyster, all of the shellfish species represented within the shell midden deposits would almost certainly have been gathered locally from the Pūhoi River estuary, and in the case of pipi perhaps also from the sand spit and beach environment of Wenderholm at the Pūhoi River mouth. Rock oyster could also have been gathered from the rocky shore at the base of the headland on the northern shore of the river mouth. Although it is of note that the earliest of the shell midden/oven sites (R10/1508), located on the northern banks of the Ōkahu Inlet, consisted almost entirely of mud snail (tītiko). It is tempting to think that the six ovens that comprised the site might reflect a brief visit by a group camping on the banks on their way inland to, or perhaps,

back from a hunting foray and making a feast of the plentiful tītiko that are still present in the inlet today. Conversely, the six ovens may represent the deliberate targeting of tītiko, a delicacy, perhaps to contribute to a specific feasting occasion.

With the sole exception of the large umu tī site R10/1512 (where snapper bones were present), fishbone or avifaunal remains were conspicuous by their absence within any of the other shell midden samples. In the wider geographical area, fishbone is often recovered from shell midden deposits, with species such as mackerel, snapper, barracouta, kahawai, red gurnard, blue mackerel and probably flounder recorded across 30 middens investigated on the Omaha sandspit (Campbell et al. 2004: 140). However, the fact that very little fishbone was recovered from the majority of the midden samples does not preclude fish being targeted as a resource by groups present within the lower Pūhoi River valley. Instead, it may simply indicate that soil conditions were not conducive to the survival of fishbone, or equally, that taphonomic factors such as the scavenging of fishbones by kurī (dogs) removed them prior to the site being sealed beneath soil formation. As Phear et al. (2019: 116) suggests, the absence of fishbone can also be explained by the probability that smaller midden sites represent short duration fishing camps, where whole fish are cured on drying racks to be taken to permanent settlements where they would be consumed later. The archaeological data from the smaller Pūhoi middens (including the in-ground evidence for fish drying racks seen in the posthole alignments) seems to confirm this interpretation. The postholes representing drying racks found at a number of the smaller midden sites located on terraces and ridge spurs indicate that fish caught in the river, estuary or possibly the ocean, were brought to such sites for processing, and were well away from main settlement areas. These small midden sites, on elevated ridges and terraces, are fairly typical of coastal archaeological sites across the wider region.

When the composition of the Pūhoi to Warkworth road project middens is compared with that of the seven shell midden sites that were exposed during the construction of the Northern Gateway Toll Road (to the south of the current project area), there are clear differences. Five of those shell middens were situated to the south of the Johnstones Hill Tunnels, either on flat-topped ridges or on land overlooking the southern banks of the Waiwera River, while the sixth was located further south on a ridge in the Chin Hill area to the west of Hatfields Beach (Foster 2009: 11-12). The seventh site (R10/1163) was situated approximately 180m northeast of the south-bound tunnel entrance on land overlooking the Pūhoi River (Foster 2009: 15). The site of the shell midden was also only some 390m to the southeast of midden site R10/1504, located to the south of and very close to Pā o Te Hēmara Tauhia (R10/921) on the Stanaway property to the northwest of the Johnstones Hill tunnels. All of the Northern Gateway Toll Road middens were dominated by pipi shell, which varied in percentage from site to site by as much as 90.31% (R10/1015) to 67.54% (R10/1164), with the remaining balance of the midden composition being cockle and lesser amounts of mud snail, tuatua, whelk and scallop (Foster 2009: 16). In comparison, the small shell midden sites investigated during the Pūhoi to Warkworth road project earthworks, were dominated mainly by cockle, with lesser amounts of pipi, mud snail and occasionally rock oyster. It is likely that the contrast in composition between the two groups of middens is mainly due to geography rather than reflecting differing intentional resource procurement strategies. The middens analysed during the Northern Gateway Toll Road project were situated in proximity to the sandy beaches of Waiwera and Hatfields Beach to the east, which is the perfect habitat for pipi, while the lesser amounts of cockle could have been harvested from the muddier environment of the Waiwera River valley and estuary. Even site R10/1163, located to the north of the Johnstones Hill Tunnels, was situated within easy access of the sandy shore at

Wenderholm, being close to the Pūhoi River estuary. The shell middens analysed for the current project, however, were clearly dominated by cockle with the exception of R10/1516 and R10/1508, located on the northern banks of the Ōkahu Inlet, which consisted almost exclusively of mud snail. The increased frequency of cockle and the lesser amounts of pipi in the samples is somewhat expected, as the distance from the estuary and the sandy shore at Wenderholm increases up river and the environment becomes increasingly muddy, a much more suitable habitat for cockle and mud snail than pipi. The increased prevalence of mud snail in the Pūhoi samples, in contrast to those of the Northern Gateway Toll Road middens, also further confirms this. The increased quantities of pipi (but still in lesser quantities than cockle) in the samples from sites R10/1498 and R10/1509 in the north of the Pūhoi River valley does suggest the deliberate targeting of pipi and likely demonstrates a trip downriver to the Wenderholm area to procure it.

The large oven site R10/1512 was consistent in size and depth with an umu tī, which could suggest that the feature had been used for cooking the starch-rich roots of the cabbage tree (*Cordyline australis*), although it is noted that no starch grains or phytoliths of cabbage tree were identified within the plant microfossil samples. However, this form of larger and deeper oven was also used for cooking large quantities of other starch-rich foods such as kūmara (*Ipomoea batatas*) and the rhizomes of bracken (*Pteridium esculentum*). Indeed, starch grains of kūmara were present within the environmental samples and confirm that it had been cooked within the feature. Large amounts of tree/shrub phytoliths present within the environmental samples attest to the considerable quantity of fuel required to heat the relatively large amount of oven stones such a big oven feature would have required, a fact perhaps also confirmed by the presence of a large cache of oven stones that were found adjacent to the feature. The plant microfossil analysis also provided evidence of large-scale landscape clearance and disturbance by early Māori in the area.

Chronology

Prior to the new Pūhoi to Warkworth road construction works, there was no radiocarbon dating evidence relating to the Pūhoi River valley, and a paucity of dating evidence in the wider area. Excluding sites R10/1106, R10/1417 and R10/1484 (discussed separately below), some 28 radiocarbon dates were produced from samples from 22 of the smaller shell midden/oven sites (Figure 8.1). The results of the radiocarbon analysis illustrate that areas of the western side of the lower Pūhoi River valley, including its inlets and the tops of spurs and ridges descending from the higher ground in the west, was occupied from the second half of the 1400s AD through to around the end of the first quarter of the 19th century, when the area was abandoned in the face of devastating Ngāpuhi raiding (Figure 8.1 and Figure 8.2).

The earliest of the small midden/oven sites is site R10/1508, situated on the northern banks of the Ōkahu Inlet, which consisted of six intercutting hāngi that were backfilled solely with mud snail shell, with the backfilling event dating to around the second half of the 1400s AD; while site R10/1505, situated on a ridge spur descending from the large hill on the former 3 Puhoi Road property, appears to date to the beginning of the 1500s AD. The dates produced by the majority of the smaller shell midden sites lie in the range 1650-1800 AD. Starting in the south of the project area, midden sites R10/1496 and R10/1504 situated just south of Pā o Te Hēmara Tauhia (R10/921) both date to the second half of the 1600s AD, while moving to the north of the Ōkahu Inlet and the 11B and 22B Billing Road properties, site R10/1516 is the greater part of 100 years earlier, dating to either side of the

turn of the 17th century. The other sites on the Billing Road properties date from around the last quarter of the 1600s AD (R10/1497 and R10/1506), through the turn of the 18th century (R10/1517) to the later 1700s and possibly as late as the turn of the 19th century (site R10/1515).

On the larger 3 Puhoi Road property, the sites are all later than the early 16th century R10/1505 (mentioned above), with all the remaining midden/oven sites dating from the period 1650-1800 AD and it is noted that this period is contemporary with both the R10/1106 site and with the full sequence of occupation at the multi-phased occupation site R10/1484. The three calibrated dates from the umu tī site R10/1512 suggest that it was constructed and used at some point from the last quarter of the 17th century to the early 18th century, with the deposition of the shell midden on top of the backfilled feature completing the sequence of activity. The dates indicate that site R10/1512 was contemporary with the Phase 2 occupation of site R10/1484 situated 150m to the south-southeast on the ridge top above.

North of the Pūhoi River on the 517 State Highway 12 property, the shell midden site on the terrace high above the floodplain (R10/1509) dates from around either side of the middle of the 1500s AD and is therefore contemporary with the Phase 1 palisaded enclosure of site R10/1417. The other dated site, R10/1510, dates to around the turn of the 18th century and is contemporary with the Phase 2 occupation of the nearby site R10/1417.

The calibrated radiocarbon dates produced by many of the smaller shell midden sites sit well with the shell midden sites that were dated during the archaeological investigation of the Northern Gateway Toll Road between 2004 and 2009 (Foster 2009). Six midden sites were dated, all but one of which were situated south of the Johnstones Hill Tunnel and the southern banks of the Waiwera River (Foster 2009). The other site (R10/1163) was situated approximately 175m northeast of the northern portals of the Johnstones Hill Tunnel, and as such represents the nearest dated archaeological site to those of the current project, being also situated within the Pūhoi River valley (Foster 2009: 15). Four of the five midden sites to the south of the Waiwera River produced calibrated radiocarbon date ranges of between 1500 AD and 1820 AD, with the highest probability for occupation of the area during the 17th century (Foster 2009: 17). This date range fits well with the dates of the two sites (R10/1496 and R10/1504) which were situated to the south of Pā o Te Hēmara Tauhia R10/921 on the Stanway Property in the far south of the project area and to the northwest of the northern Johnstones Hill Tunnel portals, both of which were occupied within the second half of the 17th century. However, the other site to the south of the tunnels (R10/1160) and site R10/1163 to the north were both earlier, with calibrated date ranges of 1480-1690 AD and 1470-1690 AD respectively (Foster 2009: 17). These were interpreted as dating from the late 15th century (Foster 2009: 17) and, in the case of site R10/1163, would have been formed around the same time as site R10/1508 situated on the northern banks of the Ōkahu Inlet on the Billing Road properties approximately 650m to the north, which also dated to the second half of the 15th century.

It is interesting to note that with the exception of sites R10/1505 and R10/1514 the earliest sites in the date range of 1450 to 1650 AD appear both in the north and south of the Pūhoi River valley, reflecting the occupation of strategic locations (Figure 8.2). The sites in the north overlook the confluence between the Pūhoi River and Hikauae Creek, both navigable by waka and providing access into the interior as well as to the ocean. The early sites in the southern area also provide views out towards the river mouth and estuary as well as the sandspit at Wenderholm and would have been well placed to view any groups entering the river valley. Later sites seem to be concentrated more on top of the ridge spurs and natural

slump terraces that overlooked the river, as well as its floodplain and inlets. There was a particular concentration of sites situated on the east facing slopes of the large hill at the 3 Puhoi Road property. The majority of these sites are contemporary with the Phase 2 occupation of the large multi-phased occupation site R10/1484, although sites R10/1501 and R10/1511 are contemporary with the final occupation phase of that site.

Three of the small, short-duration single phase sites (R10/1508, R10/1505 and R10/1516) would have been active and occupied during the early phase of occupation at the large multi-phased site R10/1417 (in the second quarter of the 1500s), while several more are contemporary with its second and final phase of activities during the first half of the 18th century. It seems likely that the two larger sites (R10/1484 and R10/1417) served as a focus or perhaps performed the function of a hub for a population dispersed across the wider landscape.

Conclusions

While the scale of the archaeological investigations in the Pūhoi River valley has clearly generated an important source of archaeological data at the local and perhaps regional level, it is acknowledged that they represent a relatively narrow transect along the western side of the Pūhoi River valley. While the earthworks corridor of the new road passed through small estuarine inlets in the south, and crossed descending ridge spurs in the west, as well as the terraces on the lower slopes above the northern banks of the Pūhoi River, it conspicuously did not incorporate the high ground above, or the floodplain below. As such, caution is required when interpreting the data, with the caveat that we are only seeing a small part of the archaeological picture. Moreover, it is accepted that archaeological excavations can only ever find what remains in the ground, with the organic objects and ecofacts that would have comprised the vast suite of everyday objects most frequently decayed and long gone.

At present nothing can be inferred as to the nature, sequence and dating of settlement activities on either the high ground or the floodplain. It is highly likely, however, that the fertile alluvium of the floodplain and on the river terraces immediately above it would have been utilised for the cultivation of kūmara, although there can be no certainty unless the areas are assessed and examined. It is also noted that the floodplain within the large meander loop on the 517 State Highway 1 property (an extremely low-lying and boggy area) would have been an advantageous site for the cultivation of taro. It is also likely that areas of longer duration settlement activity, such as kāinga, or perhaps even fortified pā, if present are situated beyond the earthworks corridor, most likely on higher ground and above waterways to the west.

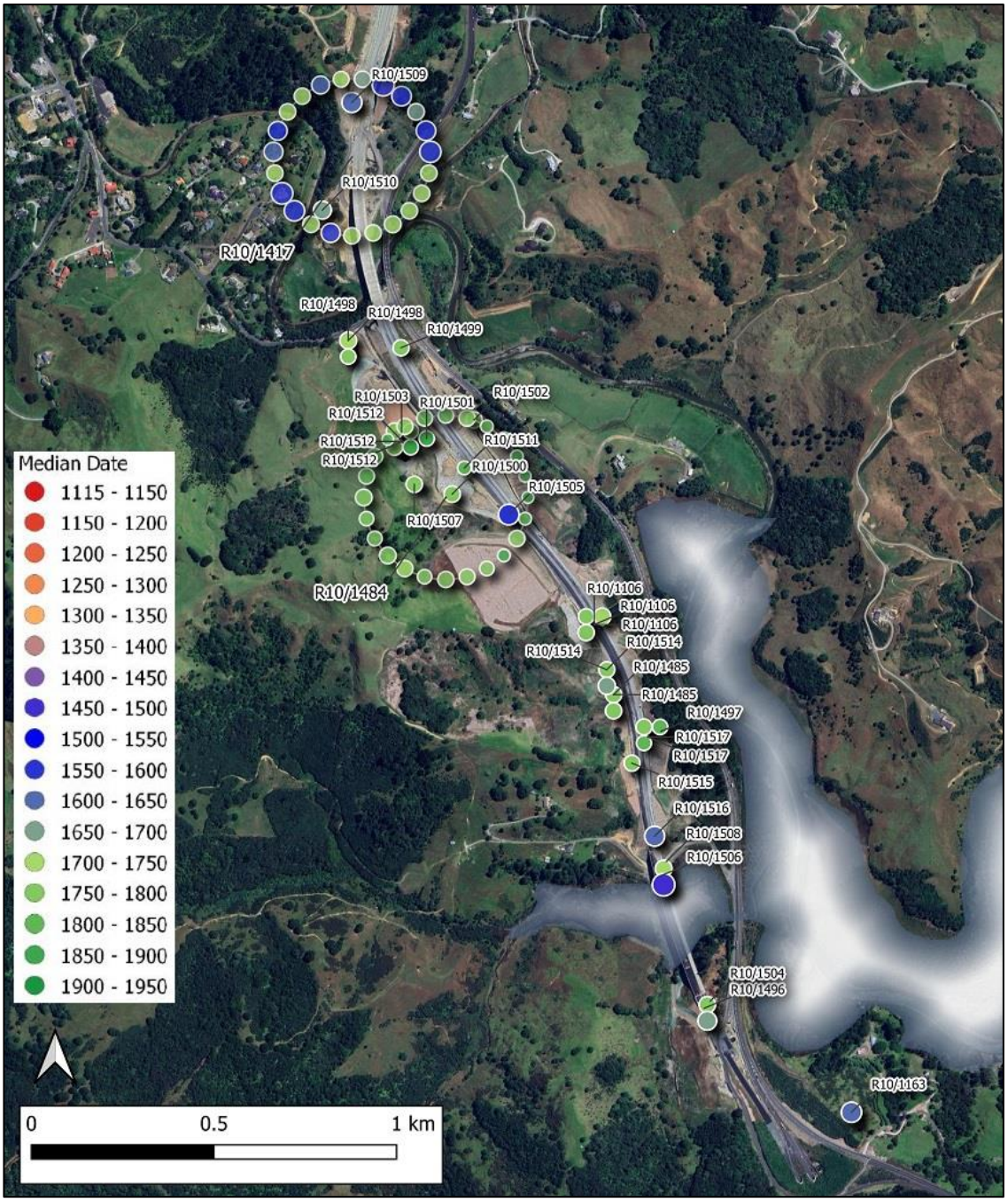


Figure 8.1 Calibrated radiocarbon dates from the Pūhoi sector of the Ara Tūhono – Pūhoi to Warkworth Road. NB. The two circular spreads of dates relate to the large volume of dates generated by the investigations of the multi-phase sites of R10/1417 and R10/1484

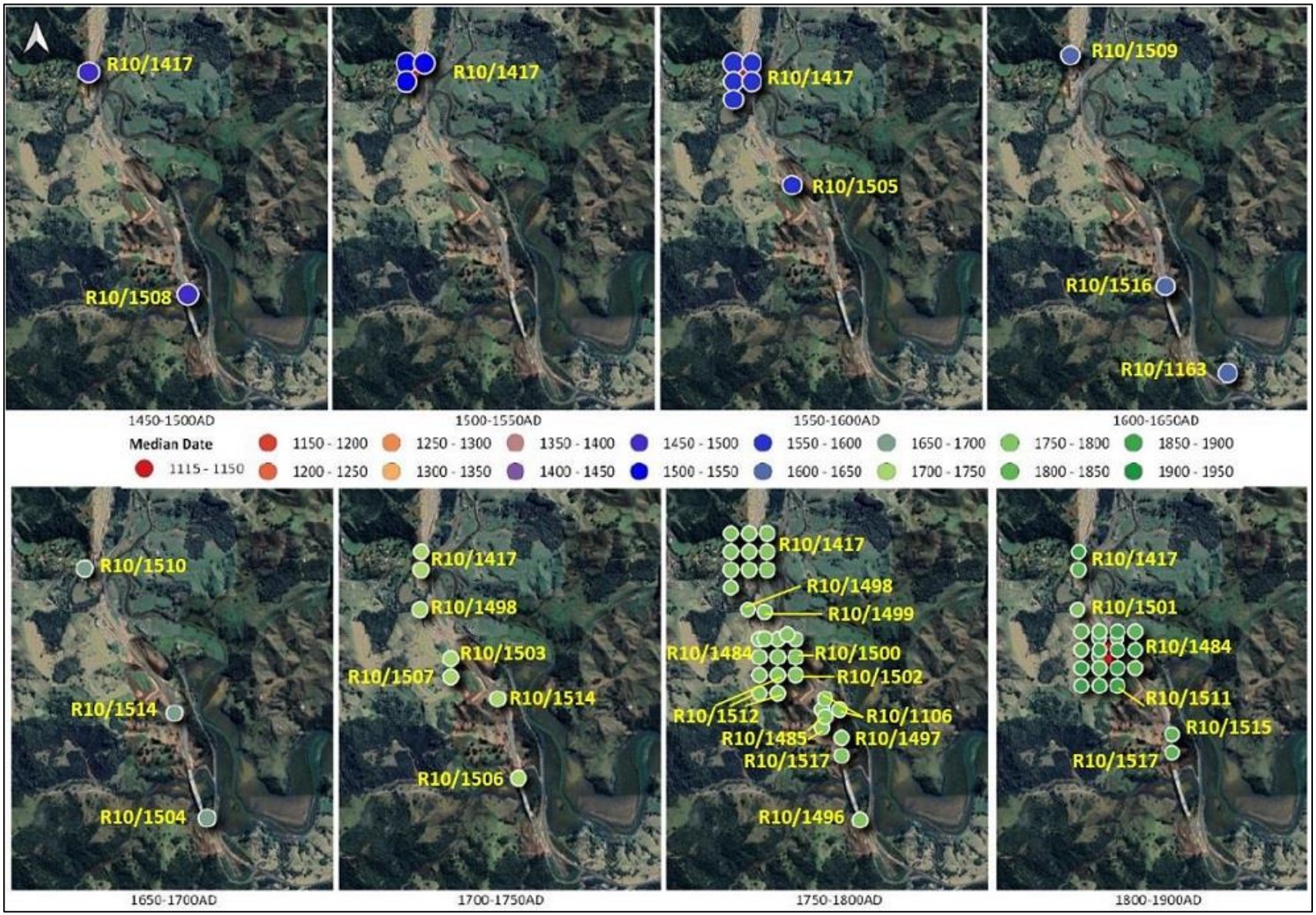


Figure 8.2 Radiocarbon dates across the project area by median date range. NB. Site R10/1163, exposed during the Northern Gateway Toll Road works, is included as it is close by, and dates for R10/1484 and R10/1417 do not include the Bayesian analysis recalibration

8.3.3 Site R09/2247 – Wooden Artefact Cache

Site R09/2247 was a findspot of a cache of seven wooden artefacts exposed within a buried palaeochannel located immediately on the western edge of Carran Road and close to its junction with Woodcocks Road, approximately 2.2km southwest of the northern terminus of the new road corridor. The site was the only archaeological site exposed during the roading works that was situated north of the Pūhoi River valley, and was also unique in that it consisted solely of a cache of artefacts within a natural flood deposit, rather than being found within an archaeological feature or deposit such as a shell midden. The artefacts were found preserved in relatively good condition within a waterlogged, poorly sorted flood deposit that consisted of twigs, small branches and leaves in a peaty silt that had been deposited in a meander bend of a small palaeochannel. Plant microfossil analysis of environmental samples taken from the flood deposit in which the artefacts were buried contained large amounts of forest pollen and spore types and, in conjunction with small amounts of bracken spores, this indicates an environment with considerable forest cover, and perhaps with minimal human activity, at least in the near vicinity of the site. The presence of pollen from *Restionaceae* (a family of rush-like plants) and spores of *Gleichenia* (a ground fern) in the sample also indicates that the localised area was probably a wetland.

The artefacts represent at least four digging sticks (kō) made of kanuka, a kō footrest (teka) of puriri, a carved post of rata, and a carved handle section of an unknown implement of manuka. The wooden implements represent proxy data for Māori horticulture in the wider area, if not in the immediate vicinity. While it will remain a matter of conjecture how the wooden artefacts came to be deposited within the palaeochannel, it is plausible that the items were washed into the stream channel during a flood event and taken downstream where the relatively long digging sticks became snagged on the banks of a tight meander bend, and were buried within a mass of twigs, small branches and leaves and subsequently buried in the blackish dark brown peaty silt that the artefacts were later exposed within.

The wooden artefact cache site R09/2247 located in the north of the project area to the west of Warkworth at Carran Road could not be dated.

8.4 Research Questions – Sites R10/1106 and R10/1417

Prior to the commencement of roading earthworks only two previously recorded archaeological sites (both shell midden sites) had been identified within the earthworks footprint, which consisted of site R10/1106 at the 3 Puhoi Road property and site R10/1417 located above the Pūhoi River at 517 State Highway 1. A research framework was formulated for these sites (see Section 1.4.2) with the aim of establishing the full extent and the nature of surviving archaeological evidence (structural features, environmental information, and artefactual and ecofactual material) within the sites by retrieving all possible evidence. In particular, the research aims focused on the nature of the occupation at the two sites and any associated activities, their chronology, the composition of the shell middens and what information that might provide on the resource procurement strategies of the sites' occupants. More broadly, the research aims were intended to show how the sites fit within the pre-European settlement archaeological landscape of the Pūhoi River valley and any relationships to other sites in the area such as Pā o Te Hēmara Tauhia (R10/921). An additional aim was that investigation of the sites would broaden existing

knowledge of shell midden sites and artefact assemblages of recorded settlement sites in the wider geographical area.

The sites are discussed sequentially below, with sections relating to the various research aims.

8.4.1 Site R10/1106 – Discussion

Site R10/1106 was situated on a flat-topped, west-east trending ridge spur that descended from the southern part of the large hill on the 3 Puhoi Road property. The site consisted of two terraces, one below the other, and both held commanding views to the south and southeast along the Pūhoi River and its valley. The ridge spur upon which site R10/1106 was situated had been fully cut through 40m to the east by the construction of the original State Highway 1 carriageway, and it is probable that the site originally extended across at least one other terrace before it would have reached the upper terrace of the Pūhoi River floodplain to the east.

Both the upper and lower terraces comprising the site had been vertically truncated in the past, most likely from farm track formation. The lower terrace in particular had been significantly truncated with the result that the original shell middens present had been completely lost while only the bases of cut features such as ovens and firescoops survived. Further exacerbating this was that the roots of the kauri trees that had once sat atop the ridge had also penetrated and distorted the archaeological features. Therefore, the opportunity to take samples for environmental analysis, such as plant microfossil analysis, was compromised. As such, the research aims can for the most part only be broadly examined.

Nature of the Archaeology

The archaeological remains that comprised site R10/1106 consisted of the remains of three substantial shell midden deposits, with a small number of associated cooking features on the upper terrace, while on the lower terrace cooking features such as hāngi and firescoops were present along with a number of postholes. Both terraces had been significantly vertically truncated by former farming activities, with the ground surface contemporary with the occupation of the terraces for the most part lost. This was most pronounced on the lower terrace, where the original shell midden deposit(s) had been completely truncated and lost. However, the fills of the oven and firescoop features contained shell midden hinting at the composition of the lost middens. The 17 postholes present on the lower terrace likely represent drying racks for the curing of fish and/or perhaps temporary screens and shelters. A single bin pit feature on the lower terrace may have been utilised for storage of kūmara or perhaps fishing equipment.

While the activities undertaken on both terraces reflect the procurement, processing and consumption of marine resources, the duration of occupation on each terrace is likely to have differed markedly. The upper terrace probably represented a quite short sequence of activity by a group cooking and consuming a relatively large amount of locally procured shellfish in just a couple of oven features, and working stone tools around fires, perhaps consistent with a group visiting or transiting through the Pūhoi River valley. Conversely, the lower terrace, with its greater number of cooking features and postholes as well as the bin pit, suggests a longer-term occupation. The postholes suggest that features such as

shelters were constructed and alignments also likely represent the presence of former drying racks for the curing of fish, perhaps before being taken to a more substantial and permanent settlement such as a kāinga associated with site R10/1484, situated on the large natural terrace to the west of the excavated part of that site. So rather than a group feasting, the nature of the lower terrace archaeology is more reflective of a group procuring local shell estuarine resources and processing them for consumption elsewhere, with smaller-scale daily consumption and cooking activities also taking place.

Structural Features

Due to the significant vertical truncation across both terraces, but in particular across the more intensively occupied lower terrace, this research aspect cannot be explored.

Material Culture

Just three artefacts, all consisting of lithics, were recovered during the excavation of site R10/1106. These consisted of a struck obsidian flake retrieved from the fill of a firescoop on the lower terrace, and two angular fragments of chert and argillite respectively from the fill of a firescoop on the upper terrace. The argillite originated from Mt Ears, D'Urville Island, Nelson region and represents long-distance trade. It displayed evidence of cortex polish, indicating that it had broken off a tool, likely an adze, probably as a result of resharpening or refurbishing works. Despite the extremely limited nature of the R10/1106 assemblage, it can still be seen to incorporate some of the standard material that is frequently found on many Māori archaeological sites. As all three artefacts were found within the fills of firescoops associated with cooking activities, it is easy to conjure the image of someone sitting around a fire sharpening an adze or perhaps working chert or obsidian cores to create stone tools.

Resource Procurement Strategies

Due to the scale of vertical truncation on the lower terrace, only shell midden deposits on the upper terrace could be sampled, although even these had suffered vertical truncation to some degree, so any conclusions drawn are based on the limited remnants of the midden deposits. The analysis of the shell midden material from the site demonstrated that the occupants of the site were mainly exploiting the local muddy shore environment of the tidal flats and inlets of the lower Pūhoi River for pipi and cockle, and also mud snail if present.

Chronology and Relationship with Other Sites

Radiocarbon dating of samples from the fill of a firescoop on the lower terrace and a sample of the largest of the shell middens on the upper terrace indicate that the two terraces were likely not occupied contemporaneously. The two radiocarbon determinations (Wk-52431 and Wk-52432) suggest that occupation of the upper terrace occurred during the first half of the 18th century, whereas the lower terrace was occupied later, during the second half of the 18th century, and possibly into the beginning of the 19th century. This indicates that the occupation of the upper terrace of site R10/1106 was contemporary with the Phase 2

occupation of site R10/1484 situated some 400m to the northwest on the next ridge spur. The lower terrace occupation corresponds with the Phase 3 occupation of R10/1484.

In terms of the wider archaeological landscape, the occupation of the upper terrace is broadly contemporary with shell midden sites R10/1498, R10/1501, R10/1502 and R10/1512 to the north, and with middens R10/1485 and R10/1517 to the south (Figure 8.1). The lower terrace activities are generally contemporary with shell midden sites R10/1500, 10/1503 and R10/1511 in the north and with midden R10/1515 to the south (Figure 8.1).

8.4.2 Site R10/1417 – Discussion

Site R10/1417 was situated on the property at 517 State Highway 1 to the north of the Pūhoi River which it overlooked as well as overlooking its confluence with the Hikauae Creek. The site was spread over two terraces on a roughly north-south trending ridgeline that descended from the high ground to the north and northwest. Both terraces held strategic views to the southeast and south along both waterways, including their confluence which was only some 165m to the southeast.

There was little evidence of any disturbance to the site, with well-preserved stratigraphy that represented two distinct phases of occupation on the site.

Nature of the Archaeology

Site R10/1417 consisted of 759 cut features situated on the two terraces which predominantly comprised postholes and stakeholes related to a palisaded enclosure, 15 kūmara storage pits, two whare, as well as three shell midden deposits with associated features such as earth ovens, firescoops, and posthole alignments. The site was well stratified with the archaeology relating to distinct phases.

The earlier phase consisted of a palisaded enclosure on the upper terrace which contained 14 kūmara storage pits, which were somewhat unusually sub-circular to slightly oval in shape, and which had an associated above ground roof superstructure; they are referred to here as rua porotaka. Perhaps surprisingly, a further rua porotaka, which was also by far the largest of the features, was situated outside of the upper terrace palisade on the lower terrace.

Also associated with the early occupation phase was a rectangular whare, an elevated storage house (pātaka), an elevated food platform (whata), and some hāngi/firescoops on the upper terrace, while an occupation layer containing considerable amounts of burnt material (charcoal and burnt stone) was present on the lower terrace and also reflected the final stage of the Phase 1 occupation of the site. The buried soil deposit 4005 on the upper terrace formed subsequent to the abandonment of the site at the end of the Phase 1 occupation and prior to the Phase 2 occupation.

3D virtual reconstructions of the Phase 1 features on the upper and lower terraces are presented in Figure 8.3 to Figure 8.5.

The Phase 2 occupation of site R10/1417 consisted of a large shell midden deposit on the upper terrace, along with a further three small midden deposits and a number of associated hāngi and firescoop features. Additionally, a rectangular whare with a stone-lined hearth was also present on the upper terrace along with a number of posthole alignments likely indicative of drying racks for curing fish. Phase 2 occupation features on the lower terrace

consisted of a moderate sized shell midden deposit along with a smaller one, some earth ovens and postholes, and an occupation layer/lithic working area which produced an assemblage of 94 lithic artefacts that consisted predominantly of obsidian, with chert, basalt and sandstone artefacts.

3D virtual reconstructions of the Phase 2 features are presented in Figure 8.6 to Figure 8.8.

Figure 8.3 3D virtual reconstruction, facing north, of the Phase 1 occupation of site R10/1417 showing the palisaded enclosure, whare and rua porotaka on the upper terrace, and the large rua porotaka on the lower terrace. The reconstruction shows the landscape setting of the site well, with the Pūhoi River far below to the west (3D image by Thomas MacDiarmid)

Figure 8.4 3D virtual reconstruction facing north-northeast and looking across the Phase 1 occupation of the two terraces at site R10/1417 (3D image by Thomas MacDiarmid)

Figure 8.5 3D virtual reconstruction, looking west, of the Phase 1 occupation on the two terraces of site R10/1417, with the large rua porotaka conspicuous on the lower terrace (3D image by Thomas MacDiarmid)

Figure 8.6 3D virtual reconstruction of the Phase 2 occupation on the two terraces of site R10/1417, looking west (3D image by Thomas MacDiarmid)

Figure 8.7 3D virtual reconstruction with top-down view of the Phase 2 occupation of site R10/1417 (3D image by Thomas MacDiarmid)

Figure 8.8 3D virtual reconstruction looking north across the upper terrace of site R10/1417 towards the Phase 2 whare 5077 with cooking and fish processing activities taking place (3D image by Thomas MacDiarmid)

Structural Features

The remains of structures on the R10/1417 site consisted of the palisade, two successive whare, 14 rua porotaka roofed structures on the upper terrace and the single, large, rua porotaka on the lower terrace (the rua porotaka are discussed below separately). The palisade on the upper terrace was the largest of the structures, and enclosed an area of some

360m² in which was situated the large early phase whare, the 14 rua porotaka, and a probable pātaka. The palisade consisted of a double row of postholes along its southern, eastern and northern courses, but only one row of postholes along its naturally well defended western side. The enclosure had two entrances on a northeast-southwest alignment with the main entrance positioned in the south overlooking the Pūhoi River and its valley, while the other was situated diagonally opposite within the northern course of postholes facing up hill. The main entrance incorporated a particularly dense concentration of large postholes, that from their depth and size indicate that the timber posts housed in them would have been of considerable size and height, perhaps consistent with carved pou whenua found within the palisaded walls of pā.

The palisade suggests a small defended kāinga in the early 1500s, with the defence of stored crops of importance. Large defended pā are not recorded until later, with large gardens and fortified villages typical of the Classic Period. Site R10/1417 can be considered an early indicator of changing social structures which may have resulted from an increase in the importance starchy crops played in the Māori diet following the loss of large protein/fat sources (such as moa and seals).

Wallace and Irwin (1999) provide a good discussion of Māori houses, which have been summarised in various ways by academics, the most basic distinction (Prickett 1982: 116) being between those made from pole and thatch and the 'carefully filled houses constructed of wrought timbers, with or without embellishment', such as meeting houses (Best 1924: 559). However, the knowledge of how these houses were constructed has been lost (Wallace and Irwin 1999: 67), and we only have predominantly archaeological features such as postholes, hearths, artefact scatters and other cultural layers as indicators of houses/whare in New Zealand archaeology. This is certainly the case with R10/1417, where postholes are the clear indicators of a whare, and in the later phase postholes and a hearth. While the posthole patterns do not show a clear central ridgepole typical of later period whare (see Wallace and Irwin 1999: 82) this could be explained as an earlier house type/prototype not yet fully developed into the form present in the Classic period. Wallace and Irwin (1999: 82) argue that the evidence found in the Kohika site (which included timbers) indicates that walls were 'constructed in the same manner as a post and batten fence and the only horizontal load-bearing element being the ridgepole. This architectural system appears significantly different from that employed in tropical Polynesia (eg. Buck 1921) but essentially identical to that found in meeting houses in the 19th century...' This was likely in response to a colder climate requiring thicker and better insulated walls, and the ability to dismantle and move the houses, with some cross-over in skills and techniques used from waka building technology (Wallace and Irwin 1999: 84). As no timbers survived from the whare at R10/1417, further details relating to the construction of the whare cannot be fully established. However, it is considered possible that the construction elements described by Wallace and Irwin may be applicable, at least in part, to the structures.

Rua Porotaka (Kūmara Storage Pits) and Horticultural Activity

The presence of the rua porotaka (round kūmara storage pits) at site R10/1417 attests to gardening activity and, in particular, the cultivation of kūmara in the vicinity of the site, most likely on the alluvial soils on the floodplain and its river terraces situated within the meander loop of the Pūhoi River to the south-southwest of the site. The storage of kūmara tubers in semi-subterranean storage pits was an essential part of the Māori horticultural cycle (Davidson et al. 2007; Jorgensen 2009; Law 2000). Storage pits were but one of a

number of adaptations Māori made to successfully cultivate what is essentially a perennial tropical cultivar in temperate conditions (Yen 1961, 1963). Kūmara cannot survive the low temperatures of the New Zealand winter and, after the growing plant itself had died, Māori stored tubers in a variety of pits through the winter to use as a seed crop for the next planting season (Davidson et al. 2007:6), as well as for consumption during the winter, although the latter were often stored in elaborately carved and painted above ground pātaka storage houses.

Kūmara storage pits are one of the most common archaeological features identified and excavated on Māori archaeological sites in Aotearoa, particularly so on North Island sites. While they are typically described as storage pits for kūmara, it has always been understood that the pits were used to store other food stuffs such as yam, taro, fern root and, on occasion, other non-perishable items (Davidson et al. 2007: 7. The two most commonly excavated and recorded forms of kūmara storage pits are rectangular pits with a peaked roof supported by a row of upright posts, and the (usually) bell-shaped subterranean rua with various forms of entrance seal (Davidson 1984: 122). However, early ethnographic accounts from the 19th and early 20th centuries suggest that there was a greater variety of storage pits both in terms of morphology and size, and in construction in either a semi-subterranean or wholly subterranean form (Best 1941: 584; Davidson et al. 2007: 7; Marshall 1836: 214 cited in Jorgensen 2009: 12-13). So, while kūmara storage pits are very common features found on Māori archaeological sites, the excavation of the rua porotaka, together with ethnographic accounts, illustrates that the range of forms usually recorded and described by archaeologists represents only a limited range of the variability that may have been present.

Of round-shaped pits, the archaeological literature refers frequently to the previously mentioned and wholly subterranean bell rua, which, while common in parts of the North Island such as the Bay of Plenty, are not commonly found on archaeological sites in the Auckland and Northland regions.

Other mention of round-shaped pits in the archaeological literature are confined to early 20th century accounts by Elsdon Best and George Graham (Best 1916: 80-81; Graham 1922: 122). Graham, recounting a visit to Otakanini Pā in the Kaipara District in 1922, observed a number of unusual kūmara storage pits that he referred to in his article title as ‘Rua-Kopiha. A peculiar type of kumara store-pit’, which he went on to describe as being some 3 feet wide and deep, and ‘thatched with raupo over a dome-shaped roof, the framework being thin stakes of manuka’ (Graham 1922: 122-123; see Figure 8.9). Graham described the dome-like roof as being about 4 feet (1.22m) high and at first glance made an analogy with old style beehives (Graham 1922: 122). He went on to state that ‘the interior was neatly lined from the base of the pit to the ceiling of the roof with bracken-fern, and the structures were quite impervious to wind and rain. The bottom of the pits were covered with a deep layer of mingimingi, and on this the kumaras were neatly stacked forming a pyramidical heap. The kumaras were taken out as required by a loop-hole or small door-way, which was kept closed by a neatly fitting bundle of manuka scrub’ (Graham 1922: 123). Graham stated that the locals referred to the pits as ‘kopiha’ or ‘rua-kopiha’ and therefore assigned that nomenclature to the round pits. However, this is erroneous as it should be noted that kōpiha in general just refers to a kūmara storage pit, and as such is merely a functional rather than form-based description.

Further round-shaped pits that were similar but with different elements to those seen by Graham were described in detail by Elsdon Best in his book *Maori Storehouses and Kindred Structures* (1916: 80-81), from which the following passages are quoted:

> 'Te Whatahoro[24] contributes the following notes regarding this type of storehouse: The rua tahuhu which was an excavated hole 3 feet deep, with a rounded roof which was covered in earth. He goes on to say that "the better part of the kūmara crop was placed in such stores—tubers selected for the purpose of cooking for guests. The two heke ripi (maihi) of a rua tahuhu were sometimes ornamented with notched patterns, termed whakatatara, but never with such carvings as are seen on a dwellinghouse, or the elaborate pataka carvings. Such notched heke ripi boards were also sometimes painted with horu, or red ochre, but never the plain ones. Only the store-pits of persons of importance were so treated.
>
> The rua whenua seems to have been much the same as a rua tahuhu—an excavated pit, with the roof above the ground-level. The excavated part was sometimes lined with slabs of tree-fern (ponga). To roof these pits pliant poles of manuka were thrust down into the earth, bent over into the form of an arch, and tied together in that position. Horizontal battens were then tied on to these poles, and the thatch lashed to these battens. The back wall was formed by inserting poles in the earth and bending their pliant tops over the rear end of the house (prior to thatching), and so lashing them. The front wall was vertical, and furnished with a small door and a pihanga, or, more correctly speaking, a koropihanga – a small opening for ventilation. When thatched the roof was covered with earth, thus leaving merely the front wall exposed. This is a Wai-rarapa form. The roof was always made with a slope; it was never flat. In the Whanga-nui district, we are told that the trunks of Dicksonia squarrosa were used for lining these food-pits, as well as for other purposes. Among the Tuhoe Tribe the trunks of several species of tree-ferns were used, and broad slabs or flakes of the trunks of Dicksonia fibrosa (punui) were employed therewith to cover the roof-frame of pit stores.
>
> When storing kumara, or sweet-potatoes, in such pits, the tubers are not allowed to come into contact with the slabs that form or line the walls, as such contact would cause decay to set in. The walls are lined, often with rushes, in order to prevent such contact. Many of such places had no wall-lining save rushes or fern.'
>
> (Te Whatahoro quoted in Best 1916: 80-81).

So it can be seen that within the literature there are a number of terms that could be ascribed tentatively for the pits found at site R10/1417 such as rua whenua/rua tahuhu, and the erroneously assigned 'rua kopiha' given to the pits at Otakanini Pā in Kaipara by Graham in 1922. However, the form of the pits seen by Graham at Otakanini Pā do appear to bear a strong resemblance to the Pūhoi pits. However, as rua kōpiha merely describes function it was decided to refer to the pits as rua porotaka (round pits).

Although rare, other round-shaped pits have been found on archaeological sites in the wider Auckland region before. During excavations undertaken at Auckland Airport by CFG Heritage Ltd between April 2008 and February 2009 as part of works in advance of the Northern Runway Development (NRD), some 34 large round pits were discovered and excavated (Campbell and Hudson 2011: 20). The features were described as ranging in size from 1 to 1.8m in diameter, up to 1m deep, and cut with straight walls and flat bases, some with drains running around the edge of their bases (Campbell and Hudson 2011: 20-21). The authors noted that this kind of pit feature had not been previously recorded archaeologically, and made the correlation with the pits that Graham had observed at

[24] Hoani Te Whatahoro Jury (1841–1923) was a Ngāti Kahungunu scholar, recorder, interpreter and a prolific writer on Māori traditions and customs (Parsons 1990).

Otakanini Pā and erroneously referred to as rua kōpiha, with the same term being applied to the round pits at the airport site (Campbell and Hudson 2011: 20).

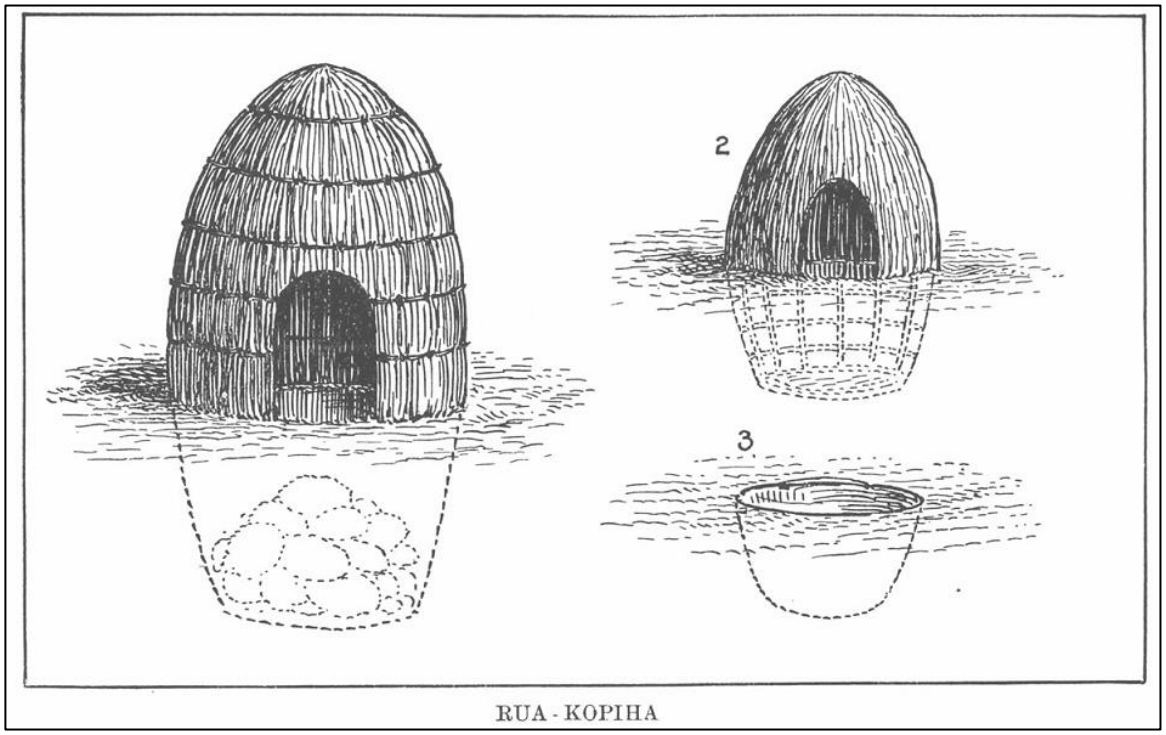


Figure 8.9 The schematic sketch of rua kōpiha from Graham 1922

The round pits discovered during the NRD investigations, while morphologically similar to those found at site R10/1417, differ in two aspects. Firstly, there was no evidence of any above ground roof structure in relation to any of the features, and secondly many of the pits had been reused for the burial of human remains, and also in some cases for dog burials. The absence of postholes relating to a roof structure are actually not at all problematic, as during the investigation of the NRD development area it was ascertained that ploughing had truncated the upper levels of the site. Therefore, any small, relatively shallow postholes such as those related to the above ground superstructure of the pits at Pūhoi, would have been truncated by the ploughing and lost. The main difference, therefore, is in the secondary re-use of the features for burials, and the fact that many of the pits also contained food waste in the form of shell midden, although the authors did acknowledge that the primary use of the pits would have been for the storage of kūmara. In contrast, the pits at site R10/1417 all seemed to have been intentionally backfilled after use, likely utilising the upcast material from the excavation of a new pit. This follows the usual sequence often found on sites with a number of rectangular, roofed storage pits.

A further two sites, both in the Auckland region, have also produced similar features. At Bishophill Farm, Matakana, a pit feature that was 1.18m wide and 0.80m deep and cut with vertical sides and a sloping base was observed in the baulk edge section of the investigation area (Phear et al. 2019: 62). Morphologically, the Bishophill Farm pit was similar to a number of the examples at Pūhoi, being of similar dimensions in section, and with the same sloping base and trample layer as a number of the site R10/1417 pits. It is also perhaps a significant detail that the Bishophill Farm site is also in the rohe pōtae of Ngāti Manuhiri.

One other site, R11/3411 located in Māngere, also had one pit of this type on the summit of a small knoll (see Larsen and Farley 2022:72)

Although there is no direct evidence of pre-European contact gardening on the R10/1417 site, it is noted that the three major crops cultivated by Māori in Aoteroa – kūmara (*Ipomoea batatas*), taro (*Colocasia esculenta*), and yam (*Dioscorea alata*) – all flourish in alluvial soils (Jones 1986, 1991). Kūmara in particular is much more dependent on silty or sandy friable soils than on inherent soil fertility (Yen 1963 cited in Jones 1986: 6). Moreover, it has long been recognised that large low-lying alluvial plains have been important in the New Zealand Classic Māori phase for cultivation (Best 1980, cited in Jones 1991: 144). Consequently, the well-drained alluvial soils, particularly those found on the river terraces immediately above the Pūhoi River floodplain would have been ideal for the cultivation of kūmara. It is therefore considered highly likely that the kūmara that would have been stored in the rua porotaka would have been grown in the very near vicinity of site R10/1417 on the fertile alluvium of the floodplain.

Material Culture

The artefact assemblage produced by the investigation of site R10/1417 consisted of a total of 314 stone artefacts relating to tool manufacture, while two shell scrapers were also present. The lithic artefact assemblage reflects the use of local sedimentary and volcanic stone, as well as the importation of obsidian from Mayor Island, the Coromandel Volcanic Zone and from north of the Coromandel Volcanic Zone, argillite from the Nelson region and nephrite jade (pounamu) from the west coast of the South Island. The presence of an argillite adze, a nephrite chisel and the identification of polish on other stone specimens attests to the reworking of adzes at the site, although the limited frequency suggests this was not undertaken at a large scale. The majority of the obsidian was geochemically traced to a source from north of the Coromandel Peninsula, and which would most likely have been located on Great Barrier Island (Aotea).

The vast majority of the lithic assemblage was recovered from occupation layers/surfaces and reflect either the use of stone tools in carrying out specific tasks, and/or the re-working of previously manufactured tools. Almost 60% of the total R10/1417 artefact assemblage was produced by just three Phase 1 contexts relating to an occupation layer associated with the Phase 1 whare (context 4055) and the buried soil layer (context 4005), both situated on the upper terrace, and the occupation layer associated with cooking activities (context 4168) on the lower terrace. Obsidian dominated the Phase 1 assemblage, comprising some 77% of the total, with 30 flakes and at least 6 cores present, with the remainder consisting of small pieces of debitage. In addition to the obsidian, specimens of chert, argillite, basalt and greywacke were also recovered from the same three Phase 1 contexts. Of particular note are the 36 artefacts that were retrieved from the occupation layer (context 4035) associated with the Phase 1 whare (context 4055). The artefacts consisted of 31 pieces of obsidian (four flakes, 26 pieces of debitage and a core), with the remainder consisting of 2 pieces of chert, 2 pieces of argillite and a single specimen of basalt. It is likely that the context 4035 artefact assemblage represents the production of a number of different tools, and it is plausible that it was produced during the construction of the whare, or enclosure, or perhaps at some point during the lifespan of these structures. The buried soil layer (context 4005) formed during the active use of the upper terrace palisaded enclosure (context 4344), the rua porotaka group and associated whare, with 111 artefacts, represents 59% of the Phase 1 assemblage. As with occupation layer 4035, the greater majority of the

buried soil assemblage consisted of obsidian (n=83) with the remainder formed of chert, argillite (with characteristics consistent with the Mt Ears source on D'Urville Island in the Nelson region), a single piece each of greywacke and basalt and a hammerstone of unidentified volcanic rock. Obsidian geochemical analysis of two obsidian items from context 4005 (a producer core and an angular fragment with cortex present), along with a flake from the Phase 1 occupation layer (context 4168) on the lower terrace established that the chemical composition of the three samples strongly suggests that they originated from Mayor Island (Tūhua) rather than Great Barrier Island (Aotea).

The artefact assemblage produced by the excavation of Phase 2 contexts was smaller than that produced by the earlier Phase 1 contexts, consisting of some 127 specimens from seven contexts and comprising just over 40% of the total R10/1417 artefact assemblage. The bulk of the assemblage was derived from the occupation surface (context 4169) interpreted as a lithic working area on the lower terrace which produced 94 artefacts, 84 of which were of obsidian with the remainder consisting of chert debitage, a basalt hammerstone, a sandstone abrader/grinding stone, and two pieces of debitage from an unidentified volcanic rock. Of note within the context 4169 obsidian assemblage was a knife, 25 flakes (six of which had been utilised as cutting tools) and four producer cores. Geochemical analysis of one of the flakes established that it was of Mayor Island origin. It is interpreted that the working surface area was used for the production of lithic tools, with the fragments of sandstone present throughout the layer representing the waste produced by the use of sandstone abraders and hōanga (grindstones).

The six other Phase 2 contexts that produced lithic artefacts were all situated on the upper terrace and consisted of three shell midden deposits, the fill of a hearth, the fill of an oven and the fill of a posthole in the whare 5077. Of particular note were the Duff Type 2B argillite adze retrieved from the fill (context 4025) of hāngi 4024 that had been cut into the main shell midden deposit (context 4001), and the bevel fragment of a nephrite (pounamu) chisel that was recovered from the midden deposit itself. Both of these tools displayed evidence of polish, with the adze also showing hammer dressing, suggesting it was at an earlier stage of production prior to breaking and then being discarded in the oven fill. Other artefacts that were classified as tools consisted of four sandstone abraders and three possible hammer stones. Also of note was a basalt producer core and a utilised greywacke flake, both from the main midden deposit, a chert core from midden 4004, and two sandstone abraders from midden deposit 4052.

That obsidian is the dominant component of the R10/1417 lithic assemblage is unsurprising, and is consistent with assemblages of other sites regionally and within the North Island generally. Nearly all of the geochemically analysed obsidian was derived from Great Barrier Island, to which the inhabitants of site R10/1417 would have had access. The Great Barrier and Mayor Island obsidian, Nelson region argillite and the pounamu chisel fragment attest to inter-island trade networks.

Resource Procurement Strategies

Food

The three shell midden samples analysed from site R10/1417 were all retrieved from the upper terrace, from the large shell midden deposit 4001, a smaller shell midden deposit 4004, and the fill of earth oven 4082. A total of eight shellfish species were present within the samples, five of which (cockle, pipi, mud snail, tuatua and rock oyster) represented the targeted procurement of a resource, while the other three (common trophon, many lined

whelk and mud whelk) represented unintended bycatch. Cockle comprised some 55% of the total of the combined samples, with pipi forming just under 38% of the total sample, while tuatua and mud snail were both just below 3.5% of the total sample and rock oyster negligible at under 1%. That the majority of the upper terrace samples were dominated by cockle with pipi forming the bulk of the remainder is no surprise and compares well with the composition of the short-duration shell midden sites. However, unlike all of the other shell midden sites (excluding R10/1503), tuatua was also present in all three of the upper terrace midden samples analysed.

As the assemblage was dominated by cockle along with pipi and to a lesser extent mud snail, this indicates that the local muddy shore of the lower Pūhoi River and its tidal inlets would have been exploited for the majority of the catch, possibly in the very near vicinity of the site itself. The tuatua, meanwhile, would have been brought in from elsewhere, perhaps from one of the sandy beaches along the coastline from the river mouth. Also, the fact that tuatua and pipi were present together in the same samples indicates that they were likely harvested together on a sandy shore environment, while the cockle and mud snail would have been collected from muddy environments, along the tidal Pūhoi River and its inlets. Tuatua was also noted as being present in the two shell midden deposits that were situated on the lower terrace of the site. It appears that the second phase of occupation of site R10/1417 differed in character from the smaller single phase, short-duration shell middens distributed across the western side of the lower Pūhoi River valley. The characteristics of the site, including a whare with hearth and a lithic working surface, appear to reflect a more permanent settlement where people would venture out of the river valley and estuary to acquire food resources such as tuatua from ocean facing shorelines before bringing the catch back for processing, cooking and consumption along with more locally sourced shellfish.

In addition to the shellfish, just four fragments of fishbone were also present from samples taken from the upper terrace, with two specimens each recovered from the large shell midden 4001 and the fill of oven 4082. All four fish specimens were very small, poorly preserved and fragile, with three likely to be fragments of spines and not diagnostic of any species in particular. This clearly indicates that fish were caught and brought to the site to be processed, cooked, consumed and discarded. The presence of posthole alignments on both terraces, most likely indicated the presence of drying racks for the curing of fish, indicating the processing of fish on the site. The fact that the four specimens of fishbone were so fragile and poorly preserved indicates that the soil conditions present at site R10/1417 were not conducive to the survival of fishbone.

Sourcing of Stone for Tool Production

The R10/1417 lithic artefact assemblage consisted of items of locally sourced stone, as well as items sourced from offshore islands of the North Island and from the northwest and west coast of the South Island. Unsurprisingly, the dominant lithic material was obsidian (n=231), followed by chert (n=36), with lesser quantities of greywacke, basalt, argillite, sandstone, nephrite and unidentified volcanics. Of the 108 obsidian samples from site R10/1417 that were submitted for pXRF geochemical analysis, 104 were established as being from a source north of the Coromandel Peninsula, two from a source on the Coromandel, while four were established as being from Mayor Island. The source north of the Coromandel Peninsula is almost certainly Great Barrier Island (Aotea) and represents the advantageous and continued access to the closest source of obsidian for the inhabitants of site R10/1417. The Mayor Island obsidian perhaps represents either formal trade or

down-the-line exchanges. An analysis of strategies for procuring obsidian by communities living on the northeast coast of the North Island in the pre-European contact era (McCoy and Carpenter 2014: 12) determined that Māori mainly obtained obsidian through direct access to sources on offshore islands such as Great Barrier. The study also established that while the quantities of Mayor Island obsidian reduced markedly in the Late Period (1500-1769 A.D.), small and sometimes significant amounts continued to be acquired (McCoy and Carpenter 2014: 12). The continued acquisition of Mayor Island obsidian is perhaps not surprising when, as Walter et al. (2010: 510) contend, Mayor Island obsidian is the highest quality flake material in New Zealand, and it remained the most important cutting tool (certainly within the North Island) until the arrival of iron with European contact from the later 18th century.

Six of the artefacts retrieved from site R10/1417 originate from the South Island (Te Waipounamu) and therefore indicate long-distance trade in lithic resources by Māori. Both metasomatised argillites from the northern South Island and nephrite jade were (amongst other material such as Tahanga basalt, obsidian and chert) particularly important in the stone tool industry (Walter et al. 2010: 501). While the use of nephrite had originally been restricted geographically, after the 16th century it became increasingly the most valued, sought after and extensively moved resource within Aoteroa (Walter et al. 2010: 501). The bevel pounamu chisel fragment was recovered from the main upper terrace shell midden deposit, the formation of which is dated with the Bayesian analysis of the radiocarbon data to around the end of the first quarter to the middle of the 18th century, which fits well into the known chronology of nephrite distribution in the upper North Island at that time (see Walter et al. 2010: 508, for a detailed account of the development of the pounamu trade).

Along with Tahanga basalt, argillite was used in the production of flaked adzes. The characteristics of the argillite adze found in the fill of the Phase 2 oven on the upper terrace, as well as those of five of the other argillite artefacts, are all consistent with an origin on Mt Ears on D'Urville Island (Rangitoto ki te Tonga), Nelson region. The presence of the South Island argillite artefacts represents trade probably in the form of exchange, with obsidian from Great Barrier Island exchanged primarily for pounamu and perhaps also argillite.

Both the Phase 1 and Phase 2 lithic assemblages from site R10/1417 were formed subsequent to the collapse of the early long-distance trade networks centred on the distribution of Mayor Island obsidian around 1500 AD. As such the obsidian that dominated the assemblage consists primarily of locally sourced obsidian from a source on Great Barrier Island, while other lithics such as argillite and pounamu represent trade between the North and South Islands.

Chronology and Relationship with Other Sites

The conventional radiocarbon determinations from site R10/1417 suggested that the initial phase of occupation with the palisade enclosing the rua porotaka complex was established during the second half of the 15th century. While it is possible that the initial phase of activity occurred during the latter 1400s AD, it is considered, when the samples from other early phase features are taken into account, that the site was first occupied at some point from the beginning of the second quarter of the 1500s. The Bayesian analysis of the calibrated dates from site R10/1417 suggests that is likely that the construction on the upper terrace of the palisade 4344, whare 4055, pataka 4305 and the successive excavation and

building of the rua porotaka, as well as the large rua on the lower terrace, took place during the period from the mid- to late 1500s AD.

The large rua porotaka on the lower terrace was contemporary with the main occupation activity on the upper terrace, while the occupation layer 4168 formed later, either towards or at the end of the Phase 1 occupation sequence. The site was possibly then left largely abandoned for at least 50 to 60 years or so, with both lower and upper terraces being re-occupied from around the final quarter of the 17th century through to the mid-1700s. During this period the shell midden deposits were formed, with the large shell midden on the upper terrace being formed progressively from the 1720s onwards and throughout much of the remainder of the 18th century. At some point during the final quarter of the 18th century, site R10/1417 seems to have been abandoned permanently.

The Bayesian analysis of the radiocarbon dates from site R10/1417 narrowed the likely time ranges for the duration of both the Phase 1 and Phase 2 occupations, from that which the radiocarbon dating results alone had suggested. The Phase 1 activity likely lasted from circa 1530s to 1620 AD, while the Phase 2 occupation of the site lasted from circa 1680s to 1770s AD.

In terms of chronological relationships with other sites, the main Phase 1 occupation was contemporary with shell midden site R10/1509, situated on a small terrace approximately 100m north-northeast and high up on the ridge above site R10/1417, which dated to the second half of the 1500s AD (Figure 8.1). It is likely that a further site, potentially a kāinga, is situated on the ridge top, above the Pūhoi River to the northwest of the site, with which both sites R10/1417 and R10/1509 would have been contemporary.

In the wider landscape, shell midden site R10/1505, situated on a ridge spur at the 3 Puhoi Road property some 800m to the southeast, was dated to the first half of the 16th century and was probably contemporary with the earliest activities of the Phase 1 occupation of site R10/1417. Further afield on the Billing Road properties shell midden site R10/1516, situated above the northern banks of the Ōkahu Inlet, was dated to the turn of the 17th century and would certainly have been contemporary with the Phase 1 occupation of site R10/1417.

The earliest stages of the Phase 2 occupation were contemporary with midden site R10/1510, situated just 100m to the southwest on a terrace overlooking the Pūhoi River and which dated to around the turn of the 18th century (Figure 8.1). In the wider landscape the Phase 2 occupation was contemporary with shell midden/oven sites R10/1498 and R10/1499, situated across the river on the 3 Puhoi Road property to the south and southeast respectively, and which dated to the first quarter of the 18th century. The Phase 2 occupation was also contemporary with the large umu tī (site R10/1512) and middens R10/1501, R10/1502 and R10/1503, also situated to the south at 3 Puhoi Road and also dating to the first quarter of the 1700s AD. In the wider area the Phase 2 occupation was also contemporary with that of shell midden R10/1517, located nearly 1.5km to the southeast on the Billing Road properties. It is also noted that several of the smaller, single phase and short-duration shell midden sites are dated less securely during this period, and it is possible that site R10/1417 may have served as a hub for them as well as the contemporary sites discussed above.

The radiocarbon dating and subsequent Bayesian analysis of the calibrated dates has demonstrated that there was no contemporary activity at site R10/1484 during the Phase 1 occupation of site R10/1417. In fact, for the most part the Bayesian modelling data suggest that sites R10/1417 and R10/1484 were probably not occupied at the same time, or if they

were it was during very brief periods contemporary with the Phase 2 occupation of site R10/1417.

8.5 Research Questions – Site R10/1484

Site R10/1484 was exposed during earthworks undertaken to form the western embankment of the new road at the 3 Puhoi Road property. The site, in a prominent location overlooking the Pūhoi River and its floodplain as well as its confluence with the Hikauae Creek, was found to be remarkably intact with only very minimal disturbance, with a relatively artefact-rich buried soil, which also contained significant quantities of kōkōwai (red ochre). Of particular note were two large post-pit features which both contained two extremely large and deep postholes, the function of which was interpreted as being to support two large and tall upright posts such as pou whenua. Associated features such as a large ochre roasting oven and alcoves/niches found within the post-pits and postholes, suggested that the features were both culturally and archaeologically significant. This interpretation was leant more weight by the presence of two large toki (adzes), one clearly broken and one significantly worn, that were found in each of the two large postholes in the earlier of the two post-pits, as well as a relatively large volume of the kōkōwai found within the large oven feature and in the buried soil around the pits. Additionally, significant quantities of hōanga and abraders were also found within the buried soil, mainly in the vicinity of the post-pits. Therefore, it was considered that it was not just the potential pou whenua that were of significance, but the site and its constituent components as a whole (the kōkōwai, hōanga, alcove/nichess, toki, and its location) which suggest a particular activity was taking place here in relation to land and cultural identification, or perhaps even commemoration.

A research framework was formulated for site R10/1484 (see Section 1.4.4) with the aim of establishing the nature of the environment at the time of the original formation of the site, the location of the site in relation to the surrounding landscape and the movement of people within it, and how the site may have interacted with other contemporary sites both in the near vicinity, and within the wider archaeological landscape of the Pūhoi River valley. Additionally, it was hoped to establish a robust chronology for the site, as well as focusing on the nature of activities undertaken at the site and how they compare and contrast with those of other sites in the surrounding landscape.

The primary focus of the research aims, however, was to gain an understanding of the nature of the potential pou whenua features. This was to be achieved by examining the archaeological data, including their form, their location in the landscape, and the results of the analysis of the kōkōwai, artefacts and environmental samples. This would then enable interpretations regarding the monumentality of the site, and allow some insights into social processes and structures within the community that created them.

Toward the later stages of the excavation of site R10/1484, two oval hut-like structures were found which did not relate directly to the research framework. However, as these were themselves significant features, they will be discussed under the structures section of the discussion below.

8.5.1 Site R10/1484 – Discussion

Both Phases 1 and 2 of site R10/1484 are notable in that the archaeological remains differ from those found within the wider archaeological landscape, both in local terms and further afield across the motu. The nature of the first and second phase features suggests a locale of significance for waymarking which likely had a ceremonial element to it. Of interest is that it appears, based on the radiocarbon determinations and chronological analysis, that the wooden monuments/pou would have been erected and present in the landscape from the late 17th to mid-18th centuries, with iwi/hapu relationships likely firmly established in the area by this time. This is supported by the microfossil analysis which indicates the surrounding landscape only had evidence of moderate disturbance, which contrasts with early settlement sites where landscape clearance indicators are more concentrated (see McGlone 2001; Williams 2009). The hills had thus likely been cleared of trees as part of the wider clearance and settlement of the area prior to the modification of the ridge evidenced at the site.

The location of the place overlooking the river and estuary meant that any monumental landscape markers would have been visible by waka as well by people travelling overland. A 3D reconstruction is provided that gives a visual representation of what these features may have looked like (Figure 8.10). That the place held special meaning and was to be highly visible is clear. The purpose of placing large pou/markers is harder to distinguish; it likely held significance and meaning on many levels, such as identifying a specific iwi/hapu; potentially signifying a particular resource; or a wāhi tapu area; and enhancing the power/prestige of the iwi. Certainly the monumental element of the pou suggests a well-structured social group able to fell, move, carve/paint and erect the markers. Evidence from the ochre/kōkōwai pit and hōanga indicate that red paint was likely used on the pou, a colour traditionally used throughout the Pacific which holds special meaning from ritual to perceptions of power.

Figure 8.10 3-D reconstruction providing an example of how the pou whenua may have looked within the landscape during the first phase of occupation (3D image by Thomas MacDiarmid)

Of interest is the ovoid house with the sunken floor associated with the first post-pit/pou. While ovoid or round houses/huts are not commonly found in the North Island but have been widely documented in the South Island (see Anderson 1986), some examples have been found in Auckland previously, such as that found by Lawlor (1981) at Puhinui and in Oruarangi. Anderson (1986:95) describes the type of structure as follows:

> 'It has stakes set into the ground and braced by a rock pile around 2/3s of the margin. Another semicircle of stake holes, comprising seen pairs, but without a stone margin or evidence of a hearth, was located at Oruarangi, where it was regarded as evidence of a round dwelling' (Teviotdale and Skinner 1947:345).

The debate over the presence of round houses/huts in New Zealand when postholes are not present sits around the presence of stone-lined hearths (see Anderson 1986). However, in other parts of the Pacific, round-ended huts, ovoid huts and round huts all differed in their hearth construction in Molikai (see Kirch and Kelly 1975), Nukuhiva (Suggs 1961) and on Easter Island (Metraux 1940; McCoy 1976). Certainly, round huts were recorded ethnographically up to the 1860s or even later in Moeraki (see Beattie 1949: 97) and Anderson states they were recorded up to the 1880s above the bushline near lake Te Anau (Beattie 1949). Often described as 'bush shelters', Anderson argues that the round structures may have been more substantial and significant than temporary 'bush shelters'. For example, Anderson reports Beattie's Nelson informant describing whare pōtae, which were more or less conical and in which the occupants lay with their feet near a stone-lined hearth (takuahi) (Anderson 1986:103). In north Canterbury informants described a variant known as a whare potaka or whare porotaka (round), most common in the South Island. Huts could be divided into sleeping huts (whare moe), working huts (whare mahi) and storage huts (whare whata) (Anderson 1986: 104-105). Construction involved the use of branches bent to create a dome, with one description by Buick (1937:168-9) as follows:

> 'Setting the slender, manuka poles firmly in the ground at equal distances round the circular base, then bending the tapering top of the poles into the centre, where they were attached to a small ring fabricated from a stout vine, which formed an aperture through which the smoke of the central fire escaped.'

This style is argued by Anderson to be the most likely model for reconstruction of the South Auckland huts referred to above (Anderson 1986:105-6). Whether the example at Pūhoi was used for sleeping or working is not known; its use may have focused more on elements of tikanga such as ceremonial uses, as there was no evidence for the working of stone tools, or evidence for shell midden, to suggest domestic use at this time.

By Phase 2 there is evidence for more activity at the site, with the second pou pit, as well as an enclosed ovoid structure with a kōkōwai oven, drainage ditch, and a complex of cooking ovens as well as some additional pits. This increased activity could suggest a change in the significance of the place. Of note is the enclosed structure with multiple phases of ochre processing. The 3-D reconstructions provide a visual representation of what the enclosed ovoid structure and cooking pits may have looked like (Figure 8.10 and Figure 8.11). Within the drainage ditch was the rare pollen of Dactylanthus or 'pua ot te reinga', the 'Flower of the underworld'. It is posited that the kōkōwai was used on the pou/monument in a similar manner to the way in which waka, whare and palisades at pā were painted, and it was also customary for chiefs to paint themselves with it (Walk 1903: 5). Kōkōwai sources could also be the source of dispute between iwi (Walk 1903: 6).

Figure 8.11 Plan view of the 3-D reconstruction showing the enclosed ovoid structure, cooking ovens and pou just visible to the north (3D image by Thomas MacDiarmid)

The third phase of activity on the site is evidenced in further re-cutting and use of the kōkōwai ovens, but also by two surfaces with the main concentration of lithic artefacts found at the site (including chert, obsidian and argillite) in a cultural layer, as well as postholes and some midden deposits. The cultural layer again had evidence of Dactylanthus.

The evidence for multiple re-use of the ochre/ kōkōwai ovens certainly stands out from other sites in the region, and could indicate that a particularly good ochre source was located nearby. That the large pou could have been a monument to a particular resource cannot be ruled out.

Monumentality in New Zealand differs from that in Pacific nations that had large stone-based monumental constructions with complex exchange networks (e.g. Rapu Nui and the Moai), and the large stone and wooden tiki statues at Taputapuatea (a UNESCO World Heritage Site). New Zealand does not have the stone-based monuments seen elsewhere, but does have pā sites which are large earthen monuments to the complex Māori social structure of the 'Classic' period, where inter-tribal warfare was a clear part of life. Certainly, placing the large wooden pou on a prominent ridge visible for many kilometres by sea and land suggests that the place had a clear meaning and was intended to be visible to all coming into the rohe, at a time when pā would also have been visible in the landscape. With lithic sources from the North and South islands evident in the archaeological record, such people could have travelled from long distances and not just be those living in the wider region.

Overall, the archaeological evidence suggests the place had substantial meaning and significance to Māori at that time.

9 CONCLUSION

Prior to the construction of the Ara Tūhono – Pūhoi to Warkworth section of the Pūhoi to Wellsford Road of National Significance, there was a distinct paucity of recorded archaeological sites throughout the Pūhoi River valley and its wider landscape. During the project works five archaeological sites that had been recorded during the assessment phase and 29 previously unrecorded archaeological sites were affected, all except three relating to Māori settlement activities. With the sole exception of a cache of wooden artefacts in the far north of the project area, the archaeological sites were all situated within the Pūhoi River valley. The majority of these sites reflected relatively short-duration occupation by groups of Māori, some perhaps related to seasonal activities such as hunting or the transiting of groups through the river valley. However, sites R10/1106, R10/1417 and R10/1484 reflected much longer-term settlement activity within the Pūhoi River valley.

Radiocarbon dating analysis of the sites confirms the long settlement history of the Pūhoi River valley by Māori from at least the late 1400s AD to the end of the first quarter of the 19th century, when the area became temporarily abandoned in the face of the musket-armed raiding parties of Ngāpuhi and their allies from the North. Evidence from the archaeological excavations and subsequent analyses of environmental samples attest to the cultivation and storage of kūmara, as well as the harvesting, processing, and consumption of local marine resources by tangata whenua, demonstrating their innate understanding of their environment and its resources.

The evidence from the initial phase of occupation at site R10/1417 from circa 1500 AD, consisting of the palisaded enclosure and several examples of a rare type of kūmara storage pit, reflects a period of dynamic societal change for Māori, a time during which the first earthwork fortifications of pā were being constructed. The site, with its substantial palisaded enclosure, situated in a prominent and strategic location above the confluence of the navigable waterways of the Pūhoi River and Hikauae Creek, likely reflects the transformation from the early ‘settler’ period of Māori society across Aoteroa, to that of a more trade-focused established tangata whenua (people of the land).

Evidence from site R10/1484 shows that activity started there in the late 1600s and continued most likely until the early 1800s. This site was located further south than R10/1417 but it was situated along the same waterway and it was highly visible to those travelling from the coast by waka or overland. Placing large pou/wooden markers in the landscape implies that the place was of significant importance – although the message they were intended to convey is not known. The identification of a particular resource, rohe or even wāhi tapu are all possibilities.

The knowledge gained through the archaeological investigation of the Pūhoi area is outstanding, with the survival of uncommon Māori crop storage features, the ovoid round huts/houses, large pits that likely held monumental pou whenua and an exceptionally large oven complex, located in fairly close proximity to two defended pā which have been protected from the roading works. Large scale movements of people or resources are evidenced by the lithic sources from across Aotearoa identified at the sites, while environmental evidence showed that four of the six horticultural crops used by Māori prior to European settlement were also present, along with evidence of a rare plant now endangered in the New Zealand environment. The extensive archaeological landscape of the Pūhoi area would not have been known if not for the development of the Ara Tūhono

– Pūhoi to Wellsford Road, and the information gained is invaluable for furthering our understanding of the ancestral footprints of this locale in Aotearoa/New Zealand.

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APPENDICES

See digital appendices provided separately.