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OPITO BAY T10/777, Coromandel Peninsula

Archaeological Excavation

Prepared for
M. and S. Edens

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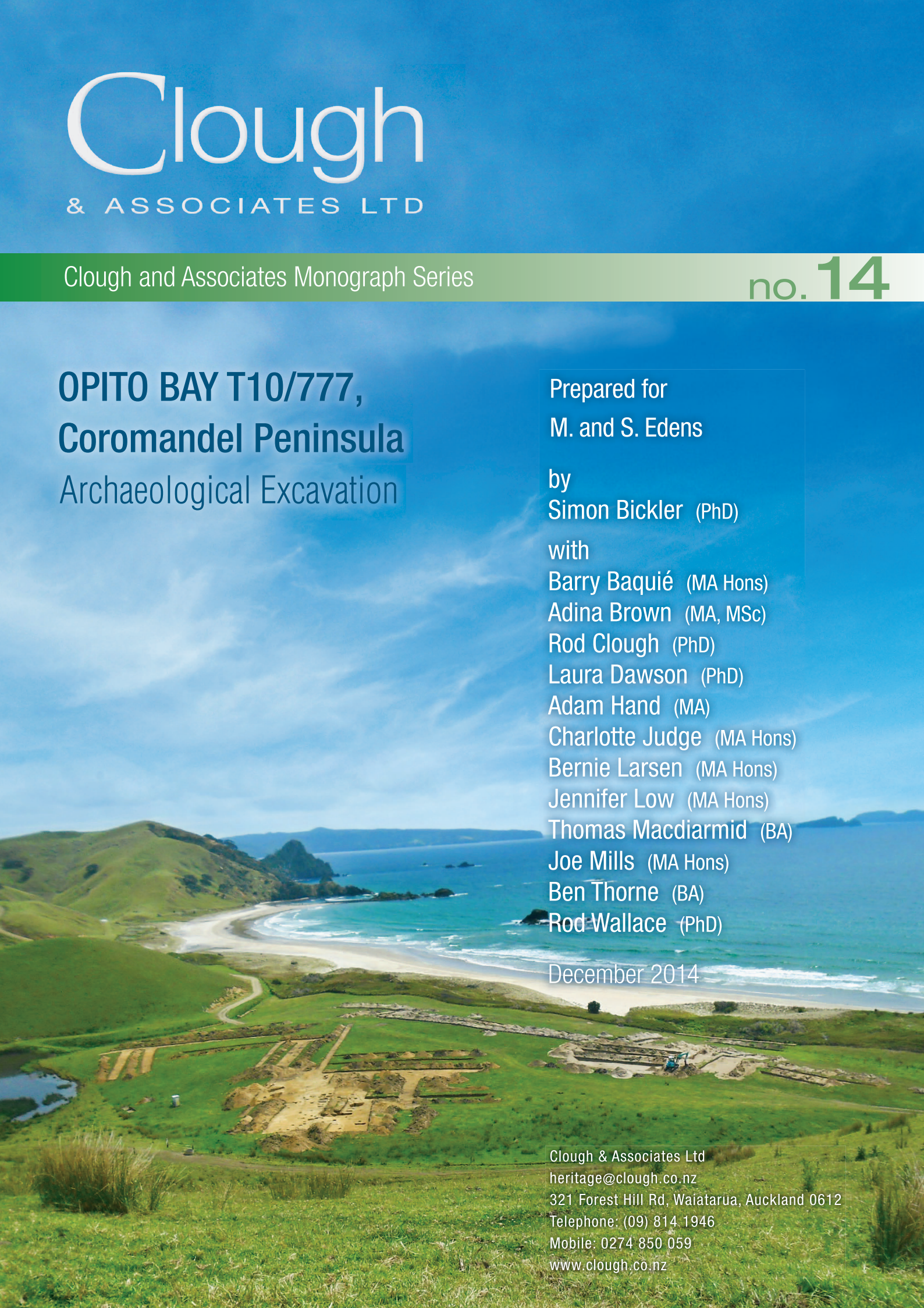
December 2014



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OPITO BAY T10/777, COROMANDEL PENINSULA: ARCHAEOLOGICAL EXCAVATION

Report in Fulfilment of NZHPT Authority No. 2008/85

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EXECUTIVE SUMMARY

Summary

This report describes the archaeological investigation of site T10/777 in Opito Bay, Coromandel under NZ Historic Places Trust (now Heritage NZ) Authority 2008/85. Fieldwork was undertaken in November 2012 following a previous test excavation by Gumbley and Hoffman (2007a) in 2007.

Over 3350m^2 of the dune areas behind the foredune were excavated. Two large concentrations of archaeological features were found and contained a number of storage pits of varying sizes and types, postholes suggestive of above ground structures, and areas of burning and cooking (Areas 1 and 2). A third concentration of small firescoops and midden was also excavated (Area 3). A small number of archaeological features including postholes, pits and firescoops were identified in trenches in other parts of the paddock.

Investigation of both Areas 1 and 2 suggested that they were occupied a number of times in the past. In Area 1 to the south, the earliest occupation appears to have been characterised by a group of large and deep rectangular pits in the dune. A later midden, identified by Gumbley and Hoffman (2007a), was found over the top of one pit which was filled with charcoal dominated by kauri. Smaller pits, firescoops and some small rua appear to follow this earlier occupation and probably represent later use of the site.

Farther behind the dunes, Area 2 consisted of large features such as deep rua, some with the door entrances intact. Rectangular pits, firescoops also occurred across an extensive area with some intercutting of features suggestive of multiple occupation events. In Area 2 a house was identified by the presence of three rows of parallel postholes cut into some of the earlier features. Between three and five occupations were indicated by the stratigraphy.

The site was characterised by a relative dearth of the tools and artefacts which characterise many of the well known Archaic sites in and around Opito Bay. Despite the close proximity of the Tahanga basalt quarries, the quantity of stone recovered was small and almost all of it appeared to have been in secondary fill contexts. A small area of flaking was identified within the midden in Area 1. Some fishing artefacts were found including a pumice float, three netsinkers and a fishhook from the fill of one of the rua. However, this hook appeared to be more ornamental than functional.

A total of nine radiocarbon dates from the excavation by Gumbley and Hoffman (2007a) and the current project provide a chronology of the site, suggesting occupation of the site from the middle of the 15th century AD through to the late 17th to mid-18th centuries. This site picks up the archaeological sequence from the earlier sites on the Peninsula that have been the focus of most of the previous archaeological investigations.

Continued on next page

Summary (continued)

It seems likely, given the presence of the storage pits and rua, that gardening in the dunes and nearby slopes occurred from the 15th century on, and that T10/777 was occupied on an irregular basis to access the gardens as well as nearby fishing, with shifting occupation across the dunes behind around Opito Bay. While the results are not definitive, there appears to be a shift towards the use of rua during the later periods, although rectangular pits were probably always used for storage.

The charcoal analysed from Opito Bay (T10/777) identified changing environmental conditions in the broader landscape. A suite of coastal and lowland forest tree taxa were found with the occupation debris, but largely absent from the coastal shrubs and seral taxa identified in the firescoops. Kauri was found in a large concentration in a pit below the midden in Area 1 and from the earliest occupation area excavated.

The data suggested that while much of the earlier parts of the sites had access to some large trees, the immediate surrounding area of the occupation was probably covered in scrub with residual sub-fossil kauri available for firewood and other species brought in for building materials. But by the 18th century AD, these large tree species had largely disappeared, although pohutakawa remained.

T10/777 therefore represents a shift from the Archaic occupation of the area focused on resource extraction related to the Tahanga quarry and marine exploitation, towards a shifting agriculturally focused occupation in the back-dunes at Opito Bay. Only one large midden was identified within Areas 1 and 2, and can only represent a couple of small scale cooking episodes by a relatively small group of people. It seems likely that the remains of the fishing and shellfish exploitation relating to these occupations probably took place mostly away from the living and food storage areas. This confirms the greater functional differentiation of space typical of later Maori settlement patterns.

Acknowledge-ments

Murray Edens carried out the digger excavation with outstanding skill and enthusiasm. We also acknowledge Murray and Sue Edens for their hard work on the project, patience and for providing accommodation. We would also like to thank Ngati Hei for their support.

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INTRODUCTION

Introduction

This report describes the archaeological investigation of site T10/777 in Opito Bay, Coromandel under NZHPT Authority 2008/85 (Figure 1). The property, Lot 1 DP 438023, is over 10ha and is being developed as a residential subdivision at the northern end of Skippers Road (Figure 2). The subdivision has been designed for 76 lots and a road reserve covering approximately 8.70 ha.

Opito Bay is in an area rich in archaeological sites which relate to pre-European Maori settlement. There are approximately 50 recorded archaeological sites representing the full range of pre-European Maori settlement in and around the Bay. These include pa, midden, storage pits, terrace sites and a stone tool working floor. They reflect both the strategic significance of, and the functional activities associated with, the coastal margins.

The current excavation was undertaken in November 2012 following a previous test excavation by Gumbley and Hoffman (2007a) in 2007. This investigation involved 14 trenches across the area of the proposed subdivision (Figure 2, Figure 17). Their results established that there was evidence of archaeological deposits and features across parts of the project area. The features uncovered included a midden in Trench 14, located behind the foredunes. Radiocarbon dating suggested that this feature dated from the late 15th or early 16th centuries. The complexity of the midden and the size of the shellfish suggested to Gumbley and Hoffman (2007a:25) that the area had been used during a period of low level exploitation, relatively early in the Polynesian settlement process.

Farther back from the beach they excavated the remains of structures and food storage pits which were similar to those that had been excavated many years previously at Skipper's Ridge site T10/165 (Gumbley and Hoffman 2007a:22). A small reworked basalt adze also indicated a relatively early date for the site.

The majority of trenches did not contain archaeological evidence, but it was clear that there was good evidence for significant archaeological features indicative of 15-16th century occupation by Maori in an area with a rich and complex history.

Authorities

The testing of site T10/777 by Gumbley and Hoffman (2007a) was under a Section 18 Authority No 2007/289. The main excavation of T10/777 was carried out under the NZHPT Authority No 2008/85. A further authority for additional work in the area of the site was granted in 2012 (2013/317), but has not yet been activated.

INTRODUCTION, CONTINUED

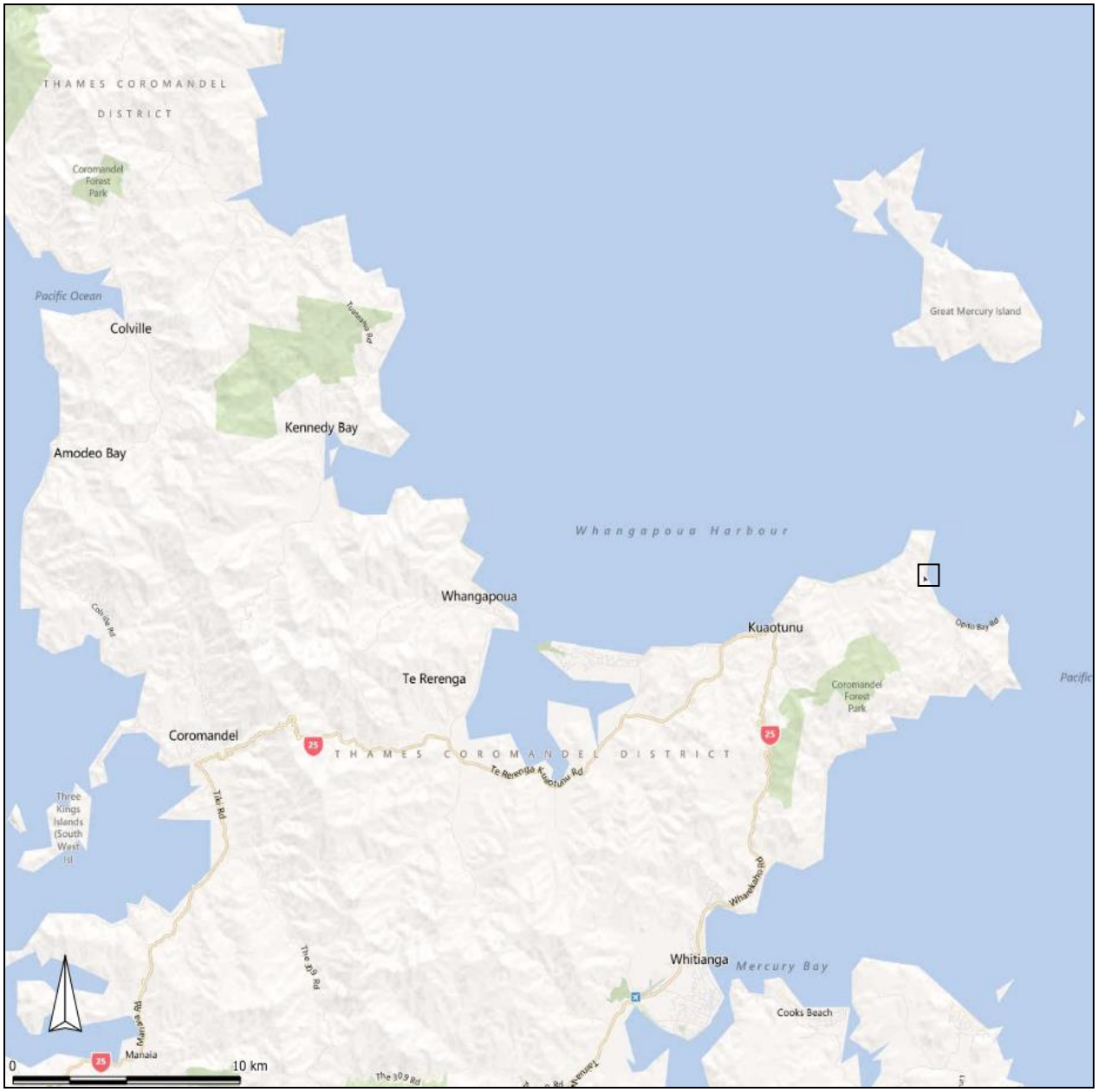

Figure 1. General location map (project area indicated)

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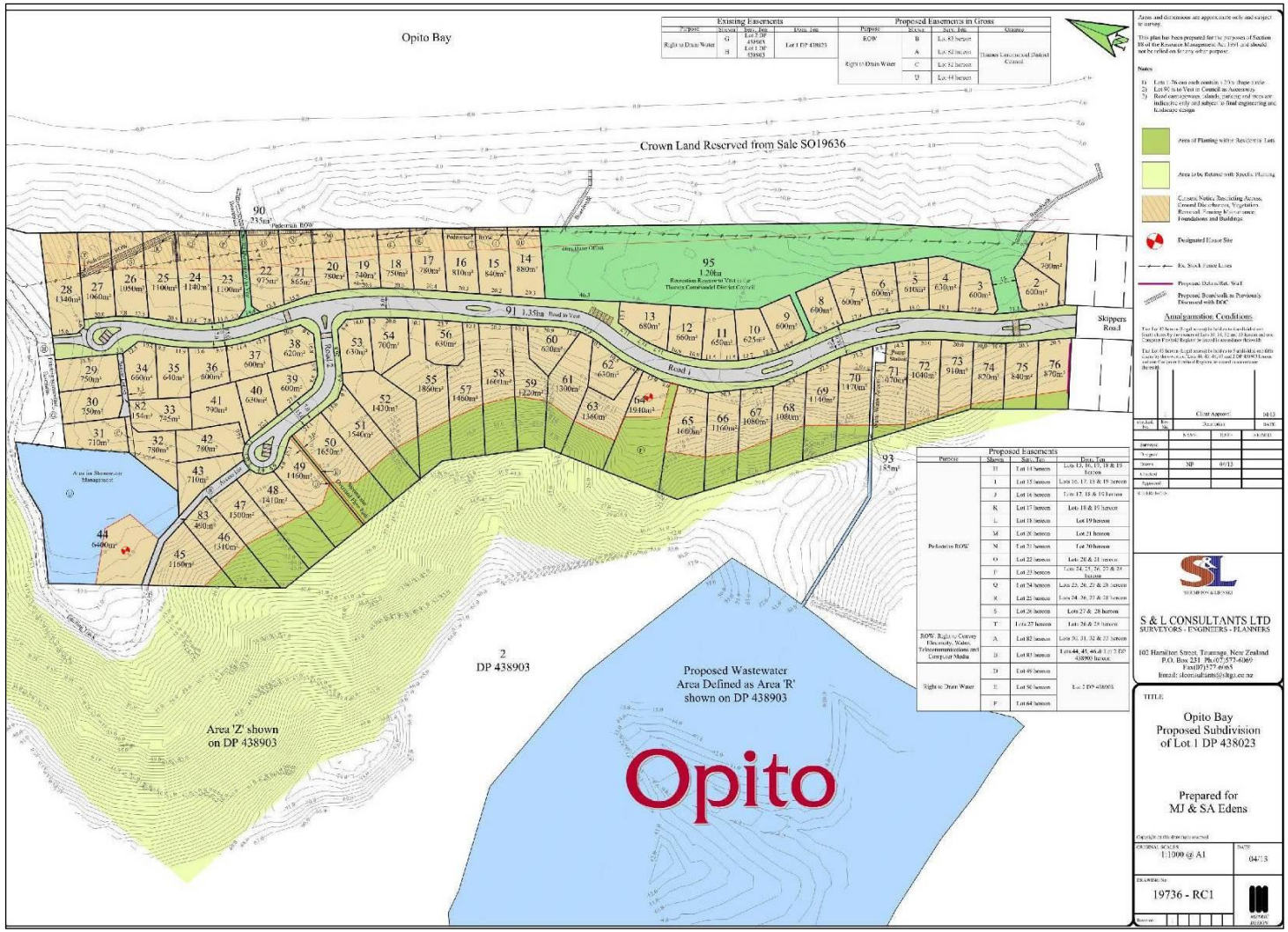
INTRODUCTION, *CONTINUED*

Figure 2. Proposed development plan at Opito Bay (2014)



PHYSICAL LANDSCAPE

Physical Landscape

The property is located at the northern end of Opito Bay, previously known as Mahinapua Bay (Figure 3) after a group of rocks just off the coast. Opito Bay is at the eastern end of the Kuaotunu Peninsula which runs eastward from the main Coromandel Peninsula. Much of the Kuaotunu is hilly and remains in forest and bush. Great Mercury Island (Ahuahu) lies to the north of Opito Bay and was a local voyaging hub with a number of smaller islands running off to the east. South of Opito Bay, another chain of small offshore islands extends out opposite Red Bay at the eastern end of the Kuaotunu Peninsula.

The Opito end of the peninsula consists of igneous rock and it is the exposed basalt at Tahanga (Figure 3) that was a major draw card for early Maori settlers in the area. Farther to the west gold was to provide a similar drawcard for later European visitors (Figure 4). The modern vegetation pattern consists of a forested inland area, pine forest with native bush, with a coastal fringe of farm land and small settlements (Figure 4).

The excavation areas are located inland of the foredunes on consolidated dunes below the high ridge that runs parallel to the shore. The land is described as 'undulating with relatively low relief' by Gumbley and Hoffman (2007a: 1), and consists of various sandy loams across the low-lying land (Figure 3).

Opito Beach is over 4km long with headland barriers at each end with four streams entering into the Pacific Ocean (Figure 5). The Bay has a significant orientation change between the two ends of the beach of almost 150° (Wood 2010:13). The beach is generally considered relatively stable (Wood 2010:141) although changes to the streams create pockets of instability.[1]

Soils in the moderately steep to steep slopes are generally well drained with some evidence of soil creep and slumping on the steeper faces. Two of the watercourses on the block are relatively ephemeral, while the third brackets the subdivision and is dammed.

The dune stratigraphy generally consists of a top area of relatively unconsolidated sand, over the top of previous dune surfaces. Waihi ashy loams cover much of the back area of the dune with evidence of ploughing of the soils in places (see Gumbley and Hoffman 2007a) and probably localised mixture of layers during Maori occupation.

Trenching across much of the site also showed a layer that probably relates to a previous event such as a storm surge or flooding and is visible in the trench sections in the lower parts of the site (e.g., Figure 6). A more detailed discussion is provided by Gumbley and Hoffman (2007a). However, it is not clear when this event would have occurred, although research by McFadgen has identified the likelihood of tsunami events around the New Zealand coastline including one hitting the Coromandel coast around the mid-15th century AD (McFadgen 2007; Goff et al. 2012).

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[1] Wood's study, however, is based on profiles to the south of the current project area (Wood 2010: 187 Figure II.7).

PHYSICAL LANDSCAPE, CONTINUED

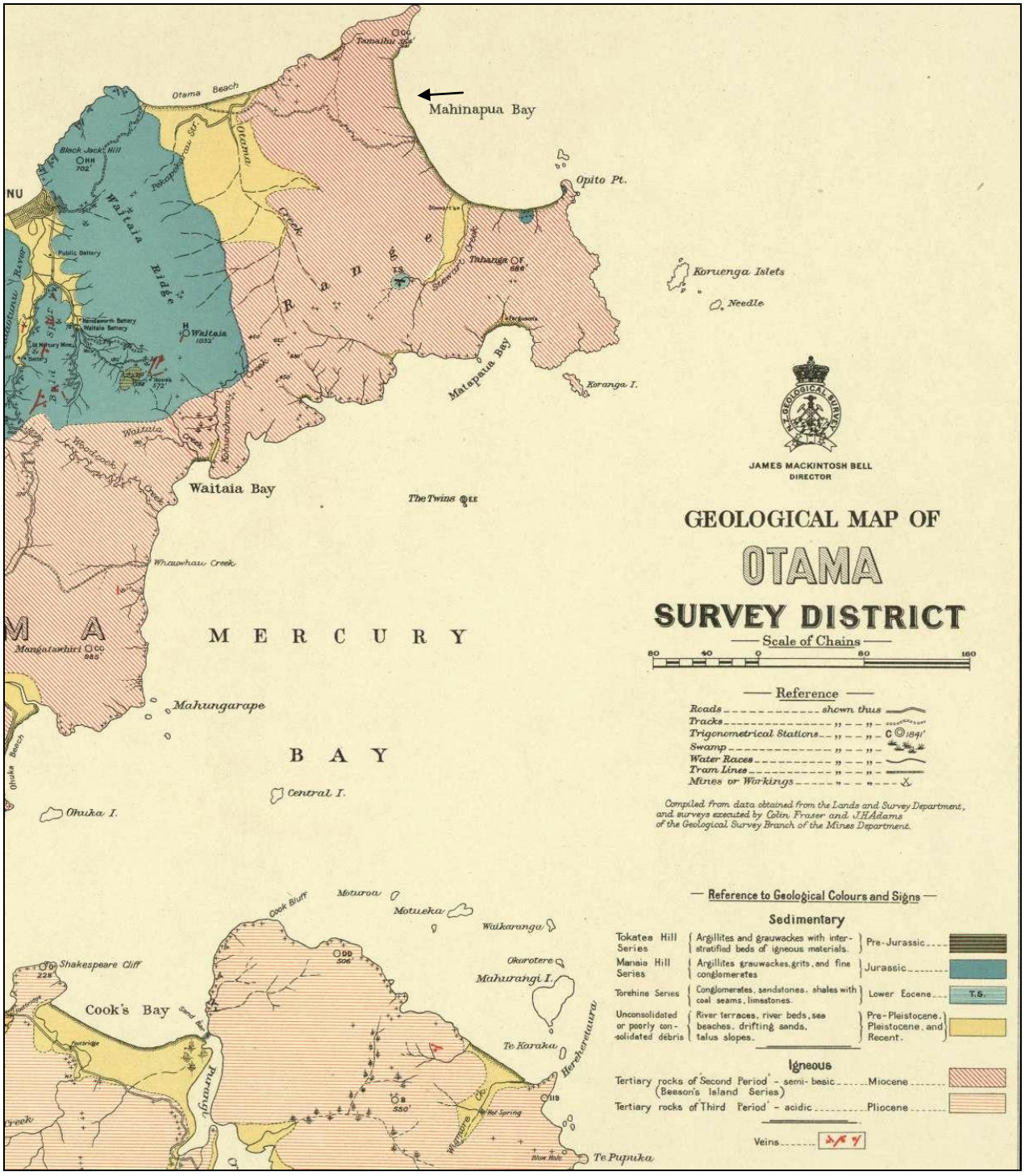

Figure 3. Geological map of Otama Survey District dated 1907

(Source: http://ndhadeliver.natlib.govt.nz/content-aggregator/getIEs?system=ilsdb&id=1231643)

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PHYSICAL LANDSCAPE, CONTINUED

Figure 4. Kuaotunu Peninsula from the west

Several gold-mines were in operation from 1889 on the Waitaia Ridge (across centre) and Bald Spur (bottom right). Left centre is Otama Beach. In the far distance are Opito Bay and the localities of the sites of Skippers Ridge and Sarah's Gully. Mt Tahanga, the source of widely used adze-stone, is the rounded knob on the far right of the photograph (Jones 1994:20)

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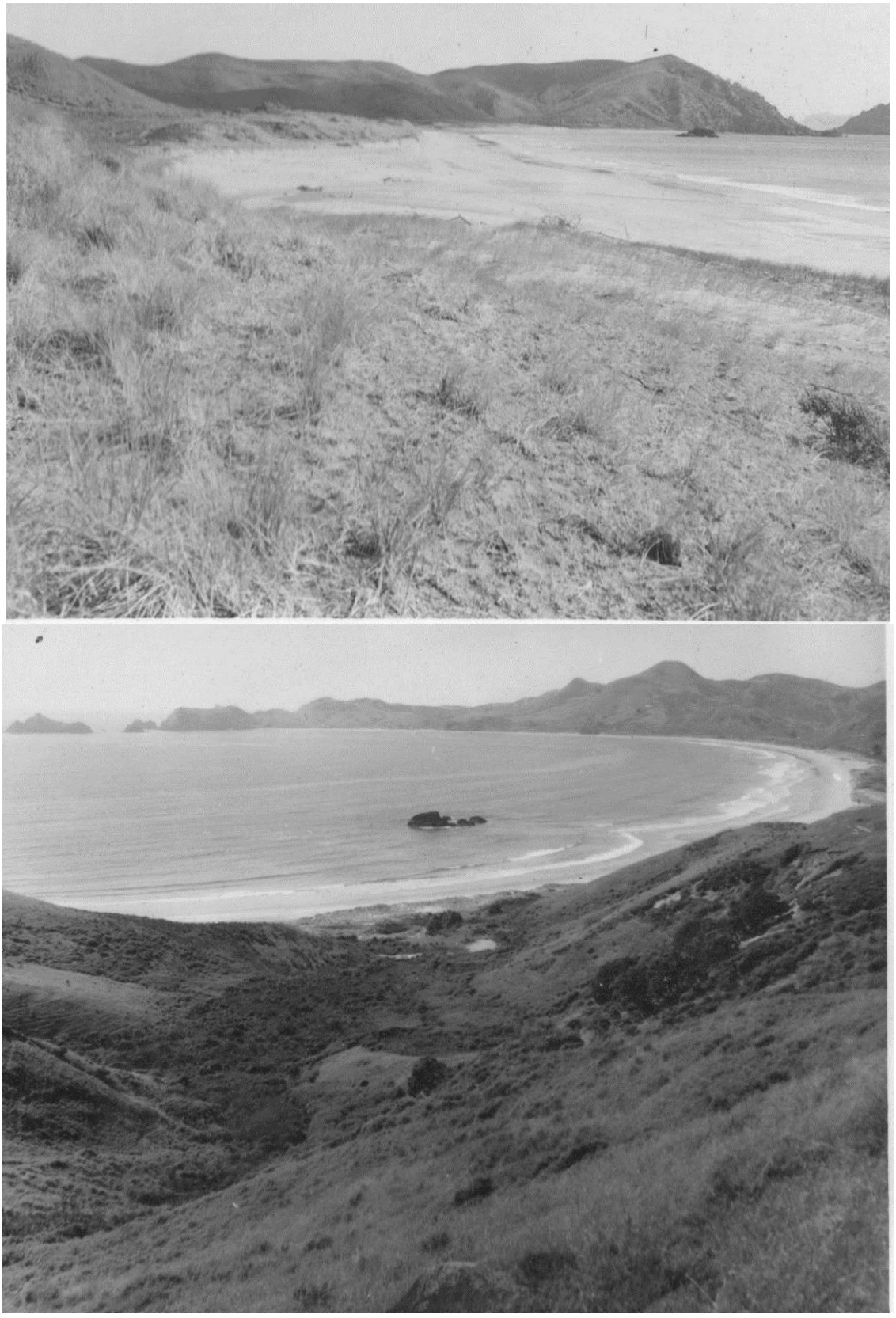

Figure 5. Views of Opito Beach in the 1960s

Looking north (top) and south (bottom) (courtesy of Roger Green)

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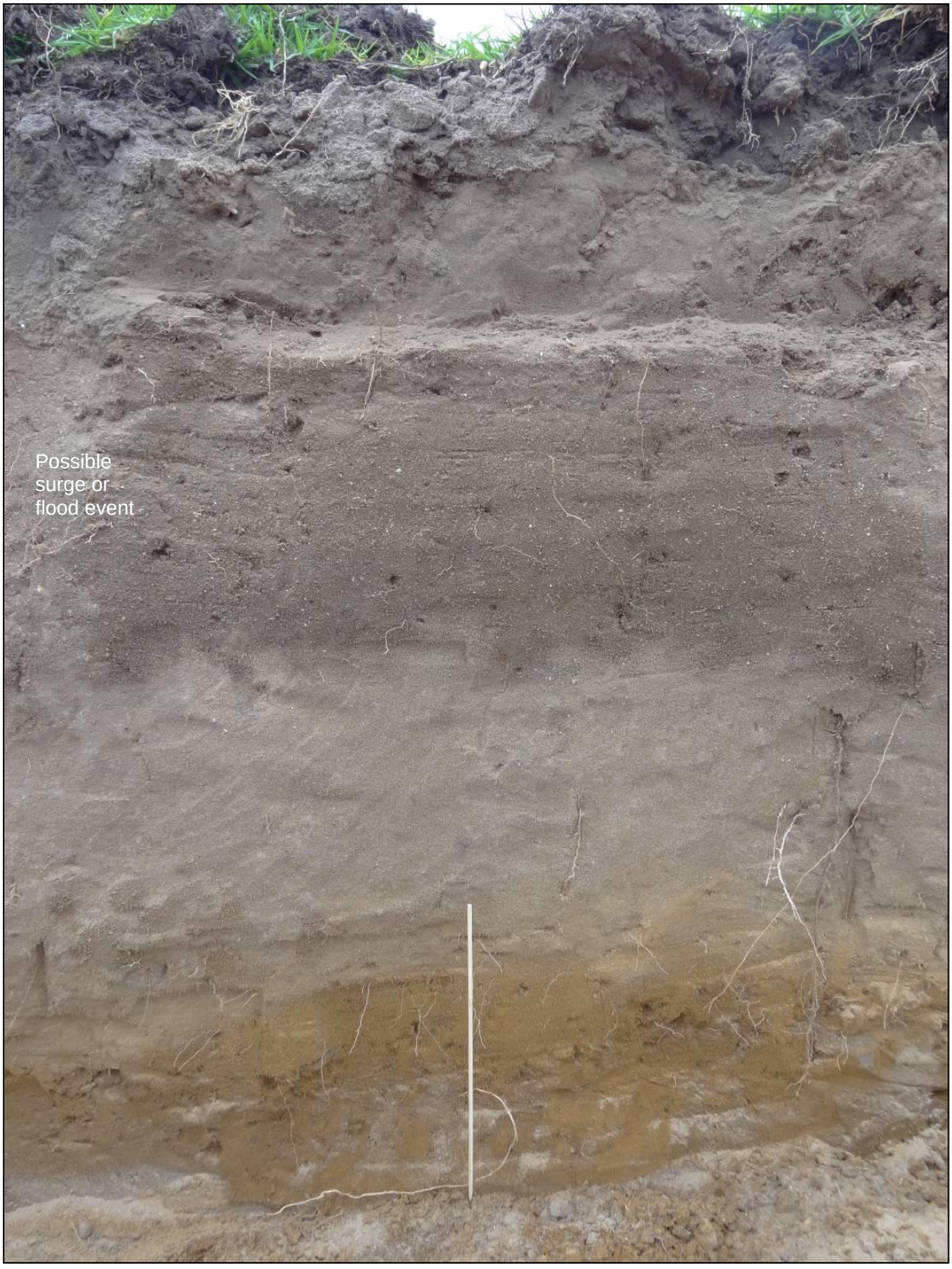

Figure 6. Example of stratigraphy in dunes

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Landscape Modifications

Modifications to the natural contour of the property were limited to farm activity (Figure 7) including the construction of a network of farm vehicle tracks, installation of stock yards in the valley floor, and possible disking and ploughing of level and moderately sloping areas of the property. Stock induced erosion is evident over much of the property, particularly in the vicinity of the yards and on the lower reaches of the spurs descending west and northwest from the eastern property boundary.

In addition to the post-1900 modifications to the landscape caused by farm activity, the coastal margins are subject to ongoing erosion and accretion episodes. Wind-blown sand covers the seaward face of the low coastal terrace and extends inland for 70m at the stream mouth.

Farming does not appear to have changed the major contour of the land across most of the site. In modern times, the area was used for pasture, gardening and for camping (Figure 7).

Figure 7. View of project area prior to excavation in September 2012

ARCHAEOLOGICAL BACKGROUND

Background

The Otama, Whaorei and Opito Bay area is rich in archaeological sites relating to pre-European Maori settlement as well as early European settlement (Figure 8). More than 40 previously recorded archaeological sites have been identified in the area (Table 1), with pa sites occupying high points surrounding the bays, and numerous shell middens located both along the beach fronts and inland. Undefended occupation sites containing visible pits and terraces and areas of working floors are also identified. In addition to the high density of sites (Figure 9), the Otama-Whaorei-Opito Bay area is considered a significant archaeological landscape due to the high proportion of 'Archaic' sites and/or sites with occupation levels dating to the period of early Polynesian/Maori colonisation in New Zealand (c.1200-1300AD) (Gumbley and Hoffman 2007a). Archaic archaeological sites are characterised by a large number of artefacts and the presence of Tahanga basalt, obsidian and moa bone. They all fit a characteristic pattern of these site types, and may range from small habitation areas to villages anchoring a wide-ranging resource gathering strategy.

Moa bones were uncovered in Opito Bay prior to the 1930s (*Auckland Star*, 2 January 1931:9), and at least one museum-led expedition to the Kuaotunu Peninsula was undertaken during the 1930s focusing on Otama and Opito Bays (*Auckland Star*, 12 December 1934:24). The expedition led by Vic Fisher at Opito Bay excavated the Archaic midden site T10/162, uncovering one occupation layer that contained moa bone fishhooks and Tahanga basalt adze preforms (Fisher 1936; Green 1963; Sewell 1990).

Site Recording at the Kuaotonu Peninsula

Site recording on the Coromandel Peninsula began largely in the late 1950s (Golson 1959). Through the 1960s and 1970s small-scale assessments resulted in the recording of many more coastal sites and also encouraged Calder (1972), whose family owned land in the area, to undertake survey of the eastern Kuaotonu Peninsula (Figure 10). Over 70 sites were identified by the survey including those previously found, and they ranged from midden, working floors associated with the Tahanga quarry to settlement sites of various sizes and complexity. This survey was followed a decade later by systematic survey of 21 east coast beaches undertaken by Easdale and Jacomb through the Hauraki Catchment Board (Easdale and Jacomb 1982).

Local involvement in the archaeology of the area has always been a hallmark of the research undertaken. Skipper Chapman, Sue Edens' father, was enthusiastic about the archaeology on his properties and encouraged the Auckland-based archaeologists to undertaken their investigations, even driving his truck up to the city to transport people and equipment down (Sue Edens pers. comm.).

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Whaorei and Opito Bay Excavations

There have been four excavations undertaken at Whaorei Bay since 1956, comprising: T10/167 (Sarah's Gully Settlement); T10/168 (Sarah's Gully Pa), T10/172 (Sarah's Gully Pa Midden) and T10/399 (Cross Creek Midden). In 1956 the University of Auckland Anthropology Department undertook a series of archaeological excavations at Opito Bay and Sarah's Gully (Golson 1959; see Figure 11–Figure 13). The Sarah's Gully and Cross Creek sites became fundamental to the development of archaeological models of Maori settlement in the North Island. The sites also provided some of the main training ground for early professional archaeological work in New Zealand.

All four of these sites were determined by Golson (1959) to be Archaic, chronologically based on a combination of characteristics including artefact material, stratigraphic connection, and limited radiocarbon dating. The pa site T10/168 showed use from the 13th century to the 16-17th centuries.

The Archaic midden site T10/171 (NZAA SRF), also in the bay, was excavated in 1960 by Birks and Birks. The site showed two separate periods of occupation, with the lower layer relating to early Archaic Maori occupation.

The Archaic midden site on the other side of the stream (T10/399) was excavated by Sewell in 1983. The excavation provided evidence of five separate periods of occupation dating to the 13th/14th centuries. The midden included a wide range of shellfish, mammal bone, fish bone, moa bone, lithic material and shell/bone fishhooks (NZAA SRF T10/399; Furey et al. 2008).

Opito Bay

Investigations at Opito Bay, T10/161 ('Opito Beach Midden') to the north of the Waitaia Stream and T10/165 ('Skippers Ridge I') were also investigated (Parker 1959, 1960, 1962) over a period of two years at the insistence of Skipper Chapman with T10/227 later investigated in 1968 (Jolly 1979).

Davidson (1975a) identifies all three sites as being part of a single larger site. T10/161 and T10/227 both contained two distinct occupation layers: the upper layer identified as a later phase and the lower layer as the Archaic phase based on the number and type of artefacts recovered. T10/165 contained four distinct layers representing different periods of occupation of the site; the lower three layers being early settlement or Archaic. The pits investigated in the lowest layer (Layer IV) were structurally distinct from those in the layers above and are interpreted as representing early attempts at storage of kumara in an unfamiliar climate (Davidson 1975a). By 1983, 16 archaeological sites had been excavated at Whaorei and Opito Bay (Sewell 1990:197-202).

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Arthur Black Midden T10/164

Arthur Black's Midden (AMB) is located on the flat dune area north of T10/777 within Opito Bay (Figure 14). Other midden sites are located nearby (Figure 8 and Figure 9). The low-lying topography has meant that the site has been subject to damage from erosion and other activities in the area since it was recorded in the 1950s (Sewell 1990:198). Early reports described the site as being rich in moa bone, dog along with other sea mammals (Calder 1972:34; Sewell 1990:198; Smith 1981) but the most recent excavation by Furey in 2001included shellfish, bird, dog and sea mammal but not moa. This suggested that the site was probably occupied a number of times with the moa coming from earliest uses with two later occupations radiocarbon dated to the 14th-15th centuries and 15th-16th centuries (Furey, pers. comm., reported in Mann 2009:52).

Tahanga

There was recognition of the importance of Tahanga Hill (Figure 15) as a major and important source of basalt, being the centre of a network of stone tool distribution that stretched most of the length and breadth of the country during the early 14th to 15th centuries AD (see e.g., Jones n.d.; Turner 2000). Polynesian/Maori settlers quickly recognised the value of the high quality basalt for the purpose of tool manufacture with Turner (2000:42) noting that the production zone extended 'along the coast from Great Barrier Island for approximately 200kms to Mt Maunganui at the eastern entrance to the Tauranga Harbour'.

Turner (2000) noted that archaeological investigations carried out along the east coast of the Coromandel have found a large number of contemporary settlements that were regularly spaced along the coast and on nearby off-shore islands. These were all involved in adze production and large quantities of Tahanga waste flakes and reject preform tools were recovered.

Interpretation

Unfortunately, many of these sites remain inadequately reported and many are undated. Those that are dated tended to have few dated samples and those were processed when radiocarbond dating was in its infancy. This made many of the dates unreliable (Gumbley and Hoffman 2007a:3). Nonetheless, on the basis of artefact styles, economy and the presence of moa bone, at least half of these sites are regarded as representative of early or Archaic Maori settlement in New Zealand (Sewell 1990: 197-202).

The later part of the archaeological sequence at Opito has received less archaeological investigation. T10/777 therefore provided the possibility of showing how Maori populations from around the 15th century onwards used the area as agricultural practices generally become a more prominent part of the settlement pattern.

ARCHAEOLOGICAL BACKGROUND, CONTINUED

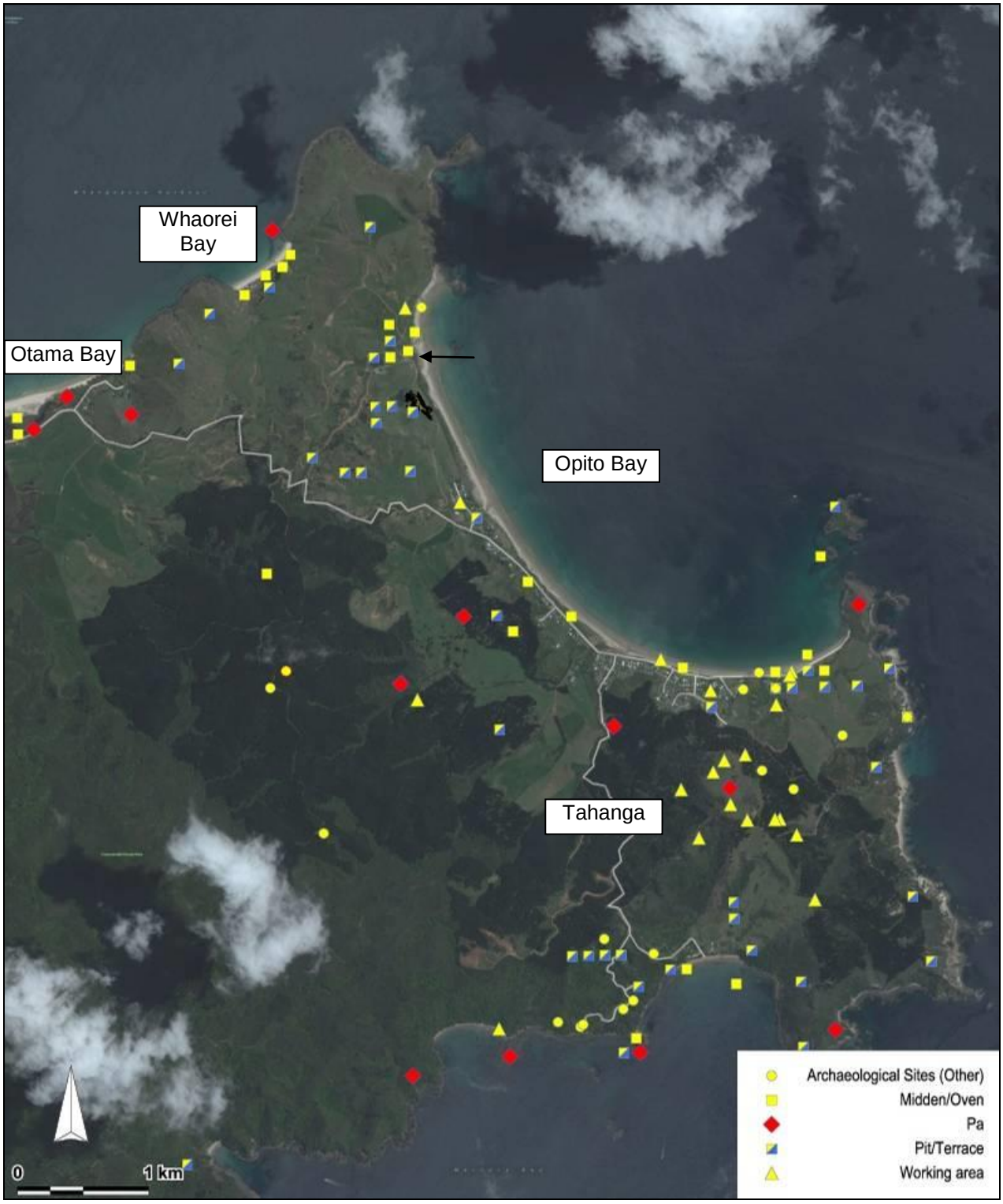

Figure 8. Showing the distribution of different site types on the Kuaotunu Peninsula

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ARCHAEOLOGICAL BACKGROUND, CONTINUED

Table 1. Known archaeological sites within the sites on the Kuaotunu Peninsula

MAP	SITE	EASTING	NORTHING	DESCRIPTION	DATE
T10	161	2759900	6494800	MIDDEN	2001
T10	162	2759530	6496190	MIDDEN	2001
T10	163	2759500	6496100	WORKING FLOOR	2001
T10	164	2759550	6495940	MIDDEN	2001
T10	165	2759900	6494800	PITS/MIDDEN	2001
T10	167	2758600	6496200	MIDDEN/PIT	1988
T10	168	2758700	6496600	HEADLAND PA	1990
T10	171	2758700	6496600	MIDDEN	1990
T10	190	2757300	6495600	PA	1964
T10	191	2757000	6495400	PA	1987
T10	193	2757800	6495500	PA	1964
T10	222	2759400	6495900	PITS	2001
T10	223	2759530	6496190	MIDDEN	2001
T10	226	2759500	6495100	PITS	1990
T10	227	2759700	6495100	MIDDEN	2001
T10	253	2758100	6495800	TERRACES/DITCH	1973
T10	254	2758300	6496100	TERRACES	1973
T10	255	2758500	6496100	BEACH MIDDEN	1973
T10	256	2759300	6496600	PITS	1973
T10	259	2756400	6494700	TERRACES	1973
T10	260	2758900	6495200	PIT/TERRACE	1973
T10	397	2759400	6495900	PITS	1976
T10	398	2759300	6495800	PITS	1990
T10	399	2758700	6496300	MIDDEN	1990
T10	624	2757100	6495400	MIDDEN	1981
T10	625	2757100	6495500	MIDDEN	1981
T10	626	2756800	6495600	MIDDEN	1981
T10	627	2756500	6494670	PLATFORM/PIT	1981
T10	630	2756200	6495400	MIDDEN/BURIAL	1981
T10	631	2756300	6495300	MIDDEN	1981
T10	632	2756700	6495400	MIDDEN	1981
T10	653	2756800	6495300	MIDDEN	1982
T10	654	2756700	6495400	MIDDEN	1982
T10	655	2757800	6495800	MIDDEN	1982
T10	657	2759550	6495940	MIDDEN	2001
T10	725	2759100	6495100	TERRACES	1990
T10	726	2759200	6495100	TERRACES	1990
T10	727	2759300	6495400	TERRACES	1990
T10	728	2759300	6495500	TERRACES	1990
T10	729	2759400	6495500	PITS	1990
T10	768	2759600	6496100	PITS/ARTEFACTS	2001
T10	777	2759700	6495400	PITS/MIDDEN	2001

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ARCHAEOLOGICAL BACKGROUND, CONTINUED

Figure 9. Sites recorded at Opito Bay (Source NZAA ArchSite)

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ARCHAEOLOGICAL BACKGROUND, CONTINUED

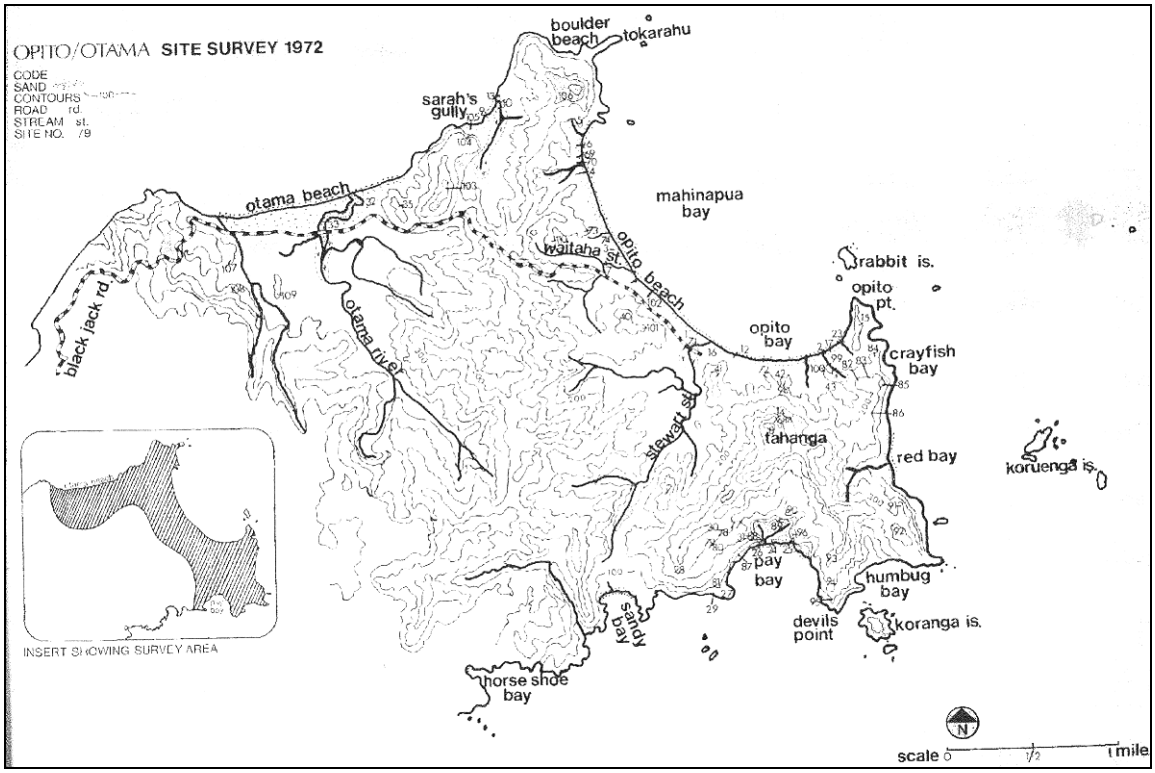

Figure 10. View of field survey of the area (Calder 1972:64)

Figure 11. Jack Golson and Skipper Chapman at Sarah's Gully around 1956 (Department of Anthropology Photographic Archive, University of Auckland)[2]

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[2] http://digitool.auckland.ac.nz/R/-?func=dbin-jump-full&object_id=8490&silo_library=GEN01

Figure 12. Ron Scarlett and Paul Hocking sampling Sarah's Gully beachfront in 1958 (Photo by W. Ambrose, Figure 13 in Campbell 2004:39)

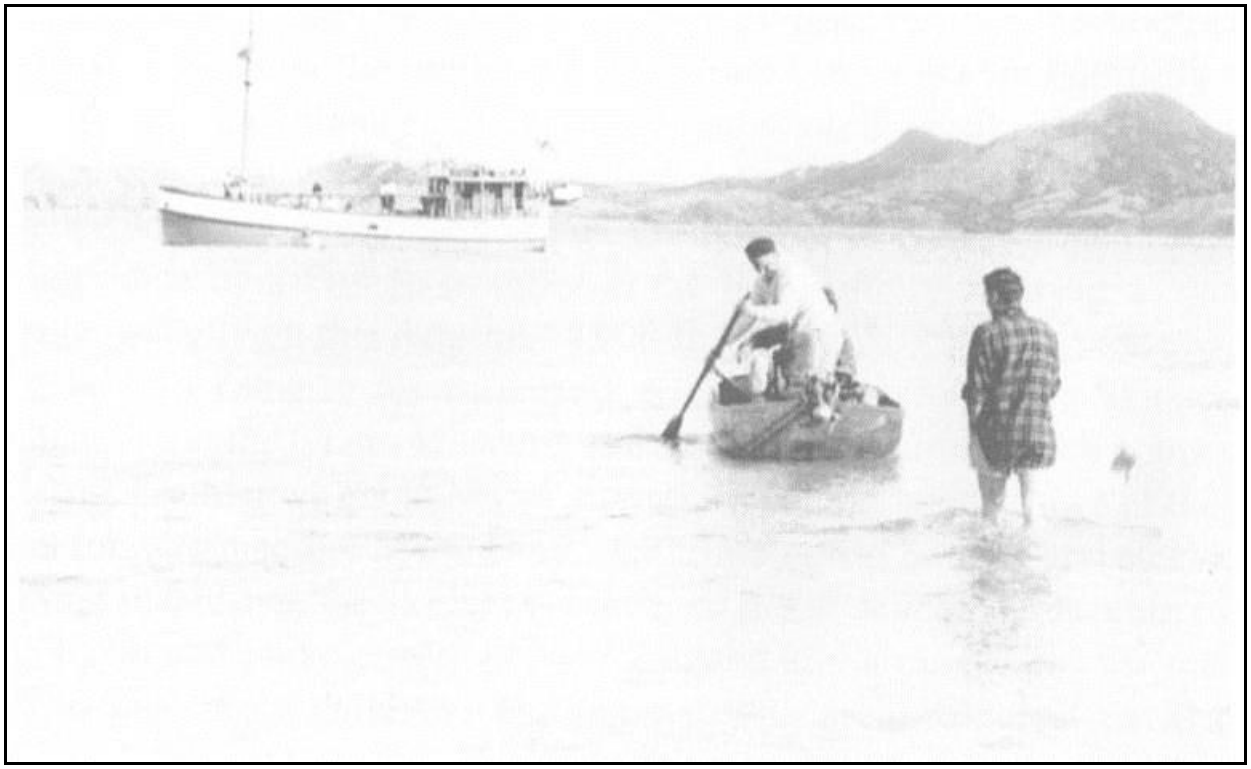

Figure 13. Bill Geddes paddling and Warwick Bradshaw wading to unload supplies from the *Lady Jocelyn* at Opito Bay (Photo by Wal Ambrose in 1956-57, Figure 50 in Campbell 2004:152)

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Figure 14. View from ridge above T10/777 across to the northern end of Opito Bay in area of Arthur Black's Midden (T10/164)

Figure 15. View from ridge above T10/777 looking towards the south at Tahanga Hill

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Kuaotunu

A growing number of excavations elsewhere on the Coromandel Peninsula have significantly altered the understanding of the prehistoric landscape. Elsewhere at Kuaotunu, Hoffman undertook the excavation of pit site T10/824. Three food storage pits with internal postholes and drainage cut into the sterile clay subsoil were located along the ridge crest behind the foreshore at Kuaotunu, Coromandel. Artefactual material included six fragments of Mayor Island obsidian, a Tahanga basalt flake and part of a large Tahanga basalt adze (Hoffman 2009).

Hahei and Hot Water Beach

In 1969 a rescue excavation of an early Archaic Maori settlement site (T11/115) at Hot Water Beach was undertaken under the auspices of the Auckland Museum. The site was reported as being an early Maori occupation site with evidence of cooking as well as stone flaking located 'on the sandy flats across the stream from the pa' (Leahy 1974:23; Gumbley 2001).

During the 1970s/1980s an early Archaic Maori occupation site T11/326 located at Hahei was investigated by Edson and Brown (1976) and Harsant (1984). The site was considered particularly interesting as it may have contained some of the earliest pit features then recorded and therefore some of the earliest evidence of agricultural practice in New Zealand.

A coastal midden site T11/242 (previously N44/215) was sampled by Nichol in the mid 1980s (Nichol 1986).

A small excavation of T11/1030 was undertaken in 2012 in Hahei after a human skeleton was uncovered during earthworks for a house (Judge et al. 2013). There was evidence of at least three separate periods of activity. The earliest in situ features were cut into the natural sand dune layer and comprised storage pits, a hearth, firescoops and postholes. Some of these features had been cut into by others, suggesting return visits to the site during the 16th century. Those features were covered with mixed grey sand with Archaic artefacts which appeared to have come from deposits associated with T11/326 nearby and deposited across the site as a result of strong winds across the dune. The burial itself post-dated both the 16th century occupation site and the Layer 2 deposition process, and is likely to pre-date European settlement of the area. T11/1030 appears to have been a short-term settlement with small storage areas located near to the hearth and fire places. The site is likely to be a remnant of what may have been a much larger settlement pattern across the Hahei dune systems during the mid-16th century.

Continued on next page

Matarangi and Tararu

More recently, an excavation of a coastal midden site (T10/993) located on the dunes of the Matarangi Sandspit was undertaken by Furey in 1999. The investigations uncovered multiple midden deposits, shallow firescoops and one posthole. Shell midden comprised predominantly cockle, tuatua and pipi, with some scallop and gastropod. Radiocarbon dates obtained indicated a date of occupation between the late 16th and early 17th centuries (Furey 1999).

In 2000, Sewell investigated midden site T12/937 located on the foreshore at Tararu (on the western side of the peninsula). Postholes, firescoops and midden deposits were revealed, indicating an extensive settlement area. Midden analysis showed a dominance of pipi and cockle. No stone or obsidian artefacts were recovered from the site, and the presence of a metal belt buckle suggested that the site was occupied during the early Contact period (Sewell 2001).

Tairua

Tairua is another centre of early settlement. T10/62, located on the beach dunes, was originally described as a typical midden containing a concentration of pipi and cockle. Archeological investigations in the 1950s and 1960s (see Green 1964; Jones 1973; Rowland 1975, 1977) provided evidence of an earlier 'Archaic' settlement including moa hunting. A significant number of artefacts were recovered, including an important pearl shell lure shank thought to derive from Polynesia. In 2002, Gumbley investigated an extensive pre-European Maori occupation site comprising terraces and middens (T12/1028) located on a hillside overlooking Tairua Harbour, Pauanui. The site was interpreted as 'an aggregate of a number of kainga occupying the ridge spurs' east of the stream (Gumbley 2003). Investigation was limited to proposed areas of development and included investigation of some terrace features and midden deposits. The investigation uncovered evidence of occupation from a cultural layer and posthole features. Analysis of midden samples identified a restricted range of species dominated by cockle and pipi. Bone identified included red gurnard, possible mackerel and possible lizard. Two radiocarbon dates obtained from the site provided dates of occupation between 1500 and 1670 AD (Gumbley 2003).

Continued on next page

Whangapoua

In 2004, Gumbley undertook an investigation of shell midden sites T10/751, T10/752 and T10/753 located on the low ridges at the foot of the hills behind Whangapoua Beach (Gumbley 2008). The investigations indicated that the three sites were in fact part of one larger occupation site with associated structural postholes and stakeholes, and a series of four rectangular pits with internal drains cut into the clay subsoil. Midden samples were dominated by pipi and cockle.

A small stone artefact assemblage of 14 items was recovered, comprising obsidian cores and flakes, a chert core and a basalt (probably Tahanga basalt) flake. The obsidian was sourced to Mayor Island and the Coromandel Peninsula. Five radiocarbon dates were obtained from the site, providing a date of occupation of late 16th to 17th century (Gumbley 2008).

More recent investigations have also been undertaken at Whangapoua Beach (Furey 2008).

Whangamata

In 2008, Gumbley and Hoffman excavated part of midden/flaking floor site T12/3 located on the coast at Whangamata Harbour. Almost 100 features were recorded including firescoops/ovens, postholes, piles of oven stones, concentrations of dog coprolites, fishbone deposits, and gardening soils. Midden contained a wide range of shellfish, and over 4000 artefacts were recovered including obsidian flakes and cores, basalt flakes, adzes and adze preforms, chert drill points, sandstone abraders, hammerstones, sinkers and fishhooks. Radiocarbon dates indicated that this was an early Archaic site dating to 1350–1400 AD (Gumbley and Hoffman 2008).

Summary

The more recent excavations have made significant changes to the interpretation of the archaeology of the region. Most notably, the dates for the earliest settlement of New Zealand have shifted from a date of around 850 AD-1000AD towards around 1250 AD with the 'Archaic' probably ending around 1350-1400 AD. Moa appear to have died out by then (Holdaway et al. 2014; Perry et al. 2014) even with apparently quite small populations and settlement appears to have shifted significantly from the exploitation of key resources like Tahanga and marine proteins, to an agricultural focused economy. However, the dates of this shift are not well understood in many regions including the Coromandel and the gardening strategies employed are subject to increasing research. However, this shift does seem to be a prelude to the population growth across the country.

INVESTIGATION OF T10/777

Section 18 Investigation T10/777 Opito

It is in this broad context of rich archaeological research that T10/777 fits. A Section 18 investigation (Gumbley and Hoffman 2007a) included 17 test trenches across the area of the proposed subdivision (Figure 16 and Figure 17).

The results established that the evidence of archaeological deposits and features across the project area was widespread (Table 2) but not continuous. The features identified were concentrated in the south-east trenches 1–3 with some additional firescoops and postholes in small numbers in other trenches.

A possible house floor in Trench 1 was associated with postholes, and nearby firescoops and storage pits in Trenches 2 and 3, including evidence of a door slot for one of the rua there.

Gumbley and Hoffman (2007a:22) observed that similar pits were identified at the Skipper's Ridge site (T10/165), and the presence of a small basalt adze in the process of re-working, suggested that this area may date to some point during the Archaic phase.

A midden in Trench 14 dated to the late 15th or early 16th centuries. The complexity of the midden and the size of the shellfish, suggested to Gumbley and Hoffman (2007a:25) that the area had been used during a period of low level of exploitation, relatively early in the Polynesian settlement process.

The relationship between the 'upper' Area 1 and the midden was not established, but despite the distance between them, it was thought that a direct relationship between the areas might be possible to establish.

The results from the investigation were therefore tantalising. The radiocarbon dating suggest that the site was later than the earliest phases of the Archaic sites at Sarah's Gully and Cross Creek and the possibility of the storage pits and settlement were characteristic of later settlement. Whether the site represented multiple phases of occupation, which seemed likely given the different clusters of features and potentially some of the earliest evidence of storage pits and gardening in the region, made the 2012 excavation of importance.

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Figure 16. Locations of identified archaeological sites and test pits (from Gumbley and Hoffman [2007a:3 Figure 1])

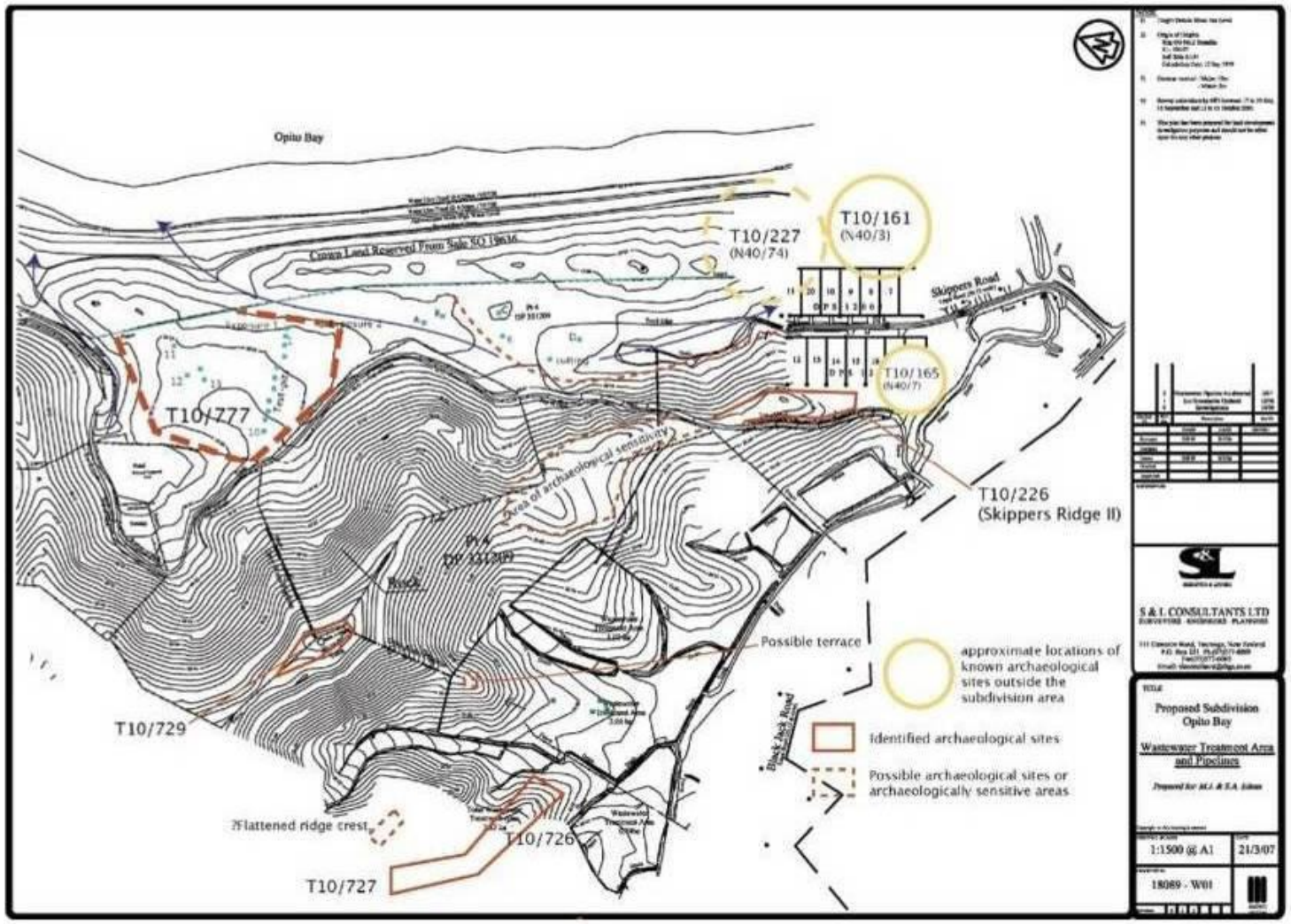

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Figure 17. Location of trenches excavated by Gumbley and Hoffman (2007a)

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Table 2. Features identified in trenches by Gumbley and Hoffman (2007a)

Feature Number	Trench	Feature Type	Type	Notes
1	16	Firescoop	Firescoop	
2	15	-	-	
3	14	Firescoop	Firescoop	
4	11	Firescoop	Firescoop	
5	11	Firescoop	Firescoop	
6	11	Firescoop	Firescoop	
7	14	Midden	Midden	
8	2	Scoop	Scoop	
9	2	Rua	Rua	
10	2	Modern	Modern pit	
11	3	Pit	Bin Pit	
12	3	Modern	Modern pit	
13	3	Rua	Rua	
14	1	Posthole	Posthole	
15	1	Posthole	Posthole	
16	1	Posthole	Posthole	
17	1	Floor	Floor	Possible house floor
18	2	Posthole	Posthole	
19	3	Scoop	Scoop	
20	3	Posthole	Posthole	At least 20cm diameter
21	3	Posthole	Posthole	
22	3	Pit	Pit	
23	3	Posthole	Posthole	Possible posthole
24	3	Posthole	Posthole	
25	3	Posthole	Posthole	
26	3	Door slot	Door slot	
27	5	Scoop	Scoop	
28	3	Posthole	Posthole	

RESEARCH STRATEGY AND METHODOLOGY

Research Strategy

The excavation was undertaken according to the research strategy and methodology outlined by Gumbley and Hoffman (2007b) as per NZHPT Authority Condition 6. The aims and methodology adopted are summarised below.

Research Aims

A particular focus of interest in the investigation related to the occupation of the area following soon after the earliest occupations at Cross Creek/Sarah's Gully, Skippers Ridge I and the Opito Beach midden sites.

The aims of the project included:

- Establishing the extent of the surviving archaeological remains of T10/777 within the subject property.
- Exposing the area of the structural layout of the site and determining relative chronologies between the features if possible.
- Determining the function and chronological relationship between the structural remains in the upper Area 1 and the nearby midden.
- Obtaining suitable samples, if possible, to date the upper ridge/structural remains.
- Collecting a large sample of midden for detailed analysis.
- Gaining additional information regarding the functional nature of occupation on the basis of structural remains and evidence of lifestyle revealed by associated artefacts and analysis of deposits.
- Retrieving possible information relating to the environmental context and agricultural practice associated with the site.
- Establishing the age of the deposits of the site.
- Integrating the information recovered from the investigation with the results of earlier investigations undertaken in the wider area around Opito Bay.
- Adding to existing knowledge of the material remains/artefact assemblages of recorded settlement sites in the wider area.

Although wide-ranging in scope, there was great potential for the excavation of T10/777 to contribute significantly to the archaeology of the Coromandel.

Continued on next page

Methodology

After an initial blessing (Figure 18), trenching was undertaken with a digger (Figure 19). Trenches 2–3m wide were dug by scraping off the topsoil and then layers of sand down until either the archaeological features were exposed or the trench was of sufficient depth to suggest that no archaeological features were likely. Safety considerations limited the final depth possible but for the most part the archaeological features were within the top 1m of the original surface.

The trenches excavated in 2012 (Figure 17, Figure 20, Figure 21) were designed to follow up on the previous work by Gumbley and Hoffman (2007a).

Initial trenching around Area 1 (Figure 21) focused on determining whether there were other features associated with the midden uncovered at the end of the original Trench 14. The midden itself was excavated by hand but other trenches, particularly to the west next to the midden, quickly established the presence of more features in the dunes.

Similarly other trenches were focused around the rua uncovered in Area 2 (Figure 21) and a large number of features meant that this area was stripped widely to determine the likely extent of the cluster.

Additional trenching between Areas 1 and 2 was also carried out to establish whether the two clusters of features represented a continual landscape or discrete occupation zones.

Other long trenches were dug to a depth of 1–2m across the rest of the dune area to establish whether any other concentrations of features were present. Area 3 was found (Figure 21) and excavated by hand but proved to be a relatively small set of firescoops. Geomorphological recording of some of the large trenches was also undertaken.

Features found were recorded by Ben Thorne with a robotic theodolite. The data was coded and added into the GIS.

Ben Thorne also undertook aerial photography of the excavations using a remote controlled octocopter (Figure 22) with a gimbal-mounted camera that was also controlled remotely. This allowed both still images and some video capture of the excavation.

All the trenches were recorded and samples of archaeological interest taken for later analysis.

Trenches shown in Figure 20 and Figure 21 are labelled with a prefix relating to the season they were excavated. However, subsequent discussion and plans relate only to the trench numbers as described in Season 2 unless otherwise specified.

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Figure 18. Joe Davis giving the dawn blessing prior to excavation (Courtesy Sue Edens)

Figure 19. Murray Edens driving the digger

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Figure 20. Location of trenches dug in Season 1 (Gumbley and Hoffman 2007a) and Season 2

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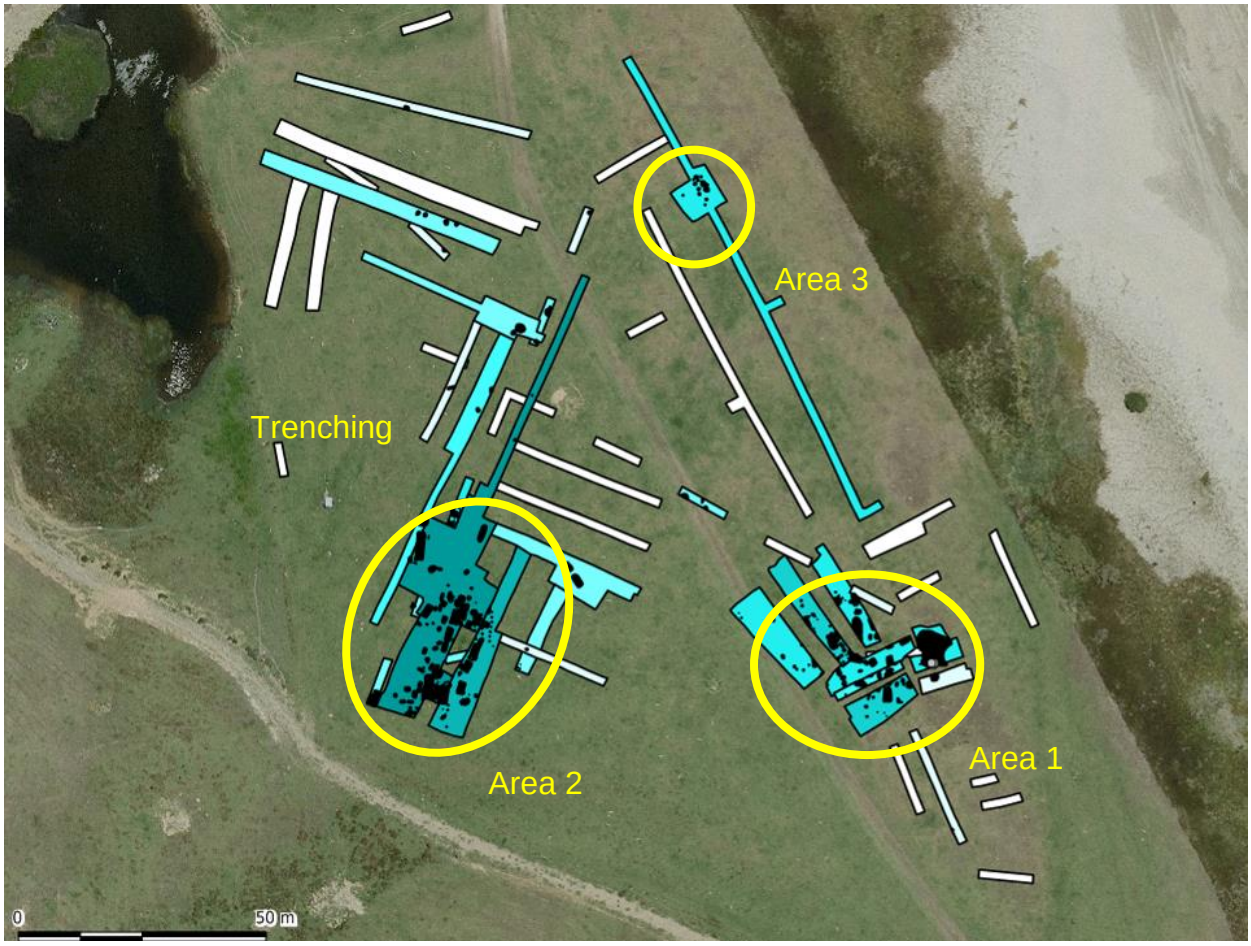

Figure 21. Location of trenches excavated by Gumbley and Hoffman (2007a) and excavations in November 2012. Darker shading indicates greater density of features

Figure 22. Flying the octocopter used for aerial site photography

ARCHAEOLOGICAL TEAM

Archaeology Team

The consultant team from Clough & Associates on site was:

Name	Role	Responsibility
Simon Bickler	Director	Direct project, excavation
Rod Clough	Project Manager	Overall management of project
Barry Baquié	Archaeologist	Excavation and recording (Week 2)
Charlotte Judge	Archaeologist	Excavation and recording
Joss Piper-Jarratt	Archaeologist	Excavation and recording (Week 2)
Kim Tatton	Archaeologist	Excavation and recording (Week 1)
Ben Thorne	Archaeologist	Excavation and Surveying

Students

Student volunteers from the University of Auckland (Anthropology and Geology) were present at various times during the project (Figure 23) and contributed significantly to the fieldwork (Figure 24) as well as sample processing, analysis and many conversations about the work (Figure 25).

The students were:

- Laura Dawson
- Krystle Davis
- Adam Hand
- Shannon Hawkins
- Simon Howard
- Ben Jones
- Bernie Larsen
- Sophie Miller
- Joe Mills.

Laura Dawson assisted in the organisation of the material following the excavation. Charcoal analysis was carried out by Adam Hand as part of his MA thesis work at the University of Auckland. Stone tool analysis was undertaken by Joe Mills. Midden analysis was done by Jennifer Low, with the fishbone component analysed by Adina Brown, both of Clough & Associates.

Bernie Larsen, Ben Jones and Laura Dawson assisted with the organisation of the team.

Final section drawings and 3D model are by Thomas MacDiarmid.

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ARCHAEOLOGICAL TEAM, CONTINUED

Figure 23. Archaeological team at Opito Bay (absent: Kim Tatton)

ARCHAEOLOGICAL TEAM, CONTINUED

Figure 24. Recording of sites during close-down

Figure 25. Theoretical discussion at the dig house

Part 2: Area 1 Excavations

INTRODUCTION

Area 1

A series of trenches were dug on the old dune associated with the midden identified by Gumbley and Hoffman (2007a) in their Trench 14 (Figure 26). The midden had provided the samples for the dates that Gumbley and Hoffman (2007a) reported, and provided the opportunity for additional information regarding the immediate 'post-Archaic' occupation of the Bay.

The midden was located just below the front of the main dune ridge that rises up from the foredune behind the beach (Figure 26) to around 9.5–10m above sea level (Figure 2). The front of the dune here is relatively unconsolidated for over a metre before hitting a denser yellow consolidated dune surface.

Behind the front, the dune has a relatively flat topography and much thinner layer of unconsolidated dune. This area suggested the possibility of prehistoric storage features that Gumbley and Hoffman (2007a) had identified during the test excavations. Associated with those storage features, might be evidence of housing, gardening and perhaps stone working floors.

Trenches (1–5) were initially dug on the slopes to the south of the midden as well as in and around the midden (Trenches 6–7). The midden was the primary focus of the initial excavations and a team continued there throughout the excavation.

Trenches 8 and 9 were excavated to the west of the midden and as features were discovered, additional trenches (10–12) were dug to the north to establish the extent of archaeology in Area 1. A further trench, 36, was dug on the last day of the excavation to provide some information linking the features that had been exposed in the earlier trenches.

Features

Features uncovered in Area 1 are described in Appendix 1 and summarised by type in Table 3. Figure 27 shows the main concentration of features including the large number of rectangular pits of various sizes, a small number of relatively small circular 'rua' pits, and a few relatively small firescoops.

Features were generally either fully sampled or half-sectioned, and their extents surveyed in. Samples were collected for later analysis, and the area was cleaned and photographed from the air when possible. The results of the excavations are described in more detail below.

Continued on next page

Table 3. Features by Type found in Area 1

Feature Type	Total
Firescoop (with charcoal rich fill)	7
Midden (including dog skeleton)	5
Pit	59
Posthole	25
Rua	4
Scoop (no major charcoal in fill)	25
Stakehole	1
Working Area	2

Figure 26. Area 1 trenches from the air

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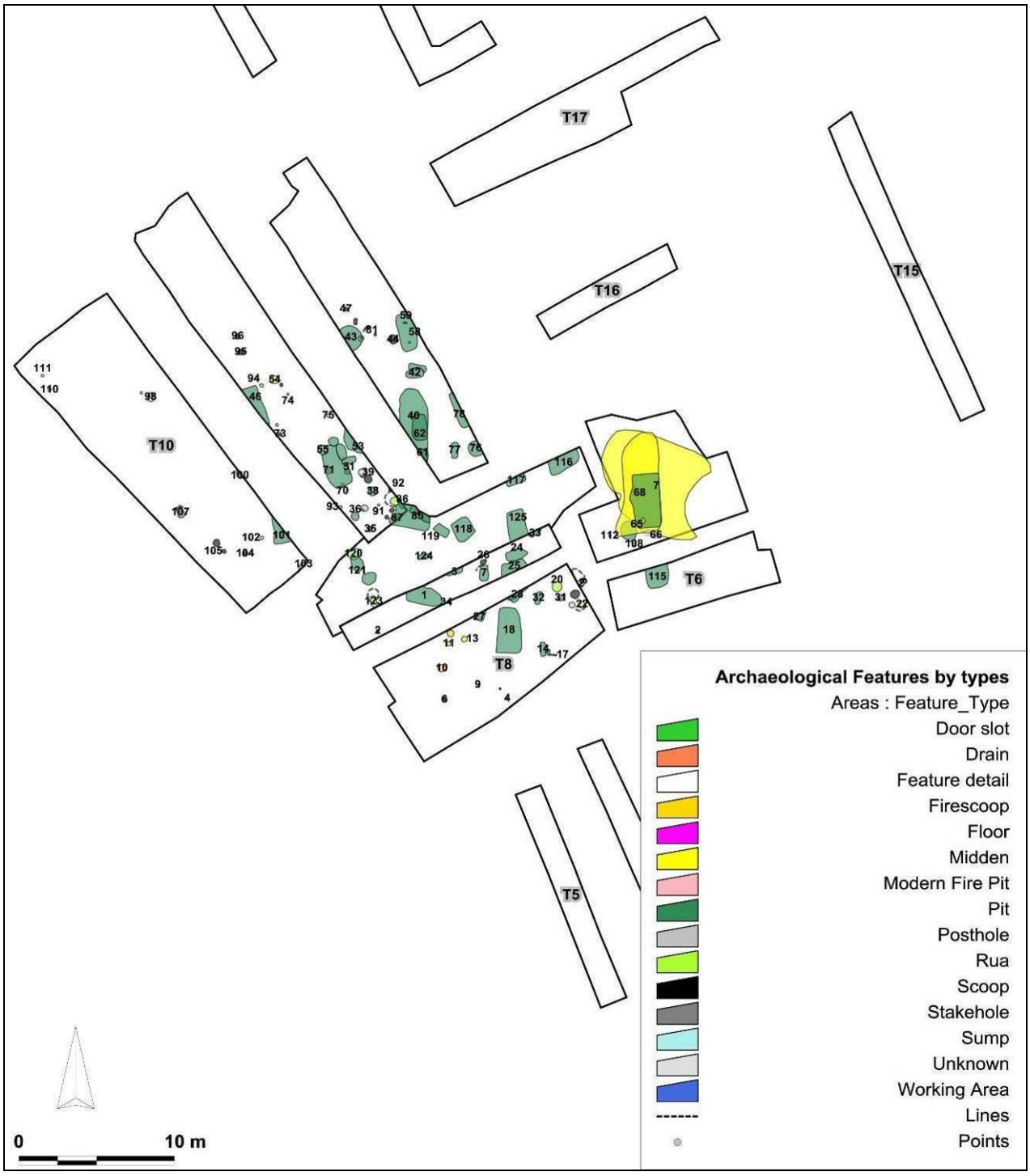

Figure 27. Features by type found in Area 1

TRENCHES 1–5

Trenches 1–5 Initial trenching was on the lower slopes below the small rise where the midden identified by Gumbley and Hoffman (2007a) was located. Five trenches, three running roughly east to west and two others running up slope in a NNW-SSE direction were dug (Figure 28). Only one small firescoop, Feature 8 (Figure 29, Figure 30), was identified in any of the trenches. Sections for Trenches 4 and 5 are shown in Figure 31 and Figure 32.

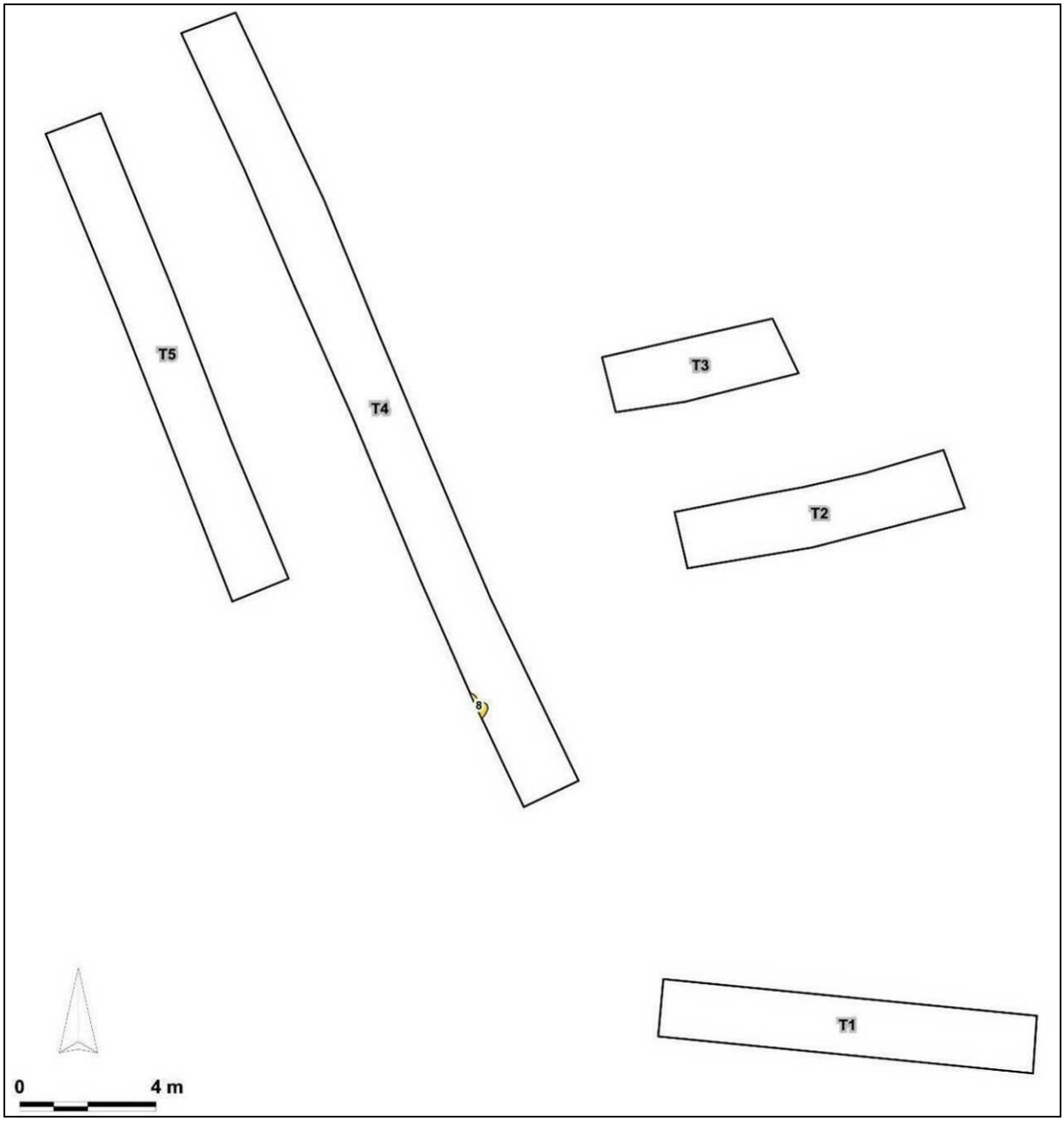

Figure 28. Plan of Trenches 1-5 showing Feature 8 in Trench 4

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TRENCHES 1–5, CONTINUED

Figure 29. View looking SSE down Trench 4

Figure 30. Firescoop (F8) in Trench 4

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Figure 31. Trench 4 south-west section

Figure 32. Trench 5 south-west section

TRENCHES 6 AND 7

Trench 6

Trenches 6 and 7 were dug across the edge of the flat dune area to the west down towards the swale behind the foredune (Figure 33). Both trenches were designed to define the extent of the midden identified in 2007. The dune sand here is relatively loose in the top 50cm, greyish in colour with a variety of windblown material such as charcoal and shell fragments.

Only one feature, a medium sized rectangular pit F115, was identified (Figure 34) in this trench. It was about 1m wide and extended into the baulk toward Trench 7 but was not visible on the southern baulk of Trench 7. This suggested it was probably around 1.5–2m long.

Trench 7 Midden

The area of midden was exposed across the edge of the dune and revealed a layer of shell with other mixed items across an area of around 6m x 8m. This was recorded as F7 (Figure 33).

F7 contained a reasonable amount of shell, but on cleaning the material was much patchier than expected. Much of it was mixed with the topsoil and dune sand (Figure 35). Cleaning it down revealed a more coherent surface (F67) with small scatters of Tahanga flakes (F68 and F84) in a couple of areas (Figure 36).

A dog skeleton (F66, Figure 37) was also identified towards the south of the area in mostly clean sand. The skeleton was nearly complete and this indicated a later burial in this area, rather than being specifically related to the midden at the time it was in use.

A charcoal rich pit (F65) was found under the midden layer F67 (Figure 38 and Figure 39). This was met with some interest as it seemed to lie below the midden where Gumbley and Hoffman (2007a) had retrieved their relatively early radiocarbon date. The pit was dense with identifiably large charcoal fragments mixed in a stained sand matrix. In the centre of the base of the pit, a cluster of riverine cobbles were found (Figure 35; Figure 39: bottom). Bulk samples of the fill were taken for later analysis and dating (see below). The density of the pit suggested that this feature had been used as a hangi.

The midden (F67) was also sampled for later analysis and the results described in detail below. Upon excavation, another ~3.5m long and ~1.5m wide rectangular pit was identified under the midden and therefore predated the midden. This pit may have been damaged by F65 and therefore predated that as well. No datable sample was obtained here.

Overall, the excavation of the Trench 7 provided a good collection of datable samples from an intriguing sequence (Figure 40) of rectangular pits under an area of midden, previously dated to the early 15th century AD.

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TRENCHES 6 AND 7, CONTINUED

Figure 33. Plan of Features in Trenches 6 and 7

Key: pit: green; midden: yellow; F66 a dog skeleton; F84: flake scatter

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TRENCHES 6 AND 7, CONTINUED

Figure 34. Cross section through Pit F115 in Trench 6 (looking north)

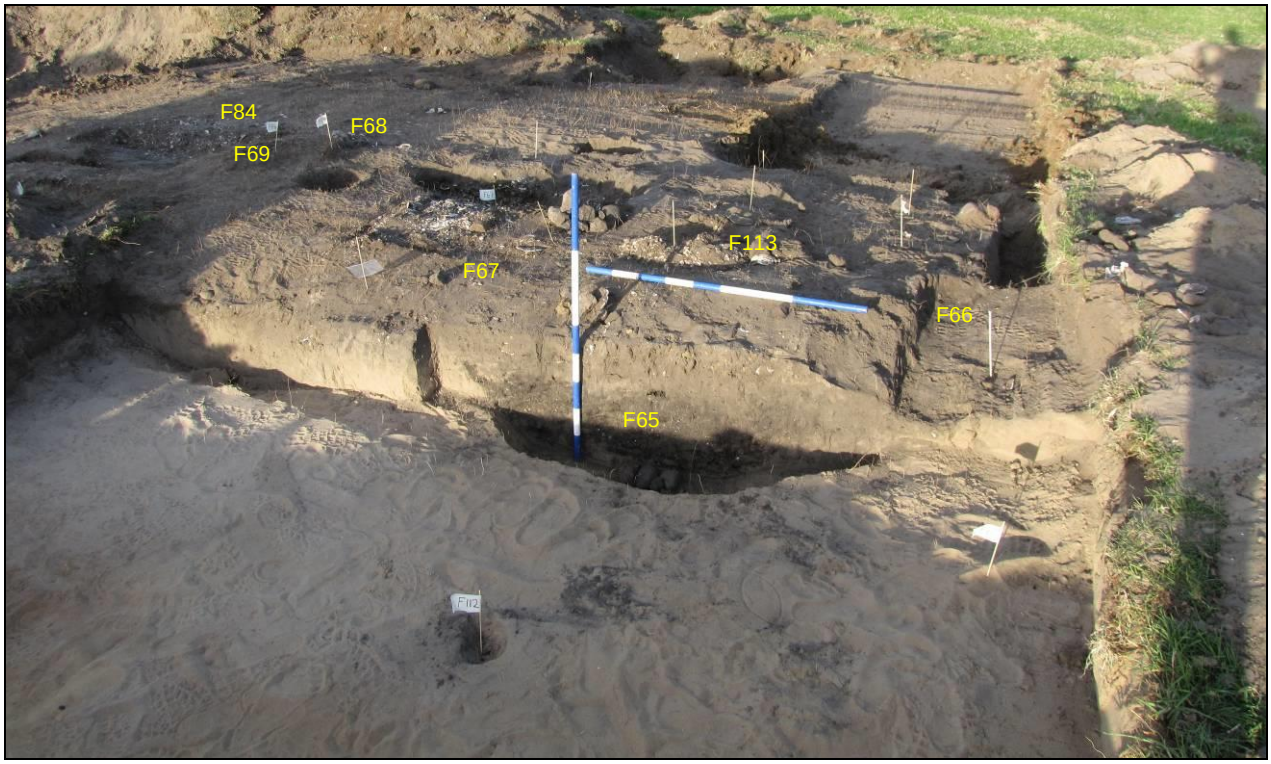

Figure 35. View of Trench 7 at end of Week 1

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TRENCHES 6 AND 7, CONTINUED

Figure 36. Scatters of basalt flakes in midden (F68 and F84)

Figure 37. Partially excavated dog skeleton (F66) in upper layer of the midden

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Figure 38. Midden area towards end of excavation of Trench 7

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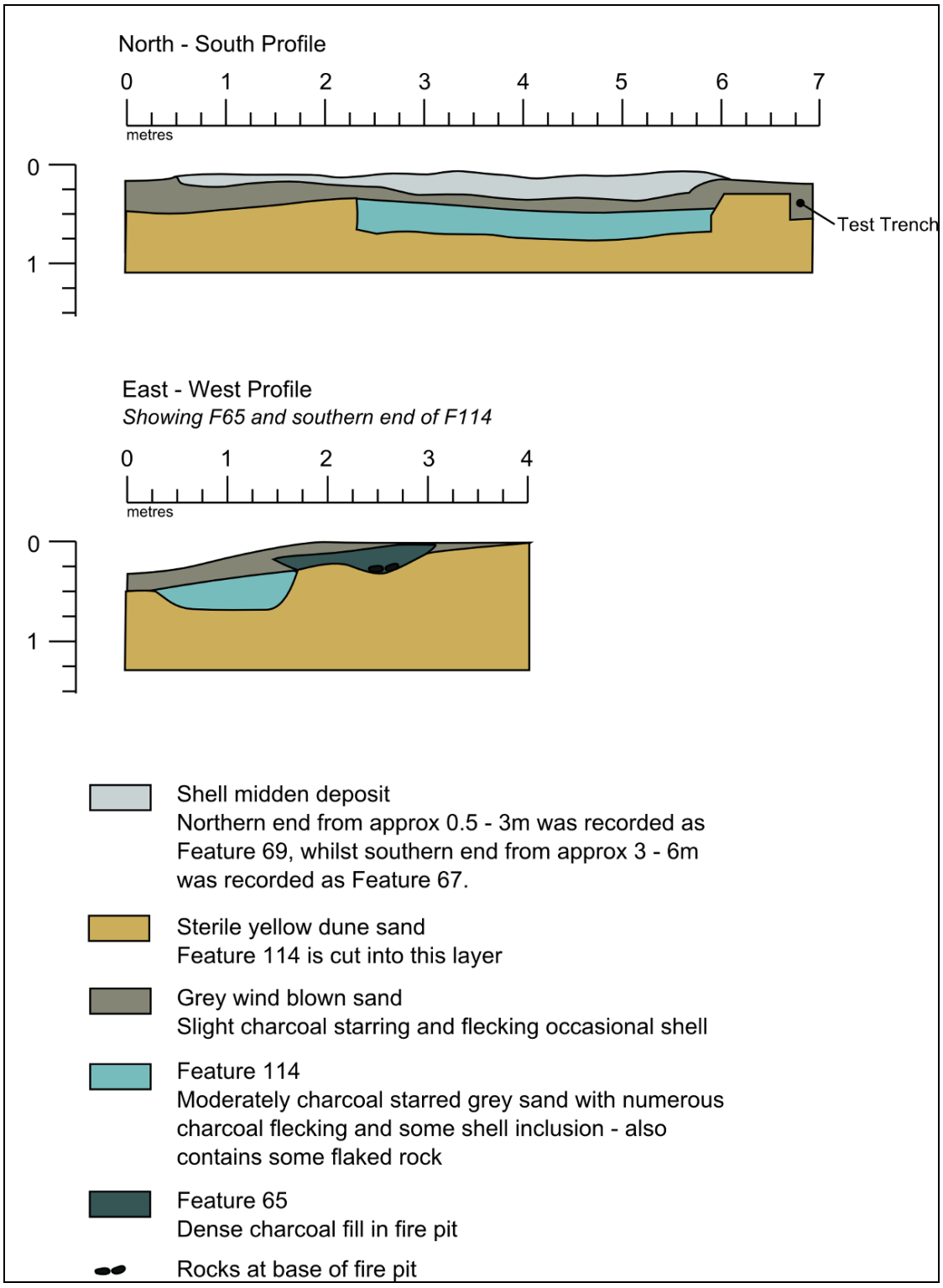

Figure 39. Trench 7 Section drawings

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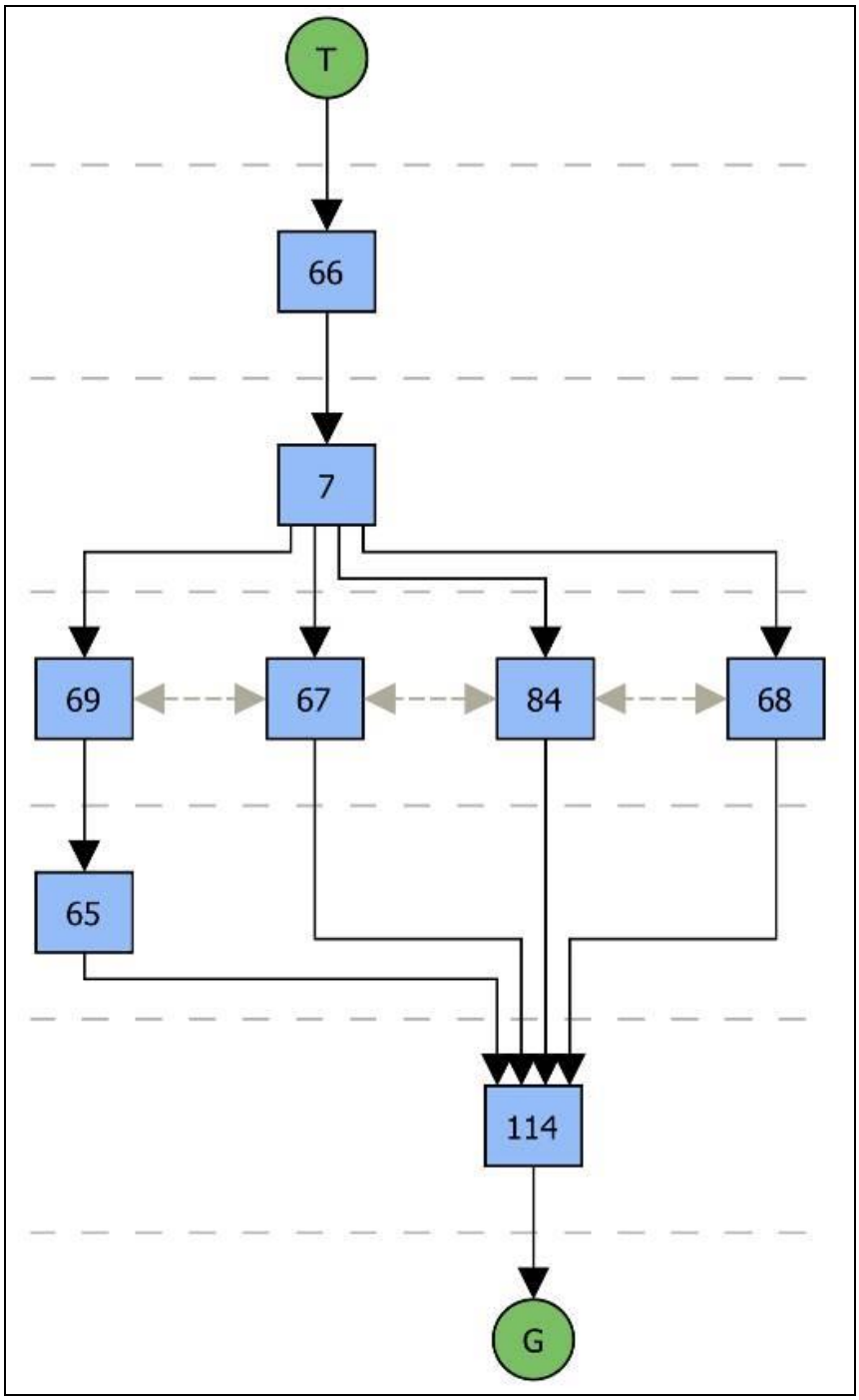

Figure 40. Harris Matrix showing the stratigraphic relations between the features in Trench 7

TRENCHES 8–12 AND 36

Trenches 8–12 and 36

While the midden excavation was undertaken, trenches were excavated to the west to determine the nature and extent of the occupation associated with the cooking area. A block around Gumbley and Hoffman's original Trench 14 was left unexcavated, as it was thought there would be few features there and the unexcavated portions would act as stratigraphic control between Trench 7, Trench 9 and the north–south trenches 10–12 to the north. That block was excavated on the final day as Trench 36, to provide some additional information regarding features found in Trenches 11 and 12, when it became apparent that unrecorded archaeological features might be found here.

A number of pits of various sizes and shapes were discovered along with a few other small firescoops and occasional postholes (Figure 41).

Trenches 8 and 9

Trenches 8 and 9 revealed a small number of mostly shallow pits and scoops (Figure 42–Figure 44).

The firescoops contained varying degrees of charcoal but almost no shell or other materials. A 3.6m x 1.7m, 25cm shallow pit, F18, found in the centre of the Trench 8, may have been used as a small shelter rather than for storage, although no indications of a superstructure were identified in or around the pit. Small depressions near to F18 in both Trenches 8 and 9 were most likely used for storing food.

Section drawings for the trenches (Figure 45 and Figure 46) show the typical profile of this part of the site, with the features just below the topsoil and dug into the top of the old dune surface. Patches of reddish, iron stained sand occurred across this part of the site, giving the excavated area an orange colour distinct from greyish colours seen in the trenches to the north.

Trench 36

As mentioned earlier, Trench 36 was dug to provide additional information regarding the features uncovered in Trenches 10–12 (discussed below) and to determine whether other features might be present north of Trench 9.

At the western end a row of small circular pits and rua were identified (F120-123, Figure 47). The rua were characterised by small entrances leading to a small bell-shaped cavity, while the pits were simple cavities dug into the sand.

A fishhook was discovered in the fill of F122 (Figure 48), a stone netsinker (see stone tool section below) found in F120, and a possible pumice float in F123. Charcoal flecking and small amounts of shell suggested that the fill was all wind-blown and it is possible that the artefacts may originally have come from the midden area.

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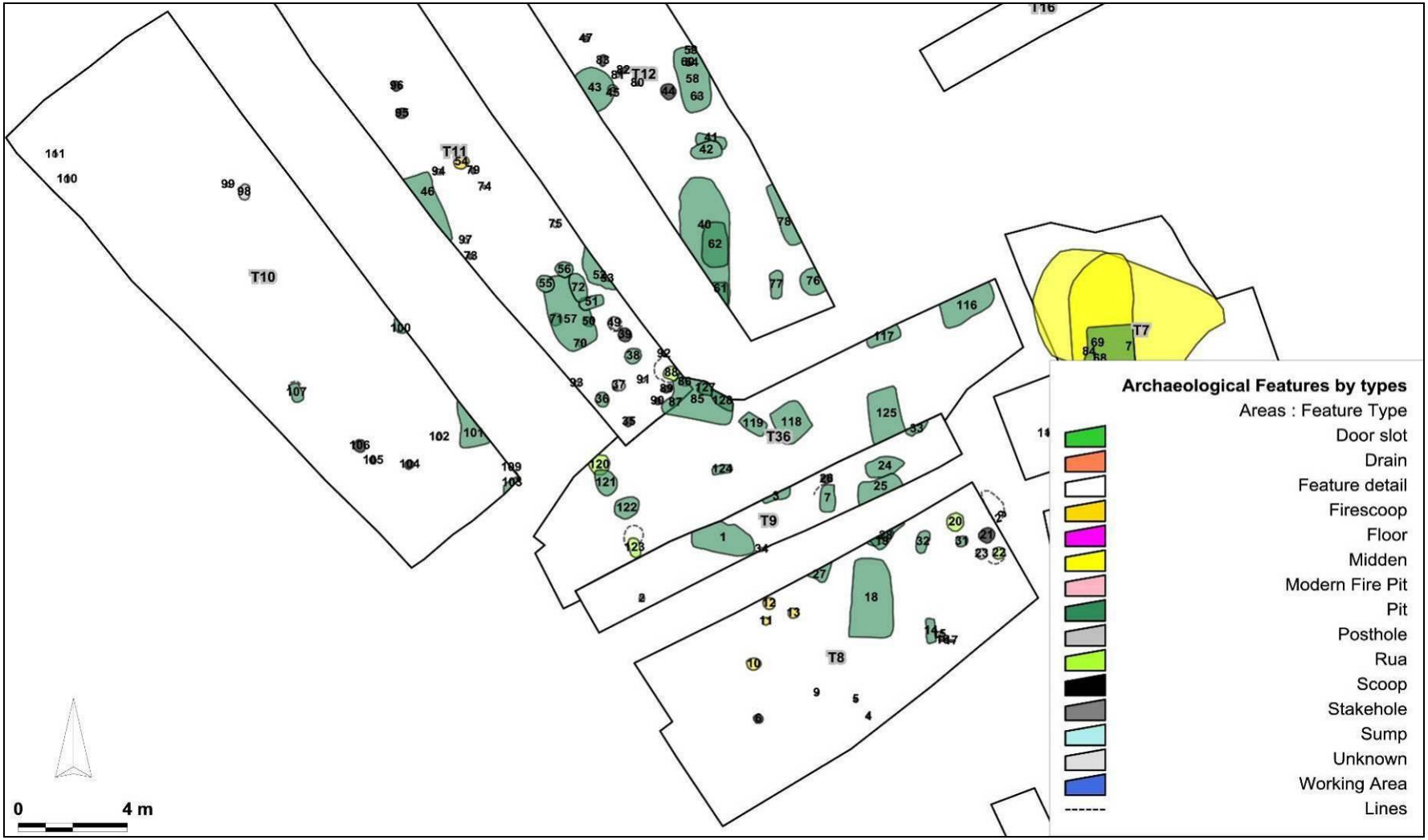

Figure 41. Plan of features in Trenches 8-12 and 36

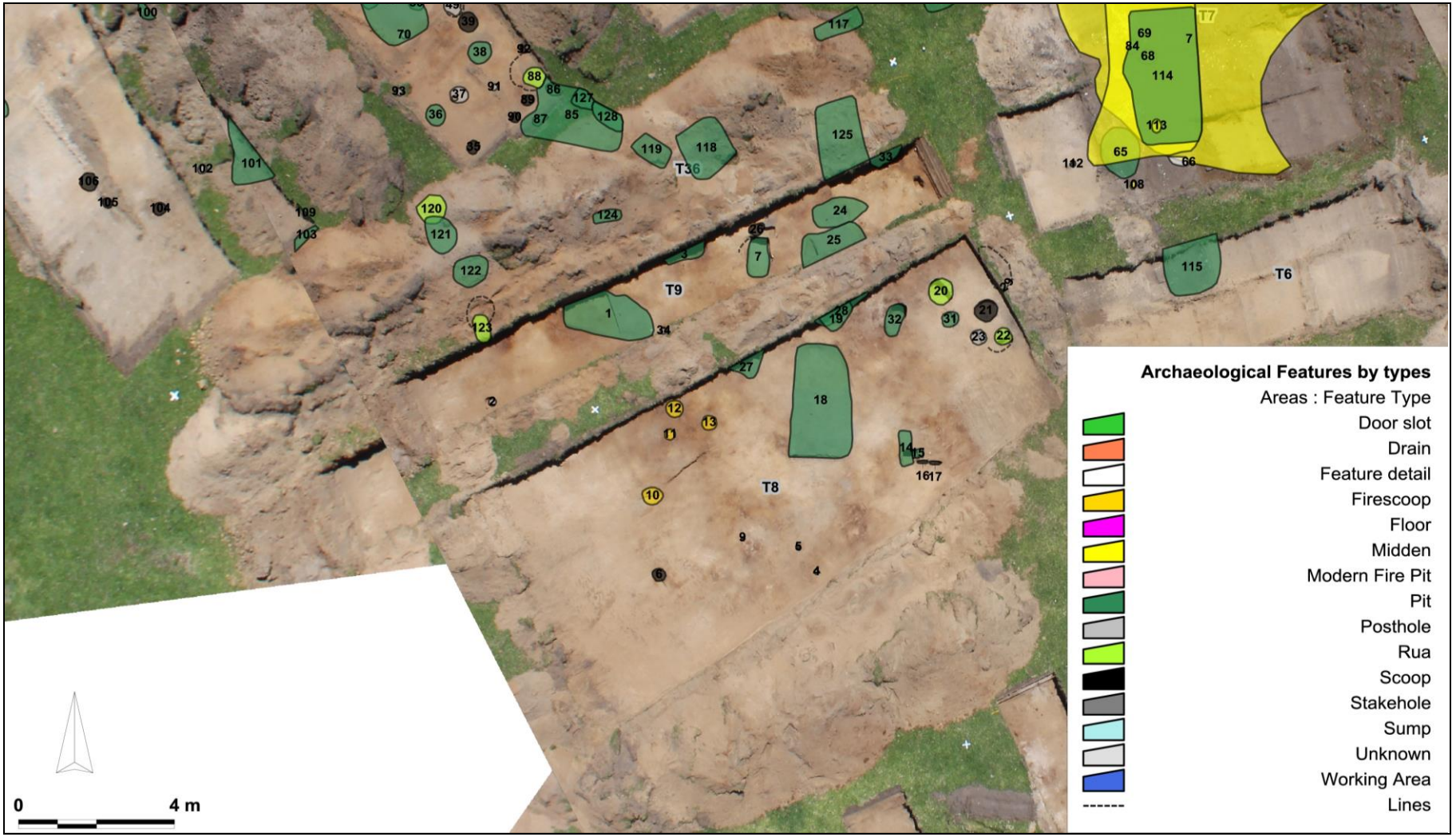

Figure 42. Features in Trenches 8-9

Figure 43. View across Trench 8 looking north

Figure 44. View looking NE down Trench 9 during the recording of features

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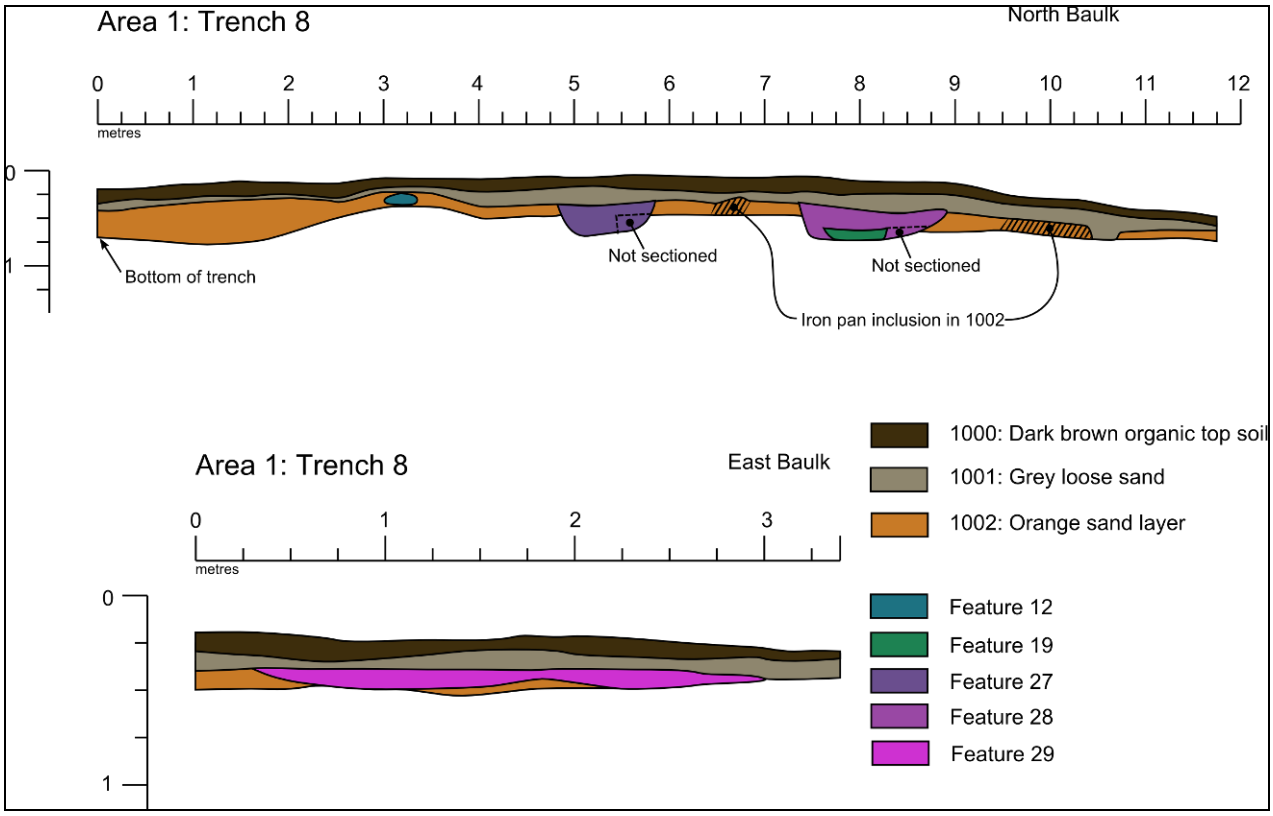

Figure 45. Trench 8 section drawings

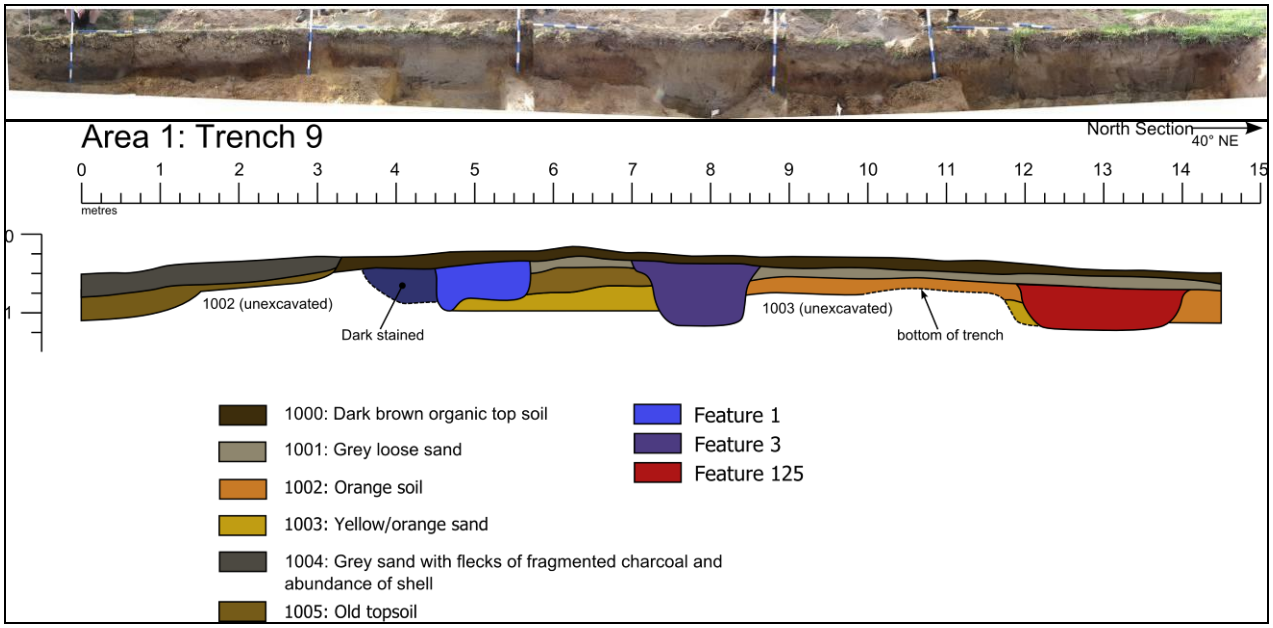

Figure 46. NW section Trench 9

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Figure 47. Cluster of features in Trench 36

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Figure 48. Ben Jones finding the fishhook from Feature F122

Trench 36 (continued)

Trench 26 also revealed a number of large deep pits in section including F116 and F118 (Figure 49–Figure 50). F116 in particular, close to the midden area excavated in Trench 7 was 2m wide and 1.2m deep. The upper fill was dark grey sand with charcoal and shell inclusions, while the lower fill was brown/grey sand with only occasional charcoal inclusions.

The size of these large pits stood out in contrast to the majority of other features in Area 1 which were relatively shallow. In the absence of good datable material from the features, it is difficult to be definitive about the chronological association of these large features with the rest of the site and the midden in particular. Interestingly, the impression at the time of excavation was that these features might be amongst the earliest features in Area 1 given their proximity to the midden, but this remains speculative.

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Figure 49. Section looking south through Trench 36 showing Features F118 and F125

Figure 50. North section (east end) of Trench 36

Figure 51. North section of Feature 118

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Trenches 10– 12

Trenches 10–12 defined the northern extent of the Area 1 occupation. A large number of pits of various sizes, small firescoops and a few postholes around characterised the occupation (Figure 52). This became less frequent to the north before mostly disappearing at the northern ends of the trenches.

Trenches 10–12 features were similar to those found in Trenches 8 and 9. Like Trenches 8 and 9, the majority of the features were relatively shallow (see section drawings Figure 53–Figure 55). The firescoops contained small concentrations of charcoal, and one small scoop (F109) identified in section contained a small concentration of tuatua (Figure 56). Given the paucity of datable material from the area, this was identified for radiocarbon dating.

A number of shallow pit features were found at the southern end of Trench 11, and with nearby possible postholes, indicated a possible living area associated with F57 (Figure 57). Another pit and rua complex associated with F85 was identified at the SE corner of Trench 11 (Figure 58), and was further defined by testpits in Trench 36 (Figure 59).

One very large pit (F40) was identified in Trench 12, at least 5m long and 2m wide, and at least 75cm deep (Figure 60). Two other pit features were found in its upper layers (F61 and F62) during excavations (Figure 61). F62 was smaller than F40 but was 1.2m deep. The presence of the large pits here fits with those found in Trench 36 nearby, and the reuse of the area at a later date.

Despite the number of features identified in the excavation of these trenches, the number of artefacts recovered was small and very little in the way of shell midden was identified. Shell and other small obsidian and stone flakes appeared to be intermixed in the fills and this suggested they were wind blown after the area was abandoned.

Intercutting features did occur, suggesting multiple occupations in Area 1 although the intensity was probably never high.

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TRENCHES 8–12 AND 36, CONTINUED

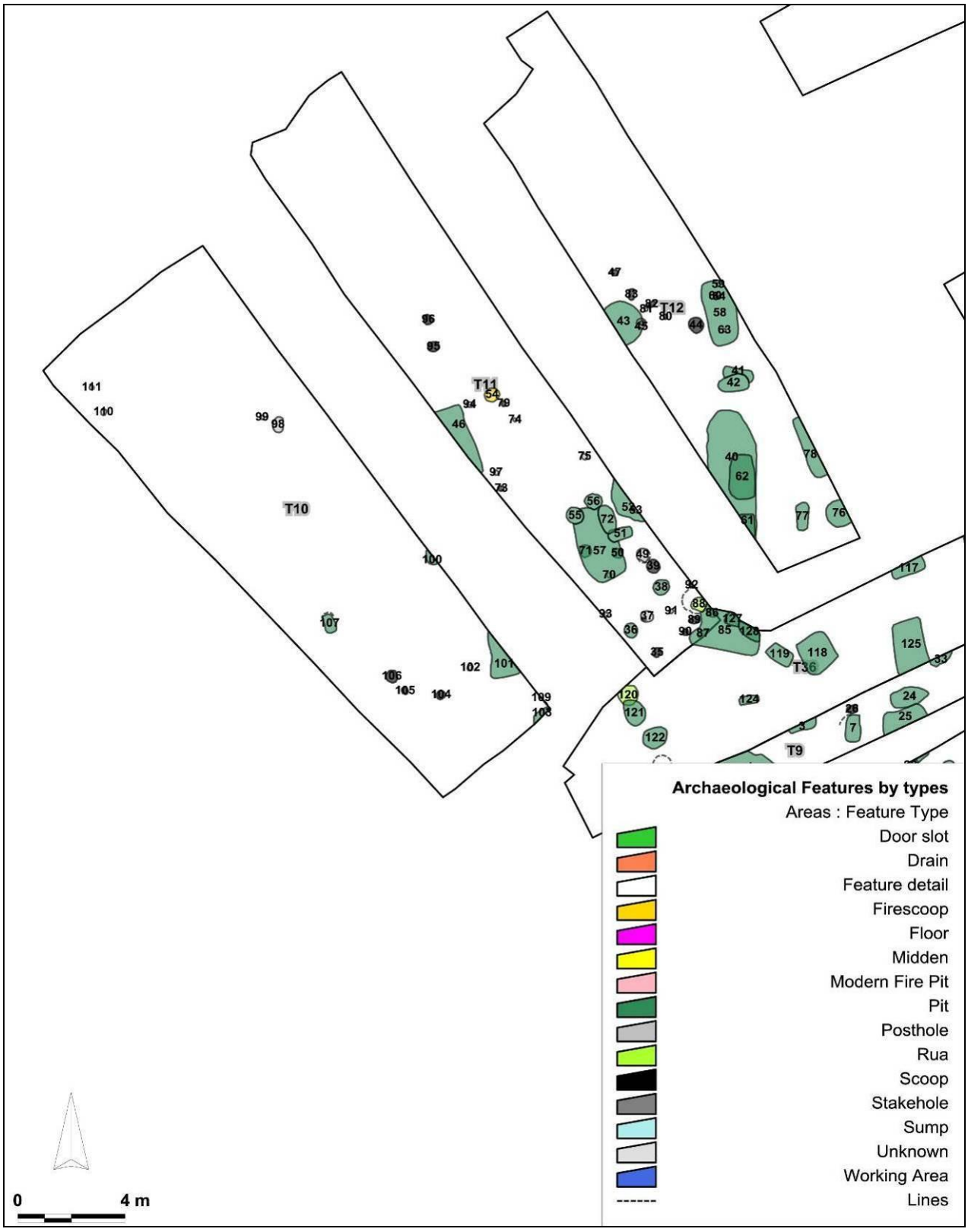

Figure 52. Features found in Trenches 10–12

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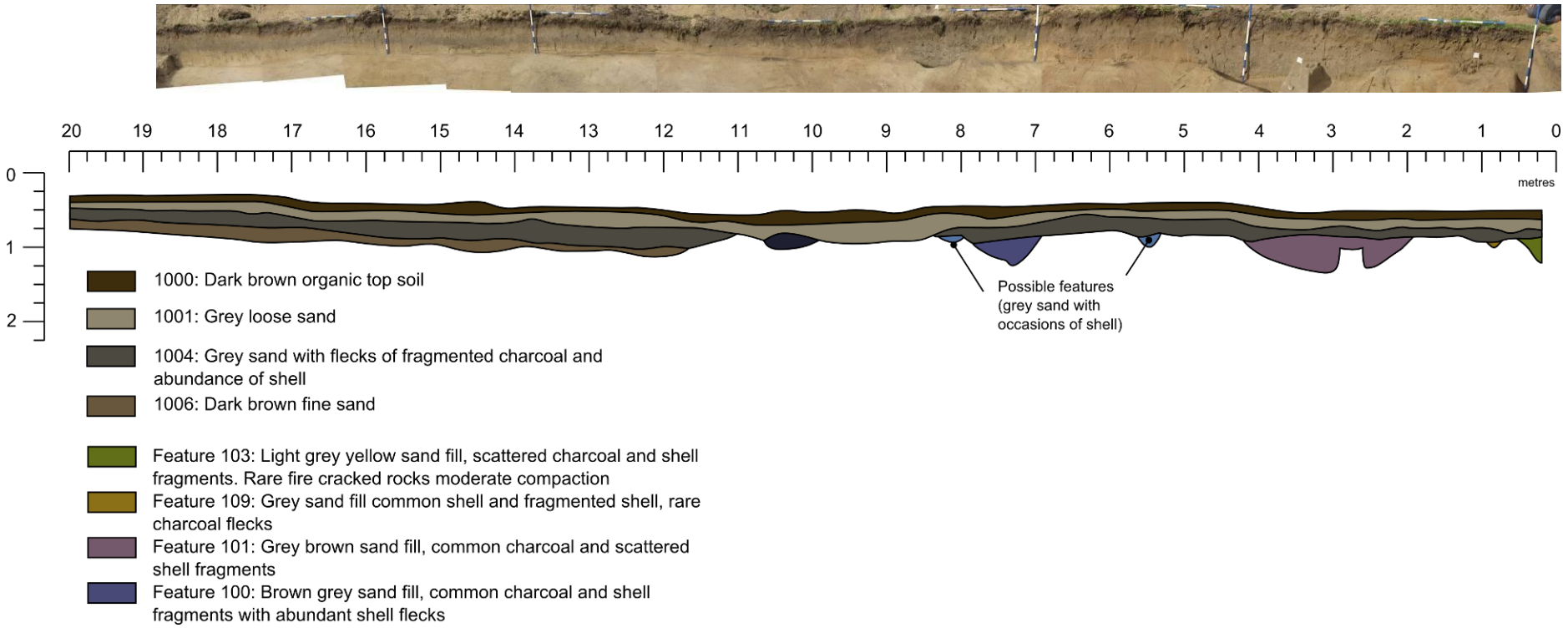

Figure 53. Trench 10 north-east section

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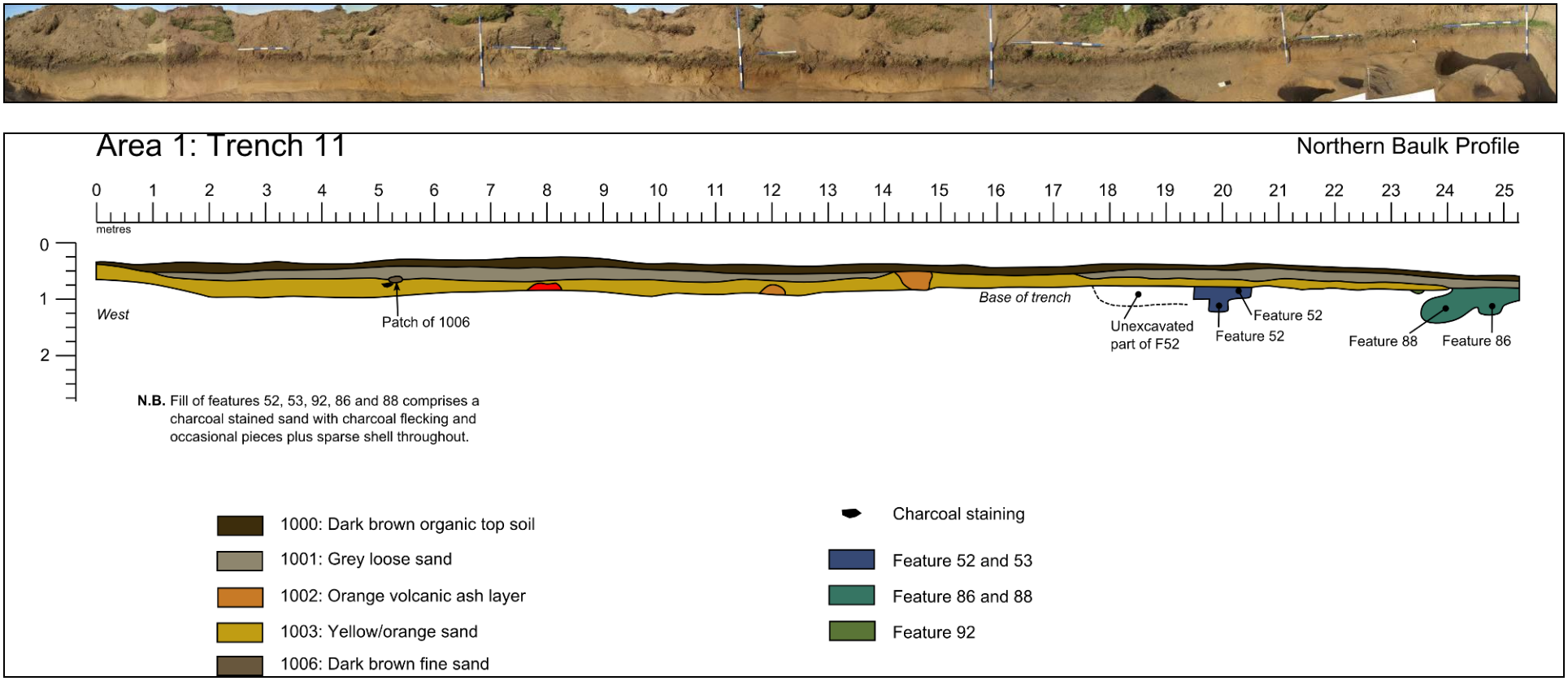

Figure 54. North-east section of Trench 11

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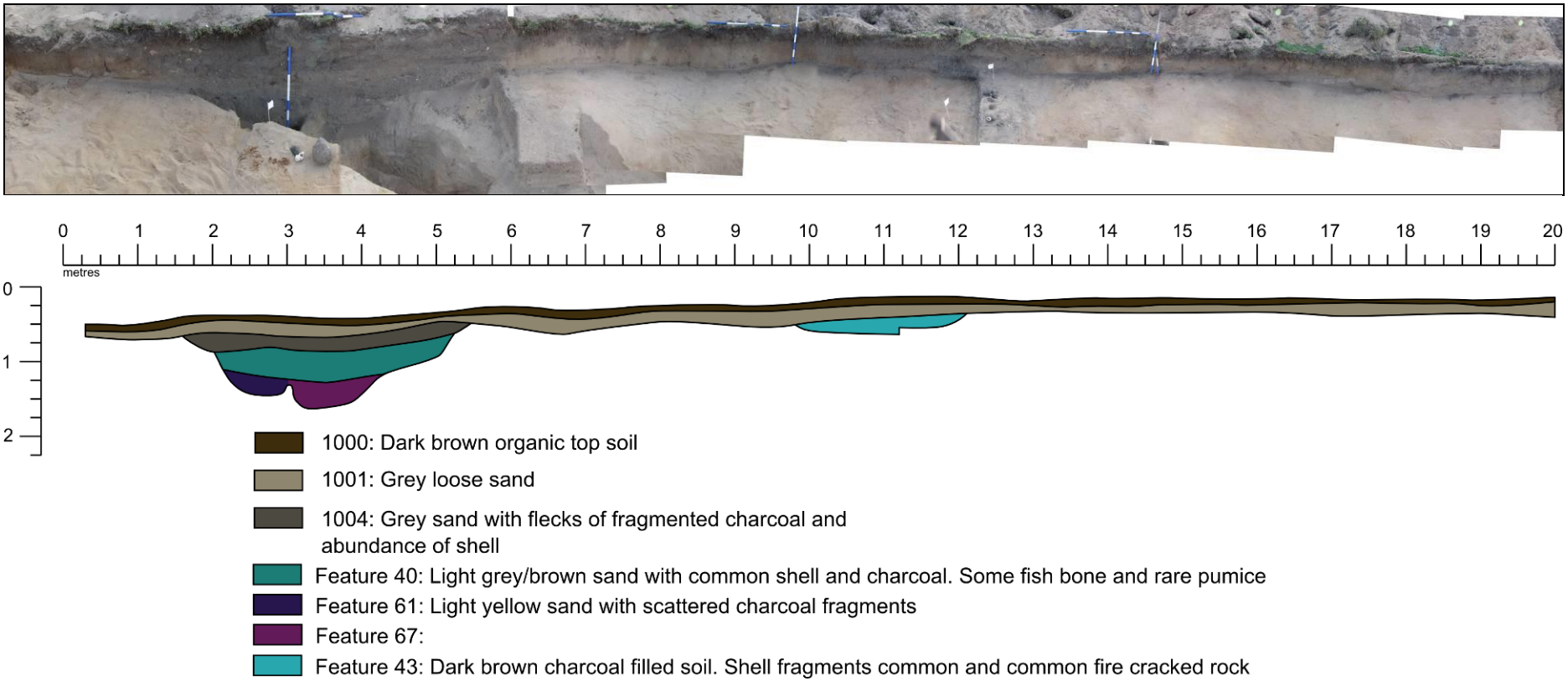

Figure 55. South-west section of Trench 12

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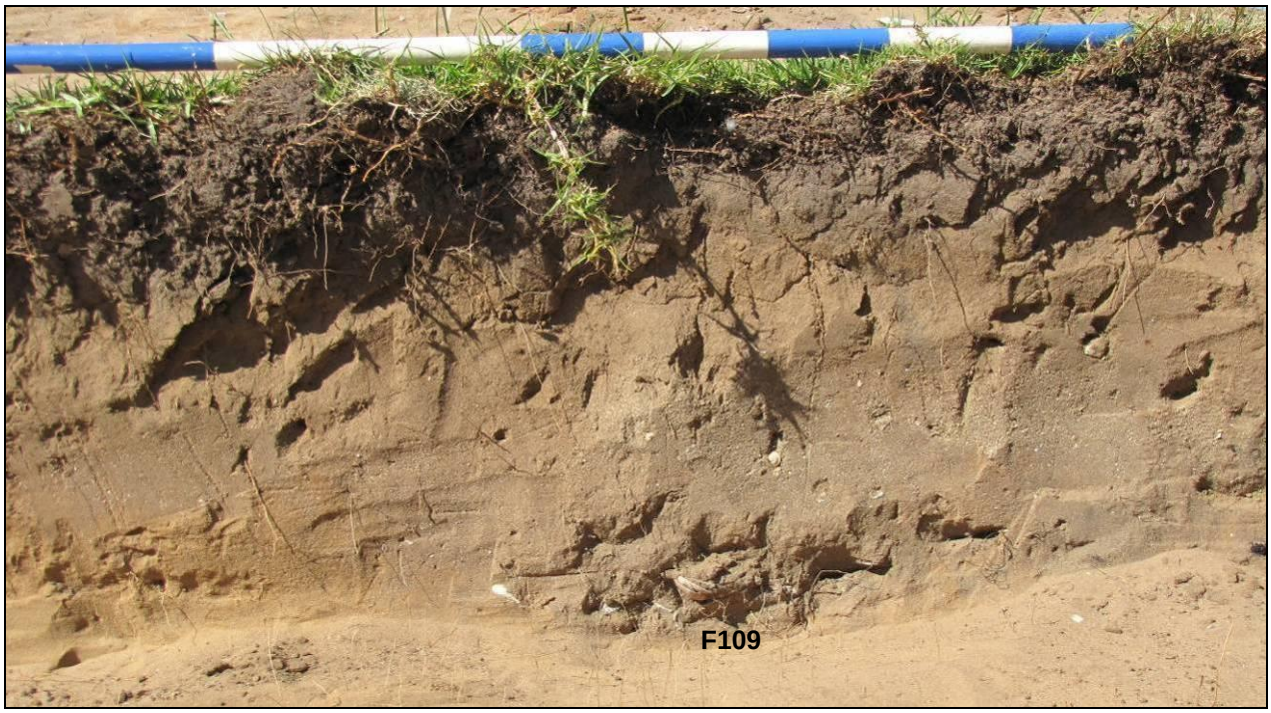

Figure 56. East section of southern end of Trench 10 with F109 visible in section

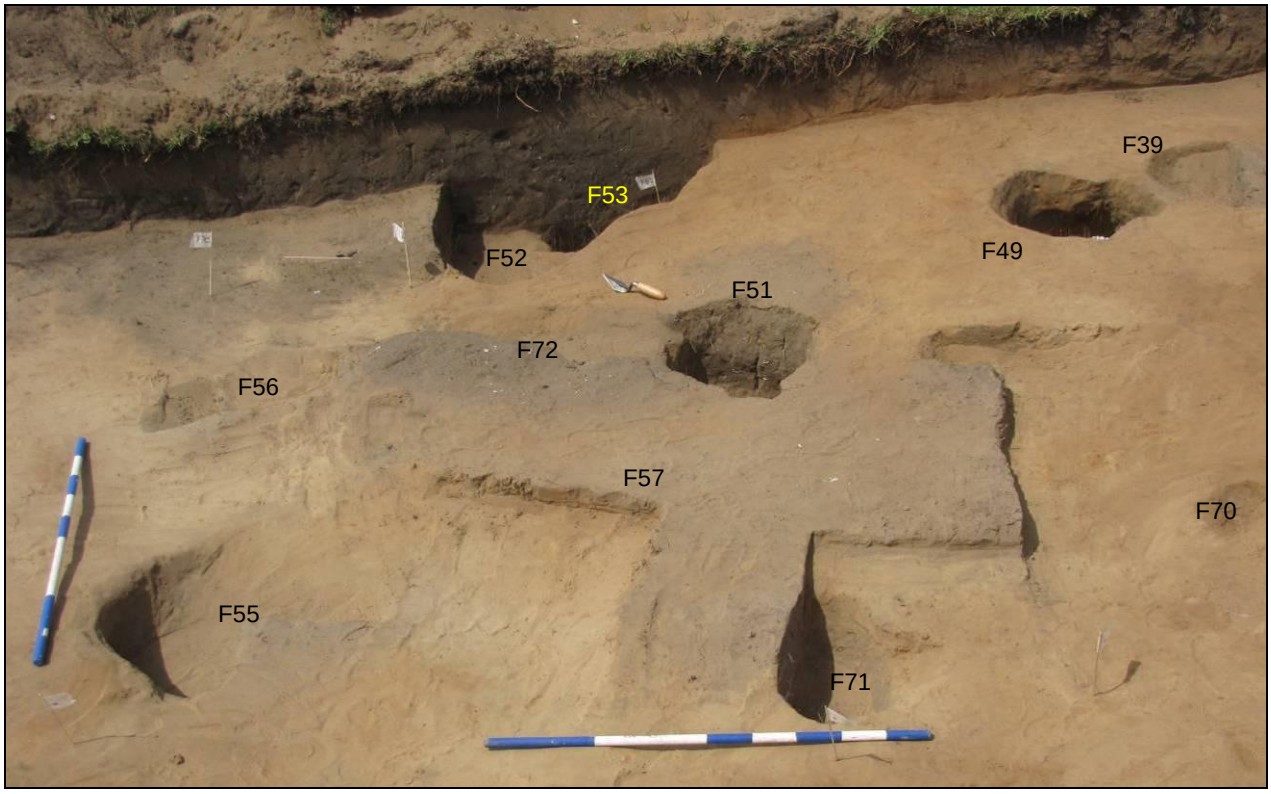

Figure 57. Feature 57 and other nearby features

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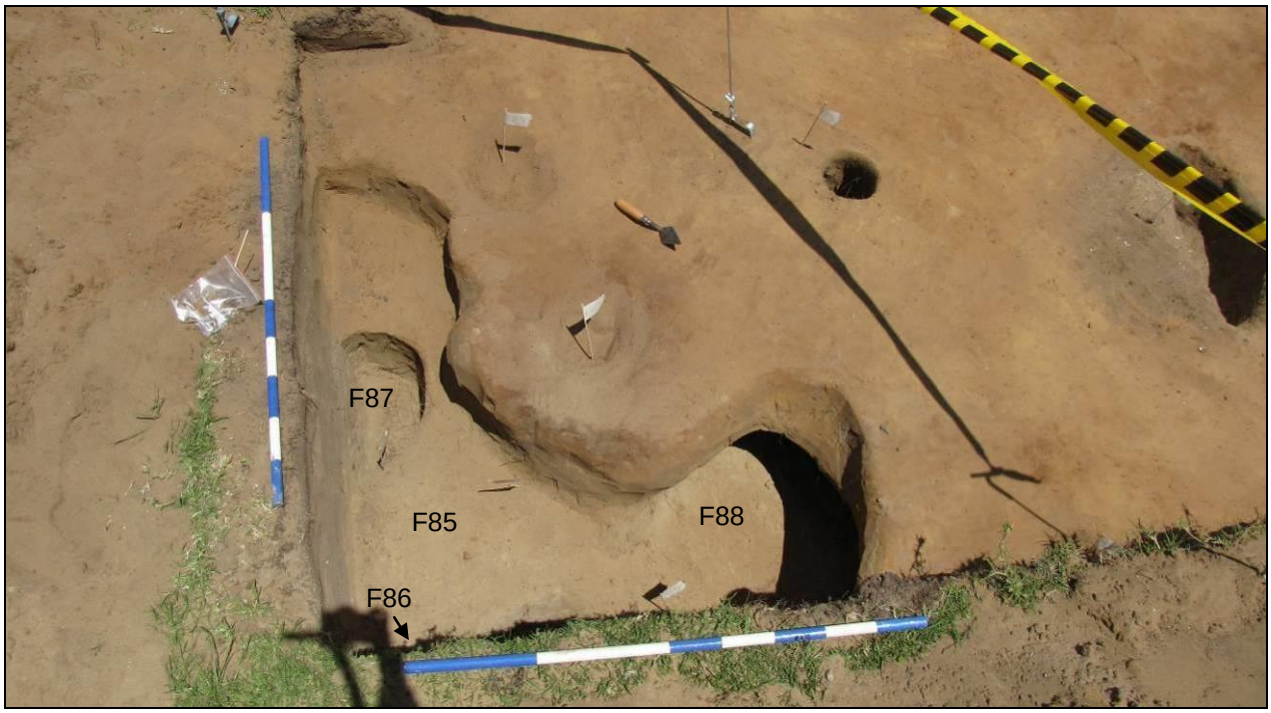

Figure 58. Initial view of F85– F88

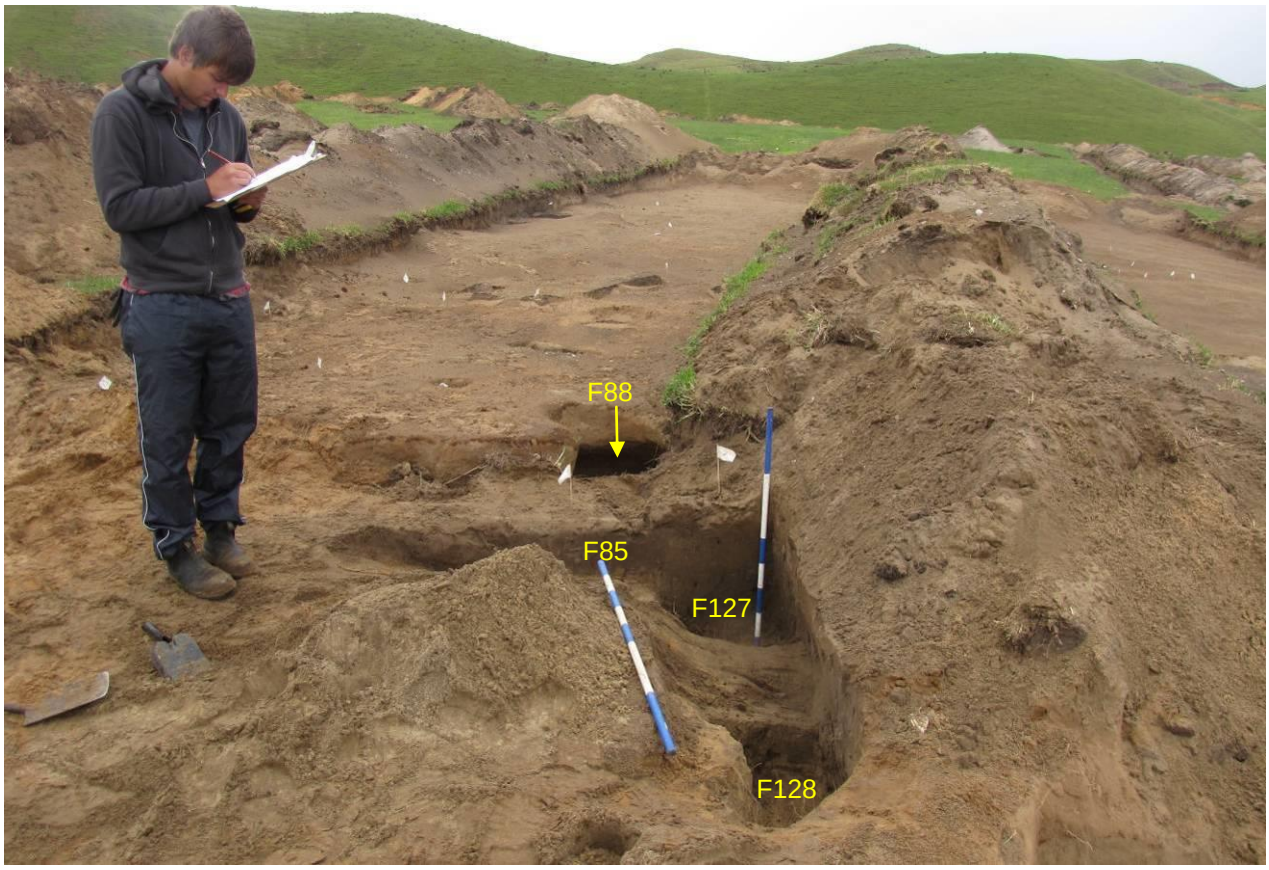

Figure 59. View of test excavations in Trench 36 to investigate F85

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Figure 60. Oblique view looking over at F40

Figure 61. View of F40 and nearby west section showing fill and later features

TRENCHES 15–17

Trenches 15–17

Three trenches to the east of the main archaeological features were excavated. Trench 15 (Figure 62) was excavated more than 20m parallel to the fence line running along the east of project area. No archaeological features were identified in this zone, which dips between the foredune along the coast and the higher ground to the west. The trench stratigraphy (Figure 63) consisted of layers of dark grey compacted sand and there was no clear evidence of any archaeological activities here.

Trenches 16 and 17 were dug north-east of the main set of Trenches, 8–12, associated with Area 1. Although some possible features were observed in initial scrapings (Figure 64), no archaeological features were confirmed. The lack of features in these trenches helped define the extent of the main archaeological occupation nearby.

Figure 62. Trench 15 looking north

Continued on next page

Figure 63. East section of Trench 15

Figure 64. Aerial view of Trenches 15–17

AREA 1 SUMMARY

Summary

The features in Area 1 covered an area of around 30m x 25m spread across the top of the old dune above the main foredunes. The earliest occupation identified may have included a number of large and deep rectangular pits in the dune nearby and was possibly associated with the area of midden found close by.

The midden area was used in at least two separate events. Gumbley and Hoffman (2007a) dated one part of the midden in their test trench to the early 15th century. These excavations suggested that at least some of the midden towards the south post-dated a medum-sized pit densely filled with predominantly kauri charcoal.

Within the midden, Tahanga basalt flakes and a smaller amount of other stone material were found, suggesting minor stone working around the midden. A dog skeleton was found in the upper layers, although the articulated nature of the skeleton suggests a later burial rather than part of any cooking activities associated with the midden.

Despite initial appearances, the midden is not particular large given the number of other features found nearby. Although covering an area of around 5m x 10m, the quantity of shell observed could have been deposited by a relatively small group in a fairly short time.

In summary, the midden area appears to have been used at least twice and on possibly up to four separate occasions: as part of the complex of deep pits possibly with some cooking; two phases of shellfish cooking and other activities; and a later more ephermeral occupation towards the south indicated by small firescoops and small shallow pit features.

The smaller rectangular pits, firescoops and the small rua found in the nearby trenches were probably mostly contemporary with the use of the midden as a cooking area. Detailed evidence of above-ground structures such as houses was not found but some of the shallow pit features with nearby firescoops in the trenches to the west and north of the midden may have used as small shelters as well as storage. Intercutting features in at least three of the trenches supported the idea of intermittent use of the area, perhaps seasonally.

The Area 1 settlement was well located to access both the beach, and nearby freshwater sources as well as the forest resources to the west. Vegetation coverage was probably never particularly dense on the dune and would have been easily cleared both for shelters, food storage and probably nearby gardening. Despite the proximity to the nearby Tahanga quarries, the small amount of stone flake material recovered, the majority in secondary fill contexts, was unexpected and suggests that the basalt was no longer a critical resource for the local population at the time Area 1 was occupied.

Part 3: Area 2 Excavations

INTRODUCTION

Area 2

Towards the end of the first week of excavations around Area 1, the second group of features identified by Gumbley and Hoffman (2007a) was investigated. The major feature they had identified was the circular rua found in their Trenches 2 and 3. A possible house floor was also identified in their Trench 1. These suggested that more features might be found nearby.

A long trench, 13, running parallel to and just to the east of the line of trenches dug by Gumbley and Hoffman was excavated, and as features appeared at the southern end, this was widened to provide the areal excavation outlined in the research strategy. Another parallel trench, 14, further east was subsequently dug cutting across the area of Gumbley and Hoffman's (2007a) Trench 5. Trench 13 and 14 were subsequently connected in places and a number of other trenches used to determine the nature and extent of the features associated with this area.

Area 2 provided the largest number of features (Table 4) found during the excavation season (Figure 65). Most identified features were either half sectioned or fully excavated as part of the sampling strategy.

Some large modern campfires were identified in the topsoil layer of Trench 13 (Figure 66), and Murray Edens (pers. comm.) confirmed the use of the area as a campsite in the recent past.

Table 4. Summary of features found in Area 2

Feature	Number
Unknown	5
Drain	2
Firescoop	6
Modern Campfire	5
Pit	76
Posthole	65
Rua	17
Scoop	5
Stakehole	1
Sump	2

Continued on next page

Figure 65. View of Area 2 in the foreground, looking north

Figure 66. Modern campfires in upper topsoil

TRENCHES 13–14

Trenches 13–14

The main concentration of features relating to the settlement at T10/777 was identified in Trenches 13 and 14. These trenches were expanded during the excavation to expose as many features as possible. The key elements found included (Figure 67):

- Clusters of pits and rua including one particular dense sub-area (A).
- A probable house identified by a series of parallel postholes.

Figure 68–Figure 69 show the final plan of features identified during the excavations. The features cluster towards the south and are generally more dispersed to the north.

The stratigraphy in Area 2 was for the most part relatively straightforward (Figure 70–Figure 73). A shallow layer of topsoil generally covered a partly consolidated greyish coloured sand matrix. Flecks of charcoal and fine shell were visible in that material which probably dates to an old dune surface previously exposed to the wind. Below that was the consolidated orange sand soil overlying earlier dune surfaces. The features were dug into those layers from the upper dune surface and below the topsoil. Gumbley and Hoffman's (2007a) Trench 5 was visible in the western baulk of Trench 14 (Figure 72).

Over 150 features were recorded in this area and it is not feasible to describe each one individually. A brief description of each of the features is provided in Appendix 1.

The rest of the chapter therefore focuses on:

1. Detailed examination of the southern part of Area 2, Sub-Area A, where a complex intercutting set of features is used to characterise the occupation in Area 2;
2. A description of the rectangular pits and small bin pits that make up the majority of excavated features;
3. A description of the circular rua pits;
4. A description of the features identified as part of a large whare or house;
5. A brief outline of the results from other nearby trenches.

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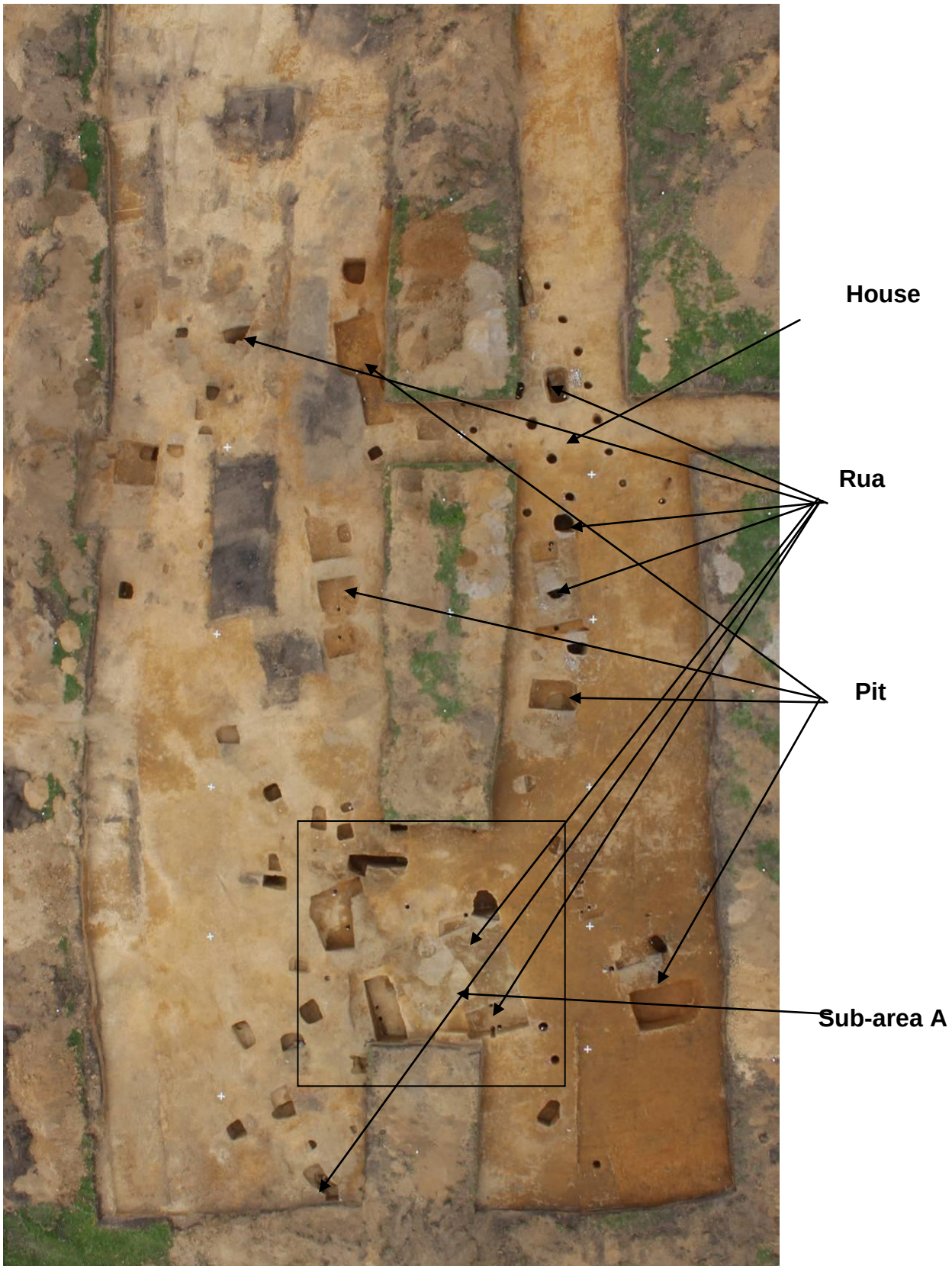

Figure 67. Plan view of Area 2 showing pits, rua and possible house

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TRENCHES 13–14, CONTINUED

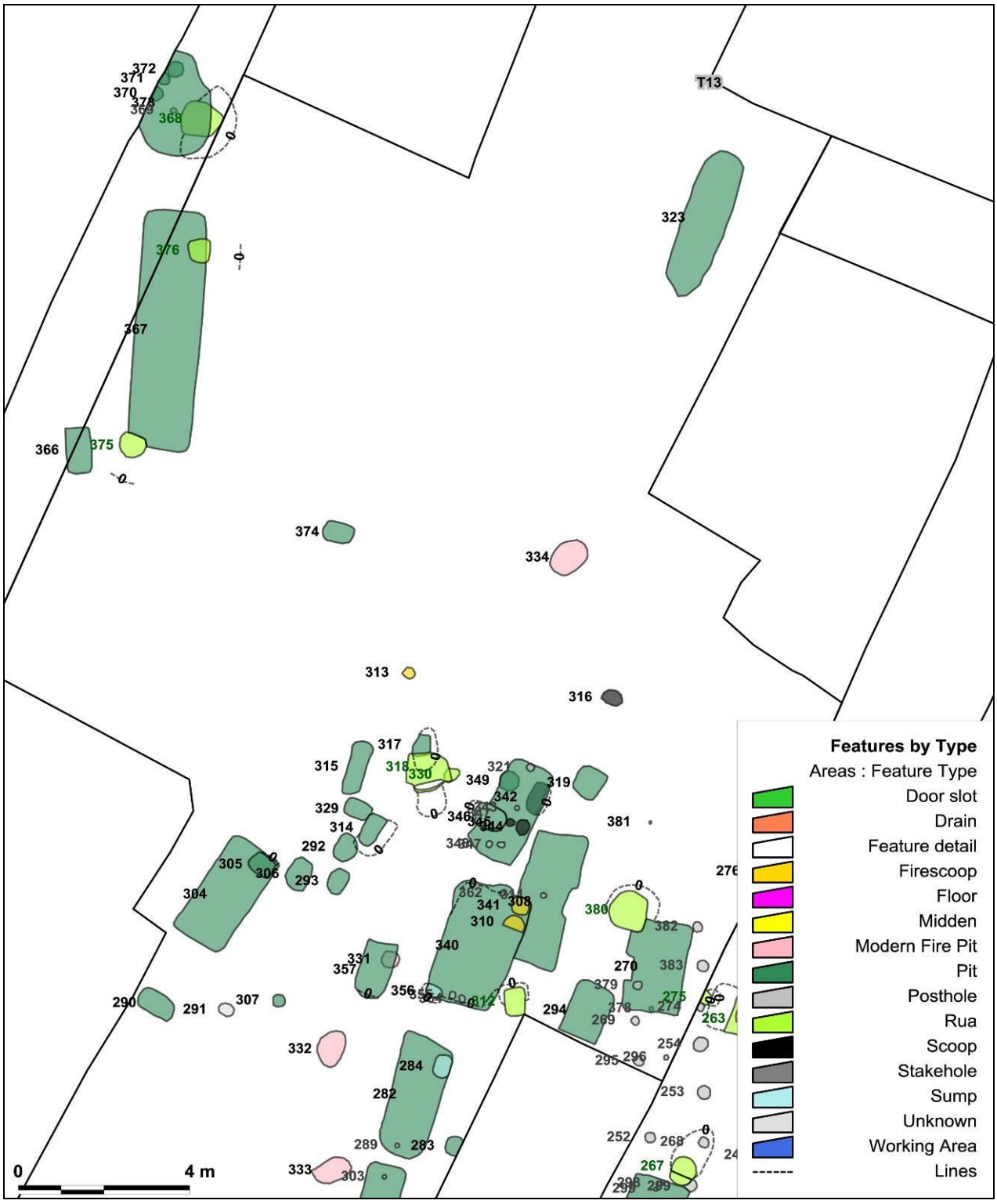

Figure 68. Plan of features in Area 2 (North)

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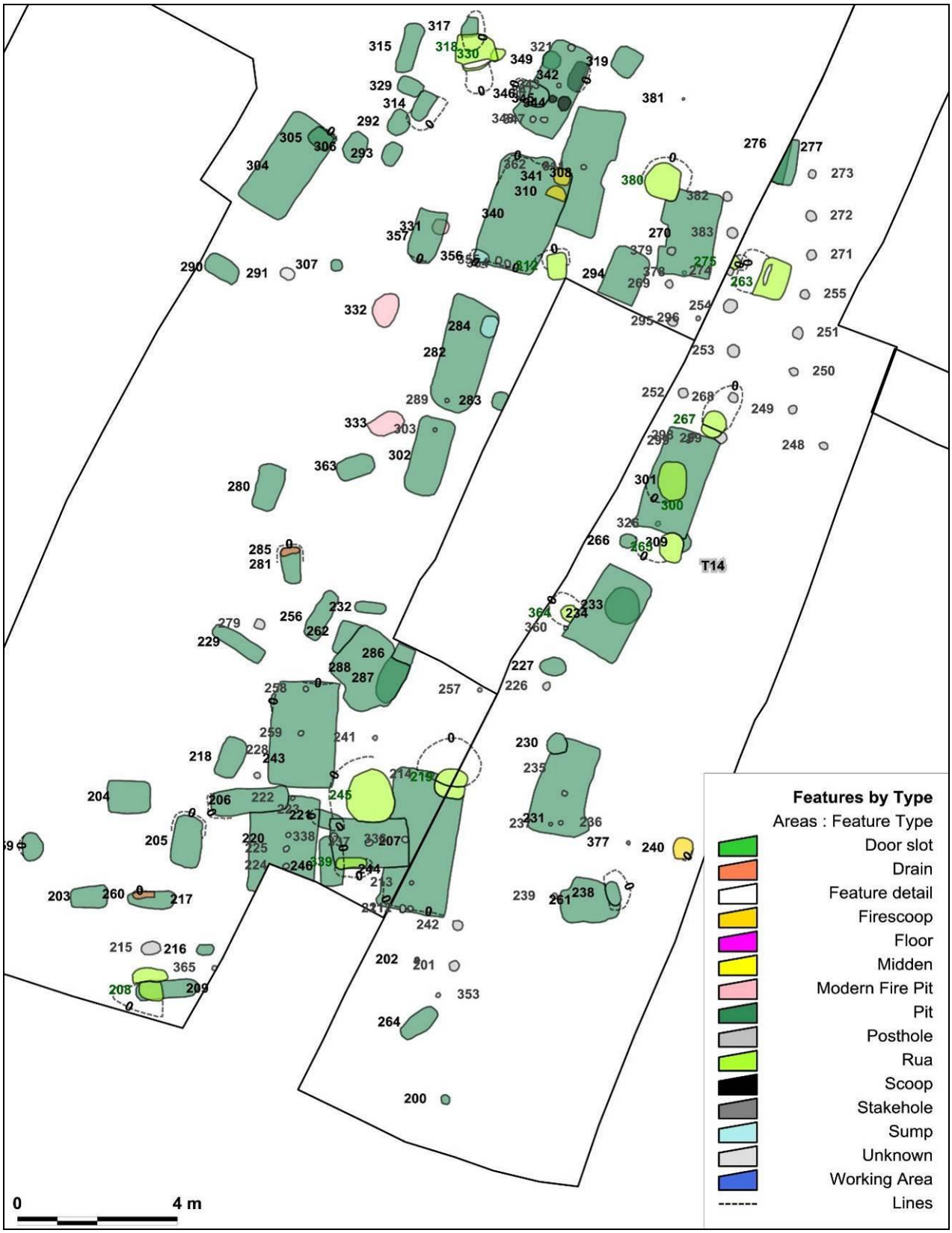

Figure 69. Plan of features in Area 2 (South)

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TRENCHES 13–14, CONTINUED

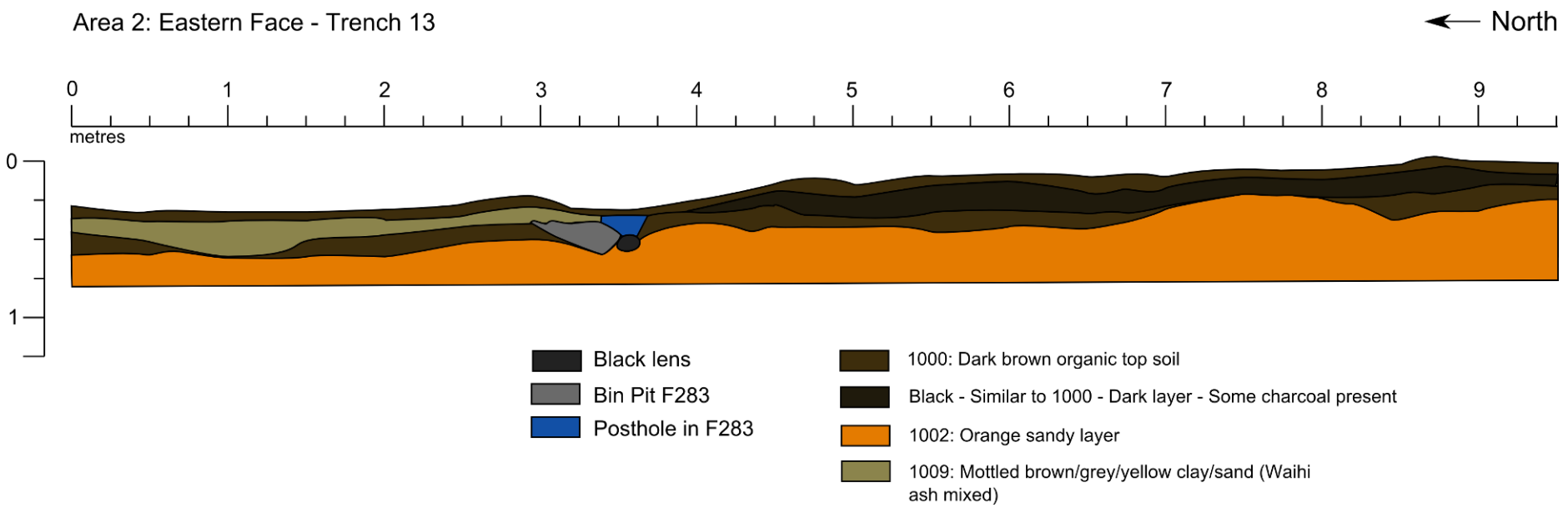

Figure 70. East section Trench 13

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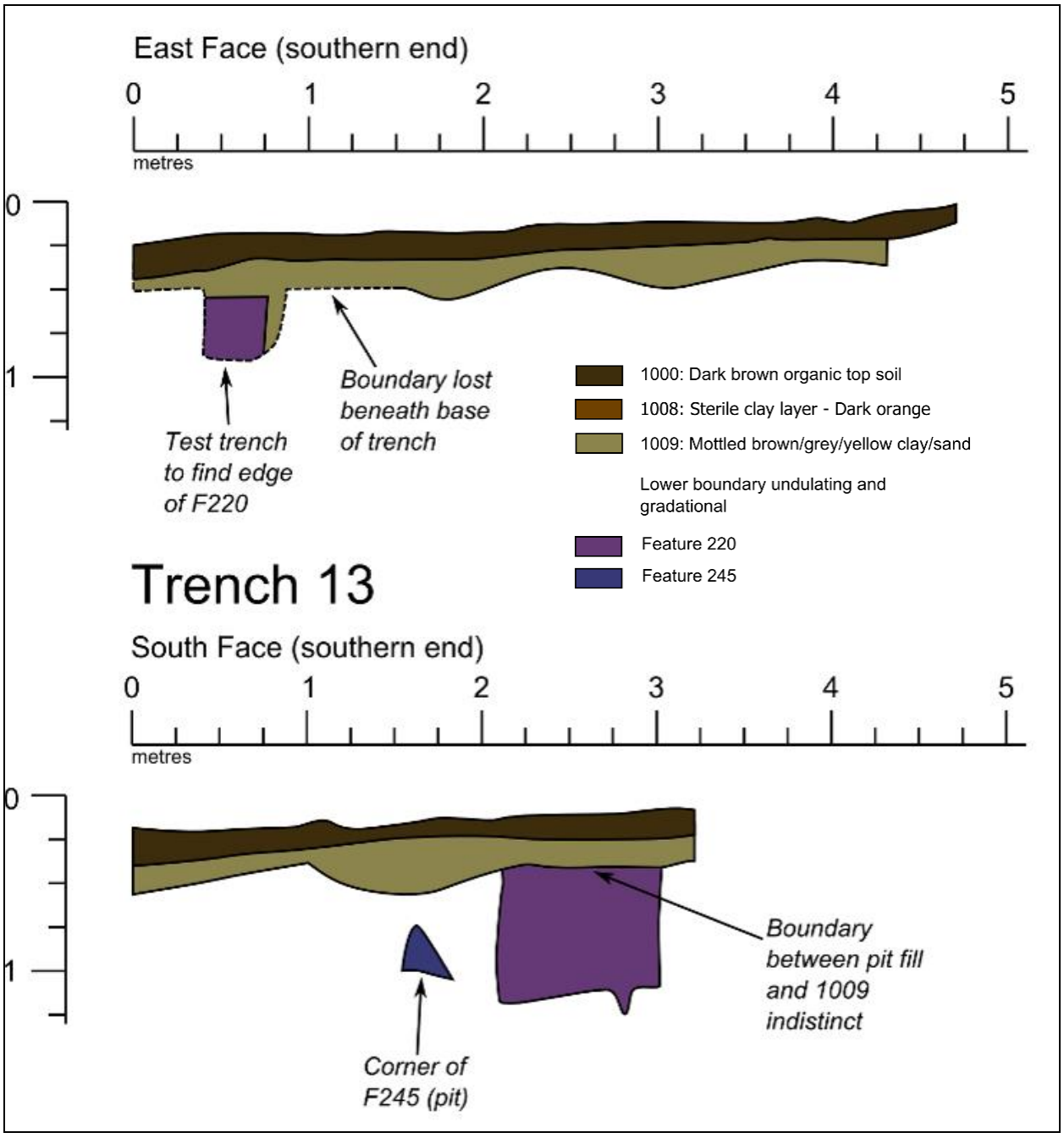

Figure 71. Southern end of Trench 13, east and southern sections

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Figure 72. West section Trench 14 middle baulk

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TRENCHES 13–14, CONTINUED

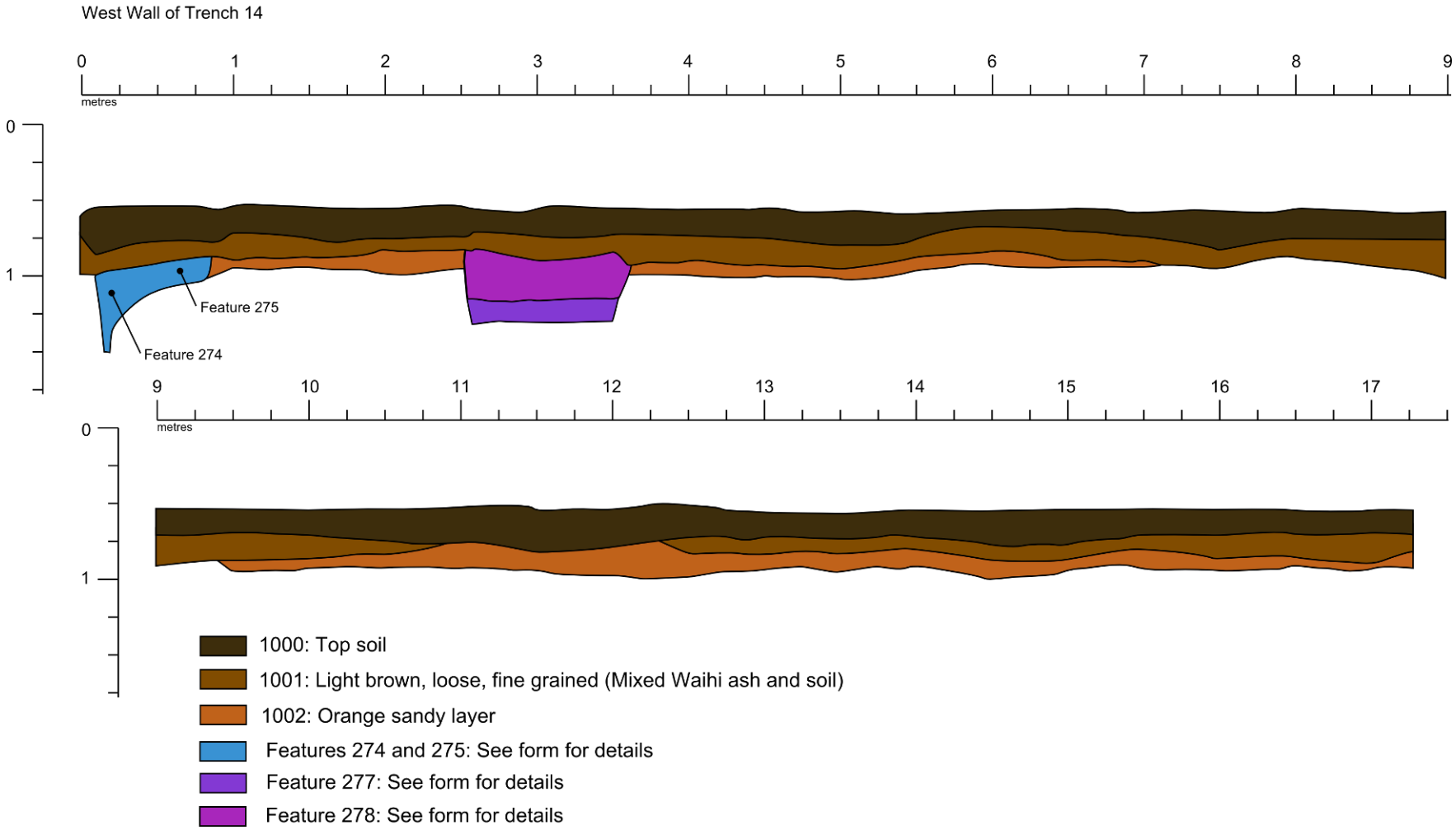

Figure 73. West section Trench 14 (northern end)

SUB-AREA A

Sub-Area A

At the southern end of Trenches 13 and 14 a dense cluster of rua and rectangular pits was excavated during the second week of work (Figure 74). The identification of this part of Area 2 was not based on any major separation of the features here and in the rest of Area 2. In fact, a number of features were found in all directions around this cluster (Figure 69). The cluster is described here in more detail due to the complex nature of the intercutting of features and the possible implications for interpreting the activities represented in Area 2 as a whole.

The area was dominated by three large north-south oriented rectangular pits (F220, F207, F243). All three had a central row of postholes running along the long axis (although the features were not all fully excavated). Other nearby smaller rectangular pits, some oriented north to south, and others more east to west, appeared to be 'bin pits' (Figure 75). However, F244, with three central postholes, cut into F207 and was oriented predominantly east to west.

Three large circular rua (F219, F245, F339) also occurred in this area and were cut into the rectangular features. F219 cut into the north-east corner of F207. F245 (Figure 76) cut into F244 and F337 while F339 also cut into F244. There was some complexity in the stratigraphic relationship between the features and these have been analysed and shown in a Harris Matrix (Figure 77).

The analysis suggested that there were at least four phases of pits built in this area, although the exact nature of some of the temporal relationships was not clear. The rua here were treated as contemporary and this suggests they were the youngest of the pit features. They were all largely cut into the same natural stratigraphy, indicating that the time difference between these 'phases' could be relatively small: from a few weeks to a few years apart. Similarly, although the analysis suggested all the rua were roughly contemporary, there was no direct evidence that this was in fact the situation. The likely interpretation was that this area was repeatedly used over one period, perhaps associated with the larger rectangular pits, with rua dominating during a later period of repeated occupation.

Elsewhere in Area 2, the rua did not seem to be the earliest features on the site. They often cut into rectangular pits (see for example F208 and F209 (Figure 78) approximately 5m to the north of Sub-Area A features in Trench 14 near the house, Figure 69) and indeed other rua such as F318 and F330 (see below).

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SUB-AREA A, CONTINUED

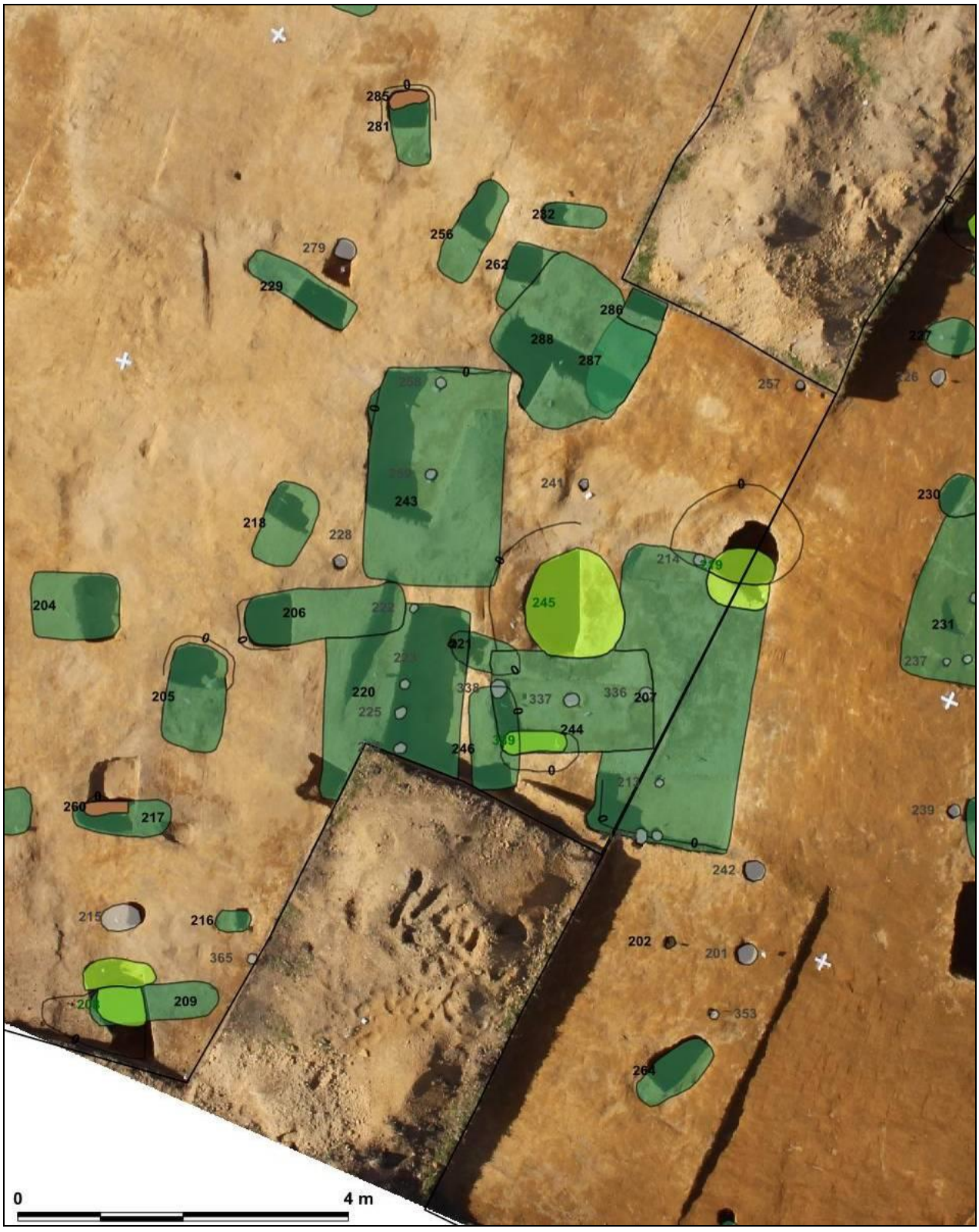

Figure 74. Overlay of features in Sub-Area A; pits: dark green; rua: light green; postholes: grey

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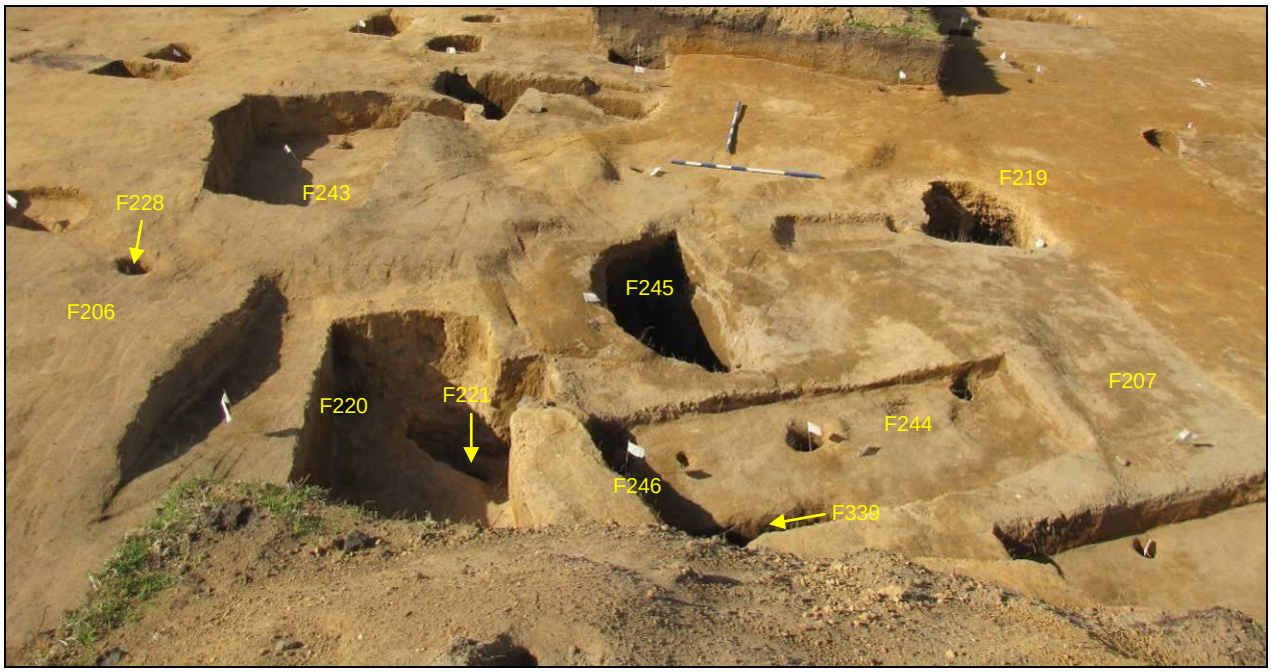

Figure 75. Looking north across Sub-Area A

Figure 76. Simon Howard excavating F245

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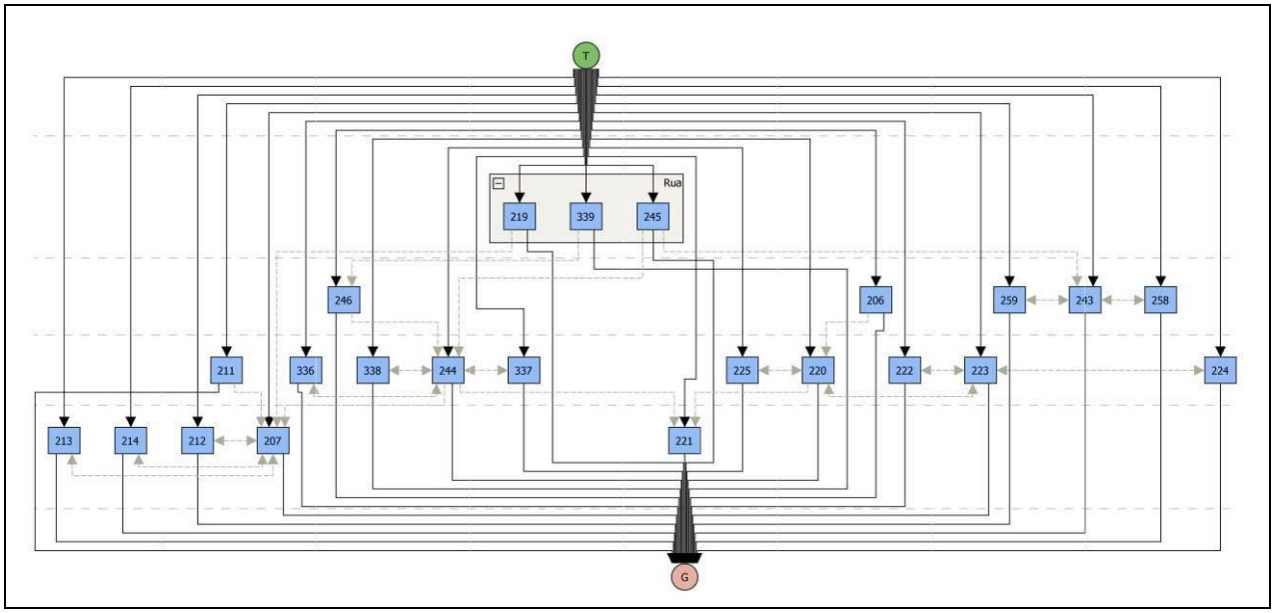

Figure 77. Harris Matrix showing stratigraphic relationships of features in Sub-Area A

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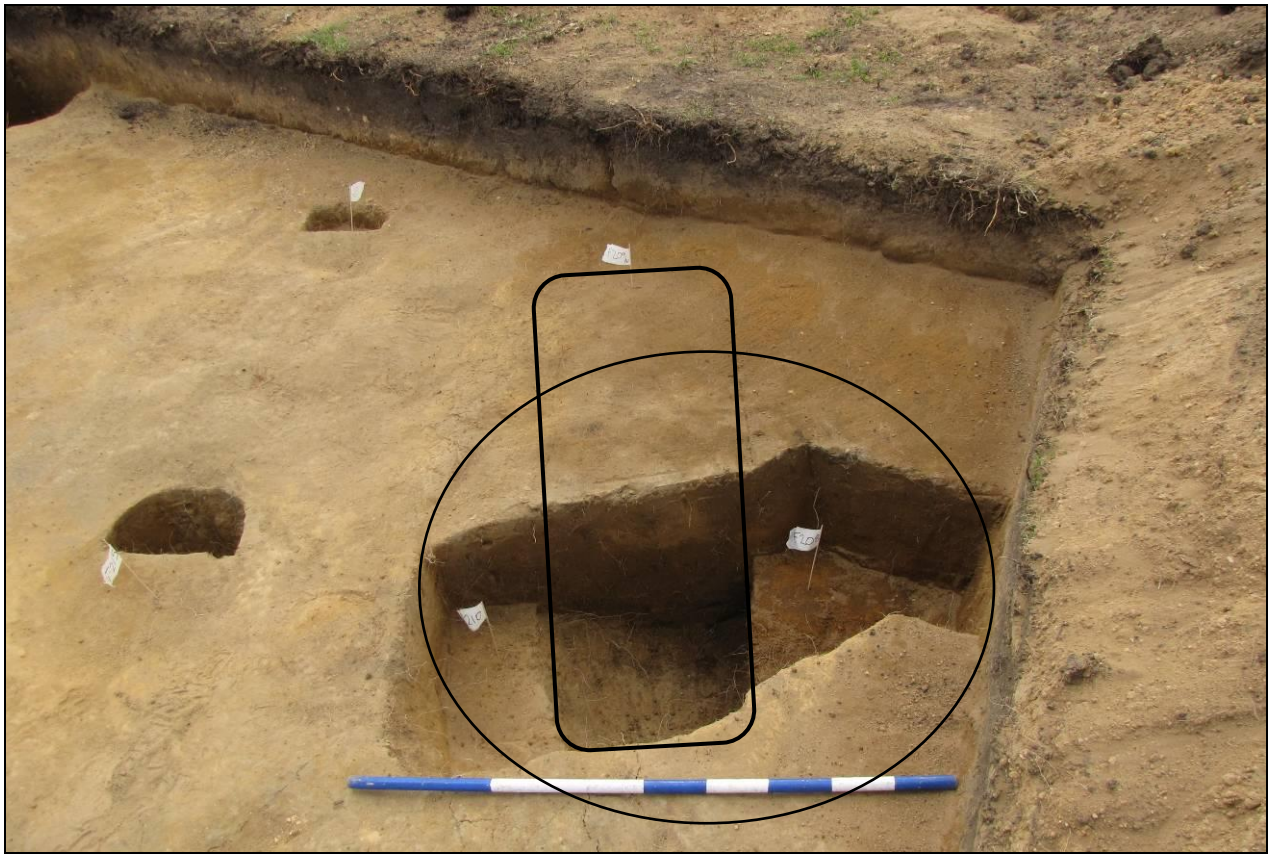

Figure 78. Features 209 and 208/210

PITS

Pit Features

The pits and other rectangular features were the most common features found in Area 2, although the term is clearly a catch-all for the many and varied depressions found across the area. Archaeological research on pits has a long history (see e.g., Fox 1974; Law 1969, 2000). Jorgensen (2009) has provided a useful summary of the analysis of pits in New Zealand and their study by archaeologists in recent years. The studies include examination of their construction, function, location and symbolic aspects of these features. The archetypal rectangular pits (Figure 79) were used for food storage, particularly kumara, and were dug into the ground, and roofed in a wide variety of ways.

Smaller pits with less formal superstructure would simply have been dug for convenience to hold baskets and other containers. These 'bin pits' (Figure 79) may not have always been covered, but a matting such as flax was probably used. Along with the circular rua kai (see below) and the raised whata platforms and pataka storehouses, the pits were the pantries for Maori during prehistory.

The general distribution of the pits found in Area 2 (Figure 68 and Figure 69) have been described earlier in general descriptions, but some key features are highlighted in this section.

The main features associated with the larger rectangular pits found include:

1. Postholes;
2. Drains/Sumps;
3. Bin Pits.

Postholes were found in a number of the pits (e.g., F220, F243, F244). In most cases where the postholes could be associated directly with the pit, they indicated that a central alignment of posts was used to support a typical symmetric apex roof covering. A few of the pits contained only one or two postholes and may have had less formalised coverings.

Drains and sumps are common in pits excavated by archaeologists around the country, but were relatively rare here. However, given the sandy soils these pits were dug into, it is likely that drainage was not a particular problem at T10/777.

Smaller pits were also found with a few of the larger pits. Some may represent later intrusions, but others dug into the same floor level as the main pits, such as F320, suggest some internal storage organisation (Figure 80). Given the easy nature of digging the sand on the site, this would have been straightforward to accomplish.

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Pit Features (continued)

The alignment of the larger rectangular pits also seemed to have the long axis approximately north to south. Whether the entrances to the pits were on the northern or southern side could not be clearly established on the archaeological evidence and may have depended in part on local wind conditions or simply individual preference.

A few pits, like F244, were oriented east to west, with the bin pits more likely to be at various angles.

A 3D reconstruction of pit F320 is shown in Figure 81. A standard symmetric roof has been added, and it may have also had sandy soil and perhaps other vegetation placed against the roof to provide a better seal to the enclosure. The entrance has been put on the northern end, but there is no specific archaeological evidence to support this.

A simple analysis of the dimensions of the pits was undertaken. The longest axis was plotted against the short axis to eliminate orientation as a factor (Figure 82). Not unsurprisingly, the results indicate two types of pits, the smaller and squarer bin pits, and larger and more rectangular pits.

The volume was calculated based on the field measurements taken during recording (Figure 83). A number of features were not included as the complete pit outline was not fully determined.

The depths were generally relative to the main excavation level, and as the upper surfaces of the features are likely to have been affected by taphonomic process, the calculation should be treated as a relative index rather than an accurate measure of pit volume. The results suggest a break between the smaller pits with a volume less than 1.75m^3 and those that are larger.

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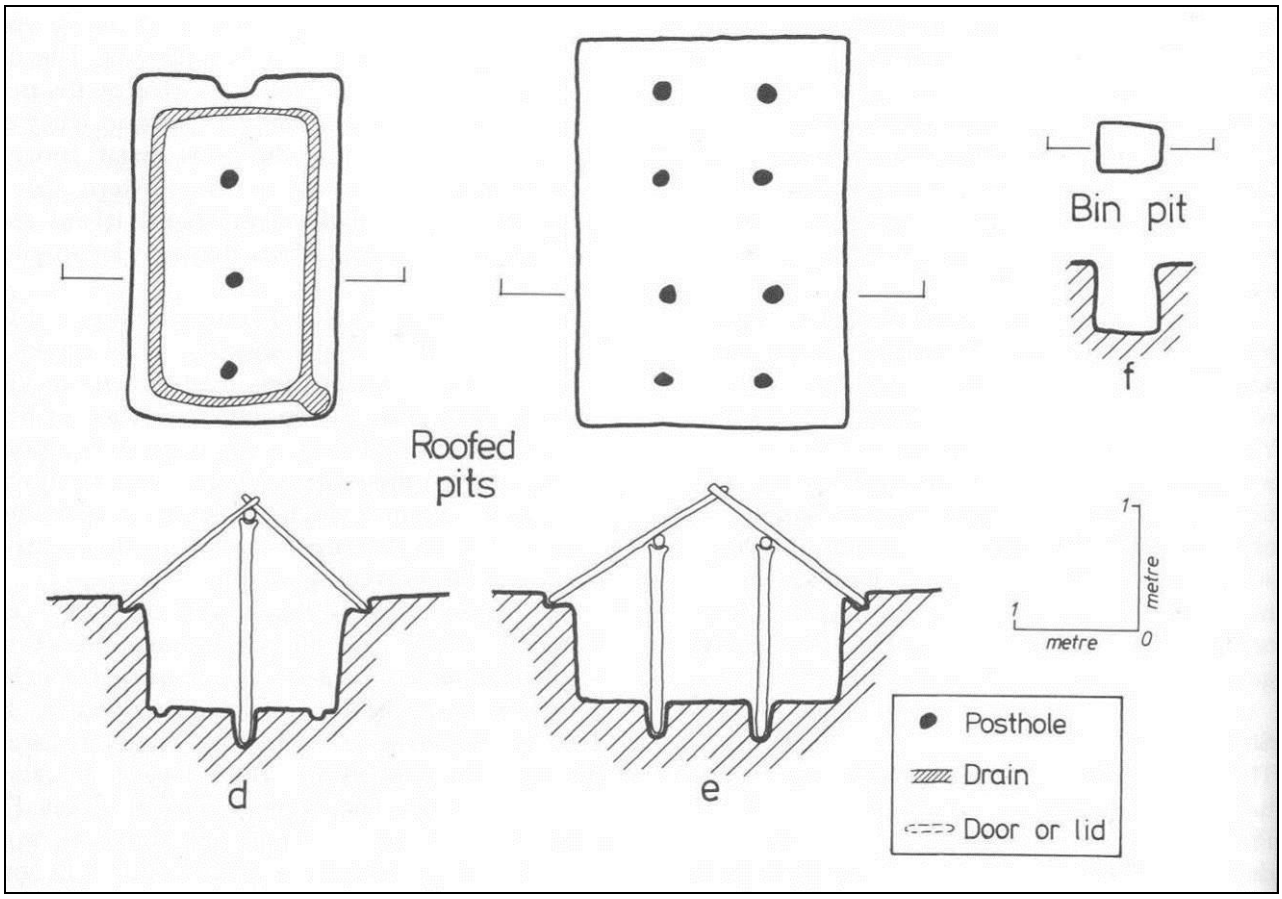

Figure 79. Archetypal rectangular storage pits (Davidson 1984: Figure 81)

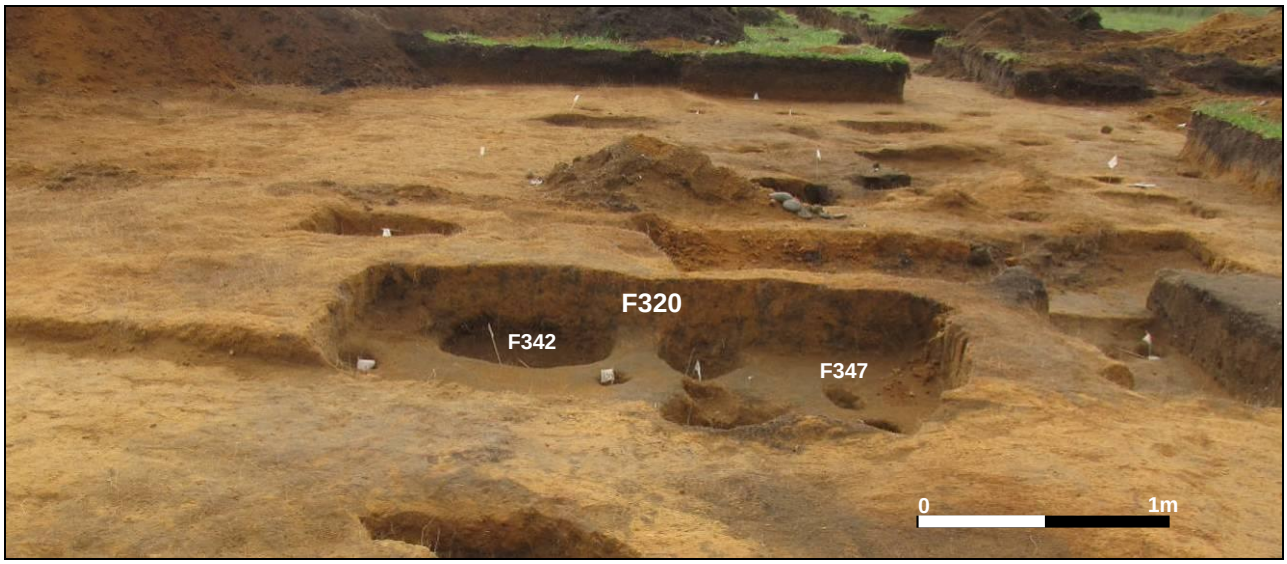

Figure 80. Pit F320 showing internal features (looking east)

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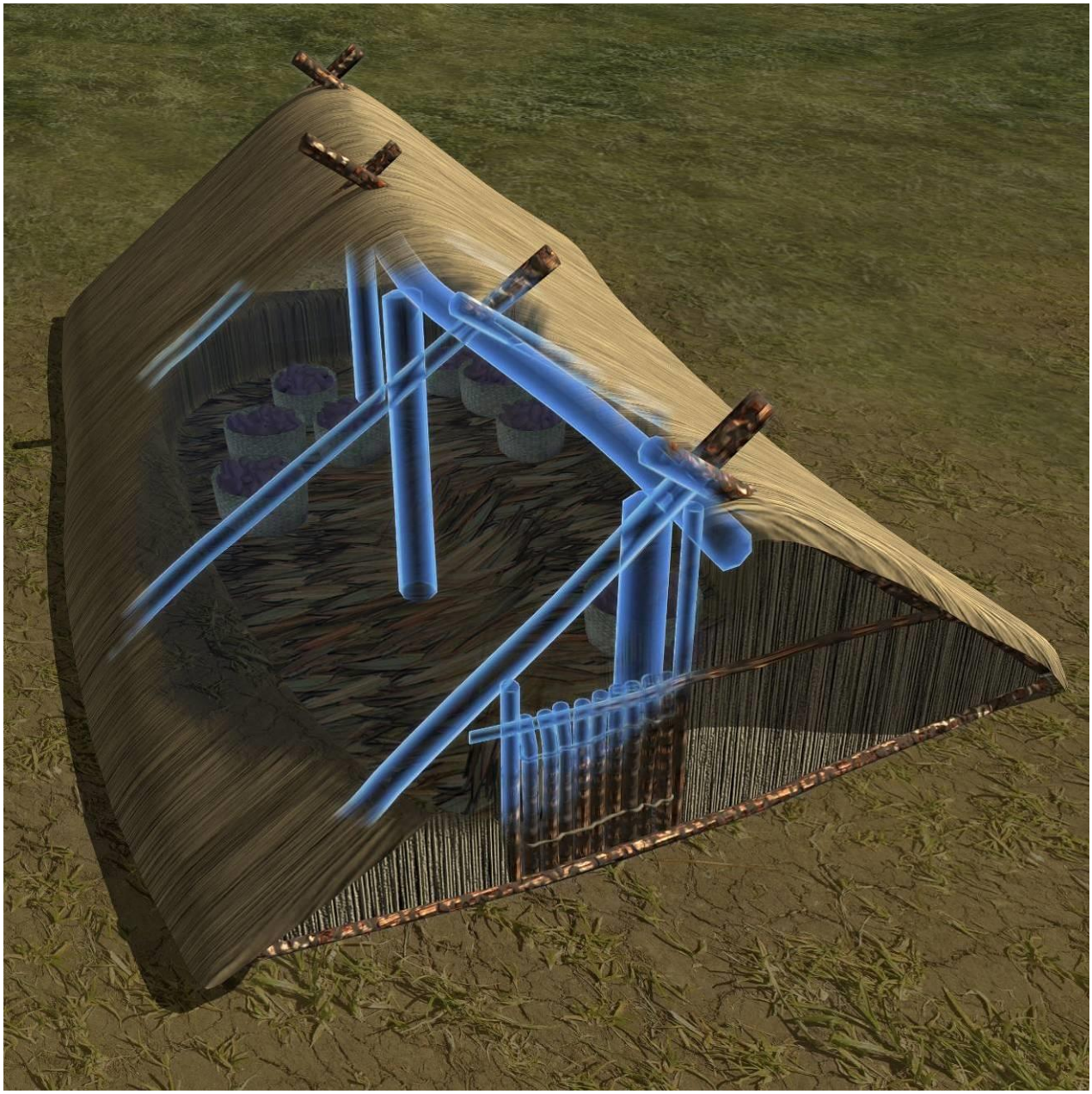

Figure 81. 3D reconstruction of F320

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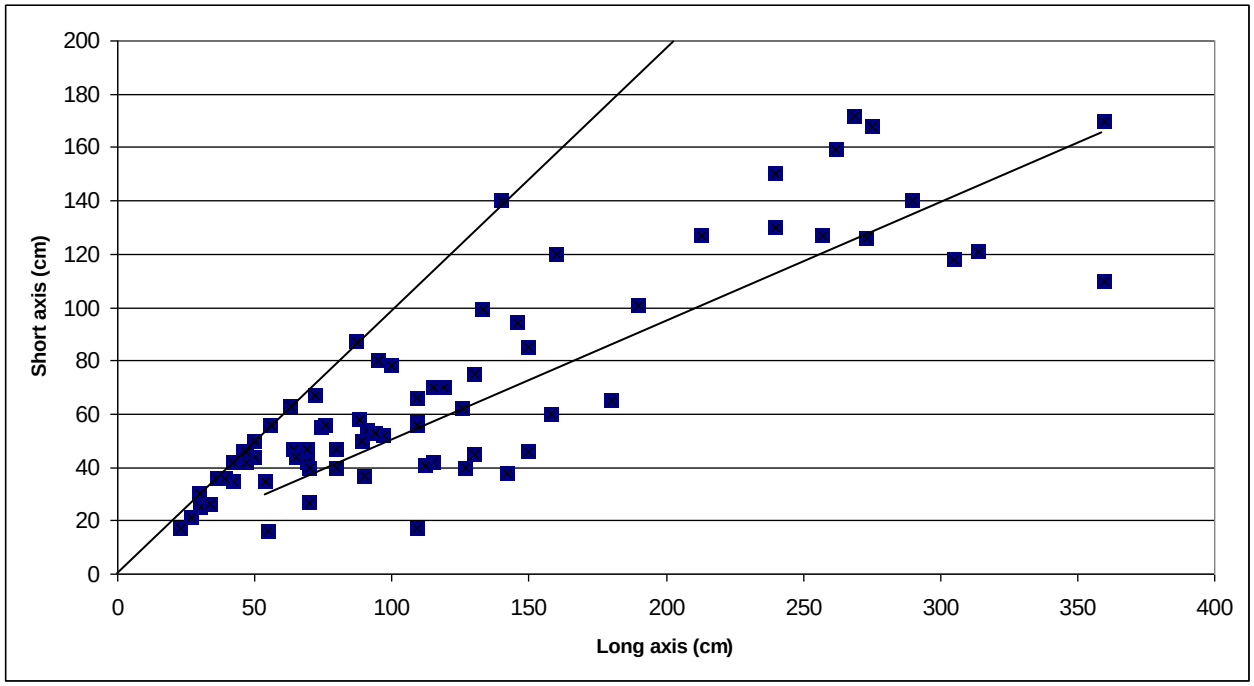

Figure 82. Sizes of pits in Area 2 – long side length versus short side

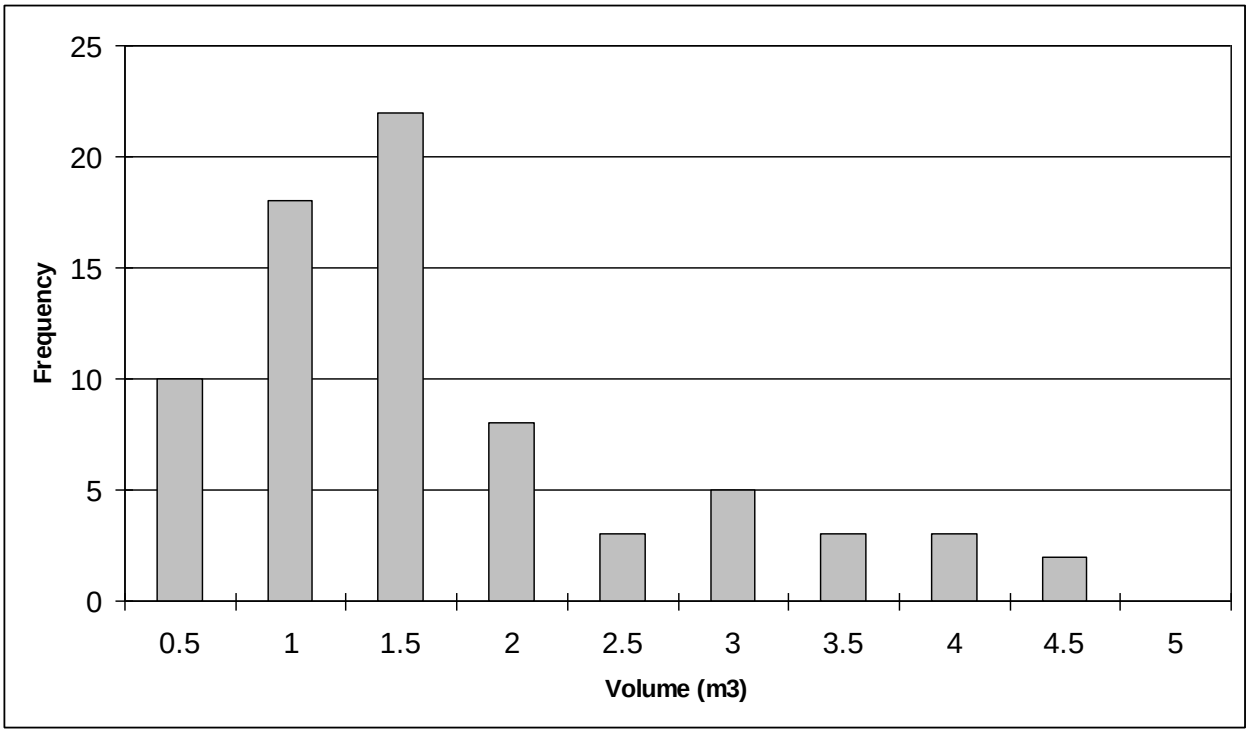

Figure 83. Distribution of estimated pit volumes for Area 2 pits

RUA

Rua Kai

The term 'rua' is generally used to describe all pits, but in archaeological terminology it usually relates to subterranean 'bell-shaped' pits used for food storage (rua kai) as distinct from the rectangular pits (Figure 84). Rua do not usually have the same above-ground structures that are associated with the rectangular pits, although ethnographic research shows this did occur on occasion (e.g., Best 1934: Figure 114). While these pits are usually associated with food storage, similar pits have been used as 'rat traps' (Downes 1926), and for water storage in the right geological conditions. Jorgensen identifies an early European explorer's possible description of a rua: 'in very many instances with trap doors, which, being shut down, excluded the wet from without, and allowed even the most incautious to walk over them in perfect security' (Marshall 1836: 214 cited by Jorgensen 2009:12-13).

Seventeen circular rua were identified in Area 2. Although distributed across Area 2, a line of three (F267, F300, F364) was excavated next to the baulk between Trenches 13 and 14 (to the south of the house) in the centre of Area 2. At least four more (F263, F267, F275, F380) were found in the vicinity of the whare (see below) nearby (Figure 85).

North-west of the main concentration of Area 2, three large rua (F368, F375 and F376) were identified when Trench 13 was expanded out toward Trench 24. These were associated with other pits including the 5.8m long F367 which had been cut by two of the rua – F375 and F376 (Figure 86). Nearby Gumbley and Hoffman (2007a) had excavated another large rua (F13) in their Trench 3.

F364 (Figure 87) provided some of the best information regarding the rua with a small chisel found near the top of the fill (see lithics section below). A small concentration of charcoal was found at the base of the pit and collected. This was analysed as part of the environmental data but most importantly provided one of the few datable samples for Area 2 (see below).

Excavation of rua is difficult (Figure 88) as they are prone to collapse in the sandy soils. Three large rua were excavated to show their cross-section shape (Figure 87 and Figure 89). All three show a top entrance providing access either directly vertically or at an angle to the ground with the front wall then dropping vertically below. The bell shape expands away from the entrance to provide the main storage area. This was probably lined with some form of vegetation and food placed inside.

Archetypal rua on level ground are generally described as having symmetric bell shapes below the top entrance (e.g., Figure 84), but those at Opito are probably asymmetric as the soft sand would have made the normal model unstable and prone to collapse if accessed above the main cavity.

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Rua Kai (continued)

The entrance to the rua would probably have been sealed to limit damage from the elements and from kiore (rats). A door slot was identified at the entrance of F318 (Figure 90). The entrance ways of the rua faced predominantly north through east, but the intercutting of some of the features makes it difficult to be definite that this was always the case.

The rua frequently intercut and on occasion were cut by other pits, making any chronological sequence difficult to determine. F318 and F330 (Figure 91) were cut next to each other and may have been associated.

The rua ranged in sized from relatively small features to large 'bells' over 75cm in depth and circumference. Comparison of the sizes of rua between Areas 1 and 2 (Figure 92) shows that while small ones were found in both locations, large ones dominated Area 2.

A 3D reconstruction of F380 is shown in Figure 93. This provides a more recognisable view as to how the storage pit would have looked.

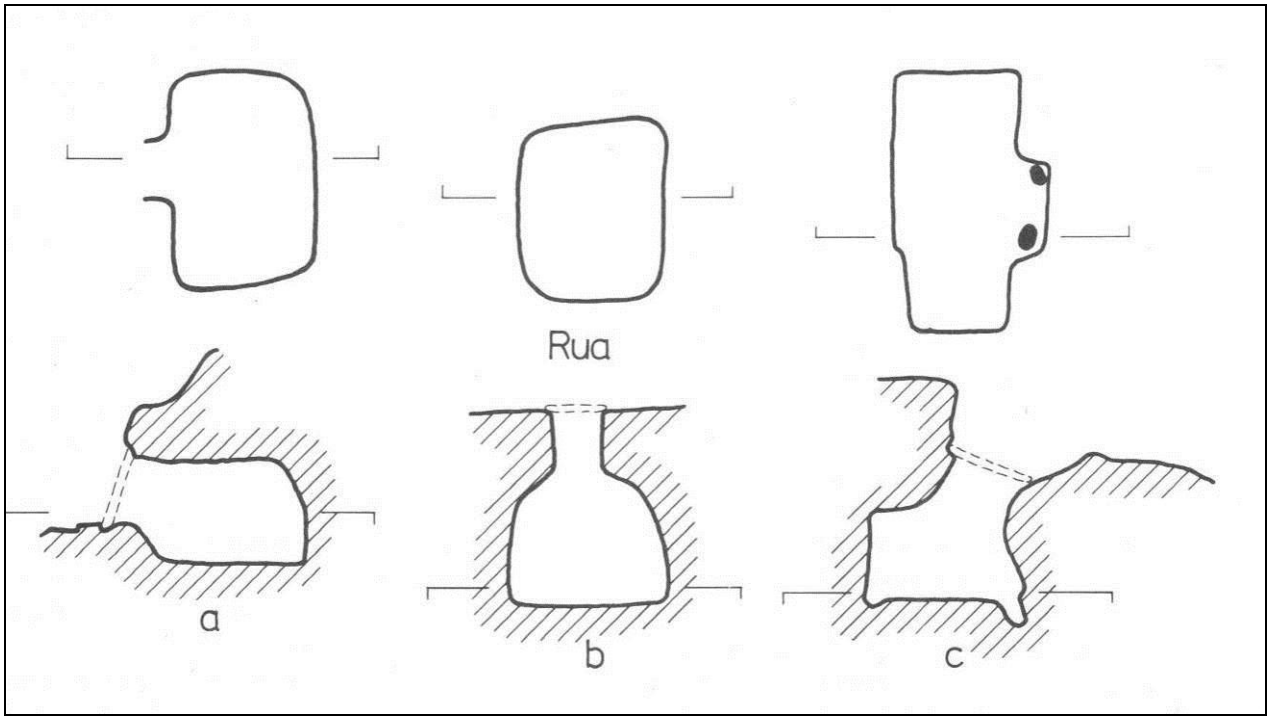

Figure 84. Archetypal rua (Davidson 1984: Figure 81)

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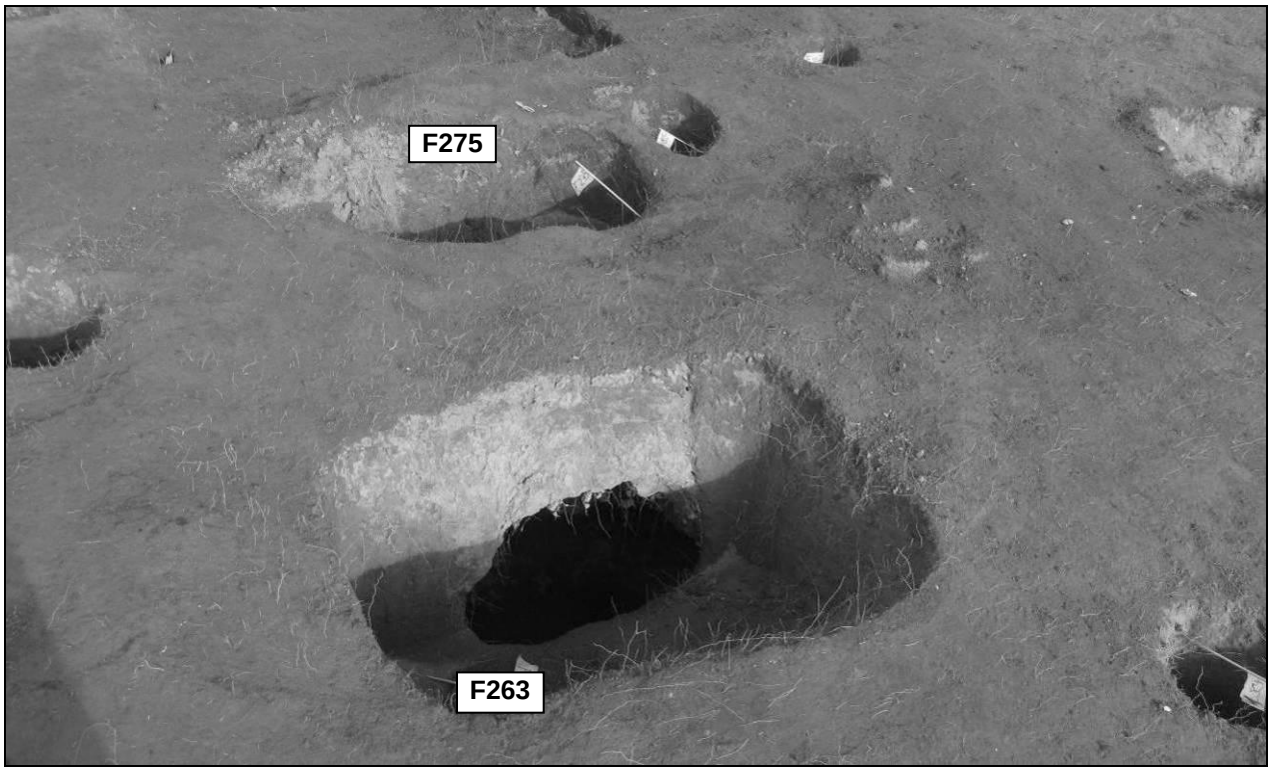

Figure 85. Rua F263 looking NE

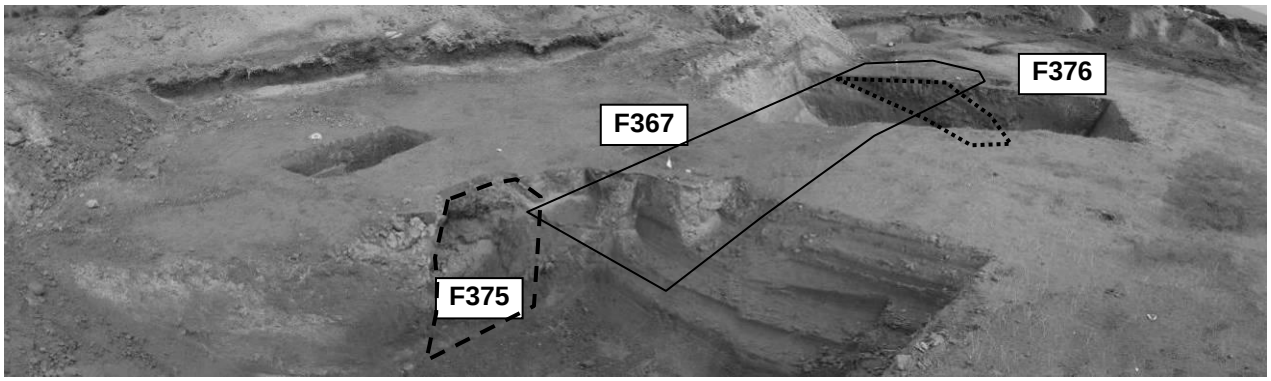

Figure 86. View of Trenches 13 and 24 showing rua F375 and F376 cutting into pit F367

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Figure 87. Cross-section through F364

Figure 88. Sophie Mills excavating rua F380 in the rain

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Figure 89. Section through F380

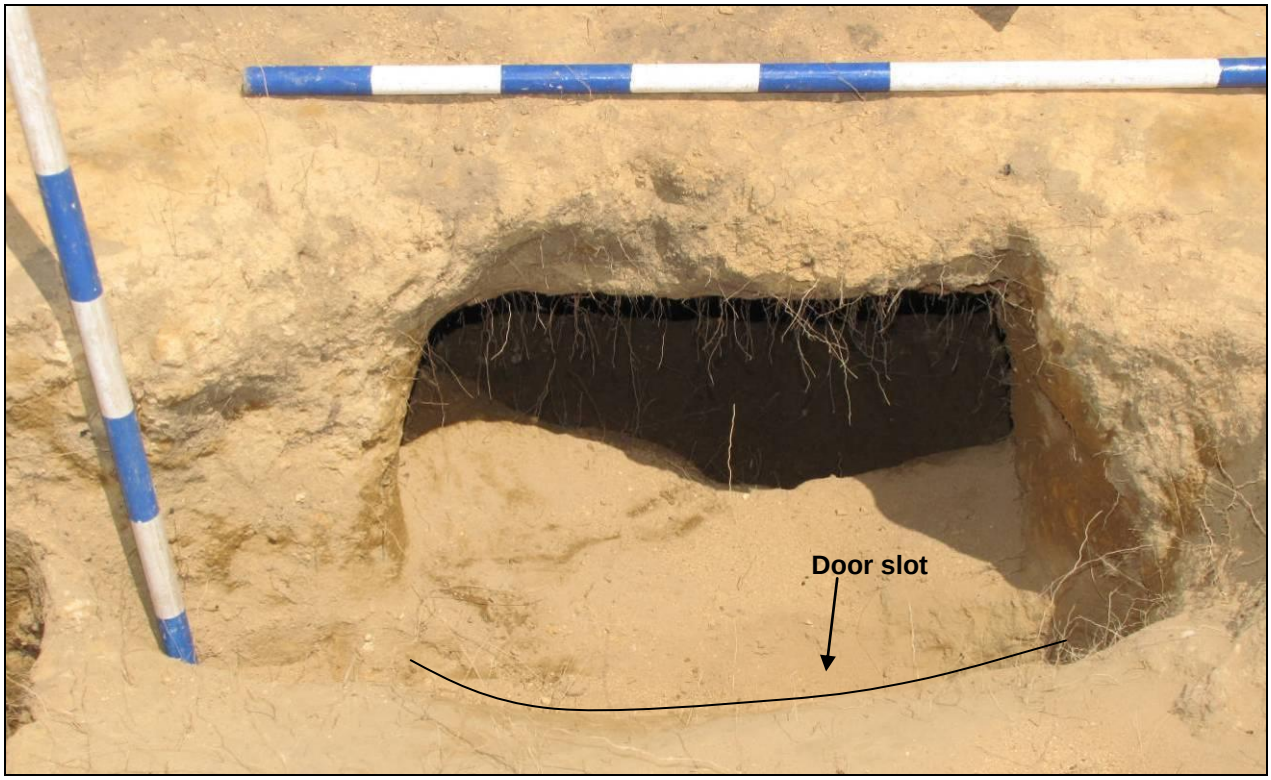

Figure 90. Entrance to F318 Rua with door slot

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Figure 91. View of rua F318 and F330

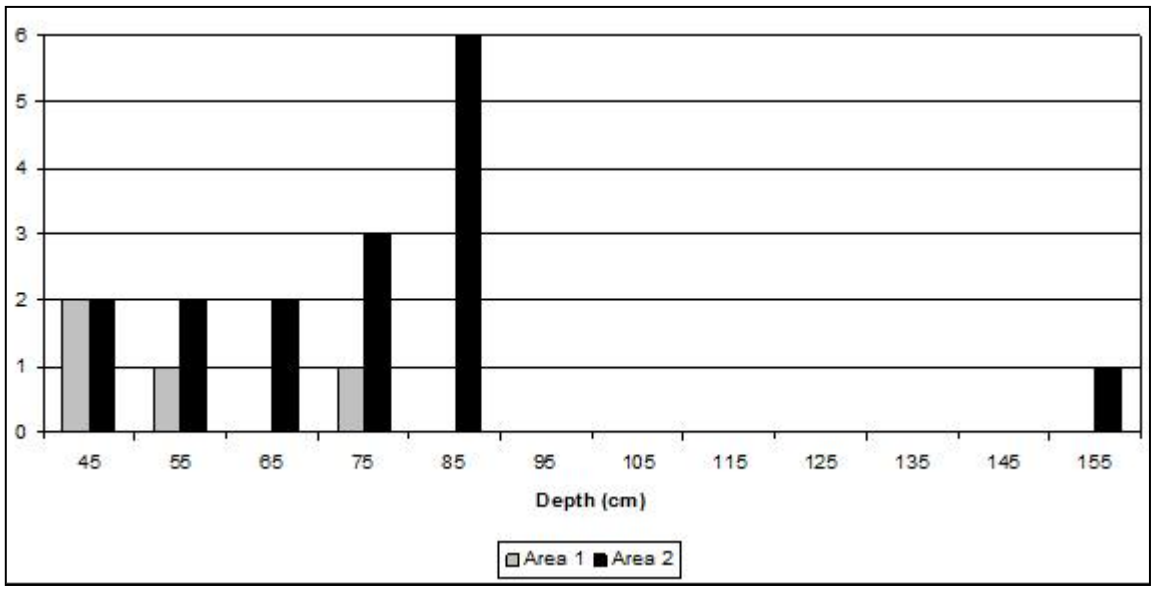

Figure 92. Average depth of rua from Areas 1 and 2

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Figure 93. 3D reconstruction of rua F380

THE WHARE

House

Three parallel lines of postholes were identified within Trench 14 (Figure 94). The postholes were relatively large compared to the others found across the site (Figure 95) and clearly delineated a structure interpreted as an almost 7m long and 3.5m wide whare with a centre-line pitched roof.

The structure had its primary axis oriented north to south with a tapered 3m wide southern end and a northern end of around 3.5m. No direct evidence of any entrance was identified and no floor surface was found. Careful excavation of the baulk and later stripping of the unexcavated western baulk that remained between Trenches 13 and 14 after the initial identification did not reveal any additional information about the floor. No artefacts were found associated with the structure.

Three rua (F263, 275 and 380) as well as a rectangular pit (F270) were cut into the area of the internal part of the house structure. F380 obscured any evidence of the north-west corner post and it was not possible to determine whether this was an earlier or later feature. The wider northern end may be better interpreted as a porch.

An archaeological reconstruction of the whare[3] is shown in Figure 96.

Figure 94. Rows of postholes identified as a whare

Continued on next page

[3] Reconstruction by T. MacDiarmid.

THE WHARE, CONTINUED

Figure 95. Plan view of features around house (pit: dark green; rua: light green; posthole: grey)

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THE WHARE, CONTINUED

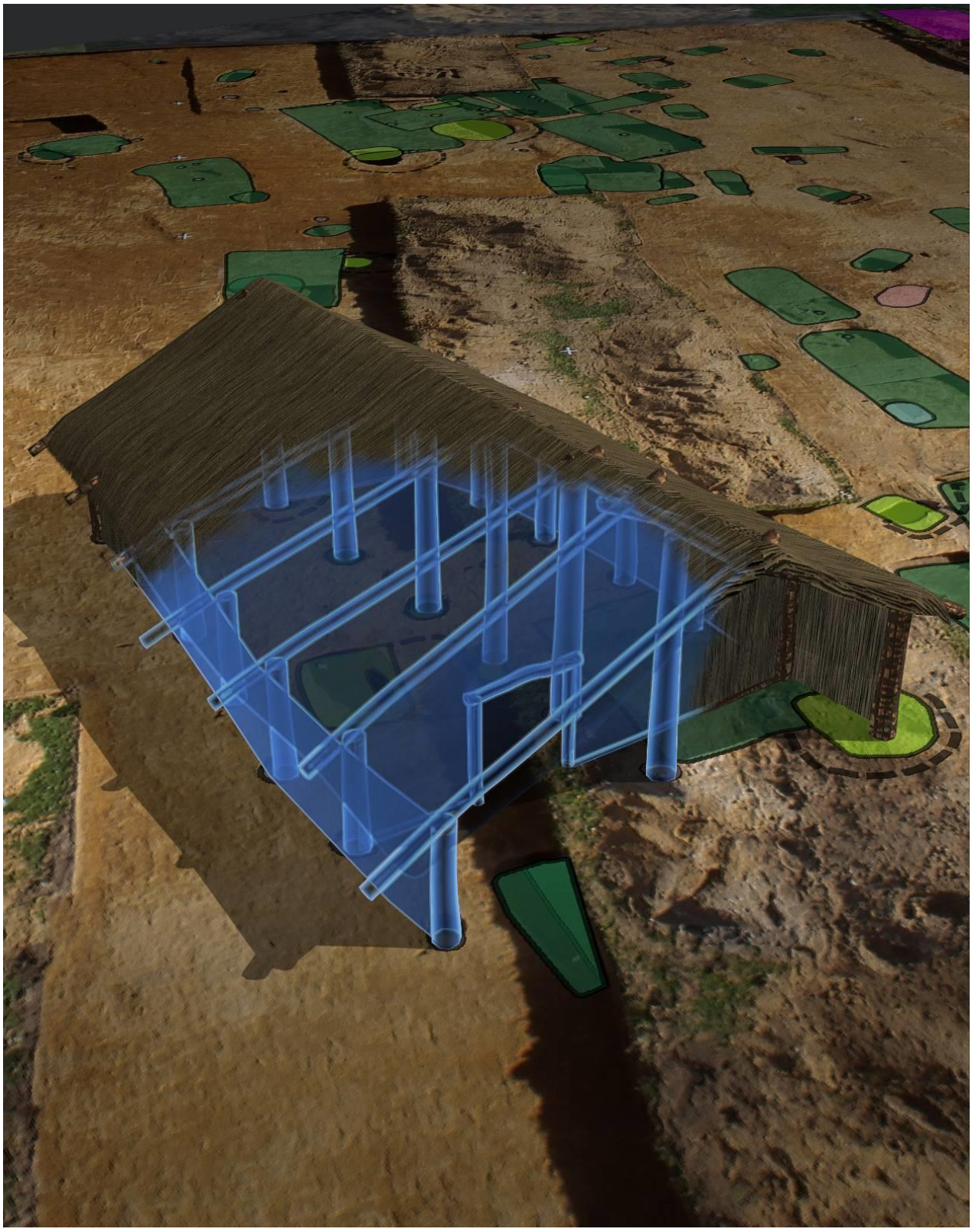

Figure 96. Hypothetical 3D reconstruction of whare

OTHER AREA 2 TRENCHES

Trenches 19–23

To the north and east of the main concentration of features in Area 2, the number of archaeological features drops off significantly (Figure 97). The stratigraphy was little changed in the areas farther west, with undulating amounts of topsoil covering the old dune surface and the more consolidated dunes below (Figure 98 and Figure 99).

Trench 19 was dug parallel and to the east of Trench 14 and contained a few small scoops or postholes and one small firescoop (F324), and the intersection of Trench 22 (Figure 100).

To the north Trench 20, running perpendicular to Trench 14, was expanded after a small pit (F358) was uncovered and another small pit F361 exposed (Figure 97, Figure 101). The pits were roughly 2–2.5m long and around 1–1.5 wide but less than 10cm deep. No internal features were discovered.

Trench 21 extended Gumbley and Hoffman's (2007a) Trench 6 both to the east and west but no features were discovered.

Trench 23 was similarly devoid of any archaeological features although a solitary pit feature (F327) was found in Trench 13 near the junction with Trench 23. Features had also been discovered in Gumbley and Hoffman's (2007a) Trench 11 around 10m east of the eastern end of Trench 23.

Despite a few isolated features, the archaeological evidence in these trenches was ephemeral.

The lack of features here served to provide a boundary of sorts to the main concentration of features associated with the occupation of Area 2. However, while no specific evidence was found, it is possible that some gardening was undertaken in this part of the dunes.

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OTHER AREA 2 TRENCHES, CONTINUED

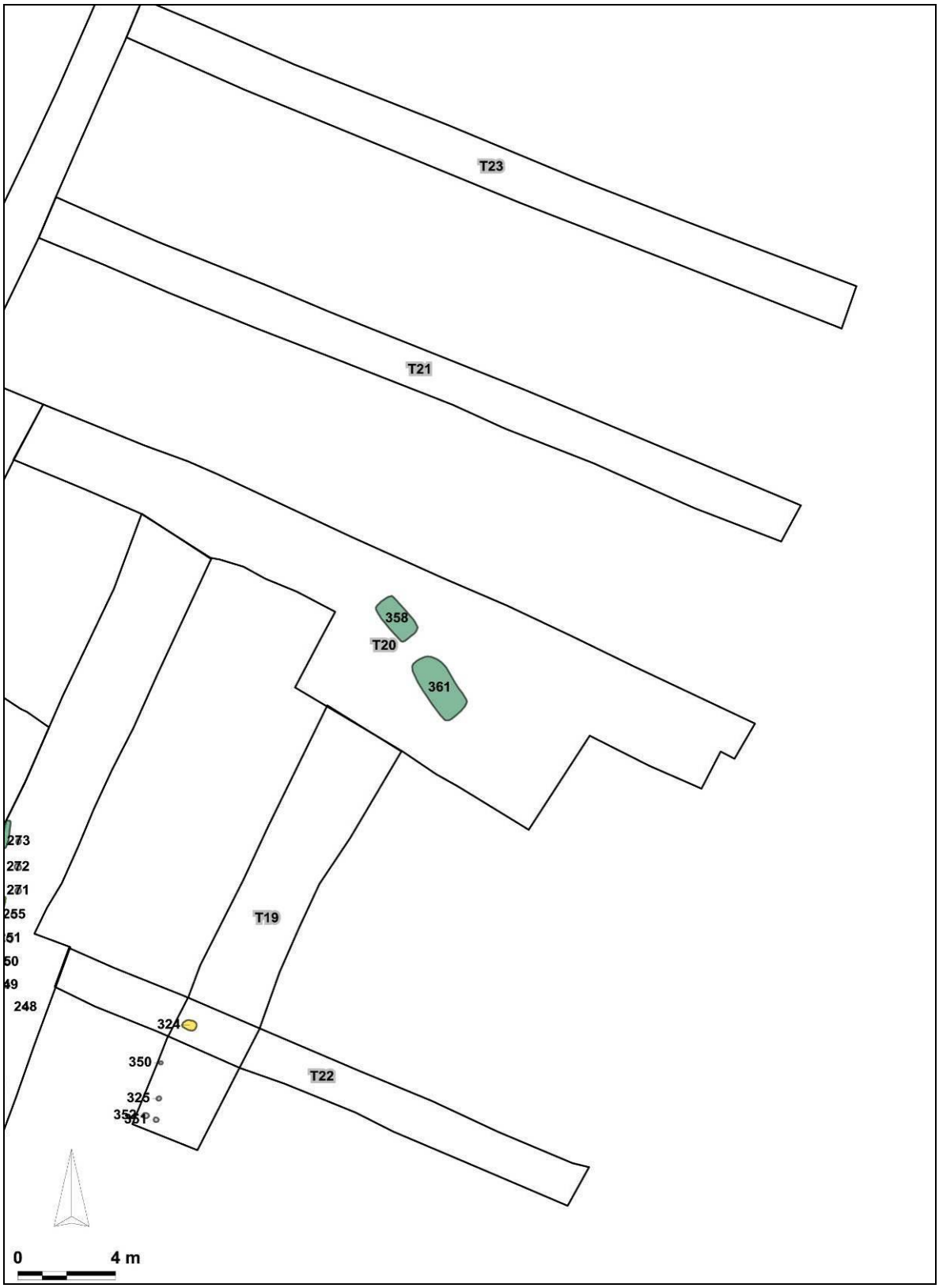

Figure 97. Plan of features in Trenches 19–23

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OTHER AREA 2 TRENCHES, CONTINUED

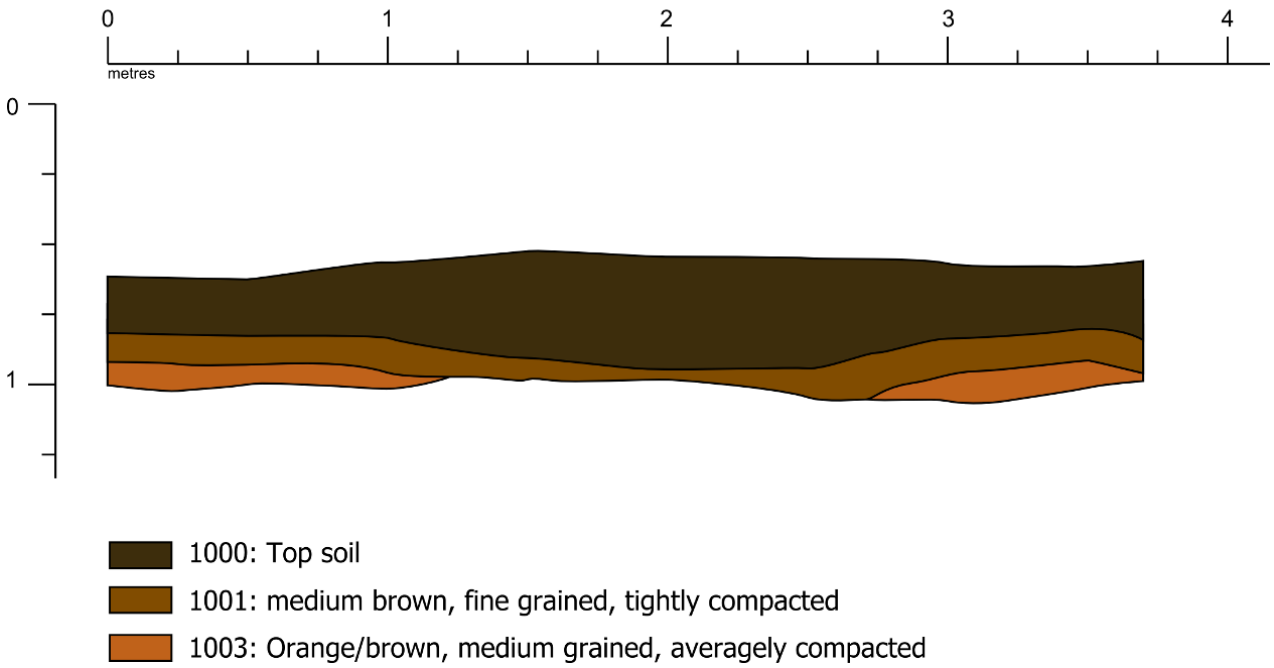

Figure 98. West section of Trench 19

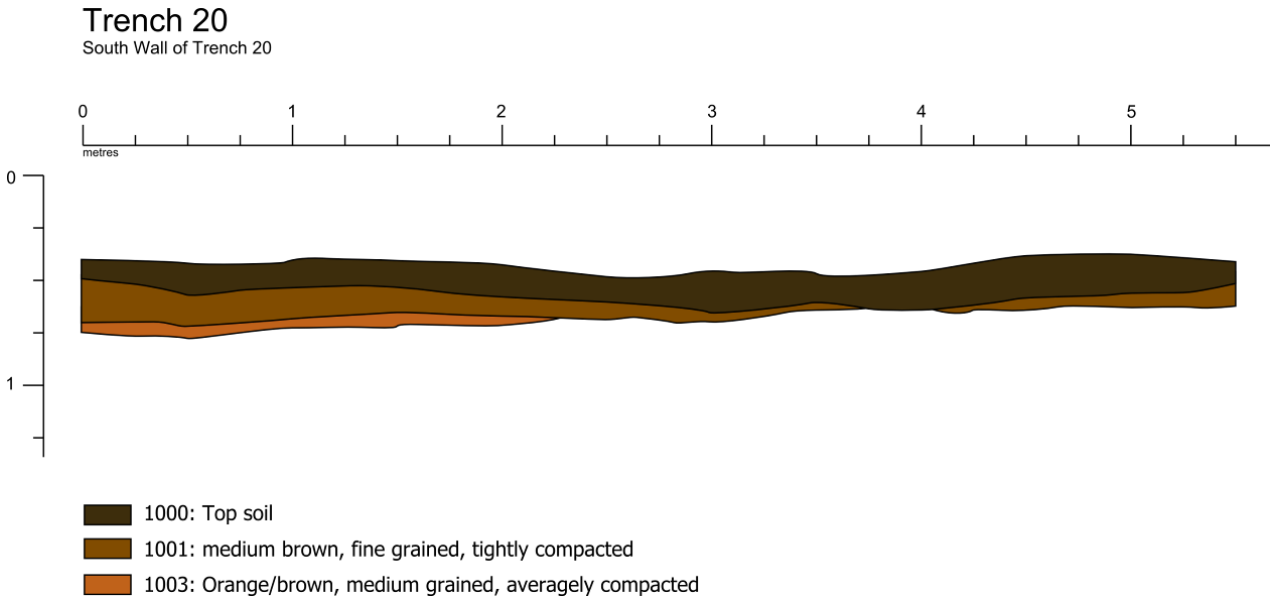

Figure 99. South section of Trench 20

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OTHER AREA 2 TRENCHES, CONTINUED

Figure 100. Features at southern end of Trench 19

Figure 101. Shallow pit features in Trench 20 looking SE

AREA 2 SUMMARY

Area 2

Excavations at Area 2 (Figure 102) uncovered a large number of archaeological features. These included:

1. Large rectangular storage pits, some with additional pits dug inside or intercutting;
2. Subterranean storage pits (rua), one with an identified door slot;
3. Smaller pits of various sizes and shapes;
4. Three parallel lines of postholes suggestive of a moderately sized whare;
5. A few relatively isolated firescoops.

A small area of burning with at least one firescoop was found to the east of the main concentration of features but evidence of cooking was relatively hard to find.

Only a few artefacts were found in Area 2, including a chisel and a netsinker along with a few stone and obsidian flakes in the pit fills. Shells were also found in the pit fill, but appear to have been wind blown rather than actively deposited.

Analysis of the features suggests that the area was probably occupied during at least two different time periods, and possibly three. The earliest was characterised by the large rectangular pits, the second by the digging of circular rua. The whare may have been contemporary with some of the pit features but there are features dug into the area of the house which are not contemporary. The stratigraphic information relating to the house makes it difficult to determine the order of occupation there. However, intercutting features in Sub-Area A make it clear that the area was re-used multiple times.

Datable material was difficult to find but some charcoal samples were obtained from several features which would allow comparison with the occupation at Area 1.

Figure 103 provides a hypothetical 3D reconstruction of typical features found in Area 2.

Continued on next page

AREA 2 SUMMARY, CONTINUED

Figure 102. Excavating Area 2

Figure 103. Hypothetical 3D reconstruction of typical features found in Area 2

Part 4: Other Areas

AREA 3

Area 3 Investigation

Trench 18 was dug over 100m along the dune ridge parallel to the beach (Figure 104). The ridge was relatively flat in this location and so the trench was designed to establish whether there were similar areas of occupation to Area 1. A parallel trench, 34, was dug approximately 10–12m west of Trench 18, with a similar aim. Another trench perpendicular to Trench 18, Trench 33 was excavated for 17m to the west near the northern end of Trench 34. However, little archaeological evidence was identified in these locations.

Despite being relatively high in the dunes, the stratigraphy in Trench 18 suggested that an earlier flooding event had occurred. A layer of consolidated finely mixed shell, with some larger shell fragments, in a dark sandy matrix was visible below the main dune layers. This appeared to be well below any specific archaeological evidence, but did suggest that a tsunami or flood event had occurred in the past across much of the dune where T10/777 was located.

A small cluster of 12 firescoops (Features 500–511) with shell midden was identified in Trench 18 (Figure 105–Figure 109). The trench was expanded at this point. These ranged in diameter from around 30cm to over 1m (see Appendix 1). All were shallow and dug into an old dune surface (Figure 106). The features were half sectioned and midden samples taken for analysis.

The firescoops all contained burnt rock and shell in loose dune sand. The rock would have had to be brought in from elsewhere as there was no obvious source at the location. Despite the number of features identified, the amount of shell midden observed was not large.

No additional structural remains were identified in the vicinity of the firescoops. The dune surface here was also less consolidated than in Area 1 and Area 2 which also suggested that the features may have been dug at a later date than found elsewhere.

Overall, the cluster of sites appeared to represent a roughly contemporary cooking area, perhaps a small campsite, occupied over a relatively short period of time.

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Figure 104. Southern end of Trench 18 looking southeast towards Area 1

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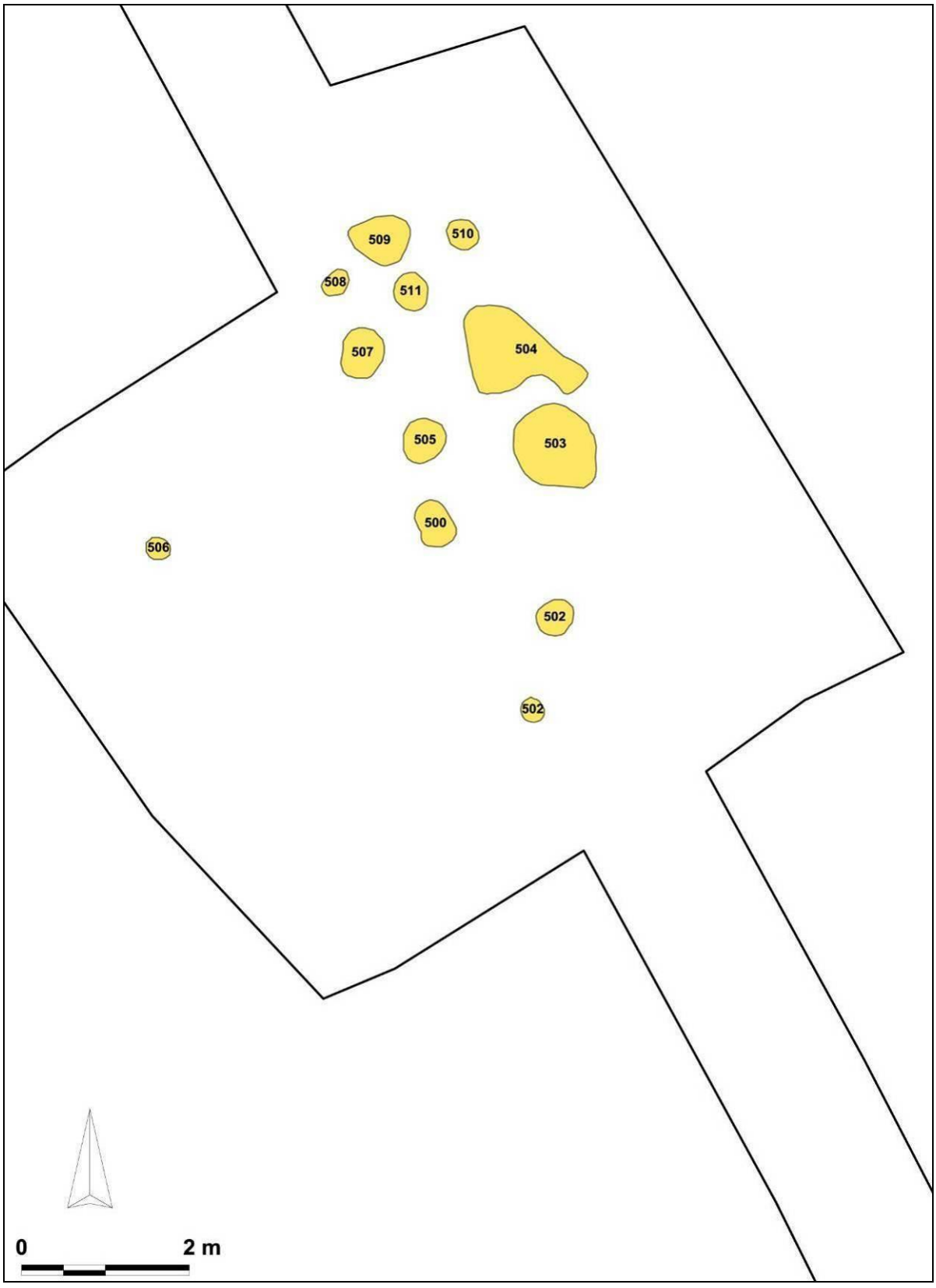

Figure 105. Firescoops in Trench 17 (Area 3)

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AREA 3, CONTINUED

Figure 106. Firescoops in Area 3 looking east

Figure 107. Area 3 looking south east

Continued on next page

Figure 108. Hangi stones within firescoop (F503) in Area 3

Figure 109. Half section view of F507 in Area 3

OTHER TRENCHES

Features Found in Other Trenches

Some isolated pits and other possible firescoops were recorded in the criss-crossing trenching in the north-west extent of the project area (Figure 110, Table 5). Trenches were generally dug to the same level as features which had been found in Area 2 (e.g., Figure 111), with occasional deeper excavations in some parts in case archaeological features were more deeply buried.

A small cluster of firescoops and pits was found in Trench 29 (Figure 112). A similar group of shallow firescoops was found at the eastern end of Trench 26.

However, little archaeological data was obtained from these features.

Table 5. Features from other trenches

Feature Number	Type
600	Firescoop
601	Firescoop
602	Bin Pit
603	Bin Pit
604	Scoop
605	Scoop
607	Pit
608	Scoop
609	Firescoop
610	Bin Pit
611	Bin Pit
612	Bin Pit
613	Firescoop
614	Bin Pit

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OTHER TRENCHES, CONTINUED

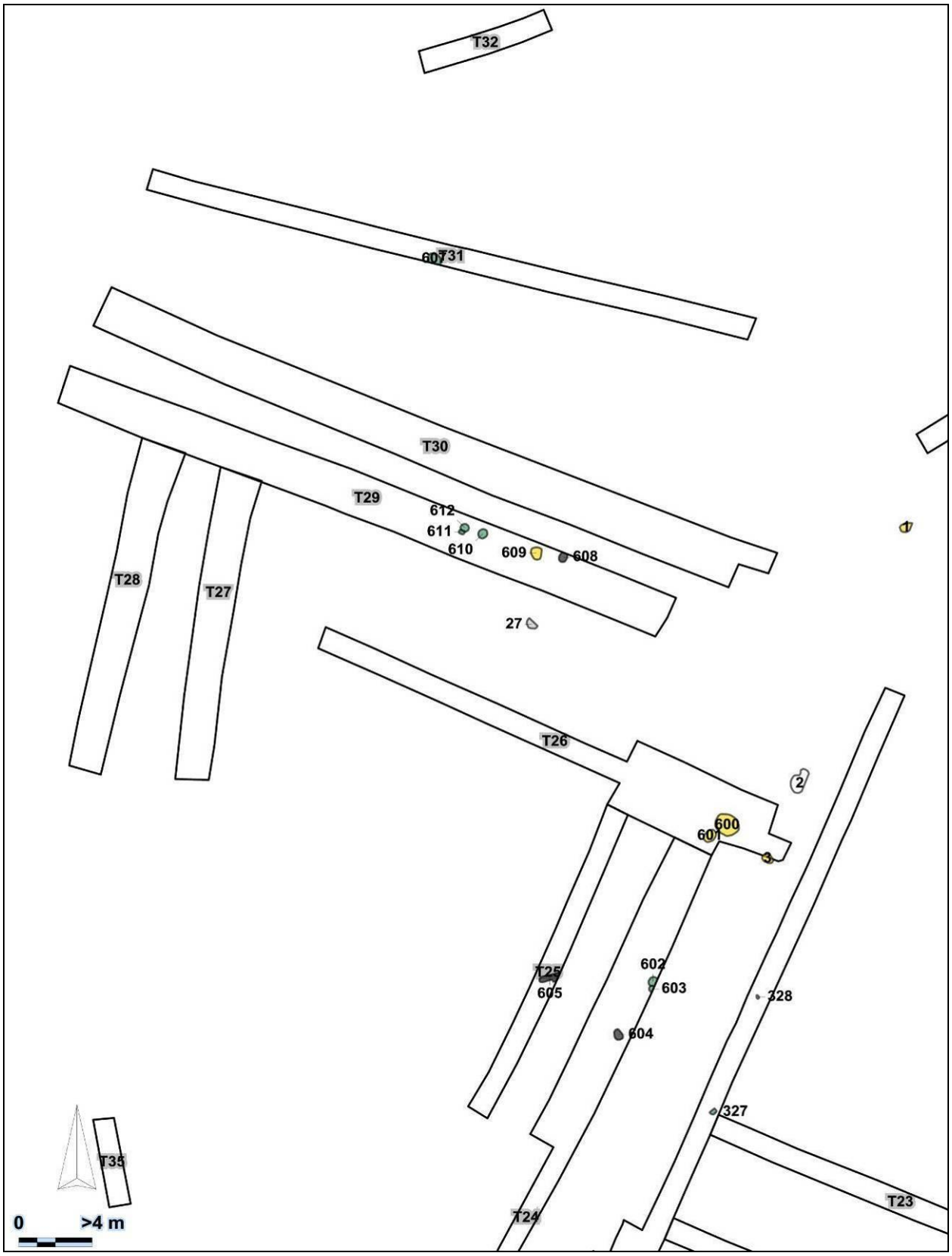

Figure 110. Plan of features in trenches in the north-west part of T10/777

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OTHER TRENCHES, CONTINUED

Figure 111. Trench 28

Figure 112. Trenches 29 (right) and 30 (left) looking east showing area of F609–612

Part 5: Analysis

INTRODUCTION

Analysis of Samples

A large number of samples of the midden, charcoal and artefacts were collected as part of the excavation work. The analysis of this material included:

- Description of major artefacts found;
- Stone tools (lithics);
- Midden analysis, including description of shellfish and fishbone;
- Environmental analysis based on description and characterisation of the charcoal samples from excavated contexts;
- Radiocarbon dating of samples.

Summary of Key Artefacts

The major artefacts recovered from the archaeological investigations included:

Area 1

- Adze rough-outs (Tahanga basalt);
- 1 flake from a polished tool made from Nelson argillite;
- Bone fishhook or pendant.

Area 2

- 3 stone sinkers for fishing nets;
- Pumice float;
- 1 reworked basalt chisel.

Obsidian and Tahanga stone flakes have also been identified and limited numbers were collected from secure contexts. These are described in detail below.

BONE FISHHOOK

Fishhook

A small complete bone fishhook (Figure 113) was found in a small pit (F122) in Area 1 during the final day's excavation. It is made from unidentified bone.

It consists of a single piece of bone, polished on the front with less finish on the back. The top is carved to allow a line to be tied around it.

The body is relatively thick and the barb leaves only a small gap for a fish to bite. It is therefore possible this was used as an ornament. The form, though, is found within early New Zealand archaeological sites (for additional discussion see Davidson 1984:62ff and Paulin 2007) as well as in central eastern Polynesia (see e.g., Allen 1996 and Mann 2009:18ff).

Figure 113. Bone fishhook (front and back view)

Continued on next page

STONE TOOLS

Introduction

Lithic analysis was undertaken by Joe Mills, who assisted with the fieldwork in 2012. This section describes the nature of the stone tool assemblage, the significance of the material represented, and the specific artefacts themselves, and offers a discussion of how the assemblage contributes to the current understanding of the site.

The collection strategy was largely based on context, with most artefacts collected from the fill of the individual features, and a few surface finds. Apart from the material associated with the midden, the fill of features was not sieved. This is likely to have resulted in a bias toward larger artefacts, but within fill artefacts would have been in a secondary context (see for example Judge et al. 2013). These issues provide some constraints on the conclusions that can be drawn regarding the nature of the assemblage at large.

Material

Basalt and obsidian were common, with a small amount of chert and other material represented (Table 6). In total, 358 individual pieces of material were collected, including cores, flakes, tools, and fragments (broken or incomplete flakes). Of these, 23 were cores, 126 were flakes, 13 were tools, 175 were fragments, and 21 were various hammerstones, grindstones, sinkers and floaters. The majority (209 pieces) were basalt, 127 pieces were obsidian, 2 were chert and the remaining 20 were general water-worn pebbles, basalt sinkers, or uncategorised.

Obsidian Source Identification

There are a number of sources of obsidian in New Zealand (Figure 114). Identification of the sources from which obsidian found at Opito came provides information regarding networks of trade and exchange across the country. (For a recent review see McCoy and Carpenter 2014).

Identification of source is generally based on identifying the colour of the obsidian in transmitted light through small pieces (Moore 1998, 2012). However, chemical techniques such as X-Ray Fluorescence (XRF) can be used to provide more specific source identification, especially where colour and other physical characteristics are not diagnostic.

The most prominent source of obsidian, from Mayor Island, is also fortunately the most distinctive and easiest to identify, with its olive-green colour and lack of spherulites and other inclusions, as well as its superior fracture qualities

All of the obsidian in the current assemblage from T10/777 can be sourced to Mayor Island with the exception of a single piece.

Continued on next page

STONE TOOLS, CONTINUED

Table 6. Lithics from the excavations

Feature	Trench	Material	Source	Count	Core	Flake	Tool	Frag	Other	Notes
7	9	Basalt	Tahanga	1	0	0	0	1	0	
18	8	Basalt	Tahanga	2	0	1	0	1	0	
25	9	Basalt	Tahanga	1	0	1	0	0	0	
28	8	Basalt	Tahanga	2	0	1	0	1	0	
66	7	Basalt	Tahanga	12	1	6	0	5	0	Flakes found in midden charcoal from bone layer concentrated above dog skeleton F108. Broken adze bagged separately. Lot of cortex.
67/69	7	Basalt	Tahanga	44	2	23	0	19	0	
114	7	Basalt	Tahanga	4	1	2	0	1	0	One large nodule which is potentially a broken preform. Also one fragment with polished edge, part of broken adze.
115	6	Basalt	Tahanga	2	2	0	0	0	0	Two large chunks. Two rough-outs maybe or a rough-out and a core. Both very large.
122	9	Basalt	Tahanga	11	0	5	0	6	0	Also some shale?
123	9	Basalt	Tahanga	1	0	1	0	0	0	Small
123	9	Basalt	Tahanga	9	1	1	0	7	0	One piece of shale
124	9	Basalt	Tahanga	10	0	5	0	5	0	One large primary flake 14cm x 5cm
125	9	Basalt	Tahanga	2	0	1	1	0	0	Small preform/rough-out
203	13	Basalt	Tahanga	6	1	3	0	2	0	One MASSIVE 17cm x 8cm core/rough-out perhaps
205	13	Basalt	Tahanga	7	0	4	0	3	0	
220	13	Basalt	Tahanga	5	0	1	0	4	0	One large primary flake with cortex
232	13	Basalt	Tahanga	3	0	1	1	1	0	Small broken preform
233	14	Basalt	Tahanga	2	0	1	0	1	0	Cortex
243	13	Basalt	Tahanga	1	0	1	0	0	0	Cortex
267	14	Basalt	Tahanga	6	0	4	0	2	0	
286	13	Basalt	Tahanga	3	0	0	0	3	0	
288	13	Basalt	Tahanga	1	0	0	1	0	0	Small preform - possibly broken
304	13	Basalt	Tahanga	18	0	9	0	9	0	One fragment with polish
372	24	Basalt	Tahanga	4	0	2	0	2	0	
373	1	Basalt	Tahana	0	0	0	0	1	0	Large broken adze rough-out
N/A	N/A	Basalt	Tahanga	1	0	0	1	0	0	Basalt preform. Large 17cm x 5cm. Cortex. Area 7/Artefact 3.
N/A	6	Basalt	Tahanga	4	0	1	0	3	0	
122	9	Chert	N/A	2	0	0	0	2	0	Some cortex. Different types of chert.

Feature	Trench	Material	Source	Count	Core	Flake	Tool	Frag	Other	Notes
7	9	Obsid	MIO	2	0	0	0	2	0	
18	8	Obsid	MIO	1	0	1	0	0	0	
18	8	Obsid	MIO	1	0	1	0	0	0	
28	8	Obsid	MIO	1	0	1	0	0	0	
46	11	Obsid	Coromandel	1	0	0	0	1	0	
78	N/A	Obsid	Mayor	2	1	0	0	1	0	
120	N/A	Obsid	Mayor	1	0	0	0	1	0	
122	9	Obsid	Mayor	11	0	5	0	6	0	
123	9	Obsid	Mayor	30	2	7	0	21	0	
125	9	Obsid	Mayor	2	0	1	0	1	0	
205	13	Obsid	Mayor	2	1	1	0	0	0	
218	13	Obsid	Mayor	1	0	0	0	1	0	Cortex
219	13	Obsid	Mayor	1	0	1	0	0	0	
220	13	Obsid	Mayor	1	0	0	0	1	0	
243	13	Obsid	Mayor	5	0	3	0	2	0	
262	13	Obsid	Mayor	3	0	0	0	3	0	
267	14	Obsid	Mayor	2	0	1	0	1	0	Cortex
280	13	Obsid	Mayor	15	1	4	0	10	0	
281	13	Obsid	Mayor	1	0	0	0	1	0	
286	13	Obsid	Mayor	5	3	1	0	1	0	
288	13	Obsid	Mayor	3	1	0	1	1	0	One fragment with use wear
288	13	Obsid	Mayor	3	0	1	0	2	0	
300	N/A	Obsid	Mayor	1	0	1	0	0	0	
304	13	Obsid	Mayor	2	0	0	0	2	0	
305	13	Obsid	Mayor	2	1	1	0	0	0	
354	N/A	Obsid	Mayor	1	0	0	1	0	0	Use wear or resharpening on one edge
363	N/A	Obsid	Mayor	9	0	2	0	7	0	
371	24	Obsid	Mayor	6	2	3	0	1	0	
505	18	Obsid	Mayor	1	0	0	1	0	0	Use wear on one edge - notched scraper?
67/69	7	Obsid	Mayor	10	2	4	0	4	0	
N/A	N/A	Obsid	Mayor	1	1	0	0	0	0	Area 7 Artefact 2?
7	9	Other	N/A	3	0	0	0	0	3	Grindstones/hammerstones
120	?	Other	N/A	1	0	0	0	0	1	Sinker with notching
123	9	Other	N/A	3	0	0	0	0	3	Two rocks, one pumice floater
203	13	Other	N/A	1	0	0	0	0	1	Hammerstone
232	13	Other	N/A	3	0	0	0	0	3	Grindstones/hammerstones
265	14	Other	N/A	1	0	0	0	0	1	Sinker with notching

Feature	Trench	Material	Source	Count	Core	Flake	Tool	Frag	Other	Notes
286	13	Other	N/A	1	0	0	0	0	1	Hammerstone
304	13	Other	N/A	1	0	0	0	0	1	Grindstone potentially
372	24	Other	N/A	2	0	0	0	0	2	Hammerstones
67/69	7	Other	N/A	1	0	0	0	0	1	Odd rough rock. Grinder?
N/A	14	Other	N/A	1	0	0	0	0	1	Sinker with notching
114	7	Pumice	N/A	1	0	0	0	0	1	Pumice floater
			Total	310	23	113	7	148	19	

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STONE TOOLS, CONTINUED

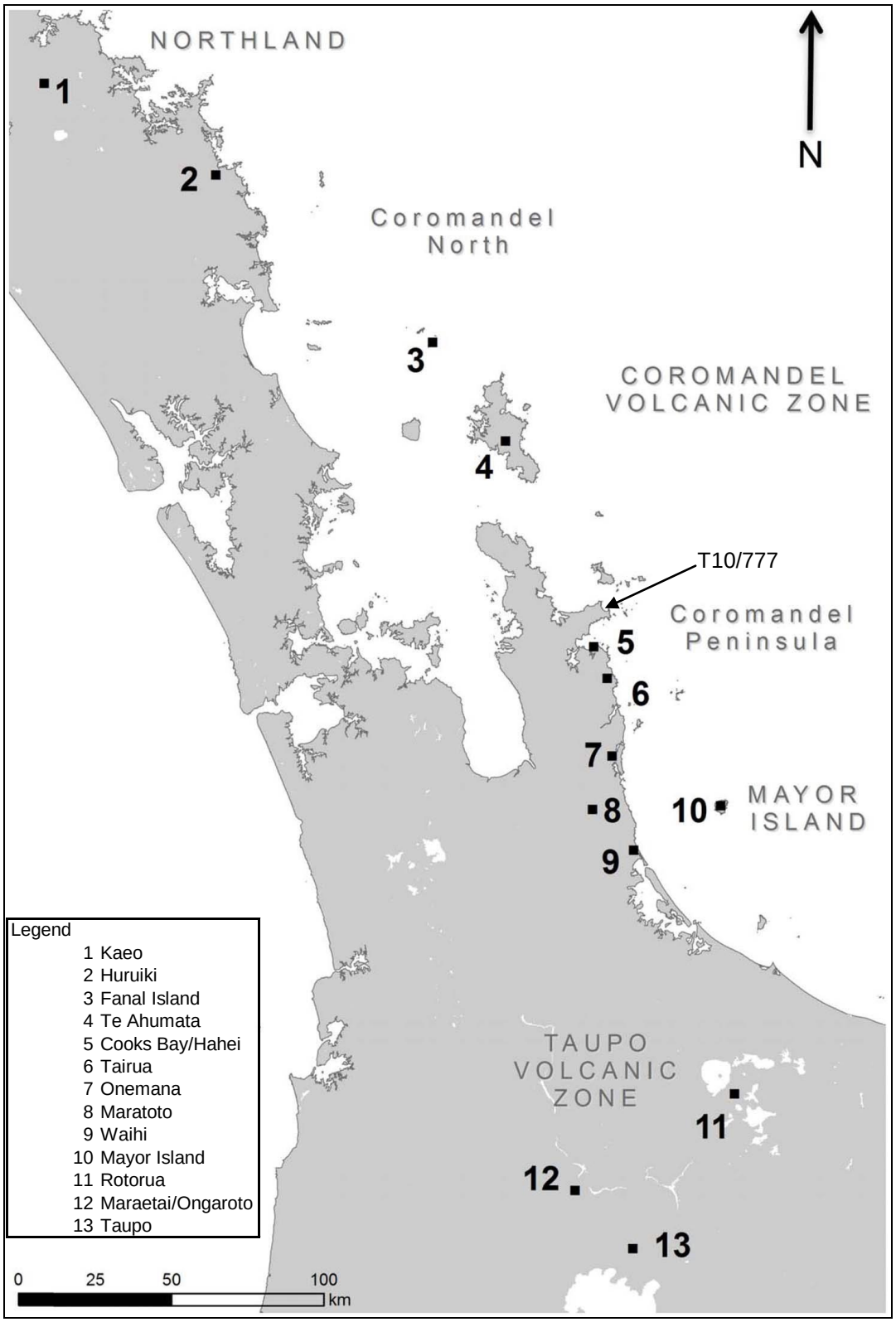

Figure 114. Sources of obsidian in the central and northern North Island (McCoy and Carpenter 2014:Figure 2)

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Obsidian Source Identification (continued)

The anomalous piece displays many characteristics of Coromandel obsidian, including a light grey colour in transmitted light, with a number of inclusions but few spherulites (Figure 115). The piece probably comes from an obsidian source at Cook's Beach, south of Whitianga.

Despite a number of equally accessible and adequate obsidian sources closer to the T10/777 site (e.g., Te Ahumata, Cook's Beach, Hahei), Mayor Island dominates. This is typical of most Coromandel sites. The obsidian was either traded to Opito by visiting groups, or procured from those groups with directed access to the material on the island. With the valuable high-quality Tahanga basalt source near to T10/777, a lively exchange of obsidian for basalt may have been occurring.

The obsidian itself was likely to have been used as a sharp cutting tool, much like a knife-blade today. Flakes would have been used largely for butchering meat, including fish and large mammals, and for the harvesting and preparation of fibres for rope and line manufacture. Many of the obsidian flakes show signs of use through edge-wear or retouching, with micro-flakes having been removed from an edge to rejuvenate and sharpen the cutting edge (e.g., Figure 116).

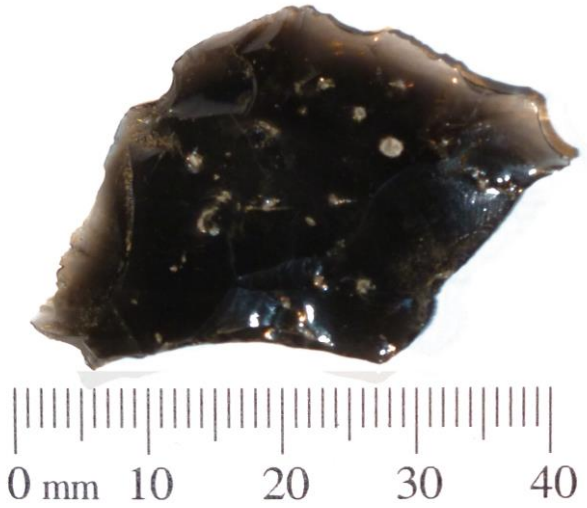

Figure 115. Obsidian from F46, likely to be of Cook's Beach origin

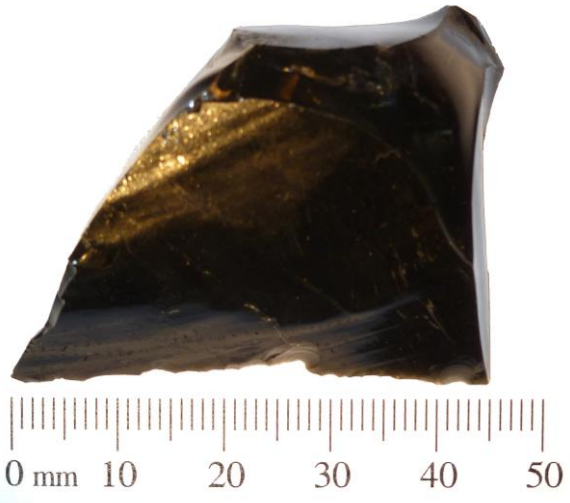

Figure 116. Obsidian flake from F505 with retouched edge

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Basalt

The basalt found at T10/777 was entirely from the source at Tahanga Hill, approximately 2.5km south of T10/777. Tahanga basalt is prolific in earlier prehistoric New Zealand contexts, and was likely to have been prized for its workability, being easily flaked and ground for the creation of adzes. It was also widely circulated, and is commonly found in sites significant distances from the source, with a wide distribution across the North Island at least south to Gisborne (Figure 117; Sheppard 2004; Turner 2000). T10/777 is in a desirable location, being within walking distance of Tahanga Hill, ensuring a ready supply of raw material with a range of choices of manufacturing strategies.

Yet despite groups living at T10/777 having ready access to Tahanga basalt, the amount of basalt found in the excavations was relatively small and was largely comparable with the obsidian sourced from farther afield.

Possible explanations of this include the hypothesis that the majority of flaking or adze manufacture is likely to have occurred at the source at the Tahanga quarry (Turner 1992). Rather than transporting large cobbles for subsequent flaking and manufacture, the primary reduction was undertaken at the source, providing a more manageable 'blank' that could be transported with ease and finished at the home base. There is some support for this hypothesis in the assemblage, with the presence of a number of large preforms of considerable size in varying stages of reduction and finish (e.g. Figure 118–Figure 124). Further evidence comes from the lack of cortical flakes in the assemblage, with only nine pieces displaying cortex and very few pieces with significant cortical surfaces. The removal of the weathered cortical exterior of the rock tends to be the first stage in tool manufacturing and in the 'reduction' sequence of the technology (Turner 1992).

It is apparent that there were very few independent flaking events at T10/777, with only one context providing a likely flaking event. Within Area 1, Feature 67 (midden), two patches of flakes were found (F69 and F84) with two cores, 23 flakes and 19 fragments. This pattern, when spatially constrained within the midden, seems to indicate a distinct flaking event probably related to food preparation.

A second explanation may come from an understanding of the function of particular features in sites. If the site at T10/777 was regarded primarily as a place of food manufacture, storage, and consumption (as the majority of features would suggest), then the absence of major basalt deposition makes sense. Basalt may not have been used in these activities, but instead sharper more readily flaked material like obsidian would be used (and is well represented in the assemblage), particularly for butchery.

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STONE TOOLS, CONTINUED

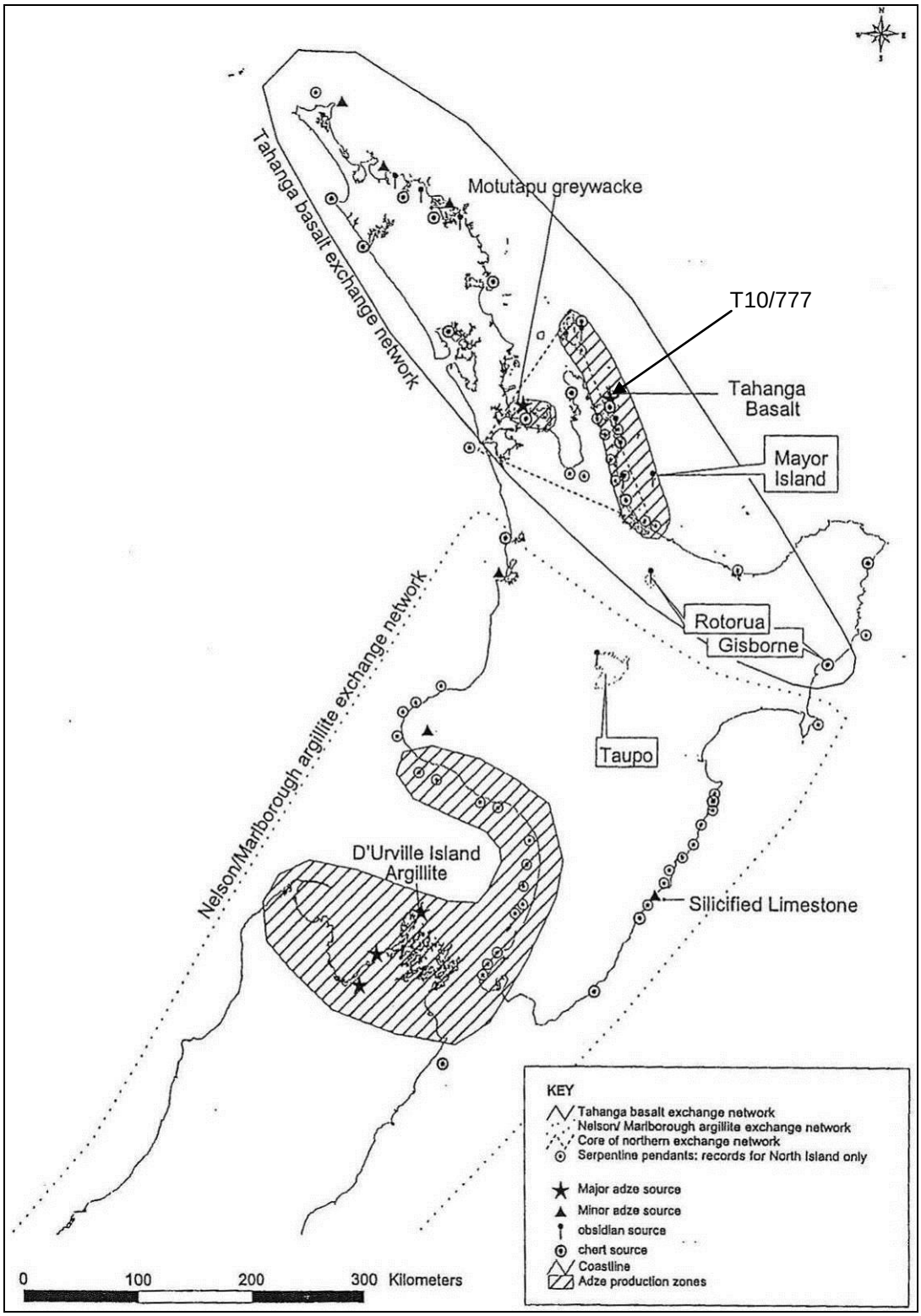

Figure 117. Stone tool sources, production zones and exchange networks (Turner 2000:442, Figure 6.1)

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Basalt (continued)

Basalt, being used for more heavy duty manufacturing tasks, particularly as ground-stone implements, would have minor importance in the more domestic activities that T10/777 seems to represent. This is further supported by the relative lack of finished basalt tools, or even discarded broken tools.

Finally, it is possible that given the value of the finished tools, these were removed from the site whenever it was abandoned.

Basalt Items

Some basalt items of particular interest were identified in the assemblage. Most notable were a number of polished flakes (e.g., Figure 120), having been removed from a finished adze and discarded at some point. This indicates some resharpening or repurposing of finished tools at the site, or significant use leading to breakage, but the evidence makes it difficult to say how common this was.

A polished basalt chisel was retrieved from F364 (Figure 121). It is approximately 7cm long and 3cm wide at its widest point, tapering to the haft end. The blade end is finely polished, with micro flakes removed, likely breaking during use. It has a latitudinal artificial break at the haft end. A piece such as this is likely to have been used for fine woodworking and carving.

A broken basalt preform was recovered from F66 (Figure 122). It is approximately 10cm long and 5cm wide at its widest point, tapering toward the haft end. It has an artificial longitudinal split down the centre, probably causing it to have been abandoned, possibly during the manufacturing process. It is finely flaked on the remaining lateral edge and the blade edge. There is some polish present on both sides of the preform toward the blade edge.

A rough basalt drill point was recovered from F33 (Figure 123). It is approximately 7cm long and 3cm wide at its widest point, tapering to a distinct point. It is roughly flaked but appears to have the hallmarks of a drill point, which was used for punching and drilling holes in soft materials.

An unfinished basalt preform was recovered from F7 (Figure 124). It is approximately 10cm long and is uniformly 5cm wide. It has a triangular blade shape, with a flattened base. There is some cortex present, and some polish on a number of surfaces. It has been broken latitudinally toward the haft end.

A large broken adze rough-out (Figure 125) was found in F373.

Argillite

An argillite fragment was also found in the main midden area F67 and was identified as likely to be from Nelson (Figure 126).

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Figure 118. Basalt preform from F115

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STONE TOOLS, CONTINUED

Figure 119. Basalt preform from Area 1 (general find)

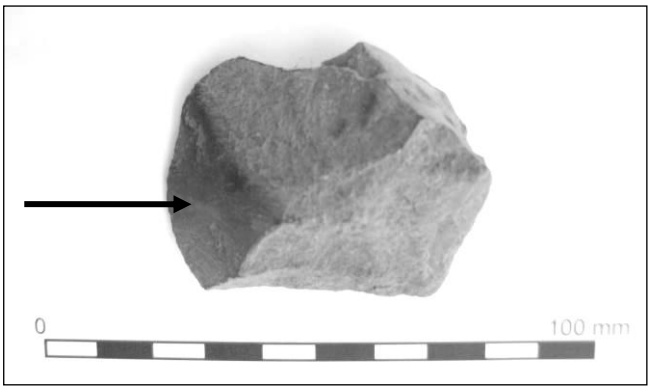

Figure 120. Polished basalt flake (adze trim) from F238

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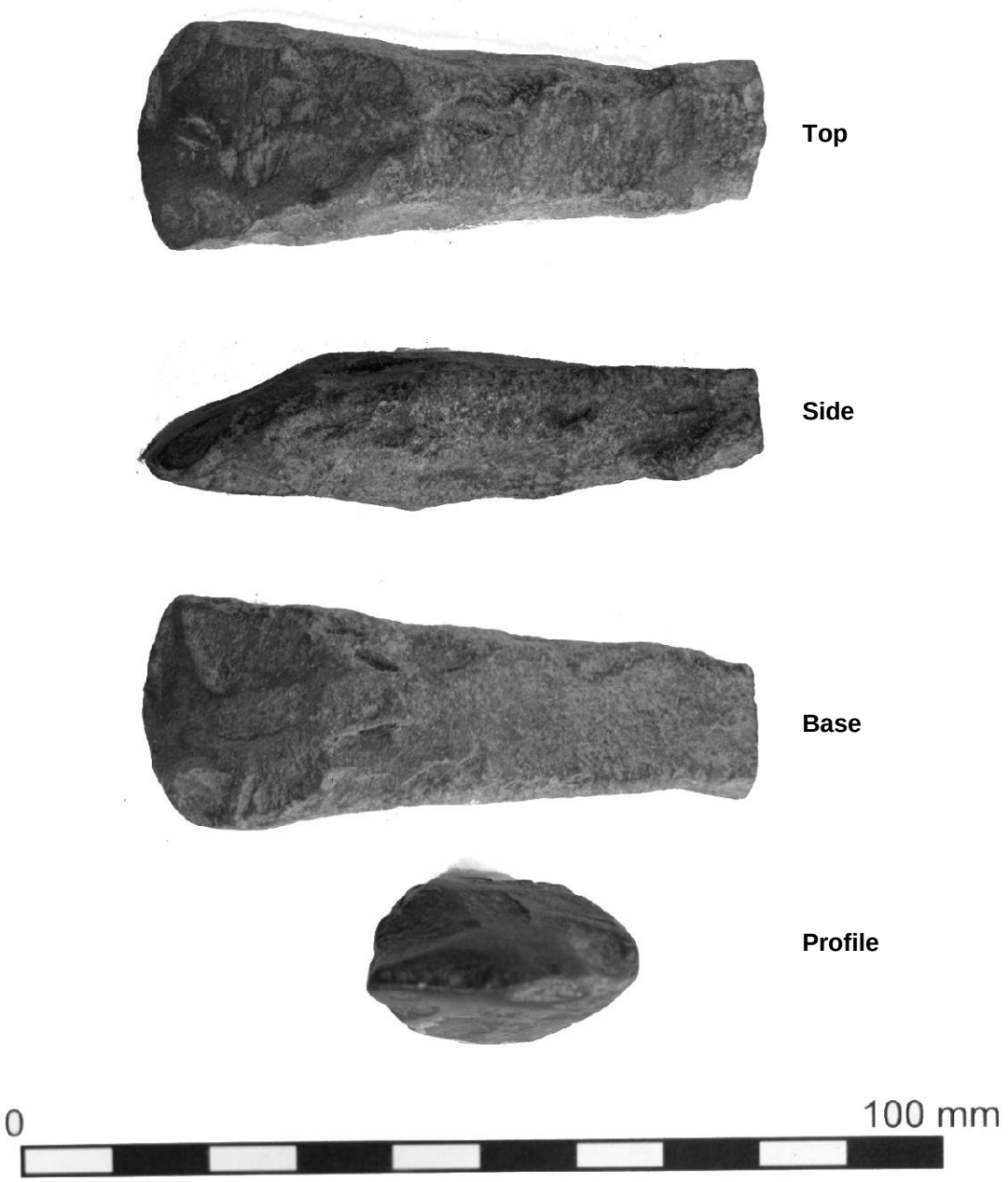

Figure 121. Basalt chisel from F364

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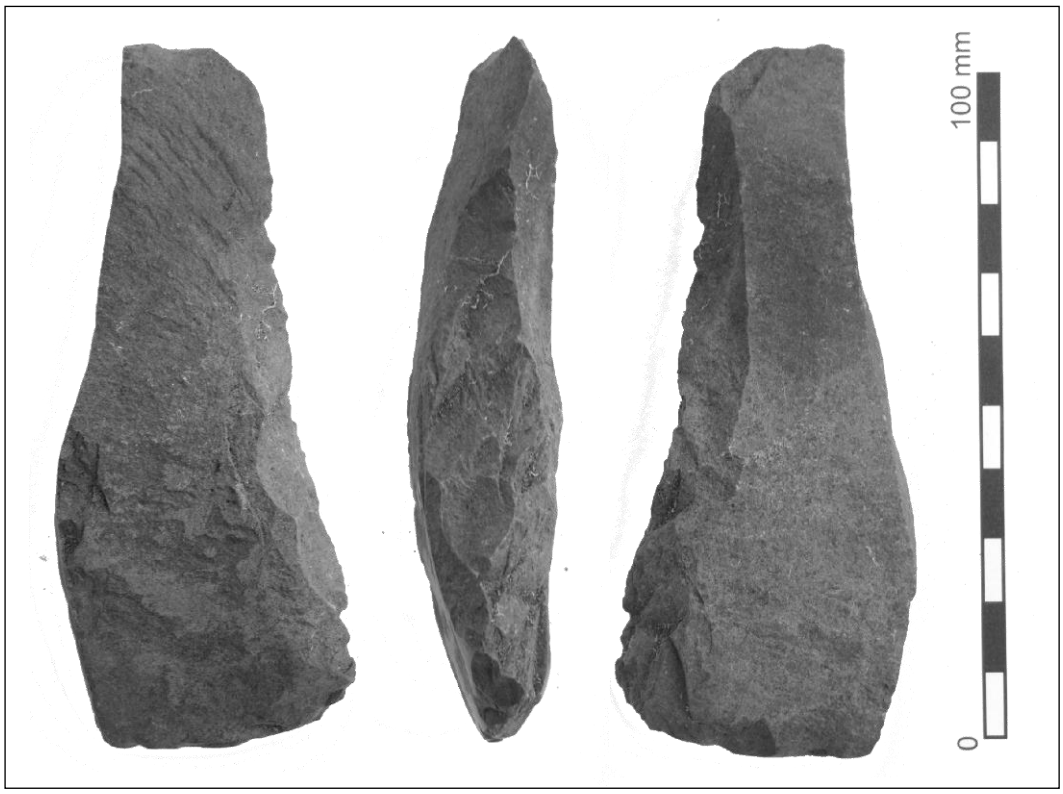

Figure 122. Broken basalt preform from F66

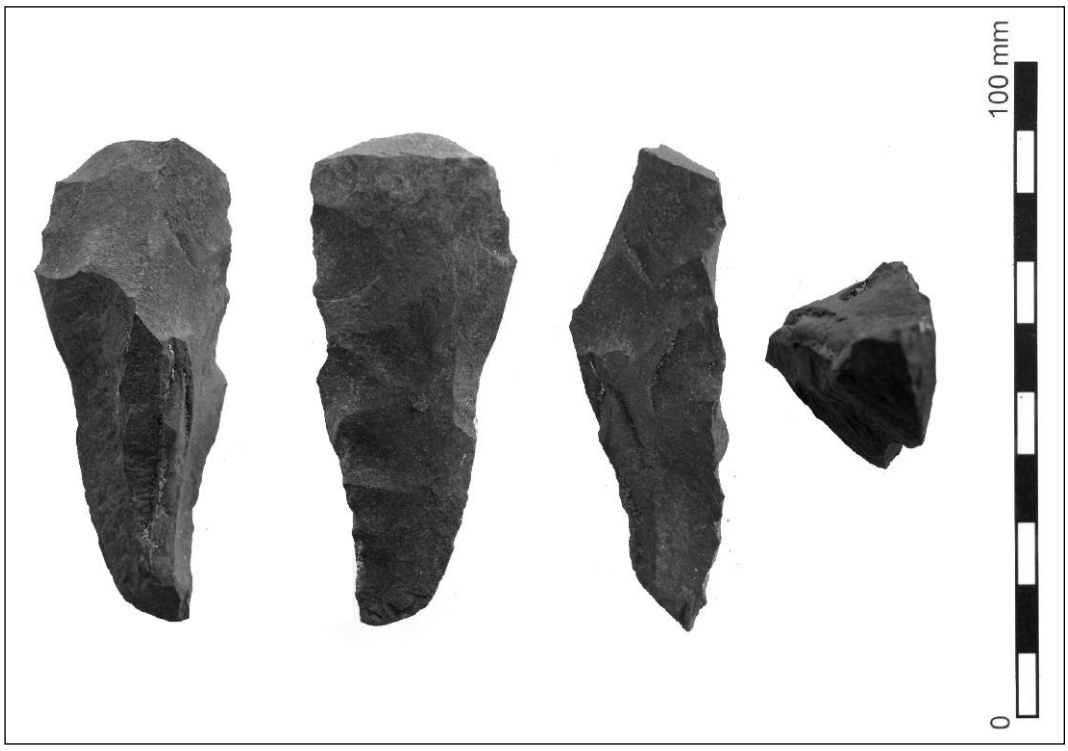

Figure 123. Small basalt drill point preform from F33

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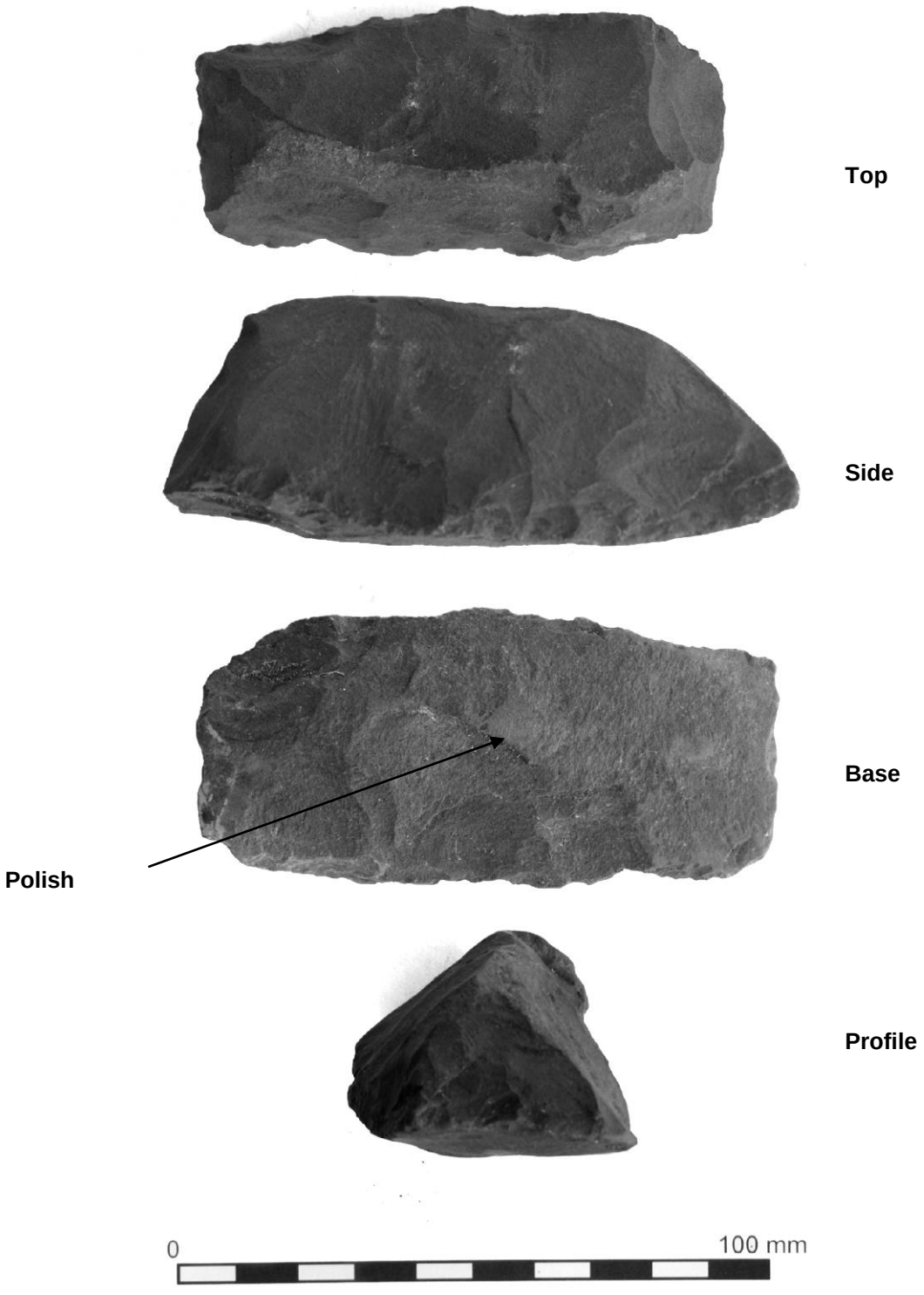

Figure 124. Unfinished basalt adze preform with small amount of polish on the base from F7

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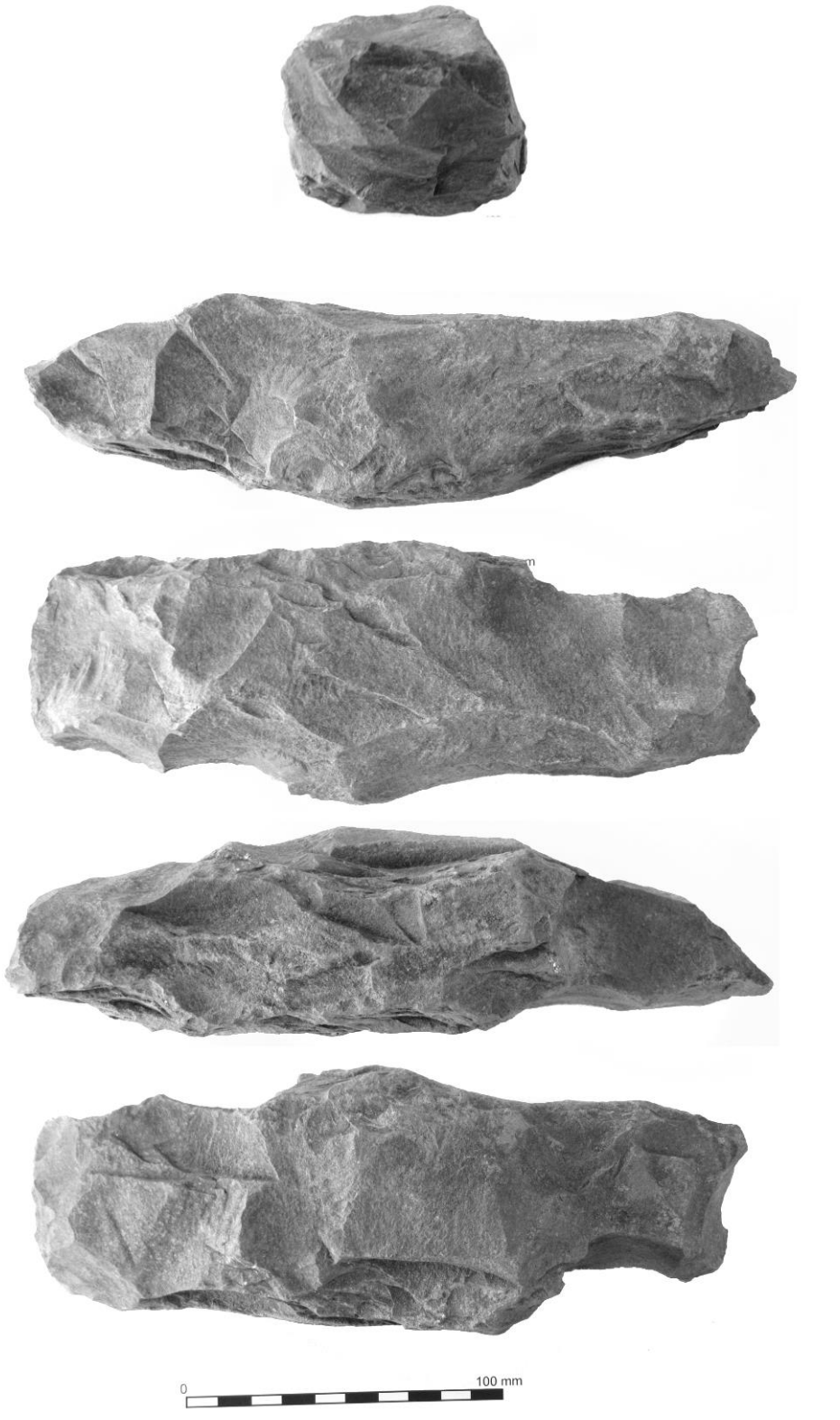

Figure 125. Large basalt rough-out from F373

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Chert

Chert was rare at T10/777 with only two pieces found (see e.g., Figure 127). Chert often provides a significant aspect of Coromandel lithic assemblages, and there are a number of sources of chert relatively close to Opito Bay (Figure 117). It seems likely that activities that might have suited chert were being met by other material, such as obsidian for butchery.

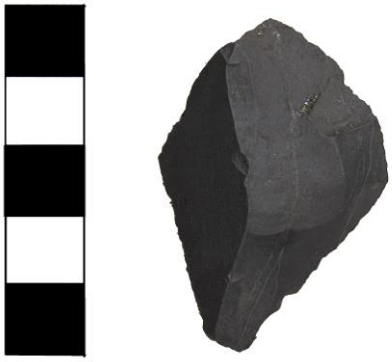

Figure 126. Flake from argillite tool (Area 1 midden F67)

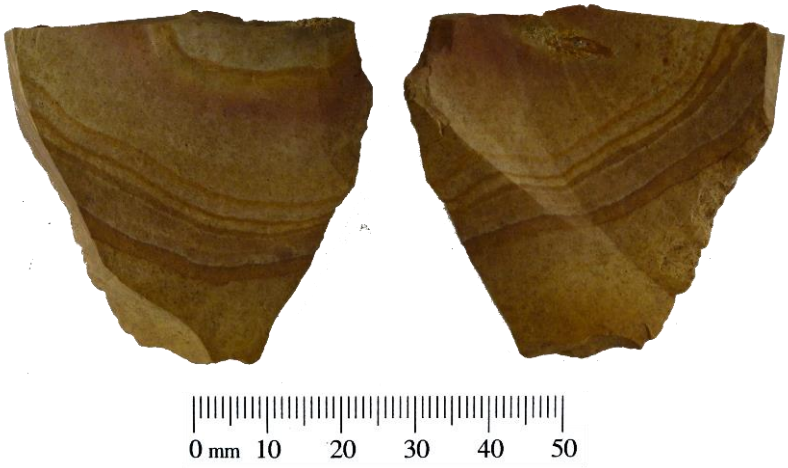

Figure 127. Chert from F122

Tools

Included in the assemblage were three sinkers, identified as such due to their distinctive binding marks (Figure 128). Two of the three sinkers had binding marks in only a single direction, while the third had multidirectional binding marks.

The type of rock used for each sinker seems to be distinct, with two appearing to be standard water-rolled stones, while the other is more weathered and distinctly angular.

The sinkers are evidence of the use of fishing nets: manufacture, repair and general use in fishing was occurring. The number of sinkers is low, relative to the number typically used in nets (Leach 2006:112), but many would have been lost in the sea or transported away with the nets rather than discarded.[4]

Continued on next page

[4] For further information refer to F. Leach's (2006) *Fishing in Pre-European New Zealand*

Tools (continued)

The remainder of the overt tools consisted of hammerstones (numbering around 10) and somewhat more tenuous grindstones (fewer than five). The hammerstones in this assemblage mainly consist of water-rolled stones, roughly palm-sized and quite dense. The stones have obviously been selected specifically and transported to site. While ascribing a function to a fairly indistinct, rounded stone can naturally be difficult, a number of the stones have what appears to be use wear on striking surfaces, with unnaturally flattened faces which show signs of repeated striking. This lends support to the idea that they were used as hammerstones. Their presence at T10/777 is unsurprising due to the obvious stone flaking practices both at the site and at the nearby Tahanga quarry. Their abandonment at the site is somewhat puzzling, as hammerstones have been recorded as being transported with people as part of what can be described as a portable toolkit. It is possible that the hammerstones at T10/777 were being stored in pits especially for use upon return to the site and not collected after abandonment of the site.

Grindstones

The grindstones are far more difficult to evaluate. None of the possible examples show definitive signs of grinding, such as wear marks or ground indentations. Instead these items have been given the attribution of grindstones due to a lack of any real other explanation for their presence, or the potentiality for grinding activities. They are commonly elongated, smaller, water-rolled pebbles with flattened, slightly concave faces or larger slabs of uncommon material such as a broken sandstone cobble with multiple flat faces. Grindstones were commonly used in the finishing of ground stone tools, such as adzes which are known at the site and in the nearby area, and for the manufacture of implements of soft organic materials, such as the bone fishhook found at the site. It is extremely likely that grinding implements were in use at T10/777, but assigning definite functions for the potential grindstones in the assemblage is overwhelmingly difficult.

Pumice Floats

Two pumice floats were recovered from distinct contexts. While one can definitely be deemed a float (Figure 129), due to the distinctive binding grooves carved around it, the other is more tenuous. The second is badly degraded, and may have been used as a float, but the damage is significant and makes identification particularly difficult. Both are roughly fist-sized, and would have been used as floats for fishing nets (Leach 2006).

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Figure 128. Sinkers: left to right from F120, Trench 14 general area, and F265

Figure 129. Pumice float from F238

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Discussion

Certain conclusions about the prehistoric population which inhabited T10/777 can be drawn from the lithic assemblage excavated at the site. Firstly, it is evident from the nature of the obsidian assemblage that the population was either highly mobile, travelling some distances to obtain resources, or they were engaged in substantive trade networks which would allow for exotic resources to be obtained. The proliferation of obsidian from Mayor Island (some 75km away, in straight line distance), and the dearth of obsidian from other closer sources displays a preference for higher-quality material, despite a greater cost to obtain it.

Secondly, the bulk of basalt reduction and working was evidently done away from the site at T10/777. The small proportion of basalt flakes and fragments is surprising, given the relative proximity of the Tahanga basalt source. It is likely that the population at T10/777 travelled to the source at Tahanga to quarry and prepare the bulk of the basalt needed to produce the ground-stone tools which were extremely important in the prehistoric Maori 'toolkit'. Preforms and rough-outs were then transported to site for finishing, evidenced by the presence of these forms. There was some evidence of re-sharpening of these ground-stone implements with polished adze flakes being found, likely to have been removed so that the tools could be re-ground to produce a sharper, refreshed edge, or as accidental breakage during use.

Finally, the population at T10/777 were engaged in net-fishing. The sinkers and floats found suggest possible net manufacture or repair was being undertaken. Maritime resources provided an important dietary element, further evidenced by the shellfish remains in midden. The fishhook found in Area 1 may have been ornamental, but similar ones are likely to have been used for line fishing, although here again the hook may have been re-deposited from an earlier settlement nearby and not indicative of the later activities represented on the site.

The lithic assemblage provides an insight into the everyday activities of the population at T10/777, with the different materials used for particular tasks, providing the means of manufacturing important tools, and the role of those tools in the gathering and preparation of foodstuffs for subsistence.

SHELLFISH

Midden

Most of the midden samples came from Area 1 in the area that was originally identified by Gumbley and Hoffman (2007a) in their Trench 14. As discussed earlier, this was excavated completely, and samples from different parts of the midden were collected as it was apparent that a number of events were represented by the collection. The features analysed were:

Area 1

- Feature 21 (scoop)
- Feature 65 (pit)
- Feature 67 (midden)
- Feature 69 (midden)
- Feature 84 (working area)
- Feature 109 (bin pit)
- Feature 113 (midden)

Area 2

- Feature 341 (firescoop)
- Feature 380 (rua)

Area 3

- Feature 503 (firescoop)
- Feature 505 (firescoop)

The shellfish data is summarised in Table 7 and clearly shows the dominance of Tuatua (*Paphies subtriangulata*) in the samples in all excavated areas. There is some diversity of species in the larger middens but these mostly appear to be by-catch.

Feature 21

Feature 21 was a relatively small feature and the shells were separated from the soil, charcoal and smaller fragments of shell, not affecting data collection, leaving 92 grams. Bone material was separated for further analysis with 2 grams collected. Eight different species were identified, the majority represented by fewer than three examples each. The overall MNI for the assemblage was 47.

Continued on next page

Feature 21 (continued)

The single greatest contributor to the assemblage was Tuatua (*Paphies subtriangulata,* Figure 130), with at least 17 individual shellfish present. The MNI was calculated from 11 complete shells and 23 incomplete shells where the hinges were intact. Complete shells were measured to establish the size range: the smallest at 22.37mm and the largest at 34.54mm.

A single large Scallop shell (*Pecten novaezelandiae,* Figure 130), one cockle shell (*Austrovenus stutchburyi*, Figure 131), and one Common Trophon (*Xymene plebius,* Figure 131) were noted. At least two Green Mussel (*Perna canaliculus*, Figure 131), two Paua (*Haliotis iris,* Figure 131), two Cat's Eye (*Turbo smaragdus,* Figure 131), and three Denticulate Limpet (*Cellana denticulate,* Figure 130) were identified. A small portion of a single Dark Top Shell (*Melagraphia aethiops,* Figure 131) was also identified. Seven small opercula were noted, but species identification could not be determined with accuracy.

Feature 65

Feature 65 sample had a total of 168g of identified shell of which 96 grams was identified as *Turbo smaragdus* (Cat's Eye). Fragments of shell which did not impact on MNI were not included in this weight.

This feature contrasted with others analysed from T10/777 in that the predominant species was collected from a rocky shore environment with smaller numbers of individual sandy shore species. A minimum of 61 *Turbo smaragdus* shells were identified, although none were complete examples. Thirty two opercula were identified with the majority probably associated with the *Turbo* species. Other rocky shore species identified included one example of a Black Nerita (*Nerita atramentosa*), a partial Cook's Turban (*Cookia sulcata*), and three examples each of Green Mussel (*Perna canaliculus*) and Dark Top Shell (*Melagraphia aethiops*).

Sandy shore species included eight examples of the Stanger's Trophon (*Paratrophon quoyi*), and a minimum of five Tuatua (*Paphies subtriangulata*) represented by four whole shells and six hinge portions. The largest whole shell measured 32.28mm and the smallest 22.32mm, with all four considered adult specimens. At least one Pipi (*Paphies australis*) was present represented by two hinge portions, and at least one Queen Scallop (*Pecten novaezelandiae*) was recorded.

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Figure 130. Scallop, Tuatua and Denticulate Limpet identified in F21 scoop

Figure 131. Top: Cat's eye, Dark Top Shell, opercula; middle: Green Mussel and Cockle; bottom: Common Trophon and Paua

Continued on next page

Table 7. Summary of MNI of shellfish species by feature

Name	Species	F21	F65	F67	F69	F84	F109	F113	F341	F380	F503	F505	Total
Cockle	*Austrovenus stutchburyi*	1		2					5				8
Pipi	*Paphies australis*		1	2	5	24		3		2			37
Tuatua	*Paphies subtriangulata*	17	5	1023	603	45	50	1543	173	22	62	96	3639
Ostrich Foot	*Struthiolaria papulosa*			1	3					6			10
Scallop	*Pecten novaezelandiae*	1	1	2	4	4	1	2	4	5		1	25
Paua	*Haliotis iris*	2								10			12
Cat's Eye	*Turbo smaragdus*	2	61	2	6	13		3	3	5			95
Kina	*Evechinus chloroticus*			1	2	1	1						5
Siphon Whelk	*Penion sulcatus*									1			1
Cook's Turban	*Cookia sulcata*		1	2	4	2			2	7			18
Dark Top Shell	*Melagraphia aethiops*	1	3	2	7	2		3	3				21
Denticulate Limpet	*Cellana denticulata*	3				3			2				8
Green Mussel	*Perna canaliculus*	2	3	1	8	13			5				32
Common Trophon	*Xymene plebius*	1											1
Black Nerita	*Nerita atramentosa*		1	1		1		1					4
Stanger's Trophon	*Paratrophon quoyi*		8						1				9
Dosinia	*Dosinia* sp.			1									1
Radiate Limpet	*Cellana radians*			1	5	1				9			16
Small Dog Cockle	*Glycymeris modesta*				2								2
Ornate Limpet	*Cellana ornata*				1								1
Ribbed Slipper Shell	*Crepidula costata*				2	2			3				7
White Rock Shell	*Dicathais orbita*					4				1			5
Tusk Shell	*Antalis nana*					1							1
Knobbed Top Shell	*Diloma bicanaliculus*							1					1
Round Wedge Shell	*Pseudacopagia disculus*								4				4
Circular Slipper Shell	*Sigapatella novaezelandiae*								1				1
Cask Shell	*Tonna cerevisina*									3			3
Oyster Borer	*Lepsiella scobina*									3			3
Cominella sp.	*Cominella* sp.									1			1
Unidentified Gastropod	Unidentified											2	2
Total		**30**	**84**	**1041**	**652**	**116**	**52**	**1556**	**206**	**75**	**62**	**99**	**3973**

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Feature 67

A small quantity of shell was collected from Feature 67 with a total shell weight of 29g. All of the shell recovered was identified as *Paphies subtriangulata* (Tuatua) and a minimum of 17 individual shellfish were calculated. Twenty-eight shells were considered complete enough to measure width, with the largest measured at 32.74mm and the smallest at 18.26mm. The majority of these specimens measured between 20mm and 30mm. A further six shells were identified from hinged portions.

Eleven fragments of fire cracked rock were noted (Figure 132), and a quantity of fishbone was submitted for further analysis. Charcoal was also noted within the sample submitted.

Figure 132. Fire cracked rock from F67

Continued on next page

Feature 69

A bulk sample from Feature 69 was submitted for analysis with the largest single contributor being that of *Paphies subtriangulata* or Tuatua. The total MNI for all species totalled 557 with 538 or 96.5% attributed to tuatua. The MNI for Tuatua was calculated from 747 complete shells and 329 incomplete hinged portions. Of the measureable Tuatua 66 individual shells measured less than 20mm in size, or 9% of the assemblage. When measured 645 shells measured 20–29.99mm equating to 86% of the measureable Tuatua. 25 shells measured 30–39.99mm (3.5%), nine measured 40–49.99mm (1%) and just four shells measured over 50mm (0.5%), the size at which Tuatua are considered sexually mature (Grant and Hay 2003).

Other sandy shore species identified include *Paphies australis* or Pipi, with a single shell collected measuring 38.69mm, two examples of *Glycymeris modesta* or Small Dog Cockle and a single example of a *Struthiolaria papulosa* or Ostrich Foot. These particular specimens may have been the result of by-catch targeting the main Tuatua bed.

Rocky shore species include five *Melagraphia aethiops* (Dark Top Shell), four *Turbo smaragdus* (Cat's Eye), two *Cookia sulcata* (Cook's Turban) and single examples of *Cellana radians* (Radiata Limpet), *Cellana ornate* (Ornate limpet) and *Crepidula costata* (Ribbed Slipper Shell). A small fragment of Kina or *Evechinus chloroticus* was also recorded.

A sample of midden above the pit fill in Feature 69 produced an MNI of 95 representing 11 species. The largest single contributor to the sample was *Paphies subtriangulata* or Tuatua with a minimum of 65. This number was calculated from 78 whole shells and 52 fragments where the hinge was intact. Of the whole measureable shell 49% of the sample (N=38) measured between 20mm and 29.99mm, 24% (N=19) measured 30–39.99mm, 15% (N=15) measured 40–49.99mm and 8% (N=6) measured over 50mm, indicating sexual mature specimens (Grant and Hay 2003).

Other sandy shore species include at least four *Paphies australis* or Pipi, four *Pecten novaezelandiae* or Scallop and two *Struthiolaria papulosa* (Ostrich Foot). Rocky shore species include at least eight *Perna canaliculus* (Green Mussel), four *Cellana radians* (Radiate Limpet), two examples each of *Cookia sulcata* (Cook's Turban), *Melagraphia aethiops* (Dark Top Shell) and *Turbo smaragdus* (Cat's Eye), one of which was large, having a width of 48.19mm and a height of 39.32mm. Single examples of *Crepidula costata* (Ribbed Slipper Shell) and *Evechinus chloroticus* (Kina) were recorded.

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Feature 84

Thirteen individual shellfish species were identified among the material recovered from Feature 84, with four bivalve species and nine univalve species identified. One example of a sea urchin was also recorded. A sizeable quantity (2795 grams) of lithic material was separated out. Shell fragments not contributing to species identification or a minimum number of individuals were separated out and weighed 899 grams. Seven grams of fishbone were separated for further analysis, and 205 grams of sand with small fragments of shell, charcoal, and roots was recorded.

Pipi shell and Tuatua were the greatest contributors to the overall MNI. A minimum of 24 individual Pipi were calculated from 24 complete shells and 23 portions with the hinge intact. The complete shells were measured and ranged from 33.77mm to 56.56mm; six of the examples being >50mm in size.

Tuatua comprised 35 complete shells and 54 incomplete shells with intact hinges, suggesting at least 45 Tuatua were present. Tuatua shells ranged in size from 19.58mm to 48.19mm. At least four Scallop (*Pecten novaezelandiae*) were found, with one being adult and 3 juveniles. The remaining bivalve species, *Perna canaliculus* or Green Mussel, was represented by a minimum of 13 examples.

Twenty-nine individual univalve shells were identified representing ten species. The most common univalve species was Cat's Eye (*Turbo smaragdus*) with a minimum of 13 specimens. Three small opercula are potentially associated with this species. Four specimens of White Rock Shell (*Dicathais orbita*) and two of Cook's Turban (*Cookia sulcata*,) were identified as the largest of the univalve species present. Portions of at least two large opercula may have been associated with these species.

Two species of limpets were identified. Three examples of the Denticulate Limpet (*Cellana denticulata*) and one example of a Radiate Limpet were noted. Two examples of a Ribbed Slipper Shell (*Crepidula costata*) were also identified. The limpets and slipper shells may have been collected as by-products of the catch rather than targeted species.

The three remaining species of univalves included two examples of Dark Top Shell (*Melagraphia aethiops*), one Black Nerita (*Nerita atramentosa*), and a single example of a Tusk Shell (*Antalis nana*). This latter species is uncommon, living in deep water (Riley 2003), and it is likely the shell washed ashore after the death of the univalve. Riley (2003) notes that Maori made use of this particular species by stringing them into a necklace.

Small fragments of at least one Kina (*Evechinus chloroticus*) were identified The Kina is a sea urchin, generally harvested by Maori in the summer months when roe was produced.

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Feature 109

Analysis of the shell within Feature 109 showed it was almost exclusively *Paphies subtriangulata,* Tuatua, with single examples of two other species identified. A total of 493 grams of tuatua shell was collected and 91 complete shells identified; nine further shells contained hinged portions but were too incomplete to measure maximum width of shell. A minimum of 50 individual Tuatua were present. Of the complete examples the largest shell width was 63.60mm and the smallest 32.54mm.

One example of a *Pecten novaezelandiae* or Queen Scallop was noted, but was incomplete. A very small fragment originating from an *Evechinus chloroticus* or Kina was also identified.

Feature 113

A sample of midden from Feature 113 was submitted for analysis, with shellfish species separated and where possible whole shell measured. The overwhelming species present was that of *Paphies subtriangulata* or Tuatua, with 3,086 individual shells recorded giving an overall MNI of 1,543 Tuatua present within the sample. This figure equates to 99% of the total MNI calculated for this assemblage.

Measureable Tuatua shell numbered 1,764 of the total with only one shell measuring above the indicated sexually mature 50mm size (Grant and Hay 2003) at 53.28mm. A single shell measured between 40mm and 49.99mm and 6 shells 30mm–39.99mm. A total of 1,597 shells measured 20–29.99mm, comprising 90.5% of the measurable shell; and 158 shells (9%) measured 19.99mm or less with the smallest measured at 14.31mm.

Other species identified, which may be the result of by-catch while targeting the Tuatua bed were at least 2 *Pecten novaezelandiae* or Queen's Scallop and *Paphies australis* or Pipi with three measurable shells 44.12mm, 44.46mm and 51.99mm and two further incomplete shells providing an MNI of 3 Pipi. Studies conducted by Hooker and Creese (1995) indicate that Pipi larger than 40mm are sexually mature individuals.

Eight examples of rocky shore shellfish representing four species were recorded. These include three *Turbo smaragdus* or Cat's Eye, three *Melagraphia aethiops* or Dark Top Shell, and one example each of *Nerita atramentosa* or Black Nerita and *Diloma bicanaliculus* or Knobbed Top Shell.

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Feature 341

Tuatua dominated the sample from Feature 341 with an MNI of 173 individual shellfish present. This was calculated from 156 measurable shells and 189 hinged shell fragments. Of the measureable shell 45 or 29.5% of the sample was 50mm or larger with the single biggest measuring 58.60mm; 69 shells or 44% of the sample measured between 40mm and 49.99mm. Shells measuring between 30mm and 39.99mm comprised 8% of the sample or 12 specimens. Those measuring 20–29.99mm numbered 25 specimens or 16% of the total measurable sample. Only four specimens or 2.5% of the sample measured less than 20mm with the smallest measuring 15.54mm. Whereas other samples analysed, such as that extracted from the base of the midden above the pit fill in Feature 67, showed a propensity for greater collection of 20-29.99mm shells (82% of that assemblage), shell recovered from Feature 341 indicates that larger size specimens were collected with 73.5% of the measureable Tuatua being 40mm or greater in size. This may be due to selective procurement based on size or greater availability of larger specimens due to beds being left untouched for some time.

Other sandy/muddy shore environment species include at least four examples of *Pecten novaezelandiae* (Scallop), at least five *Austrovenus stutchburyi* (Cockle) and four *Pseudacopagia disculus* (Round Wedge Shell).

Rocky shore species include five *Perna canaliculus* (Green Mussel), three examples each of *Melagraphia aethiops* (Dark Top Shell), *Crepidula costata* (Ribbed Slipper Shell), and *Turbo smaragdus* (Cat's Eye). Two examples each of *Cookia sulcata* (Cook's Turban) and *Cellana denticulata* (Denticulate Limpet) were recorded. Single examples of *Sigapatella novaezelandiae* (Circular Slipper Shell) and *Paratrophon quoyi* (Stanger's Trophon) were also identified.

Feature 380

The sample from Feature 380 was not large in volume but contained larger specimens than observed in midden from other features. Both sandy shore and rocky shore species were identified with 13 species recorded.

Tuatua provided an MNI of 22, calculated from 34 measureable shells and 10 hinged portions. Of the measureable shell, two measured <20mm, 19 measured 30–39.99mm, eight measured 40–49.99mm and five measured >50mm in size.

A minimum of two pipi were calculated from a complete shell measuring 43.17mm and two hinged portions. At least five individual *Pecten novaezelandiae* or Scallops were identified from several shells with the number calculated by comparing relative size of shells. The largest complete shell had a width of 61.43mm, but larger fragmented shells were present. Portions of at least six *Struthiolaria papulosa* or Ostrich Foot shells were identified including one complete example.

Continued on next page

Feature 380 (continued)

Rocky shore species, while not great in number, were generally much larger than examples found in other features. Ten *Haliotis iris* or Paua shells were noted. Seven *Cookia sulcata* or Cook's Turban were collected with three able to be measured at 57.94mm, 68.77mm and 78.62mm in width. Five *Turbo smaragdus* or Cat's Eyes were identified. Three *Tonna cerevisina* or Cask Shell and three *Lepsiella scobina* or Oyster Borer were noted. Single examples of *Penion sulcatus* or Siphon Whelk and *Dicathais orbita* or White Rock Shell were also recorded along with a single example of *Cominella* sp. which could not be identified with accuracy. Nine *Cellana radians* or Radiate Limpet completed the assemblage.

Feature 503

The Feature 503 sample had a total weight of 204 grams, of which 34 grams originated from sand and small shell particles smaller than 2mm in size. Whole shell and hinged portions were separated from remaining shell, with a total of 81 grams being of fragmented shell not affecting MNI.

All of the identifiable shell material originated from Tuatua (*Paphies subtriangulata*). Sixty-seven whole shells could be measured, and ranged from 14.42mm to 36.60mm. Ten of the whole shell samples measured less than 20mm in size, suggesting they may not have been fully sexually mature. A further 56 hinged portions were calculated, giving a total MNI for the species at 62.

Feature 505

Shell from Feature 505 was separated and identified with almost the entire assemblage consisting of Tuatua (*Paphies subtriangulata*). One Scallop (*Pecten novaezelandiae*), fragments of at least two unidentified gastropod shells and a single operculum were also recorded. The operculum, while not conclusively identified, is consistent with a Cat's Eye (*Turbo smaragdus*).

Whole tuatua shells ranged in length from 16.94mm to 47.31mm. One shellfish had not opened during the cooking process. Eight of the whole shells measured less than 20mm, suggesting they were not yet fully sexually mature.

A total of 99 whole shells were measured, and a further 92 shells where the hinge was intact suggest a minimum of 96 tuatua were present within the sample.

Continued on next page

Summary

The shell midden was composed of a diverse range of shell species including: Paua (*Haliotis* sp.); Cat's Eye (*Turbo smaragdus*); Rock Shell (*Dicathais orbita* or *Haustrum haustorium*); Cask Shell (*Tonna cerevisina*); Black Nerita (*Nerita atramentosa*); chiton (various); limpet (*Cellana* sp.); Cook's Turban (Cookia sulcata); Scallop (*Pecten novaezelandiae*); Green Mussel (*Perna canaliculus*); and Rock Oyster (*Saccostrea cucullata*).

Very small, <3 cm, length Tuatua (*Paphies subtriangulata*) were the dominant shell type; however, some medium size and very few large Tuatua were present (Figure 133). Pipi (*Paphies australis*), Ostrich Foot (*Struthiolaria papulosa*), and the common Cockle (*Austrovenus stutchburyi*) were also present, but in small numbers compared to the Tuatua. Although most Tuatua were notable for their small size many of the individuals of other shell species were large compared to most other examples found in prehistoric shell middens. This seems to have been particularly so with regard to rocky shore species. For example many of the *Turbo smaragdus* were close to 70mm diameter, the maximum size given by Powell (1976, Plate 20)

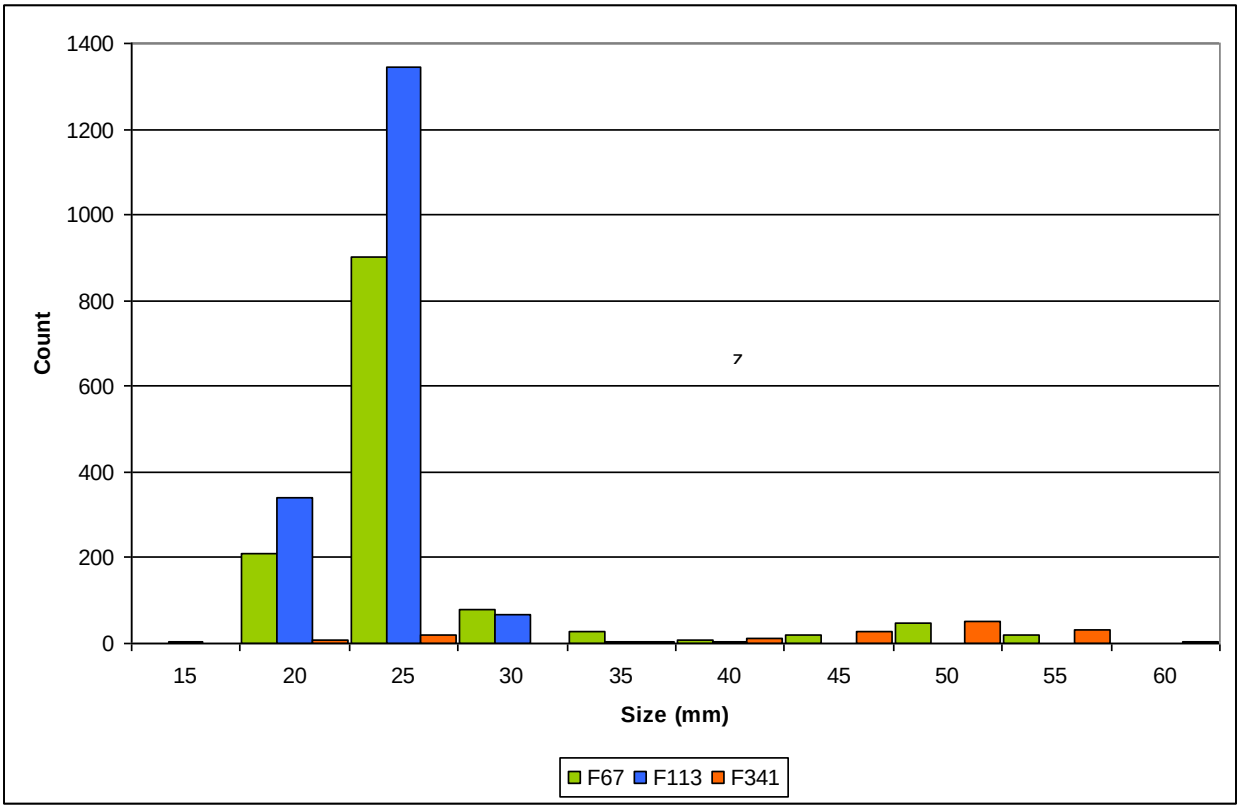

Figure 133. Size distribution of Tuatua from the three largest contexts

FISHBONE

Fishbone Analysis

Fishbone analysis was undertaken by Adina Brown.

A total of 1,384 fish bones and 707 scales (2091 fragments) were collected from sieved midden, with a total weight of 91g. Overall, relatively little fishbone was recovered, and no other types of bone were present. Despite some factors affecting preservation, the results do suggest that the emphasis was on shellfish.

Fish species most commonly represented were snapper, *Pagrus auratus*. The shoreline habitat of Opito Bay is well suited to snapper, and there is no reason to suggest that they would not have been caught locally. The small size and fairly poor condition of the fishbone assemblage necessarily means that only limited conclusions can be drawn.

The fishbone analysis aimed to determine the following information:

- The relative abundance of different fish types caught;
- The exploitation strategy and nature of environment indicated by the fishbone;
- The relationships between site features, e.g., temporal or functional, as regards the fishbone assemblage; and
- The context of the site in comparison to other sites in the region.

Method

The midden samples were wet sieved under a fine spray (at 5mm). This material was subsequently air dried and retained for analysis, including weight, number of identified fragments (NIF/NISP), number of identified elements (MNE/NIE), and minimum number of individuals (MNI).

The method for recording, identifying, and quantifying fishbones is set out in Leach (1997). Briefly, this involves identifying those parts of the fish anatomy which are characteristic of all taxa to minimise bias, i.e. identifying the five cranial bones (dentary, premaxilla, articular, maxilla and quadrate), as well as any 'special bones' present amongst only certain types of fish. The remaining fishbone is categorised as 'fish bones not identified', although the number of vertebrae is also noted.

No complete cranial bones were recovered, which precluded size-frequency analysis of each fish type.

Continued on next page

FISHBONE, CONTINUED

Preservation

The fishbone assemblage was generally poorly preserved, and a number of bones blackened in most contexts. Bone surface textures were fair or poor, with only a couple of good examples. Only a few elements were near-complete, with the majority being broken and abraded. Because of the small size of the assemblage, it was not considered statistically viable to undertake 'ratio of head to body parts' or 'fragmentation ratio' analysis.

Results

The remains of most of the fish being consumed at Opito Bay are likely to have been deposited in their entirety, given the presence of cranial bones, vertebrae, spines and scales. No examples of butchery were found. The results are detailed in Table 8. The features where fishbone were recovered were:

Area 1

- Feature 21
- Feature 65
- Feature 67(two samples)
- Feature 69
- Feature 84
- Feature 109
- Feature 112
- Feature 113

Area 2

- Feature 341

Overall, the assemblage was dominated by Snapper (*Pagrus auratus*) (8 MNI/25 NIF), with some Trevally (*Pseudocaranx dentex*) (3 MNI/4 NIF), Leatherjacket (*Parika scaber*) (4 MNI/4 NIF), Rock Cod (*Lotella rhacinus*) (3 MNI/3 NIF) and possibly Spotty (*Notolabrus celidotus*) (1 MNI/1 NIF). In total at least 33 fish were present.

In Area 1 Trench 8 (Feature 21, scoop) and Trench 10 (Feature 109, midden) had the least amount of fishbone, with 9 NIF and 12 NIF respectively. In Area 2 Feature 341 (firescoop) returned the most fragments, with 479 NIF and in Area 1 Feature 113 had 408 NIF. Of the features with identifiable species, all but F84 had Snapper present and five features had additional species (outlined above). All of the features had at least one MNI (from unidentified species), with most exhibiting between 2 and 4 MNI. The two largest samples from F67 and F69 had 7 and 10 MNI respectively, but given that they were double the size of the other samples this figure is consistent in terms of a percentage.

Continued on next page

FISHBONE, CONTINUED

Table 8. Fishbone identification from features

Area 1

		Species							
Feature	**Anatomy**	Unknown	Snapper	Trevally	Rockcod	Leatherjacket	Spotty	**Count**	
21	Special							0	
	Vertabrae	5						5	2-10mm
	Not identified	4						4	
21	NIF	9	0	0	0	0	0	**9**	**Total NIF**
	MNE	0	0	0	0	0	0	**0**	**Total MNE**
	MNI	1	0	0	0	0	0	**1**	**Total MNI**
65	Special							0	
	Teeth		1					1	
	Vertabrae	6						6	1-9mm
	Not identified	13						13	
65	NIF	19	1	0	0	0	0	**20**	**Total NIF**
	MNE	0	1	0	0	0	0	**1**	**Total MNE**
	MNI	1	1	0	0	0	0	**2**	**Total MNI**
67 (1)	Special							0	
	Teeth	1	2					3	
	R dentary		1					1	
	R premaxilla		1					1	
	L maxilla	1						1	
	R maxilla	2						2	
	Vertabrae	36						36	2-10mm
	Not identified	148						148	
	Scales	83						83	
67	NIF	271	4	0	0	0	0	**275**	**Total NIF**
	MNE	4	4	0	0	0	0	**8**	**Total MNE**
	MNI	2	1	0	0	0	0	**3**	**Total MNI**
67 (2)	Special		1			1		2	
	Teeth		2					2	
	L premaxilla		1					1	
	R articular	1						1	
	R maxilla				1			1	
	L quadrate	1						1	
	R quadrate			1				1	
	Vertabrae	17						17	2-6mm
	Not identified	213						213	
	Scales	27						27	
67	NIF	259	4	1	1	1	0	**266**	**Total NIF**
	MNE	2	4	1	1	1	0	**9**	**Total MNE**
	MNI	1	1	1	1	1	0	**5**	**Total MNI**
69	Special					2		2	
	Teeth		3					3	
	L premaxilla		1					1	
	L articular	1						1	
	R articular	1						1	
	L maxilla				1			1	
	L quadrate	1		1				2	
	R quadrate	2						2	
	Vertabrae	26						26	2-14mm
	Not identified	167						167	
	Scales	31						31	
69	NIF	229	4	1	1	2	0	**237**	**Total NIF**
	MNE	5	4	1	1	2	0	**13**	**Total MNE**
	MNI	2	1	1	1	2	0	**7**	**Total MNI**
69	Special							0	
	L maxilla			1				1	

	R maxilla	1						1	
	Vertabrae	15						15	2-5mm
	Not identified	94	4					98	
	Scales	79						79	
69	NIF	189	4	1	0	0	0	**194**	**Total NIF**
	MNE	1	0	1	0	0	0	**2**	**Total MNE**
	MNI	1	1	1	0	0	0	**3**	**Total MNI**
84	Special					1		1	
	L maxilla	1						1	
	R maxilla	1						1	
	R quadrate	1						1	
	Vertabrae	16						16	1-7mm
	Not identified	67						67	
	Scales	36						36	
84	NIF	122	0	0	0	1	0	**123**	**Total NIF**
	MNE	3	0	0	0	1	0	**4**	**Total MNE**
	MNI	1	0	0	0	1	1	**3**	**Total MNI**
109	Special							0	
	R articular		1					1	
	Not identified	11						11	
109	NIF	11	1	0	0	0	0	**12**	**Total NIF**
	MNE	0	1	0	0	0	0	**1**	**Total MNE**
	MNI	1	1	0	0	0	0	**2**	**Total MNI**
112	Special							0	
	Vertabrae	4						4	2-9mm
	Not identified	56						56	
	Scales	4						4	
112	NIF	64	0	0	0	0	0	**64**	**Total NIF**
	MNE	0	0	0	0	0	0	**0**	**Total MNE**
	MNI	1	0	0	0	0	0	**1**	**Total MNI**
113	Special		1					1	
	Teeth	1	3					4	
	R dentary		1					1	
	L maxilla	1		1				2	
	R maxilla	1						1	
	L quadrate	1						1	
	Vertabrae	19						19	2-8mm
	Not identified	187						187	
	Scales	192						192	
113	NIF	402	5	1	0	0	0	**408**	**Total NIF**
	MNE	4	5	1	0	0	0	**10**	**Total MNE**
	MNI	1	1	1	0	0	0	**3**	**Total MNI**

Area 3									
Feature	**Anatomy**	Unidentified	Snapper	Trevally	Rockcod	Leatherjacket	?Spotty	Count	
341	Special							0	
	Teeth		1					1	
	L dentary				1		1	2	
	R maxilla	1						1	
	R quadrate	1						1	
	Vertabrae	47						47	1-4mm
	Not identified	168						168	
	Scales	261						261	
341	NIF	478	1	0	1	0	1	**481**	**Total NIF**
	MNE	2	1	0	1	0	1	**5**	**Total MNE**
	MNI	1	1	0	1	0	1	**4**	**Total MNI**

TOTALS		**Unidentified**	**Snapper**	**Trevally**	**Rockcod**	**Leatherjacket**	**?Spotty**		
	NIF	2053	24	4	3	4	1	**2089**	**Total NIF**
	MNE	21	20	4	3	4	1	**53**	**Total MNE**
	MNI	13	8	4	3	4	2	**34**	**Total MNI**

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Fishbone Conclusion

The small fish assemblage from Opito Bay indicates that marine fish species were exploited, with an emphasis on snapper. The small quantity of identified fish makes it difficult to speculate on changes through time and the relationships between different contexts.

The small quantity of identified fish limits conclusions that can be drawn from the size of the fish. It is therefore difficult to speculate on the amount of food represented by the fish remains, method of fish procurement, and the state of fish reserves. For example, an abundance of small specimens can hint at use of fish poison or very fine mesh nets, or an environment depleted of large fish by overfishing (Leach 1997). Similarly, the ratio of head bones to vertebrae would be based on a very small sample, and this makes it difficult to comment on any possible patterns of processing or disposal of fish.

The preliminary report by Gumbley and Hoffman (2007a: Table 6) from the midden also shows that both Snapper and Leatherjacket were the most abundant species found, with a number of other species probably indicating a generalist range of fishing strategies being used.

Mann's (2009) analysis of the midden from the nearby ABM site (T10/164), however, indicates a focus on the catching of Leatherjacket rather than the typical focus on Snapper suggested in this analysis. However, the differences may not really be that significant as both species are found at T10/777 and are likely to reflect the targeting of both species throughout the periods of occupation around Opito Bay.

The scale of activities represented at T10/777 contrasts with the very limited size of midden identified during the excavation. This suggests that fishing and midden processing and cooking may have taken place away from the main living areas, perhaps closer to the beach.

Radiocarbon Dating

Sample Selection

The choice of samples was dictated by the recovery of datable material as well as an attempt to provide absolute dates to the relative chronology for the different areas based on the stratigraphy.

Area 1 Samples:

1) Feature 12 (a small midden)
2) Feature 65 (this represented the dense burnt material found in the pit under the midden dated previously)
3) Feature 67 (midden)
4) Feature 109 (a possible bin pit)

Area 2 Samples were more difficult to obtain with only limited datable samples available. Three samples were chosen:

1) Feature 278 (firescoop)
2) Feature 341 (firescoop)
3) Feature 364 (rua)

One sample from Area 3, Feature 503 (firescoop), was dated from the small cluster of middens. It was expected that this represented a later occupation than the main cluster of features in Areas 1 and 2.

All charcoal samples were selected after species identification by Adam Hand with the assistance of Rod Wallace, and only short-lived species, twigs and seeds were used. This was designed to limit any in-built age effects.

Previous Dates

As discussed earlier, Gumbley and Hoffman (2007a) had obtained two dates from excavated spits from the midden in their Trench 14. This correlated to our Feature 67, which was a more complex feature than was visible in the original trench.

T10/777 Dating

The combined samples were calibrated using the new 2013 calibration curves in OxCal 4.2.[5] The basic calibrations are shown in Table 9 and Figure 134.

The dates obtained from the features near those obtained by Gumbley and Hoffman (2007a) in Area 1 were mostly a little later than theirs, which was surprising, especially as the sample from Feature 65 was from the pit fill under the shell midden.

Continued on next page

[5] Radiocarbon dates results from the Waikato Laboratory in Appendix 2 are provided with earlier calibrations. These differ only marginally to those presented here.

T10/777 Dating (continued)

However, there was sufficient overlap in the dates to suggest that this part of the site dated from around the late 15th to the mid 16th century AD. Feature 109 from Trench 11 to the west of the midden gave a contemporary date.

Feature 12, from Area 1, did come out significantly later, suggesting reoccupation of the southern trenches in Area 1, perhaps in the 18th century but maybe as late as the 19th century.

The dates from Area 2 all seem relatively similar and most probably related to 16th century AD habitation. The excavations in Area 2 suggested at least two and perhaps as many as five phases of occupation there. Unfortunately datable samples from the pits and rua were hard to obtain, and only one rua (F364) was dated, and was similar to the firescoops that provided the other two dates. However, rua are not thought to have been the earliest of the excavated features, so it is possible that the dates do not necessarily define the earliest use of Area 2.

Area 3 may have been as early as the late 17th century although it could have been a century later. Further dates would be required to determine this more convincingly.

ABM Site T10/164

The dates for the ABM site T10/164 excavated by Furey in 2001 (see Mann 2009) provide two dates for two different occupations – one most likely from the mid-14th through to mid-15th century with a later occupation very similar to the earliest dates for T10/777 obtained by Gumbley and Hoffman from the Area 1 midden, around the mid-15th to 16th centuries (Figure 135). However, the midden appears to be most similar to other 'Archaic' sites rather than the majority of the T10/777 contexts.

Cross Creek Site T10/399

Cross Creek Site (T10/399) nearby has recently been re-dated and a new sequence for its occupation presented (Furey et al. 2008). The revised sequence places the last occupation of that site around 1500 AD. This is contemporary with the earliest dates presented here. Cross Creek is defined primarily by being a rich midden site occupied from around 1300 AD onwards. It is therefore associated with 'Archaic' Maori settlement, and having moa-hunting evident in the earlier parts of its sequences. In contrast, the large number of pits associated with agricultural practices, particularly kumara gardening, found at T10/777 suggests there had been a shift in economy and focus of local groups around 1500 AD. Re-dating the Sarah's Gully site next to Cross Creek could offer a valuable comparison to the work presented here.

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Wider Coromandel Area

Comparison of the radiocarbon dates from T10/777 and other radiocarbon dates from nearby archaeological sites was made using the radiocarbon database recently presented by Bickler and others (Bickler et al. 2013) and Mulrooney and Bickler (2013). Dates from sites in the T10 and T11 sections of the Coromandel are shown in Figure 135. While some of the individual dates obtained from T10/777 did include the possibility of occupation there during the 17th century, the dates obtained generally suggest that they reflect an early pre-1620 AD occupation in both Areas 1 and 2, and a post-1680 AD (perhaps as late as the 19th century AD) occupation in Area 1, with the one date from Area 3 either from the mid-1600s or mid to late 1700s.

Table 9. Calibration of radiocarbon dates from T10/777 (Years AD)

Area	Feature	Type	Sample	Material	CRA	Error	-1σ	1σ	-2σ	2σ	Median
1	Sp 2 (F67)	Midden	Wk21368[6]	Tuatua	843	32	1431	1517	1393	1620	1475
	Sp 6 (F67)	Midden	Wk21369	Tuatua	792	32	1455	1566	1438	1643	1518
	F12	Firescoop	Wk37542	Twig	151	28	1696	...	1679	...	1849
	F65	Pit	Wk37543	Twig	390	20	1465	1622	1460	1626	1558
	F109	Bin pit?	Wk37544	Tuatua	789	33	1457	1570	1440	1645	1521
2	F278	Firescoop	Wk37545	Twig	375	20	1497	1624	1480	1630	1563
	F341	Firescoop	Wk37546	Tuatua	754	32	1492	1617	1459	1659	1553
	F364	Rua	Wk37547	Twig	367	23	1501	1627	1483	1634	1561
3	F503	Firescoop	Wk37548	Twig	254	29	1648	1797	1635	1803	1745

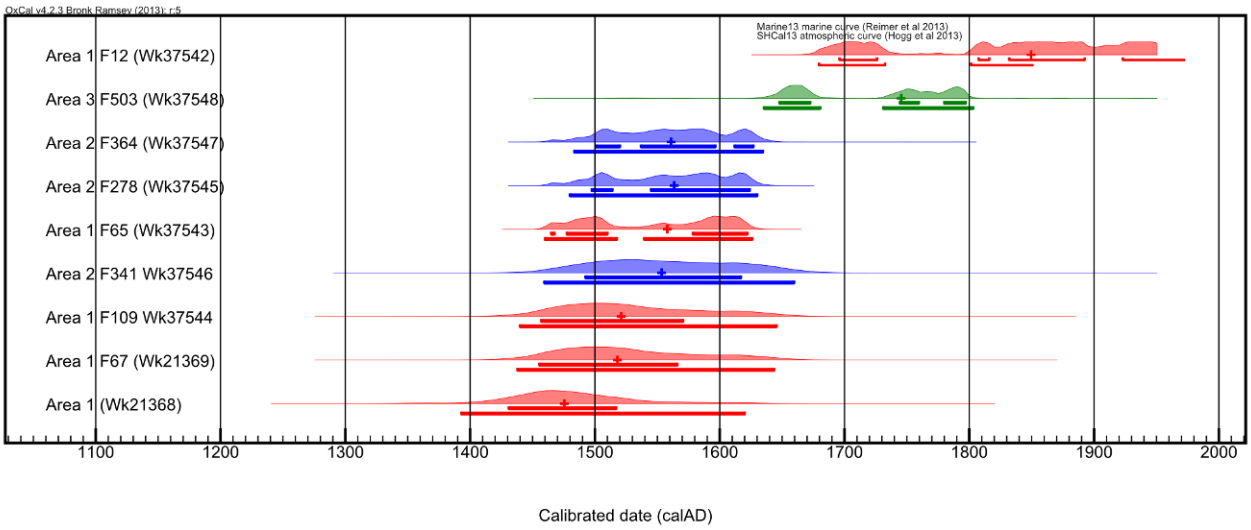

Figure 134. Calibrated radiocarbon dates from T10/777

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[6] Wk21368 and Wk21369 from Gumbley and Hoffman (2007a).

FISHBONE, CONTINUED

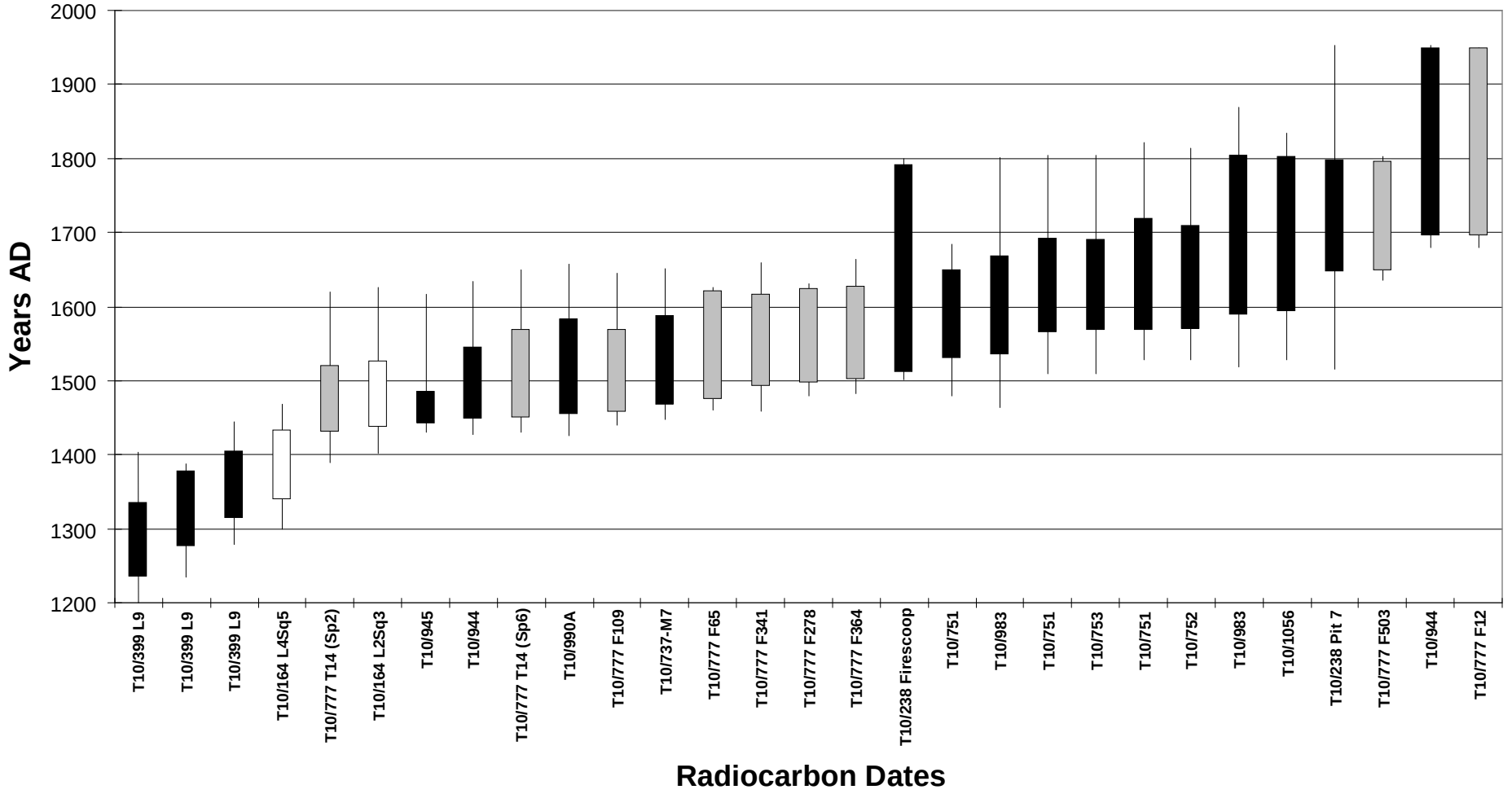

Figure 135. Radiocarbon dates from T10/777 (grey), the ABM site T10/164 (white) (Furey pers. comm. in Mann 2009:Table 3.2) and other nearby Coromandel sites

CHARCOAL ANALYSIS

Introduction

Thirty-nine samples of charcoal were analysed from 22 features totalling 2,367 identifications (see Table 11 and Table 12). The aims of the analysis were three-fold:

- To identify suitable material for radiocarbon dating purposes by identifying short-lived plant taxa, that would reflect site occupations;
- To understand how Maori interacted with the surrounding landscape. This was done through analysis of the types of wood used in fuel contexts;
- To build a picture of the local vegetation of T10/777 at the time of occupation.

A guide to the species and common names of wood identified here is shown in Table 10.

Methodology

Eight samples, from seven features (F13, F67, F230, F267, F313, F505, F364) were of manageable quantity (<10 g) and were identified in total. Thirty-one samples exceeded the 10g weight threshold and so sub-sampling was employed.

Samples which exceeded the 10g threshold were sieved using a 3.2 mm geological sieve. Material smaller 3.2 mm was bagged as not identifiable. The remaining material was split using a riffle box. The riffle box is a geological sample splitter which divides samples randomly into the required batch sizes for sub-sampling. This prevents subconscious bias that may be inherent in grab sampling. The riffle box was lined with bubble wrap to prevent further fragmentation of specimens. A strategy of sampling to taxonomic redundancy and representativeness was utilised to process the samples (following Leonard 1987). This involved analysis of all material in each sub-sample generated by the riffle box, in sequence, until subsequent sub-samples revealed no new taxa. Charcoal fragments were identified using procedures adapted from Leney and Casteel (1975).

Seventeen samples from fuel wood features were analysed to address the functional aims. Scattered charcoal without an obvious functional context was also then analysed to address the general environmental reconstruction. In Area 1, 15 samples from six features were used, totalling 556 fragments. In Area 2, seven samples from four features were used, totalling 430 identifications. No samples in Area 3 were appropriate for reconstruction and so no conclusions can be made about the wider environment at this time.

To understand how Maori interacted with the wider landscape, it is not sufficient to identify and catalogue the taxa present. Ubiquity analysis, also referred to presence/absence analysis, was utilised to perform comparisons between functional contexts and explore broad patterns in the data, while ignoring the quantity of the material recovered.

Continued on next page

Table 10. Guide to common names of wood species

Common	Scientific Name	Habitat/Type
Akeake	*Dodonaea viscose*	Broadleaf shrub
Bracken	*Pteridium esculentum* (bracken rhizome)	Fern
Cabbage tree	*Cordyline australis*	Monoctyledon
Coprosma	*Coprosma* species	Broadleaf shrub
Fivefinger	*Pseudopanax arboreus*	Broadleaf shrub
Hangehange	*Geniostoma rupestre*	Broadleaf shrub
Hebe	*Hebe* species	Broadleaf shrub
Hinau/Pokaka	*Elaeocarpus dentatus* or *hookerianus*	Large broadleaf tree
Kanuka	*Kunzea ericoides*	Small tree
Kauri	*Agathis australis*	Coniferous tree
Kohekohe	*Dysoxylum spectabile*	Large broadleaf tree
Lancewood	*Pseudopanax crassifolius*	Broadleaf shrub
Mahoe	*Melicytus ramiflorus*	Small tree
Maire	*Nestegis* sp.	Large broadleaf tree
Mangrove	*Avicenna marina*	Estuarine tree
Manuka	*Leptospermum scoparium*	Broadleaf shrub
Mapau	*Myrsine australis*	Small tree
Matai	*Prumnopitys taxifolia*	Coniferous tree
Ngaio	*Myoporum laetum*	Broadleaf shrub
Olearia sp	*Olearia* species	Broadleaf shrub
Pittosporum sp	*Pittosporum* species	Broadleaf shrub
Pohutukawa	*Metrosideros excelsa*	Large broadleaf tree
Punga	*Cyathea sp.*	Fern
Puriri	*Vitex lucens*	Large broadleaf tree
Putaputaweta	*Carpodetus serratus*	Small tree
Rewarewa	*Knightia excelsa*	Large broadleaf tree
Ribbonwood	*Plagianthus divaricatus*	Small tree
Shrub sp.	*Unidentified shrub*	Shrub
Tanehaha	*Phyllocladus trichomanoides*	Coniferous tree
Tarairi	*Beilschmiedia tarairi*	Large broadleaf tree
Toro	*Myrsine salicina*	Small tree
Tutu	*Coriaria arborea*	Broadleaf shrub
Unidentified	*Unidentified*	Unknown

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Results

Results of the identification process are presented in Table 11 and Table 12. In total, 2,367 fragments were identified from 39 samples, from 22 distinct features. Twenty-two woody taxa were identified, as well as seeds of *Elaeocarpus dentatus*. All material was identified using the University of Auckland's wood reference collection with the exception of the monocotyledon spp. This collection currently has no comparative material for identifying New Zealand monocotyledon material. Five taxa could only be identified to the generic level. Four hundred and sixty-five fragments lacked anatomical features necessary to make a positive identification and so were recorded as unidentifiable. Unidentifiable fragments accounted for 20% of the total number of identifications.

Taxonomic Richness

Functional contexts provide different information about past human behaviour and the surrounding landscape (Théry-Parisot et al. 2010b). Charcoal from functional contexts such as hearths and firescoops provides a biased account of past vegetation, due to cultural (e.g., intentional selection) and taphonomic processes (e.g., combustion, cleaning, trampling). That being said, concentrations of charcoal may occasionally function as synthetic deposits when they have been re-used multiple times.

To examine this, taxonomic richness was investigated for all functional contexts (Figure 136). It was hypothesised that firescoops would have a smaller median and mean of taxonomic richness relative to other functional contexts. Firescoops were variable in terms of the fuel used because they do not have challenging fuel requirements. It was hypothesised that cooking areas would have a higher median and mean number of species, due to re-use. It was expected that occupational debris would contain the highest median and mean taxonomic richness relative to other functional contexts. This was expected because these deposits represent wood from mixed origin, long and potential long-term deposition. Multiple samples were combined because they are samples from the same population.

Firescoops were found in Area 1 and 2 and had an average of three taxa, with Feature 10 yielding six taxa. Common fuel used was large tree species *Metrosideros excelsa* (Figure 137) and *Agathis australis* (Figure 138) as well as shrub species *Coprosma* spp., *Coriaria* sp., and *Veronica* spp. In contrast, the firescoops found exclusively in Area 3 had a mean of 7.3 taxa per sample and *Agathis australis* was rare in these features, with only two fragments found.

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Table 11. Summary of wood charcoal identifications from Area 1 T10/777. Values presented as fragment count

	Area 1 Late 15th to 16th century																					
Taxa / Feature No.	F3	F10	F10	F12	F13	F20	F22	F54	F54	F65	F65	F65	F65	F65	F65	F65	F65	F65	F66	F67	F67
Agathis australis	37					32	32	47	31	25	33	46	46	32	41	39	14	31	45	26	28
Brachyglottis repanda																					
Coprosma spp.	17				2				1								1		1		
Coriaria sp.	2	4	1		3		1														
Dodonaea viscosa																					
Dysoxylum spectabile						1									1		1				
Leptospermum scoparium		43	48	4	6							2	1								
Laurelia novae-zelandiae						1															
Melicytus ramiflorus	21		1				1											1		1	1
Metrosideros excelsa		6	6		1	3					13			1	1		1	2	8		
Monocotyledon spp.		1												1							
Myoporum laetum																					
Nestegis spp.							2				1										
Nothofagus truncata						13	7					5	3		1	3			1		2
Olearia spp.				27															1		
Podocarpus totara																					
Prumnopitys taxifolia						1					1			3							
Pseudopanax arboreus																					
Pteridium spp.											2				1						1
Schefflera digitata																					
Veronica spp.	2	5		3	5							1									
Vitex lucens										5	1							2			
*Elaeocarpus dentatus**						1	2				3		3	3	1		2	2		1	
Unidentifiable	13	17	12	10	6	18	20	30	10	9	13	14	3	10	4	7	9	12	14	5	9
Total	92	76	68	44	23	70	65	77	42	39	67	68	56	50	50	49	28	50	70	33	41
Number of Taxa	5	5	4	3	5	7	6	1	2	2	7	4	4	5	6	2	5	5	5	3	4

***Seeds found**

F3 and F65 (pits); F20 and F22 (rua); F10, F12, F13 and F54 (firescoops); F66 and F67 (midden)

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Table 12. Summary of wood charcoal identifications from Areas 2 and 3 T10/777. Values presented as fragment count

	Area 2 16th century											Area 3 post-AD 1650							
Taxa / Feature No.	F230	F233	F233	F267	F278	F313	F324	F341	F364	F364	F364	F503	F503	F505	F505	F505	F507	F511	**Total**
Agathis australis	37	36			30	26	70		66	47	34				2				933
Brachyglottis repanda				15															15
Coprosma spp.					13								3					2	40
Coriaria sp.		4	4									3	8		2	7	4	6	49
Dodonaea viscosa								9		1	3	2							15
Dysoxylum spectabile																			3
Leptospermum scoparium		1	7	30					2	2						1	5	1	153
Laurelia novae-zelandiae															8				9
Melicytus ramiflorus									5	2	3	10		1					47
Metrosideros excelsa			29					3	5	2	4	15	15		9	7	32	5	168
Monocotyledon spp.																			2
Myoporum laetum		1																	1
Nestegis spp.		1							3	2	1								10
Nothofagus truncata		1							2	3									41
Olearia spp.			26					26				27	34	12	7	18	23	20	221
Podocarpus totara									3										3
Prumnopitys taxifolia											3					1			9
Pseudopanax arboreus									1					1					2
Pteridium spp.																			4
Schefflera digitata												1							1
Veronica spp.			4					14	1	4		4			3	20	11	38	115
Vitex lucens									2		4								14
*Elaeocarpus dentatus**		6							5	5	13								47
Unidentifiable	5	17	10	3	20	10	5	15	17	12	15	15	19	6	10	17	11	13	465
Total	42	67	80	48	63	36	75	67	112	80	80	77	79	20	41	71	86	85	**2367**
Number of Taxa	1	7	5	2	2	1	1	4	11	9	8	7	4	3	6	6	5	6	

F230 and F233 (pits); F267 and F364 (rua); F278, F313, F324, R341, F503, F505, F507 and F511 (firescoops)

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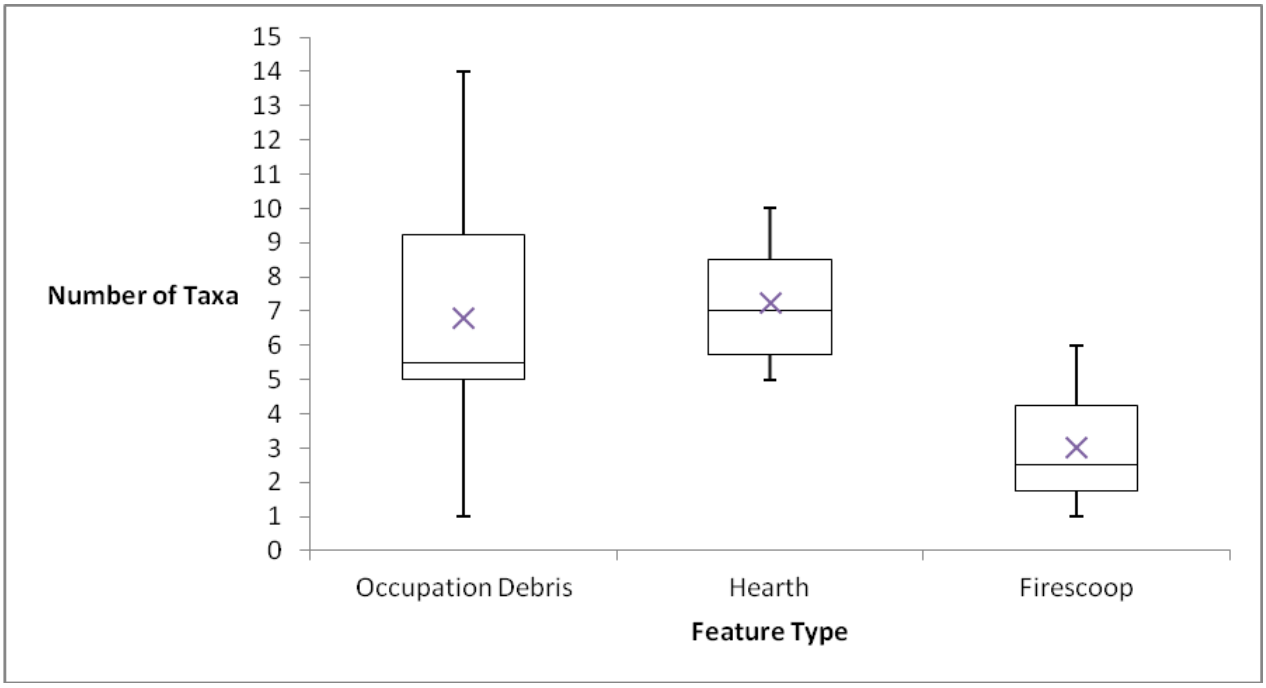

Figure 136. Summary of taxonomic richness for three feature types found at T10/777

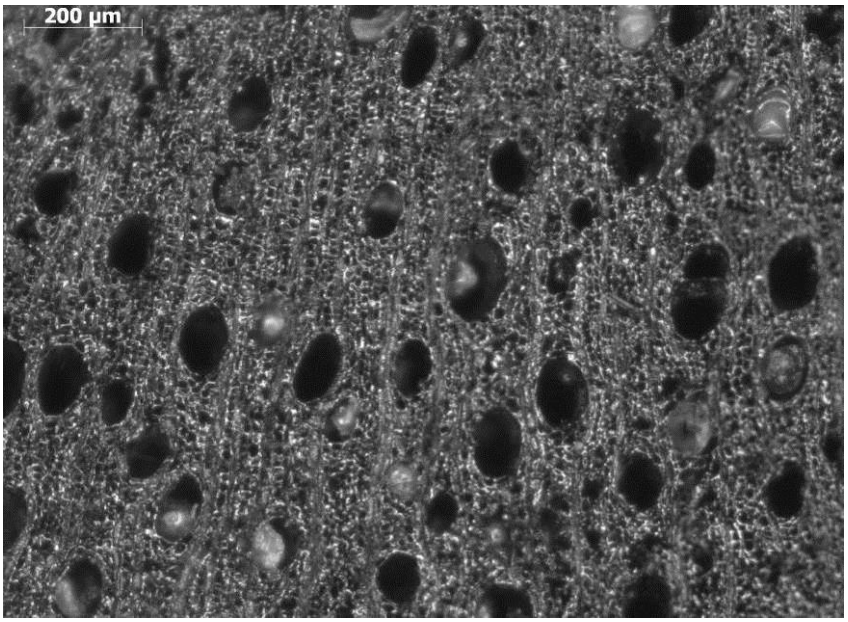

Figure 137. CS x50 – *Metrosideros excelsa*

Kauri has large vessels which are evenly distrubuted through the growth ring

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CHARCOAL ANALYSIS, CONTINUED

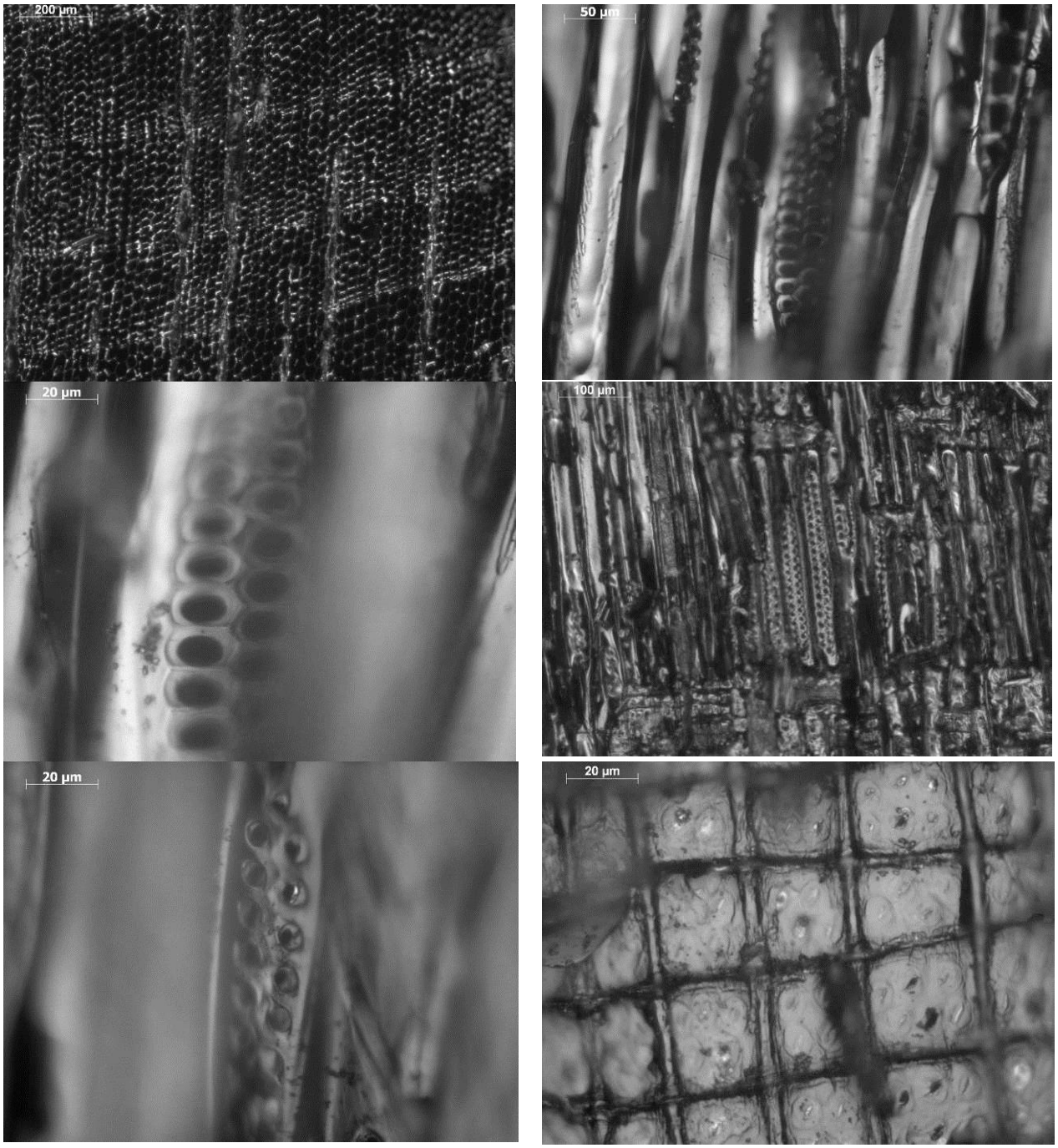

Figure 138. Microphotograph of growth rings

Top left: CS x50 – distinct growth rings. Top centre: TLS x200 – inter-tracheid pits in the late wood of the tangential wall. Typical uniseriate ray in the right corner. Top right: TLS x500 – bordered, alternating inter-tracheid pits. Bottom left: RLS x100 – inter-tracheid pits on the radial wall with prominent cross-fields at the bottom. Bottom centre: RLS x500 – bordered, alternating inter-tracheid pits on the radial wall. Bottom right: cupressoid ray to tracheid pits

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Taxonomic Richness (continued)

All firescoops had the large tree species *Metrosideros excelsa* and the shrub genus *Olearia* spp. Firescoops also contained shrubs *Coprosma* spp., *Coriaria* sp., *Dodonaea viscosa, Veronica* spp., as well as small trees *Melicytus ramiflorus,* and *Leptospermum scoparium.* Firescoops had a minimum taxonomic richness of 5 and maximum of 10, with a standard deviation from the mean of 2.2.

Occupational debris had a minimum taxonomic richness of 1 and maximum of 14, with a mean taxonomic richness of 6.8 and standard deviation of 4.3. Feature 65, which was from Area 1, had 14 taxa, including trees *Agathis australis, Elaeocarpus dentatus, Dysoxylum spectabile, Metrosideros excelsa, Nestegis* sp., *Nothofagus truncata*, *Prumnopitys taxifolia*, and *Vitex lucens*. Feature 365 was a lens of charcoal at the bottom of a storage pit (rua), in Area 2. It had 13 taxa. The taxa represented included shrubs *Dodonaea viscosa, Olearia* spp., *Veronica* spp., small trees *Leptospermum scoparium, Melicytus ramiflorus,* large trees *Elaeocarpus dentatus, Metrosideros excelsa, Nothofagus truncata, Nestegis* spp., *Vitex lucens,* and conifers *Agathis australis, Podocarpus totara* and *Prumnopitys taxifolia*. Occupational debris had a lower mean than firescoops, but the higher standard deviation indicates more variance in occupational debris, with certain samples especially taxonomically rich.

Ubiquity Analysis

Ubiquity analysis was utilised to perform comparisons between functional contexts and explore broad patterns in the data, while ignoring the quantity of the material made. This was done because the formational processes that shaped this assemblage are poorly understood (Table 13).

Agathis australis was the most ubiquitous taxa, occurring in 0.69 of all samples. It was more common in occupational debris and only present in one firescoop sample. *Metrosideros excelsa* was the second most ubiquitous taxa occurring in 0.54 of all contexts. It occurred frequently in both occupational debris and fuel contexts. Tree species *Dysoxylum spectabile, Elaeocarpus dentatus* seed, *Laurelia novae-zelandiae, Nestegis* spp., *Nothofagus truncata, Vitex lucens, Prumnopitys taxifolia* and *Podocarpus totara* were found in occupational debris but were absent or had negligible ubiquity scores for fuel wood contexts. Shrub species *Coprosma* spp., *Coriaria* sp., *Dodonaea viscosa, Olearia* spp., *Veronica* spp. were common in fuel contexts but had lower ubiquity scores in occupational debris. The small tree species *Leptospermum scoparium* and *Melicytus ramiflorus* were somewhat common in both contexts.

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Table 13. Ubiquity results for all feature types

Taxon	All Contexts N = 39	Fuel Contexts N = 17	Occupational Debris N = 22
Shrubs			
Coprosma spp.	0.21	0.29	0.14
Coriaria sp.	0.33	0.53	0.18
Dodonaea viscosa	0.10	0.12	0.09
Olearia spp.	0.28	0.53	0.09
Pteridium spp.	0.01	-	0.14
Veronica spp.	0.36	0.59	0.18
Small Trees			
Brachyglottis repanda	0.03	-	0.05
Leptospermum scoparium	0.36	0.41	0.32
Melicytus ramiflorus	0.28	0.18	0.36
Monocotyledon spp.	0.05	0.06	0.05
Myoporum laetum	0.03	-	0.05
Pseudopanax arboreus	0.05	0.06	0.05
Schefflera digitata	0.03	0.06	-
Large Trees			
Dysoxylum spectabile	0.08	-	0.14
Elaeocarpus dentatus seed	0.33	-	0.59
Laurelia novae-zelandiae	0.05	0.06	0.05
Metrosideros excelsa	0.54	0.59	0.50
Nestegis spp.	0.15	-	0.27
Nothofagus truncata	0.28	-	0.50
Vitex lucens	0.13	-	0.23
Conifers			
Agathis australis	0.69	0.41	0.77
Podocarpus totara	0.03	-	0.05
Prumnopitys taxifolia	0.13	0.06	0.18

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Types of Fuel

Charcoal from firescoops is the result of domestic cooking fires. Fuel wood is a heavy resource and so it is assumed that the majority of it was from the local sources near the site. Due to the temporal overlap between Area 1 and 2, data was aggregated for a combined score (Table 14). In Area 1, *Leptospermum scoparium* was the most common fuel, occurring in 0.66 of samples. Other common species included shrub species *Coprosma* spp. (0.33), *Coriaria* sp. (0.50), *Veronica* spp. (0.50), and tree species *Metrosideros excelsa* (0.50), and *Agathis australis* (0.33). There is a notable absence of other large taxa. The most ubiquitous taxa in Area 2 were *Agathis australis* (0.75). Other taxa found were the shrubs *Coprosma* spp. (0.25), *Dodonaea viscosa* (0.25), *Olearia* spp., and the large tree *Metrosideros excelsa* (0.25).

Firescoops from Area 3 also demonstrate a signature similar to earlier firescoop contexts. The most ubiquitous taxa were *Olearia* spp. which was found in all contexts. Other ubiquitous taxa were *Coriaria* sp. (0.86), *Leptospermum scoparium* (0.43), *Metrosideros excelsa* (0.86), and *Veronica* spp. (0.71). *Agathis australis* scored 0.14 and was only found in one sample. Large tree species *Laurelia novae-zelandiae* and *Prumnopitys taxifolia* also occurred in one sample.

Fuel Sources

The majority of the taxa found in fuel contexts do not grow on the coastal flat of Opito Bay today. Lowland areas around Opito Bay and the Coromandel region in general have been highly modified for residential and farming purposes; only *Olearia* spp. and *Metrosideros excelsa* were casually observed in the area. *Olearia* spp. was observed in sand dunes along Opito Bay. *Metrosideros excelsa* was observed along the Opito Bay coastline and was numerous along the coastline of the Coromandel Peninsula.

Two vegetation types are represented in fuel contexts at Opito Bay. The genera *Coprosma* spp., *Coriaria* sp., *Olearia* spp. and *Veronica* spp., contain many species and have species found in all types of environments, including coastal environments. *Dodonaea viscosa*, *Leptospermum scoparium,* and *Melicytus ramiflorus* and *Psuedopanax arboreus* are lowland seral species, which are commonly found in environments following disturbances (Dawson and Lucas 2011). These species likely were common along the coast in prehistory.

Agathis australis, *Laurelia novae-zelandiae, Prumnopitys taxifolia,* and *Schefflera digitata* were also found in fuel contexts. Remnant stands of *Agathis australis* were observed along ridges on the Coromandel Peninsula in places unsuitable for farming. *Agathis australis* forms its own vegetation type on infertile soils, along ridges and plateaus.

Continued on next page

Fuel Sources (continued)

The wood of *Agathis australis* is highly resinous and persisted in soils as sub-fossil wood. It is possible that wood exploited for fuel was derived from sub-fossil fuel. The other taxa found are typical of wet, lowland forest environments and prefer well-drained, alluvial soil. These taxa were probably not present on the coastal flat but instead found in the surrounding landscape.

Table 14. Ubiquity scores for various fire features found at T10/777 by temporal phase

	Area 1	**Area 2**	**Combined**	**Area 3**
	Late 15th-16th centuries	16th century	(Area 1 & 2)	post-AD 1650
Taxon	N=6	N=4	N=10	N=7
Shrubs				
Coprosma spp.	0.33	0.25	0.30	0.29
Coriaria sp.	0.50	-	0.30	0.86
Dodonaea viscosa	-	0.25	0.10	0.14
Olearia spp.	0.17	0.25	0.20	1.00
Pteridium spp.	-	-	-	-
Veronica spp.	0.50	0.25	0.40	0.71
Small Trees				
Brachyglottis repanda	-	-	-	-
Leptospermum scoparium	0.66	-	0.40	0.43
Melicytus ramiflorus	0.17	-	0.10	0.29
Monocotyledon spp.	0.17	-	0.10	-
Myoporum laetum	-	-	-	-
Pseudopanax arboreus	-	-	-	0.14
Schefflera digitata	-	-	-	0.14
Large Trees				
Dysoxylum spectabile	-	-	-	-
Elaeocarpus dentatus seed	-	-	-	-
Laurelia novae-zelandiae	-	-	-	0.14
Metrosideros excelsa	0.50	0.25	0.40	0.86
Nestegis spp.	-	-	-	-
Nothofagus truncata	-	-	-	-
Vitex lucens	-	-	-	-
Conifers				
Agathis australis	0.33	0.75	0.50	0.14
Podocarpus totara	-	-	-	-
Prumnopitys taxifolia	-	-	-	0.14

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Fuel Use through Time

To evaluate fuel use change through time, features from two time periods were compared. Samples from 10 firescoops from Area 1 and 2 (late 15th to 16th centuries were compared with seven samples from four small firescoops from Area 3 (dated to post-AD 1650). None were large communal ovens which would require specific types of fuel to heat oven stones. The most ubiquitous taxa in the early firescoops were *Agathis australis* with a ubiquity score of 0.50. It was the most abundant taxa at 47% of fragments identified. Later in time, *Agathis australis* declined substantially to 0.14 and only accounted for 0.60% of fragments in later middens. Other common taxa in the earlier firescoops were *Metrosideros excelsa* (0.40, 3.6%), *Leptospermum scoparium* (0.44, 23.1%), *Olearia* spp. (0.20, 12%) and *Veronica* spp. (0.40, 6.10%).

Later in time, *Olearia* spp. was the dominant fuel used, with a ubiquity score increased to 1.00 and accounted for 43% of charcoal in later hearths. *Metrosideros excelsa* ubiquity score increased to 0.86 and accounted for 25.3% of charcoal identified. *Leptospermum scoparium* score slightly increased to 0.43 but its relative abundance declined substantially to 2.1% of charcoal identified. *Veronica* spp. score increased to 0.71 and accounted for 11% of charcoal identified. Small tree taxa *Pseudopanax arboreus, Schefflera digitata*, and large trees *Laurelia novae-zelandiae* and *Prumnopitys taxifolia* were found in one sample of later features.

Overall, species composition varied somewhat, with *Olearia* spp. replacing *Australis agathis* as the dominant fuel. *Metrosideros excelsa* also increased substantially in prevalence through time. Other taxa, *Coprosma* spp., *Dodonaea viscose*, and *Leptospermum scoparium* declined through time, with the latter declining significantly. Taxonomic richness also varied with early features having a mean of 3 taxa and late features a mean of 7.3.

Vegetation of Opito Bay

Wood charcoal analysis allowed reconstruction of vegetation in the immediate and surrounding landscape of Opito Bay, during the 16th century. New Zealand ecologies have undergone restructuring since human arrival. The analysis of Opito Bay charcoal is a window into this formative period. It was hypothesised that shrub species and seral species indicative of ecological disturbance would be common, with the contribution of large tree species to be negligible.

To explore this, charcoal derived from occupational debris, i.e., those with mixed origins, may be the result of long-term deposition. Charcoal from occupations dating to the late 15th to 16th centuries (Area 1 and 2) were used in this reconstruction, as they were derived from occupational debris. Samples from Area 3 were derived from fire features exclusively and, therefore, deemed inappropriate for vegetation reconstruction.

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Vegetation of Opito Bay (continued)

In Area 1, kauri (*Agathis australis*) was the most ubiquitous taxa, occurring in all samples (Table 15). All large trees occur in samples from Area 1. Small trees and shrubs occur with *Melicytus ramiflorus* the most common at 0.33.

In Area 2, *Agathis australis*, *Prumnopitys taxifolia* and *Nothofagus truncata* decline slightly to 0.71, 0.14, and 0.43 respectively. It is notable that some large trees increase in ubiquity e.g. *Metrosideros excelsa, Nestegis* spp., *Vitex lucens* and *Podocarpus totara.* This trend of increasing ubiquity is also evident in shrub and seral species with *Coriaria* sp., *Dodonaea viscosa*, *Olearia* spp., *Leptospermum scoparium* and *Melicytus ramiflorus* identified in many of the features.

When the ubiquity scores are calculated for both Areas 1 and Area 2, a clear pattern emerges which contrasts with that of the fuel contexts. Large trees, typical of lowland forest dominated. This contrasted with the signature from fuel contexts, which is dominated by shrubs, seral trees (*Leptospermum scoparium*, *Melicytus ramiflorus*), *Metrosideros excelsa* and *Agathis australis*.

Table 15. Ubiquity scores for occupational debris from T10/777

	Area 1 Late 15th to 16th centuries	Area 2 16th century	Combined (Area 1 & 2)
Taxon	N=15	N=7	N=22
Shrubs			
Coprosma spp.	0.20	-	0.14
Coriaria sp.	0.13	0.29	0.18
Dodonaea viscosa	-	0.29	0.09
Olearia spp.	0.07	0.14	0.09
Pteridium spp.	0.20	-	0.14
Veronica spp.	0.13	0.43	0.18
Small Trees			
Brachyglottis repanda	-	0.14	0.05
Leptospermum scoparium	0.13	0.71	0.32
Melicytus ramiflorus	0.33	0.43	0.36
Monocotyledon spp.	0.07	-	0.05
Myoporum laetum	-	0.14	0.05
Pseudopanax arboreus	-	0.14	0.05
Schefflera digitata	-	-	-
Large Trees			
Dysoxylum spectabile	0.20	-	0.14
Elaeocarpus dentatus seed	0.60	0.57	0.59
Laurelia novae-zelandiae	0.07	-	0.05
Metrosideros excelsa	0.40	0.57	0.50
Nestegis spp.	0.13	0.57	0.27
Nothofagus truncata	0.53	0.43	0.50
Vitex lucens	0.20	0.29	0.23
Conifers			
Agathis australis	1.00	0.71	0.77
Podocarpus totara	-	0.14	0.05
Prumnopitys taxifolia	0.20	0.14	0.18

ENVIRONMENT DISCUSSION

Role of Functional Context

Charcoal deposits can inform on past practices of humans and their wider environments but are the result of a range of human and natural taphonomic filters. The human filter includes past people's choices, the aesthetic and ritual significance of wood, as well as the energy and functional requirements of the fires. The nature of the combustion process itself is a filter; wood has differential burning and preservation potential which results in some fuel converting to charcoal and other fuels to ash.

The functional context of the sample provides different information about past human behaviour and the landscape (Théry-Parisot et al. 2010). Charcoal from functional contexts such as hearths and firescoops provides a biased account of past vegetation, due to cultural (e.g., intentional selection) and taphonomic processes (e.g., combustion, cleaning, trampling). Charcoal from other feature types such as occupational debris, may still be affected by these filters but are more likely to represent a wide range of processes, accumulating over a long timescale.

The Opito Bay assemblage had samples from a range of spatially distinct, functional contexts. These included concentrations of charcoal (firescoops) and dispersed charcoal from the fill of midden and pits of various shapes and sizes. Hypotheses were evaluated by comparing taxonomic richness of samples from these functional contexts.

As expected, smaller firescoops had the lowest average taxonomic richness. Firescoops are small concentrations of charcoal, typically with small amounts of shell. The low taxonomic richness of firescoops indicates they were either the result of an incomplete combustion event or wood charcoal that had been removed from the fire prior to complete combustion.

Surprisingly, the main midden in Area 1, with multiple fires, dense shell debris, and intact and broken hangi stones, had the highest mean taxonomic richness. This richness suggests that these areas were used multiple times and, therefore, represent a palimpsest of different fuel choices. The fuel chosen was shrub and seral community taxa, consistent with fuel utilised earlier in time. These taxa are common in coastal flats and in sand dunes, while others thrive following ecological disturbance, and both would have been accessible.

Occupational debris had a high mean taxonomic richness. These samples were either derived from lenses or from dispersed charcoal within pit fills. It was hypothesised that these samples were the result of anthropogenic and natural processes, and this was consistent with the high variance found. This feature type had the highest, second and third equal maximum taxonomic richness. The majority of taxa found were either absent or found in low amounts in the other two feature types. The taxonomically rich signature of samples obtained from occupational debris suggests it is a more appropriate feature type for reconstruction of the vegetation around Opito Bay.

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Changes in Fuel Use

Fuel use through time was evaluated by comparing charcoal derived from the late 15th/16th century firescoops and post-1650 AD contexts (see previous section). The most ubiquitous and abundant fuel in early firescoops was *Agathis australis*. This species undergoes regular abscission and produces a litter of dead branch wood, suitable for collection. This was the only forest taxon exploited for fuel at this time. Another common taxon was *Metrosideros excelsa*. Typically, this species has a short trunk with multiple secondary trunks diverging from it. This gives the species its distinctive spreading crown, which results in abundant litters of twig and branch wood. It is common along New Zealand coastlines now and also in the past, and its exploitation is indicative that people were exploiting fuel sources near the site. Other common taxa found were *Coprosma* spp., *Coriaria* sp., *Leptospermum scoparium* and *Veronica* spp.; taxa which are photophilic and probably would have been common on the coastal flat or sand dunes.

In the later features *Agathis australis* underwent substantial decline in ubiquity and abundance, with only two fragments found in one context. There are multiple ways this change can be interpreted. Firstly, this change in fuel use may indicate the loss or unavailability of *Agathis australis* fuel sources in the surrounding landscape either as living trees or as sub-fossil remains.

The Area 3 contexts dated to the 17th to 18th centuries show that the larger tree species are all but gone, although Pohutakawa remains throughout.

Another explanation is that *Agathis australis* was available as fuel but was avoided or was tapu because preferences for fuel had changed through time. Fuel wood collection was not an isolated act of resource extraction but one which was socially mediated, with socially determined rules and taboos (Picornell et al. 2011). These rules and tapus are unknowable now but avoidance is plausible, as the heartwood of *Agathis australis* is highly resinous, producing undesirable black soot when fired. It also may have been avoided as fuel because of harvesting pressures as it was a valuable structural and construction timber exploited by Maori.

It is equally possible, that this decline represents the exploitation of nearby coastal sources, at the expense of forest fuel sources. This explanation seems to be the most likely, considering the absence of forest taxa in the early firescoops.

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Changes in Fuel Use (*continued*)

Wood is a heavy resource and Maori may have considered factors such as relative usefulness, abundance, availability and status (e.g., dry or wet, alive or dead) of nearby coastal fuel sources prior to exploiting sources further afield.

The most ubiquitous and abundant taxon in the contexts was *Olearia* spp. which was found in all samples and accounted for 43% of charcoal identified. Other taxa present in the earlier firescoops also increased substantially in ubiquity and abundance (e.g., *Metrosideros excelsa*, *Veronica* spp., *Coriaria* sp.). These taxa are indicative of exploitation of coastal flat and sand dunes.

The Opito Bay Environment

The archaeological evidence found at T10/777 was that of extensive evidence of storage and postholes suggestive of a house with some cooking areas. A number of the storage pits found were intercutting, suggesting multiple uses of the coastal flat. This evidence coupled with the late 15th to 16th century dates obtained from certain features suggests that this was not the first usage of Opito Bay and that the activities of the site would have modified the vegetation. It was thought that shrub species and seral species indicative of ecological disturbance would be common, with the contribution of large tree species to be negligible.

This was not the case, and coastal and lowland trees dominated occupational debris. *Agathis australis* was the most ubiquitous and abundant taxon found. Other common taxa were the canopy forming trees *Elaeocarpus dentatus, Nothofagus truncata, Nestegis* spp., *Vitex lucens* and the coastal tree *Metrosideros excelsa*. Other canopy and emergent trees found were *Dysoxylum spectabile, Laurelia novae-zelandiae, Podocarpus totara* and *Prumnopitys taxifolia*. The only open habitat taxa that were common were *Leptospermum scoparium* and *Melicytus ramiflorus*, which are often found at the edges of forest. Shrubby taxa common in fuel contexts form a minor component of the occupational debris.

The archaeological evidence at T10/777 is suggestive of multiple occupations; therefore, it is argued that the sand dunes and coastal flat would have been cleared of vegetation. Intermittent clearance of vegetation on the coastal flat would encourage the establishment of open habit taxa such as *Coprosma* spp., *Dodonaea viscosa*, *Melicytus ramiflorus, Olearia* spp., *Veronica* spp, as well as fire-adapted species *Coriaria* sp., *Leptospermum scoparium* and *Pteridium* spp. Assuming that availability and avoidance conditioned fuel choice selectivity, evidence from fuel contexts suggest that the coastal flat and sand dune was predominately exploited for fuel.

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The Opito Bay Environment (continued)

The signature obtained from the occupational debris suggests that open habitat and seral taxa played a minor role in the wider vegetation but it is possible that the occupational debris is skewed towards some importation of larger species for building (see Wallace 2014, in Appendix 4). The coastal flat is likely to have been dominated by bracken fern and scrub with a forest in the hinterland providing additional larger trees.

Remnant fragments *Agathis* forest and mixed conifer-broadleaf forest can still be found on the Coromandel Peninsula today. Palynological evidence suggests that these lowland forest types were once widespread in the Coromandel Peninsula in pre-human times (Byrami et al. 2002; Newnham et al. 1995). These palynological records note that with human arrival, lowland forest taxa declined substantially and were replaced by seral communities. Charcoal from Opito Bay suggests that this process of landscape restructuring began on the coastal flat (Figure 139).

Figure 139. 3D reconstruction of Opito Bay looking across pa site T10/173 (left foreground) towards T10/777

Part 6: Discussion and Conclusion

EXCAVATIONS AT T10/777

Excavations

Trenching and excavation exposed a range of features within the boundaries of site T10/777 as defined by Gumbley and Hoffman (2007a). In 2012, over 3350m^2 of the dune areas behind the foredune were excavated, making this one of the larger excavations recently undertaken in the Coromandel.

The archaeological features were identified in two large concentrations. Both contained a number of storage pits of varying sizes and types, postholes suggestive of above ground structures, as well as areas of burning and cooking (Areas 1 and 2). A third concentration of small firescoops and midden was also excavated (Area 3).

A small number of archaeological features including postholes, pits and firescoops were identified in trenches in other parts of the paddock and may have represented either more ephemeral occupation at other times or outlier structures related to gardening or activities away from the main living areas.

Some modern fires were also identified in the upper layer of Area 2 and there were signs of modern camping identified during the excavations.

Area 1

The features in Area 1 covered an area of around 30m x 25m spread across the top of the old dune above and behind the main foredunes. The earliest occupation appears to have been characterised by a group of large and deep rectangular pits in the dune. Their size and number were only fully appreciated at the end of the excavation when the upper features were removed.

A later midden, initially identified by Gumbley and Hoffman (2007a), was found over the top of one of the large but relatively shallow pits that was densely filled with predominantly kauri charcoal. Within the midden, Tahanga basalt flakes and a smaller amount of other stone material were found, suggesting minor stone working around the midden. A dog skeleton was also found in the upper layers within this area. The articulated nature of the skeleton suggests a later burial rather than part of the cooking activities associated with the midden.

Many of the smaller rectangular pits, firescoops and some of the small rua found in the nearby trenches relate to cooking area identified by the midden. Evidence of above-ground structures such as houses was not found but some of the shallow pit features with nearby firescoops in the trenches to the west and north of the midden may have used as shelters as well as storage. Intercutting features in at least three of the trenches supported the idea of intermittent use of the area, but at different times, perhaps seasonally.

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Area 1 (continued)

Despite initial appearances, the midden was not particular large given the number of other features found nearby. Although covering an area of around 5m x 10m, the quantity of shell observed could have been deposited by a relatively small group in a fairly short time.

Outside the midden area, artefacts were rare given the scale of the excavations. While sieving was not undertaken outside the midden, the fill of the features consisted primarily of wind-blown sand. The small size and low density of artefacts found in the fill suggested that these were not in situ items and probably came in with the movement of the dunes that covered all of the features.

Area 2

Farther to the west and back on the older flat area of the dunes, a large number of pits, rua, some with the door entrances intact, small firescoops and at least one large structure were identified as part of Area 2. Gumbley and Hoffman (2007a) found and excavated a large rua during their excavations and this proved to be part of a group of rua at the northern edge of the occupation.

Rectangular pits, circular rua and firescoops are concentrated in an area of around 30m x 45m with a smaller number of features found out towards the north and east of the main group. A possible house floor was identified in the south-west corner of the excavation. Some of the pits may have been used as pits, but others may have been partly subterranean houses, e.g., F340 where a small firescoop was identified in the north east corner of the main structure. Small pits dug into the larger pits were also common.

Firescoops relating to the occupation were rare in the main concentration of pits and rua, but a small cluster of scoops was found separated off at the eastern side. This may have been a separate cooking area for the largely living and storage areas, but the lack of any debris, such as shell, along with the paucity of charcoal is not convincing.

Intercutting of features in the southern end of the site in particular indicated multiple occupation events. In that area, at least two but as many as five occupation ‘events’ were identified, although some may have occurred over a relatively short period of time. The phases may have been characterised by an initial occupation with relatively small rectangular pits, and a later phase dominated by the digging of the large rua. A house identified by three rows of parallel postholes was found dug into the area where a couple of the rua had been filled in.

However, the storage feature types are not definitive markers of relative date and it is likely that rectangular pits and rua were being dug, used and backfilled frequently throughout the occupation of Area 2.

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Area 3

Area 3 contained 11 firescoops with shell midden concentrated in an area of around 7m x 6m within Trench 18. All were shallow and the amount of shell suggested a relatively short use of this zone. The scoops were dug into relatively unconsolidated dune sand suggestive of a more recent use. The one radiocarbon date from Feature 503 supported this interpretation (see below). No evidence of structures was found, and this supports the interpretation that this was a short-lived small cooking area separated from any nearby living areas.

Gardening

No specific evidence of gardening was identified during the excavations. The sandy soils with some organic material added in would have been good for kumara and indeed kumara have been grown there by the current landowners (Murray Edens, pers. comm. 2012). It seems likely that gardening occurred around the main concentrations of features and that a number of the other satellite features identified related to those activities.

Chronology

A total of nine radiocarbon dates from the excavation by Gumbley and Hoffman (2007a) and the current project provide a chronology of the site suggesting occupation of the site from the middle of the 15th century AD through to the mid-18th century AD. This site picks up the archaeological sequence from the earlier sites on the Peninsula that have been the focus of most of the previous archaeological investigations particularly nearby at Sarah's Gully and Cross Creek.

Investigation of both Areas 1 and 2 suggested that they were occupied at different times in the past, although it is difficult to establish a definitive sequence across the entire site given the complexity of the dune stratigraphy. The radiocarbon sequence suggests that Area 1 was occupied during at least three different periods: initially during the latter half of the 15th century, later during the 16th century, and a final occupation in the 18th century (although this may have been during the early 17th century).

All the dates from Area 2 features come from the 16th century. This suggests that this area was occupied on and off during that time before being abandoned.

As discussed earlier, the date from Area 3 indicates this area was probably used after the main occupations of Areas 1 and 2 in the 17th to 18th centuries AD.

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Environment[7] The firewood charcoal recovered from firescoops dating to the 16th century in Areas 1 and 2 was dominated by kauri, which made up over 55% of the firewood assemblage, with other large trees contributing only 5%. Another 40% of the assemblages here were shrub and scrub species dominated by Hebe, Coprosma, Olearia, and Manuka. These species are typical of the early phases of vegetation regeneration on cleared land.

While kauri was the most abundant firewood species present, the trees that would have accompanied it if it came from a living forest are notably absent. Living coastal broadleaf forest generally contains a diverse collection of large trees with kauri as only one element. A comparative example of a charcoal assemblage derived from intact coastal virgin forest comes from the Archaic site of T11/914 in Whitianga where over 80% of the charcoal is from large forest trees which include Kahikatea, Matai, Rimu and Totara accompanied by a wide variety of broadleaf tree species, and where only modest amounts of Kauri occur (R. Wallace report in Appendix 4). That old sub-fossil wood was the primary source of Kauri in the Opito Areas 1 and 2 firewood samples is fairly conclusively demonstrated by this data.

In the firewood charcoal assemblages from the Area 3 excavations dated to the late 17th to 18th centuries, 74% of the charcoal is from shrub and scrub species typical of the early phases of vegetation regeneration on cleared land. Pohutukawa forms around a quarter of the assemblage while other large trees including Kauri contribute less than 3%. As Pohutukawa is abundant on this coast today and almost certainly always has been, its presence is not an indicator of forest and much of that found in these samples may have been driftwood collected off the beach originating from trees growing on the cliffs along the coast.

The charcoal collected from the pit fills shows a quite different pattern. The origin of this material cannot be conclusively defined but must be a mixture deriving from a variety of burning events. The dominant species is Kauri which contributes 64% of the total pieces identified. A further 12% of the assemblage comes from a wide range of large forest trees which include Maire, Beech, Hinau, Pukatea, Kokekohe, Puriri, Matai and Totara. Only 17% of the charcoal is from shrub and scrub species. If we assume that the pit structures in Area 1 and 2 date to the same periods as the cooking features, then is is possible that the charcoal indicates the local vegetation at the times the site was occupied consisted of bracken, shrub and scrub species with pohutukawa as the only large tree. Charcoal from the large tree species in the pit fills is therefore less likely to have been from vegetation actually growing in the immediate area and could have been the remains of wood brought to the site as building timber.

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[7] Conclusions derived from Wallace 2014 in Appendix 4.

Environment (continued)

In summary, the fact that nearly half the charcoal in T10/777 is Kauri indicates that forest containing this tree once occurred locally. However, by the time the site was occupied it was present only in the form of old sub-fossil wood. The remains of burnt building material from the pits suggests that the forest must have been present somewhere in the general area in the 16th century AD but, in comparison, the firewood charcoal indicates the local vegetation at this time consisted mainly of bracken, shrub and scrub species. By the late 17th to 18th centuries AD, the sub-fossil Kauri wood had been used up and the local woody vegetation including Tutu, Hebe and Olearia were common. This probably implies the primary plant cover at the time was bracken fern with these other shrub species.

Artefacts

The site was characterised by a relative dearth of the tools and artefacts that characterise many of the well known Archaic sites in and around Opito Bay. Despite the close proximity of the Tahanga basalt quarries, the quantity of stone recovered was small and almost all appeared to have been in secondary fill contexts. Small numbers of obsidian flakes were also found.

A small area of flaking was identified within the midden in Area 1. The material suggests opportune reworking of a tool most probably associated with food preparation at the midden. Part of an argillite adze was also found in the midden. However, there was no evidence of a primary tool production area anywhere around the excavated site. These are probably either down on the foredunes (e.g., T10/161 and T10/165, Figure 16) or in the inter-tidal zones. The inter-tidal working floors recorded are located at the eastern end of Opito Bay and include T10/160, T10/247 and T10/250 (Figure 9). These are closer to the Tahanga quarries than T10/777. Interestingly, the earlier sites at Sarah's Gully are farther away but more generally considered to be contemporary with the use of the Tahanga resource.

Fishing artefacts were found at different locations and included a pumice float, three netsinkers and a fishhook. Two of the netsinkers appeared to be made from round basaltic cobbles with cross-tie marks visible. The third was more irregular in shape.

The fishhook was excavated from the fill of one of the small rua in Area 1 and was made of unidentified bone. Its small size and condition suggests that it may have been more ornamental than functional.

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Conclusion

The importance of the excavations at T10/777 can be seen in the wider context of the significant archaeological investigations that have occurred in the Coromandel region. The excavations at T10/777 demonstrate a shift from the Archaic occupation of the area focused on resource extraction related to the Tahanga quarry and marine exploitation, towards a shifting agriculturallycentric occupation of the back dunes at Opito Bay. The sandy dunes and rich Waihi ashy loams provided good conditions for gardening near to the beach with its rich marine resources and swamps and bush to the west for wood and birds.

Only one large midden was identified within Areas 1 and 2, and in all likelihood represents a couple of small-scale cooking episodes by a relatively small group of people. It seems likely that the remains of the fishing and shellfishing exploitation relating to these occupations probably took place mostly away from the living and food storage areas. The lack of both Tahanga stone and middens across the site are two unusual features. This supports the greater functional differentiation of space typical of later Maori settlement patterns.

It seems likely, given the presence of the storage pits and rua, that gardening in the dunes and nearby slopes occurred from the 15th century on, and that T10/777 was occupied on an irregular basis to access the gardens as well as nearby fishing, with shifting occupation across the dunes at the northern end of Opito Bay. While the results are not definitive, the large circular rua seem to come into use during the 16th century, in part replacing some of the rectangular features, although the rectangular pits of various sizes were probably always present. Easy access to the forest in the hills behind the site and access to freshwater in the streams around the site would also have made this a desirable location, particularly in the summer months.

Open settlements with large amounts of food storage capacity could provide families with a desirable well-established living and gardening area. The settlement appears to have been occupied multiple times from the 15th century onwards, but the length and duration of any particular occupation could not be established. However, as pressures from elsewhere kicked in, the more defendable locations at the headlands may have become more of a drawcard, with only intermittent and temporary occupation along the beach dunes occurring.

Part 7: References and Appendices

Barry Baquié with Murray (top) and Sue Edens (bottom left) and Rod Clough talking with Kim Edens (bottom right) (Opito 2012)

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APPENDIX 1: FEATURE LIST

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
1	Pit	Grey sand fill with charcoal and iron pan inclusions. Possible drain in west corner	105	220	35		
2	Posthole	Clean orange-brown sand fill with crushed shell inclusions	17	17	18		
3	Pit	Sterile grey sand fill with flecks of iron pan. Irregular shape, widens at the northern end	116	33	70		
4	Posthole	Mottled orange/grey/brown fill with rare charcoal inclusions. Tapers to a point at the base	13	13	24		
5	Scoop	Mottled grey/orange/brown fill. East and west walls slope, while north and south walls vertical	9	11	5		
6	Scoop	Event fill (1006). Sloping sides	30	30	15		
7	Bin Pit	Grey sand fill with charcoal and iron pan inclusions. Shell, basalt, bone and obsidian inclusions	100	50	35		
8	Firescoop	Dense charcoal with brownish sand	28	43	5		
9	Stakehole	Light yellow sand fill. Walls taper to a point at the base	10	10	7		
10	Firescoop	Dense charcoal pieces and powder with yellow sand infill	46	48	6		
11	Firescoop	Dense charcoal pieces mixed with yellow sand fill. Poorly defined edges	34	28	3		
12	Firescoop	Charcoal deposits mixed with red/brown sand and water rolled stones	41	39	5		
13	Firescoop	Charcoal deposits mixed with red/brown sand	30	33	5		
14	Pit	Mottled grey/brown sand fill with charcoal inclusions	72	30	48		F14>F15>F16
15	Bin Pit	Mottled grey/yellow/brown sand fill. Bowl shaped base	27		18		F14>F15>F16
16	Scoop	Grey/brown sand fill with large (<3cm) inclusions	14	26	5		F14>F15>F16
17	Scoop	Light grey sand fill. Elliptical in shape with a stakehole or drain at eastern end	17	30	14		
18	Pit	Mottled grey/yellow sand fill	360	170	25		
19	Pit	Grey sand infill flecked with iron pan and charcoal	73	53	4		F19>F28
20	Rua	Dark, charcoal rich sand fill with charcoal, shell and fire-cracked rock inclusions	9	9	7		
21	Scoop	Grey sand infill with shell, charcoal and fire-cracked rock inclusions.	55	55	13		
22	Rua	Dark, charcoal rich sand fill with charcoal, shell and fire-cracked rock inclusions	42	42	45		
23	Posthole	Yellow sand with charcoal, shell and fire-cracked rock inclusions	36	37	19		
24	Bin Pit	Grey sand with rare charcoal flecks infill	60	70	33		F24>F25
25	Pit	Grey sand with infrequent shell and water rolled stone inclusions	58	146	40		F24>F25
26	Scoop	Grey sand fill with charcoal and iron pan inclusions. Charcoal, water rolled pebbles and fire-cracked rock inclusions	65	33	16		
27	Pit	Light grey sand fill. Obsidian and charcoal inclusions	50	65	25		
28	Pit	Grey sand infill with charcoal flecks.	147	31	2		F19>F28
29	Firescoop	Dense charcoal layer with light grey sand fill. Still in baulk	130		13		
30	Pit	Grey sand with small patches of charcoal fill. Partially in baulk	168		25		
31	Pit	Mottled brown/orange sandy fill with common charcoal and rare iron pan inclusions	37	44	14		
32	Pit	Medium grey sand infill with charcoal flecks	83	48	48		
33	Pit	Light grey sand infill with charcoal flecks. Still partially in baulk. Fishbone, shell and basalt found	180	40	100		
34	Posthole	Grey sand fill with water rolled pebbles and shell inclusions. May relate to pit F30 as an external structure	18	18	25		
35	Scoop	Grey sand infill with charcoal flecks	28	28	8		
36	Bin Pit	Yellow/grey sand infill with rare charcoal flecks	44	44	17		
37	Posthole	Mould fill was grey/ash layer with small bits of shell. Drag out fill is yellow grey with rare charcoal inclusions	17	17	21		
38	Bin Pit	Grey sand fill with ash and shell inclusions	62	62	33		

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
39	Scoop	Grey sand fill (1006)	47	47	15		
40	Pit	Charcoal grey stained sand fill. Fish bone present.	200	490	75		F61=F62>F40
41	Bin Pit	Mottled grey/yellow sand fill with common iron pan and scattered charcoal inclusions	45	110	35		F41>F42
42	Bin Pit	Mottled dark grey/brown fill with charcoal inclusions	56	107	33		F41>F42
43	Pit	Grey/brown sand fill with charcoal, shell, fire-cracked rock and obsidian inclusions	250	112	10		F43=F45
44	Scoop	Grey/brown sand fill	60	60	10		
45	Posthole	Grey/brown sand fill with flecks of shell and charcoal. One stone inclusion. Drag out section visible	14	14	27	F43	F43=F45
46	Pit	Grey/brown sand fill with shell, fish bone, charcoal and rock inclusions. Sloping base	266	96	50		
47	Scoop	Grey charcoal stained sand	22	22	6		
48	Scoop	Charcoal stained lens cut into the top of F46	120	60	5		F46>F48
49	Posthole	Dark grey sand fill with charcoal, shell and bone inclusions. "Rocked" with drag out section evident. Large, whole scallop shell found near base	12.5	12.5	28		
50	Pit	Grey sand fill with small charcoal and shell inclusions. Noted as an activity floor.	34	34	5		F50>F51>F57=F56=F55=F70=F71=F72
51	Bin Pit	Grey sand fill with charcoal and yellow sand mottling.	88	47	37		
52	Pit	Grey sand fill with shell and charcoal inclusions	66	350	69		F52=F53
53	Posthole	Grey sand fill with shell and charcoal inclusions. Deeper than 99cm, but unable to excavate further	25	25	99		F52=F53
54	Firescoop	Charcoal stained grey brown sand fill with charcoal and large stone inclusions	46	60	7		
55	Bin Pit	Grey/yellow sand fill with charcoal inclusions	60	72	17		
56	Bin Pit	Grey/yellow sand fill with charcoal inclusions	25	25	15		F50>F51>F57=F56=F55=F70=
57	Pit	Shallow pit	250	140	10		F71=F72
58	Pit	Grey/brown sand fill with fire-cracked rock, charcoal and shell inclusions	245	123	14		
59	Posthole	Light brown sand fill with 2cm of grey/brown fill at the top	16	16	25	F58	
60	Posthole	Brown/grey sand fill with charcoal inclusions	13	13	16	F58	F59=F64>F58=F60=F63
61	Pit	Light grey sand fill with infrequent flecks of charcoal. Partially in baulk			61		F61=F62>F40
62	Pit	Light grey sand fill with infrequent flecks of charcoal and patches of wind-blown sand present.	160	75	120		F61=F62>F40
63	Posthole	Brown/grey sand fill with charcoal inclusions	12	12	19	F58	
64	Posthole	Brown sand fill capped by 1cm of dark brown/grey fill	9	9	12	F58	F59=F64>F58=F60=F63
65	Pit	Heavily charcoal stained sand fill with charcoal and shell inclusions	110	110	30		F144>F65>F67=F69
66	Midden	Dog jaw, pelvic bone and snapper jaw. Underneath, dense deposits of shell, charcoal, fire-cracked rock and basalt flakes			10		
67	Midden	Upper 5cm mainly whole shell, scallop, tuatua, cooks turban, cats eye, cockle, paua, limpet. Lower 10cm mainly tuatua. Charcoal, argillite and fish bone inclusions. Cut by Warrens trench			15		F114>F67=F69
68	Working Area	Scattered basalt flakes on a working floor	60	50	5		F68=F84
69	Midden	Consists of tuatua, with some mussel, whelk, white rock shell and scallop. Cut by Warren's trench	280	150	20		F114>F67=F69
70	Posthole	Grey sand fill with charcoal inclusions			14		
71	Bin Pit	Grey sand fill with flecks of charcoal	40	50	21		F50>F51>F57=F56=F55=F70=
72	Bin Pit	Black grey sand fill with rock, charcoal and shell inclusions	60	110	15		F71=F72
73	Scoop	Grey sand fill with shell flecks (1006)	22	22	12		
74	Posthole	Dark grey sand fill with charcoal inclusions	15	15	10		
75	Posthole	Dark grey/brown sand fill with stone inclusions	19	19	10		
76	Pit	Grey sand fill with rare charcoal flecks. Continues into the baulk with near-vertical sides and a flat base	76	94	42		

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
77	Bin Pit	Grey sand fill. Ovaloid in shape, rounded sides and a flat base	49	91	30		
78	Pit	Grey sand fill with charcoal flecks, continues into baulk. Obsidian flake and core collected from fill. Kauri root inclusions in NE corner, only gum remains, staining the sand and holding root shape	33	239	40		
79	Scoop	Yellow-grey fill with charcoal inclusions	20	20	7		
80	Scoop	White sand fill	18	18	7		
81	Posthole	Grey sand fill with rare charcoal flecks	14	14	10		F82>F81
82	Scoop	White Aeolian sand fill with water rolled stone inclusions	55	21	8		F82>F81
83	Scoop	White Aeolian sand fill with charcoal mottling	35	21	9		
84	Working Area	May be a part of F68. Scattered basalt flakes on a working floor	30	20			F68=F84
85	Pit	Part of larger complex. Grey sand fill with flecks of shell (1006)	140	75	42		
86	Bin Pit	Grey sand fill with infrequent shell inclusions (1006). Continues in to baulk	20	38	77		
87	Bin Pit	Grey fill with infrequent shell inclusions	40	22	69		
88	Rua	Grey fill with infrequent shell inclusions. Curves under 1002 for approximately 40m	60	65	42		F85=F86=F87=F88
89	Scoop	Grey sand fill	26	26	5		
90	Scoop	Grey sand fill	26	26	5		
91	Posthole	Grey sand fill with shell inclusions (1006)	18	18	47		
92	Scoop	Grey sand fill with light charcoal staining	25	25	10		
93	Posthole	Grey sand fill with shell inclusions (1006)	19	19	27		
94	Posthole	Grey sand fill with shell inclusions (1006)	26	26	21		
95	Scoop	Grey sand fill	35	35	8		
96	Scoop	Grey sand fill with shell inclusions (1006) and charcoal flecks	31	31	10		
97	Posthole	Grey sand fill with shell inclusions and charcoal flecks	19	19	29		
98	Posthole	Dark grey sand fill with small and infrequent shell inclusions. Drag out section extends east with total dimensions 53x62x27cm	42	42	40		
99	Posthole	Grey sand fill with shell inclusions (1006). 40cm west of F98 (posthole)	17	17	12		
100	Bin Pit	Grey sand fill with shell inclusions (1006), some larger shell and charcoal inclusions. Continues into the baulk	29	65	55		
101	Pit	Grey sand fill with larger shell inclusions, capped by 1006. Continues into baulk	120	173	48		
102	Posthole	Grey sand fill with shell inclusions (1006)	18	18	10		
103	Pit	Grey sand fill with charcoal staining, capped by event layer. Continues into baulk	89	25	33		
104	Scoop	Grey sand fill with shell inclusions (1006), infrequent large shell inclusions (whole pipi)	29	29	15		
105	Scoop	Grey sand fill with charcoal staining and charcoal inclusions	27	27	15		
106	Scoop	Grey sand fill with fire-cracked rock and water rolled stone inclusions	51	51	5		
107	Pit	Grey sand fill	45	69	26		
108	Midden	Dog bone and fish bone deposit	20	20	10		
109	Bin Pit	Tuatua scoop with grey sand infill and charcoal flecks. Capped by 1006	41	41	10		
110	Posthole	Grey sand fill with slight charcoal staining. Rocked on the N-S axis when removed	26	22	18		
111	Posthole	Grey sand fill with charcoal inclusions and small shell flecks	17	17	8		
112	Scoop	Charcoal imbued sand fill	15	26	6		
113	Midden	Dense deposit of very small tuatua	50	30	10		F113=F69
114	Pit	Grey sand fill with charcoal inclusions. At base fill becomes lighter and shell inclusions increase	145	340	35		F114>F67=F69
115	Pit	Grey sand fill with charcoal flecking and pieces, infrequent scallop shell inclusions. 2 worked basalt pieces taken from fill. Continues into baulk	90	75	40		
116	Pit	Dark grey sand fill with abundant charcoal and shell inclusions (1006). Lower fill brown/grey	200		120		

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
		sand with occasional charcoal inclusions					
117	Pit	Dark grey/brown sand fill with charcoal inclusions and rare basalt flakes	120		20		
118	Pit	Brown/grey sand fill with common shell and charcoal inclusions, including some larger fragments.	121		100		
119	Bin Pit	Rectangular pit	57	98	17.6		
120	Rua	Brown/grey sand fill with shell and charcoal inclusions. Obsidian, bone and fishing sinker taken from fill	80	80	70		F120>F121
121	Pit	Brown/grey sand fill with charcoal flecks	75	92	16		F120>F121
122	Pit	Brown/grey sand fill with bone fishhook, basalt flakes, bone and obsidian taken.	70	95	42		
123	Rua	Dark brown/grey sand fill with pumice floater, obsidian, bone, charcoal and basalt found in the fill	75	40	50		
124	Bin Pit	Grey/brown sand fill with iron-pan inclusions. Basalt flakes collected from fill	26	30	45		
125	Pit	Dark grey sand fill with charcoal and basalt inclusions. Obsidian preform taken. Full extent lost when trenching.		123	44		
126	Pit	Extends into the baulk	290	160	22		
127	Pit		200	50	57		
128	Bin Pit	Brown/grey sand fill with sand and charcoal inclusions	30	100	45		F126>F127>F128
200	Pit	Round pit with mottled yellow/brown sandy fill with occasional charcoal	36	36	32		F200>1008
201	Posthole		26	26	62		
202	Scoop	Brown/orange clay fill	13	11	8		
203	Bin Pit	Compacted grey-brown topsoil fill, top 10cm appears to be backfill with darker topsoil	54	91	47		
204	Pit	Clay infill with charcoal flecks	78	100	26		
205	Pit	Dark brown clay-loam infill with charcoal flecks. Large basalt boulders found	119	70	32		
206	Pit	Mottled yellow-brown sandy clay, darker towards base. Small depression at base of trench 3cm (in section)	65	180	46		F220=F243>F206
207	Pit	Grey clay-loam soil with charcoal inclusions. 4 postholes in base, intercut by rua.	360	170	20		F207=F211=F212=F213=F214 >F244=F245=F219
208	Rua	Mottled brown/yellow silt and natural clay, collapsed ceiling mixed into fill. Step entrance, flat base, undercut sides.	100	113	77		208/210>209
209	Pit	Brown topsoil mixed with sand and clay, some charcoal inclusions. Sloping sides with concave base	46	150	55		
210	-	See 208					
211	Posthole	Grey loam soil fill with charcoal specs	10	10	60	F207	
212	Posthole	Grey loam soil fill with charcoal specs. Sections were unearthed as a void, indicating the post may have rotted in situ	13	13	87	F207	
213	Posthole	Grey loam soil fill with charcoal specs	10	10	40	F207	F207=F211=F212=F213=F214
214	Posthole	Grey loam soil fill with charcoal specs	16	16	42	F207	>F244=F245=F219
215	Posthole	Brown topsoil mixed with sand and clay fill. Base consists of rotten rock	30	47	27		
216	Pit	Brown topsoil mixed with sand and clay fill	35	42	12		
217	Bin Pit	Mottled grey/brown fill with lumps of yellow silt fill. Some charcoal inclusions	42	115	38		F217=F260
218	Pit	Clay infill with charcoal flecks	47	64	11		
219	Rua	White grey sand fill with charcoal, shell and obsidian inclusions.	35	65	70		F207=F211=F212=F213=F214 >F244=F245=F219
220	Pit	Mottled brown/yellow clay sand fill with charcoal, basalt and obsidian inclusions. Base has a hard-packed clay layer (approx 2cm thick) above the natural)	262	159	67		F221>F220=F222=F223=F224
221	Pit	Grey/yellow soil fill with many rock inclusions	40	80	70		=F225

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
222	Posthole	Mottled yellow/brown clay sand fill. A hard packed clay layer was at the top – depth unknown	16	16		F220	
223	Posthole	Mottled yellow/brown clay sand fill. A hard packed clay layer was at the top	8	8	16	F220	
224	Posthole	Mottled yellow/brown clay sand fill. A hard packed clay layer was at the top	13	13	20	F220	
225	Posthole	Mottled yellow/brown clay sand fill. A hard packed clay layer was at the top	14	14	43	F220	
226	Posthole	Light grey sand fill with no inclusions	20	20	8		
227	Pit	Light grey sand fill with charcoal flecks	47	69	15		
228	Posthole		17	17	18		
229	Pit	Sand/clay fill with charcoal inclusions. Bulk sample of charcoal taken	38	142	80		
230	Pit	Round sided with dark orange soil fill. Rocks found in the middle of the half section	50	50	60		
231	Pit	Dark grey/orange soil	240	150	14.6		F231=F235=F236=F237>F230
232	Pit	Dark brown clay fill with charcoal flecks. Rock cache with numerous basalt artefacts, water rolled stones and fire-cracked rock	26.5	70	24		
233	Pit	Round pit with dark soil fill, frequent charcoal inclusions and lenses of shell. Basalt and shell collected from fill, bulk sample taken for charcoal	87	87	39		
234	Pit	Yellow/brown clay like fill with no inclusions	213	127	25		F234>F233=F364
235	Posthole	Grey soil fill	12	12	30		
236	Posthole	Grey soil fill	10	10	21		
237	Posthole	Grey/brown fill	10	10	20		F231=F235=F236=F237>F230
238	Pit	Round sided with brown/yellow clay sand fill. Charcoal, shell, fire-cracked rock, water rolled stones and basalt inclusions	90	37	42		F238>F261
239	Posthole	Mottled yellow/brown clay sand fill. Shell, fire-cracked rock and water rolled stone inclusions.	16	16	28		
240	Firescoop	Dark grey/brown sand with charcoal staining. Bowl-shaped base	50	50			
241	Posthole	Grey/brown topsoil	13	13	38		
242	Posthole	Grey soil fill	26	26	48		
243	Pit	Brown sand clay fill with stone inclusions	275	168	40		F243=F258=F259
244	Pit	Yellow sand fill	120	160	13		F244=F336=F337=F338>F245 =F246=F339=F207
245	Rua	Orange/brown loam fill with sand and charcoal lenses. Charcoal, shell and basalt inclusions	134	145	82		
246	Bin Pit	Orange/brown loam fill with charcoal flecks	126	62	34		F244=F336=F337=F338>F245 =F246=F339=F207
247	-	Not used					
248	Posthole	Mottled brown/yellow clay sand fill. Drag-out section	18	24	35		
249	Posthole	Mottled brown/grey clay sand fill	22	22	26		
250	Posthole	Yellow/grey soil fill with basalt flake inclusion	21	25	38		
251	Posthole		30	27	38		
252	Posthole		32	27	38		
253	Posthole	Rounded sides with mottled yellow/brown clay sand fill and occasional water rolled stone inclusions.	30	30	65		
254	Posthole	Rounded sides with mottled yellow/brown clay sand fill and occasional water rolled stone inclusions.	33	33	53		
255	Posthole		22	25	36		
256	Pit	Brown clay fill with charcoal flecks. Base has a dark clay lens	130	45	23.5		
257	Posthole		12	14	20		
258	Posthole		11	11	22	F243	F243=F258=F259
259	Posthole		13	13	38	F243	F243=F258=F259
260	Drain	Drain for pit F217. Yellow/brown silt fill with no inclusions	22	56	22	F217	F217=F260

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
261	Pit	Mottled yellow/brown clay sand fill with charcoal, basalt, shell, fire-cracked rock and water rolled stone inclusions. Sinker and float taken	94	146	5		F238>F261
262	Bin Pit	Light brown/yellow clay sand fill. Obsidian taken from fill	80	95	30		F262>F288
263	Rua	Basalt, shell, fire-cracked rock and water rolled stone inclusions. Two steps in entrance	105	73	54		
264	Bin Pit	Yellow soil fill with rock inclusions. Gum also found in the fill	57	109	50		
265	Rua	Grey/brown fill with a grey sand lens containing abundant shell fragments (1006). Charcoal, shell, water rolled stone, basalt, fish bone and fire-cracked rock inclusions	69	55	84		
266	Bin Pit	Grey sand fill with charcoal flecks	36	36	7		
267	Rua	Grey sand fill with shell, obsidian, charcoal, basalt and bone inclusions. Fill runs into F269 and is similarly composed	60	60	86		F297=F309>F301=F298=F299
268	Posthole	Grey sand fill with charcoal flecks. Fill runs into F267 and is similarly composed.	45	45	50		>F265=F300=F267=F268
269	Posthole	Grey sand fill. Large stone found at base	23	23	32		
270	Pit	Grey sand fill with charcoal flecks.	60	158	8		F380>F270=F378=F379
271	Posthole	Grey/yellow sand fill	27	27	36		
272	Posthole	Grey/yellow sand fill	22	28	37		
273	Posthole	Grey/yellow sand fill. Water rolled stone inclusion	22	22	32		
274	Posthole	Grey/yellow sand fill	20	20	65		F275>F274
275	Rua	Grey sand fill. Continues into baulk	29	26	46		F275>F274
276	Pit	White sand fill with shell inclusions. Continues into the baulk	112	41	31		
277	Pit	Extends into the baulk	109	17	18		
278	Firescoop	Extends into the baulk	82		6		F278>F277>F276
279	Posthole	Clay fill with a grey sand layer at base	14	14	38		
280	Pit	Brown soil fill with rock, obsidian, and charcoal inclusions	109	66	21		
281	Pit	Brown/orange clay fill with charcoal flecks. Obsidian taken from fill	89	50	45		F281=F285
282	Pit	Dark yellow/grey fill with charcoal flecks	305	118	11		F282=F284=F289
283	Bin Pit	Grey sand fill with charcoal flecks. Continues into baulk	42	42	15		
284	Sump	Loose clay fill with charcoal flecks	53	41	13	F282	F282=F284=F289
285	Drain		15	45	14	F281	F281=F285
286	Bin Pit	Dark brown topsoil with yellow clay and sand inclusions. Charcoal, pumice, fire-cracked rock, shell, obsidian and basalt also found in fill. Continues into baulk	44	50	50		
287	Pit	Yellow/brown soil fill with clay and sand. Stone and basalt inclusions. Extent unknown due to intercutting pits	1150	700	800		
288	Pit	Dark brown soil fill with sand and clay inclusions. Obsidian and charcoal found in the fill	140	140	80		F262>F288>F287>F286
289	Posthole	Clay fill with charcoal inclusions	10	10	24.4	F282	F282=F284=F289
290	Pit	Brown sand silt fill with clay inclusions. Fire-cracked rock, charcoal and basalt also in fill	52	97	42		
291	-	Tree Roots -Orange/brown clay silt. Sides very uneven. Not cultural	26.5	31.5	6.5		
292	Bin Pit	Yellow/grey sand fill	63	63	10		
293	Bin Pit	Grey sand fill with charcoal flecks and larger shell inclusions	56	56	15		
294	Pit	Clay base, continues into the baulk	133	99	12		
295	Posthole		24	26	38		
296	Posthole		13	13	12		
297	Bin Pit	Grey sand soil fill with charcoal flecks	30	30	10		
298	Posthole		12	12	32	F301	F297=F309>F301=F298=F299
299	Posthole	Orange/brown clay fill	10	9	45	F301	=F326>F265=F300=F267=F26
300	Rua	Grey sand soil fill with shell fragment, fire-cracked rock, basalt and obsidian flake inclusions	90	65	51		8
301	Pit	Mottled yellow/brown clay sand fill with charcoal inclusions	290	140	88.9		

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
302	Pit	Grey/orange fill with a hard clay base. Two stone found in the fill	150	85	11		F302=F303
303	Posthole	Dark grey soil fill	9	9	24	F302	F302=F303
304	Pit	Orange/brown clay fill with charcoal flecks. Basalt flakes, fire-cracked rocks and obsidian found in fill	257	127	12		F305>F304
305	Pit	Orange/brown clay fill with charcoal flecks. Shell and obsidian found in fill	42	47	41		F305>F304
306	Bin Pit	Orange/brown silt fill with fragmented shell and charcoal inclusions	74.5	55	15.5		
307	Bin Pit	Orange/brown silt fill with charcoal inclusions	25	30.5	7		
308	Pit	Grey/yellow sand clay fill with basalt flake and water rolled stone inclusions	314	121	28		F340=F354=F355=F356=F362>F341=F310>F308=F311
309	Pit	Dark grey sand fill. Extent unknown due to intercutting pits	46	46	17		F297=F309>F301=F298=F299=F326>F265=F300=F267=F268
310	Firescoop	Dark brown sand fill with abundant charcoal inclusions and shell fragments	35	35	8		F340=F354=F355=F356=F362>F341=F310>F308=F311
311	Posthole	Yellow/grey sand clay fill	13	13	22	F308	
312	Rua	Grey sand fill with charcoal flecks	69	40	33		
313	Firescoop	Dark charcoal filled sand with fire-cracked rock inclusions	22	22	6		
314	Bin Pit	Clay fill with shell, obsidian, basalt and charcoal inclusions	80	47	25		F314>F329
315	Bin Pit	Clay sand fill with charcoal flecks and basalt inclusions. A large cobble was found in the fill	69	42	30		
316	Scoop	Orange/brown clay fill with charcoal flecks	36	48	7		
317	Pit	Dark charcoal stained soil, with a lens of dense charcoal	40	127	13		
318	Rua	Orange/brown soil fill with shell, rock and obsidian inclusions. Door frame and step were present; Full depth not established	130	84	1		F318>F330
319	Pit	Orange/brown clay fill with charcoal flecks and fire-cracked rock inclusions	72	67	52		
320	Pit	Yellow/grey fill with charcoal flecks. Shell, fire-cracked rock, water-rolled stone, basalt and bone inclusions. A large stone knife was also found	40	120	33		F320=F321=F342=F343=F344=F345=F346=F347=F348=F349
321	Posthole	Orange/brown loam fill	16	19	32		
322	Pit	Grey soil fill with water rolled stone inclusions	360	110	45		F322=F323
323	-	Same feature as F322					F322=F323
324	Firescoop	Orange/brown charcoal impregnated fill with large charcoal inclusions	32	60	5		
325	Posthole	Orange/brown loam fill	16	15	20		
326	Posthole	Rectangular in shape with dark yellow loam clay fill and charcoal flecks	17	17	28	F301	F297=F309>F301=F298=F299=F326>F265=F300=F267=F268
327	Bin Pit	Orange/brown clay loam fill with charcoal flecks	54	35	34		
328	Posthole	Orange clay fill with charcoal flecks	19	29	32		
329	Bin Pit	Clay sand fill	44	65	20		F314>F329
330	Rua	Yellow clay loam fill with charcoal flecks. A step was excavated at the entrance	110	130	158		F318>F330
331	Modern Fire Pit	Hangi stones and fire-cracked rock inclusions.	42	50	10		
332	Modern Fire Pit	Hangi stones and fire-cracked rock inclusions. Part of a pedestalled section	70	50	15		
333	Modern Fire Pit	Dark clay soil with charcoal and shell inclusions. Part of the pedestalled area	68	63	15		
334	Modern Fire Pit	Topsoil with charcoal and burnt rock	65	65	18		
335	Modern Fire Pit	Topsoil with charcoal and burnt rock	55	50	10		
336	Posthole	Light brown soil fill	14	14	35		
337	Posthole	Light brown soil fill	17	17	26		F244=F336=F337=F338>F245=F246=F339=F207
338	Posthole	Grey/brown soil sand fill	10	10	30		

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
339	Rua	Soft grey soil fill with shell and stone inclusions	50	100	80		
340	Pit	Clay/sand fill	269	172	49		
341	Firescoop	Dark brown ash charcoal fill with abundant burnt shell and charcoal. A lens between F308 and F340	37	37	12		F340=F354=F355=F356=F362>F341=F310>F308=F311
342	Scoop	Yellow/grey fill	77	46	16	F320	
343	Posthole	Yellow/grey fill	13	13	17	F320	
344	Scoop	Yellow/grey fill	36	33	17	F320	
345	Scoop	Yellow/grey fill	16	18	14	F320	
346	Pit	Brown clay loam fill	58	88	56	F320	
347	Posthole	Orange/brown fill	13	20	26	F320	F320=F321=F342=F343=F344
348	Posthole	Grey/brown fill	16	14	16	F320	=F345=F346=F347=F348=F34
349	Bin Pit	Orange/brown fill	47	46	26	F320	9
350	Posthole	Orange/brown clay fill	13	13	18		
351	Posthole	Orange/brown clay fill with a digging stick impression on the east face	17	18	32		
352	Posthole	Orange/brown clay fill	22	25	15		
353	Posthole	Brown soil fill with some clay and sand inclusions	11	11	9		
354	Posthole	Sand clay fill with obsidian found in base fill	15	15	23		
355	Posthole	Sand clay fill	14	14	20		
356	Sump	Same fill as F340 (clay/sand)	31	43	21		F340=F354=F355=F356=F362
357	Pit	Yellow clay fill with a lens of dark grey aeolian sand and darker soil in the NE corner	130	75	32		>F341=F310>F308=F311
358	Pit	Dark brown/orange clay fill with charcoal flecks.	101	190	16		
359	Bin Pit	Brown/yellow loam fill which is variable in colour and composition across the feature	76	56	35		
360	Posthole	Light brown sand soil fill	12	12	35		
361	Pit	Orange/brown clay fill with charcoal flecks. Root action seen in wall sections and potentially collapsed on NW side	126	273	13		
362	Posthole	Grey sand fill	13	13	54	F340	F340=F354=F355=F356=F362>F341=F310>F308=F311
363	Pit	Orange/grey soil with obsidian and rock inclusions	53	94	49		
364	Rua	Dark brown fill with yellow sand inclusions and charcoal flecks. Dense charcoal lens found near the base. A small chisel was taken from fill	40	50	65		F234>F233=F364
365	Posthole	Mottled yellow/brown clay sand fill with occasional clay inclusions	13	13	20		
366	Pit	Rectangular fill near 375 cut into base layer	109	56	43		
367	Pit	Brown silt fill with a lens of mottled clay above the natural. Shell and charcoal inclusions	548.5	160	29		F367>F375=F376
368	Rua	Yellow/grey clay sand fill with shell, obsidian and grindstone inclusions. Collapsed sides and potential drain and door slot	85	85	68		
369	Posthole	Yellow clay fill	12	12	19	F373	
370	Pit	Light yellow clay loam fill. Basalt rough-out found nearby	34	26	17	F373	
371	Pit	Yellow clay sand fill. Continues into the baulk	27	21	12	F373	F373=F369=F370=F371=F372
372	Pit	Yellow clay sand fill	36	39	15	F373	>F368
373	Pit	Yellow clay fill with charcoal flecks with a basalt rough-out taken from the fill	23	17	48		
374	Bin Pit	Grey/brown soil sand fill with stone, shell and charcoal inclusions. Rua dug by Warren is intercutting this feature, cannot tell which came first	40	70	55		
375	Rua	Grey sand fill with brown silt inclusions	54	74	74		
376	Rua	Brown sand silt fill with charcoal, shell an large cobble inclusions	80	80	86		F367>F375=F376
377	Stakehole	Dark brown soil fill with sand inclusions	5	5	6		
378	Posthole	Dark brown/grey sand fill	9	9	30	F270	F380>F270=F378=F379

Id	Type	Notes	NS (cm)	EW (cm)	Depth (cm)	Parent Feature	Stratigraphy
379	Posthole	Orange/brown fill with charcoal flecks	22	22	23	F270	
380	Rua	Dark yellow clay loam fill with charcoal flecks. Shell, bone and charcoal found in fill	96	92	82		
381	Unknown	yellow/brown clay fill	5	5	10		
382	Posthole	yellow/brown clay fill	22	23		House	F382=F383
383	Posthole	yellow/brown clay fill	25	24		House	F382=F383
500	Firescoop	Charcoal imbued sand fill with fire-cracked rock and obsidian inclusions	50	52	10.4		
501	Firescoop	Charcoal imbued sand fill with shell inclusions	53	54	14		
502	Firescoop	Charcoal imbued sand fill with shell inclusions	40	53	9.5		
503	Firescoop	Charcoal imbued sand fill with dense shell midden deposits and hangi stones	110	115	26.4		
504	Firescoop	Charcoal imbued sand fill with shell and burnt stone inclusions	100	100	31.2		
505	Firescoop	Charcoal imbued sand fill with shell and obsidian inclusions	65	70	12.8		
506	Firescoop	Charcoal imbued sand fill	26	29	14.3		
507	Firescoop	Charcoal imbued sand fill with shell inclusions	70	60	12.2		
508	Firescoop	Charcoal imbued sand fill with shell inclusions	37	45	17.5		
509	Firescoop	Charcoal imbued sand fill with shell inclusions	61	57	15.7		
510	Firescoop	Charcoal imbued sand fill with shell inclusions	35	42	16		
511	Firescoop	Charcoal imbued sand fill with shell inclusions	58	49	14.1		
600	Firescoop	Loam sand fill with charcoal and fire cracked rock inclusions	162	186	14		
601	Firescoop	Loam sand fill with charcoal and fire cracked rock inclusions	105	64	12		
602	Bin Pit	Dark brown sand loam fill with charcoal inclusions	120	102	17		F603>F602
603	Bin Pit	Dark brown sand loam fill with charcoal inclusions	59	60	18		F603>F602
604	Scoop	Grey sand loam fill with charcoal flecks	103	60	4.5		
605	Scoop	Grey/brown sand loam fill with charcoal inclusions	170	90	9		
606	-	Not a feature					
607	Pit	Grey/brown silt fill with charcoal and cobble inclusions. Continues into the baulk	75	100	90		
608	Scoop	Grey/brown fill with charcoal flecks	70	62	4		
609	Firescoop	Grey loam fill with charcoal flecks	78	90	8		
610	Bin Pit	Grey/brown loam sand fill with charcoal flecks	107	60	8		
611	Bin Pit	Grey/brown sand loam fill	44	48	5		F611>F612
612	Bin Pit	Grey/brown sand loam fill	68	72	6		F611>F612
613	Firescoop	Dark grey/black sand loam with charcoal and shell inclusions	59	68			
614	Bin Pit	Grey/brown sand loam fill	36	46	7		

APPENDIX 2: RADIOCARBON DATES

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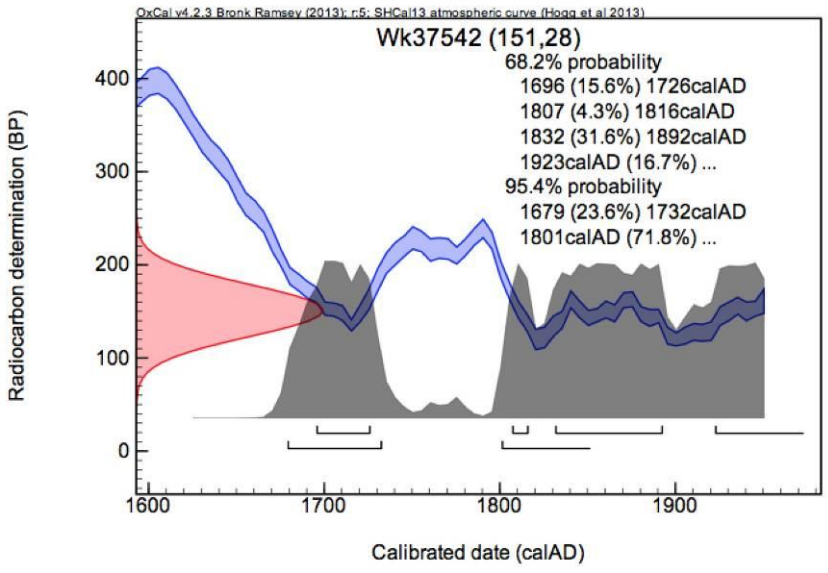
Report on Radiocarbon Age Determination for Wk- 37542

Submitter	S Bickler
Submitter's Code	T10/777 F12
Site & Location	T10/777, New Zealand
Sample Material	short-lived spp
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.

$\delta^{13}C$	-25.6 ±	0.2 ‰
$D^{14}C$	-18.6 ±	3.4 ‰
$F^{14}C\%$	98.1 ±	0.3 %
Result	**151 ± 28 BP**	

Comments



2/10/13

- 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, $\delta^{13}C$, is expressed as ‰ wrt PDB.
- $F^{14}C\%$ is also known as *Percent Modern Carbon (pMC)*

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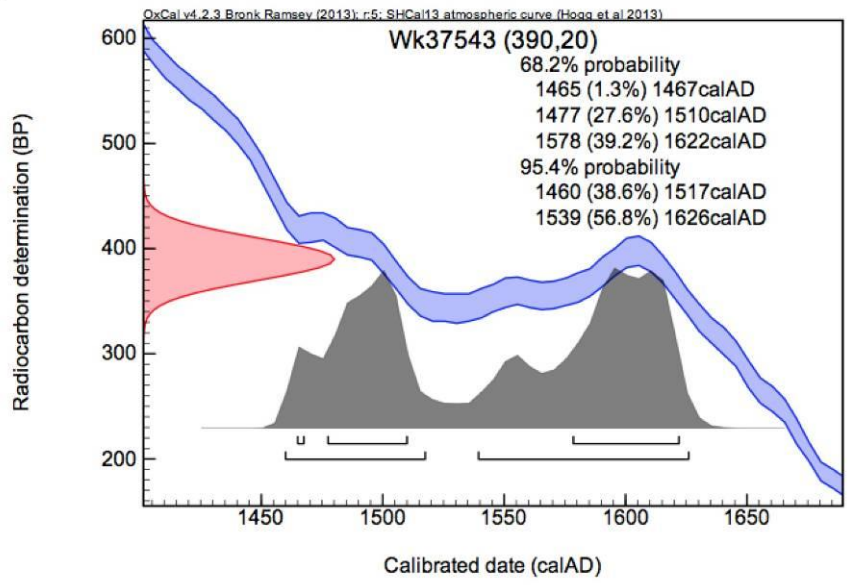
Report on Radiocarbon Age Determination for Wk- 37543

Submitter	S Bickler
Submitter's Code	T10/777 F65
Site & Location	T10/777, New Zealand
Sample Material	Hinau seed
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$\delta^{13}C$	-23.7 ±	0.2 ‰
$D^{14}C$	-47.4 ±	2.4 ‰
$F^{14}C\%$	95.3 ±	0.2 %
Result	**390 ± 20 BP**	

(AMS measurement)

Comments



2/10/13

- 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, $\delta^{13}C$, is expressed as ‰ wrt PDB.
- $F^{14}C\%$ is also known as *Percent Modern Carbon (pMC)*

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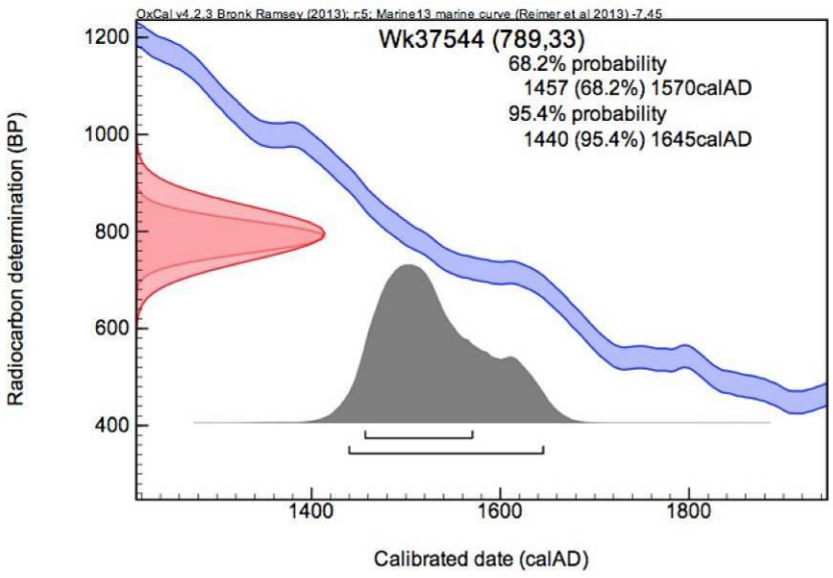
Report on Radiocarbon Age Determination for Wk- 37544

Submitter	S Bickler
Submitter's Code	T10/777 F109
Site & Location	T10/777, New Zealand
Sample Material	Tuatua (Paphies subtriangulata)
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.

$\delta^{13}C$	1.8 ±	0.2 ‰
$D^{14}C$	-93.5 ±	3.8 ‰
$F^{14}C\%$	90.6 ±	0.4 %
Result	**789 ± 33 BP**	

Comments



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- 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, $\delta^{13}C$, is expressed as ‰ wrt PDB.
- $F^{14}C\%$ is also known as *Percent Modern Carbon (pMC)*

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APPENDIX 2: RADIOCARBON DATES, CONTINUED

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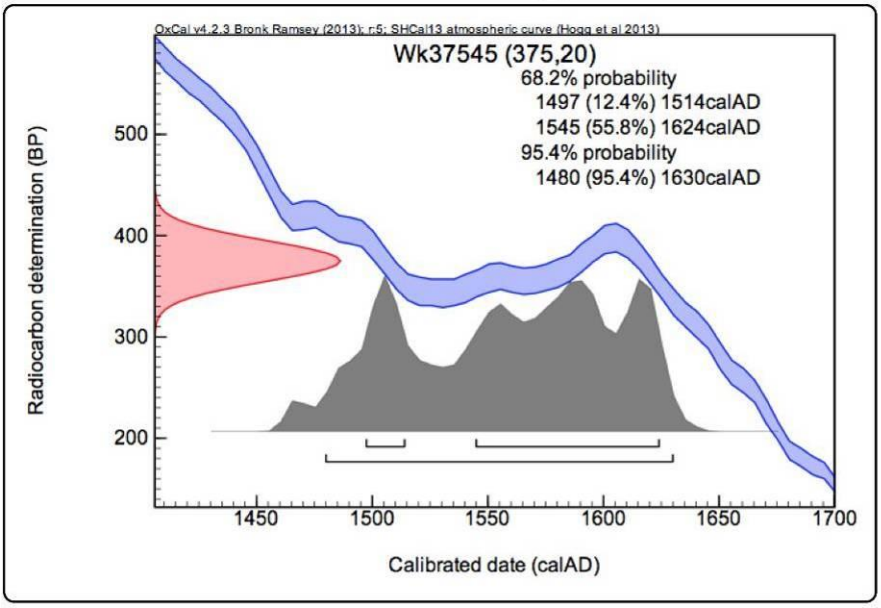
Report on Radiocarbon Age Determination for Wk- 37545

Submitter	S Bickler
Submitter's Code	T10/777 F278*
Site & Location	T10/777, New Zealand
Sample Material	Charcoal (coprosma spp)
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$\delta^{13}C$	-24.9 ±	0.2 ‰
$D^{14}C$	-45.6 ±	2.4 ‰
$F^{14}C\%$	95.4 ±	0.2 %
Result	**375 ± 20 BP**	

(AMS measurement)

Comments



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- 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, $\delta^{13}C$, is expressed as ‰ wrt PDB.
- $F^{14}C\%$ is also known as *Percent Modern Carbon (pMC)*

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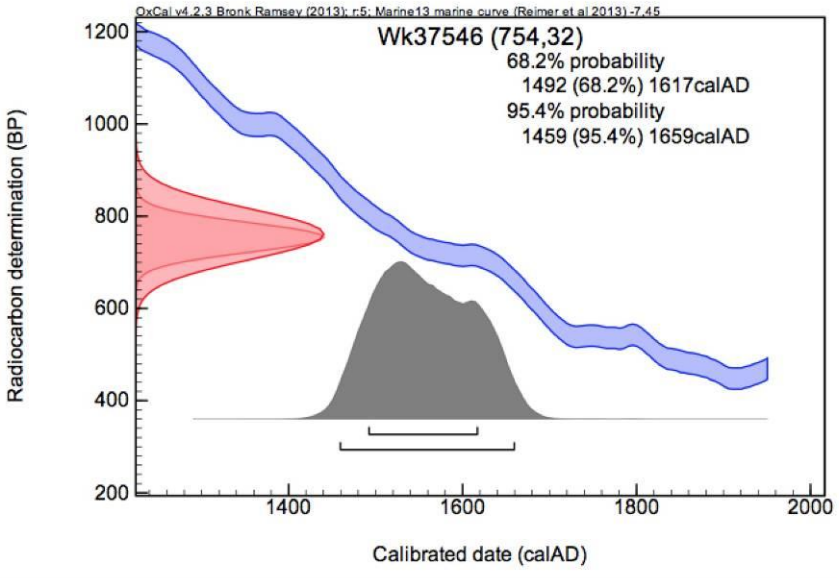
Report on Radiocarbon Age Determination for Wk- 37546

Submitter	S Bickler
Submitter's Code	T10/777 F341
Site & Location	T10/777, New Zealand
Sample Material	Tuatua (Paphies subtriangulata)
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.

$\delta^{13}C$	1.5 ±	0.2 ‰
$D^{14}C$	-89.6 ±	3.6 ‰
$F^{14}C\%$	91.0 ±	0.4 %
Result	**754 ± 32 BP**	

Comments



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- 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, $\delta^{13}C$, is expressed as ‰ wrt PDB.
- $F^{14}C\%$ is also known as *Percent Modern Carbon (pMC)*

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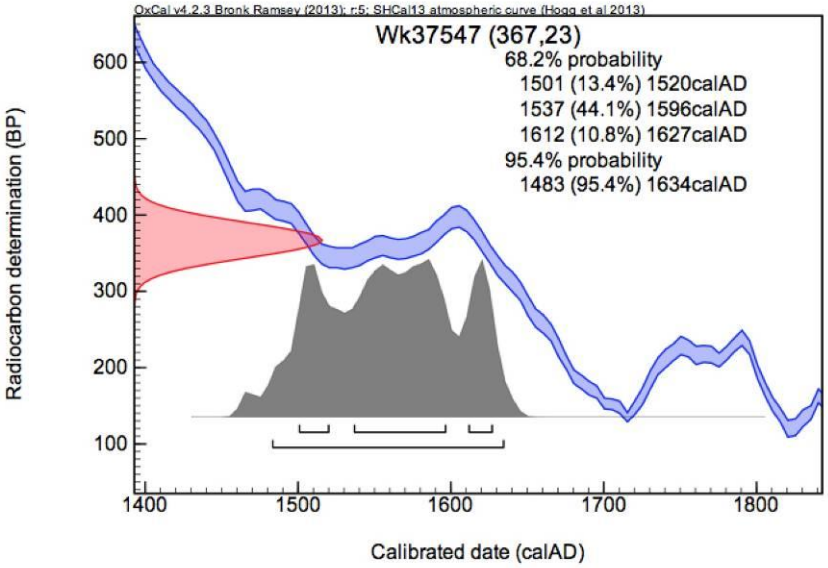
Report on Radiocarbon Age Determination for Wk- 37547

Submitter	S Bickler
Submitter's Code	T10/777 F364
Site & Location	T10/777, New Zealand
Sample Material	Seed
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$\delta^{13}C$	-25.9 ±	0.2 ‰
$D^{14}C$	-44.7 ±	2.7 ‰
$F^{14}C\%$	95.5 ±	0.3 %
Result	**367 ± 23 BP**	

(AMS measurement)

Comments



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- 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, $\delta^{13}C$, is expressed as ‰ wrt PDB.
- $F^{14}C\%$ is also known as *Percent Modern Carbon (pMC)*

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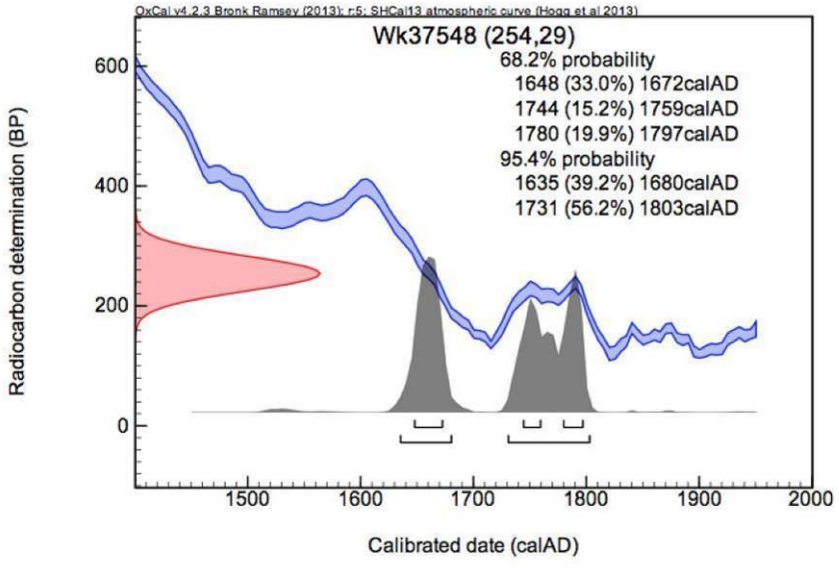
Report on Radiocarbon Age Determination for Wk- 37548

Submitter	S Bickler
Submitter's Code	T10/777 F503
Site & Location	T10/777, New Zealand
Sample Material	Charcoal (various short-lived spp)
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.

$\delta^{13}C$	-25.6 ±	0.2 ‰
$D^{14}C$	-31.1 ±	3.5 ‰
$F^{14}C\%$	96.9 ±	0.4 %
Result	**254 ± 29 BP**	

Comments



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- 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, $\delta^{13}C$, is expressed as ‰ wrt PDB.
- $F^{14}C\%$ is also known as *Percent Modern Carbon (pMC)*

APPENDIX 3: UPDATED SITE RECORD FORM

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

ARCHSITE archaeological site recording scheme

Site Record Form

NZAA SITE NUMBER: T10/777

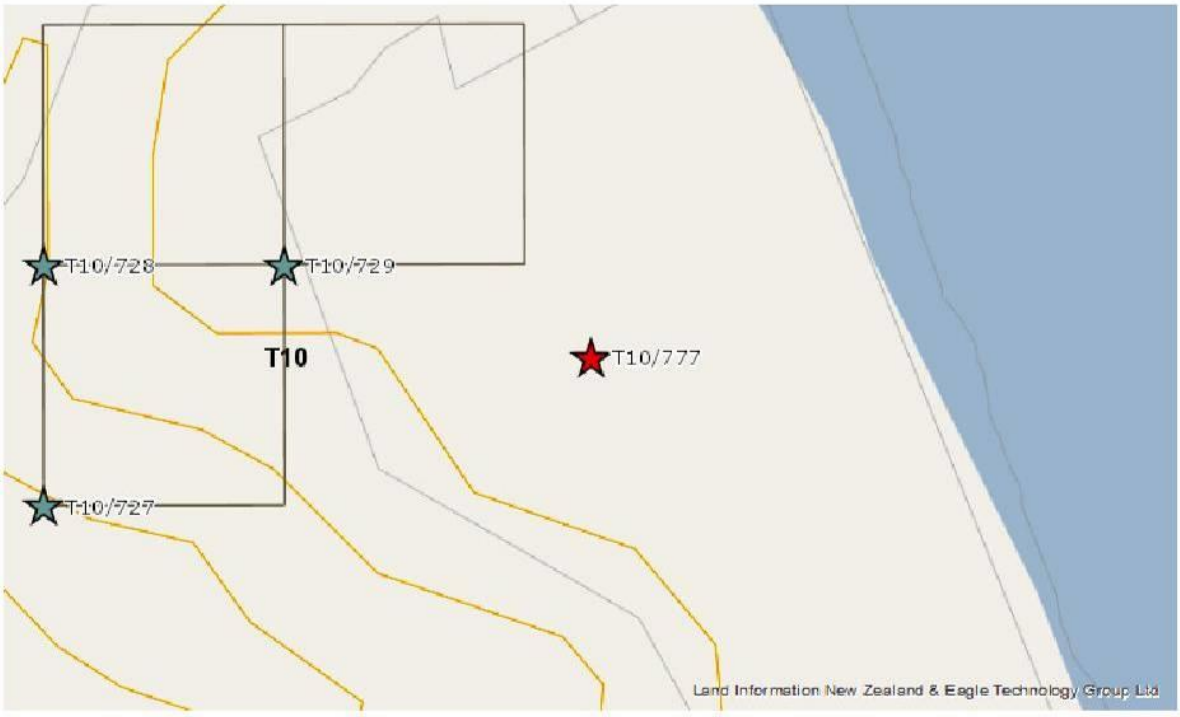
SITE TYPE: Pit/Terrace

SITE NAME(s):

DATE RECORDED:

SITE COORDINATES (NZTM) Easting: 1849075 **Northing:** 5933960 **Source:** Handheld GPS

IMPERIAL SITE NUMBER: **METRIC SITE NUMBER:** T10/777



Finding aids to the location of the site

'In paddock at end of Skippers Road, Opito Bay, Coromandel.'

Brief description

Area of storage pits and other associated evidence of use. Excavated 2007 by Gumbley and Hoffman under S18 investigation. Excavated by Clough and Associates in 2012 under NZHPT Authority 2008-85.

Recorded features

Artefact, Midden, Pit, Post hole

Other sites associated with this site

Continued on next page

APPENDIX 3: UPDATED SITE RECORD FORM, CONTINUED

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD HISTORY	**NZAA SITE NUMBER:** T10/777

Site description

'Updated 30/11/2014 (other), submitted by simonbickler
Grid reference (E1849075 / N5933960)

Updated: 07/12/2012, Visited: 05/11/2012 - NZTM E1849075 / N5933960 (Handheld GPS). Investigated under NZHPT Authority 2008-85. Fieldwork 5th-17th November 2012. This work included extensive trenching of the area of archaeological interest identified by Gumbley and Hoffman (2007). Over 3350m2 was investigated. Two main concentrations of archaeological features were found (Figure 1, Areas 1 and 2) and contain a number of storage pits of varying sizes and types, postholes suggestive of above ground structures, and areas of burning and cooking. A small number of archaeological features including postholes, pits and firescoops were identified in trenches in other parts of the paddock. A third concentration of small firescoops and midden was also identified. Inspected by: Bickler, Simon.'

Condition of the site

'Updated 30/11/2014 (other), submitted by simonbickler

The rest of the site is subject also to a current HNZ Authority (issued in Dec 2012) which allows for additional excavation to allow subdivision of the block when that work is undertaken

Updated: 07/12/2012, Visited: 05/11/2012 - Site is mostly excavated.'

Statement of condition

Updated: 14/12/2012, Visited: 05/11/2012 - Poor - Visible features are incomplete, unclear and/or the majority have been damaged in some way

Current land use:

Updated: 07/12/2012, Visited: 05/11/2012 - Grazing, Rural residential
Updated: 30/11/2014 - Grazing, Grazing, Rural residential, Rural residential, Coastal margins

Threats:

Updated: 07/12/2012, Visited: 05/11/2012 - Subdivision

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

Panorama showing excavations in November 2012

Continued on next page

APPENDIX 3: UPDATED SITE RECORD FORM, CONTINUED

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD INVENTORY	**NZAA SITE NUMBER:** T10/777

Observations about this site made in

Author	Year	Title	Publication Details

Supporting documentation held in ArchSite

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION
SITE RECORD FORM (NZMS 260)
Map number: T10
Map name: Coromandel
Map edition: 1

NZAA METRIC SITE NUMBER T10/777
DATE VISITED December 2001
SITE TYPE Open settlement
SITE NAME: MAORI
OTHER

Grid Reference Easting 597 Northing 954

T10/777

1. Aids to relocation *attach a sketch map):*

At Opito Bay 500 m to the north of the end of Skipper's Road

2. State of site and possible future damage:
In pasture

3. Description of site *(supply full details, history, local environment, references, sketches, etc. If extra sheets are attached include a summary here).*

Site appears to consist of pits and rua. In patches of erosion dark cultural soil seen and occasional basalt flakes and midden.

This site is likely to be much larger than first described and probably extends from the end of Skippers Road all along the flats behind the sanddunes right up to the second very small creek that disgorges on to the beach

4. Owner Chapman/Edens
Address Opito Bay

Tenant/Manager
Address

5. Nature of information *(hearsay, brief or extended visit, etc):Brief visit*
Photographs *(reference numbers:)*
Aerial photographs *(reference numbers and clarity of site:*

6. Reported by: L.Furey
Address: Woodside Road, Mount Eden

Filekeeper
Date

DR. NEVILLE A. RITCHIE
REGIONAL ARCHAEOLOGIST
DEPT. OF CONSERVATION
PRIVATE BAG.
HAMILTON.
22 APR 2004

7. Keywords:

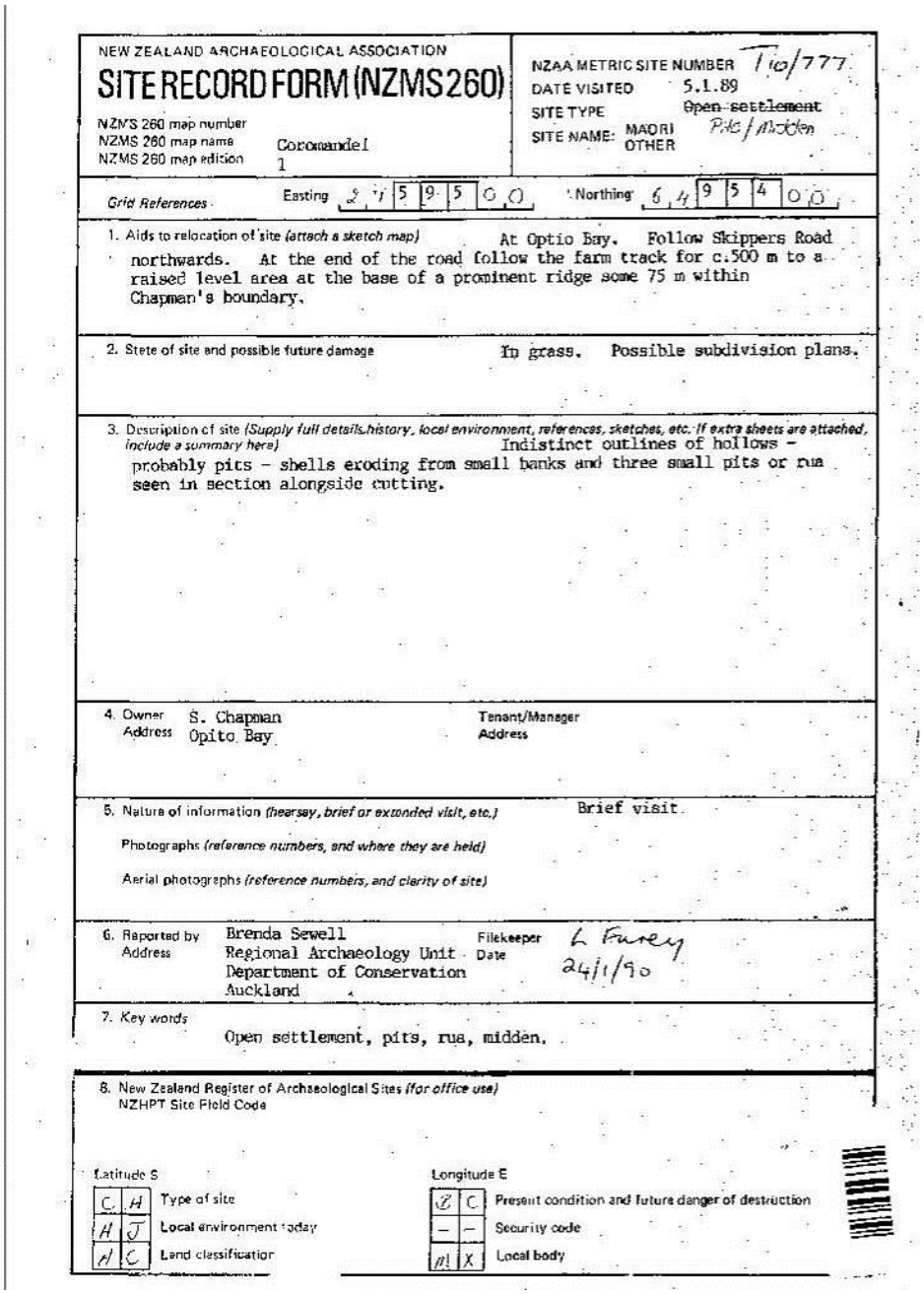
8. New Zealand Register of Archaeological Sites *(for office use)*
NZHPT Site Field Code

Latitude S
Type of site
Local Environment today
Land Classification

Longitude E
Present condition and future danger of destruction
Security code
Local body

Continued on next page

APPENDIX 3: UPDATED SITE RECORD FORM, CONTINUED



NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD FORM (NZMS 260)

NZMS 260 map number
NZMS 260 map name — Coromandel
NZMS 260 map edition — 1

NZAA METRIC SITE NUMBER T10/777
DATE VISITED 5.1.89
SITE TYPE ~~Open settlement~~ Pit / Midden
SITE NAME: MAORI / OTHER

Grid References — Easting 2 7 5 9 5 0 0 — Northing 6 4 9 5 4 0 0

1. Aids to relocation of site *(attach a sketch map)*
At Optio Bay. Follow Skippers Road northwards. At the end of the road follow the farm track for c.500 m to a raised level area at the base of a prominent ridge some 75 m within Chapman's boundary.

2. State of site and possible future damage
In grass. Possible subdivision plans.

3. Description of site *(Supply full details,history, local environment, references, sketches, etc. If extra sheets are attached, include a summary here)*
Indistinct outlines of hollows - probably pits - shells eroding from small banks and three small pits or rua seen in section alongside cutting.

4. Owner S. Chapman — Address Opito Bay
Tenant/Manager Address

5. Nature of information *(hearsay, brief or extended visit, etc.)* Brief visit.
Photographs *(reference numbers, and where they are held)*
Aerial photographs *(reference numbers, and clarity of site)*

6. Reported by Brenda Sewell — Address Regional Archaeology Unit, Department of Conservation, Auckland
Filekeeper L Furey — Date 24/1/90

7. Key words
Open settlement, pits, rua, midden.

8. New Zealand Register of Archaeological Sites *(for office use)*
NZHPT Site Field Code

Latitude S / Longitude E

C H	Type of site
H J	Local environment today
H C	Land classification
Ø C	Present condition and future danger of destruction
– –	Security code
~~Ø~~ X	Local body

APPENDIX 4: CHARCOAL ASSEMBLAGE

Rod Wallace 5 November 2014

Introduction
Thirty-nine charcoal samples from Site T10/777 Opito Bay, Coromandel Peninsula were identified by Adam Hand as a part of an MA research project. The work was carried out in the Auckland University Anthropology Department with Melinda Allen as the academic supervisor with the identifications being done in the archaeology laboratories under my supervision. The following is a summary of the results obtained by Adam followed by my interpretations of the assemblage.

Two large concentrations of archaeological features (Areas 1 and 2) were excavated that revealed numerous storage pits of varying sizes and types, postholes suggestive of above ground structures and areas of burning and cooking. A third concentration of small firescoops and midden (Area 3) was also excavated. A total of nine radiocarbon dates were run indicating the site was occupied from the middle of the 15th century AD through to the mid-18th century.

The charcoal samples were collected from 22 specific features in the site. Two of these were shell middens, 12 were firescoops, 7 were from the fill of rua or pits and 1 was from a charcoal rich lens. Many of these features were sampled multiple times and material from a total of 39 individual sample bags was identified. The raw data is given on the table below where samples were divided into 2 types: (a) those from deliberately constructed firescoops indicating the charcoal was definitely remains of firewood, and (b) samples extracted from the fill of pits or soil lenses where the nature of the burning events that generated the charcoal was less clear.

Firewood
Firewood used by the prehistoric inhabitants is highly likely to have been collected from areas immediately surrounding the site. Consequently the species content of such samples will provide the best data concerning local vegetation at the times the site was occupied. While most firewood would have been collected from plants actually growing locally, driftwood from the beach and wood from stumps and logs of trees that died quite a long time before occupation of the site could also have been used. Beach driftwood is almost certain to be dominated by pohutukawa as this tree is abundant on local shorelines and cliffs and often its dead branches end up in the sea. Sub-fossil wood is likely to be from a few species of large conifers which produce durable stumps, branches and root wood. In this regard kauri is the most likely candidate it yields branches and roots that are exceptionally resinous and so durable they typically survive on land surfaces for centuries.

Charcoal from Areas 1 and 2 Structural Features
Charcoal samples extracted from the fill of pits will have originated from a wide variety of sources. Some will be the remains of building material such as pit framing, house timbers, fences or other above ground structures that were charred in post occupation landscape fires. Other likely sources include firewood remains re-deposited as fill in the pits as well as charcoal from fires in post-occupation vegetation that entered the pits as they in-filled.

Results
The results of the charcoal identification for each of the firewood samples given in Table B and those from the fills of structural features are shown in Table C below. In Table A these results are

summarized in three categories, Areas 1 and 2 pit fill charcoal, Areas 1 and 2 firescoops and finally Area 3 firescoops.

Discussion

The fire features dating to the 16th century in Areas 1 and 2 40% of the firewood charcoal consists of shrub and scrub species. These were dominated by Hebe, Coprosma, Olearia, and Manuka, species are typical of the early phases of vegetation regeneration on cleared land. Kauri forms 55% of the firewood assemblage with large trees all other trees contributing only 5%. Kauri is the most abundant firewood species present, however the trees that would have accompanied it if it came from a living forest are notably absent. Living coastal broadleaf forest contains a diverse collection of large trees with kauri as only one element. An example of a charcoal assemblage derived from intact coastal virgin forest is one from the Archaic site of T11/914 in Whitianga where over 80% of the charcoal is from large forest trees which include Kahikatea, Matai, Rimu, Totara accompanied by a wide variety of broadleaf tree species and where only modest amounts Kauri occur. That old sub-fossil wood was the primary source of Kauri in the Opito area 1 and 2 firewood samples is fairly conclusively demonstrated by this data.

In the firewood charcoal assemblage from the 18th century Area 3 firescoops 74% of the charcoal is from shrub and scrub species typical of the early phases of vegetation regeneration on cleared land. Pohutukawa forms 23% of the assemblage while other large trees including Kauri contribute less than 3%. As Pohutukawa is abundant on this coast today and almost certainly always has been its presence is not an indicator of forest and much of that found in these samples may have been driftwood collected off the beach originating from trees growing on the cliffs along the coast.

The charcoal from the pit fills shows a quite different pattern. The origin of this material cannot be conclusively defined but must be a mixture deriving from a variety burning events. The dominant species is Kauri which contributes 64% of the total pieces identified. A further 12% of the assemblage comes from a wide range of large forest trees which include Maire, Beech, Hinau, Pukatea, Kokekohe, Puriri, Matai and Totara. Only 17% of the charcoal is from shrub and scrub species. I assume the pit structures in Areas 1 and 2 date to the same periods as the cooking features there, charcoal from which indicates the local vegetation at the times the site was occupied consisted of bracken, shrub and scrub species with pohutukawa as the only large tree. This indicates charcoal from the large tree species in the pit fills is unlikely to have been from vegetation actually growing in the immediate area which suggests most are remains of wood brought to the site as building timber.

Conclusions

That nearly half the charcoal in T10/777 is Kauri indicates forest containing this tree once occurred locally but that by the time the site was being occupied it was present locally only in the form of old sub-fossil wood. The remains of burnt building timbers from the pit features indicates forest must have be present somewhere in the general area in the 16th century AD but firewood charcoal indicates the local vegetation at this time consisted mainly of bracken, shrub and scrub species. By the 18th century AD sub-fossil Kauri wood had been used up and the local woody vegetation consisted of shrubs of which only Tutu, Hebe and Olearia were common. This probably implies the primary plant cover at the time was bracken fern.

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APPENDIX 4: CHARCOAL ASSEMBLAGE, CONTINUED

Table A - Summary of Charcoal Identifications by Sample Type							
Area		**1 and 2 Pit Fills**		**1 and 2 Firewood**		**3 Firewood**	
Date		**Circa 1600 AD**		**Circa 1600 AD**		**Circa 1850 AD**	
Species		**Pit Fill**		**Firewood**		**Firewood**	
Bracken	Fern shrub and scrub species	3	17%	1	40%		74%
Monocot.		1		1			
Tutu		11		8		30	
Hebe		12		27		76	
Coprosma		18		17		5	
Akeake		4		9		2	
Manuka		45		101		7	
Mahoe		33		3		11	
Olearia		26		54		141	
Rangiora		15					
Pseudopanax		1				1	
Ngaio		1					
Pate						1	
Pohutukawa		61	6%	24	4%	83	23%
Maire	Broadleaf Forest Trees 1.3%	10	12%		1%		2%
Beech		38		3			
Pukatea		1				8	
Hinau		46		1			
Kokekohe		3					
Puriri		14					
Totara	Other Conifers	3	1%				0.3%
Matai		8				1	
Kauri		628	64%	303	55%	2	0.5%
Totals		**982**		**552**		**368**	

Continued on next page

APPENDIX 4: CHARCOAL ASSEMBLAGE, CONTINUED

Table A - Summary of Charcoal Identifications by Sample Type					
Species		**Firewood**		**Pit Fill**	
Bracken	Fern shrub and scrub species	1	54%	3	17%
Monocot.		1		1	
Tutu		38		11	
Hebe		103		12	
Coprosma		22		18	
Akeake		11		4	
Manuka		108		45	
Mahoe		14		33	
Olearia		195		26	
Rangiora				15	
Pseudopanax		1		1	
Ngaio				1	
Pate		1			
Pohutukawa		107	12%	61	6%
Maire	Broadleaf Forest Trees 1.3%		1.3%	10	12%
Beech		3		38	
Pukarea		8		1	
Hinau		1		46	
Kokekohe				3	
Puriri				14	
Totara	Other Conifers		0.1%	3	1%
Matai		1		8	
Kauri		305	33%	628	64%

Continued on next page

APPENDIX 4: CHARCOAL ASSEMBLAGE, CONTINUED

Table B - Charcoal Results from all Cooking Feature samples (ie. Firewood)																				
Area No.		**Area 1**			**Area 2**										**Area 3**					
Feature Type		**Midden**			**Fire Scoops**															
Feature No.		**66**	**67**	**67**	**10**	**10**	**12**	**13**	**54**	**54**	**313**	**324**	**341**	**278**	**503**	**503**	**505**	**505**	**505**	**507**	**511**
Bracken	Fern shrub and scrub species 54%			1																	
Monocot.					1																
Tutu					4	1		3							3	8		2	7	4	6
Hebe					5		3	5					14		4			3	20	11	38
Coprosma		1						2		1				13		3					2
Rangiora																					
Akeake													9		2						
Olearia		1					27						26		27	34	12	7	18	23	20
Pseudopanax																	1				
Ngaio																					
Pate															1						
Mahoe			1	1		1									10		1				
Manuka					43	48	4	6											1	5	1
Pohutukawa	12%	8			6	6		1					3		15	15		9	7	32	5
Maire	Broadleaf Forest Trees 1.3%																				
Beech		1		2																	
Pukatea																		8			
Hinau			1																		
Kokekohe																					
Puriri																					
Totara	Conifers 33%																				
Matai																			1		
Kauri		45	26	28					47	31	26	70		30				2			

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APPENDIX 4: CHARCOAL ASSEMBLAGE, CONTINUED

Table C - Charcoal Results from all samples from the Fills of Structural Features																			
		Area 1													Area 2				
Feature #		**65**	**65**	**65**	**65**	**65**	**65**	**65**	**65**	**65**	**3**	**230**	**233**	**233**	**267**	**20**	**22**	**364**	**364**	**364**
Feature Type		**Pit and Rua Fill**																**Lens**		
Bracken	Fern Shrubs and Scrub Species 17%		2				1													
Monocot.						1														
Tutu											2		4	4			1			
Hebe				1							2			4				1	4	
Coprosma									1		17									
Rangiora															15					
Akeake																			1	3
Olearia														26						
Pseudopanax																		1		
Ngaio													1							
Pate																				
Mahoe										1	21						1	5	2	3
Manuka				2	1								1	7	30			2	2	
Pohutukawa	6%		13			1	1		1	2				29		3		5	2	4
Maire	Other Broadleaf Tree species 12%		1										1				2	3	2	1
Beech				5	3		1	3					1			13	7	2	3	
Pukatea																1				
Hinau			3		3	3	1		2	2			6			1	2	5	5	13
Kokekohe							1		1							1				
Puriri		5	1							2								2		4
Totara	Conifers 65%																	3		
Matai			1			3										1				3
Kauri		25	33	46	46	32	41	39	14	31	37	37	36			32	32	66	47	34