

STAGES 3-9, ONE TREE POINT ROAD SUBDIVISION DEVELOPMENT, ONE TREE POINT (ARA KAHIKA), WHANGĀREI HARBOUR

Archaeological Investigation and Monitoring Report

By Ben Jones, MA (Hons)
Bernie Larsen, MA (Hons)
Tom Clough-Macready, BA (Hons), BCIS
Simon Bickler, PhD
Rod Clough, PhD
Sarah Phear, PhD

Report prepared for WFH Properties Ltd

In Accordance with HNZPT Authority 2018/648

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Clough
& ASSOCIATES LTD

321 Forest Hill Rd,
Waiatarua, Auckland 0612
Telephone: (09) 8141946
Mobile 0274 850 059
www.clough.co.nz

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1 INTRODUCTION

1.1 Project Background

One Tree Point (Ara Kahika) near Marsden Point (Te Koutu), Whangarei Harbour (Te Rerenga Paraoa) is situated approximately 5km northwest of the Whangarei Harbour mouth and 10km from Port Whangarei and the head of the harbour (Figure 1). Further inland to the south are the Ruakaka flats, which are similar in origin and topography to One Tree Point, while 3km to the west lie the Takahiwai hills, which rise some 200m above sea level. Across the harbour is a range of hills, with Manaia rising dramatically to a height of over 400m.

A large subdivision and residential housing development is being undertaken at One Tree Point Road (Figure 2). The project area of approximately 54ha is bounded by One Tree Point Road to the northeast and Pyle Road to the southwest (Figure 2). The overall development involves subdivision into 494 residential lots between 600m² and 700m² in size. Stages 1 and 2 of this development have previously been completed under authority from Heritage New Zealand Pouhere Taonga (HNZPT), exposing several archaeological sites which were investigated and recorded (Plowman et al. 2008).

This report relates to Stages 3-9 of the development. Stages 1 and 2 were carried out under Authority 2006/33, and a new authority (2007/231) was issued to cover the full development. However, it had expired before the start of works and a new authority was required to complete the subdivision.

An updated archaeological assessment was prepared for Stages 3-10 (later redesignated Stages 3-9, with some adjustments made to staging boundaries from what is shown in Figure 2) (Dawson et al. 2017). This established that six archaeological sites had previously been recorded in Stage 4 of the proposed subdivision development (Q07/1419-Q07/1423 and Q07/1433). Two additional sites (Q07/327 and Q07/1437) were recorded within Stage 10 (later incorporated into Stage 3) but had been destroyed during past development works. No additional sites were identified as a result of the field assessment. However, several areas of potential archaeological interest were identified where it was considered likely that additional archaeological sites would be uncovered over the course of the development.

An application for a general authority to modify archaeological sites in the Stages 3-9 development area was made under section 44(a) of the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) and the authority was granted on 18 May 2018 (No. 2018/648). The authority was conditional on the subdivision works being carried out in accordance with an archaeological management plan and research strategy (Phear 2018). Condition 2 of the authority required that the six recorded archaeological sites (Q07/1419-Q07/1423 and Q07/1433, see Figure 3) were investigated prior to earthworks, in accordance with the management plan, and condition 4 required that any earthworks that may affect archaeological sites were monitored by an archaeologist. These areas were identified in the management plan as Stages 3, 4 and 9. The management plan outlined procedures to be followed during investigation of sites, including the recording and sampling of archaeological remains, and provision for works to be temporarily halted if archaeological remains were exposed in areas where the archaeologist was not present (Phear 2018).

This report details the results of the archaeological excavation of the six recorded sites and of two additional sites which were discovered and recorded during works up prior to the start of 2020 (Q07/1447 and Q07/1463) (Table 1, Appendix A). The six recorded sites were investigated between 3 June 2019 and 21 June 2019. Monitoring of earthworks in Stages 3 and 4 was carried out between June and September 2019, with the additional two sites investigated and recorded on 15 to 16 September 2019 (Q07/1463) and 21-22 October 2019 (Q07/1447). Two additional areas

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of archaeological material were exposed during earthworks on 5 and 9 August 2019 and were recorded as part of site Q07/1419. All of the sites were located within Stage 4 except for the two additional areas, which were just inside Stage 5. Earthworks in Stages 6-9 were completed by September 2022, but no further archaeological remains were exposed.

Following investigation and sampling, the shell midden material was relocated within the parks in the subdivision and buried, as agreed with the Patuharakeke representatives.

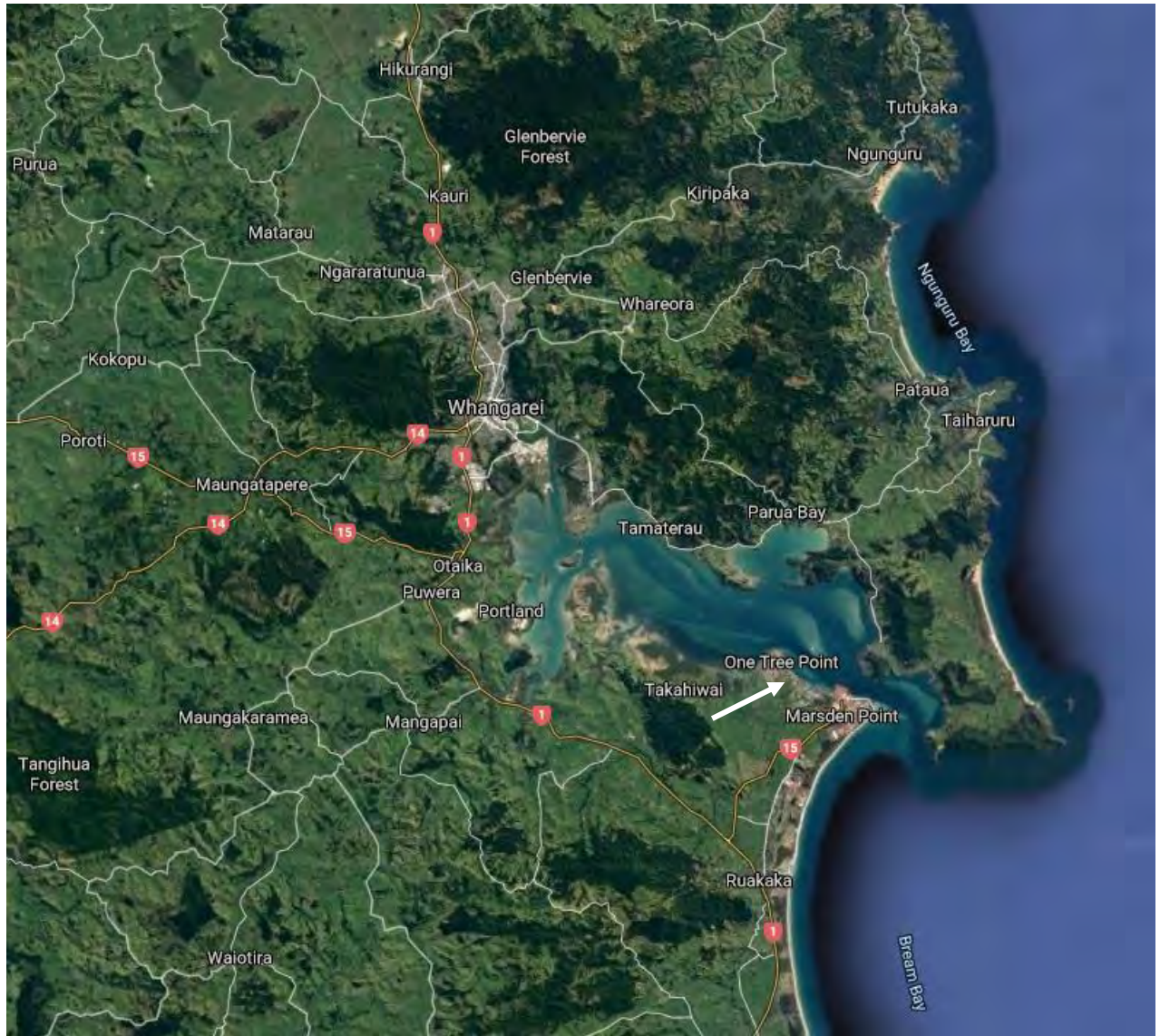


Figure 1. Aerial showing Whangarei and its environs and the location of the development site (white arrow) (source: Google Maps)

1. Introduction

Table 1. Archaeological sites investigated within Stage 4 (Figure 2)

Site	Description	Easting (NZTM)	Northing (NZTM)
Q07/1419	Midden	1731955	6033790
Q07/1420	Midden	1732055	6033800
Q07/1421	Midden	1732025	6033705
Q07/1422	Midden	1732060	6033695
Q07/1423	Midden	1732165	6033665
Q07/1433	Midden	1732149	6033721
Q07/1447	Midden	1732129	6033651
Q07/1463	Midden	1732124	6033684

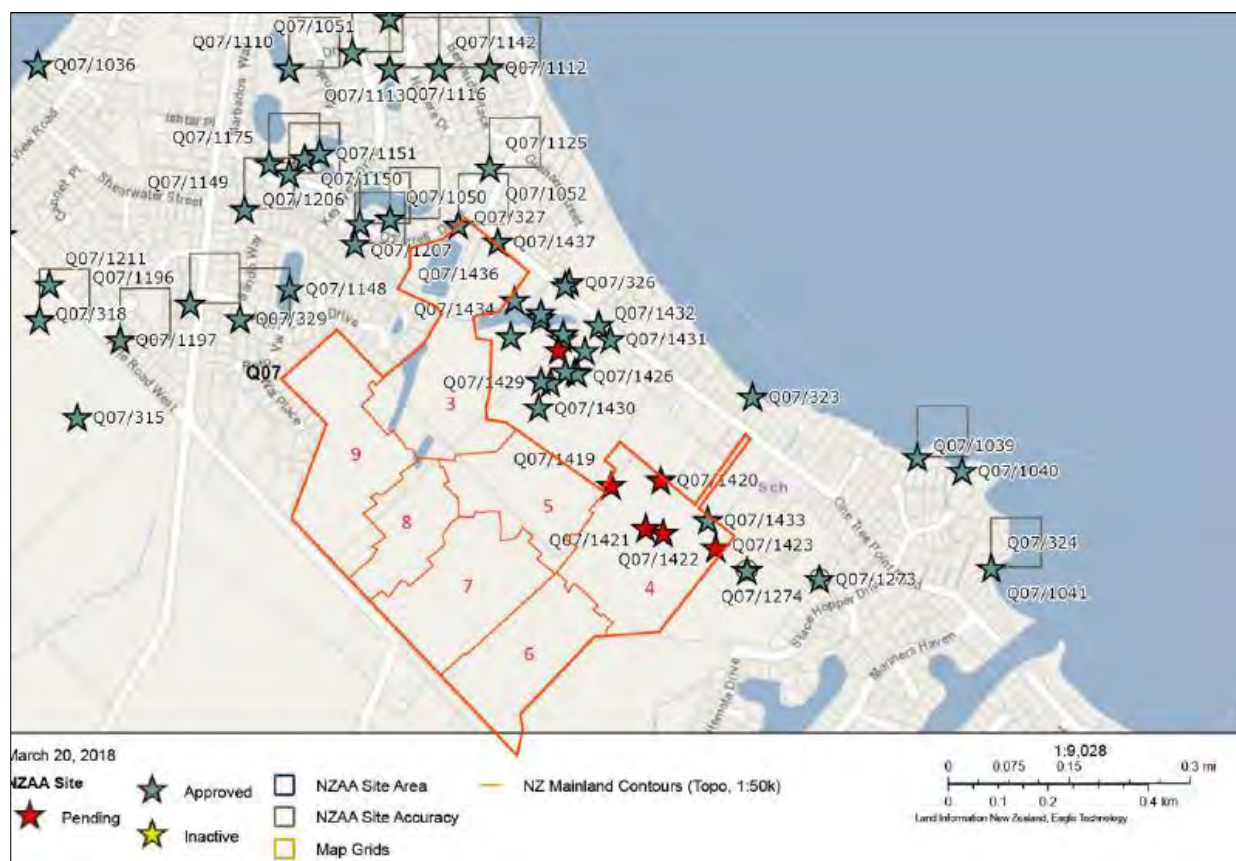


Figure 2. Stages 3-9 of the development site at One Tree Point in relation to the archaeological sites previously recorded on the NZAA ArchSite database

1. Introduction



Figure 3. Locations of the six previously recorded archaeological sites (in orange) located in the Stage 4 area that were to be investigated at the start of, or prior to, project earthworks commencing

1.2 Research Aims

As set out in Phear 2018, the archaeological investigations aimed to:

- Establish the full extent and nature of sites Q07/1419–1423 and Q07/1433.
- Record and investigate any subsurface features present which were associated with middens Q07/1419–1423 and Q19/1433.
- Recover and analyse shellfish and other species present, including fish/animal bones.
- Establish if there was an indication of permanent or single use occupation, and/or occupation changes over time.
- Submit any suitable samples for radiocarbon dating to help establish a date range for occupation. Obtaining radiocarbon dates to contribute to the chronology of settlement at One Tree Point was an important component of the research strategy. Dates previously obtained indicate settlement from 1500 AD onwards, with some early 19th century dates which have been attributed to gum digging activities (Phillips and Harlow 2001).
- Compare the results with those of similar sites located nearby and previously investigated in the Stage 1 and 2 areas, and on neighbouring properties.

1. Introduction

- Conduct analysis of any artefacts recovered, which would then provide insight into resource procurement beyond subsistence strategies and could be compared with other results for the area.
- Add to the knowledge of the occupation of Te Poupouwhenua including One Tree Point by Māori prior to European contact.

The methodology used was as outlined in Phear (2018) and followed accepted archaeological practice. The archaeological investigation was undertaken in a manner similar to other excavations in the area so that comparisons could be made. This methodology was designed to establish the extent to which the remains of structures, features and associated faunal material and artefacts were still present, and to excavate them as required.

The topsoil of each of the sites was cleared using a mechanical excavator with a tilt bucket under the supervision of an archaeologist to expose the extent of the known archaeological deposits (Figure 4). Once cleared, archaeological features/deposits such as midden concentrations were examined, bulk sampled and recorded on the site plan. Trenches along the width of the midden concentrations were dug to investigate internal stratigraphy, which was recorded with section drawings and photography. The midden deposits then were removed by the mechanical excavator to expose underlying features which were excavated by hand, sectioned and intact remains were recorded.

The features with the densest charcoal concentrations such as firescoops, hangi and post holes were then bulk sampled to retrieve both shell and charcoal for further analysis to provide information on the environmental context at the time of occupation and for dating purposes. Sample locations were marked on the site plan. Descriptions of features and their contents were recorded (see Appendix B), photographed and plotted on site plans. Stratigraphic relationships between features were established where possible. After the main excavation, monitoring followed the protocol of weekly to bi-weekly site visits, and notification by the contractors if suspected archaeological remains were exposed when the archaeologist was not present.

1. Introduction



Figure 4. Showing archaeological monitoring and use of mechanical excavator to strip the topsoil

1.3 Acknowledgements and Project Personnel

The role of Patuharakeke cannot be understated, both as Kaitiaki and for the kōrero shared and insight given from a Mātauranga Māori perspective. The practical assistance of the cultural monitors (Ari Carrington, Xzavier Watson, Joshua Foote and Layton Carrington) during monitoring and excavation was also invaluable and greatly appreciated by the first author and other members of the archaeological team. The cultural monitors were present during all stages of the development. We are also grateful to Dr Mere Kepa for providing comments on the draft report and further information.

Thanks are also extended to Damion Jackson and the crew from Bob Hicks Earthmoving. Damion was instrumental in both ensuring the safety of the archaeologists around large moving vehicles and following the archaeological management plan. The expertise of Scott on the mechanical excavator was of great assistance during the investigation of the archaeological material.

The archaeological team consisted of Ben Jones, Barry Baquié, Tom Clough-Macready, Bernie Larsen and Aaron Apfel, under the direction of Sarah Phear and Rod Clough.

2 HISTORICAL BACKGROUND¹

The following brief historical background is intended to provide context to the archaeological landscape and the results of the investigations presented in this report. A detailed history of Māori settlement and whakapapa, however, is beyond the scope of the report and the authors' area of expertise. The information below is based on the historical sources available to us but should not be viewed as complete or without other context. We acknowledge that there are many histories known to different iwi/hapu in the region and that those histories are for tangata whenua to tell rather than the archaeologist.

The traditional historical associations relating to the region reflect the migrations, conquests and occupations that have taken place over the centuries. It is a complex history and mana whenua today is based on the pattern which had emerged by the late 18th century. Patuharakeke (hapu of Te Parawhau) hold mana whenua over the area, exercising nohonga in respect of ahi ka, location of their marae and wahi tapu (Hammon pers. comm. to Harlow 1998). The whakapapa of Patuharakeke in relation to the lands in southern Whangarei has been discussed in Fletcher 2016. Some of the place names recorded at the time of European contact are shown in Figure 5.

The lands around Whangarei originally belonged to the Ngāti Awa and subsequently the Ngāitāhuhu people. In the mid-1700s, the Ngāpuhi chief Te Ponaharakeke, living in the district, decided to conquer the One Tree Point area, known as Ara Kahika (Figure 5), with the help of Ngarokiteuru. The land was divided between the conquerors. Te Ponaharakeke's son, Te Kāhore, married Ngā Pae, the daughter of the Ngāitāhuhu chief Hikurangi. He also married Weku, the sister of the Hokianga chief, Te Raraku. The latter was given lands at Ara Kahika and Ruakaka and invited to live there (Manihera et al. in Nevin 1982:6,9).

In the early 1800s a war party of Ngātipukenga from Tauranga is said to have attacked the pa at Takahiwai, to the west of One Tree Point and been defeated by Patuharakeke (Nevin 1982:11).

In 1823 the missionary Samuel Leigh travelled through the district of Whangarei and found it desolate. He landed near One Tree Point with a mission group and spent the night at Takahiwai (Vallance 1964:30). The missionary Marsden had previously travelled through the area in 1815 and 1820 and eventually the influence of the visiting missionaries helped to abate the wars. Another missionary, Colenso, travelled the district between 1836 and 1842, accompanied by the British Resident James Busby in 1839, who bought the Ruakaka area from the Parawhau and Patuharakeke chiefs. The sale was supervised by the chiefs Te Tirarau III and Karekare (Nevin 1982:14). In 1841 Colenso travelled from the Kaipara, with the first habitation the party came across being 'near the present settlement of Takahiwai', where they were welcomed by the Patuharakeke rangitira Pou and the hapu (Vallance 1964:34). A sketch dated to 1842 shows the entrance to Whangarei Harbour with silhouettes of the Heads and a manned waka (Figure 6). In February 1854 Ruakaka was again sold by Māori, this time to the Crown. It was a smaller block than that sold previously, not including Marsden Point or One Tree Point, so they insisted on Busby being compensated. The excluded area was known as Poupouwhenua (Figure 7). The term Te Poupouwhenua refers to a marker of ownership – at Ara Kahika Te Poupouwhenua refers to the ownership of the whenua by Tirarau, the High Chief of Te Parawhau in the 1800s (Dr Mere Kepa, pers. comm.).

On 14 July 1854 the Crown 'entered into a land transaction with Mahihera, Tatau, Te Matemare, Poa, and Kare Kare and Reweti for a piece of Land called the Rau[w]iri at Poupouwhenua (Turton Deeds – No. 101)' (Fletcher 2016: 11; see also Richards 1984:9-12). The Crown purchase deeds for the area identify Te Parawhau as the hapu group with interests in Poupouwhenua, as well as for the

¹ This section incorporates background information from Bickler et al. 2005 and Fletcher 2016.

2. Historical Background

neighbouring Ruakaka block to the south (Figure 7), with Patuharakeke and Ngāti Tu the hapu groups identified for the Takahiwai block to the west (information provided by Dr Mere Kepa).

In 1857, Donald McLean, Land Commissioner wrote to the Governor describing the district of Whangarei:

‘... the low, sandy country around the town site of Marsden, ... on the banks of streams are some Native villages, ... here and there are occasional patches of poor white clay soil, which have been dug over for kauri gum’ (Nevin 1982:5).

It is highly likely that one of these ‘Native villages’ was along the banks of the Takahiwai Stream and possible that Patuharakeke were engaged in gum-digging activities for, as the trade developed, Māori became rapidly involved. Nevin has attempted to trace the gumfields which were worked over around the Whangarei Harbour, showing likely activity in the One Tree Point and Marsden Point areas, although neither is listed among the main gumfields in the district (Vallance 1964:84). For evidence, Nevin used local knowledge, field observations and typical soil types (Nevin 1982:16, 17). Small pieces of gum could still be found in recent times on the southeast side of the development property in disturbed soil.

Captain Duncan Mackenzie must have been an early purchaser of land in the area as he had a property and store at One Tree Point in 1854. It was here that ships’ passengers were offloaded and taken in open boats along the coast to Waipu. The Captain, also known as ‘Prince’, was very active in the shipping business and had four sons who were all master mariners (Pickmere 1986:127).

A.M. Rust, born 1859, wrote in his reminiscences of Whangarei that, for Māori, fishing was a great pastime, describing how they used to make raids on the sharks about One Tree Point, then clean the harvest and hang it out to dry in the sun (Rust 1936:125).

The Takahiwai area supplied flax for mills in and around Whangarei in the early days of European settlement. The chief of the Patuharakeke at the time was Te Ikanui Te Pirihi (Nevin 1982:15). Pickmere records that there was a Māori settlement at Takahiwai in the 1880s (1986:151).

In 1906 a survey was carried out around One Tree Point by G. Martin (SO 14130, Figure 8). The property now under development was described as covered in manuka and fern. A later plan in 1943 describes the land as ‘flat country in grass’. Pt Allotment 1 was owned by James Davis while the owner of Pt Allotment 2 was L.E. Nikolaison (DP 31632).

2. Historical Background

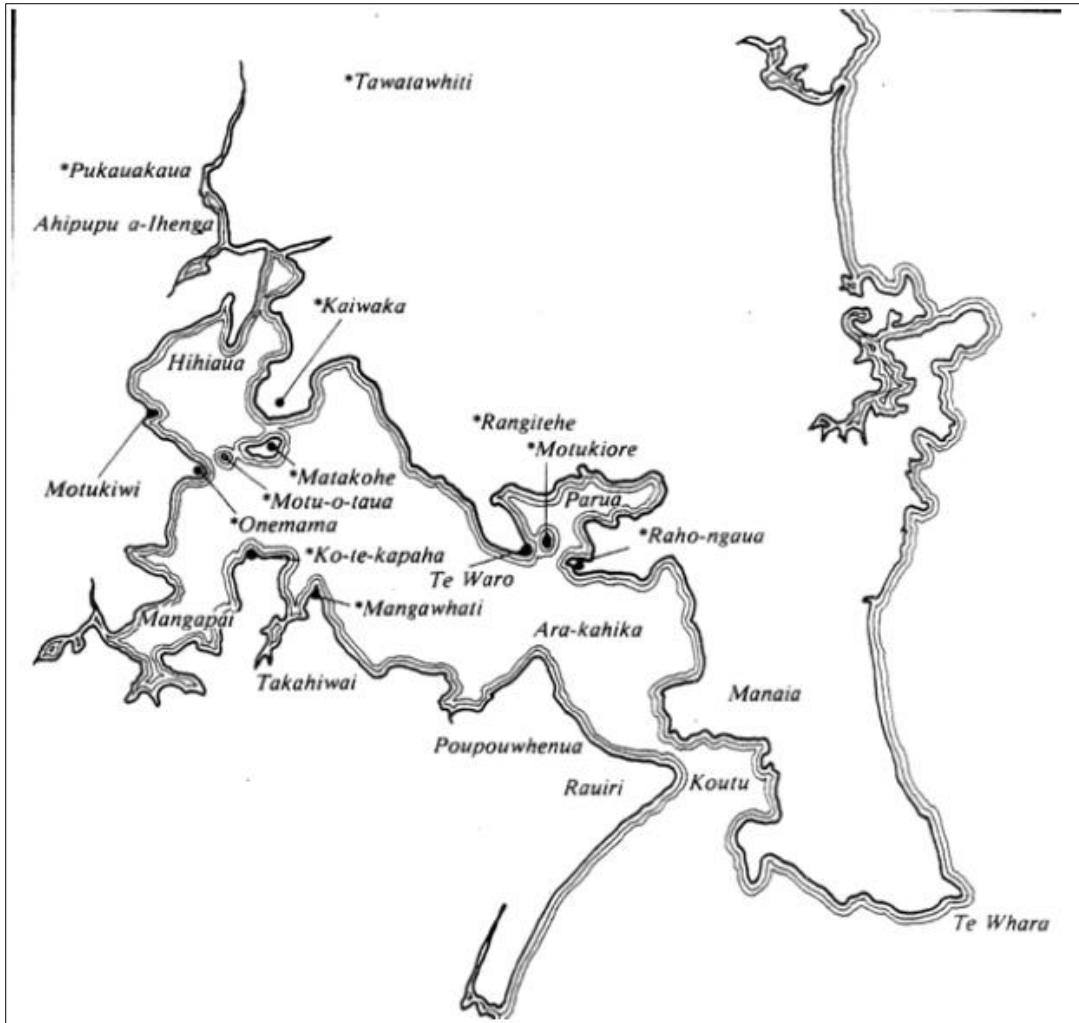


Figure 5. Traditional place names used in the early 19th century (Pickmere 1986:5)

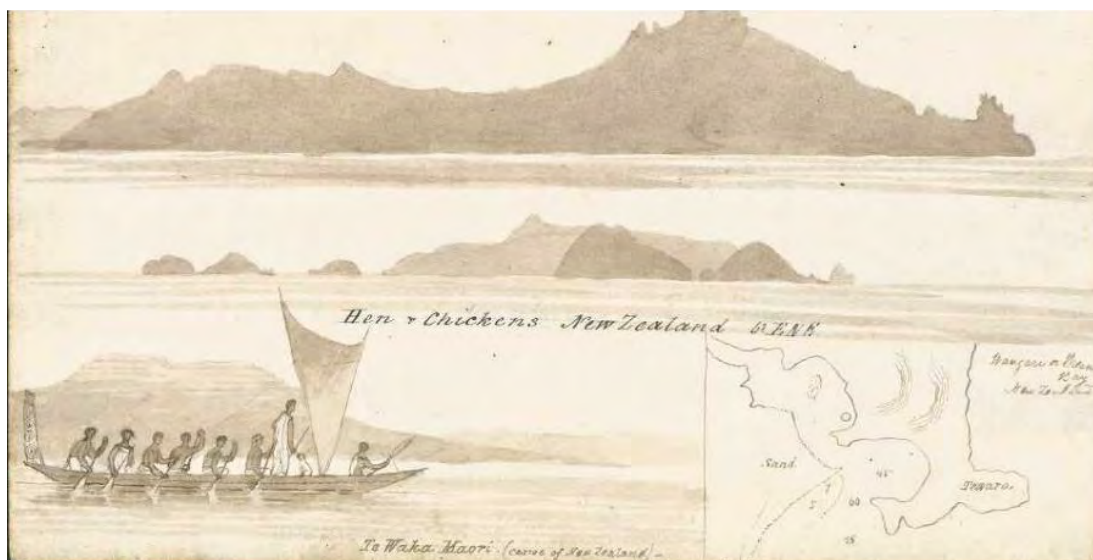


Figure 6. View of the Entrance to Whangarei Harbour (1842) Entrance to Whangarei River, bearing NW by W; Hen and Chickens, New Zealand..., Te Waka Māori (canoe of New Zealand); Wangari or Bream Bay, New Zealand.1842. Reference number: MS-0104-071 (<https://tiaki.natlib.govt.nz/#details=ecatalogue.239815>)

2. Historical Background

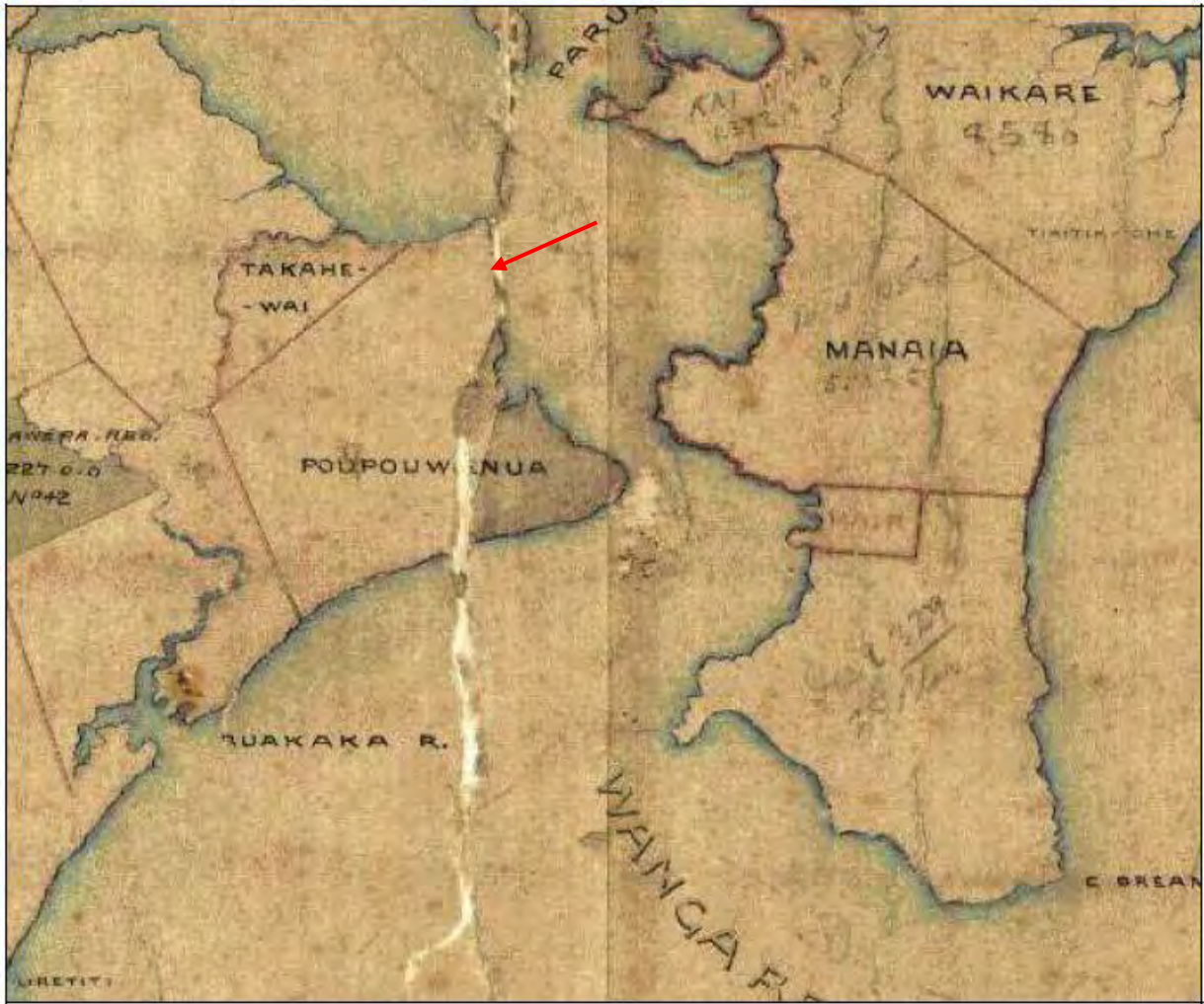


Figure 7. A close-up of Roll 16 (approximate location of the development arrowed in red) (source: LINZ, taken from Plowman et al. 2008)

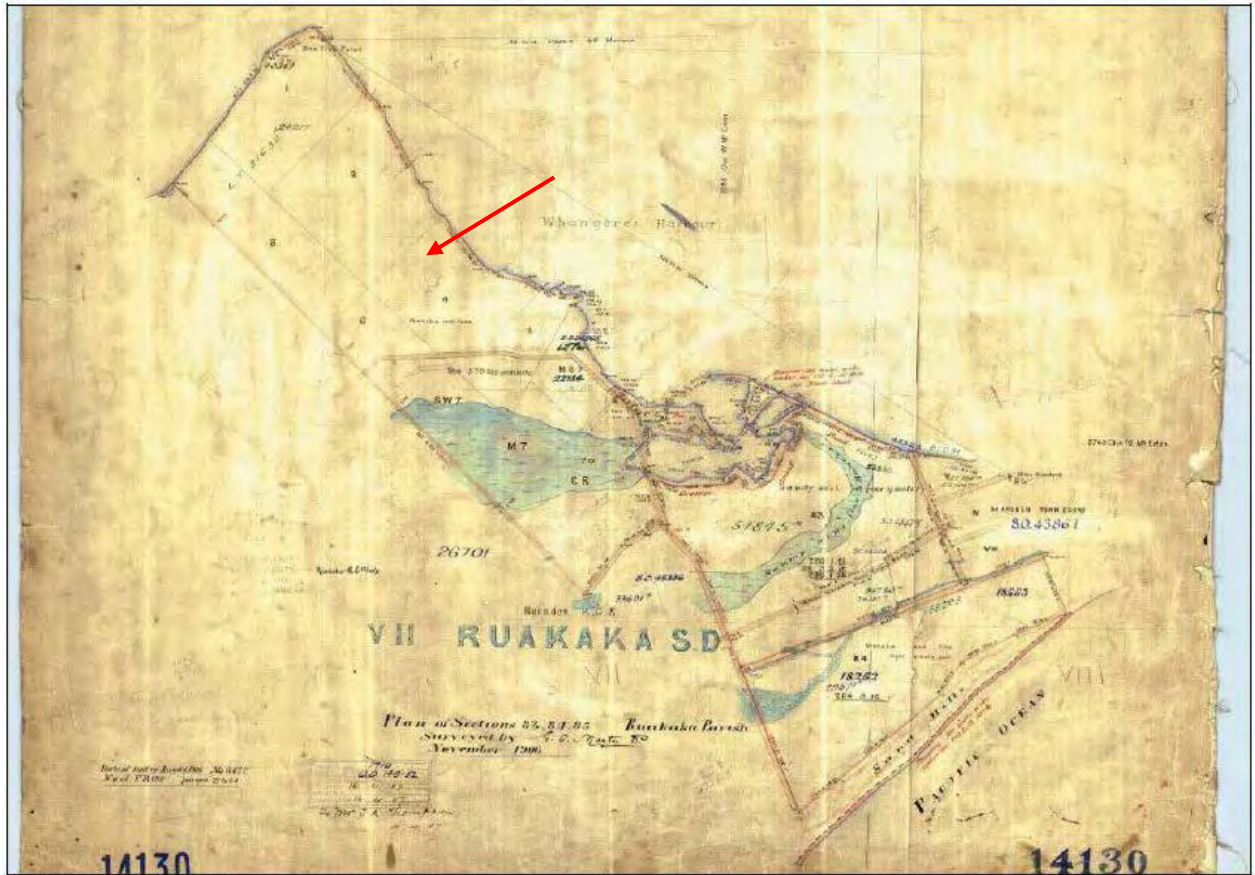


Figure 8. SO 14130 dated 1906 (approximate location of the development area arrowed in red)

3 ARCHAEOLOGICAL BACKGROUND²

3.1 Previous Archaeological Research

The district is dominated by Whangarei, the largest city north of Auckland, which is situated at the western end of a large harbour with extensive mangrove and estuarine catchments, rich shellfish beds and other marine resources. The harbour entrance at the eastern end of the harbour is a relatively narrow channel that is bordered by the Whangarei Heads area to the east and the Marsden Point – One Tree Point area to the west. The last decade or two have seen increasing subdivision of the farmland and orchards surrounding the city of Whangarei, extending westwards towards Maunu, eastwards beyond Onerahi and southeast onto the Whangarei Heads. On the southern side of the harbour, the Ruakaka – One Tree Point area has also seen increasing subdivision. The wider district remains largely rural, with extensive farmland and large areas of both native and exotic forestry. There are a number of smaller settlements along the coast, including Waipu to the south, and on the northern side of the harbour, Pataua, Ngunguru, Tutukaka, Matapouri and Whananaki. The district also includes several offshore islands, notably the Poor Knights and Hen and Chickens Islands. For Polynesians arriving from the tropics hundreds of years ago, the Whangarei district was a highly favourable area for settlement. The sheltered Whangarei Harbour and other major rivers and inlets (Ngunguru, Horahora, Ruakaka, Pataua, Taiharuru and Whananaki), with their rich marine resources and easy accessibility by canoe, attracted occupation from the earliest times. Thorne (1876) described moa bones and obsidian tools in locations around the Whangarei Heads and particularly at Pataua, indicative of this early ‘Archaic’ settlement. Similarly, European settlers and traders rapidly adapted to their new country during the 19th century, setting up homes and gardens alongside farming and extractive and other industries along this coastline.

Excavations have been carried out around Whangarei Harbour since the 1960s. At Bream Head, for example, a large midden site produced evidence of significant shellfish cooking as well as seal, dog, bird, tuatara and fish bone, chert flakes and hangi stones and fishing equipment (Green and Davidson 1964 and NZAA Site Record Form Q07/103 cited by Phillips and Harlow 2001:14). More recent test excavations at Bream Head have been conducted, but little information is available regarding the results. Bickler et al. (2008) excavated midden sites in McGregor’s Bay, opposite the subject area on the north side of Whangarei Harbour, consisting of small to medium-sized middens, but these were relatively simple sites with no evidence of structural features.

Nevin and Nevin (1981; G. Nevin 1982) carried out the main surveys on the southern side of Whangarei Harbour and identified a large number of the sites which have been identified in the Ruakaka area. These were mostly midden near the coast. Further inland, G. Nevin (1984) identified a wider range and large numbers of sites in the Takahiwai hills including pa, sites containing pits and terraces, and evidence of gardening along with the ubiquitous midden sites.

In the inland areas around Takahiwai and near Ruakaka, the Māori settlement pattern appears to have been focussed around the higher ridges. Pa sites offered some defence from raiding parties travelling through the area. Gardening was carried out in this hinterland. Access to the rich marine resources would have been straightforward and during the seasonal cycle, groups probably moved down to the dune lands to collect food for storage and perhaps exchange.

A small number of excavations have been carried out near Whangarei on the western and southern side of the harbour. These include the investigation of Ruarangi Pa (Q07/30). The excavations there created a picture of an area that had been occupied a number of times from the 1700s with evidence

² This section incorporates background information from Plowman et al. 2008.

3. Archaeological Background

of houses and midden within the defences. Cockle was overwhelmingly the most common shellfish identified in the midden excavated at the pa (Hougaard 1971 cited in Phillips and Harlow 2001:12-13). A large midden, Q07/58, was excavated by Nichol and Walton in 1976 (Nichol 1988 cited in Phillips and Harlow 2001:13) and suggested extensive shellfish processing much like at the sites around One Tree Point.

More recently, Best (1999) excavated a small pit and terrace complex (Q07/897) in Ruakaka where a sequence of pollen data was retrieved, illustrating environmental impact by Māori and then Europeans in the area. The site included a cache of digging implements of unknown, but relatively 'modern' age (i.e. 1800s onwards, where radiocarbon techniques become problematic) and a radiocarbon date from a midden on the ridge above the cache returned a date of between 1640 and 1870 AD (at 2σ).

Some extensive excavations were carried out on the neighbouring property to the northwest of the development area by Phillips and Harlow (2001). A series of midden deposits were excavated which ranged from small concentrations of hangi/firescoops overlain with shells through to large complexes of firescoops, hangi, stake and post holes. The investigators concluded that the sites represented summer occupation of the One Tree Point area for large-scale processing of shellfish from 1500 AD onwards. Most appeared to have only been used during a single season, but in at least one case there was evidence that Māori had returned to one of the sites at least once. Some late 19th century to early 20th century artefacts were also recovered during the investigation of the sites. They were considered to be chance finds relating to gum-digging activities and not linked with the earlier shellfish processing activities.

Ongoing work has been carried out on neighbouring properties to the south (Campbell 2005, 2006) and west (Prince 2003), including the block that directly borders the current property on the west (Bickler et al. 2007). The results of these other projects suggest that those sites were similar to the sites investigated by Phillips and Harlow (2001), with little evidence of structures identified.

The development site was surveyed in 2004 (Prince 2004a, b) with a range of midden sites identified in Stages 1 and 2, and it was considered likely that additional midden would be found during any earthworks, leading to the monitoring and excavations in Stages 1 and 2 described in Plowman et al. (2008; see Figure 9). During the earthworks in Stages 1 and 2, 16 midden sites (two of which were redeposited or modern) were excavated, most with a series of hangi pits underneath the initial shell deposits (Figure 10). One of the middens contained predominantly pipi (*Paphies australis*), while the remainder were predominantly cockle (*Austrovenus stutchburyi*). A further 10 shell species were identified in the middens, at lower frequencies. Four of the shell samples from the excavation were submitted for radiocarbon dating, which returned a date range for occupation in the area from the mid-16th century to the early 19th century. The additional sites were not recorded in the NZAA site recording scheme at the time, but all sites in Stages 1 and 2 are described in Plowman et al. 2008, and were destroyed as a result of the subdivision development works. As from August 2017 the sites investigated (Plowman et al. 2008) have been recorded at the request of HNZPT – see Table 2 (which provides a correlation between the site numbers used in the report), Figure 10 and Figure 11.

Overall, the results of previous archaeological work suggest widespread shellfish processing at One Tree Point, probably seasonal in nature, from around 1500 AD onwards. While the work of Phillips and Harlow (2001) identified many structural features, including post holes and stake holes, these were not identified in Stages 1 and 2, in the area adjacent to the Stages 3-9 development (Plowman et al. 2008). The sites investigated that were closest to Stages 3-9 all indicate seasonality of settlement, with hangi, middens and small bin pits most predominant in the record. The remnants of these relatively short-lived settlements have left clusters of shell debris across the sand dunes.

3. Archaeological Background

The initial survey by Prince in 2004 recorded five archaeological sites in what is now the Stage 4 area of the development. These were numbered Q07/1169–Q07/1173 and the original authorities for the development issued by HNZPT in 2005 and 2007 authorised the modification of these sites. However, the site records were not filed in the NZAA site recording scheme, and those site numbers no longer apply. The sites have, as of July 2017, been recorded by Prince in NZAA ArchSite as Q07/1419–Q07/1423. An additional site, Q07/1433, that was noted in 2005 during the removal of a fence just before subdivision works were halted, has also been recorded. Another site recorded as being within the Stage 10 area, Q07/327, has been destroyed as a result of previous development works. Site Q07/1437, while within the Stage 10 area, was excavated and removed as part of the Stage 1 and 2 works.

The eight previously recorded sites within Stages 3-9 are listed in Table 3, and their locations are shown in Figure 11 (except for Q07/327 and Q07/1437, which were located to the northwest on the northern boundary of Stage 10 – see Figure 2). The recorded sites have a predominantly coastal focus, as can be seen in Figure 2 and Figure 11.

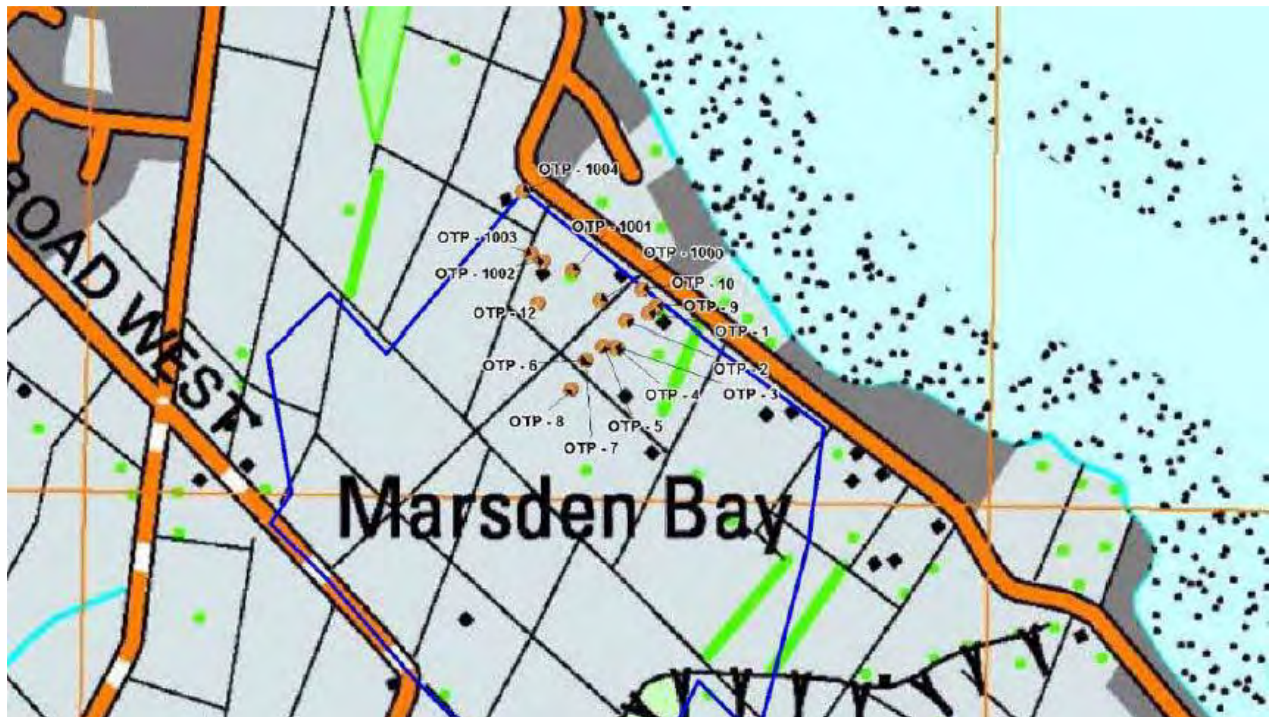


Figure 9. The location and initial identification numbers of the midden sites excavated by Plowman et al. (2008) in Stages 1 and 2

3. Archaeological Background

Table 2. NZAA archaeological sites recorded in the Stages 1 and 2 area (see Figure 10). Recently recorded sites Q07/1418 and Q07/1424-Q07/1431 are correlated with the site numbers originally assigned in Plowman et al. 2008, and Prince 2004a

NZAA No.	Plowman et al. 2008 no.	Prince 2004a No.	Easting	Northing	Site Type
Q07/1126			1731813	6034123	Midden/Oven
Q07/1218	1001		1731915	6034133	Pit/Terrace
Q07/1219			1731858	6034083	Midden/Oven
Q07/1418		Q07/1168	1731850	6034060	Midden/Oven
Q07/1424	2		1731903	6034058	Midden/Oven
Q07/1425	3		1731883	6034016	Midden/Oven
Q07/1426	4		1731887	6034013	Midden/Oven
Q07/1427	5		1731864	6034017	Midden/Oven
Q07/1428	6		1731834	6033994	Midden/Oven
Q07/1429	7		1731815	6033998	Midden/Oven
Q07/1430	8		1731810	6033944	Midden/Oven
Q07/1431	9		1731953	6034082	Midden/Oven
Q07/1432	10		1731930	6034110	Midden/Oven
Q07/1434	12		1731755	6034087	Midden/Oven
Q07/1435	1000		1731859	6034092	Midden/Oven
Q07/1436	1002		1731763	6034158	Midden/Oven
Q07/1437	1004		1731729	6034275	Midden/Oven



Figure 10. Recorded archaeological sites within Stages 1 and 2 (source: NZAA ArchSite August 2017)

3. Archaeological Background

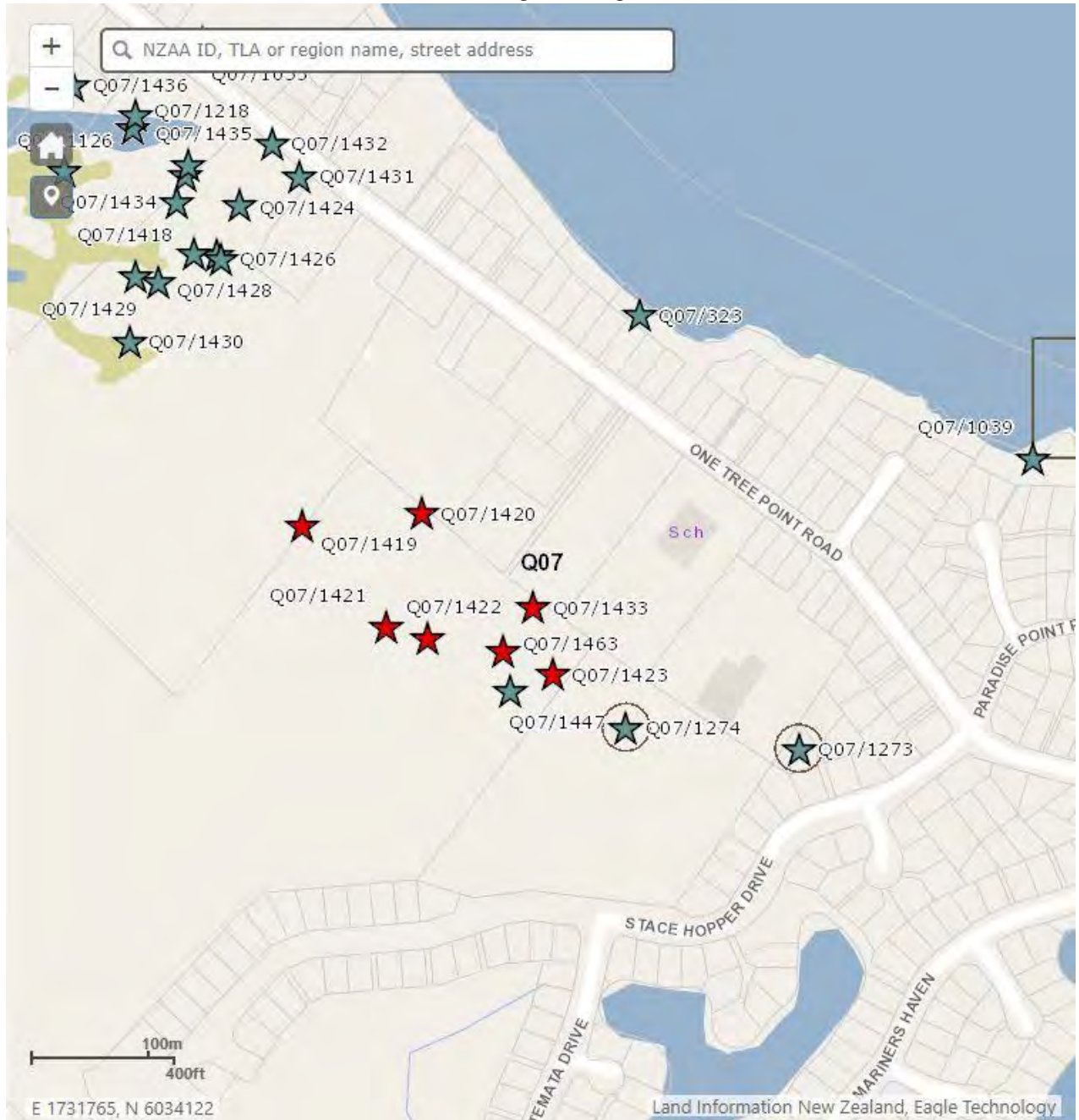


Figure 11. NZAA ArchSite map showing the distribution of archaeological sites within the development area (source: NZAA ArchSite 2020). Note that this map includes the two sites exposed during the recent earthworks (Q07/1463 and Q07/1447)

3. Archaeological Background

Table 3. Previously recorded archaeological sites in Stages 3-9 (Q07/327 and Q07/1437 were removed during previous earthworks)

NZAA No.	Prince 2004a No.	Easting	Northing	Site Type
Q07/327	-	1731650	6034309	Midden/Oven
Q07/1419	Q07/1169	1731955	6033790	Midden/Oven
Q07/1420	Q07/1170	1732055	6033800	Midden/Oven
Q07/1421	Q07/1171	1732025	6033705	Midden/Oven
Q07/1422	Q07/1172	1732060	6033695	Midden/Oven
Q07/1423	Q07/1173	1732165	6033665	Midden/Oven
Q07/1433	-	1732149	6033721	Midden/Oven
Q07/1437	-	1731729	6034275	Midden/Oven

3.2 Recorded Sites in Stage 4 Prior to Works

The sites identified within Stage 4 prior to the recent earthworks were described in the site record forms as follows:

Q07/1419:

The site is located in pasture spanned by the boundary fence of Lt 2 DP332054 to the west and DP106192 to the east. Shell midden consisting of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which is burnt), charcoal and fire cracked rock tightly packed in a black sandy loam matrix up to 350mm thick and covering a 20m x 8m area. Some surface damage by stock traffic and fencing, otherwise in good condition,

Q07/1420:

Two deposits of midden c.20m apart in pasture southwest of One Tree Point Road; both deposits straddle the boundary fences. Two deposits: to west a 16m x 9m midden, to east a 6m x 2.5m midden. Both deposits comprise whole and fragmented shell (predominantly cockle with some pipi and whelk, mostly burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam matrix up to 400mm thick. Midden in good condition with some disturbance to the eastern deposit by residential development.

Q07/1421:

One Tree Point Road, One Tree Point, Ruakaka. Three shell midden deposits located in pasture spread for 70m along and down the west flank of main dune ridge southwest of One Tree Point Road. Three midden deposits: 11m x 9m, 9m x 6m and 11m x 7m. All consist of whole and fragmented shell (predominantly cockle with some pipi and whelk, most burnt & some articulated), charcoal and fired rock tightly packed in a blackened sandy loam matrix up to 300mm thick. Some minor surface damage by stock traffic.

Q07/1422:

Two small midden and surface scattered shell in pasture southwest of One Tree Point Road. Site consists of two shell middens: 4m x 3m x 250mm thick and 2m x 1m x 100mm thick. Both consist of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which is burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam. Some surface damage to deposits by stock traffic.

3. Archaeological Background

Q07/1423:

Site located in pasture southwest of One Tree Point Road approximately mid-way down west dune flank. Site consists of a 3m x 2m x 100mm thick shell midden comprised of whole and fragmented shell (predominantly cockle with some pipi and whelk, much is burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam matrix. Some surface damage by stock traffic.

Q07/1433:

Site located within Lot 2 DP 358186, and situated some 175m SW of One Tree Point Road. Midden extent identified by probing as being c.20m EW by 10m NS. Possibly affected by the old farm track on the western side of the deposit. Material consisted primarily of cockle and pipi, with some fire-cracked rock. Deposit appeared to be tightly packed and in fairly good condition, with some fragmentation. Site was only observed via the holes left by the removal of old fence posts. Modified by fence posts.

4 PHYSICAL ENVIRONMENT

The nature of the physical environment is key to how the methodology was developed and influenced the subsequent results. The development area occupies part of a drowned valley and stranded barrier sand dune system with an old, relatively steep cliff face running north–south at the eastern end of the project area. Flooding in the low-lying areas would have made the raised areas around the Point itself more attractive for Māori settlement.

The dunes contain Holocene and Quaternary sediments, predominantly sand and organic soils. Between the wind-blown dunes are bands of organic soils and peat within the swales (Figure 12). Extensive hard iron pans have developed within the swales and influence groundwater movement and levels across the area (Figure 13). The groundwater levels are relatively complex, being generally higher within the sand dunes than in the adjacent peat swales (Harlow 2005). Radiocarbon dates obtained by Osborne (1983) for a section approximately 3km north of the Ruakaka River mouth suggested that dune progradation started about 4,000 years ago, slowing down over time, with the youngest date, of around 1440 BP, obtained some 30m inland from the present shoreline (Osborne 1983: 6.6, cited in Best 1996). This probably also applies to the dunes in the One Tree Point area.

The vegetation cover of the sandy and peaty soils of One Tree Point prior to human arrival was probably kauri and coastal forest species such as pohutukawa, puriri, karaka and kohekohe, as well as the smaller kawakawa, mahoe and ngaio (Fleet 1986, cited in Phillips and Harlow 2001). Kauri stumps and pieces of kauri gum (up to 20cm in diameter) were found in the peaty swales during earthworks in 1999 and 2005.

The most significant feature of the sites at One Tree Point is the amount of cockle shells. Only 1.5km out into the harbour lies Snake Bank: a large sandy spit partially exposed at high tide, where cockles are available (Figure 14). Cockles are also available around the One Tree Point coastline in quantity (Williams et al. 2006). Commercial shell fishing of cockles from Snake Bank ‘began in the early 1980s and is undertaken year-round, with no particular seasonality’ (Cryer 1997:2, cited in Phillips and Harlow 2001). The shellfish are gathered by dredging. Natural shellfish growth is somewhat slower in high-density beds, but increases when they are thinned, or harvested.

4. Physical Environment



Figure 12. Cross section showing dune swales, ridges and peat formations



Figure 13. Cross section showing the hard-compacted sterile sand with lenses of disturbed sand on top

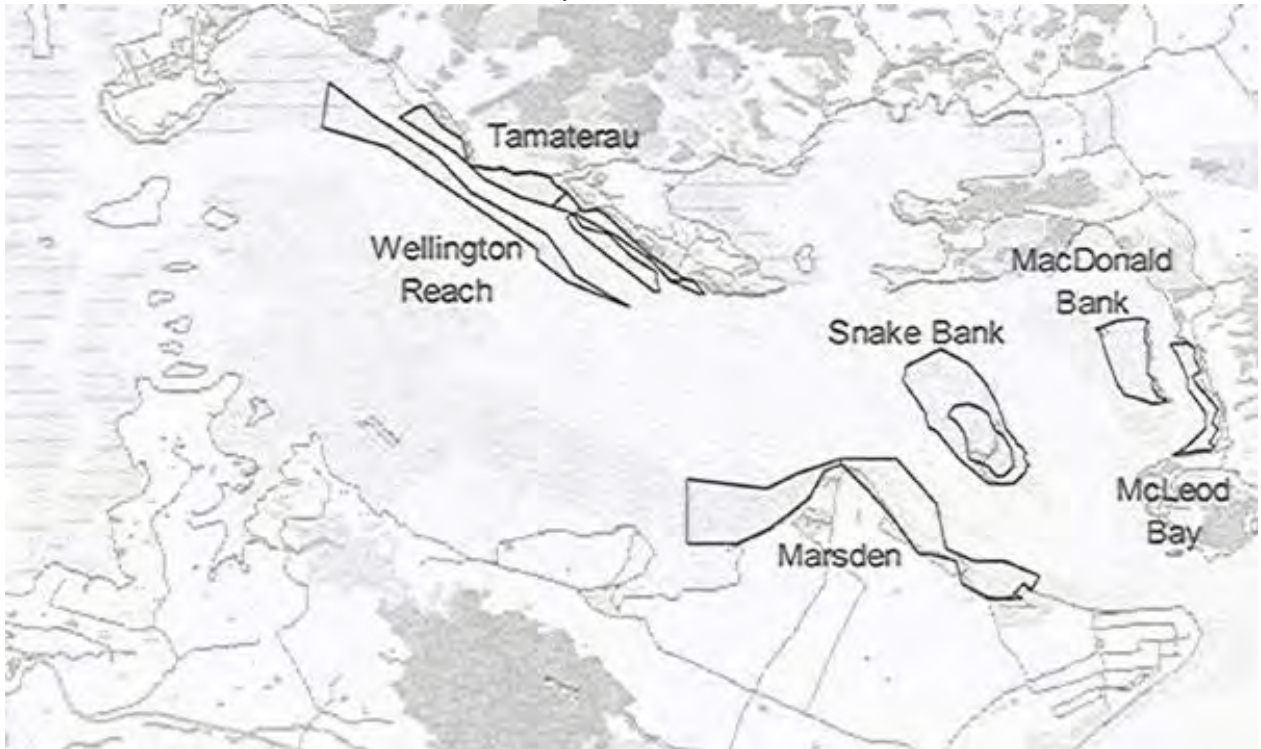


Figure 14. Beaches and banks in Whangarei Harbour that support appreciable numbers of cockles (as of July 2002). From Williams et al. (2006)

5 ARCHAEOLOGICAL INVESTIGATIONS

5.1 Introduction

Buffers areas around the recorded extents of each of the midden sites were marked out before work commenced. A 20-ton excavator then stripped the topsoil within the buffer area under archaeological supervision, exposing the individual patches of midden at five of the six recorded sites: Q07/1419, Q07/1420/ Q07/1421, Q07/1422 and Q07/1423. The sixth site, Q07/1433, could not be relocated even after extensive probing and stripping within and outside the buffer area.

Two additional midden sites were identified during earthworks monitoring and were assigned the numbers Q07/1447 and Q07/1463. Earthworks also exposed a further area of midden and a hangi, which were notified to the archaeologists, investigated and recorded. They were included as part of site Q07/1419.

The middens were recorded and sampled, with four bulk samples equalling 10L in total taken from all midden sites. However, only midden samples from Q07/1419, Q07/1420, Q07/1422 and Q07/1447 were analysed due to budgetary constraints. These middens were selected as they appeared to be the most intact, with an abundance of charcoal in the matrix.

Once the middens had been recorded and sampled, these layers were stripped to ascertain if features were located underneath. Extensive features were identified underneath middens Q07/1419, Q07/1420, Q07/1421, Q07/1422, Q07/1447 and Q07/1463. However, only one feature was located beneath midden Q07/1423. Features underneath the midden layers were bulk sampled with two bags taken per feature.

Once the features underneath the various middens had been investigated and recorded the area was again cut down to a depth of 0.2m to 0.5m to ascertain if any features were located at lower levels. This included a cross-section trench cutting through the estuarine deposit in many of the dune swales (e.g. Figure 19, below).

Environmental soil samples were taken from various layers (these could not be analysed due to budgetary constraints as priority was given to dateable material). For example, the peat in the gully underneath Q07/1419 was bulk sampled, as well as the grey and white ash layer (see below). Fire cracked rock (FCR) from cache-like features encountered at sites Q07/1419, Q07/1420, Q07/1422, Q07/1447 and Q07/1463 was also sampled.

Figure 15 and Figure 16 show the locations and extents of the excavated sites, which are discussed in the following sections. Detailed notes on feature measurements, fill descriptions, etc, can be found in the context list in Appendix B.

None of the sites remain as all were fully excavated.



Figure 15. Location of excavated areas within Stage 4



Figure 16. Extent of excavated middens. *Q07/1433 could not be located through trial trenching and excavation of its recorded extent

5.2 Excavation Results

5.2.1 Site Q07/1419

Q07/1419 was described on the original site record form as being located in pasture spanned by the boundary fence of Lot 2 DP332054 to the west and DP106192 to the east. The shell midden consisted of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which was burnt), charcoal and fire cracked rock (FCR) tightly packed in a black sandy loam matrix up to 350mm thick and covering a 20m x 8m area. There was some surface damage by stock traffic and fencing, otherwise the site was in good condition.

Stripping of the topsoil uncovered the midden within an infilled gully. The stormwater installation works for the project appeared to have pushed spoil into the gully and created a mound of soil partially covering the midden (Figure 17 and Figure 18). The midden layer also continued under the road (Figure 19). The general shape of the midden was sub-rectangular, orientated in a N-S direction (Figure 20).

The midden layer was composed of a dark brown matrix with semi-compacted sand and with frequent cockle shell, occasional pipi, whelk, charcoal, and FCR inclusions (Figure 21, and Figure 22). Some of the shell was burned and bleached with fragmented and whole shell noted throughout. The midden was 23.9m in length, 4.5m wide and 0.20m thick. One chert core with cortex and flake scars was found within the midden layers (Figure 23 and Figure 24). This unifacial core was mostly covered in cortex with flake scars on one side, hence struck from one side. The core did not show heavy working and might have snapped and then been discarded. No other artefacts were noted; even though all features were hand excavated no lithic material was recovered. This low presence of artefact material was a pattern that was also noted across the other middens investigated and is consistent with previous excavations at One Tree Point.

Once the layer was sampled and recorded, trenches were dug along the short axis to record the internal stratigraphy (Figure 25). This also showed the top of features underneath the midden situated within a peat layer (98) (Figure 20, Figure 26). The stratigraphy (Figure 25) consisted of:

Layer 1 (100): dark brown sand of loose compaction with rootlets. Approximately 0.5m thick. Topsoil.

Layer 2 (101): grey loose compacted grey yellow sand with occasional cockle shell. Interpreted as a spoil mound related to stormwater works.

Layer 3 (102): mid-brown sandy silt, moderate compaction with rootlet inclusions. 25cm thick and 20 to 50cm below Layer 1. Interpreted as a buried topsoil.

Layer 4 (105): dark brown matrix, semi compact with frequent cockle shell, and occasional pipi, charcoal fragments and FCR. Midden layer.

Layer 5 (103): white grey ash of moderate compaction.

Layer 6 (104): grey brown silty ash of loose compaction.

Layer 7 (98): firm black brown sand. Interpreted as sand turning into peat

Layer 8 (99): firm red brown sand. Subsoil.

The midden layer (105) was stratigraphically above the white and grey ash and grey brown silty ash layers (103-104) and these sat above the peat layer (98) and dune sand layer (99). Layers 105, 103, 104, and 98 were sampled; however, not all samples were analysed, see Figure 25). The grey layer (104) is assumed to be dune erosion and may be related to Māori gardening on the sloped banks of the dunes. The white and ashy grey layer (103) is assumed to be a localised volcanic eruption and

5. Archaeological Investigations

the ash may be a form of tephra (Figure 26). The Harris matrix in Figure 27 provides a generalised stratigraphic understanding of the area and how the midden relates to the geomorphology of the area (see Section 7.1 for further discussion of the geomorphology).

Once the midden layer (105) was removed a number of features were exposed and 98 context numbers were allocated to them (Figure 28–Figure 30). Thirty-eight of these contexts were voided. Sixty contexts were allocated to 32 confirmed features, shown in Figure 31. Generally, these features were functionally interpreted to be post holes with some hangi/firepits. What seemed to be a cache of FCR was also noted. In all there were 29 postholes (contexts 108, 110, 112, 118, 120, 122, 124, 126, 132, 134, 136, 138, 140, 144, 148, 150, 154, 158, 164, 172, 178, 184, 188, 190, 192, 194, 196, 206 and 208); 2 hangi/firepits (contexts 106 (not shown on plan but in section) and 200); and 1 FCR cache (context 212).

The post holes were probably supporting structures for small drying racks and/or small shelters, with depths ranging between 200mm to 400mm, and probably represent a single occupation site. The hangi/firepits may be related to cooking and smoking seafood to preserve it for later use. Context 106, the hangi visible in section (Figure 25), which was cut through the midden layer 105, represents later activity following the midden accumulation, and may indicate re-use of this area. The FCR cache was similar to features noted by Bickler et al. in their 2007 report.

Once the features were sampled and recorded the area was cut down (Figure 33). No further features were identified beneath this layer except for an in situ stump below the organic peat layer (Figure 32).



Figure 17. Pre-excavation photo in the area where site Q07/1419 was located



Figure 18. Pre-excavation photo showing the spoil mound located on midden Q07/1419



Figure 19. South-facing section containing midden Q07/1419 (scale interval 0.25m)



Figure 20. Pre-excavation photo of midden Q07/1419 facing south (scale interval 0.5m)



Figure 21. Types of shell (apart from cockle) found within the middens



Figure 22. Sample of FCR (scale interval 0.25m)



Figure 23. Unifacial chert core showing cortex and flake scars



Figure 24. Unifacial chert core; note the flake scar on the right of the image with hinged platform

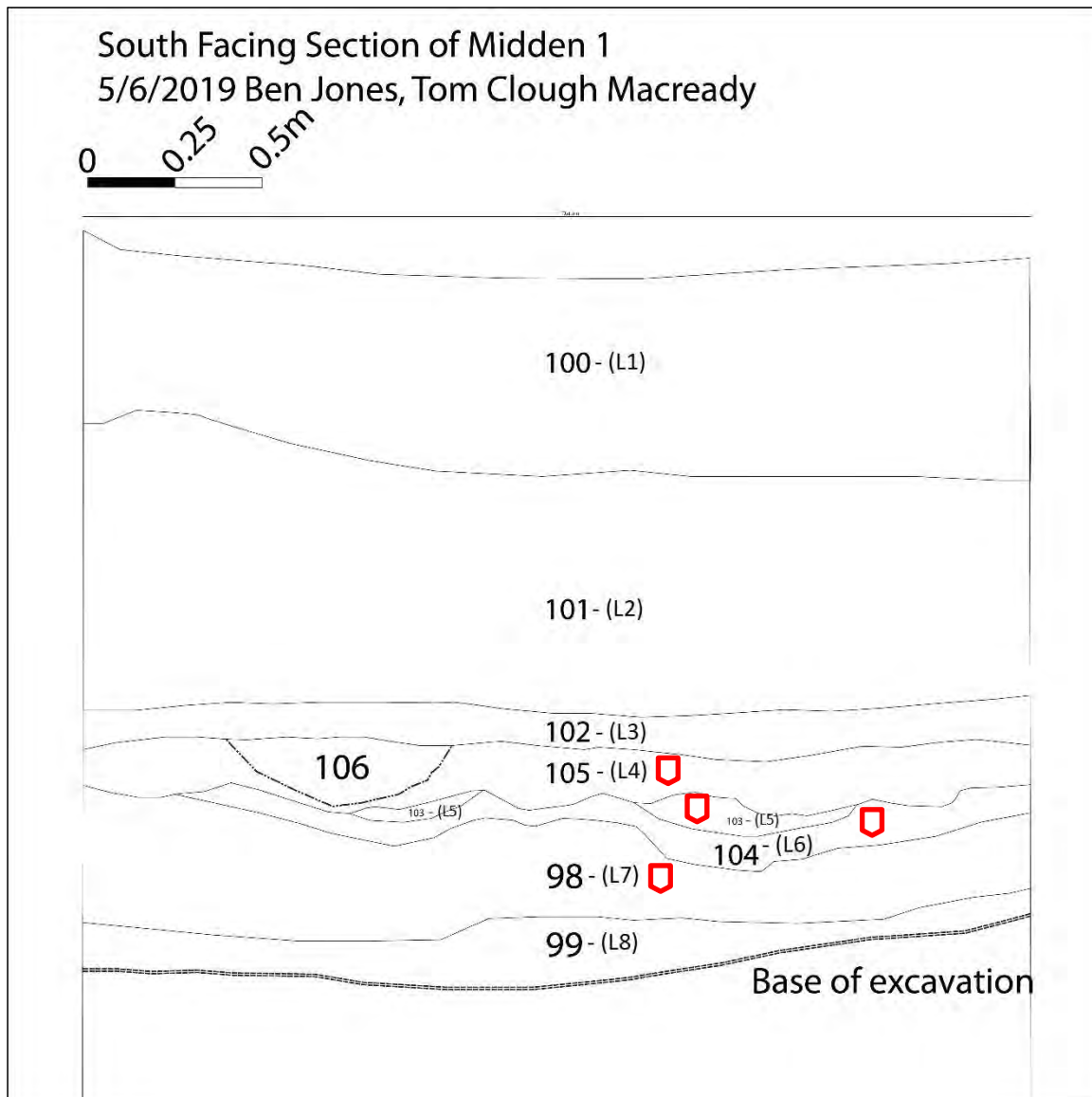


Figure 25. South-facing section showing the individual layers within Q07/1419 marked in black; context 106 is a hangi. Sample locations noted in red (see Figure 31 for section location)



Figure 26. North-facing trench section illustrating the various layers underneath midden Q07/1419

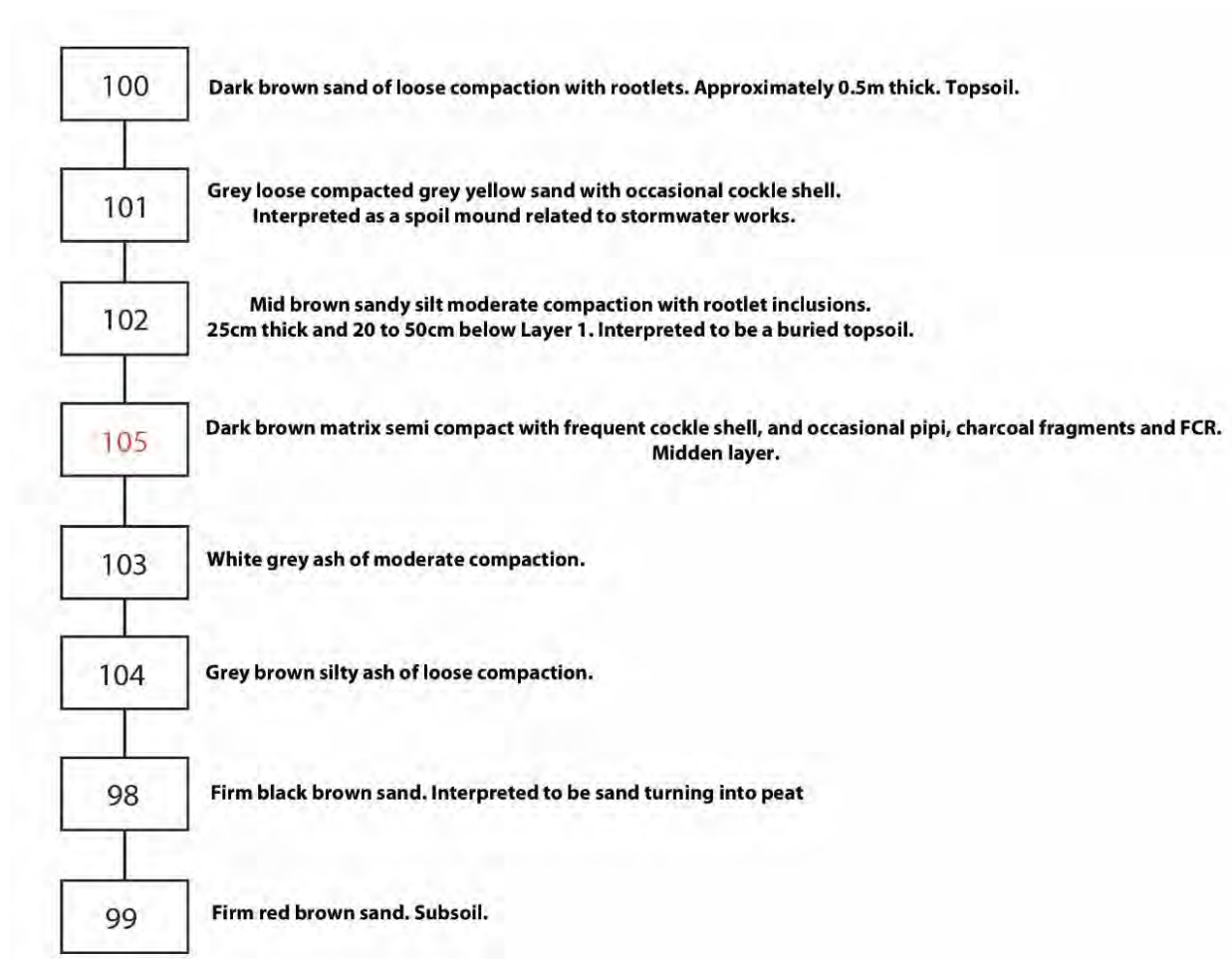


Figure 27. Harris matrix relating to midden Q07/1419 stratigraphy



Figure 28. Trench section showing the stratigraphy of the midden and features underneath (scale interval 0.5m)



Figure 29. Panorama facing west of excavated extent of midden Q07/1419 (scale interval 0.5m)



Figure 30. Facing east looking towards the excavated features under midden Q07/1419 (scale interval 0.5m)

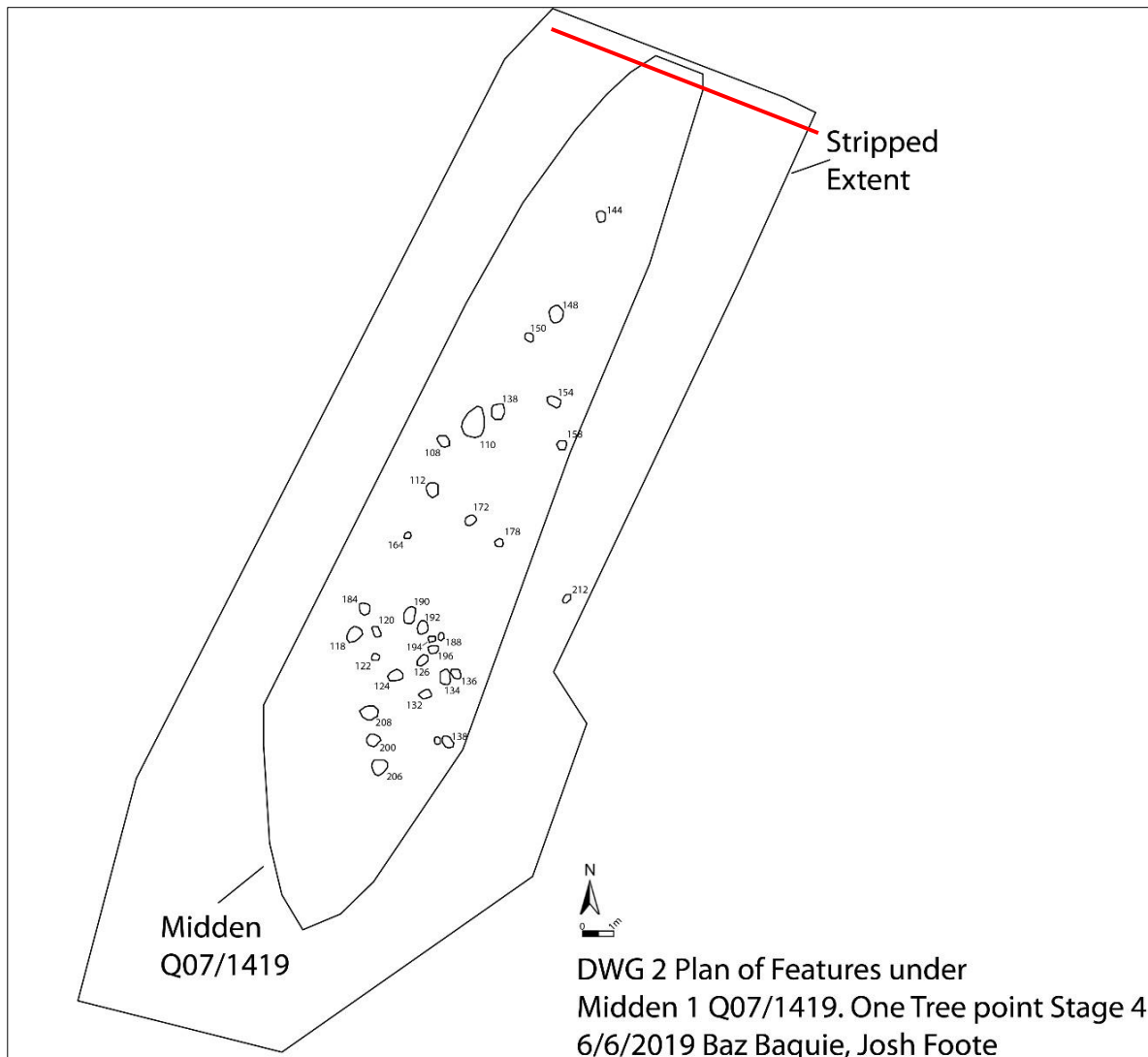


Figure 31. Scale plan of extent of stripping and midden Q07/1419, with features found below the midden; section line (Figure 28) in red



Figure 32. In situ stump/root system found underneath the peat layer (98) (scale interval 0.25m)



Figure 33. Facing south looking towards the cleared gully in which midden Q07/1419 sat

5.2.2 Site Q07/1420

Q07/1420 was originally described as ‘two deposits of midden c.20m apart in pasture southwest of One Tree Point Road; both deposits straddle the boundary fences. The western deposit is a 16m x 9m midden, and the eastern a 6m x 2.5m midden. Both deposits comprise whole and fragmented shell (predominantly cockle with some pipi and whelk, mostly burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam matrix up to 400mm thick. The midden is generally in good condition with some disturbance to the eastern deposit by residential development.’

Stripping of the topsoil showed that the two previously recorded midden deposits were in fact one continuous layer. The general shape of the midden was sub-rectangular, orientated in a NNE-SSW direction (Figure 34 and Figure 35). The midden layer was composed of grey-black loose sand with frequent burnt whole cockle shell and occasional pipi and tuatua. Pebble-sized FCR rocks were frequent and occasional charcoal fragments were noted as well (Figure 36). Some of the shell in the matrix was burned and bleached with fragmented and whole shell noted throughout. The midden was 22m in length, 12.4m wide and 0.25m thick. The midden layer was situated on a similar peat layer to layer 98 in Q07/1419 and was located within a gully. Once the layer was sampled and recorded a central trench was dug along the short axis to note internal stratigraphy (Figure 37 and Figure 38). This showed a dense lens of whole cockle shell probably related to a depositional dumping event (context 214a, Figure 36 and Figure 39). The trench also showed the top of features underneath the midden (Figure 40, Figure 41). The midden was in good condition, and a segment of it continues north onto the adjacent property.

Eighty-six contexts were allocated to 43 confirmed archaeological features, shown in Figure 34. The features were functionally interpreted to be hangi/firepits, post holes, bin pits and a firescoop. What seemed to be caches of FCR were also noted. In all there were 26 post holes (contexts 221, 225, 227, 229, 231, 235, 237, 239, 253, 255, 257, 261, 265, 271, 275, 277, 279, 283, 289, 293, 295, 303, 307, 309, 321 and 323); 8 hangi/firepits (contexts 251, 273, 285, 311, 313, 317, 325 and 327), 1 firescoop (context 219); 5 bin pits (contexts 223, 233, 241, 243 and 267); and 3 FCR caches (contexts 245, 247 and 297).

The post holes were probably supporting structures for small drying racks and/or temporary shelters, with depths ranging between 150mm and 350mm, and probably represent a single occupation site. The hangi/firepits may indicate the location of cooking/food processing areas and thus are similar to the other sites discussed in this report where hangi/firepits were found. As shown in Figure 34, to the north there were several large hangi/firepits, for example 317. To the east of this was a line of postholes, for example, 303, 307 and 309, which may indicate a drying rack. To the south there was a similar concentration of hangi; however, the area was hemmed by post holes which may indicate a temporary shelter. The FCR caches are similar to features noted by Bickler et al. in their 2007 report.

Once the features were sampled and recorded the area was cut down, but no additional archaeology was noted.

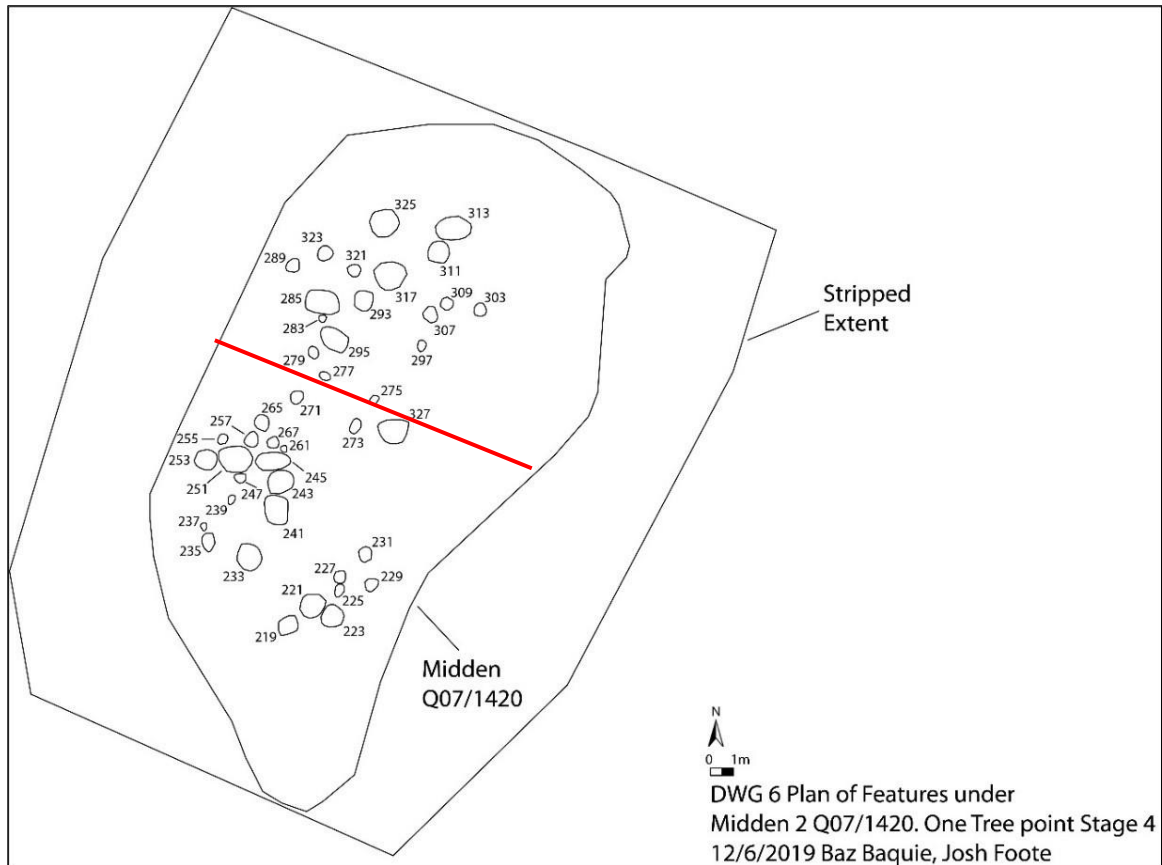


Figure 34. Features and numbers (cut contexts only) found under midden Q07/1420; section line (Figure 39) in red



Figure 35. Facing west looking at the full extent of midden Q07/1420 (scale interval 0.5m)



Figure 36. Close-up photo of midden deposit 214a within Q07/1420



Figure 37. Facing east towards the central trench within midden Q07/1420



Figure 38. North-facing section showing the internal stratigraphy of midden Q07/1420

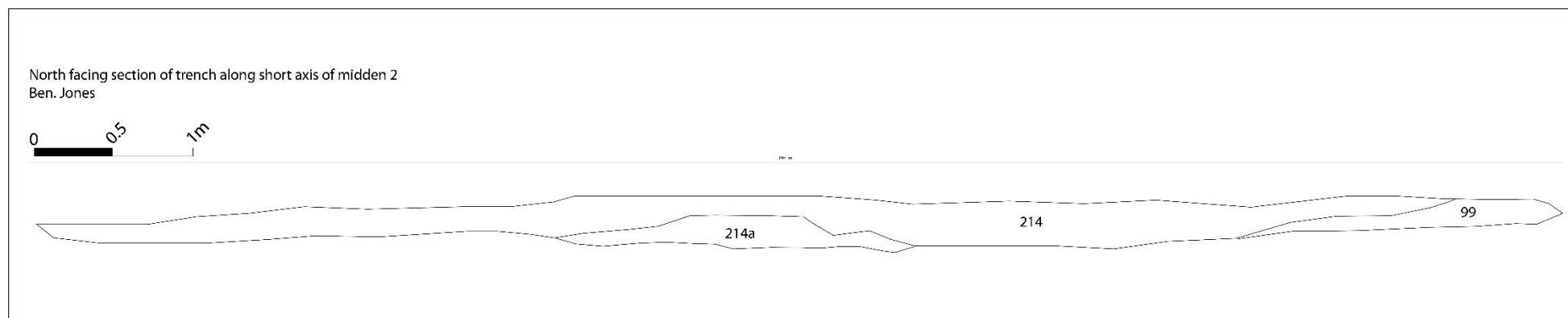


Figure 39. North-facing section of trench within midden Q07/1420; see Figure 34 for section location



Figure 40. Working shot facing east, showing the features being exposed, Q07/1420



Figure 41. Facing north looking towards excavated features under midden Q07/1420

5.2.3 Site Q07/1421

Q07/1421 was originally described as ‘consisting of three shell midden deposits located in pasture, spread for 70m along and down the west flank of the main dune ridge southwest of One Tree Point Road. The three midden deposits were recorded as 11m x 9m, 9m x 6m and 11m x 7m. All consisted of whole and fragmented shell (predominantly cockle with some pipi and whelk, most burnt & some articulated), charcoal and fired rock tightly packed in a blackened sandy loam matrix up to 300mm thick. Some minor surface damage by stock traffic.’

Stripping of the topsoil showed there were in fact only two intact middens, referred to here as middens 3 and 4 (Figure 42). Midden 3 was oval shaped and orientated in a N-S direction, composed of a loose grey black sandy silt with frequent whole and fragmented cockle shell. Whelk, FCR and charcoal were also frequently present. The midden measured 15.4m in length with a width of 7.2m and a thickness of 0.255m. It was situated on a similar peat layer to layer 98 recorded at Q07/1419, within a dune swale (Figure 43). No midden deposits were located on the ridge to the west running parallel to the gully. A central trench was dug along the short axis of the midden layer to note the internal stratigraphy of midden 3 (Figure 44–Figure 46).

Thirty-four contexts were allocated to 17 confirmed features identified under midden 3 (Figure 42, Figure 47). These were all fully excavated, and the features were interpreted as post holes, a hangi/firepit and several firescoops. There were 7 post holes (contexts 329, 333, 339, 341, 343, 351 and 393); 4 FCR rock caches (contexts 335, 337, 389 and 391); 1 hangi/firepit (context 349); and 5

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firescoops (contexts 331, 345, 347, 387 and 395). The post holes, with depths ranging between 200mm and 350mm, were probably supporting structures for small drying racks, and the site was probably a single occupation. The post holes noted under this midden were orientated in a NE-SW axis and may indicate a drying rack with the hangi/firepit (349), FCR rock caches and firescoops potentially related to the process of shellfish preparation.

Once the features were recorded and excavated the area was cut down. No additional archaeology was noted.

Midden 4 was a rectangular oval shape, orientated in a N-S direction (Figure 42, Figure 48) and composed of a loose grey black sandy silt with frequent whole and fragmented cockle shell. Whelk, FCR and charcoal were also frequently present. It measured 17m in length with a width of 6.2m and a thickness of 0.20m; it was situated on a similar peat layer to 98 in Q07/1419 and was located within a dune swale. No midden deposits were located on the ridge to the east that ran parallel to the gulley. A central trench was dug along the short axis of the midden layer to note the internal stratigraphy (Figure 49–Figure 51).

Trenching revealed numerous features underneath midden 4 (Figure 42, Figure 52). Thirty contexts were allocated to the 15 confirmed features. These were all fully excavated and were interpreted as post holes and firescoops. There were 11 post holes (contexts 353, 357, 359, 363, 365, 369, 375, 377, 379, 381 and 383); and 4 firescoops (contexts 355, 361, 367 and 385). The post holes, with depths ranging between 150mm to 400mm, were probably supporting structures for small drying racks similar to midden 3, and the site was probably a single occupation. The firescoops may be related to drying/smoking.

Once the features were recorded and excavated the area was cut down. No additional archaeology was noted.

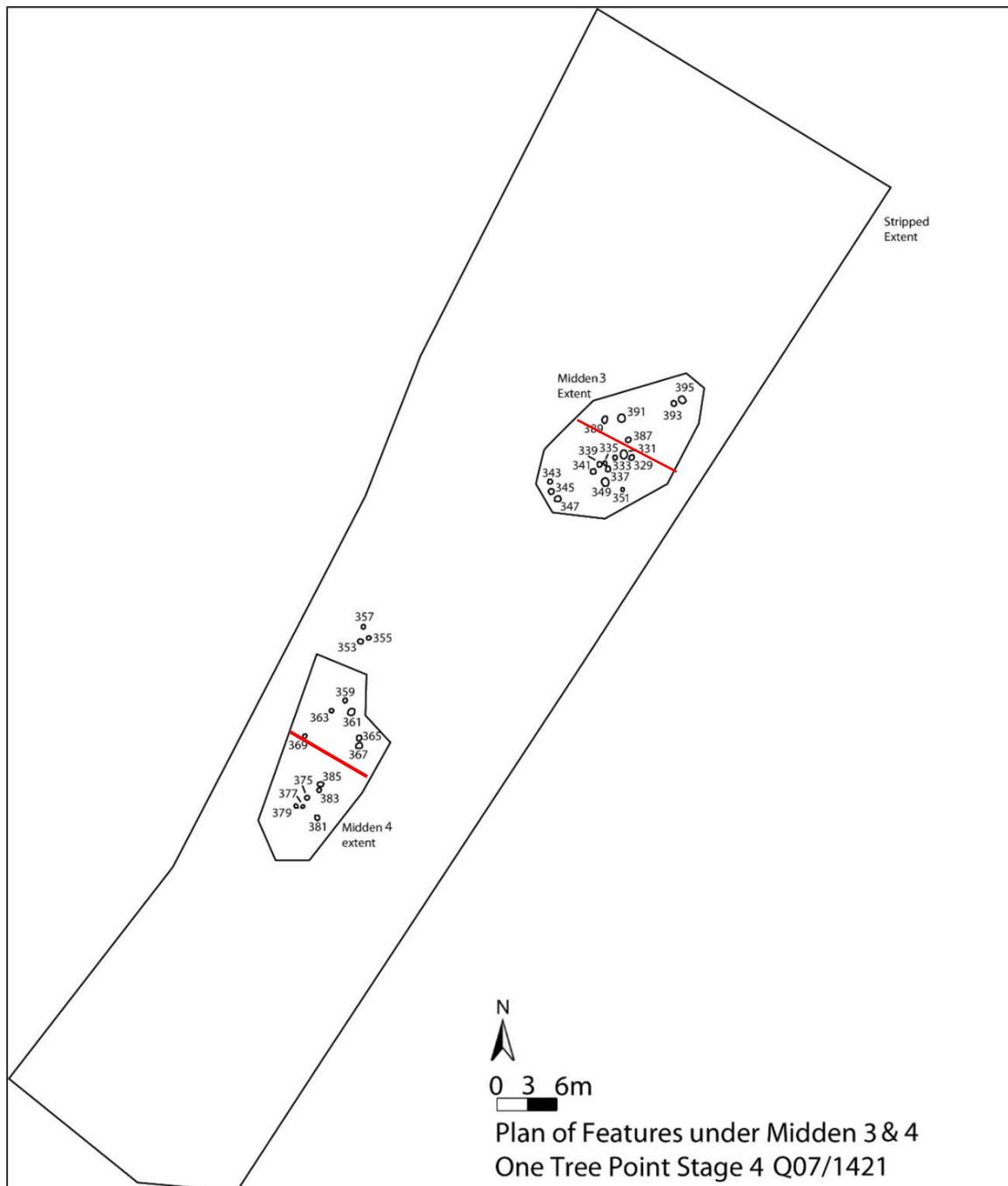


Figure 42. Plan of excavated extent of Q07/1421 with the two patches of midden exposed within the buffer area (scale interval 0.5m); section lines (Figure 45 and Figure 51) in red



Figure 43. Facing south looking towards the extent of midden 3 Q07/1421 (scale interval 0.5m)



Figure 44. Facing southwest showing the central trench within midden 3 Q07/1421 (scale interval 0.5m)

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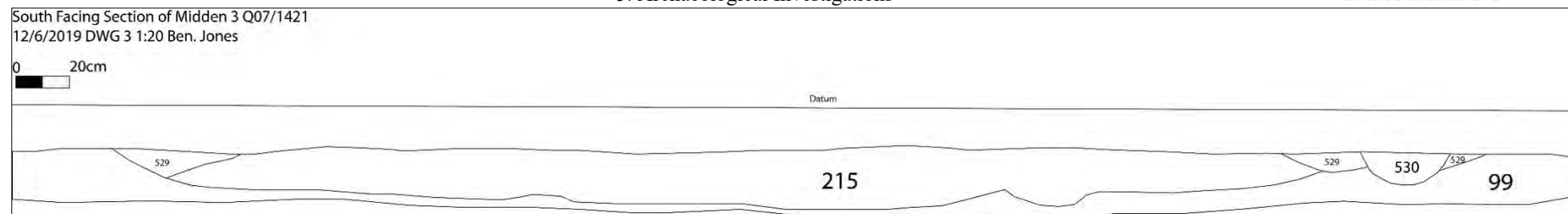


Figure 45. Section drawn of midden 3 Q07/1421(scale interval 0.5m); see Figure 42 for section location



Figure 46. Panorama showing the stripped extent of midden 3 (scale interval 0.5m)



Figure 47. Facing north looking towards the features exposed and excavated underneath midden 3 Q07/1421 (scale interval 0.5m)



Figure 48. Facing north looking towards midden 4 Q07/1421 (scale interval 0.5m)



Figure 49. Facing east looking towards the central trench within midden 4 Q07/1421 (scale interval 0.5m)



Figure 50. East-facing section showing general stratigraphy (scale interval 0.5m)

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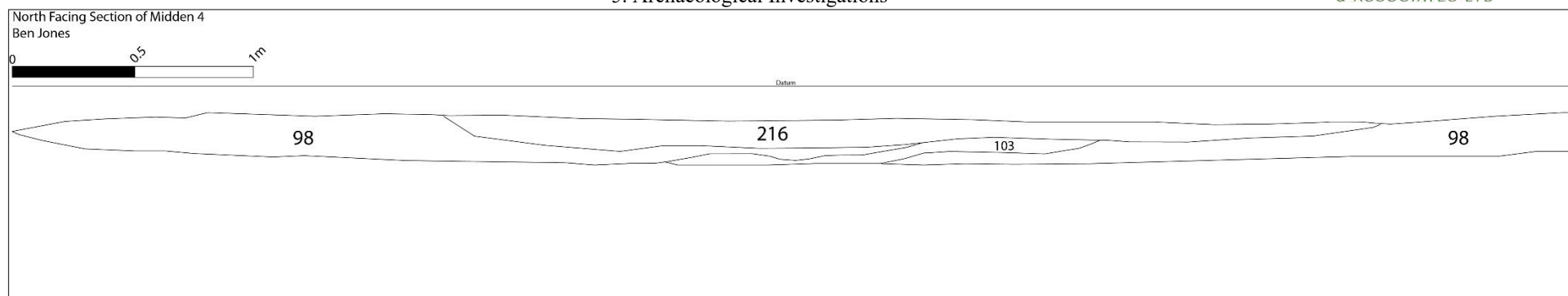


Figure 51. Midden 4 section Q07/1421; see Figure 42 for section location



Figure 52. Features under midden 4 Q07/1421 (scale interval 0.5m)

5.2.4 Site Q07/1422

Q07/1422 was originally described as ‘two small midden and surface scattered shell in pasture southwest of One Tree Point Road. The two shell middens were measured at 4m x 3m x 250mm and 2m x 1m x 100mm. Both consisted of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which was burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam. Some surface damage to deposits by stock traffic was noted.’

Stripping of the topsoil showed the ploughed midden deposit (Figure 53 and Figure 54). It measured 17m in length, with a width of 0.3m and a thickness of 0.1m orientated in a N-S direction. The deposit was compacted, composed of grey black sandy silt with frequent cockle, and occasional scallop, FCR, and charcoal. Once the deposit was sampled and removed it became apparent that sand was deposited on the south-eastern extent and it ran deeper. Sections are shown in Figure 55, Figure 56 and Figure 57. Re-deposited sand, mottled yellow orange in colour, had been compacted to create a platform for the nearby construction of a shed. This process impacted the integrity of the midden. However, once this sand and the remaining midden layer were removed, extensive features were noted.

Eighty-four contexts were allocated to 42 confirmed features, visible in Figure 58–Figure 60. All of these were fully excavated and recorded (Figure 60). There were 27 post holes (contexts 407, 417, 419, 421, 425, 441, 445, 447, 451, 455, 463, 465, 475, 477, 481, 491, 493, 495, 499, 501, 503, 505, 507, 513, 515, 521 and 523); 5 hangi/firepits (contexts 443, 461, 497, 517 and 519); 7 firescoops (contexts 401, 411, 413, 431, 449, 483 and 485); and 3 caches of FCR (contexts 457, 471 and 489).

The post holes, with depths ranging between 120mm and 400mm, were probably supporting structures for small drying racks, and/or temporary shelters. It was probably a single occupation site with several cooking and food processing areas indicated by hangi and firescoops. As shown on

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Figure 58, there was a temporary shelter (composed of postholes 407, 417, 419 and 421) around hangi 423 with a firescoop in the centre, 413, and also firescoop 411 close by. To the south was a possible rectangular structure with 521, 513, 499 and 463 being the outer posts, 461 being the cooking area with a large rake out area and firescoops such as 483.

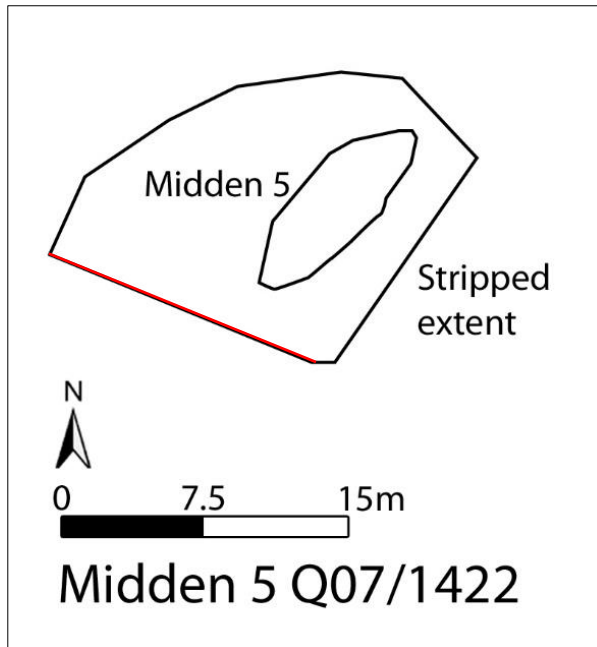


Figure 53. Extent of midden Q07/1422 before excavation



Figure 54. Initial extent of midden Q07/1422 (scale interval 0.5m)

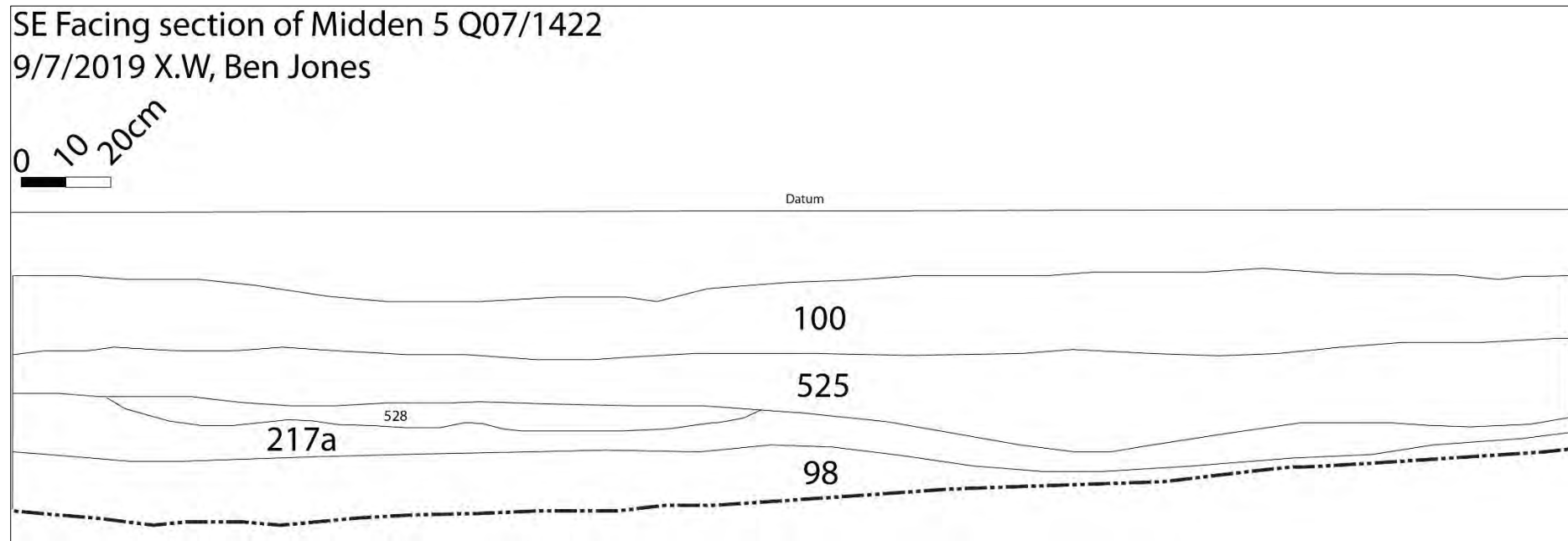


Figure 55. Section drawing of midden Q07/1422; section location shown in Figure 58

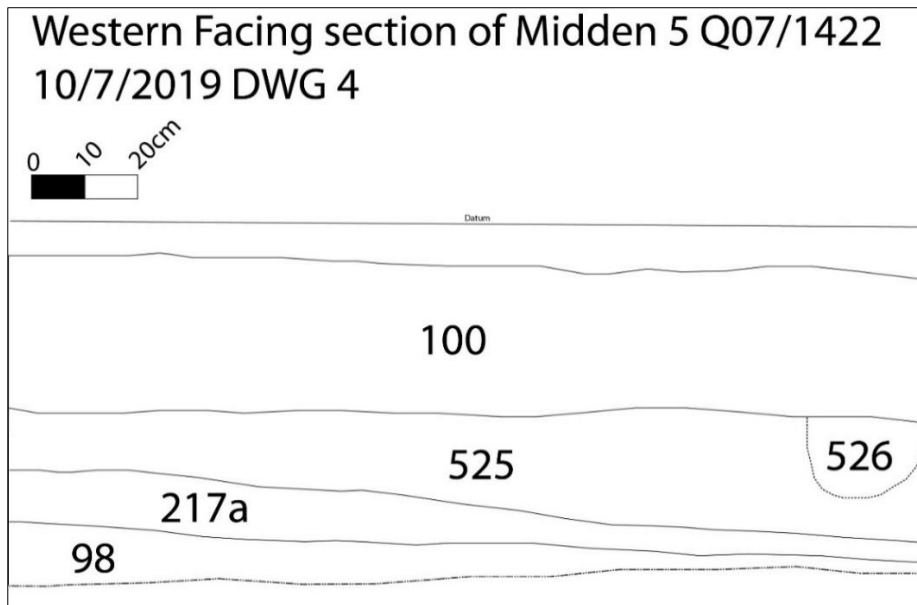


Figure 56. Section drawing of midden Q07/1422; section location shown in Figure 58 (note: posthole 526 is a modern feature)



Figure 57. Western facing section of midden Q07/1422 (scale interval 0.5m)

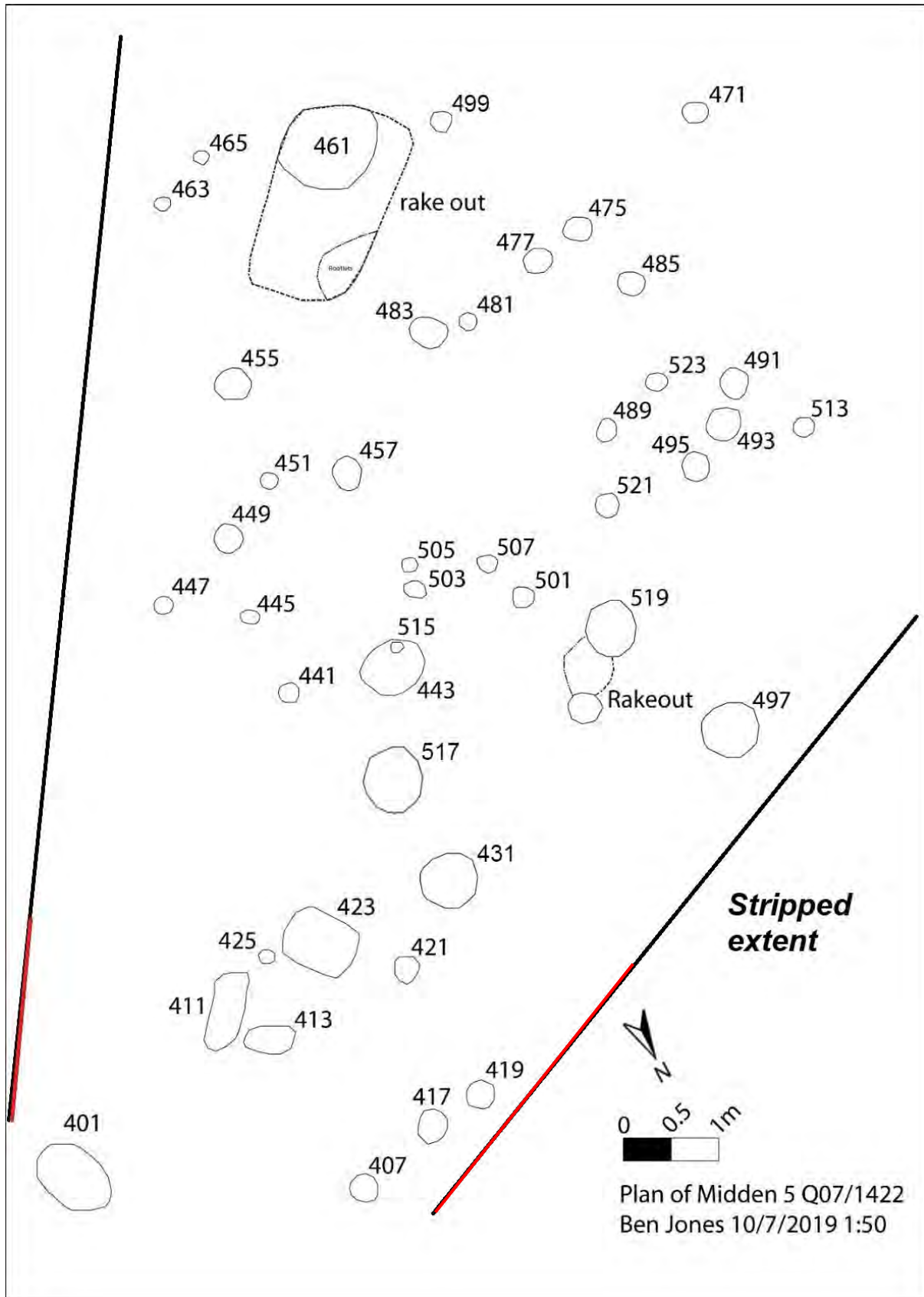


Figure 58. Plan of features underneath midden Q07/1422; section lines in red (Figure 55 right, Figure 56 left)



Figure 59. Exposed features under midden Q07/1422 (scale interval 0.5m)



Figure 60. Excavated features under midden Q07/1422 (scale interval 0.5m)

5.2.5 Site Q07/1423

Q07/1423 was originally described as ‘located in pasture southwest of One Tree Point Road approximately mid-way down west dune flank. The site consisted of a 3m x 2m x 100mm thick shell midden comprised of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which was burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam matrix. Some surface damage by stock traffic was noted.’

Stripping of the topsoil showed the midden was patchy and quite compact, composed of grey black sandy silt with frequent cockle, and occasional scallop, FCR, and charcoal fragments (Figure 61 and Figure 62). It measured 8m in length, 4m in width and 0.25m in thickness. Once sampled and recorded the midden was stripped to reveal one feature underneath: a hangi/firepit (context 399) (Figure 63).



Figure 61. Extent of midden Q07/1423 (scale interval 0.5m)



Figure 62. Feature under midden Q07/1423



Figure 63. Hangi (context 399) (scale interval 6.2cm)

5.2.6 Site Q07/1433

Q07/1433 was originally described as ‘located within Lot 2 DP 358186, and situated some 175m SW of One Tree Point Road. The midden extent was identified by probing as being c.20m EW by 10 m NS. It was possibly affected by stock.’

Stripping of the topsoil in the recorded location of this midden did not manage to relocate the midden, nor did extensive probing and trial trenching in the surrounding area.

5.3 Monitoring Results

5.3.1 Introduction

Two new sites were identified during archaeological monitoring in Stage 4 and assigned the numbers Q07/1447 and Q07/1463 (Figure 16). Another area of midden and a hangi/firepit (Areas B and C in Figure 16) were identified by the contractors in August just within Stage 5 and were recorded as part of site Q07/1419. These are described in the following sections.

5.3.2 Site Q07/1447

Q07/1447 was exposed in the north-eastern corner of Stage 4, 3m west of the eastern boundary fence and 30m south of the boundary with One Tree Point school (E1732129 N6033651). Stripping of the topsoil showed a rough oval-shaped midden measuring approximately 10m x 6.5m and a maximum thickness of 10cm (Figure 64, Figure 65). It was located running from the middle of the eastern slope of a low palaeodune to the base of a shallow swale (Figure 66, Figure 67). The shell was whole and fragmented, dominated by cockle with small quantities of pipi and unidentifiable gastropod. Charcoal and FCR rock were rare inclusions. The matrix was dark grey to light grey fine sand with some areas of ashy fine sand matrix (Figure 65).

Beneath the midden were several additional features with the majority being firescoops, with small numbers of post holes and rock caches (Figure 68). Forty-two contexts were allocated to 22 confirmed features, visible in Figure 64. All of these were fully excavated and recorded (see Figure 64 and Figure 65). There were 17 firescoops (contexts 542, 544, 546, 550, 554, 556, 558, 560, 562, 564, 568, 572, 576, 578, 580, 582 and 584); 3 post holes (contexts 550, 568 and 572); and 2 FCR rock caches (contexts 548 and 564). As with other sites investigated, the presence of cooking features and small arrangements of post holes is suggestive of a cooking and food processing area.

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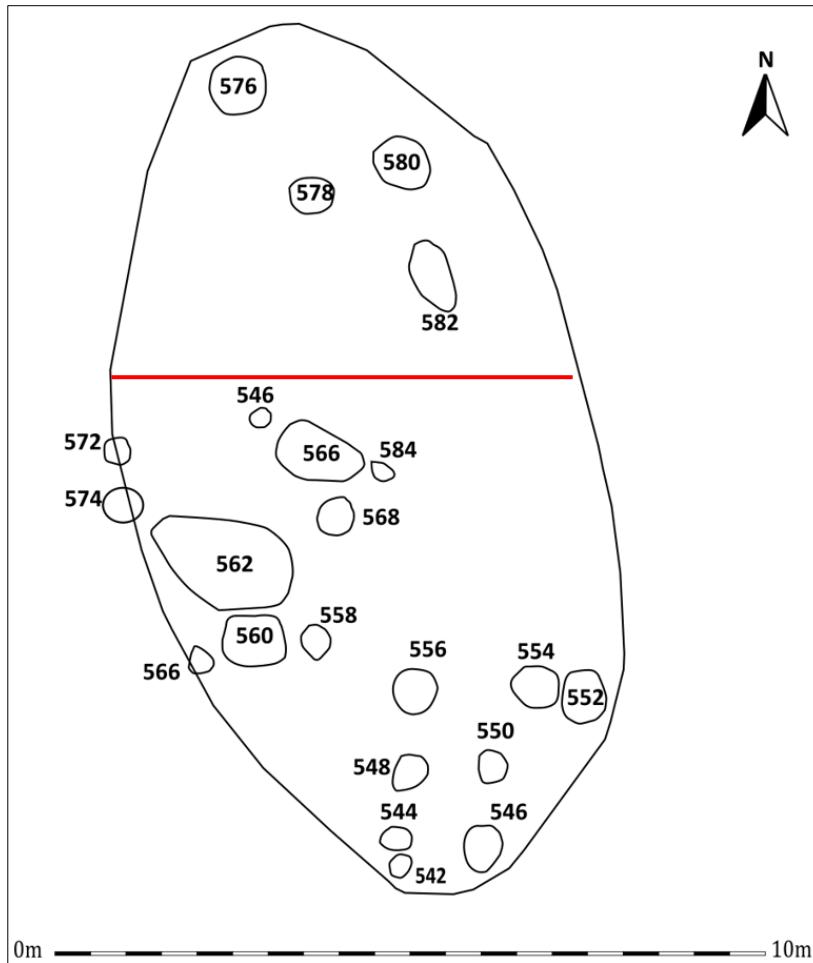


Figure 64. Plan of Q07/1447; section line (Figure 65) in red

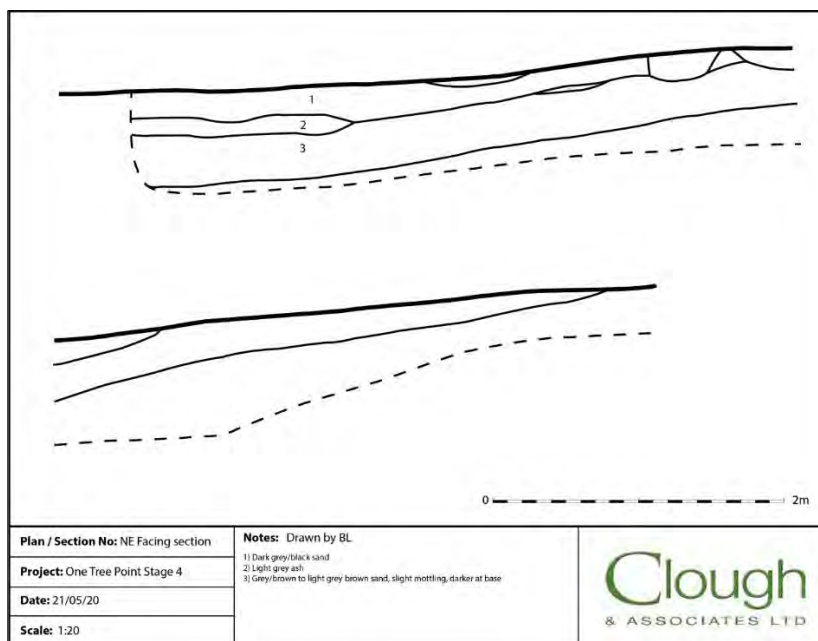


Figure 65. Northeast-facing section of site Q07/1447; see Figure 64 for section location. Layer 3 is the midden layer



Figure 66. Facing north looking towards Q07/1447 (scale interval 0.5m)



Figure 67. Facing south looking towards Q07/1447 (scale interval 0.5m)



Figure 68. FCR rock cache, Q07/1447 (scale interval 0.10m)

5.3.3 Site Q07/1463

This midden had not been previously recorded and was found roughly 50m to the southwest of the One Tree Point School boundary and 50m to the northwest of the development's western boundary. The midden was situated immediately to the east of a corrugated iron farm shed that has since been demolished. Stripping of the topsoil showed the site consisted of an 8m x 6m x 170mm thick shell midden composed of largely fragmented and some whole shell (predominantly cockle with some pipi and whelk, much of which was burnt), charcoal and FCR rock tightly packed in a blackened sandy loam matrix (Figure 69–Figure 72). Some surface damage by stock traffic was noted. The site was similar to Q07/1447, as beneath the midden were several additional features with the majority being firescoops and hangi/firepits with a small numbers of post holes and a FCR rock cache (Figure 73–Figure 76).

Forty contexts were allocated to 20 confirmed features, visible in Figure 71. All of these were fully excavated and recorded. In all there were 2 firescoops (contexts 618 and 674); 10 hangi (contexts 614, 616, 620, 622, 650, 658, 664, 668, 670 and 672); 6 post holes (contexts 624, 626, 632, 634, 648 and 660); and 2 FCR rock cache (contexts 636 and 666). As with other sites investigated, e.g. Q07/1421, Q07/1422 and Q07/1447, the presence of cooking features and small arrangements of post holes is suggestive of a cooking and food processing area.



Figure 69. Facing northwest looking at exposed midden layer, Q07/1463 (scale interval 0.5m)



Figure 70. Midden layer with central trench, Q07/1463 (facing north and scale interval 0.5m)

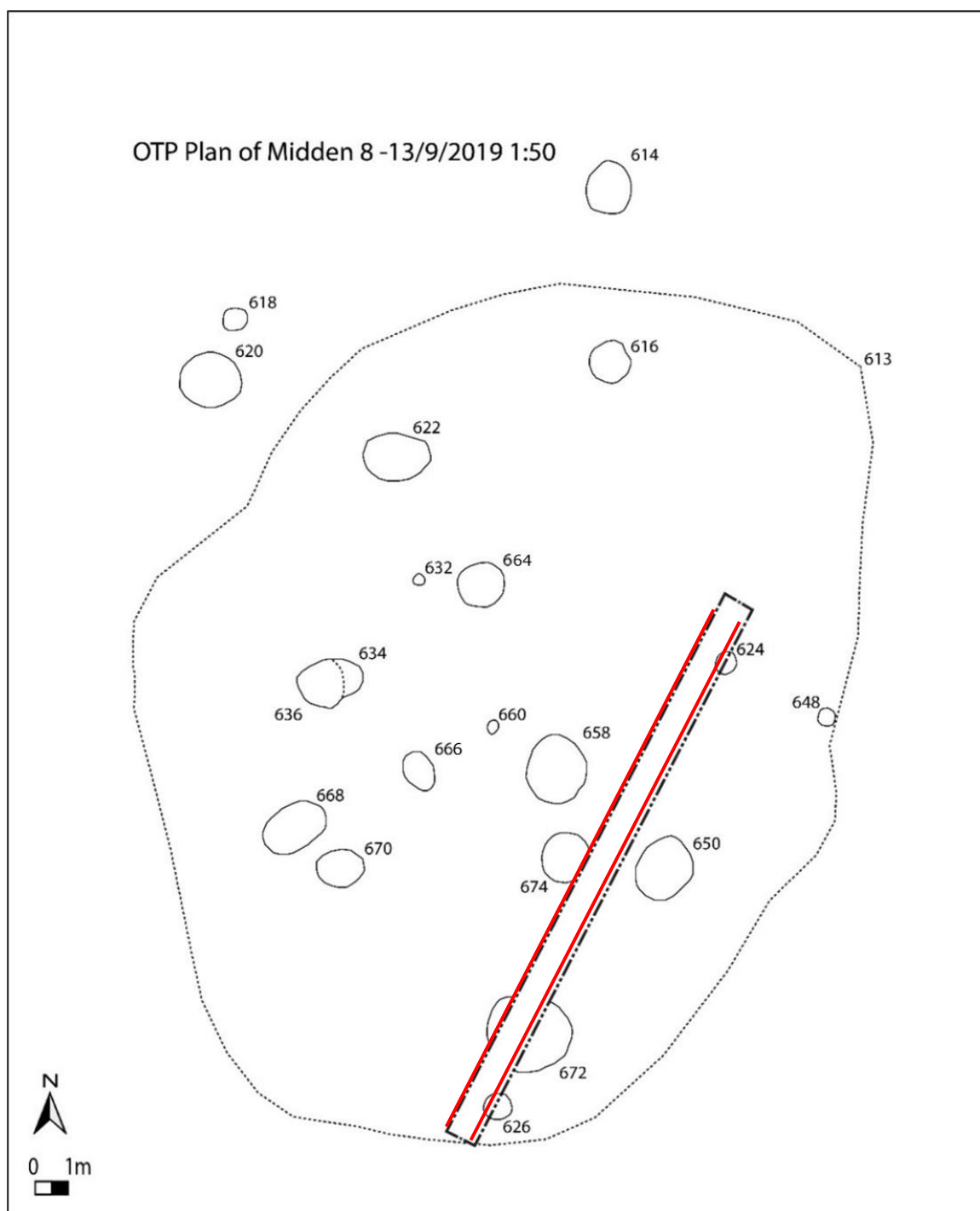


Figure 71. Plan of Q07/1463; section lines (Figure 72) in red

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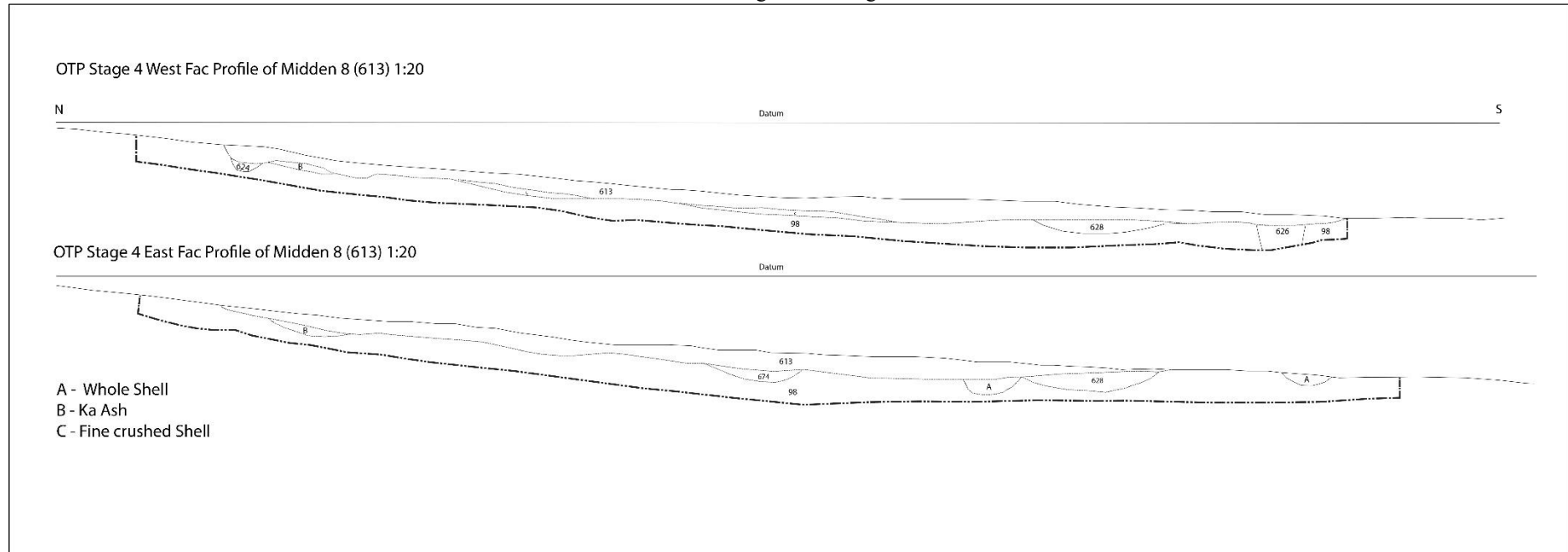


Figure 72. East and west facing sections, Q07/1463; see Figure 71 for section locations



Figure 73. Pre-excavation photo of features underneath midden layer, Q07/1463 (facing south)



Figure 74. Post-excavation photo of features underneath midden layer, Q07/1463 (facing north – scale interval 0.5m)



Figure 75. Half sectioned hangi 658, east-facing section, Q07/1463 (scale interval 6.6cm)



Figure 76. Firescoop (context 674) in east-facing section of trench, Q07/1463 (scale interval 6.6cm)

5.3.4 Area B (part Q07/1419)

In August 2019 a midden was uncovered by the ongoing mechanical excavation in the Stage 5 area, which was recorded as part of site Q07/1419 (see Figure 16). The midden was heavily disturbed both by past activity and by current excavation. The midden contained a significant amount of bone (identified as sheep) and several concentrated pockets of shell, most of which were damaged and pulverised. These pockets of shell were scattered over a large area spanning approximately 8m x 4m. At the same depth as the midden was the remains of a nearby concrete wall or structure, which also contained some animal bone.

The midden was located on a dune surface and was discovered at a significant depth (Figure 77–Figure 82). Due to the nature of the dune surface some of the midden was discovered at a slightly lower depth, particularly the southeast side. As the topsoil and upper layers had already been stripped, the depth at which the midden was located is assumed to have been approximately 1.5–2m below the surface. Across an area spanning approximately 8m x 4m were 6 identifiable pockets of shell, each 40-50cm deep and heavily disturbed. These identifiable pockets had a significant amount of intact shell, while the rest of the scatter was pulverised. Figure 79 and Figure 80 show pockets of shell at a significantly lower depth than the rest of the midden, possibly due to the nature of the dune. A significant amount of bone was found on the upper layer of the northeast corner of the midden, the majority recovered from a cut by the excavator, and was found to be sheep bone.

The midden consisted primarily of cockle with some tuatua and pipi. There was a very small number of gastropods present and no sign of charcoal or charcoal-stained soil. The two most intact pockets of shell were sampled but were not analysed due to their uncertain archaeological context.

The sediment and soil in the midden area consisted mainly of loose light-coloured sand and dark sandy soil, with some clay deposits at a lower depth. Figure 83 gives a good indication of the stratigraphy in the midden area. The concrete wall (Figure 84) was 20cm wide and approximately 6.8m in length and was found at the same depth as the midden on the north side at NZTM coordinates E1731828 N6033801 ±3m. The concrete had a noticeable amount of shell inclusions, which may have come from the midden. Some bone, which also appeared to be sheep, was found amongst the concrete rubble. Much of the concrete wall had been disturbed and destroyed by the excavator. Two wooden posts were found a few metres southwest of the concrete wall; however, these had been pulled out by the excavator and had also lost their context. A large iron object (Figure 85), which may have been part of a plough, was located amongst the concrete rubble a metre away from one of the shell pockets. Unfortunately, much of the context of the midden and the concrete structure had been disturbed. It is unclear whether the concrete structure was historic or modern.

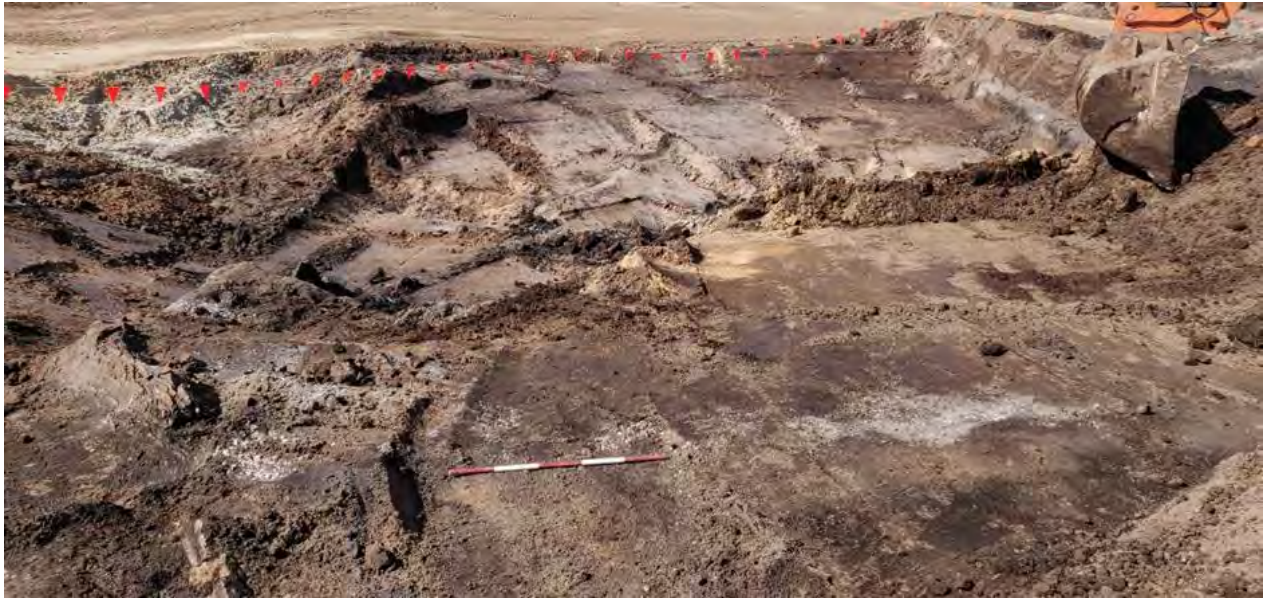


Figure 77. Midden showing distinct pockets and scatter on upper layer (Area B, part Q07/1419)



Figure 78. Midden showing pockets with more distinct scatter at slightly lower depth (Area B, part Q07/1419)



Figure 79. Section of one of the shell pockets located on northeast corner of midden, showing mostly pulverised shell with some intact at the top (drawn in Figure 81) (Area B, part Q07/1419)



Figure 80. Section of another shell pocket located on northeast corner of midden, showing mostly pulverised shell and dark soil staining, but no indication of charcoal (Area B, part Q07/1419)

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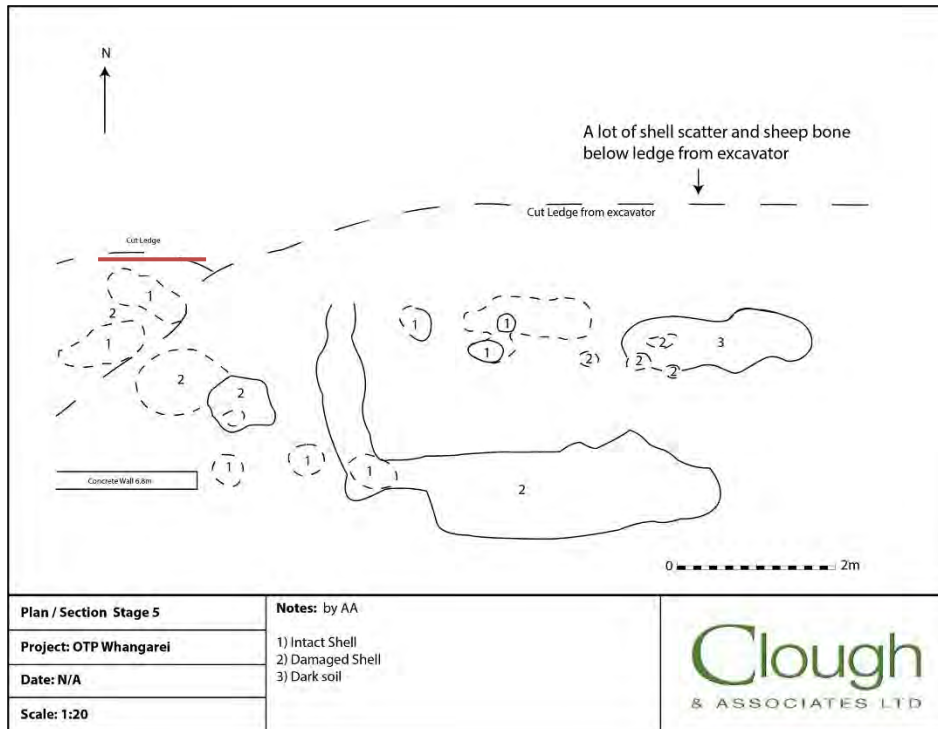


Figure 81. Drawing of midden area showing distinct midden pockets and scatter (Area B, part Q07/1419), section line in red

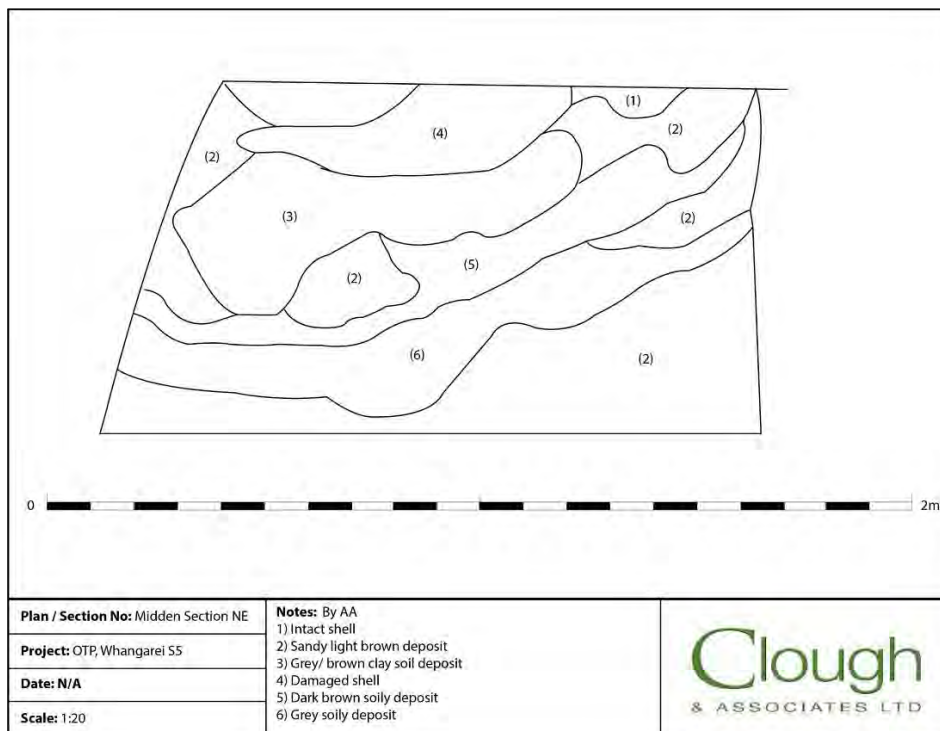


Figure 82. Drawing of cross section of one of the shell pockets, shown in Figure 81

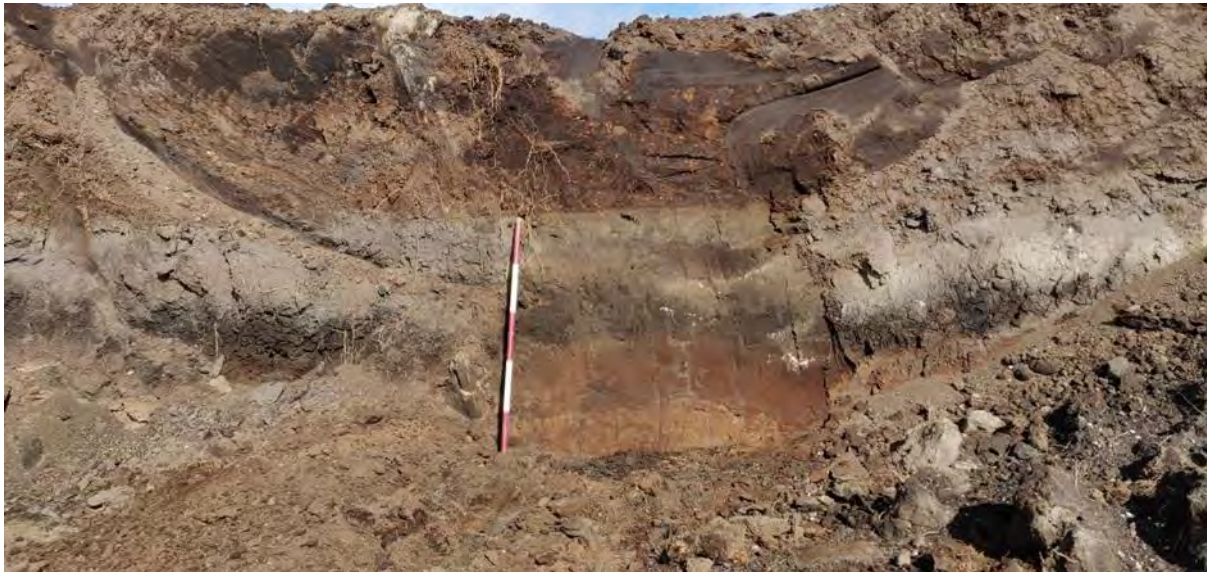


Figure 83. Stratigraphic profile located southeast of midden Area B, part Q07/1419



Figure 84. Remains of concrete wall, where soil staining and rubble to the left indicates it continued south towards the midden where more rubble was found



Figure 85. Iron object discovered amongst the concrete rubble and near the midden (Area B, Q07/1419), possibly part of a plough

5.3.5 Area C (part Q07/1419)

In August 2019 Damion Jackson from Bob Hicks Earthmoving called to report the discovery of possible archaeological features. The surrounding area was fenced off until an archaeologist could investigate (Figure 86). The feature was an isolated hangi/firepit 0.7m long x 0.6m wide x 0.20m thick (Figure 87). To the north was an isolated firescoop/rakeout 0.2m x 0.2m x 0.2m thick. No associated features were noted in the surrounding area. The hangi/firepit was half sectioned and sampled. The cut of the hangi truncated sterile dune sand. Although earthworks in the surrounding area were monitored, no additional features appeared.



Figure 86. Fenced off area facing east (scale interval 0.5m) (Area C, part Q07/1419)



Figure 87. Pre-excavation photo of hangi/firepit (scale interval 0.5m) (Area C, part Q07/1419)

6 ENVIRONMENTAL ANALYSIS

6.1 Midden Analysis

6.1.1 Introduction

Four 10L midden samples were analysed from the One Tree Point project. They were bulk sampled during archaeological investigations that were carried out between 3 June and 3 October 2019 and the samples taken from sites Q07/1419, Q07/1420, Q07/1422 and Q07/1447 were selected for analysis. The internal stratigraphy of the middens investigated did not suggest multiple phases of occupation. Sampling of the middens was carried out in the densest area of shell at each site to maximise the information that could be obtained from the analysis and attempt to obtain a sample representative of the midden diversity. The four midden samples analysed were chosen with the aim of investigating variation across the project area rather than intensively investigating the variability in a single midden, in order to gain an understanding of the different deposits within the different dune swales.

6.1.2 Methodology

The samples were wet sieved with a 2mm sieve, with the charcoal floated and separated during this process. The separated components were air dried and weighed (Table 4).

The identifiable shells were sorted and analysed by taxon and preferred habitat was also noted. The analysis of each taxon examined six aspects: Minimum Number of Individuals (MNI), MNI percentage, the Number of Identified Specimens (NISP), NISP percentage, weight (in grams) and weight percentage of the sample total.

NISP was calculated by counting the total number of identifiable shells for each species. For bivalves to be counted an umbo was the minimum requirement. For gastropods whole or nearly whole terminal spires or a complete anterior canal were counted.

MNI is calculated for bivalves by separating the shells into left and right hinge. The larger number counted is the calculated MNI and the NISP is the sum of the left and right hinges. For gastropods the MNI is the largest number counted of the two methods for identifying individuals and NISP is the sum of the two.

Shell dimensions were analysed to explore what range of sizes were represented in the assemblage. This was carried out on cockle due to the substantial numbers of whole shells. Only complete shells were measured and a measurement in millimetres was made of the distance between the widest two points on the shell. Any whole shell was measured to determine size. Using accepted age grouping size ranges of measured whole shell it was possible to reach some general conclusions relating to the collection methods used by occupants of the site.

6.1.3 Results

The results show that a large portion of each of the samples consisted of sediment, between 57.89 and 64.8 percent of the total sample weight (Table 4). The second largest portion of the samples was unidentified shell that consisted of around 30 percent (c.25 to 34%). The identifiable shell portions were similar for all four samples but showed two groupings. Q07/1419 and Q07/1447 had

6. Environmental Analysis

8-9% identified shell and Q07/1420 and Q07/1422 had 11-12 %. The remaining components of the samples were small portions of rock and charcoal.

Comparing the percentage of the total identified taxa by NISP and MNI showed very similar percentages across all of the samples (Table 5–Table 8). For example, the NISP of cockle as a percentage of the total (92.4) in Q07/1419 was very similar to the MNI of cockle as a percentage of the total (91.4). MNI will be used to compare the sample taxa composition as it is a more accurate representation of the number of individuals present.

The results show the middens were broadly similar in composition with very low evenness (dominated by one species) but low to medium richness in the number of different species present in each sample (Table 5–Table 8). The taxonomic results show that cockle (*Austrovenus stutchburyi*) accounted for the vast majority of the identified species in all of the four samples, with the percentage of the total by MNI ranging from 84.0 (Q07/1420) to 97.6 (Q07/1447) percent. Pipi (*Paphies australis*) was the next largest component, ranging from 0.5 (Q07/1447) to 13.8 (Q07/1420) percent MNI. The remaining species were very small components, often less than 1 percent of the total.

There was some variation in the MNI counts of cockle. Q07/1419 had the smallest number by MNI (480) and Q07/1422 had the largest (761). The pipi results showed large variation in the counts from 3 (Q07/1447) to 111 (Q07/1420).

One interesting aspect is the difference in pipi between the percentage portion of the total by MNI and percentage total by weight. The percentage of the total MNI was always higher than the percentage of the total weight. For example, Q07/1420 showed the pipi was 13.8 percent of the total MNI but only 8.3 percent of the total weight. This demonstrates how a pipi shell weight is generally less than that of a cockle and has less weight compared to the numbers of individuals.

The remaining species in the samples were mainly small predatory or scavenger gastropods such as the lined whelk (*Buccinulum linea*) and *Cominella glandiformis*. In the sample from Q07/1422 there were no large gastropod species; only a single other bivalve was encountered – two individuals of a *Dosinia* species.

A large number of the species identified in the samples are from sandy/muddy environments, including the two main species, cockle and pipi (Table 9). Three species were from rocky environments.

Table 4. Sample components

	Q07/1419		Q07/1420		Q07/1422		Q07/1447	
	N (g)	% of total	N (g)	% of total	N (g)	% of total	N (g)	% of total
Sediment	6895	57.89	7117	58.62	8327	58.08	11024	64.80
UnID Shell	4042	33.94	3390	27.92	4342	30.29	4336	25.49
Shell	932	7.82	1480	12.19	1616	11.27	1502	8.83
Rocks	40	0.34	154	1.27	48	0.33	99	0.58
Charcoal	2	0.02	0	0.00	3	0.02	52	0.31
Bone	0	0.00	0	0.00	0	0.00	0	0.00
Total	11911	100.00	12141	100.00	14336	100.00	17013	100.00

6. Environmental Analysis

Table 5. Counts of species identified in the Q07/1419 sample

Taxon	NISP#	NISP %	MNI #	MNI %	Weight g	Weight %
Cockle	977	92.4	480	91.4	693	91.1
Pipi	74	7.0	40	7.6	51	6.7
Knobbed Whelk	1	0.1	1	0.2	<1	0.0
Turret Shell	1	0.1	1	0.2	15	2.0
<i>Cominella</i> Sp.	1	0.1	1	0.2	<1	0.0
Gastropod Sp.	3	0.3	2	0.4	2	0.3

Table 6. Counts of species identified in the Q07/1420 sample

Taxon	NISP#	NISP %	MNI #	MNI %	Weight (g)	Weight %
Cockle	1342	85.6	678	84.0	1073	90.0
Pipi	205	13.1	111	13.8	99	8.3
White Rock Shell	8	0.5	6	0.7	2	0.2
Gastropod Sp.	4	0.3	4	0.5	1	0.1
Hornsnail	3	0.2	3	0.4	15	1.3
Speckled Whelk	2	0.1	2	0.2	2	0.2
Cats Eye	1	0.1	1	0.1	0	0.0
<i>Diloma zelandica</i>	1	0.1	1	0.1	0	0.0
Operculum	1	0.1	1	0.1	0	0.0

Table 7. Counts of species identified in the Q07/1422 sample

Taxon	NISP#	NISP %	MNI #	MNI %	Weight (g)	Weight %
Cockle	1490	93.2	761	91.9	1184	93.2
Pipi	86	5.4	48	5.8	46	3.6
<i>Dosinia</i> sp.	2	0.1	2	0.2	5	0.4
Turret Shell	2	0.1	2	0.2	1	0.1
<i>Diloma substratum</i>	2	0.1	2	0.2	1	0.1
Lined Whelk	16	1.0	12	1.4	33	2.6
<i>Cominella glandiformis</i>	1	0.1	1	0.1	1	0.1

6. Environmental Analysis

Table 8. Counts of species identified in the Q07/1447 sample

Taxon	NISP#	NISP %	MNI #	MNI %	Weight (g)	Weight %
Cockle	1121	98.6	577	97.6	1230	99.6
Pipi	5	0.4	3	0.5	1	0.1
<i>Diloma substratum</i>	1	0.1	1	0.2	1	0.1
Lined Whelk	6	0.5	6	1.0	1	0.1
<i>Cominella glandiformis</i>	4	0.4	4	0.7	2	0.2

Table 9. Shellfish species and preferred habitat

Common name	Scientific Name	Preferred Habitat
Cockle	(<i>Austrovenus stutchburyi</i>)	Muddy and/or sandy environment
Pipi	(<i>Paphies australis</i>)	Muddy and/or sandy environment
Speckled Whelk	(<i>Cominella adspersa</i>)	Muddy and/or sandy environment
Cat's Eye	(<i>Lunella smaragda</i>)	Rocky environment
Knobbed Whelk	(<i>Austrofusus glans</i>)	Sandy environment
Lined Whelk	(<i>Buccinulum linea</i>)	Rocky environment
<i>Diloma substratum</i>	(<i>Diloma substratum</i>)	Muddy and/or rocky environment
<i>Diloma zealandica</i>	(<i>Diloma zealandica</i>)	Muddy and/or rocky environment
Turret Shell	(<i>Maoricolpus roseus</i>)	Muddy and/or sandy environment
White Rock Shell	(<i>Neothais scalaris</i>)	Rocky environment
<i>Cominella glandiformis</i>	(<i>Cominella glandiformis</i>)	Muddy and/or sandy environment
<i>Dosinia</i> sp.	(<i>Dosinia</i>)	Muddy and/or sandy environment)
Gastropod sp.		Other / Unknown
Operculum		Other / Unknown

6.1.3.1 Dimension Results

A total of 300 cockle individuals were measured from samples from Q07/1442 and Q07/1447. No analysis of pipi was undertaken due to the small number of individuals identified.

The dimension results show variability in the range of sizes (Table 10). Sample Q07/1447 showed a larger range as well as a lower minimum and higher maximum (min: 15.07 max: 44.37) than Q07/1442 (min: 18.19 max: 37.03). However, the mean of each sample was comparable at 27.11 (st. dev. 3.07) (sample Q07/1422) and 27.98 (st. dev. 5.11) (sample Q07/1447).

The dimension histograms also show differences between the two samples (Figure 88, Figure 89). Q07/1422 shows a normal distribution around the mean whereas Q07/1447 shows a right skewed bimodal distribution with peaks at 24 and 30.

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).

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Table 10. Descriptive statistics for the cockle dimension results (mm)

Sample	Q07/1422	Q07/1447
N.	300.00	300.00
Min	18.19	15.07
Max	37.03	44.37
Mean	27.11	27.98
St. dev.	3.07	5.11
Median	26.90	27.67
Mode	28	23

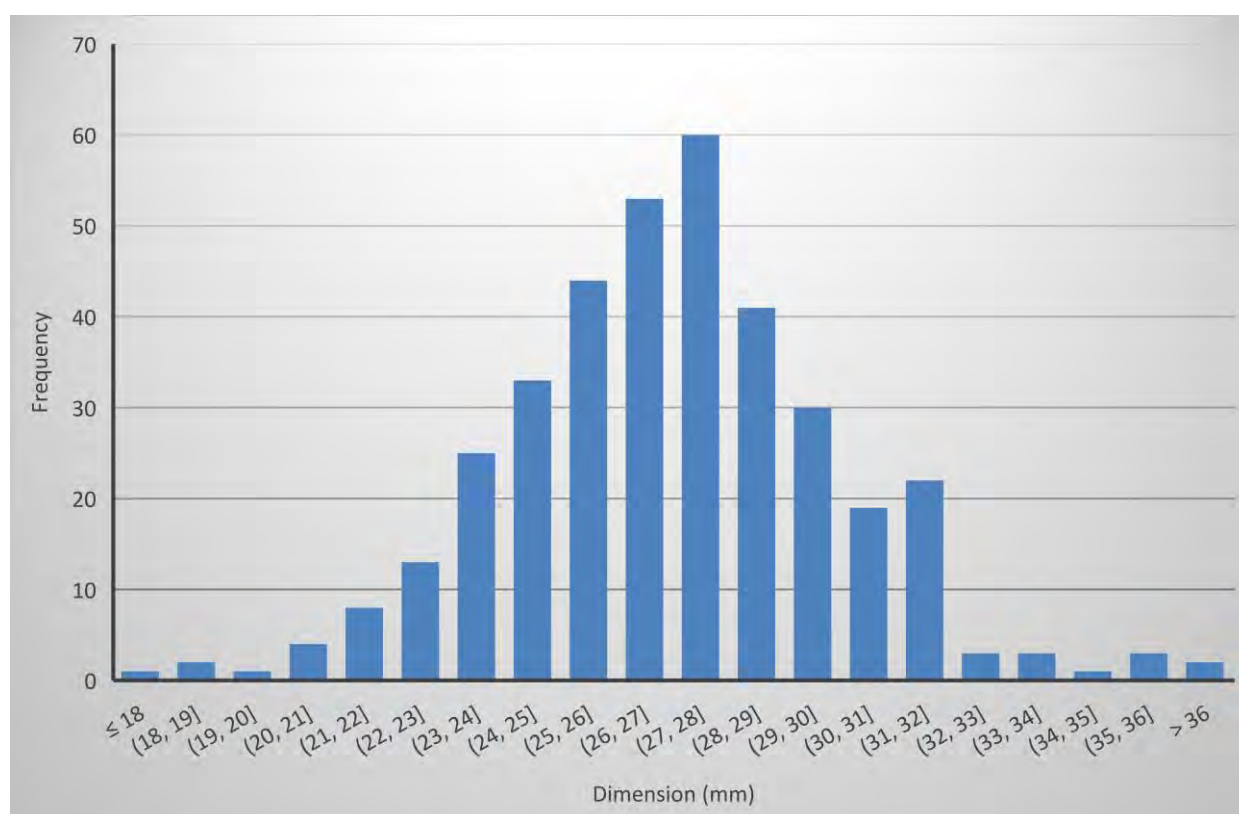


Figure 88. Histogram of cockle dimensions for Q07/1422

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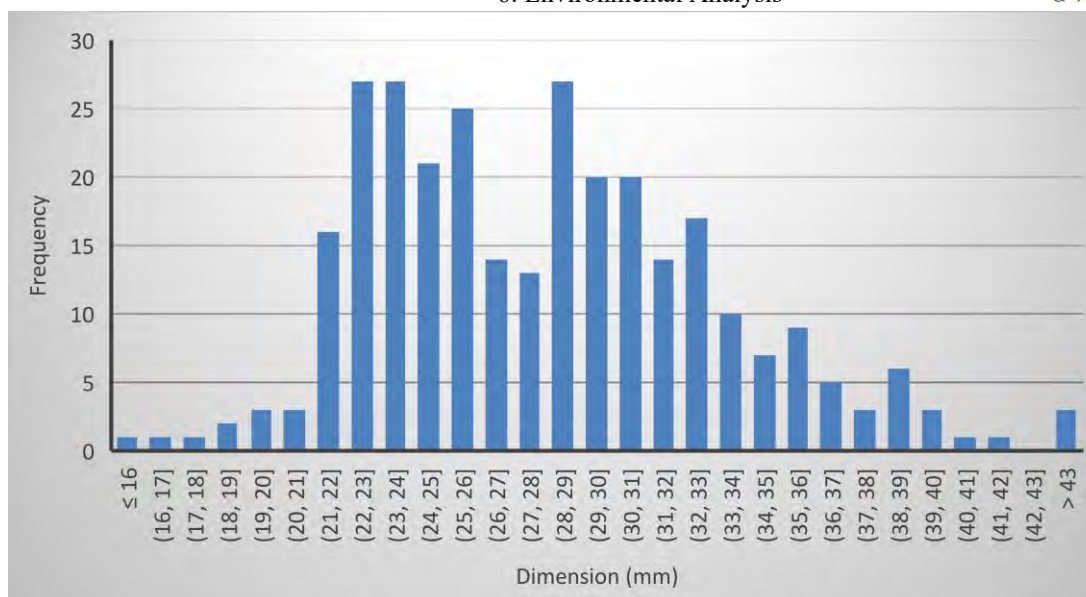


Figure 89. Histogram of cockle dimensions for Q07/1447

6.1.3.2 Fragmentation Ratio

A fragmentation ratio was calculated to assess the level of fragmentation. 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.

In order to calculate the ratio, the identifiable shells were separated into those with over 50% of the shell intact and those with less than 50%. Only cockle and pipi were calculated as other species lacked sufficient numbers. The MNI of each portion was measured and the less than 50% portion was divided by the greater than 50% portion. This creates a ratio of broken shells to whole shells, with a higher number indicating more broken shells. The MNI numbers of each portion and the ratio for each taxon are presented in Table 11.

The results show that the cockle had generally very low fragmentation rates with all four below 1.5 (Table 11). Pipi showed slightly higher fragmentation ratios ranging from 2.64 (Q07/1419) to 3.44 (Q07/1422); however, the numbers of individuals were far lower than the numbers of for cockle.

Table 11. Fragmentation ratios

	Q07/1419		Q07/1420		Q07/1422		Q07/1447	
	MNI	Ratio	MNI	Ratio	MNI	Ratio	MNI	Ratio
Cockle <50%	265	1.23	367	1.18	451	1.45	281	0.95
Cockle >50%	215		311		310		296	
Pipi <50%	29	2.64	86	3.44	35	2.69	3	0.00
Pipi >50%	11		25		13		0	

The fragmentation results can be used as an indication of processes that had acted on the shell deposits. The results indicated the shells were not highly fragmented, suggesting the middens were not exposed to significant processes that acted to break down the shells. While archaeological sites should not be considered 'good' or 'bad' due to the perceived quality of the deposits, the low fragmentation ratios indicate the samples have high information potential.

The results of the shell midden analysis showed the middens were dominated by cockle, with smaller components of pipi and very small numbers of various gastropods species. This indicates exploitation of a muddy/sandy shore environment. However, a small number of the gastropod species were from rocky environments. The low numbers of these in the sample suggest they may be opportunistic collections rather than evidence of rocky shores being targeted for harvesting.

The weight of the shell is also a factor that can be used to explore decisions reflected in the midden samples. The percentage of the total MNI for pipi was always higher than the percentage of the total sample weight. This indicated the pipi shells were generally lower in weight compared to the cockle. If it is assumed that people will preferably target the least expensive resource in terms of energy expenditure, the pipi would be more ideal as there is less weight to carry compared to cockle. A reason for cockle to be preferentially targeted rather than pipi may have been due to past cultural-based decisions such as a specific tikanga or awa; however, it may simply have been that what was close at hand was selected. Potentially the pipi beds were not as extensive as the cockle, as noted in the Physical Environment section, which would seem to explain the cockle preference. This preference aligns with the results of previous investigations in the area.

The location of the project area is in close proximity to multiple resource areas with estuaries to the east and west, sandbars and sandy tidal beaches in the harbour to the north. It then comes as no surprise that sandy/ muddy environments and the extensive cockle beds in particular were targeted and brought to a nearby location to be processed.

One aspect of the species present is the complete lack of fish in the midden samples. It is unclear if this is due to the processing and discarding of fish remains being carried out in other locations or the result of taphonomic factors, where the fish bone did not survive in the archaeological record.

Shell dimension is a variable that can reveal changes in the levels of predation over time and harvesting strategies. A dense occupation in an area over a considerable period of time could harvest a particular species intensively 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 or having access to a large number of resource areas may simply select the largest available individuals.

The results show the two samples have different patterns in the data. One sample (Q07/1422) indicates a normal distribution centred around a mean of adult size where the second (Q07/1447) has a bimodal distribution. If we assume a normal distribution for a natural population (Pawley 2011) we can compare the data to a natural population to explore harvesting strategies reflected in the data. The normal distribution sample suggests harvesting of a healthy shell bed with all individual sizes being taken. The bimodal distribution may suggest the shell was taken from two different shell beds; one immature, resulting in the smaller individuals and one mature, where the larger individuals were taken.

The problem with this conclusion is there is no temporal aspect to the sample. Although the stratigraphy generally did not indicate multiple phases of occupation, it is impossible to tell whether the shell in the sample was from a single depositional episode or from multiple episodes close in time. It is possible the sample reflects a mixture of multiple different behaviours that have combined

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with post-depositional processes to create the result of the analysis. The results must be understood with this in mind, that the archaeological deposit is the result of multiple natural and cultural processes.

The results of the midden analysis indicate that the middens reflect intensive exploitation of a primary species (cockle) and less intensive exploitation of a secondary main species (pipi). People in the past appear to have been targeting the easily available and productive species, with a lack of interest in other species, most of which appear to have been opportunistically gathered or included as a by-catch. Cockle was targeted more than pipi, potentially due to higher local availability on sandbanks in the harbour. The dimension data suggest multiple areas may have been targeted or that the harvesting strategy may have changed through time. Radiocarbon dating of the samples may allow further investigation of how the middens reflect changing patterns of harvesting of shellfish species over time.

6.2 Charcoal and Wood Analysis

6.2.1 Introduction

The sampling strategy involved taking 10L bulk samples from midden layers and features within sites Q09/1419, Q07/1420, Q07/1421, Q07/1422, Q07/1423, Q07/1447, and Q07/1463. Flotation of the soil from these samples then allowed the collection of charcoal for species identification and radiocarbon dating.

6.2.2 Results

Abundant charcoal material was able to be separated from the bulk samples from sites Q07/1419, Q07/1420, Q07/1447 and Q07/1463. Eight charcoal samples from the features within these sites were submitted for identification and C14 dating sample selection. These were contexts 214, 220, 266 and 290 from Q07/1420; 362 from Q07/1421; 189 from Q07/1419 (two samples); 613 from Q07/1463; and 540 from Q07/1447. These samples were then submitted to University of Auckland archaeological laboratory to be identified to species and dateable material by Dr Rod Wallace (see Appendix C).

The results are summarised in Table 12 below. Abundant material suitable for C14 dating was present in all samples (see Appendix C).

6.2.3 Discussion

The charcoal was dominated (80%) by manuka and kanuka with a further 17% consisting of the shrubs *kōkōmuka/hebe*, *raurākau/coprosma*, *kōhūhū/pittosporum*, *Pseudopanax arboreus*/ five finger, *mingimingi/coprosma* and *mapou/Myrsine australis*. Of the residual 3% mahoe is a small tree that often occurs in scrub while pohutukawa is still typical of the shoreline vegetation.

In 1999 Dr Rod Wallace analysed wood and charcoal for Diane Harlow from what may have been earlier activity on the same One Tree Point development. The wood was mainly ancient sub-fossil swamp kauri but the cultural charcoal largely matched the above results.

The charcoal results demonstrate that at the time these sites were occupied the woody vegetation of the local area consisted almost entirely of ti tree scrub. Bracken was likely also to have been abundant, but as it was not used for firewood and is not durable enough to survive in sites it does not appear in the samples.

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The 1906 One Tree Point land survey by G. Martin (Figure 8) described the area as covered in manuka and fern. Clearly this vegetation has been typical of the area well back into pre-European times. Dr Wallace concluded that this was almost certainly due to human initiated landscape fires that were able to sweep unimpeded across this very flat area, suppressing any regeneration after clearance of the original forest.

Table 12. Charcoal identification (from all samples collectively)

Charcoal Identification, One Tree Point			
Species	Plant type	# Pieces	%
Kōkōmuka / Hebe	Small shrubs	2	17%
Coprosma / Raurākau		3	
<i>Pseudopanax arboreus</i> / Fivefinger		14	
Kōhūhū / Pittosporum		1	
Mingimingi / Coprosma		4	
Mapou / <i>Myrsine australis</i>		8	
Manuka / <i>Leptospermum scoparium</i>	Scrub	127	80%
Kanuka / <i>Kunzea ericoides</i>		20	
Mahoe / <i>Melicytus ramiflorus</i>	Trees	2	3%
Pohutukawa / <i>Metrosideros excelsa</i>		3	
Total		184	

6.3 C14 Dating

The following section is presented in three parts: methodology, results and discussion. The methodology briefly describes the sampling strategy and how the samples were processed. The results of the radiocarbon results are shown and discussed in comparison with dates from previous projects nearby.

6.3.1 Methodology

The samples sent for dating were from shell midden layers. The rationale for selecting dateable material from middens was as follows: the excavated middens were located across the Stage 4 area within dune swales, which formed part of the larger Holocene prograding barrier system. Due to the lack of obsidian artefacts within the shell middens, it was unclear how this spatial pattern occurred chronologically. Sample selection focused on ‘rich’ whole shell and dense charcoal patches within midden layers. The chronological information that can be gained from shell middens means these deposits provide abundant, readily datable and culturally derived organic remains, and

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where the carbon in both the charcoal and shell can be dated to allow a more reliable paired date, to within around 50 years (HNZPT 2014; Petchey and Schmidt 2020).

Robust determinations often come from well-defined features (Petchey and Schmidt 2020). As in this case, most archaeological dates in New Zealand are taken from midden contexts (Petchey and Schmidt 2020). Increasing the number of dates per deposit and/or pair-dating charcoal and shell samples adds confidence to the precise date range of a deposit using the two different calibration curves, terrestrial and marine.

Two sets of samples were therefore taken to provide the best chance of getting useful results. First, one shell date from each of the five middens was selected (Table 13). The rationale for this was to understand the spatial chronological pattern of the excavated middens to provide a general idea of when the dunes swales were actively used. Additionally, this would provide insight as to whether the shell midden areas were deposited at different points in time or whether they were contemporaneous.

Second, an additional terrestrial charcoal (*Manuka*, *Myrsine*, *Pittosporum* sp.) sample from Q07/1463 was chosen to match the cockle date from the same shell midden deposit as a paired date for chronological control.

The six samples used suitable identified charcoal and shell. The five shell samples were *Austrovenus stutchburyi* (cockle). All samples were submitted to the Radiocarbon Dating Laboratory located at Waikato University.

6.3.2 Results

Table 13 summarises the C14 dating results showing the calibrated results between 1 and 2 standard deviations (σ). The full reports from the laboratory are provided in Appendix D.

Table 13. Radiocarbon dates from the project calibrated using 2013 calibration curves

Sample	Lab Code	Material	CRA	Error	-1 σ AD	1 σ AD	-2 σ AD	2 σ AD
Q07/1421 362 (50)	Wk51376	Shell	600	32	1649	1804	1550	1869
Q07/1463 613 (39c)	Wk51377	Charcoal	238	30	1656	1797	1640	1807
Q07/1463 613	Wk51378	Shell	731	32	1517	1636	1472	1673
Q07/1419 105	Wk51379	Shell	659	27	1570	1686	1502	1802
Q07/1447 540	Wk51380	Shell	630	28	1573	1715	1533	1815
Q07/1420 214	Wk51381	Shell	704	27	1539	1650	1486	1685

The results show that the middens in Stage 4 date from the early 16th century AD through to the early 19th century AD (at 1 σ). As there was little vertical stratigraphy associated with the individual middens, the range of dates reflects a horizontal stratigraphy of land-use indicative of small-scale but repeated occupation of the project area over three centuries.

Figure 90 compares the result of the shell and charcoal dates from Q07/1463. The charcoal and shell dates overlap between 1650 and 1700 AD, which narrows down the occupation of the site within that 50-year period.

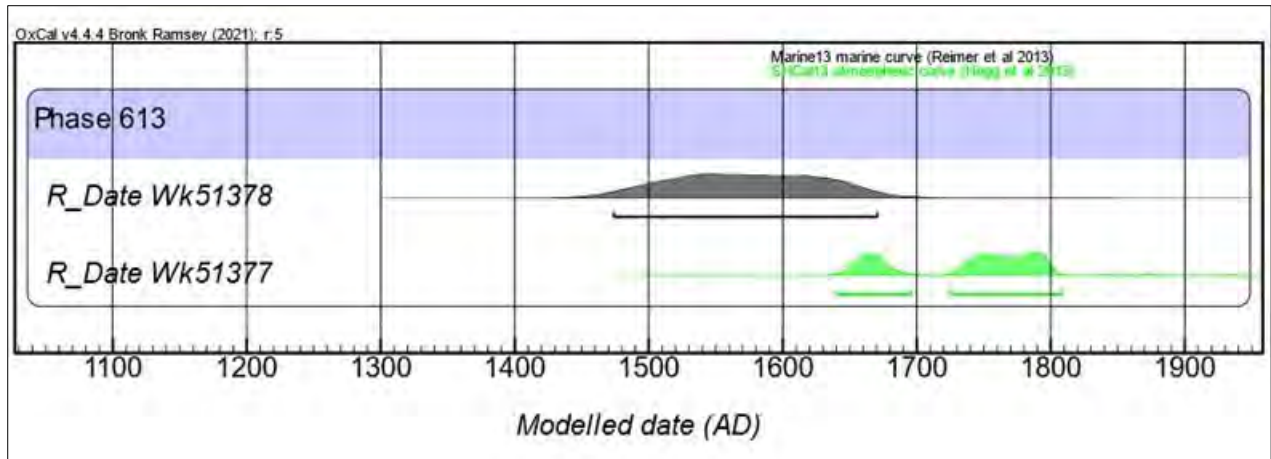


Figure 90. Comparison of charcoal (below) and shell (above) dates from R11/1463 context 613

6.3.3 Discussion

The results from the Stage 4 project can be compared with other radiocarbon dates from One Tree Point and the wider area.

Figure 91 and Figure 92 provide graphical and spatial visualisation of the dates from archaeological excavations from the region.

The dates from Q07/1463 and Q07/1420 are the earliest from the current project and are similar to those obtained from sites to the north at One Tree Point. Sites Q07/322 and Q07/1121 may be around 20 years older. As noted above, the charcoal date from Q07/1463 is shown as the latest date from One Tree Point (Figure 91) but paired with the shell date, it is more likely that it falls in the mid-late 17th century and in the middle of the occupation sequence of the area. Q07/1421 dates are similar to those from the nearby sites labelled OTP-5-6 and OTP-6B-5, which are associated with sites Q07/1427 and Q07/1428 respectively and indicative of the 18th century AD settlement of the coastal margin.

Overall, the occupation at One Tree Point seems well established from the mid-15th century onwards with some shifts to the south and the flatter dune areas there during the later periods. The dates demonstrate over 300 years of mostly small-scale single occupation sites for shellfish extraction and processing.

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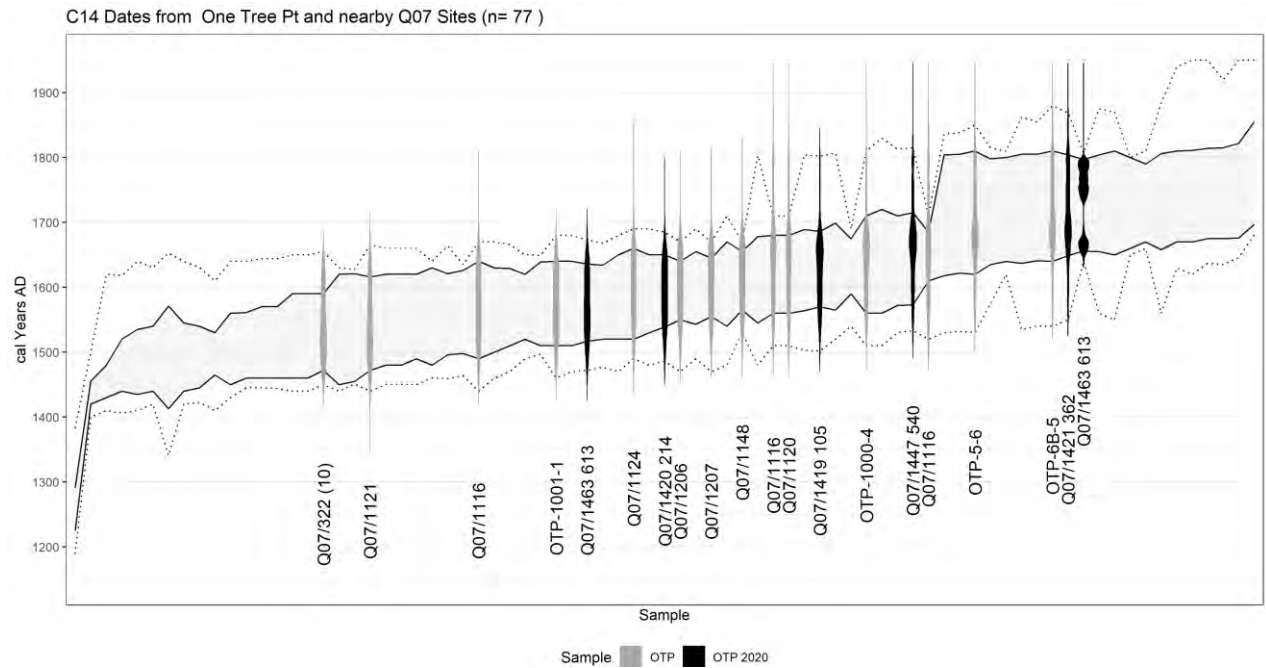


Figure 91. Comparison of C14 dates from all sites within the general grid Q07 area (n=77). Dates in black relate to the Stage 4 project with other dates from One Tree Point shown in dark grey. The light grey ribbon shows one standard deviation and dotted lines show two standard deviation date ranges of calibrated dates from the region

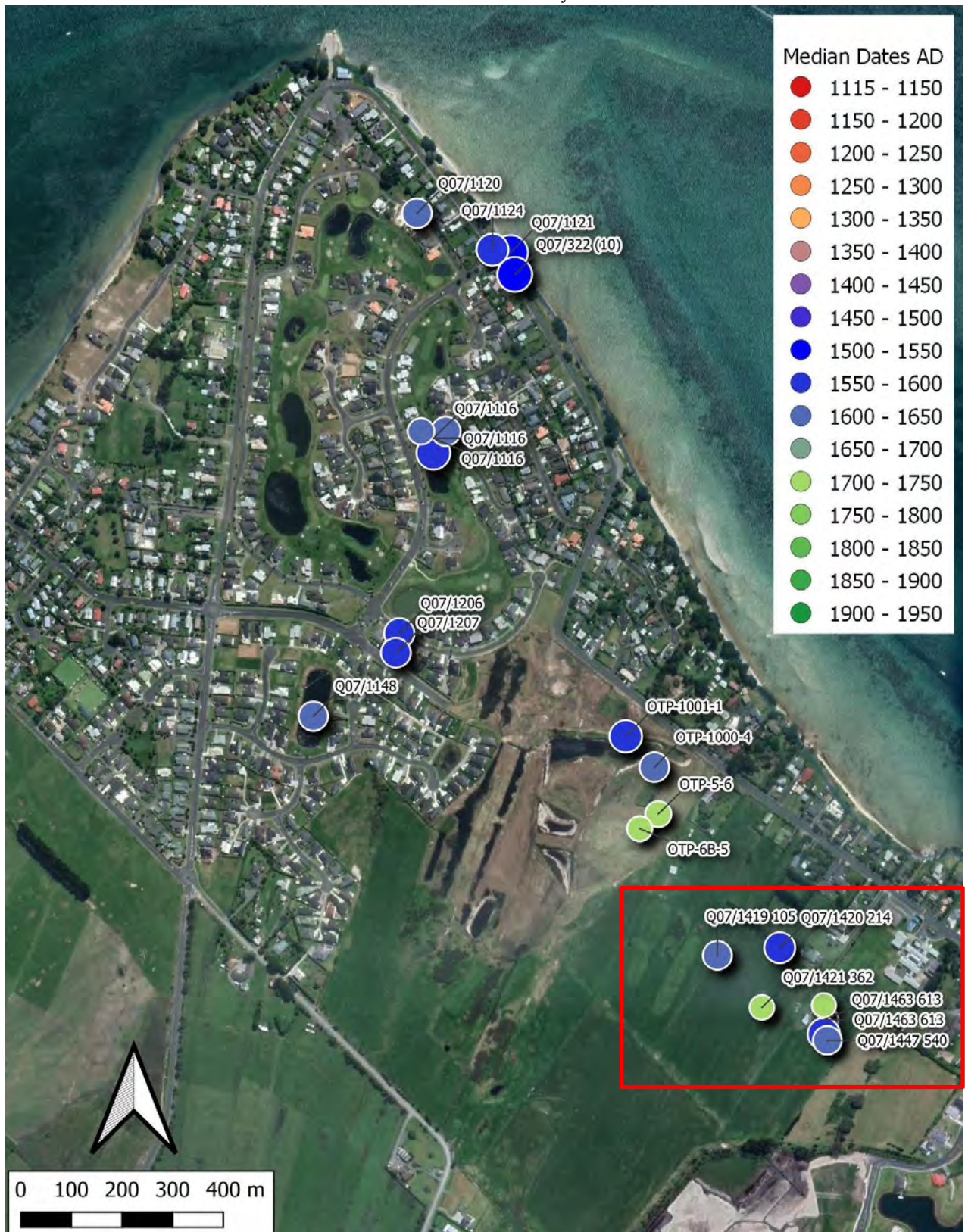


Figure 92. Location of radiocarbon dates from the project in red rectangle with a colour spectrum of median early (red) to late dates calibrated

7 DISCUSSION AND CONCLUSIONS

7.1 Discussion

The results of the excavations confirmed the information in the previous site records, which accurately identified the locations of the midden scatters, although there were minor variations in extent and depth. The exception to this was site Q07/1433, which could not be relocated despite extensive stripping and probing. Under most of the midden deposits there were features in the form of hangi, firescoops, FCR stone caches and post holes, the size of which indicated drying racks or shelters rather than more substantial structures (Figure 93). The middens excavated here will add to the results of other investigations at One Tree Point by Bickler et al. (2005, 2007), Phillips and Harlow (2001), Campbell (2006) and during previous stages of the current development (Plowman et al. 2008). It is in this context that the data from the current project will be examined.

To contextualise the sites investigated at One Tree Point a brief discussion is needed of the coastal geomorphology. The archaeology of One Tree Point is situated on a prograded stranded barrier dune system (elongated sand ridges caused by tidal currents and waves that get stranded as the coastline grows). As summarised by Nichol (2002:153): ‘a prograded barrier is a regressive coastal landform that exists because the interplay between sediment supply, sea level and shoreline processes has been weighted in favour of deposition and preservation of incoming sediment’. Prograded barriers are often wide (hundreds to thousands of metres), low lying (<5m asl), have multiple beach ridges forming a strand plain and typically form in sheltered embayments like Bream Bay. These ridges are visible from aerial photography (Figure 94).

The archaeological sites discussed here are situated in the outer barrier (Figure 94). These strands become younger towards the sea and overlies transgressive estuarine deposits, where there was rapid advance 6,500 years ago with reducing rates afterwards due to sediment supply. Sediment supply overwhelms sea level rise (SLR), creating a wide and low plain of multiple beach ridges. This leaves a clear ridge and swale topography where the beach ridges were growing and each time step allowed at least one ridge to form and be preserved (Nichol 2002: 157). The individual ridges of One Tree Point would have become stranded within less than a decade of each other (Nichol 2002). The sites investigated during the works discussed were deposited in these swales between the ridges, which created a relatively stable estuarine environment and preserved the archaeology. The modification of the topsoil by 19th and 20th century farming practices seems to have disturbed or buried some of the sites deposited across this dune system (such as Q07/1419). Despite this, the middens excavated in 2019 have provided information that has added a dimension to the archaeological investigations carried out in the area. The archaeology here was dominated by middens, which provide evidence on the nature of coastal resource exploitation by Māori, with each midden deposit potentially providing a date range as well as environmental information relating to the time of this resource use.

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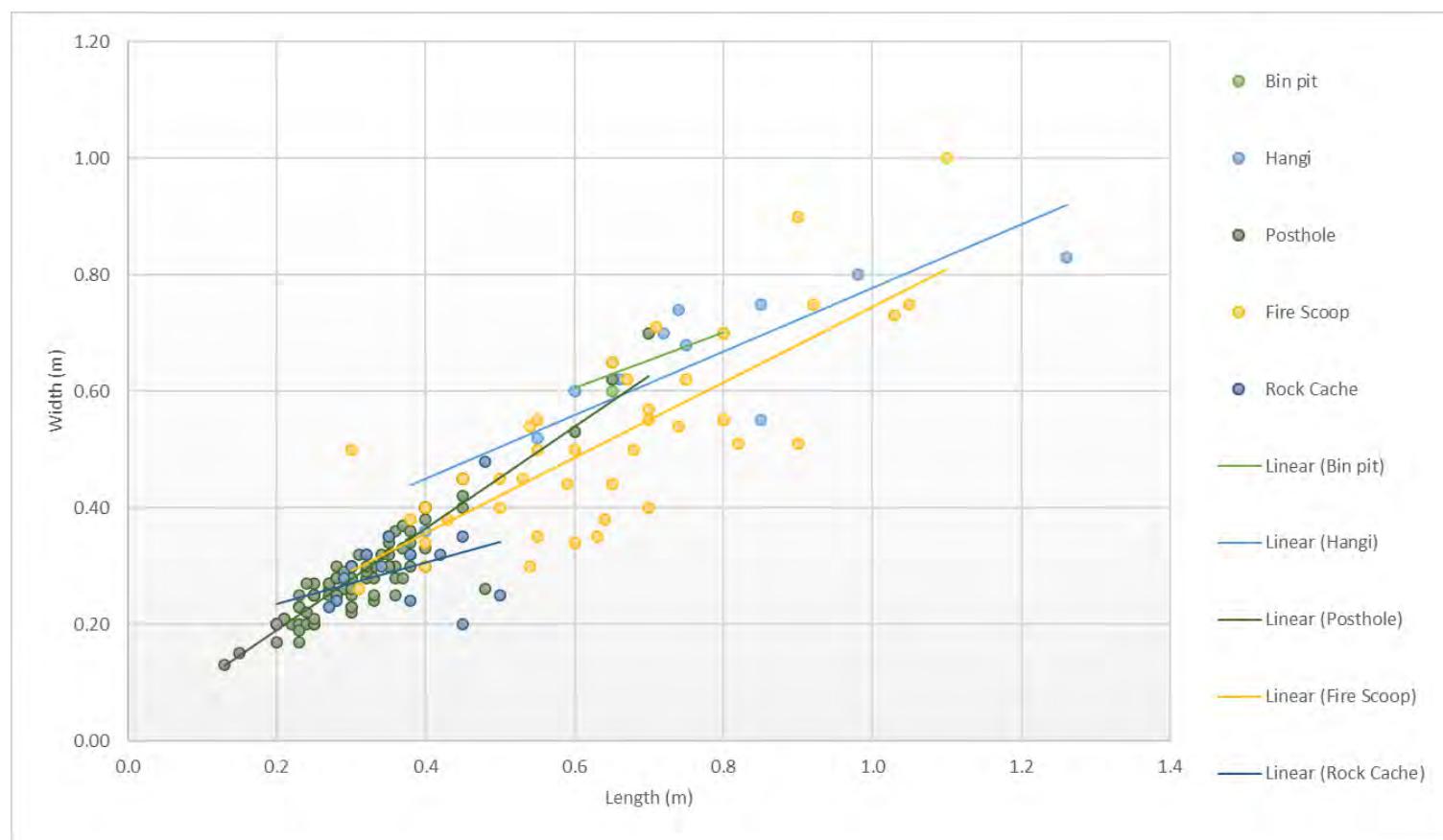


Figure 93. Scatterplot showing the general length and width (m) of feature types excavated at One Tree Point Road

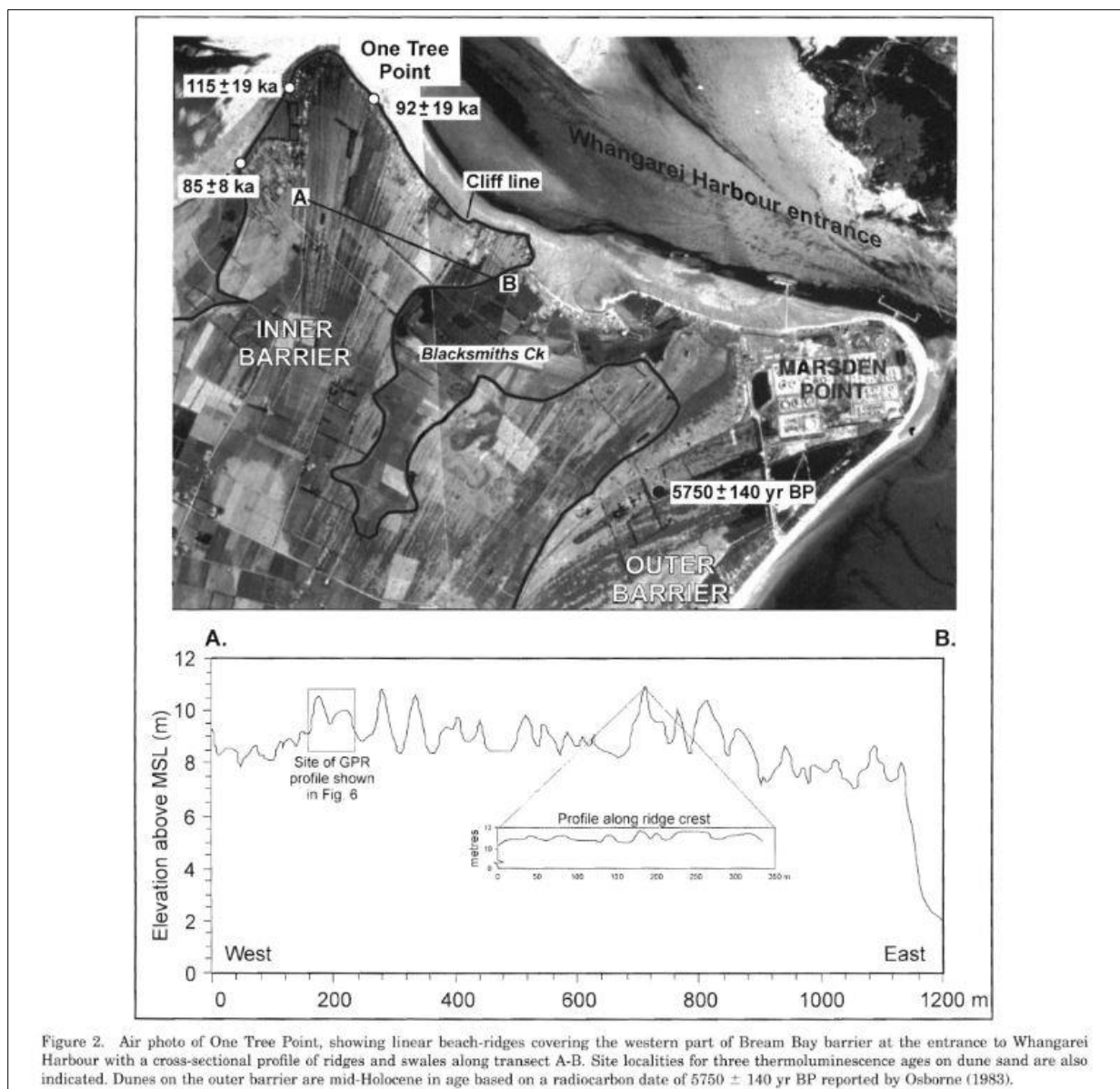


Figure 94. Aerial showing linear beach ridges and a profile of ridges and swales in the One Tree Point area (from Nichol 2002)

The C14 dates highlight the temporal span of coastal resource exploitation at One Tree Point. Six dates across five different deposits in separate swales show a pattern of repeated use of the area from the early 16th century through to the early 19th century. The middens are, as noted above, often located in sheltered swales, though large middens spill over on to dune crests. Local environmental, and in particular climatic, conditions explain the general midden location. But two aspects of the middens are still unaccounted for — the avoidance of reoccupation (with the exception of a single later hangi in Q07/1419) and the lack of alternative activities. Clearly a primary role of One Tree point was as a food procurement area, or a periphery area for more settled activity (for example in the Takahiwai hills c.3km to the southwest, where pa, terrace and pit sites are numerous). The midden, the C14 dates and general excavation results seem to fit this pattern.

Each of the sites reflects the remains of small, temporary cooking areas in a coastal landscape that was dominated by scrub such as ti tree and bracken. The cooking areas are situated in the swales in between the dune ridge crests which vary from <5m above sea level to 15m in height and have a

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spacing of between 20m and 85m. The lack of archaeology on the upper surface of these ridges is due to the substantial modification by 19th and 20th century farming practices. This has left only the bases of small hangi pits or firescoops still intact, which was seen in Stage 5 Area C. It is possibly why reoccupation of the same area or alternative activities are not being recorded as these have not been preserved in the One Tree Point landscape.

The sites discussed here that date to the 16th to early 19th centuries (see section 6.3) are similar to those that have been excavated in neighbouring areas at One Tree Point. They represent temporary or short-term encampments used by Māori to extract the rich marine resources off the coast.

The lack of evidence for permanent occupation can be surmised through a niche construction conceptual model (see Odling-Smee et al. 2013 for a review). The model is a way to view how Māori may have been exploiting the coastal morphology of One Tree Point and similar environments. The idea behind the model is a socio-environmental system with a feedback loop between an agent and the environment. The actor carries out a behaviour which affects the environment and in turn the environment provides a response, affecting the actor. The charcoal results, for example, show that at One Tree Point human-initiated landscape fires were able to sweep unimpeded across this very flat landscape, suppressing any regeneration after clearance of the original forest. The ti tree scrub and bracken may have provided ideal kindling for the cooking areas. This may have provided an ideal niche for shellfish harvesting and processing across a stable dune system. In turn the agents periodically returned to access this niche, affecting and maintaining it. The archaeology indicates a niche reflective of targeted exploitation, as shown by the midden analysis. Evidently a deep cultural understanding of available resources was codified in successive generational seasonal gatherings to process shellfish, which has left evidence in the form of the abundant remnant middens deposited in the dune swales. In other words, the continual feedback loop of temporary encampments maintained in this landscape can be understood to be guided by social and cultural memory, that is to say the tikanga (protocols) and kawa (cultural practices), which would have framed the behaviours in this area from the 1450s onwards.

This model seems to be consistent with the midden results. Multiple harvesting behaviours are reflected in how this niche was utilised. For example, a small number of the gastropod species were from rocky environments. The low numbers of these in the samples suggest they may be opportunistic collections. Additionally, the distribution of shell sizes in different samples showcases different collection routines. The normal distribution of one of the samples suggests harvesting of a healthy cockle shell bed with all individual sizes being taken. The bimodal distribution of another sample may suggest the shell was taken from two different shell beds, one immature, resulting in the smaller individuals, and one mature, where the larger individuals were taken. All these behaviours are reflective of the interaction between an individual's agency and the socio-environmental systems they lived within. Presenting scenarios as to why this variation is apparent cannot be achieved without more evidence. On a base level, however, it shows the interaction between the niche, the actors and the feedback through time and can also be seen elsewhere.

The results of the One Tree Point excavations are generally similar to other extensive niche midden landscapes in the upper North Island where one or two species predominate, but the dominant species is different. At One Tree Point, cockle obviously dominates, while at Omaha Sandspit pipi prevail (Bickler et al. 2003). Elsewhere, at Matarangi, cockle and tuatua predominate (Furey 1999), and at Waihi Beach it is tuatua (Moore and Phillips 2002), while tuatua and ostrich foot are the two most common species at Papamoa sites (McGovern-Wilson 1995). Fredericksen, Barber and Best (1995) suggest a shift from ostrich foot to tuatua through time at Papamoa. This probably relates mostly to availability, but the story may well be more complex as other species may be targeted for other reasons (such as for medicines) and indeed exchanged over some distances (e.g., toheroa at Omaha Sandspit, Bickler et al. 2003:182).

7. Discussion and Conclusions

Expanding the niche model, we can interpret that during the summer months, members of a Māori hapu arrived at the scrub-covered dunes, cleared a small area, set up temporary shelters and collected firewood. Hangi stones would not have been available in the dunes, and those that were found at the sites would have been brought with them from further afield, or perhaps collected from stockpiles left from previous visits (a potential explanation for the FCR caches). Over the occupation period, which may have been quite short in relation to the particular middens excavated, groups would head out to collect cockles from the shoreline and probably from Snake Bank (if it existed back then; more evidence is needed) as well as other shellfish from the mangroves to the east. Others would fish using nets or fishing lines in the harbour and shark-hunting expeditions would probably also have set out from the Point. While no fishbone was recovered from the middens investigated here, this may have been due to the processing and discarding of fish remains being carried out in other locations at One Tree Point (see Phillips and Harlow 2001; Campbell 2006), or could be the result of taphonomic factors, where the fish bone did not survive in the archaeological record.

The food would have been brought back to the campsites, and the shellfish was probably piled on the fires and covered to steam in preparation for seasonal storage. Fish and vegetables would have been added for meals consumed at the site. A portion of the catch might have been set aside and smoked over nearby fires using temporary drying racks. Over the following days, the hangi areas would have been raked over and re-used until it was time to leave, with the preserved food taken back to the various kainga and pa. In most cases, the sites were abandoned for good, but the rock caches posit the suggestion that the sites may have been reused, or that a return to the site was envisaged.

The niche construction model can be extended to the archaeological landscape at One Tree Point, which is also similar to that at Omaha (Campbell et al. 2004; Bickler et al. 2003) and at Matarangi (Furey 1999), with a range of midden, some very large in size, but poor in artefacts. At Omaha, a small number of obsidian flakes, some fragments of worked sea mammal bone, an adze and a net sinker were all that were recovered from a large number of middens. At One Tree Point, the sites (excluding the European period artefacts) excavated by Phillips and Harlow in their first season (2001) contained some chert flakes along with a grinding stone and a stone anvil with evidence of ochre. The 2005 season recovered no additional artefacts. The lack of artefacts, along with the obvious scale of the shell deposits, makes it clear that One Tree Point, as at Matarangi and Omaha, was probably a specialised marine exploitation area occupied for relatively short periods of time as part of a general economic cycle targeting specific niches. Furey (1999) stresses the importance of preservation of the protein sources by smoking as a major factor in interpreting excavation evidence at Matarangi and a similar argument has been made for the Omaha sites. Archival information about Omaha Sandspit (summarised in Bickler et al. 2003) relates how important shellfish and fishing grounds were at times in providing large amounts of food for hui and other gatherings where feasting was an essential social activity. All of these arguments may apply to One Tree Point.

The middens are part of a much larger pre-contact archaeological landscape. On the southern side of Whangarei Harbour, the many recorded sites are mostly middens located near the coast. Further inland, a wider range and many sites have been identified in the Takahiwai hills, including pa, pit and terrace sites, and evidence of gardening as well as the ubiquitous middens. In the inland areas around Takahiwai and near Ruakaka, the Māori settlement pattern appears to have been focused around the higher ridges, where after 1500 AD pa sites offered some defence from raiding parties travelling through the area and where gardening was carried out. Access to the rich marine resources would have been straightforward and, during the seasonal cycle, family groups probably moved down to the dune lands to collect food for storage and, perhaps, exchange.

7. Discussion and Conclusions

The site distribution reflects a strong dependence on the marine resources of the area. The middens of One Tree Point reflect the exploitation of only a small part of the marine and estuarine food resources available in the area, with the investigation seeming to show targeted and some opportunistic marine resource exploitation.

In summary then, the sites investigated and explained here reveal short-term cooking and food processing areas which are situated in a larger midden landscape. The investigation of these sites is key as they broaden our view of how the niche exploitation of the marine resources changed over time. It also gives a deeper understanding of how Māori lived in and adapted to these landscapes, and in turn affected them. The radiocarbon dates give chronological information for that activity. The value of these sites relates to how they function as local and regional identity for those living today, and the information they provide relating to New Zealand history. These isolated middens on a coastal fringe near Whangarei are archaeologically important as they provide valuable information on the pre-Contact settlement and environment in the Whangarei area. The location of the middens provides settlement information, the charcoal and/or shell provides dateable material, and the charcoal provides information relating to terrestrial environmental history. Combining information from multiple middens from different locations in a multi-scalar analysis begins to shed light on the effects of settlement on the natural environment and the processes of cultural transformation involved in the development of Māori society from East Polynesian origins. The information from the investigations conducted here was able to add to the broader dialogue of New Zealand history.

7.2 Conclusions

There were six previously recorded midden sites within Stages 3-9 of the development (one of which could not be relocated) and a further two midden sites were identified during earthworks monitoring. All the sites were investigated and recorded in detail before being destroyed by earthworks. The data produced from the investigations ranged from detailed site mapping, to paleoenvironmental information relating to One Tree Point, to midden analysis, which showed some diversity of shell harvesting behaviours, and to radiocarbon dates ranging from the 16th to the early 19th centuries AD which add to our understanding of the nature and chronology of settlement in Northland. This historical data is of particular relevance for descendant communities including Patuharakeke and contributes to the broader history of the Northland region. The results of these investigations can be synthesised with other work in the One Tree Point and wider area to provide a greater understanding of how Māori lived within coastal landscapes in the past, and how the effects of centuries of Māori settlement have been reflected in the area in more recent times.

Previous excavations around One Tree Point have found that the shell middens sites, although predominantly cockle processing sites, showed a high degree of diversity in the distribution of features underneath. The distribution of the cooking areas, the arrangements of temporary shelters and the locations of drying racks have all showed discrete diversity across the investigated sites. This diversity can further be extended to the range of behaviours that could be extracted from the shell midden analysis, showing a diverse harvesting strategy. The sites have also varied according to their location, closeness to the sea, the number and range of features, and the amount of shell accumulated. Most sites in the One Tree Point area were located just below the ridge lines in slight hollows, presumably for protection from the wind. Interestingly, despite the fact that the principal activity was the processing of cockles (which had to be transported from the sea), many of the sites were several hundred metres inland. All these aspects contribute to the larger questions of when this behaviour occurred, why this diversity occurred and how it may have changed over time. On unanswered question is the function of FCR rock caches, and whether they represented stockpiles for use on future visits that were not relocated by people returning to the area.

7. Discussion and Conclusions

The sites investigated here and in other locations on One Tree Point showed some similarity, as they generally contained less than 50 cubic metres of shell, and very few artefacts were discovered. The one artefact found in Stages 3-9 was a unifacial chert core, but the lack of flake scars and cortex was indicative of a relatively unused artefact. Even the hangi stones were in short supply and the shells themselves may have been used as heat retainers. Within the sites the principal component was cockle shells, which would have been gathered from the extensive cockle beds that have been recorded around Whangarei Harbour mouth, including at Snake Bank, which is just off-shore. Other shellfish were present in the middens, indicating that the people did frequent other locations. It is likely that a great deal of fishing was undertaken, and that many of the features found represent drying racks for shark and other species, even though no fishbone was preserved in the middens investigated here.

In summary, the range of features investigated in Stages 3-9 in combination with the results from earlier investigations in the One Tree Point area, demonstrate how Māori were continually harvesting and processing shellfish and fish within the landscape around the Whangarei Harbour. The lack of houses suggests that this was a summer activity – although cockles are available all year round, the processing may only have taken place in the summer.

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APPENDICES

Appendices

APPENDIX A: SITE RECORD FORMS

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

 Site Record Form archaeological site recording scheme		NZAA SITE NUMBER: Q07/1419 SITE TYPE: Midden/Oven SITE NAME(s): DATE RECORDED:
SITE COORDINATES (NZTM) Easting: 1731955 Northing: 6033790 Source: Handheld GPS		
IMPERIAL SITE NUMBER: METRIC SITE NUMBER: Q07/1419		
		
Finding aids to the location of the site One Tree Point RD, One Tree Pt, Ruakaka. Site located in pasture spanned by boundary fence of Lt 2 DP332054 to the west and DP106192 to the east. Originally given site number Q07/1169.		
Brief description		
Recorded features Midden		
Other sites associated with this site		

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD HISTORY	NZAA SITE NUMBER: Q07/1419
<p>Site description</p> <p>Updated 05/02/2021 (other), submitted by rodclough Grid reference (E1731955 / N6033790)</p> <p>Number of features under midden and refer to report 'Stage 3 to 10m One tree point road subdivision development, Whangerei harbour archaeological and investigation report: authority 2018/648'. 2020.</p> <p>Updated 19/06/2020 (other), submitted by rodclough Grid reference (E1731955 / N6033790)</p> <p>The site is located in pasture spanned by the boundary fence of Lt 2 DP332054 to the west and DP106192 to the east. Shell midden consisting of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which is burnt), charcoal and fire cracked rock tightly packed in a black sandy loam matrix up to 350mm thick and covering a 20m x 8m area. Some surface damage by stock traffic and fencing, otherwise in good condition.</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2004 by Donald Prince Grid reference (E1731955 / N6033790)</p> <p>Shell midden consisting of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which is burnt), charcoal and fire cracked rock tightly packed in a black sandy loam matrix up to 350mm thick and covering a 20m x 8m area.</p> <p>Condition of the site</p> <p>Updated 05/02/2021 (other), submitted by rodclough</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2004 by Donald Prince</p> <p>Some surface damage by stock traffic and fencing, otherwise in good condition,</p> <p>Statement of condition</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Good – Majority of visible features are intact, but some minor loss of definition and/or damage</p> <p>Current land use:</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Grazing</p> <p>Threats:</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Property development</p>	

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION



SITE RECORD INVENTORY	NZAA SITE NUMBER: Q07/1419
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Supporting documentation held in ArchSite

Feature front view



NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

 <p>Site Record Form</p>		<p>NZAA SITE NUMBER: Q07/1420</p> <p>SITE TYPE: Midden/Oven</p> <p>SITE NAME(s):</p> <p>DATE RECORDED:</p>
<p>SITE COORDINATES (NZTM) Easting: 1732055 Northing: 6033800 Source: Handheld GPS</p>		
<p>IMPERIAL SITE NUMBER: METRIC SITE NUMBER: Q07/1420</p>		
		
<p>Finding aids to the location of the site</p> <p>One Tree Pt Rd, One Tree Point, Ruakaka. Two deposits of midden c.20m apart in pasture southwest of One Tree Pt Rd both deposits straddle the boundary fences. Site originally given site number Q07/1170</p>		
<p>Brief description</p> <p>Two midden deposits. Both deposits comprise predominantly cockle with some pipi and whelk, mostly burnt, charcoal and fire cracked rock tightly packed in a blacken sandy loam matrix up to 400mm thick.</p>		
<p>Recorded features</p> <p>Midden</p>		
<p>Other sites associated with this site</p>		

Printed by: rodclough

19/06/2020

1 of 4

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD HISTORY	NZAA SITE NUMBER: Q07/1420
<p>Site description</p> <p>Updated 05/02/2021 (other), submitted by rodclough Grid reference (E1732055 / N6033800)</p> <p>A number of features under midden and refer to report 'Stage 3 to 10m One tree point road subdivision development, Whangerei harbour archaeological and investigation report: authority 2018/648'. 2020.</p> <p>Updated 19/06/2020 (other), submitted by rodclough Grid reference (E1732055 / N6033800)</p> <p>Two deposits of midden c.20m apart in pasture southwest of One Tree Point Road; both deposits straddle the boundary fences. Two deposits: to west a 16m x 9m midden, to east a 6m x 2.5m midden. Both deposits comprise whole and fragmented shell (predominantly cockle with some pipi and whelk, mostly burnt), charcoal and fire cracked rock tightly packed in a blacken sandy loam matrix up to 400mm thick. Midden in good condition with some disturbance to the eastern deposit by residential development.</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2004 by Donald Prince Grid reference (E1732055 / N6033800)</p> <p>Two deposits: to west a 16m x 9m midden, to east a 6m x 2.5m midden. Both deposits comprise whole and fragmented shell (predominantly cockle with some pipi and whelk, mostly burnt), charcoal and fire cracked rock tightly packed in a blacken sandy loam matrix up to 400mm thick.</p> <p>Condition of the site</p> <p>Updated 05/02/2021 (other), submitted by rodclough</p> <p>Updated 19/06/2020 (other), submitted by rodclough</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2004 by Donald Prince</p> <p>Midden in good condition with some disturbance to the eastern deposit by residential development.</p> <p>Statement of condition</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Good – Majority of visible features are intact, but some minor loss of definition and/or damage</p> <p>Current land use:</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Grazing, Rural residential</p> <p>Threats:</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Property development</p>	

Appendices

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION



SITE RECORD INVENTORY	NZAA SITE NUMBER: Q07/1420
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Supporting documentation held in ArchSite

Q07/1420 Facing west



NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

 Site Record Form		NZAA SITE NUMBER: Q07/1421 SITE TYPE: Midden/Oven SITE NAME(s): DATE RECORDED:
SITE COORDINATES (NZTM) Easting: 1732025 Northing: 6033705 Source: Handheld GPS		
IMPERIAL SITE NUMBER: METRIC SITE NUMBER: Q07/1421		
		
Finding aids to the location of the site One Tree Point Rd, One Tree Pt, Ruakaka. Three shell midden deposits located in pasture spread for 70m along and down the west flank of main dune ridge southwest of One Tree Pt Rd. Site originally given site number Q07/1171.		
Brief description Three midden deposits: 11m x 9m, 9m x 6m and 11m x 7m. All consist of predominantly cockle with some pipi and whelk, most burnt & some articulated, charcoal and fired rock tightly packed in a blackened sandy loam matrix up to 300mm thick.		
Recorded features Midden		
Other sites associated with this site		

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION



SITE RECORD HISTORY	NZAA SITE NUMBER: Q07/1421
<p>Site description</p> <p>Updated 05/02/2021 (other), submitted by rodclough Grid reference (E1732025 / N6033705)</p> <p>A number of features under midden and refer to report 'Stage 3 to 10m One tree point road subdivision development, Whangarei harbour archaeological and investigation report: authority 2018/648'. 2020.</p> <p>Updated 19/06/2020 (other), submitted by rodclough Grid reference (E1732025 / N6033705)</p> <p>One Tree Point Road, One Tree Point, Ruakaka. Three shell midden deposits located in pasture spread for 70m along and down the west flank of main dune ridge southwest of One Tree Point Road. Three midden deposits: 11m x 9m, 9m x 6m and 11m x 7m. All consist of whole and fragmented shell (predominantly cockle with some pipi and whelk, most burnt & some articulated), charcoal and fired rock tightly packed in a blackened sandy loam matrix up to 300mm thick. Some minor surface damage by stock traffic.</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2005 by Donald Prince Grid reference (E1732025 / N6033705)</p> <p>Three midden deposits: 11m x 9m, 9m x 6m and 11m x 7m.</p> <p>All consist of whole and fragmented shell (predominantly cockle with some pipi and whelk, most burnt & some articulated), charcoal and fired rock tightly packed in a blackened sandy loam matrix up to 300mm thick.</p> <p>Condition of the site</p> <p>Updated 05/02/2021 (other), submitted by rodclough</p> <p>Updated 19/06/2020 (other), submitted by rodclough</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2005 by Donald Prince</p> <p>Some minor surface damage by stock traffic.</p> <p>Statement of condition</p> <p>Updated: 03/05/2019, Visited: 09/06/2005 - Good – Majority of visible features are intact, but some minor loss of definition and/or damage</p> <p>Current land use:</p> <p>Updated: 03/05/2019, Visited: 09/06/2005 - Grazing</p> <p>Threats:</p> <p>Updated: 03/05/2019, Visited: 09/06/2005 - Property development</p>	

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

Q07/1421 Panorama



NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

 <p>Site Record Form</p>	<p>NZAA SITE NUMBER: Q07/1422</p> <p>SITE TYPE: Midden/Oven</p> <p>SITE NAME(s):</p> <p>DATE RECORDED:</p>
<p>SITE COORDINATES (NZTM) Easting: 1732060 Northing: 6033695 Source: Handheld GPS</p>	
<p>IMPERIAL SITE NUMBER: METRIC SITE NUMBER: Q07/1422</p>	
 <p>Scale 1:2,500</p> <p>Land Information New Zealand, Eagle Technology</p>	
<p>Finding aids to the location of the site</p> <p>One Tree Pt Rd, One Tree Point, Ruakaka. Two small midden and surface scattered shell in pasture southwest of One Tree Pt Rd. Originally given site number Q07/1172.</p>	
<p>Brief description</p> <p>Two shell middens: 4m x 3m x 250mm thick and 2m x 1m x 100mm thick. Both consist of predominantly cockle with some pipi and whelk, much of which are burnt & some burnt, charcoal and fire cracked rock tightly packed in a blackened sandy loam.</p>	
<p>Recorded features</p> <p>Midden</p>	
<p>Other sites associated with this site</p>	

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD HISTORY	NZAA SITE NUMBER: Q07/1422
<p>Site description</p> <p>Updated 05/02/2021 (other), submitted by rodclough Grid reference (E1732060 / N6033695)</p> <p>A number of features under midden and refer to report 'Stage 3 to 10m One tree point road subdivision development, Whangarei harbour archaeological and investigation report: authority 2018/648'. 2020.</p> <p>Updated 19/06/2020 (other), submitted by rodclough Grid reference (E1732060 / N6033695)</p> <p>Two small midden and surface scattered shell in pasture southwest of One Tree Point Road. Site consists of two shell midden: 4m x 3m x 250mm thick and 2m x 1m x 100mm thick. Both consist of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which is burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam. Some surface damage to deposits by stock traffic.</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2004 by Donald Prince Grid reference (E1732060 / N6033695)</p> <p>Site consists of two shell midden: 4m x 3m x 250mm thick and 2m x 1m x 100mm thick. Both consist of whole and fragmented shell (predominantly cockle with some pipi and whelk, much of which are burnt & some burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam.</p> <p>Condition of the site</p> <p>Updated 05/02/2021 (other), submitted by rodclough</p> <p>Updated 19/06/2020 (other), submitted by rodclough</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2004 by Donald Prince</p> <p>Some surface damage to deposits by stock traffic.</p> <p>Statement of condition</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Fair - Some intact features, but others may be unclear or damaged</p> <p>Current land use:</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Grazing</p> <p>Threats:</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Property development</p>	


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Q07/1422 initial extent



NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION
Q07/1423 Initial view



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 <p>ARCH SITE archaeological site recording scheme</p> <p>Site Record Form</p>	<p>NZAA SITE NUMBER: Q07/1423</p> <p>SITE TYPE: Midden/Oven</p> <p>SITE NAME(s):</p> <p>DATE RECORDED:</p>
<p>SITE COORDINATES (NZTM) Easting: 1732165 Northing: 6033665 Source: Handheld GPS</p>	
<p>IMPERIAL SITE NUMBER: METRIC SITE NUMBER: Q07/1423</p>	
 <p>Scale 1:2,500</p> <p>Land Information New Zealand, Eagle Technology</p>	
<p>Finding aids to the location of the site One Tree Point Rd, One Tree Pt, Ruakaka. Site located in pasture southwest of One Tree Pt Rd approximately mid way down west dune flank. Site originally given site number Q07/1173.</p>	
<p>Brief description Site consists of a 3m x 2m x 100mm thick shell midden comprised of predominantly cockle with some pipi and whelk, much are burnt, charcoal and fire cracked rock tightly packed in a blackened sandy loam matrix.</p>	
<p>Recorded features Midden</p>	
<p>Other sites associated with this site Q07/1420</p>	

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD HISTORY	NZAA SITE NUMBER: Q07/1423
<p>Site description</p> <p>Updated 05/02/2021 (other), submitted by rodclough Grid reference (E1732165 / N6033665)</p> <p>A number of features under midden and refer to report 'Stage 3 to 10m One tree point road subdivision development, Whangarei harbour archaeological and investigation report: authority 2018/648'. 2020.</p> <p>Updated 19/06/2020 (other), submitted by rodclough Grid reference (E1732165 / N6033665)</p> <p>Site located in pasture southwest of One Tree Point Road approximately mid-way down west dune flank. Site consists of a 3m x 2m x 100mm thick shell midden comprised of whole and fragmented shell (predominantly cockle with some pipi and whelk, much is burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam matrix. Some surface damage by stock traffic.</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2004 by Donald Prince Grid reference (E1732165 / N6033665)</p> <p>Site consists of a 3m x 2m x 100mm thick shell midden comprised of whole and fragmented shell (predominantly cockle with some pipi and whelk, much are burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam matrix.</p> <p>Condition of the site</p> <p>Updated 05/02/2021 (other), submitted by rodclough</p> <p>Updated 19/06/2020 (other), submitted by rodclough</p> <p>Updated 28/07/2017 (Field visit), submitted by donaldprince , visited 09/06/2004 by Donald Prince</p> <p>Some surface damage by stock traffic.</p> <p>Statement of condition</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Good – Majority of visible features are intact, but some minor loss of definition and/or damage</p> <p>Current land use:</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Grazing</p> <p>Threats:</p> <p>Updated: 03/05/2019, Visited: 09/06/2004 - Property development</p>	

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD INVENTORY

NZAA SITE NUMBER: Q07/1423

Supporting documentation held in ArchSite

Initial view





NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

 <p>Site Record Form</p>	<p>NZAA SITE NUMBER: Q07/1447</p> <p>SITE TYPE: Midden/Oven</p> <p>SITE NAME(s):</p> <p>DATE RECORDED:</p>
<p>SITE COORDINATES (NZTM) Easting: 1732129 Northing: 6033651 Source: Handheld GPS</p>	
<p>IMPERIAL SITE NUMBER: METRIC SITE NUMBER: Q07/1447</p>	
 <p>Scale 1:2,500</p> <p>Land Information New Zealand, Eagle Technology</p>	
<p>Finding aids to the location of the site Located in the north eastern corner of The Landings housing development, 3 metres west of the eastern boundary fence and 30 metres south of the boundary with one tree point school</p>	
<p>Brief description</p>	
<p>Recorded features Midden, Oven (intact), Ovenstones</p>	
<p>Other sites associated with this site</p>	

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD HISTORY	NZAA SITE NUMBER: Q07/1447
<p>Site description</p> <p>Updated 05/02/2021 (other), submitted by rodclough Grid reference (E1732129 / N6033651)</p> <p>A number of features under midden and refer to report 'Stage 3 to 10m One tree point road subdivision development, Whangarei harbour archaeological and investigation report: authority 2018/648'. 2020.</p> <p>Updated 30/06/2020 (other), submitted by rodclough Grid reference (E1732129 / N6033651)</p> <p>22 features underneath midden layer.</p> <p>Updated 26/08/2019 (Field visit), submitted by rodclough , visited 21/08/2019 by Larsen, Bernie Grid reference (E1732129 / N6033651)</p> <p>A rough oval shaped midden measuring approximately 10m x 6.5m and a maximum thickness of 10cm. It was located running from the middle of the eastern slope of a low paleodune to the base of a shallow swale. The shell was whole and fragmented, dominated by cockle with small quantities of pipi and unidentifiable gastropod. Charcoal and fire cracked rock were rare inclusions. The matrix was dark grey to light grey fine sand with some areas of ashy fine sand matrix.</p> <p>Beneath the midden were a number of additional features with the majority being firescoop ovens and small numbers of post holes and rock caches.</p> <p>Condition of the site</p> <p>Updated 05/02/2021 (other), submitted by rodclough</p> <p>Updated 30/06/2020 (other), submitted by rodclough</p> <p>Updated 26/08/2019 (Field visit), submitted by rodclough , visited 21/08/2019 by Larsen, Bernie</p> <p>Destroyed</p> <p>Statement of condition</p> <p>Current land use:</p> <p>Updated: 10/06/2020 - Urban residential</p> <p>Threats:</p>	

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

 Site Record Form ARCHSITE archaeological site recording scheme		NZAA SITE NUMBER: Q07/1463 SITE TYPE: Midden/Oven SITE NAME(s): DATE RECORDED:
SITE COORDINATES (NZTM) Easting: 1732124 Northing: 6033684 Source: On Screen		
IMPERIAL SITE NUMBER: METRIC SITE NUMBER: Q07/1463		
		
Finding aids to the location of the site Located in the north eastern corner of The Landings housing development, 60 metres west of the eastern boundary fence and 60 metres south of the boundary with one tree point school		
Brief description		
Recorded features Midden		
Other sites associated with this site		

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD HISTORY	NZAA SITE NUMBER: Q07/1463
<p>Site description</p> <p>Updated 05/02/2021 (other), submitted by rodclough Grid reference (E1732124 / N6033684)</p> <p>A number of features under midden and refer to report 'Stage 3 to 10m One tree point road subdivision development, Whangarei harbour archaeological and investigation report: authority 2018/648'. 2020.</p> <p>Updated 18/06/2020 (Field visit), submitted by rodclough , visited 16/09/2019 by Ben Jones Grid reference (E1732124 / N6033684)</p> <p>The site consisted of a 8 m x 6 m x 170 mm thick shell midden comprised of largely fragmented and some whole shell (predominantly cockle with some pipi and whelk, much of which was burnt), charcoal and fire cracked rock tightly packed in a blackened sandy loam matrix. Some surface damage by stock traffic was noted. Similar to Q07/1422 beneath the midden were several additional features with the majority being firescoop ovens and small numbers of post holes and rock caches.</p> <p>Condition of the site</p> <p>Updated 05/02/2021 (other), submitted by rodclough</p> <p>Updated 18/06/2020 (Field visit), submitted by rodclough , visited 16/09/2019 by Ben Jones</p> <p>Site destroyed - was in good condition</p> <p>Statement of condition</p> <p>Current land use:</p> <p>Updated: 06/07/2020 - Urban residential</p> <p>Threats:</p> <p>Updated: 06/07/2020 - Subdivision</p>	

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD INVENTORY

NZAA SITE NUMBER: Q07/1463

Supporting documentation held in ArchSite

Facing north looking towards Midden extent



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Facing north after excavation of features underneath



APPENDIX B: CONTEXT REGISTER

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
1	VOID	General working shots of Q07/1419						VOID	
2	VOID	working shots of Q07/1420						VOID	
3	VOID	working shots						VOID	
Q07/1419									
97	Layer	firm red black sand					colluvial wash	Layer	30
98	Layer	firm black sand turning into peat buried topsoil					buried topsoil	Layer	29
99	Layer	loose mottled brown black sand infill					infill under ash	Layer	28
100	Layer	dark brown sand of loose compaction with root action			0.5		topsoil	Layer	
101	Layer	grey loose compacted grey yellow sand					subsoil	Layer	
102	Layer	mid brown soil, moderate compaction, rootlets			20 to 50 cm below topsoil. 25cm deep		old topsoil	Layer	
103	Layer	white ash moderate compaction. no inclusions			12cm thick		friable ash layer underneath 100 midden - possible early burning event	Layer	3
104	Layer	grey brown silty ash, loose compaction.						Layer	2
105	Layer	sub rectangular midden layer dark brown matrix semi compact sand with frequent cockle shell, occasional piping, whelk , charcoal and fer	23.9	4.5	0.2	N S	midden Q07/1419	Midden	4
106	Cut	oval in section, sloping sides to concave base. photo in first section drawing and section photo of 100		0.4	0.36		hangi	Hangi	1

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
107	Fill	grey/brown silt, loose compaction, pebble and cobble sized fcr, friable cockle shell					fill of 106		1
108	Cut	squarish near vertical sides with a concave base	0.23	0.17	0.2		posthole cut	Posthole	
109	Fill	loose compaction grey black sandy silt with frequent whole cockle shell. Burnt shell present and occasional charcoal and fcr					fill of 108		
110	Cut	oval near vertical sides and concave base. shallow	0.45	0.45	0.08		posthole cut	Posthole	
111	Fill	loose compaction grey black sandy silt with frequent fragmented an occasional whole cockle shell. Burnt shell present and occasional charcoal and fcr					fill of 110		
112	Cut	squarish near vertical sides and concave base undercut on western side	0.48	0.26	0.3	EW	posthole cut	Posthole	
113	Fill	loose compaction grey black sandy silt with frequent whole cockle shell. Burnt shell present and occasional charcoal and fcr. whelk and pipi present					fill of 112		
114	VOID	oval near vertical sides and concave base slight vertical truncation	0.35	0.3	0.26	EW	posthole base	VOID	
115	VOID	greyish brown sand silty with frequent fragmented cockle shell. occasional charcoal - occasional pipi and fcr jagged and whole Cobb sized rocks					fill of 114	VOID	
116	VOID	oval near vertical sides and concave base	0.28	0.25	0.2	EW	posthole cut	VOID	
117	VOID	loose compaction grey black sandy silt with frequent whole and fragmented cockle shell. Burnt					fill of 116	VOID	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
		shell present and occasional charcoal and fcr. occasional whelk							
118	Cut	circular near vertical sides and concave base	0.3	0.28	0.08	EW	posthole cut	Posthole	
119	Fill	loose compaction grey black sandy silt with frequent whole and fragmented cockle shell, occasional rare pipi. fcr and burnt shell present					fill of 118		
120	Cut	squarish, near vertical sides concave base, truncated by digger	0.3	0.23	0.13	EW		Posthole	
121	Fill	loose compaction grey black sandy silt with occasional whole and frequent fragmented cockle shell. Burnt shell present and occasional charcoal					fill of 120		
122	Cut	circular near vertical sides concave base truncated by the digger	0.25	0.25	0.04		fcr at base	Posthole	
123	Fill	loose compaction grey black sandy silt with frequent whole cockle shell. fcr present at base					fill of 122		
124	Cut	squarish, near vertical sides concave base, truncated by digger	0.35	0.3	0.26	EW	base of posthole	Posthole	
125	Fill	loose compaction grey black sandy silt with occasional whole and frequent fragmented cockle shell. Burnt shell present and occasional charcoal					fill of 124		
126	Cut	oval near vertical sides and concave base	0.4	0.3	0.15	EW	base of posthole	Posthole	
127	Fill	loose compaction grey black sandy silt with frequent crushed and wholesome cockle shell. Burnt shell present. pebble sized rocks present					fill of 126		
132	Cut	squarish, near vertical sides concave base, truncated by digger	0.35	0.3	0.26	EW	base of posthole	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
133	Fill	loose compaction grey black sandy silt with occasional whole and frequent fragmented cockle shell. Burnt shell present and occasional charcoal					fill of 124		
134	Cut	circular near vertical sides and concave base	0.36	0.36	0.18		posthole cut	Posthole	
135	Fill	loose compaction grey black sandy silt with whole and fragmented cockle shell. shell burnt but in good condition. charcoal present.					fill of 134		
136	Cut	circular near vertical sides and concave base	0.36	0.3	0.05	NS	posthole cut	Posthole	
137	Fill	loose compaction grey black sandy silt with frequent whole cockle shell. occasional pipi and charcoal present.					fill of 136		
138	Cut	circular near vertical sides and concave base	0.36	0.36	0.18		posthole cut	Posthole	
139	Fill	loose compaction grey black sandy silt with whole and fragmented cockle shell. shell burnt but in good condition. charcoal present.					fill of 134		
140	Cut	squarish, near vertical sides concave base, truncated by digger	0.35	0.3	0.26	EW	base of posthole	Posthole	
141	Fill	loose compaction grey black sandy silt with occasional whole and frequent fragmented cockle shell. Burnt shell present and occasional charcoal					fill of 124		
140 to 143 VOID	VOID	VOID	VOID	VOID	VOID	VOID	VOID	VOID	
144	Cut	circular near vertical sides and concave base vertical truncation by digger	0.2	0.17	0.15	N S	base of posthole	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
145	Fill	loose black brown fill with frequent whole cockle shell and Occasional charcoal					fill of 144		11
146 to 147 VOID	VOID	VOID	VOID	VOID	VOID	VOID	VOID	VOID	
148	Cut	circular near vertical sides with concave base vertical truncation by digger	0.35	0.34	0.14		base of posthole	Posthole	
149	Fill	fragmented shell dark grey loose compaction silty sand with rootlets frequent fragmented cockle and occasional pipi. burnt shell present and occasional charcoal					fill of 148		
150	Cut	circular near vertical sides and concave base vertical truncation by digger	0.2	0.2	0.1		base of posthole	Posthole	
151	Fill	loose compaction grey black sandy silt with frequent fragmented cockle shell. Burnt shell present and occasional charcoal and fer					fill of 150		
154	Cut	oval near vertical sides and concave base vertical truncation by digger	0.36	0.25	0.14	E W	base of posthole	Posthole	
155	Fill	loose compaction grey black sandy silt with frequent cockle shell. whole cockle shell predominant Burnt shell present and occasional charcoal and					fill of 154		
156	VOID	oval in plan, vertical sides, concave base	0.25	0.2	0.15	NS EW	base of posthole	VOID	
157	VOID	loose compaction grey black sandy silt with frequent whole cockle shell. whelk present rare					fill of 156	VOID	
158	Cut	oval, vertical sides undercut on east, concave base	0.22	0.2	0.28	E W	base of posthole	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
159	Fill	loose compaction grey black sandy silt with frequent whole cockle shell. Predominantly whole cockle shell and occasional charcoal with fcr					fill of 158		
164	Cut	circular near vertical sides and concave base	0.33	0.3	0.08	EW	base of posthole	Posthole	
165	Fill	loose compaction grey black sandy silt with frequent fragmented cockle shell. Occasional whole cockleshell. Burnt shell present and occasional charcoal					fill of 162		
166	VOID	circular near vertical sides and concave base	0.33	0.28	0.09	N S	base of posthole	VOID	
167	VOID	loose compaction grey black sandy silt with frequent whole cockle and fragmented shell. Fcr and charcoal present					fill of 166	VOID	
168	VOID	circular near vertical sides and concave base	0.23	0.2	0.19	N S	posthole cut	VOID	
169	VOID	loose compaction grey black sandy silt with frequent whole cockle and fragmented shell. Fcr present. occasional pipi					fill of 168	VOID	
170	VOID	circular near vertical sides and concave base slightly truncated	0.36	0.28	0.18	E W	base of a posthole	VOID	
171	VOID	loose cockle shell, in a sparse dark sandy fill. frequent whole cockle shell, occasional pipi, charcoal and fcr					fill of 170	VOID	
172	Cut	circular near vertical sides and concave base	0.3	0.28	0.08	E W	posthole cut	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
173	Fill	loose compaction grey black sandy silt with frequent whole and fragmented cockle shell, occasional rare pipi. fcr and burnt shell present					fill of 172		
174	VOID	circular near vertical sides and concave base posthole cut	0.23	0.23	0.24		posthole cut	VOID	
175	VOID	loose compaction grey black sandy silt with frequent whole and fragmented cockle shell. burnt shell and fcr present					fill of 174	VOID	
178	Cut	circular near vertical sides and concave base	0.29	0.26	0.17	E W	posthole cut	Posthole	
179	Fill	loose compaction grey black sandy silt with frequent whole and fragmented cockle shell. burnt shell and fcr present					fill of 176		
180	VOID	circular near vertical sides and concave base	0.27	0.26	0.38	N S	posthole cut	VOID	
181	VOID	loose compaction grey black sandy silt with frequent whole cockle shell. fcr and pipi present					fill of 180	VOID	10
182	VOID	oval, near vertical sides and concave base, truncated by digger	0.23	0.25	0.1	E W	posthole cut	VOID	6
183	VOID	loose compaction grey black sandy silt with frequent crushed shell and occasional whole cockle. Burnt shell and charcoal present					fill of 182	VOID	
184	Cut	oval, vertical sides and concave base, truncated by digger	0.28	0.3	0.26	E W	cut of posthole	Posthole	5
185	Fill	loose compaction grey black sandy silt with frequent fragmented and whole cockle, rare pipi. Burnt shell and fcr present					fill of 184		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
186 to 187 VOID	VOID	VOID	VOID	VOID	VOID	VOID	VOID	VOID	
188	Cut	circular near vertical sides and concave base	0.3	0.28	0.08	E W	posthole cut	Posthole	
189	Fill	loose compaction grey black sandy silt with frequent whole and fragmented cockle shell, occasional rare pipi. fcr and burnt shell present					fill of 188		8
190	Cut	circular near vertical sides and concave base undercut on western side	0.31	0.32	0.26	N S	posthole cut	Posthole	7
191	Fill	loose compaction grey black sandy silt with frequent fragmented cockle shell. burnt shell present. rare pipi. fcr present					fill of 186		
192	Cut	circular near vertical sides and concave base	0.2	0.2	0.03		posthole cut	Posthole	
193	Fill	loose compaction grey black sandy silt with frequent fragmented cockle shell. fcr present					fill of 192		
194	Cut	circular near vertical sides and concave base	0.29	0.26	0.17	E W	posthole cut	Posthole	
195	Fill	loose compaction grey black sandy silt with frequent whole and fragmented cockle shell. burnt shell and fcr present					fill of 195		
196	Cut	circular near vertical sides and concave base	0.37	0.33	0.1		posthole cut	Posthole	
197	Fill	loose compaction grey black sandy silt with frequent fragmented cockle shell and whole. charcoal present. rare pipi					fill of 196		
198	VOID	circular near vertical sides and concave base	0.33	0.3	0.34			VOID	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
199	VOID	loose compaction grey black sandy silt with frequent whole cockle shell. fcr and charcoal present					fill of 198	VOID	9,15
200	Cut	oval sloping sides and concave base, truncated by digger	0.4	0.36	0.17	E W	hangi	Hangi	
201	Fill	loose compaction grey black sandy silt with frequent fragmented and occasional whole cockle, rare pipi. Burnt shell and fcr present					fill of 200		7
202	VOID	circular near vertical sides and concave base, truncated by digger	0.3	0.22	0.17	NW SE	cut for posthole	VOID	
203	VOID	loose compaction grey black sandy silt with frequent whole cockle, rare pipi. Burnt shell and fcr present					fill of 202	VOID	
204	VOID	circular vertical sides and concave base, truncated by digger	0.3	0.3	0.2		cut for posthole	VOID	
205	VOID	loose compaction grey black sandy silt with frequent whole cockle, rare pipi. Burnt shell, charcoal, and fcr present					fill of 204	VOID	
206	Cut	circular, near vertical sides and concave base, truncated by digger	0.32	0.32	0.04		posthole cut base	Posthole	
207	Fill	loose compaction grey black sandy silt with frequent fragmented and whole cockle, rare pipi. Burnt shell and fcr present					fill of 206		
208	Cut	circular near vertical sides and concave base, truncated by digger	0.24	0.2	0.06	NS	cut for posthole	Posthole	
209	Fill	loose compaction grey black sandy silt with frequent fragmented and occasional whole cockle, rare pipi. Burnt shell and fcr present					fill of 208		
210	VOID	c, steeply sloped sides and concave base, truncated by digger	0.38	0.36	0.17	NS		VOID	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
211	VOID	loose compaction grey black sandy silt with frequent whole cockle, rare pipi. Burnt shell, charcoal, and fcr present					fill of 210	VOID	
212	Cut	circular near vertical sides and concave base	0.35	0.35	0.15		rock cache	Rock Cache	
213	Fill	loose compaction grey black sandy silt with frequent cobble sized fcr					fill of 212		
Midden numbers									
214	Layer	midden 2, Q07/1420 1170. Grey black loose sand with frequent burnt whole cockle shell with occasional pipi and tuatua. Pebble sized FCR frequent and charcoal fragments frequent.	22	12.4	0.25	NNE SSW	midden layer/deposition. deposited within gulley of old original sand dunes.	Midden	12
214a	Layer	lower lens of midden 2, Q07/1420 1170. Grey black loose sand with frequent burnt whole cockle shell with occasional pipi and tuatua. Pebble sized FCR frequent and charcoal fragments frequent.	21	10.4	0.25	NNE SSW	midden lower/deposition. deposited within gulley of old original sand dunes.	Midden	
215	Layer	midden 3, Q07/1421 1171 Loose grey black sandy silt with frequent whole and fragmented cockle shell. Whelk, fcr and charcoal present.	15.4	7.2	0.255	N S	highly fragmented and patchy midden layer on east side of dune ridge	Midden	13
216	Layer	midden 4, Q07/1421 1171 Loose compaction grey black sandy silt with frequent whole and fragmented cockle shell. Pipi, charcoal, whelk and fcr present	17	0.3	0.1	NS	fragmented and patchy midden	Midden	14
217	Layer	midden 5, Q07/1422 1172 compact grey black sandy silt with frequent cockle, and occasional scallop fcr and charcoal	8	4	0.25	NS	ploughed midden	Midden	23

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
217a	Layer	midden 5 lens , Q07/1422 1172 compact grey black sandy silt with frequent cockle, and occasional scallop fcr and charcoal	8	4	0.25	NS	midden layer	Midden	23
218	Layer	midden 6, Q07/1423 1173	3.5	2.5	0.07		midden layer	Midden	24
Q07/1420									
219	Cut	shallow sloping sides to a concave base. vertical truncation.	0.55	0.5	0.05		firescoop	Firescoop	16
220	Fill	loose compaction grey black sandy silt with frequent fragmented cockle, charcoal and fcr, occasional whole cockle. burnt shell present					fill of 219		
221	Cut	circular sloping sides and concave base. long sloping side on ne extent	0.65	0.62	0.26	NW SE	cut of posthole	Posthole	
222	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 221		
223	Cut	circular sloping sides and concave base	0.65	0.65	0.11		base of small pit	Bin pit	
224	Fill	loose grey black sandy silt with frequent fragmented and whole cockle shell. occasional pipi, charcoal and pebble sized jagged fcr. burnt shell present					fill of 223		
225	Cut	circular sloping sides and concave base	0.25	0.27	0.07	E W	cut for posthole	Posthole	
226	Fill	Loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 225		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
227	Cut	circular near vertical sides and concave base	0.35	0.32	0.15	E W	cut for posthole	Posthole	
228	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fcr. burnt shell present					fill of 227		
229	Cut	circular near vertical sides and concave base	0.37	0.33	0.19	N S	cut for posthole	Posthole	
230	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present. Boulder, cobble and pebble sized jagged fcr present					fill of 229		
231	Cut	circular sloping sides and concave base	0.37	0.37	0.12		cut for posthole	Posthole	
232	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fcr. burnt shell present					fill of 231		
233	Cut	circular sloping sides and concave base	0.6	0.6	0.12		cut for shallow small pit	Bin pit	
234	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 233		
235	Cut	circular near vertical sides and concave base	0.4	0.33	0.17	N S	cCut for posthole	Posthole	
236	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of posthole 235		
237	Cut	circular near vertical sides and concave base	0.24	0.27	0.13	N S	cut for posthole	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
238	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 237	Posthole	
239	Cut	circular near vertical sides and concave base	0.21	0.21	0.12		cut for posthole	Posthole	
240	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 239		
241	Cut	circular, sloping sides and concave base, truncated	0.65	0.65	0.15		shallow small pit	Bin pit	
242	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 241		
243	Cut	circular, sloping sides and concave base, truncated	0.8	0.7	0.2	NS	small shallow pit	Bin pit	
244	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell, and charcoal. occasional whelk and fcr. burnt shell present					fill of 243		17
245	Cut	circular near vertical sides and concave base	0.34	0.3	0.35	NW SE	rock cache	Rock Cache	
246	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 245		
247	Cut	oval, near vertical sides and concave base.	0.28	0.24	0.16	NS	rock cache	Rock Cache	
248	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 247		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
249	VOID	VOID						VOID	
250	VOID	VOID						VOID	
251	Cut	circular, sloped sides and concave base	0.98	0.8	0.11	EW	hangi	Hangi	
252	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fer. burnt shell present					fill of 251		
253	Cut	oval sloping sides giving way to near vertical sides and concave base	0.6	0.53	0.53	N S	cut for posthole	Posthole	
254	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fer. burnt shell present					fill of 253		
255	Cut	circular near vertical sides and concave base	0.3	0.25	0.25	N S	cut for posthole	Posthole	
256	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, pipi, charcoal and fer. burnt shell present					fill of 255		
257	Cut	oval sloping sides and concave base	0.45	0.42	0.2	N S	cut for posthole	Posthole	
258	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, pipi charcoal and fer. burnt shell present					fill of 257		
259	VOID	root bowl						VOID	
260	Fill	fill of midden							
261	Cut	circular sloping sides and concave base	0.25	0.25	0.1		cut for posthole	Posthole	
262	Fill	loose grey black sandy silt with frequent fragmented cockle shell.					fill of 261		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
		occasional, charcoal. burnt shell present							
263	VOID	root bowl						VOID	
264	VOID	fill of 263						VOID	
265	Cut	circular near vertical sides and concave base	0.45	0.4	0.2	E W	cut for posthole	Posthole	
266	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 265		18
267	Cut	oval sloping sides and concave base	0.65	0.6	0.1	N S	base of shallow small pit	Bin pit	
268	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, pipi, charcoal and fcr. burnt shell present					fill of 267		
269	VOID	root bowl						VOID	
270	VOID	root bowl						VOID	
271	Cut	circular sloping sides and concave base	0.28	0.28	0.14		cut for posthole	Posthole	
272	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 271		
273	Cut	circular sloping sides and concave base	0.7	0.7	0.09		hangi firepit	Firepit	
274	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 273		
275	Cut	circular unexcavated						Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
276	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 275		
277	Cut	circular shallow sides and concave base	0.33	0.24	0.12	E W	cut for posthole	Posthole	
278	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 277		
279	Cut	circular near vertical sides and concave base	0.27	0.27	0.23		cut for posthole	Posthole	
280	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional whelk, pipi, charcoal and fcr. burnt shell present					fill of 279		
281	VOID	VOID						VOID	
282	VOID	VOID						VOID	
283	Cut	squarish near vertical sides and concave base	0.23	0.19	0.19	N S	cut for posthole	Posthole	
284	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, pipi, charcoal and fcr. burnt shell present					fill of 283		
285	Cut	oval sloping sides and concave base	1.26	0.83	0.12	E W	hangi firepit	Hangi	
286	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 285		19
287	VOID	VOID						VOID	
288	VOID	VOID						VOID	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
289	Cut	circular near vertical sides and concave base	0.32	0.28	0.21	NE SW	cut for posthole	Posthole	
290	Fill	loose grey black sandy silt with frequent whole and cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 289		20
291	VOID	VOID						VOID	
292	VOID	VOID						VOID	
293	Cut	circular near vertical sides and concave base	0.35	0.34	0.16	E W	cut for posthole	Posthole	
294	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 293		
295	Cut	circular near vertical sides and concave base	0.37	0.28	0.15	N S	cut for posthole	Posthole	
296	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill for posthole		
297	Cut	circular near vertical sides and concave base	0.2	0.2	0.17		rock cache	Rock Cache	
298	Fill	loose grey black sandy silt with frequent fragmented shell and fcr. occasional whole cockle, charcoal. burnt shell present					fill of 297		
299	VOID	VOID roots						VOID	
300	VOID	VOID						VOID	
301	VOID	VOID						VOID	
302	VOID	VOID						VOID	
303	Cut	circular near vertical sides and concave base	0.23	0.23	0.2		base of posthole	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
304	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 303		
305	VOID	VOID						VOID	
306	VOID	VOID						VOID	
307	Cut	circular near vertical sides and concave base	0.38	0.3	0.18	N S	cut for posthole	Posthole	
308	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fcr. burnt shell present					fill of 307		
309	Cut	circular near vertical sides and concave base	0.3	0.23	0.25	N S	cut for posthole	Posthole	
310	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, pipi, charcoal and fcr. burnt shell present					fill of 309		
311	Cut	oval sloping sides and concave base	0.72	0.7	0.17	N S	hangi / firepit small shallow pit	Hangi	
312	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 311		
313	Cut	oval sloping sides and concave base	0.85	0.75	0.1	E W	hangi / firepit shallow small pit	Hangi	
314	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, pipi, charcoal and fcr. burnt shell present					fill of 31e		22
315	VOID	VOID						VOID	
316	VOID	VOID						VOID	
317	Cut	circular shallow sides and concave base	0.75	0.68	0.14	E W	hangi firepit shallow small pit	Hangi	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
318	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 317		21
319	VOID	VOID						VOID	
320	VOID	VOID						VOID	
321	Cut	circular sloping sides and concave base	0.27	0.27	0.12		cut for posthole	Posthole	
322	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present							
323	Cut	squarish sloping sides and concave base	0.32	0.29	0.14	N S	cut for posthole	Posthole	
324	Fill	loose grey black sandy silt with frequent fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 324		
325	Cut	oval sloping sides and concave base	0.74	0.74	0.1		cut for hangi firepit shallow small pit	Hangi	
326	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 325		25
327	Cut	circular sloping sides and concave base	0.25	0.25	0.1		cut for hangi firepit shallow small pit	Hangi	
328	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fcr. burnt shell present	0.76	0.75	0.15		fill of 327	Hangi	
Q07/1421									

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
329	Cut	circular near vertical sides and concave base	0.4	0.4	0.38		posthole cut with jagged sized rocks at base of fill 330	Posthole	
330	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional whelk, charcoal and fcr.					fill of 330		
331	Cut	squarish sloping sides and flat base	0.55	0.55	0.05		truncated firescoop	Firescoop	
332	Fill	loose grey black sandy silt with frequent fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 331 different fill from 330		
333	Cut	circular sloping sides and concave base	0.35	0.35	0.18		cut for posthole	Posthole	
334	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present							
335	Cut	circular sloping sides and concave	0.32	0.32	0.2		rock cache	Rock Cache	
336	Fill	loose grey black sandy silt with frequent cobble sized jagged fcr					fill possible rock cache		
337	Cut	circular near vertical to sloping sides and concave base	0.38	0.32	0.2	E W	cut for rock cache	Rock Cache	
338	Fill	loose grey black sandy silt with frequent Cobble sized fcr and occasional cockle pipi and charcoal					fill of 337		
339	Cut	circular near vertical sides and concave base	0.4	0.38	0.2	N S	cut for posthole	Posthole	
340	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional whelk, pipi, charcoal and fcr. burnt shell present					fill of 339		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
341	Cut	circular sloping sides and concave base	0.4	0.4	0.15		cut for posthole	Posthole	
342	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 341		
343	Cut	circular sloping sides and flattish base	0.35	0.3	0.1		cut for posthole	Posthole	
344	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fcr. burnt shell present					fill of 344		
345	Cut	circular sloping sides and flattish base	0.4	0.4	0.02		base of firescoop truncated	Firescoop	
346	Fill	loose grey black sandy silt with frequent fragmented cockle shell. occasional, charcoal. burnt shell present					fill of 345		
347	Cut	circular sloping sides and concave base	0.54	0.54	0.1		cut for firescoop	Firescoop	
348	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, pipi charcoal and fcr. burnt shell present					fill of 347		
349	Cut	oval sloping sides and concave base	0.66	0.62	0.11	N S	cut for hangi firepit	Hangi	
350	Fill	Loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 349		
351	Cut	circular sloping sides and concave base	0.25	0.25	0.1		cut for posthole	Posthole	
352	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi,					fill of 351		26

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
		charcoal and fcr. burnt shell present							
353	Cut	circular near vertical sides and concave flattish base	0.33	0.25	0.15	N S	cut for posthole	Posthole	
354	Fill	loose grey black sandy silt with frequent fragmented cockle shell. occasional, charcoal and fcr. burnt shell present					fill of 353		27
355	Cut	circular near vertical sides and concave base	0.35	0.35	0.12		cut for firescoop	Firescoop	
356	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 355		
357	Cut	circular sloping sides and concave base	0.3	0.3	0.12	358	cut for posthole	Posthole	
358	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 357		
359	Cut	circular sloping sides and concave base	0.27	0.25	0.12	N S	cut for posthole	Posthole	
360	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional charcoal and fcr.	0.25	0.2	0.25		fill of 359		
361	Cut	circular sloping sides and concave base	0.5	0.45	0.1	N S	cut for firescoop	Firescoop	
362	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 361		
363	Cut	circular near vertical sides and concave base	0.25	0.25	0.28		cut for posthole	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
364	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 363		
365	Cut	circular near vertical sides and flattish base	0.38	0.36	0.25	NE SW	cut for posthole	Posthole	
366	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 365		
367	Cut	oval sloping sides and concave base	0.5	0.4	0.08	N S	cut of firescoop	Firescoop	
368	Fill	loose grey black sandy silt with frequent fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 367		
369	Cut	squarish near vertical sides and flattish base	0.3	0.3	0.15		cut for posthole	Posthole	
370	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 369		
371	VOID	VOID	0.35	0.35	0.2			VOID	
372	VOID	VOID						VOID	
373	VOID	VOID	0.25	0.25	0.2			VOID	
374	VOID	VOID						VOID	
375	Cut	circular sloping sides and concave base	0.34	0.32	0.18	N S	cut for posthole	Posthole	
376	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional charcoal and fcr. burnt shell present					fill of 375		
377	Cut	circular sloping sides and concave base	0.25	0.25	0.23		cut for posthole	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
378	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 3u7		
379	Cut	circular sloping sides and concave base	0.25	0.25	0.13		cut for posthole	Posthole	
380	Fill	same as 377							
381	Cut	circular near vertical sides and concave	0.35	0.35	0.3		cut for posthole	Posthole	
382	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 381		
383	Cut	circular near vertical sides and concave base	0.3	0.3	0.15		cut for posthole	Posthole	
384	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 383		
385	Cut	circular sloping sides and concave base	0.45	0.45	0.18		cut for firescoop	Firescoop	
386	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 385		
387	Cut	circular, sloped sides and concave base	0.3	0.3	0.12		firescoop	Firescoop	
388	Fill	loose grey black sandy silt with frequent whole and fragmented cockle. whelk, charcoal and fcr. burnt shell present					fill of 387		
389	Cut	circular sloping sides and concave base	0.29	0.28	0.18		cut rock cache	Rock Cache	
390	Fill	loose yellow brown sand with frequent cobble sized fcr rocks					fill		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
391	Cut	oval, sloped sides and concave base	0.48	0.48	0.22		rock cache	Rock Cache	
392	Fill	loose yellow brown sand					fill of 391		
393	Cut	circular sloping sides and concave base	0.3	0.3	0.1		cut posthole	Posthole	
394	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present							
395	Cut	circular sloping sides and concave base	0.43	0.38	0.05		firescoop	Firescoop	33
396	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present							
Q07/1423									
399	Cut	circular sloping and concave base	0.55	0.52	0.1	m d	hangi	Hangi	
400	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional charcoal and fcr. burnt shell present					fill of 399		
Q07/1422									
401	Cut	oval sloping sides and flattish base - truncated by digger	0.8	0.55	0.04	E W	base of firescoop	Firescoop	
402	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and burnt shell present					fill of 401		
403	VOID	VOID						VOID	
404	VOID	VOID						VOID	
405	VOID	VOID					rootlet	VOID	
406	VOID	VOID						VOID	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
407	Cut	circular sloping sides and flattish base	0.35	0.3	0.03	E W	base of posthole	Posthole	
408	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal					fill of 408		
409	VOID	VOID						VOID	
410	VOID	VOID						VOID	
411	Cut	oval sloping sides and concave base truncated by posthole cut	0.7	0.4	0.05		base of firescoop	Firescoop	
412	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fcr.					fill of 411		
413	Cut	oval sloping sides and concave base	0.6	0.34	0.05	E W	base of firescoop	Firescoop	
414	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, charcoal and fcr. burnt shell present					fill of 413		
415	VOID	VOID						VOID	
416	VOID	VOID						VOID	
417	Cut	sub circular sloping sides and concave base	0.35	0.35	0.1		posthole cut	Posthole	
418	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 417		
419	Cut	circular sloping sides and flattish base	0.38	0.34	0.12		cut for posthole	Posthole	
420	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present							

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
421	Cut	circular sloping sides and concave base	0.28	0.25	0.16	E W	cut for posthole	Posthole	
422	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, whelk, charcoal and fcr. burnt shell present					fill of 421		
423	Cut	sub rectangular near vertical sides and flattish base with possible ko marks	0.85	0.55	0.19	NW SE	cut for hangi	Hangi	32
424	Cut	lose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, whelk, charcoal and fcr. burnt shell present					fill of 424		32
425	Cut	circular sloping sides and concave base	0.25	0.25	0.03		cut for posthole	Posthole	
426	Fill	loose grey black sandy silt with frequent fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 425		
427	VOID	VOID					rootlet	VOID	
428	VOID	VOID						VOID	
429	VOID	VOID					rootlet	VOID	
430	VOID	VOID						VOID	
431	Cut	oval sloping sides and flattish	0.8	0.55	0.1	N S	cut for firepit	Firescoop	
432	Fill	loose grey black sandy silt with frequent fragmented cockle shell. occasional pipi, whelk, charcoal and fcr. burnt shell present					fill of 431		
433	VOID	VOID rootbowl						VOID	
434	VOID	VOID						VOID	
435	VOID	VOID rootbowl					rootbowl	VOID	
436	VOID	VOID						VOID	
437	VOID	VOID rootbowl						VOID	
438	VOID	VOID						VOID	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
439	VOID	VOID rootbowl						VOID	
440	VOID	VOID						VOID	
441	Cut	circular near vertical sides and concave base	0.25	0.2	0.18	N S	cut for posthole	Posthole	
442	Fill	loose grey black sandy silt with frequent fragmented cockle shell. occasional charcoal. burnt shell present					fill of 442		
443	Cut	circular sloping sides and concave base	0.7	0.7	0.1		cut for firepit		
444	Fill	loose grey black sandy silt with frequent fragmented cockle shell, charcoal and fcr. burnt shell present					fill of 443		
445	Cut	circular sloping sides and concave base	0.2	0.2	0.12		cut for posthole	Posthole	
446	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 445		
447	Cut	circular sloping sides and concave base	0.35	0.3	0.1	NS	cut for posthole	Posthole	
448	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 447		
449	Cut	oval sloping sides and concave base	0.4	0.3	0.08	N s	cut for firescoop	Firescoop	
450	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 449		
451	Cut	circular unexcavated	0.28	0.28			cut for posthole	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
452	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 451		
453	VOID	VOID					rootlet	VOID	
454	VOID	VOID						VOID	
455	Cut	circular sloping sides and concave base	0.35	0.35	0.11		cut for posthole	Posthole	
456	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 455		
457	Cut	circular sloping sides and concave base	0.34	0.34	0.18		rock cache	Rock Cache	
458	Fill	rock pebble and cobble sized fcr					fill of 457		
459	VOID	VOID rootlet						VOID	
460	VOID	VOID						VOID	
461	Cut	circular sloping sides and concave base	0.75	0.62	0.1	E W	cut for firepit	Hangi	
462	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, whelk, charcoal and fcr. burnt shell present					fill of 461		31
463	Cut	circular sloping sides and concave base	0.3	0.26	0.07		cut for posthole	Posthole	
464	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional, charcoal and fcr. burnt shell present					fill of 463		
465	Cut	circular near vertical sides and concave base undercut on eastern side	0.38	0.32	0.3	N S	cut for post	Posthole	
466	Fill	loose grey black sandy silt with frequent whole cockle shell.					fill of 465		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
		occasional pipi, whelk, charcoal and fcr. burnt shell present							
467	VOID	VOID					rootbowl	VOID	
468	VOID	VOID						VOID	
469	VOID	VOID rootlet						VOID	
470	VOID	VOID						VOID	
471	Cut	circular near vertical sides and concave base	0.3	0.3	0.15		rock cache	Rock Cache	
472	Fill	pebble sized fcr rocks					fill of 471		
473	VOID	VOID					rootlet	VOID	
474	Fill	void					void		
475	Cut	circular near vertical sides and concave base	0.28	0.28	0.17		cut for posthole	Posthole	
476	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 475		
477	Cut	circular sloping sides and concave base	0.3	0.3	0.15		cut for posthole	Posthole	
478	Fill	same as 476					fill of 477		
479	VOID	VOID rootlet						VOID	
480	VOID	VOID						VOID	
481	Cut	circular sloping sides and concave base	0.3	0.28	0.15	N S	cut for posthole	Posthole	
482	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 481		
483	Cut	oval sloping sides and concave base	0.55	0.35	0.17	N S	firescoop cut	Firescoop	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
484	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, whelk, charcoal and fcr. burnt shell present					fil. of 483		
485	Cut	oval sloping sides and concave base	0.65	0.44	0.19	N S	cut for firescoop	Firescoop	
486	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 485		
487	VOID	VOID rootlet						VOID	
488	VOID	VOID						VOID	
489	Cut	oval sloping sides and concave base	0.45	0.2	0.1	NS	rock cache with pebble sized fcr	Rock Cache	
490	Fill	rock cache frequent fcr angular to sub angular. Approx., 11cm in size. mid loose compaction light grey fine sand matrix					fill of 489		
491	Cut	circular near vertical sides and concave base	0.32	0.3	0.13	NS	cut for posthole	Posthole	
492	Fill	same as 494					fill of 492		
493	Cut	circular sloping sides and concave base	0.4	0.4	0.12		cut for posthole	Posthole	
494	Fill	loose grey black sandy silt ash with frequent fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 493		
495	Cut	circular sloping sides and concave base	0.35	0.3	0.17	N S	cut for posthole	Posthole	
496	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 495		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
497	Cut	oval sloping sides and concave base	0.65	0.62	0.05	N S	cut for firepit	Hangi	
498	Fill	loose grey black sandy silt ash with frequent fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 497		33
499	Cut	circular near vertical sides and concave base	0.35	0.3	0.2	N S	cut for posthole	Posthole	
500	Fill	loose grey black sandy silt ash with frequent fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 499		
501	Cut	circular near vertical sides and concave base	0.25	0.25	0.1		cut for posthole	Posthole	
502	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fcr. burnt shell present					fill of 501		
503	Cut	circular sloping sides and concave base	0.3	0.3	0.15		cut for posthole	Posthole	
504	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 503		
505	Cut	circular sloping sides and concave base	0.28	0.25	0.1	N S	cut for posthole	Posthole	
506	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional, charcoal and fcr. burnt shell present					fill of 505		
507	Cut	squarish sloping and concave base	0.25	0.2	0.1	N S	cut for posthole	Posthole	
508	Fill	loose grey black sandy silt with frequent whole cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 507		
509	VOID	VOID rootlet						VOID	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
510	VOID	VOID						VOID	
511	VOID	VOID rootlet						VOID	
512	VOID	VOID						VOID	
513	Cut	circular near vertical sides and concave base	0.2	0.2	0.09		cut for posthole	Posthole	
514	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional charcoal and fcr. burnt shell present					fill of 513		
515	Cut	circular near vertical sides and concave base	0.2	0.2	0.1		posthole cut truncated 353	Posthole	
516	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 515		
517	Cut	circular sloping sides and flattish base	0.6	0.6	0.05		cut for firepit truncated by 519 and 499	Hangi	
518	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional whelk, charcoal and fcr. burnt shell present					fill of 517		
519	Cut	circular sloping sides and concave base	0.45	0.45	0.05		cut for hangi truncated 517	Hangi	
520	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi, whelk, charcoal and fcr. burnt shell present					fill of 519		
521	Cut	circular sloping sides and concave base	0.35	0.3	0.2	N S	cut for posthole	Posthole	
522	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional pipi,					fill of 521		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
		whelk, charcoal and fcr. burnt shell present							
523	Cut	circular near vertical sides and concave base	0.25	0.2	0.25	N S	cut for posthole	Posthole	
524	Fill	loose grey black sandy silt with frequent whole and fragmented cockle shell. occasional fill of 523, charcoal and fcr. burnt shell present					fill of 523		
525	Layer	compacted mottled orange yellowish sand			45		redeposited and compacted sand	Layer	
526	Cut	cut visible in section of dwg 4. Circular, sloped sides and concave base - Modern	0.21	0.21	0.15		posthole cut - modern	Posthole	
527	Fill	same as 523					fill of 526		
528	Layer	grey brown compact sand			0.05		buried topsoil	Layer	
529 to 539 Void	VOID	VOID						VOID	
Q07/1447									
540	Layer	a rough oval shaped midden measuring approximately 10m x 6.5m and a maximum thickness of 10cm. It was located running from the middle of the eastern slope of a low paleodune to the base of a shallow swale. The shell was whole and fragmented, dominated by cockle with small quantities of pipi and an unidentifiable gastropod. Charcoal and fire cracked rock were rare inclusions. The matrix was dark grey to light grey fine sand with some areas of ashy fine sand matrix.	1	0.65	0.1	ns	Shell midden	Midden	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
541	Fill	whole and fragmented shell dominated by cockle, moderate compaction in a mid to dark grey brown fine sandy soil matrix					fill of 540		
542	Cut	irregular oval, gently sloping sides, irregular concave base, 542 and 544 one feature	0.64	0.38	0.12	NS	firescoop	Firescoop	
543	Fill	whole and fragmented shell dominated by cockle, moderate compaction in a mid to dark grey brown fine sandy soil matrix rare charcoal inclusions					fill of 542		
544	Cut	see 542						Firescoop	
545	Fill	very fragmented with rare whole shell dominated by cockle, moderate-loose compaction, light grey ashy fine sand matrix with rare charcoal fragments					fill of 544		
546	Cut	oval , sloped sides, concave base	0.54	0.3	0.15	NE SW	firescoop	Firescoop	
547	Fill	abundant angular to sub angular fire cracked rock from 30mm to 110mm in size in a grey brown fine sand matrix moderate compaction					fill of 546		
548	Cut	irregular oval, near vertical and sloping sides, concave base	0.27	0.23	0.22	NE SW	rock cache	Rock Cache	
549	Fill	fragmented and whole shell dominated by cockle, moderate-loose compaction, less density of shell than other features, dark grey fine sand matrix					fill of 548		
550	Cut	circular, vertical sides, concave base	0.29	0.29	0.23		post hole cut	Posthole	
551	Fill	Whole and fragmented shell dominated by cockle, moderate compaction in dark grey charcoal					fill of 550		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
		stained fine sandy soil matrix, rare charcoal and FCR inclusions							
552	Cut	oval , sloped sides, concave base	0.68	0.5	0.13	NE SW	firescoop	Firescoop	
553	Fill	whole and fragmented shell dominated by cockle, moderate compaction in dark grey charcoal stained fine sandy soil matrix, common charcoal fragments and rare FCR inclusions					fill of 552		
554	Cut	oval , sloped sides, concave base	0.53	0.45	0.06	NE SW	firescoop	Firescoop	
555	Fill	fragmented and whole shell dominated by cockle, moderate-loose compaction, less density of shell than other features, dark grey fine sand matrix					fill of 554		
556	Cut	oval , sloped sides, concave base	0.59	0.44	0.05	NE SW	firescoop	Firescoop	
557	Fill	whole and fragmented shell dominated by cockle, moderate compaction in dark grey charcoal stained fine sandy soil matrix, rare charcoal and FCR inclusions					fill of 556		
558	Cut	oval , sloped sides, concave base	0.4	0.34	0.11	EW	firescoop	Firescoop	
559	Fill	very fragmented with rare whole shell dominated by cockle, moderate-loose compaction, light grey ashy fine sand matrix with rare charcoal fragments					fill of 558		
560	Cut	oval , sloped sides, flat base	0.92	0.75	0.1	EW	firescoop	Firescoop	
561	Fill	abundant whole and some fragmented, clean shell, some areas ashy and increasing fragmentation at edges, moderate to loose compaction mid-light brown matrix with rare FCR and charcoal					fill of 560		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
562	Cut	oval , sloped sides, flat base	0.92	0.75	0.1	EW	firescoop	Firescoop	
563	Fill	abundant sub angular to sub rounded firecracked rock loose compaction in mid brown fine sand matrix					fill of 562		
564	Cut	oval, near vertical sides, flat base	0.45	0.35	0.25	EW	rock cache	Rock Cache	
565	Fill	very fragmented with rare whole shell dominated by cockle, moderate-loose compaction, light grey ashy fine sand matrix with rare charcoal fragments					fill of 564		
566	Cut	oval, sloped sides, sharply concave base	0.82	0.51	0.18	NW SE	firescoop	Firescoop	
567	Fill	fragmented and whole shell dominated by cockle, moderate-loose compaction, light brown ashy fine sandy soil matrix					fill of 566		
568	Cut	round, near vertical, slightly concave base	0.13	0.13	0.11		posthole cut	Posthole	
569	Fill	whole and fragmented shell dominated by cockle, moderate compaction in dark grey charcoal stained fine sandy soil matrix, rare charcoal and FCR inclusions					fill of 568		
570	Cut	oval, steeply sloped sides, slightly concave base	0.34	0.3	0.15	EW	firescoop	Firescoop	
571	Fill	fragmented and whole shell dominated by cockle, moderate-loose compaction, light brown ashy fine sandy soil matrix					fill of 570		
572	Cut	round, near vertical, slightly concave base	0.13	0.13	0.11		posthole cut	Posthole	
573	Fill	very fragmented shell, dominated by cockle, shell calcined and ashy, moderate-loose compaction, light					fill of 572		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
		brown ashy fine sand matrix with rare charcoal fragments							
574	Cut	oval , sloped sides, concave base	0.4	0.34	0.11	EW	firescoop	Firescoop	
575	Fill	very fragmented rare whole shell, dominated by cockle, shell calcined and ashy, moderate-loose compaction, light grey fine sand matrix with rare charcoal fragments					fill of 574		
576	Cut	circular, gently sloping sides, flat base	0.71	0.71	0.08		firescoop	Firescoop	
577	Fill	very fragmented rare whole shell, dominated by cockle, shell calcined and ashy, moderate-loose compaction, mid to light brown fine sand matrix with rare charcoal fragments					fill of 576		
578	Cut	oval, steeply sloped sides, slightly concave base	0.34	0.3	0.15	EW	firescoop	Firescoop	
579	Fill	very fragmented rare whole shell, dominated by cockle, shell calcined and ashy, moderate-loose compaction, light grey fine sand matrix with rare charcoal fragments					fill of 578		
580	Cut	oval, gently sloping sides, flat base	0.74	0.54	0.07	NW SE	firescoop	Firescoop	
581	Fill	whole and fragmented shell dominated by cockle with rare pipi, moderate-loose compaction, dark grey fine sand matrix, rare FCR inclusions					fill of 580		
582	Cut	oval, gently sloping sides, flat base	0.9	0.51	0.12	NS	firescoop	Firescoop	
583	Fill	whole and fragmented shell dominated by cockle with rare pipi, loose compaction, grey ashy fine sand matrix					fill of 582		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
584	Cut	oval, steeply sloped sides, slightly concave base	0.38	?	0.18		firescoop	Firescoop	
585	Fill	by cockle with rare pipi, moderate-loose compaction, dark grey fine sand matrix, rare FCR inclusions	0.3	0.3	0.12	N S	fill of 584		
Q07/1463									
600 to 612 voided	VOID	VOID						VOID	
613	Layer	largely fragmented with some whole shell, slightly calcified in some areas, occasional firecracker rock ,<4cm. Even density of shell, cockle, pipi + mid whelk + large gastropod	8	6	0.17	N-S	midden	Midden	
614	Cut	oval, slopped sides, concave base	0.7	0.57	0.07	EW	hangi	Hangi	
615	Fill	frag. Shell, cockle dominant, common FCR, rare charcoal, dark grey sand matrix Moderate compaction	0.75	0.72	0.1	EW	fill of 614		
616	Cut	oval, slopped sides, flat base					hangi	Hangi	
617	Fill	frag. And some whole shell, cockle and pipi. More frag at base and rare FCR and charcoal Moderate compaction					fill of 616		
618	Cut	oval sloped sides and concave base	0.31	0.26	0.1	EW	firescoop?	Firescoop	
619	Fill	whole and frag. Cockle shells, mod whelk + large gast brown sand soil matrix Moderate compaction					fill of 618		
620	Cut	oval sloped sides concave base	0.67	0.62	0.07	NS	hangi	Hangi	
621	Fill	whole and frag. Cockle shells. Moderate compaction. Large quantity of brown sand soil matrix Moderate compaction					fill of 620		

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
622	Cut	oval sloping sides, flat base	1.05	0.75	0.19	NE-SW	hangi	Hangi	
623	Fill	v. frag. Cockle shells, moderate compaction, mud whelk common, FCR common. Brown grey ashy fine sand					fill of 622		
624	Cut	circular, short sloping sides, concave base.	0.2	0.2	0.15		posthole cut	Posthole	
625	Fill	grey/brown ashy silt, freq. crushed cockle shell, occ. Pipi, FCR and charcoal					fill of 624		
626	Cut	circular, short sloping sides, concave base.	0.2	0.2	0.15		posthole cut	Posthole	
627	Fill	grey/brown ashy silt, freq. crushed cockle shell, occ. Pipi, FCR and charcoal					fill of 626		
628	VOID	VOID					VOID	VOID	
629	VOID	VOID					VOID	VOID	
630 to 631	VOID	VOID					VOID	VOID	
632	Cut	circular, near vertical sides, concave base.	0.15	0.15	0.1		posthole cut	Posthole	
633	Fill	black/brown sandy silt with freq. whole cockle shells and charcoal fragments					fill of 632		
634	Cut	circular, long sloping sides, flattish base.	0.5	0.5	0.18	NS	posthole	Posthole	
635	Fill	frequent angular basalt volcanic FCR. Pebble/cobbles sized, loose brown/black silty sand					fill of 634		
636	Cut	circular, sharp sloping sides, flattish base.	0.5	0.25	0.25	NS	rock cache	Rock Cache	
637	Fill	frequent angular FCR rocks <5mm					fill of 636		
638 to 647 VOID	VOID	VOID						VOID	
648	Cut	circular, near vertical sides and concave base	0.24	0.22	0.1	EW	posthole cut	Posthole	

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
649	Fill	loose black/brown with freq. whole and frag. Cockle shell and freq. charcoal					fill of 648		
650	Cut	short sloping sides, concave base	0.8	0.7	0.24	NS	hangi	Hangi	
651	Fill	loose grey ashy sand, with freq. crushed cockle shell and occ. Charcoal and FCR					fill of 650		
652 to 657 Void	VOID	VOID						VOID	
658	Cut	circular, sloping sides, concave base.	0.9	0.9	0.15		hangi	Hangi	
659	Fill	same as 624 but freq. pebble sized FCR					fill of 658		
660	Cut	circular, near vertical sides, concave base	0.25	0.25	0.07		posthole	Posthole	
661	Fill	black/brown, loose sandy soil, freq. crushed shell, occ. Charcoal					fill of 660		
664	Cut	circular, short sloping sides, concave base	0.65	0.65	0.15		hangi	Hangi	
665	Fill	same as 629					fill of 664		
666	Cut	circular, sharp sloping sides, flattish base.	0.45	0.20	0.24	NS	rock cache	Rock Cache	
667	Fill	Frequent angular basalt volcanic for pebble/cobble sized					Fill of 666		
668	Cut	sub-rect, short sloping sides with concave base.	0.7	0.55	0.19	NNE-SSW	hangi	Hangi	
669	Fill	loose black/brown sandy silt with whole cockle shell and occ. Frag. Cockle and FCR					fill of 668		
670	Cut	sub-rect, short sloping sides with concave base.	0.6	0.5	0.9	E-W	hangi	Hangi	
671	Fill	loose black/brown sandy silt with whole cockle shell and occ. Frag. Cockle and FCR					fill of 670		
672	Cut	oval sloping sides, flat base	1.2	0.90	0.35	NE-SW	hangi	Hangi	

0.5

Context No.	Type	Description	Length (m)	Width (m)	Depth (m)	Orientation	Interpretation	Interpretation Type	Sample No.
673	Fill	Quite fragmented. Majority of cockle shells, moderate compaction, mud whelk common, FCR common. Brown grey ashy fine sand					fill of 672		
674	Cut	circular, sloping sides and concave base.	0.3	0.5	0.2		firescoop	Firescoop	
675	Fill	loose grey white ash with frequent crushed shell with occ charcoal					fill of 674		

APPENDIX C: CHARCOAL

Charcoal Identification, One Tree Point, Whangarei Harbour

Report to Bernie Larsen

Clough and Associates

321 Forest Hill Road, Waiatarua

AUCKLAND 0612

heritage@clough.co.nz

bernielarsen@clough.co.nz

Rod Wallace

2nd June 2020

Introduction:

Nine charcoal samples from pre-European Māori occupation sites from a sub-division development at One Tree Point, Whangarei Harbour, were submitted for identification and C14 dating sample selection. The raw results listed in the Appendix are summarised in the Table below.

Charcoal Identification, One Tree Point			
Species	Plant type	# Pieces	%
Hebe	Small shrubs	2	17%
Coprosma		3	
Fivefinger		14	
Pittosporum		1	
Mingimingi		4	
Mapou		8	
Manuka	Scrub	127	80%
Kanuka		20	
Mahoe	Trees	2	3%
Pohutukawa		3	
Total		184	

Discussion:

The charcoal was dominated (80%) by manuka and kanuka with a further 17% consisting of the shrubs hebe, coprosma, pittosporum, fivefinger, mingimingi and mapou. Of the residual 3% mahoe is a small tree that often occurs in scrub while pohutukawa is still typical of the shoreline vegetation.

In 1999 I analysed wood and charcoal for Diane Harlow from what may have been earlier activity on the same One Tree Point development. The wood was mainly ancient sub-fossil swamp kauri but the cultural charcoal largely matched the above results.

The charcoal results demonstrate that at the time these sites were occupied the woody vegetation of the local area consisted almost entirely of Ti tree scrub. Bracken was likely also to have been abundant but as it was not used for firewood and is not durable enough to survive in sites it doesn't appear in the samples.

The 1906 One Tree Point land survey by G. Martin mentioned in your report described the area as covered in manuka and fern (One Tree Point Road Subdivision Development, Whangarei Harbour: Archaeological Assessment' (Dawson, Jones and Phear, 2017). Clearly this vegetation has been typical of the area well back into pre-European times. This is almost certainly due to human initiated landscape fires that were able to sweep unimpeded across this very flat area suppressing any regeneration after clearance of the original forest.

Abundant material suitable for C14 dating was present in all samples.

Appendix:

Q07/1420 – (266) - <18>

Manuka	15	C14 sample
Kanuka	3	C14 sample

Q07/1420 – (290) - <20>

Manuka	2	C14 sample
Fivefinger	12	C14 sample

Q07/1420 – (220) - <16>

Manuka	15	C14 sample
Kanuka	1	C14 sample
Mingimingi	3	C14 sample

Q07/1420 – (214) - <12>

Manuka	7	C14 sample
Hebe	2	C14 sample
Coprosma	2	C14 sample
Fivefinger	2	C14 sample
Pohutukawa	1	

Q07/1421 – (362) - <21>

Manuka	8	C14 sample
Kanuka	8	
Mingimingi	1	C14 sample

Q07/1447 – (540) - <50>

Manuka	25	C14 sample
Pittosporum	1	C14 sample
Mapou	4	C14 sample

Q07/1419 – (189) - <8>

Manuka	20	C14 sample
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Q07/1419 – (189) - <8>

Manuka	20	C14 sample
Kanuka	4	
Coprosma	1	C14 sample
Mahoe	2	
Pohutukawa	1	

Q07/1463 – (613) - <39>

Manuka	15	C14 sample
Kanuka	4	C14 sample
Mapou	4	C14 sample
Pohutukawa	1	

Species Names:

Hebe	<i>Veronica</i> sp.
Coprosma	<i>Coprosma</i> sp.
Pittosporum	<i>Pittosporum</i> sp.
Fivefinger	<i>Pseudopanax arborea</i>
Mingimingi	<i>Leucopogon fasciculatus</i>
Mapou	<i>Myrsine australis</i>
Manuka	<i>Leptospermum scoparium</i>

Kanuka	<i>Kunzea</i> sp. prob. <i>robusta</i>
Mahoe	<i>Melicytus ramiflorus</i>
Pohutukawa	<i>Metrosideros excelsa</i>

References:

‘Charcoal Identifications from One Tree Point, Whangarei’. Report to Architage, Heritage Management Consultancy, 548 Manukau Rd, Epsom, Auckland. Dr. Rod Wallace, 14th Sept. 1999

Charcoal identification summary table

Site No.	Context No.	Sample No.	Hebe	Coprosma	Fivefinger	Pittosporum	Mingimingi	Mapou	Manuka	Kanuka	Mahoe	Pohutukawa
Q07/1419	189	8							20			
Q07/1419	189	8		1					20	4	2	1
Q07/1420	214	12	2	2	2				7			1
Q07/1420	220	16					3		15	1		
Q07/1420	266	18							15	3		
Q07/1420	290	20			12				2			
Q07/1421	362	21					1		8	8		
Q07/1463	613	39						4	15	4		1
Q07/1447	540	50				1		4	25			
			2	3	14	1	4	8	127	20	2	3

APPENDIX D: 14C DATES



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Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 51376

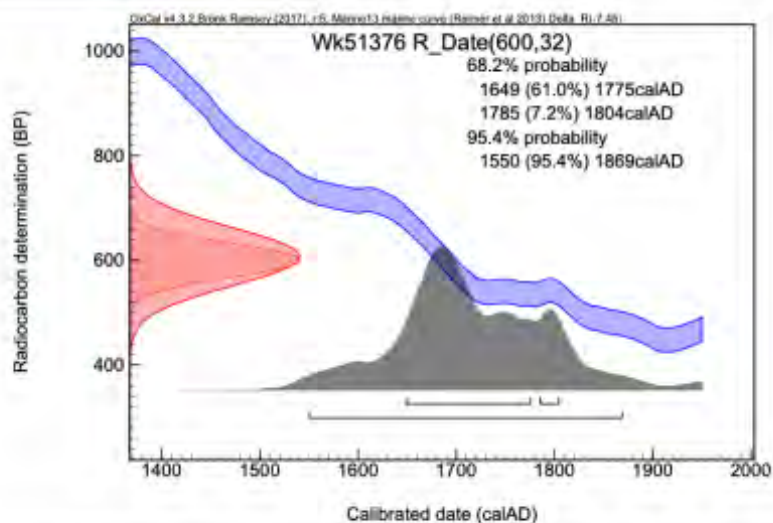
Private Bag 3105
Hamilton,
New Zealand,
Ph +64 7 838 4278
email c14@waikato.ac.nz

Tuesday, 21 July 2020

Submitter	R. Clough
Submitter's Code	OTP sample #27(362)
Site & Location	One Tree Point, New Zealand
Sample Material	Austrovenus stutchburyi
Physical Pretreatment	Surfaces cleaned. Washed in an ultrasonic bath. Tested for recrystallization: aragonite.
Chemical Pretreatment	Sample acid washed using 2 M dil. HCl for 120 seconds, rinsed and dried.

$\delta^{13}\text{C}$	$0.9 \pm 0.5 \text{ ‰}$	(CRDS)
D^{14}C	$-72.0 \pm 3.7 \text{ ‰}$	
$\text{F}^{14}\text{C}\%$	$92.8 \pm 0.4 \%$	
Result	$600 \pm 32 \text{ BP}$	

Comments



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}\text{C}$, is expressed as ‰ wrt PDB and is measured on sample CO_2 .
- $\text{F}^{14}\text{C}\%$ is also known as *Percent Modern Carbon (pMC)*.

Al Hogg



THE UNIVERSITY OF
WAIKATO
Te Whānau Wānanga o Waikato

Private Bag 3105
Hamilton,
New Zealand.
Ph +64 7 838 4278
email c14@waikato.ac.nz
Tuesday, 21 July 2020

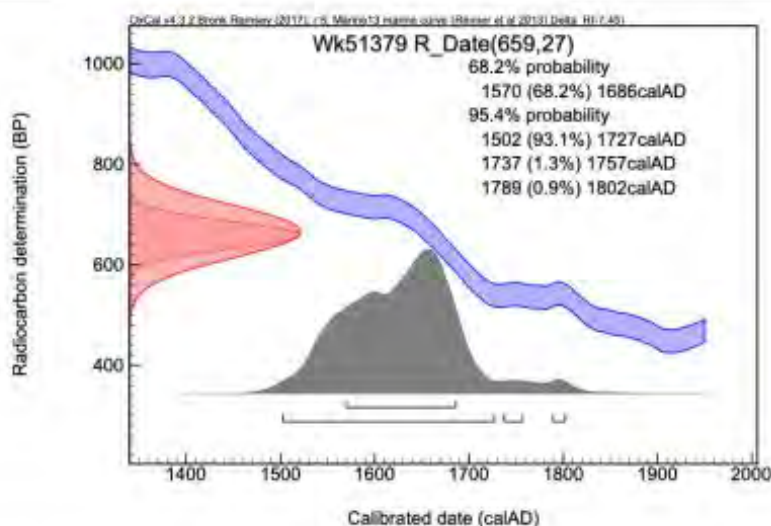
Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 51379

Submitter	R. Clough
Submitter's Code	OTP sample #4 (105)
Site & Location	One Tree Point, New Zealand
Sample Material	Austrovenus stutchburyi
Physical Pretreatment	Surfaces cleaned. Washed in an ultrasonic bath. Tested for recrystallization: aragonite.
Chemical Pretreatment	Sample acid washed using 2 M dil. HCl for 120 seconds, rinsed and dried.

$\delta^{13}\text{C}$	0.8 ± 0.5 ‰ (CRDS)
D^{14}C	-78.8 ± 3.1 ‰
$\text{F}^{14}\text{C}\%$	92.1 ± 0.3 ‰
Result	659 ± 27 BP

Comments



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}\text{C}$, is expressed as ‰ wrt PDB and is measured on sample CO_2 .
- $\text{F}^{14}\text{C}\%$ is also known as *Percent Modern Carbon (pMC)*.

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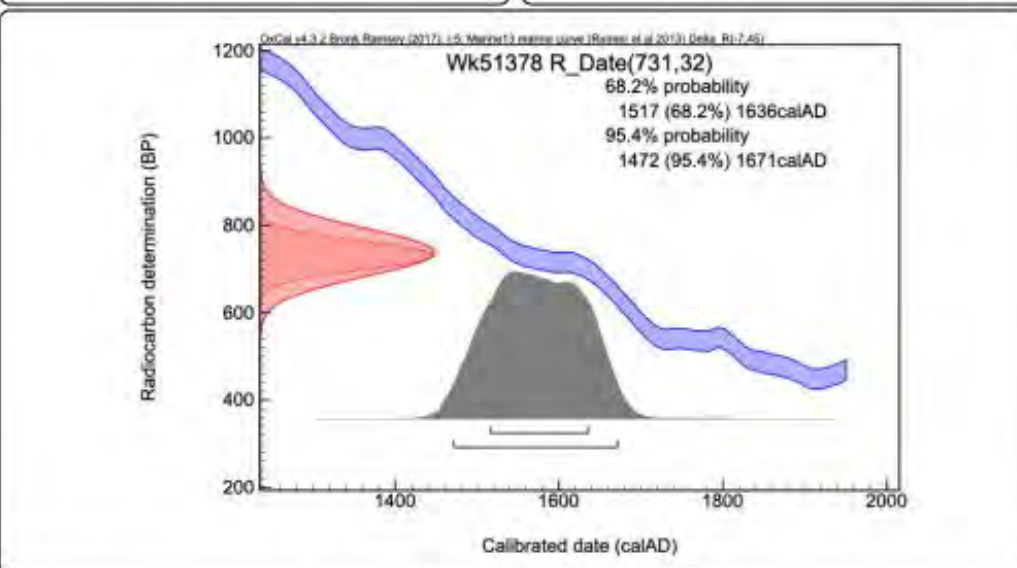
Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 51378

Private Bag 3105,
Hamilton,
New Zealand.
Ph. +64 7 838 4278
email c14@waikato.ac.nz
Tuesday, 21 July 2020

Submitter	R. Clough
Submitter's Code	OTP sample #39(613)
Site & Location	One Tree Point, New Zealand
Sample Material	Austrovenus stutchburyi
Physical Pretreatment	Surfaces cleaned. Washed in an ultrasonic bath. Tested for recrystallization: aragonite.
Chemical Pretreatment	Sample acid washed using 2 M dil. HCl for 120 seconds, rinsed and dried.

$\delta^{13}\text{C}$	$1.6 \pm 0.5 \text{ ‰}$	(CRDS)
D^{14}C	$87.0 \pm 3.6 \text{ ‰}$	
$\text{F}^{14}\text{C}\%$	$91.3 \pm 0.4 \%$	
Result	$731 \pm 32 \text{ BP}$	
Comments		



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}\text{C}$, is expressed as ‰ wrt PDB and is measured on sample CO_2 .
- $\text{F}^{14}\text{C}\%$ is also known as *Percent Modern Carbon (pMC)*.

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Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 51377

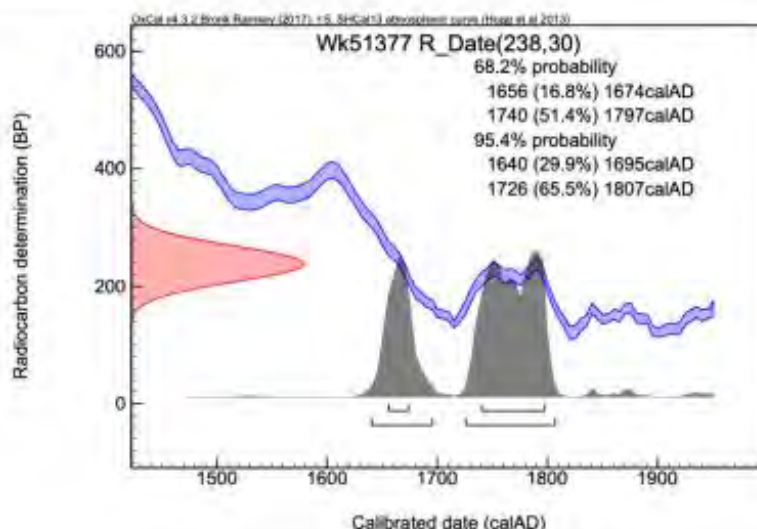
Private Bag 3105
Hamilton,
New Zealand.
Ph +64 7 838 4278
email c14@waikato.ac.nz

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Submitter	R. Clough
Submitter's Code	OTP sample #39c (613)
Site & Location	One Tree Point, New Zealand
Sample Material	Manuka, Myrsine, Pittosporum sp.
Physical Pretreatment	Possible contaminants were removed. Washed in ultrasonic bath.
Chemical Pretreatment	Sample washed in hot 10% HCl, rinsed and treated with hot 1% NaOH. The NaOH insoluble fraction was treated with hot 10% HCl, filtered, rinsed and dried.

$\delta^{13}\text{C}$	$-22.9 \pm 0.5 \text{ ‰}$ (CRDS)
D^{14}C	$-29.2 \pm 3.6 \text{ ‰}$
$\text{F}^{14}\text{C}\%$	$97.1 \pm 0.4 \text{ ‰}$
Result	$238 \pm 30 \text{ BP}$

Comments



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}\text{C}$, is expressed as ‰ wrt PDB and is measured on sample CO_2 .
- $\text{F}^{14}\text{C}\%$ is also known as *Percent Modern Carbon (pMC)*.

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THE UNIVERSITY OF
WAIKATO
Te Whare Winanga o Waikato

Private Bag 3105
Hamilton,
New Zealand.
Ph +64 7 838 4278
email c14@waikato.ac.nz

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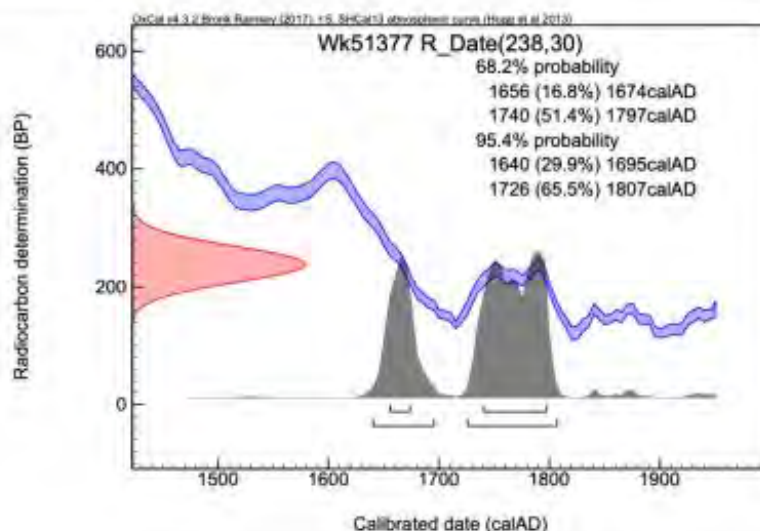
Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 51377

Submitter	R. Clough
Submitter's Code	OTP sample #39c (613)
Site & Location	One Tree Point, New Zealand
Sample Material	Manuka, Myrsine, Pittosporum sp.
Physical Pretreatment	Possible contaminants were removed. Washed in ultrasonic bath.
Chemical Pretreatment	Sample washed in hot 10% HCl, rinsed and treated with hot 1% NaOH. The NaOH insoluble fraction was treated with hot 10% HCl, filtered, rinsed and dried.

$\delta^{13}\text{C}$	$-22.9 \pm 0.5 \text{ ‰}$	(CRDS)
D^{14}C	$-29.2 \pm 3.6 \text{ ‰}$	
$\text{F}^{14}\text{C}\%$	$97.1 \pm 0.4 \text{ ‰}$	
Result	$238 \pm 30 \text{ BP}$	

Comments



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}\text{C}$, is expressed as ‰ wrt PDB and is measured on sample CO_2 .
- $\text{F}^{14}\text{C}\%$ is also known as *Percent Modern Carbon (pMC)*.

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THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

Private Bag 3105
Hamilton,
New Zealand.
Ph. +64 7 838 4278
email c14@waikato.ac.nz

Tuesday, 21 July 2020

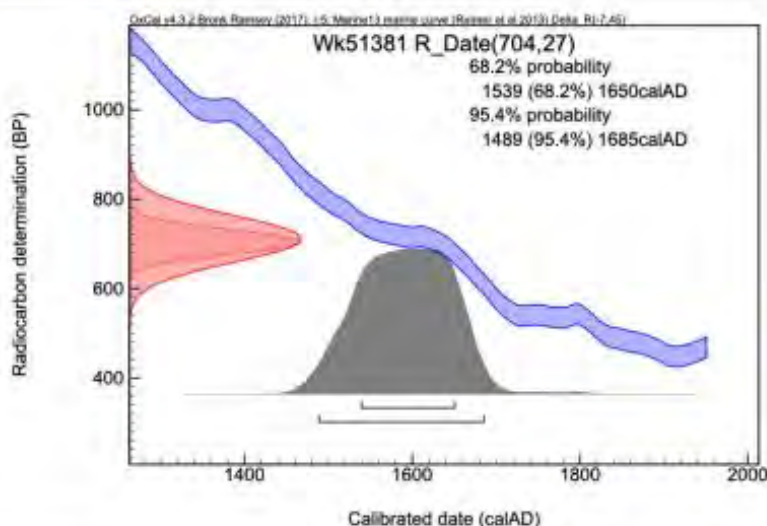
Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 51381

Submitter	R. Clough
Submitter's Code	OTP sample #12 (214)
Site & Location	One Tree Point, New Zealand
Sample Material	Austrovenus stutchburyi
Physical Pretreatment	Surfaces cleaned. Washed in an ultrasonic bath. Tested for recrystallization: aragonite.
Chemical Pretreatment	Sample acid washed using 2 M dil. HCl for 120 seconds, rinsed and dried.

$\delta^{13}\text{C}$	$2.7 \pm 0.3 \text{ ‰}$	(CRDS)
D^{14}C	$-83.9 \pm 3.0 \text{ ‰}$	
$\text{F}^{14}\text{C}\%$	$91.6 \pm 0.3 \%$	
Result	$704 \pm 27 \text{ BP}$	

Comments



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (<http://c14.arch.ox.ac.uk/embed.php?File=explanation.php>)
- Result is *Conventional Age or Percent Modern Carbon (pMC)* following Stuiver and Polach, 1977, Radiocarbon 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. This age is normally quoted in publications and must include the appropriate error term and Wk number.
- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}\text{C}$, is expressed as ‰ wrt PDB and is measured on sample CO_2 .
- $\text{F}^{14}\text{C}\%$ is also known as *Percent Modern Carbon (pMC)*.

Ally Hogg