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Clough and Associates Monograph Series

# PUWERA LANDFILL SITE, PORTLAND, WHANGAREI

Final Report on Excavations at sites Q07/1091, 1092 and 1103 in fulfilment of NZHPT Authority No. 2004/50 and 2009/250



Prepared for Whangarei District Council

no

# by

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December 2010

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# **EXECUTIVE SUMMARY**

Summary A landfill site is currently being developed at Puwera, north of the Ngako Creek and south of the Portland lime quarry, at Whangarei. The landfill has impacted on recorded archaeological sites Q07/1091 (Terrace and Midden), Q07/1092 (Pit and Terrace Complex) and Q07/1103 (Ridge Top and Midden). This report describes the results of the excavations of the sites carried out between 18 February and 7th March 2008, and subsequent archaeological monitoring in May 2009. The archaeological team consisted of Clough & Associates archaeologists with staff and students from the University of Auckland's Department of Anthropology.

The excavations at Puwera revealed two major complexes of features relating to pre-European Maori occupation around Ngako Creek. At the top of a knoll, at site Q07/1092, small houses with a large number of pits, most of which are thought to have been used for storage of kumara, represented a series of occupations. Two large post holes may have represented single-pole pataka or storehouses. Interestingly, a fire appears to have swept through part of the site and possibly destroyed some features that were still either in use or not long abandoned.

Downhill from the main concentration, site Q07/1091 contained the floor of a rectangular whare where tools including two made of greenstone were found in the fill. This whare was probably the most substantial of the houses in the area and was located close to a working floor containing numerous obsidian flakes. Analysis of the sources of the stone artefacts illustrated how widespread the exchange networks were that connected the people living at Puwera to other regions. The greenstone items suggested that the house may have belonged to an individual of wealth or mana. An area just to the north of the whare was dense with shell and contained at least three hangi stone concentrations. This may have the cooking zone associated with the whare.

On the neighbouring spur, excavations at site Q07/1103 revealed another concentration of storage pits, of similar size and internal organisation to those at Q07/1092 but oriented differently. All pits probably had pitched roofs, as indicated by posts along the centre-line. Drainage was a major concern on both sites, with drains dug in almost all the major pits.

Radiocarbon dating suggests that all three sites were occupied at much the same time – between 1500 and 1700AD. The two larger sites, Q07/1092 and Q07/1103, may have been abandoned by the middle of the  $17^{th}$  century, as may Q07/1091 (although the results indicated a slightly later occupation span). Later sporadic use of the area occurred, but the focus of occupation had probably shifted to a more defensive location at a pa above.

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# **Chapter 1: Introduction**

## BACKGROUND

The Project A landfill site is in the process of being developed at Puwera, north of the Ngako Creek and south of the Portland lime quarry, south of Whangarei The landfill project has impacted on recorded (Figure 1, Figure 2). archaeological sites Q07/1091 (Terrace and Midden), 1092 (Pit and Terrace Complex) and 1103 (Ridge Top and Midden). An Authority to modify, damage or destroy these sites was applied for and issued to Whangarei District Council (no. 2004/50) by the NZ Historic Places Trust (NZHPT) on 16 October 2003. This lapsed after five years and a further Authority was issued on 28 April 2009 (no. 2009/250). The Authority was conditional on the archaeological monitoring of any work that might affect these sites and the identification, recording, measurement, investigation, sampling and analysis of archaeological stratigraphy, features and remains in accordance with accepted archaeological practice; the mapping and sampling of any suspected garden soils; and the retention for analysis of a representative part of any midden.

Drs Rod Clough, Marianne Turner (University of Auckland), and Simon Best were approved by the NZHPT under Section 17 of the Historic Places Act 1993 to carry out the archaeological work. The archaeological team consisted of Clough & Associates archaeologists, and staff and students from the University of Auckland's Department of Anthropology.

The archaeological investigation work was carried out between 18 February and 1 March 2008 with an additional visit on 7 March 2008. Additional monitoring work by Dr Simon Best was carried out in May 2009.



Figure 1. Location of project area (Google Earth) and close-up view showing quarry (NZTM 200m Grid, source QuickMap)

Continued on next page

WDC Puwera Landfill: Final Report

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The legal description of the landfill site is Lot 2 Pt Allot 135 Blk IV Tangihua **Physical** Setting<sup>1</sup> SD and Block 1 Ruakaka SD. The landfill is located on the north side of the Ngako Creek and is composed of two swamp flats that accompany branches of the Ngako Creek up to the base of the hillslopes, and two knolls rising up quite steeply from the flats. These are the ends of ridges running down from the high ground to the north, of which Mt Tikorangi (Figure 3) was the highest point prior to the quarry activities that have taken out much of the northern side of the ridge. The head of the watershed where the landfill is to be located is about 1km across, bounded by ridges up to 120m high on the north (quarry) side, and up to 60m high to the south. The eventual fill level is expected to be something less than halfway up the valley sides. The south side of the Ngako Creek consists of an irregular slope with a central ridge, containing minor spurs and knolls, running down from the ridge to the south. The west end of the project area is a continuation of the topography of the north side, with a sharply defined knoll on the south-west side of the main Ngako Creek head. This and the north side had retained some of the original bush in the gully heads prior to the current project, with puriri up to about 1.8m in diameter. The land has been in the ownership of Portland Cement Companies since 1914 (see below) and until very recently appears to have been relatively unmodified, with only the occasional farm track providing access up the hills, and no drainage system dug through the swamps. Part of the south slope has been in pine plantation in the past, and minor tree stump disturbance is present, together with slumping, which can add to the difficulties of identifying archaeological sites. **Traditional** There are apparently no oral traditions regarding sites or occupation in the History Ngako Creek area itself. There are, however, traditions of a pa on Mt Tikorangi, although to date no written reference to this has been found, and there is no mention of the site in Maori Land Court Records (M. Fletcher, pers. comm.). Both Ngako Creek and Tikorangi appear as boundary markers in early Land Transactions (Turton 1877:141 and 1882:283).

<sup>&</sup>lt;sup>1</sup> From Best (1999a,b) with additional notes by Simon Bickler

Land Sales The earliest reference to the land which contains the sites is the 1839 transaction between Pomare and 21 other chiefs and Alexander Busby, relating to the 25,000 acre Ruakaka Block (Turton 1882:283). With the addition of the Waipu Block to the south, obtained in 1840 (Turton 1882:285), Busby acquired a total of 40,000 acres, the subject of Old Land Claims 23 and 24. The files for these, in the National Archives Wellington, have not been researched for any reference to sites.

The Crown obtained the Maungatapere Block, which includes the head of the Ngako Creek, in 1855 (Figure 4). The Ngako Creek appears to have defined the southern boundary of the land.

The subsequent title history of the site is as follows. The land blocks involved are Allotments 26 and 27, Maungatapere Parish.

### Allotment 26

- 1. 27 August 1856. Crown Grant to Henry Walton (BIG 167).
- 2. 29 August 1856. H. Walton, settler, sold to William Smellie Grahame, merchant of Auckland (B1 165).
- 3. 20 January 1858. W.S. Grahame sold to John Grant Johnson of Whangarei, Esquire (B1 252).
- 4. 28 May 1861. J.G. Johnson sold to George Fraser of Whangarei, settler (B1 559).
- 5. Various mortgages and remortgages until:
- 6. 21 November 1870. G. Fraser mortgaged to Edmund Augustus Mackechnie, solicitor of Auckland (B3 751).
- 7. 30 June 1871. Memorial.
- 8. 5 May 1873. E.A. Mackechnie sold to James Smeaton of Whangarei, farmer (B4 284).
- 9. 14 November 1873–. Various mortgages.
- 10. 28 December 1908. Mary Ann Smeaton and Robert Thompson, trustees, sold to Joseph Herbert Phillips of Whangarei, farmer (R168 37).
- 11. Doubts arose about the validity of the 1908 conveyance.
- 12. 25 August 1914. Mary Smeaton and trustees sold 25 parcels of land, including Allotment 26, to Dominion Portland Cement Co. Ltd (R241 334).
- 13. 27 November 1918. Dominion Portland Cement Co. Ltd., in liquidation, sold to Wilsons (NZ) Portland Cement Ltd (R293 88).

Land Sales,	Allotment 27		
continued	<ol> <li>7 November 1856. Crown Grant to George Chambers Taylor and John Ward Taylor (BIG 118).</li> </ol>		
	2. 2 April 1859. G.C. Taylor, settler, sold to J.W. Taylor, settler (B1 261).		
	<ol> <li>28 October 1873. J.W. Taylor, now of England, sold to James Smeaton of Whangarei, farmer (B5 100).</li> </ol>		
	4. From here the same history as Allotment 26.		
LINZ Plans	The area of the sites is shown in two early survey plans (Figure 4 and Figure 5). Both are undated, but they are probably from the late 1850s/early 1860s. In Figure 4 the area consisting of the high ridge which includes Mt Tikorangi is shown, with the top described as 'Good Land' in 'Natural Grass'. The land south of this is described as 'Good Fern Land'. The plan also shows the cultivations on the bank of the Otaika River, which were exempted from the 1855 deed of sale.		
	The survey was carried out by William Clarke, whose only existing fieldbook was handed in in 1859, and the plan is likely to date to around that time.		
	Figure 5 is entitled 'Maungakaramea Block at Whangarei', surveyed by Andrew Sinclair. It shows Mt Tikorangi and the eastern branch of the Ngako Creek. Two whare are marked, one on the coast east of the end of the present day Mcgill Road, and the other on the Mangapai headland.		
	A geological survey map of the Tangihua District, based on fieldwork carried out between October 1921 and April 1925 (Ferrar et al. 1934), and recording detail as small as individual huts and whare, marks three pa in the vicinity of the landfill area (Figure 6). Two are shown within 1km north and west of Mt Tikorangi, and a third about the same distance south from the south side of the creek head, on the divide between Ngako and Waikaurakaura Creeks.		
	Two of these are sites now recorded in the NZAA database: one is a pit complex and the other a pa without defensive earthworks. These are presumably sites that were encountered by the geologists while walking the ridges, and it is interesting that nothing is recorded for Mt Tikorangi, which must have been visited.		

Photographs	The earliest located photograph of the area is dated to the 1930s, and is a Whites Aviation aerial of the Portland Works from seawards (Air Logistics, File Ref. 62583). The Ngako Creek valley head is behind Mt Tikorangi, which is itself slightly obscured by smoke from the works. A 1942 aerial gives a clear view of the valley head. Two sites are visible, both in the sparsely vegetated area on the south side of the creek. Again nothing is shown on Mt Tikorangi, and it is of interest that the pa to the south is clearly visible on the same run of photographs. The western edge of the then quarry area is just outside the right edge of the photo. Another Whites Aviation aerial from the north-east, dated 8.5.1958 (Air Logistics, File Ref. 45923), gives a very clear view of the Mt Tikorangi summit, with the quarry area approaching. Again no earthworks are visible.
Archaeology around Whangarei	Excavations have been carried out around Whangarei Harbour (Figure 1) since the 1960s, when a large midden site at Bream Head (Whangarei Heads) produced evidence of significant shellfish cooking as well as seal, dog, bird tuatara and fish bone, chert flakes and hangi stones and fishing equipment (Green & Davidson 1964 and NZAA Site Record Form Q07/103, cited by Phillips & Harlow 2001:14). Other recent test excavations at Bream Head have been conducted, but little information is available regarding the results. More recent excavations on Whangarei Heads include excavated midden sites in McGregors Bay (Bickler, Farley et al. 2008), consisting of small to medium- sized middens, but these were relatively simple sites with no evidence of structures of significant complexity.
	A small number of excavations have been carried out near Whangarei on the western side of the harbour, including the investigation of the Ruarangi Pa (Q07/30) to the north of the project area. The excavations there created a picture of a site that had been occupied a number of times from the 1700s with evidence of houses and midden within the defences. Cockle was overwhelmingly the most common shellfish identified in the midden excavated at the Pa (Hougaard 1971, cited in Phillips & Harlow 2001:12-13).
	Excavation of site Q07/616 on a knoll on the northern side of Limeburners Creek (Bickler et al. 2010) exposed midden, firescoops and a single pit, but minimal structural evidence. The site appeared to be a remnant of a small living area or camp site above the creek, with occupation dating to between c.1450 and 1650 AD. A large midden, Q07/58, on the southern side of Limeburners Creek was excavated by Nichol and Walton in 1976 (Nichol 1977) and suggested extensive shellfish processing, similar to the more recently excavated sites around One Tree Point (discussed below).

Archaeology<br/>aroundMost<br/>WhanWhangarei,<br/>continuedsurvey<br/>record

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

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

At Ruakaka Best (1999) excavated a small pit and terrace complex (Q07/897) from which a sequence of pollen data was retrieved, illustrating environmental impact by Maori and then Europeans on the area. The site included a cache of digging implements of unknown, but considered relatively 'modern' age (i.e. 1800s onwards, where radiocarbon techniques become problematic) and a radiocarbon date from a midden on the ridge above the cache returned a date of between 1640-1870 (at  $2\sigma$ ). At Takahiwai an excavation of a small habitation site on a hill overlooking the mangrove swamps in the harbour has been carried out, exposing a small historic rubbish pit probably related to a turn of the 19<sup>th</sup> century occupant of the property (Harlow et. al. 2007).

The most extensive excavations, though, have been at One Tree Point, undertaken by a number of archaeological teams. The excavations by Phillips and Harlow (2001) uncovered a series of midden deposits which ranged from small concentrations of hangi/firescoops overlain with shells through to large complexes of firescoops, hangi, stake and post holes. The investigators concluded that the sites represented summer occupation of the One Tree Point area for large scale processing of shellfish from 1500 AD onwards. Most appeared to have only been used during a single season but, in at least one case, there was evidence that the Maori returned to one of the sites at least once. Other smaller excavations at One Tree Point have been carried out on the properties to the south (Campbell 2005, 2006; Bickler, Baquié et. al 2007), and west (Prince 2003; Bickler, Plowman et al. 2008) of the Phillips and Harlow (2001) project with similar, although mostly smaller, sites relating to Maori use of the area.

Some late 19<sup>th</sup> century to early 20<sup>th</sup> century artefacts were also recovered during the investigation of the sites by Phillips and Harlow (2001). They were considered to be chance finds relating to gum-digging activities and not linked with the earlier shellfish processing activities.

Currently there are major gaps in the archaeology of the Whangarei Harbour. Archaeology around The focus of more recent research has been on the midden sites, particularly at Whangarei, the Whangarei Heads and One Tree Point areas. However, this has meant that larger habitation sites have not been investigated and there is little information continued relating to the more substantial sites located at more inland areas and at the western end of the Harbour. The current project therefore contributes significantly to our understanding of pre-European Maori occupation in the Whangarei Harbour area. These sites provide more structural information than is usually obtained from the coastal midden sites (with some notable exceptions) and the chronological data will assist in the development of models relating to the changes in settlement of the region during the last few hundred years. Assessment of An archaeological assessment of the proposed landfill site was initially the Puwera undertaken by Dr Simon Best in 1999 (Best 1999a). This assessment covered a c.30ha area on both the northern and southern sides of the Ngako Creek. No Sites previous intensive survey of the area had been carried out and only four archaeological sites had previously been recorded. The procedure consisted of walking over the block, examining and probing all likely locations on ridges and spurs, examining erosion faces and creek banks, and checking the recently dug swamp drains and their spoil heaps. Test spade holes were dug in a number of localities to check on initial probing results. One of the heads of the creek was also examined for a reputed cave, which could have been close to the northern boundary of the fill footprint, and which in any case needed to be located and recorded in case cultural material was present. A watch was kept for carvings on the very large puriri trees in the bush and on any rock faces, and for taro in the swamp areas. Best identified 14 sites, all in the creek head. One site qualified as a small pa, two others as pit/terrace complexes of some size, one as a habitation area (at least) on a high point, and the remainder were mostly small pit/terrace sites, two with shell midden (see Figure 3 and Table 1). In addition the cave was located and investigated. The sites cover a range of types, from a small pa to single pits and/or terraces. The topography of the area has resulted in the larger complexes being on knolls on the western and northern slopes of the valley head, with the sites spread along the gentler north-facing slope south of the Ngako Creek in general being much smaller. Of the latter, however, site Q07/1101 is extensive, and is also the central site on the south side.

Assessment of the Puwera Sites, *continued* 

A second assessment was carried out by Best to assess the potential for the presence of cached artefacts in the swampy areas along the course of the Ngako Creek (Best 1999b). All of the areas tested (with a probe and soil borer) appeared to be outside the footprint of the landfill. The closest areas to the landfill site were Best's 'type 3' locations along the creek itself. Best concluded that there were no locations identifiable as having advantages over others for storing artefacts and considered it likely that the course of the creek has changed over the years. He pointed out that the main bed of a creek may not be an ideal place to store artefacts due to the dangers of flooding and erosion of the banks, side branches probably being preferable locations. The creek course is 'virtually one elongated swamp', and Best recommended monitoring of any work in this area.

Best (1999a) argued that the Ngako valley head was a small discrete archaeological landscape, containing the physical remains of a prehistoric social/political system. If there was no pa on the adjacent Mt Tikorangi, then this was not a satellite settlement, but rather a system in its own right, although probably associated with a larger stronghold some distance away in the surrounding region to which the population could retreat in times of large scale warfare.

One of the very reasons for the selection of the area for the proposed landfill – a small contained watershed – is unfortunately also the reason for the sites being concentrated in such a relatively small area. The lack, until very recently, of any significant European modification to the landscape has meant that most of these sites are (or in the cased of those investigated, were) in relatively good condition.

Q07/1093 A	sparse scatter of small cockle in an erosion		1 <b>1 1 1 1 1 1 1 1</b>	NI a set la face se
Q07/1093 A	sparse scatter of small cockle in an erosion		Easting	Northing
90		Midden, Pit, Terrace	1718022	6035982
	carp.			
Q07/1103 10	Om of midden exposed on the east side of the	Midden	1718471	6036131
ric	dge top.			
Q07/1100 A	small pa with a tihi/platform and 5 main	Pa. Midden, Platform,	1717762	6036159
te	erraces and 2 pits, with 2 small exposures of	Terrace, Pit		
m	nidden.			
Q07/1098 A	line of 5 pits running down a spur.	Pit, Terrace, Drain	1718018	6035952
Q07/1091 Te	errace/Midden	Terrace, Midden	1718183	6036189
Q07/1092 Pi	Pit/Terrace	Terrace, Pit	1718063	6036188
Q07/1097 O	One pit with another possible one to the south,	Terrace, Pit, Midden	1718097	6035914
ar	nd a flat area behind.			
Q07/1096 Te	errace on a spur end, on the south side of	Terrace	1718149	6035899
N	Igako Creek.			
Q07/1094 O	Dne single large pit and 4 other possible small	Pit	1718165	6035851
pi	its.			
Q07/1099 A	single pit and terrace on a spur end, at about	Terrace, Pit	1718184	6035767
th	ne 45m contour.			
Q07/1102 A	t least 2 pits, and probably 4, with a flat area	Pit, Terrace	1718208	6035859
(p	possible terrace) to the south.			
Q07/1104 Ä	pit like feature that could be natural, such as	Pit	1718417	6035762
a	tree throw.			
Q07/1095 A	single pit on a knoll, with midden, mainly pipi,	Pit, Midden	1718044	6035856
er	roding down the north face.			
Q07/1101 9	definite & 5 probable pits on a broad north	Midden, Terrace, Pit	1718084	6035863
tre	ending ridge at the 40m contour.			

### Table 1. List of sites in the project area (NZAA ArchSite 2010)



Figure 3. Sites in the project area (top: LINZ NZTM AX31; bottom: oblique view - Google Earth 1999)



Figure 4. SO 1057F (?late 1850s), unsigned showing general project area (LINZ)



Figure 5. Close-up of SO 1134B (by Andrew Sinclair, c.1860) showing project area (LINZ)



Figure 6. Part of Geological map of Tangihua Survey District, 1921-25

(Ferrar et al. 1934; NZ Geological Survey Bulletin)

# **RESEARCH AIMS AND METHODOLOGY**

Research	The archaeological investigations planned to:
Aims	• Establish the full extent of the surviving archaeological remains of sites Q07/1091, 1092 and 1103.
	• Gain 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 midden deposits.
	• Retrieve possible information relating to the environmental context of the site(s) and the age of the deposits
	• Integrate the information recovered from the investigation with the results of earlier investigations in the Whangarei area.
	• Add to existing knowledge of the material remains/artefact assemblages of recorded settlement sites in the Whangarei area.
	• Produce a study of the archaeology of the pre-European settlement of the Ngako Creek area of Whangarei set in the broader regional context
Methodology	Sites Q07/1091, 1092 and 1103 were fully recorded and investigated prior to earthworks for the landfill.
	Earthworks in the vicinity of these sites were monitored by an archaeologist. All in situ archaeological features or deposits were recorded and if they had the potential to provide significant information were investigated in detail.
	Excavation:
	The following procedure was adopted for the investigation of sites Q07/1091, 1092 and 1103:
	1. The sites were machine stripped of topsoil using a weed bucket, under archaeological supervision.
	2. Manual investigation and recording of all features exposed, was undertaken using standard archaeological techniques.
	3. A large representative sample of any midden was collected and analysed, including samples for environmental and charcoal analysis. Samples were submitted for radiocarbon dating.
	4. Artefacts discovered were recorded and analysed as set out below.
	Continued on wort proce
	Continued on next page

# **RESEARCH AIMS AND METHODOLOGY,** CONTINUED

Methodology, <i>continued</i>	<ul><li>Artefact sampling and recording was based on the following procedure:</li><li>1. Where possible both the horizontal and stratigraphic locations of individual artefacts or deposits of artefacts (as appropriate) were recorded on the site plan.</li></ul>
	2. All artefacts from primary deposits were retained.
	3. Artefacts were catalogued in the field note book by context and bagged for removal and analysis.
	4. Artefacts were classified according to type and analysed by appropriate specialists.
	5. Selected artefacts were digitally photographed and the photographs either featured in the final report or submitted on an accompanying DVD.
	6. Artefacts will be deposited at the Whangarei Museum.
Research Outputs	A detailed preliminary report was provided to the NZHPT at the completion of the fieldwork and used by the University of Auckland students in the preparation of the research reports. This final report updates the interim report with the results of the student projects carried out on various aspects of the project, and the radiocarbon dating results. A photo-album and Powerpoint presentation was also produced and the presentation included in the DVD accompanying the report.
DVD Contents	<ul> <li>The accompanying DVD contains:</li> <li>Copies of the main reports,</li> <li>GIS files showing the excavated features,</li> <li>Photographs</li> </ul>
	<ul> <li>Powerpoint presentation of the project results.</li> </ul>

# ARCHAEOLOGICAL TEAM

**Project** Organisation Rod Clough, Marianne Turner and Simon Best directed the project as the Section 17 archaeologists. This was a joint project between Clough & Associates and the University of Auckland, which held its annual field school at Puwera and provide archaeology students for the project. The use of some student labour assisted in keeping the costs of the recording and investigation down, while providing a good opportunity for training students. All archaeological work was supervised by one of the directors and all work by students was individually supervised by them or other qualified and experienced archaeologists (listed below), as appropriate.

It was also intended that some of the materials analysis would be undertaken by students as part of their course work. This work was supervised and reviewed by Marianne Turner and Clough & Associates archaeologists with relevant specialist knowledge.

		1	
Archaeology	Name	Role	Responsibility
Team	Rod Clough, PhD	Director	Direct project. Co-direct field-work, supervise students, direct preparation of final report
	Marianne Turner, PhD	Director	Direct project. Co-direct field-work, supervise students, contribute to final report
	Simon Best, PhD	Director	Excavation. Reporting.
	Simon Bickler, PhD	Archaeologist	Excavation, monitoring and recording, supervise students, IT specialist, mapping, Interim and Final report writing
	Rod Wallace, PhD	Archaeologist	Excavation, monitoring and recording, supervise students, charcoal analysis
	Raylene Reihana-Ruka, BA	Tutor	Supervising students
	Mica Plowman, MA	Archaeologist	Excavation, monitoring and recording, supervise students
	Ben Thorne, MA	Archaeologist	Excavation, monitoring and recording, mapping, supervise students.
	Colin Sutherland, MA	Archaeologist	Excavation, monitoring and recording, mapping, supervise students.

# ARCHAEOLOGICAL TEAM, CONTINUED

Other Specialists	Matt Watson (Scantec Ltd) provided use of his remote control aircraft to take aerial photographs of the excavations.
	Tim Mackrell from the University of Auckland acted as site photographer during much of the excavation.
Students	The 2008 University of Auckland Field School students were joined by a number of graduate students. All their hard work and endurance in the face of the storm conditions that hit the project are to be commended.

# Chapter 2: Excavation of Q07/1091

# SITE Q07/1091<sup>2</sup>

Introduction	Three areas were investigated on the eastern slopes of the knoll (Figure 7, Figure 8):
	1. An area of shell midden to the north of the terrace area exposed by the removal of gorse (Area D)
	2. Another possible terrace up the slope to the west of the originally recorded terrace (Area E)

3. Q07/1091 – the original terrace recorded by Best (1991) – the location of a house (Area F)

All archaeological features were excavated (Figure 8). A description of individual features is provided in Appendix 1.

Excavation of Areas E and F was carried out using trowels and spades. Sieving of the spoil was carried out in part in Area F, and at all times in Area E. All archaeological features were excavated, numbered and recorded on plan and in a record book. All artefacts and midden samples were bagged, numbered and also recorded on plan and in a record book. Recording was by layer and measured elevation. Following excavation, the site was backfilled.



Figure 7. View of Q07/1091 during excavation (photo: C. Kerrigan)

<sup>&</sup>lt;sup>2</sup> Derived from excavation notes by Rod Wallace and Carole-Lynne Kerrigan



Figure 8. Excavated areas in Q07/1091

Area D – A large area of midden was exposed. The shell was dense to a depth of about 20-25cm and running down the slope to the east. The area was trenched and exposed a large area of rake-out midden with charcoal and hangi stones. Areal excavation revealed three hangi stone concentrations (Figure 9), the likely source of the cooking, in the centre of the shell debris.

The midden was divided into two main stratified middens – Upper and Lower (Figure 10). Layers 1 and 2 in the Upper Midden consisted of dense shell with charcoal and hangi stones. A lower midden containing more crushed shell was in part separated by denser concentrations of charcoal in pockets.

The upper midden contained predominantly large pipi shells and the lower layer cockles and mud snails. Analysis of a single midden bulk sample indicated 44% cockle (tuangi); 39% pipi; 16% mud snails (titiko) and approximately 1% of other assorted species, such as one tuatua, a couple of whelks and a number of additional unidentified items. No fish bones were identified. Of particular note was the possible presence of a large *Paphies* species not usually found in midden. A more detailed analysis of the midden is presented below in Chapter 5.

It seems likely that this area represented a cooking area associated with the house to the south. The lower midden associated with Layers 3 and 4 were raked over to form the platform for the upper hangi, some of which were still partially intact, and the shell from this period created the upper midden layer as the material was raked out of these hangi.



Figure 9. The three hangi in Area D midden (Q07/1091) – F133, F134 and F135





Area E – This flattish area (Figure 11) was stripped by machine but no archaeological features were identified here. The presence of numerous obsidian flakes in varying sizes (60 pieces), five pieces of chert, a couple of pieces of unidentified rock and a single small greenstone flake (A122, Figure 21a) in the topsoil just above the clay base, indicated that this natural terrace had been a working area associated with the house below. Obsidian flakes were found in a concentrated area in loose, friable soil often associated with small pieces of charcoal. The back of the terrace was not located and no other indication of structural modification or cultural activity was noted.

Analysis of the obsidian in particular (see Chapter 5) suggested that although no structural features were present, the natural terrace was used for activities such as flax preparation and working of the obsidian flakes. It is also possible that flakes from this area were washed down into the house area.



Figure 11. Site Q07/1091 Area E looking eastwards towards the house site at Area F (photo: Tim Mackrell)

Area F – The main site was originally mapped as a terrace overlooking a swampy flat. The topsoil was stripped and revealed a very level 6m by 3m 'floor' stepped into the hillside. This area was bounded to its west and south by a cut scarp up to 1m high with a drain 200-300mm deep at its base. The surface was composed mainly of broken up rock fragments generated by the cut into the base of the scarp.

This flat area had been built up to make it reasonably level with an artificial scarp falling sharply away to the east. A minor scarp to the north was also visible where the level surface of the 'floor' made a transition to the natural slope of the original terrace.

Artefacts including a small greenstone chisel, another small chisel and a small basalt adze from Tahanga stone were found in the upper fill material along with a small scatter of obsidian (Figure 21c-d, Figure 22e-h).

The flat area had all the characteristics of a house platform.

The upper fill layer was removed by hand to reveal the original floor of the house (Figure 12–Figure 14). Post holes were identified along the west and south walls of the house. Seven definite post holes and one possible post hole delineated the western wall and these appeared to be 'slots' for dressed timber slabs (Figure 15). The largest slab was a post cast 450mm x 40mm thick set at least 450mm in the ground.

Along the southern wall only three post casts were found including the centre (*poutarongo*) and the south-east corner (*poupou*).

Towards the north, the 'front' of the house, a small stone-filled feature was found and although thought to have been a hearth, may have been a hole made for the front centre-post (*poutahuhu*). The front edge of the house platform was also identified by a drain running west to east across it.

Two further adzes were recovered during the clearing of the floor fill.

The orientation of the house with the front pointing roughly towards the north is typical of 'Type 1' houses described in other Northland settings. The separation of the cooking area is not uncommon. The location of the complex well away from the pit and terrace site Q07/1092 on top of the knoll suggests that these may be different episodes of occupation, although the orientation of the possible house(s) there appears to be the same (see below).



Figure 12. Close-up of features in Area F House excavation (Q07/1091)



Figure 13. Area F Q07/1091: plan of features from the house (top) and hypothetical section of house (bottom) (sketch by R. Wallace)



Figure 14. View of house floor (Area F, Q07/1091)



Figure 15. Close-up of slot post hole for house (F76, Area F, Q07/1091)
Area F – House Floor, continued The north-east corner of the house floor was made up of a weathered rock platform adjacent to post hole F79. It had a regular edge along its northern perimeter, creating a 100mm change in floor level towards the natural slope of the original mapped terrace and possible location of a porch. Approximately 900mm south of this change in level were several pieces of weathered limestone (F64, Figure 16). They were positioned on edge and at right angles to each other, forming two sides of a square or rectangle. While a dark soil 'shadow' formed the western and southern sides of this feature, fire cracked rock or ash was not present. A rock pile was identified as hangi stones in a firescoop (F39) and positioned just beyond the possible porch, in line with F73 (Figure 12).

#### Stratigraphy:

Excavation of the terrace revealed a simple stratigraphic sequence (Figure 17).

The topsoil (Layer 1), a loam generally removed with the turf, was mainly devoid of cultural evidence. The cultural layer (Layer 2) was a loose, friable soil that included most of the artefacts. The house platform (Layer 3) generally comprised weathered rock fragments generated by the cut into the ground slope to create a terrace, and the redistribution of excavated material along its outer edge as fill. Features (Figure 12, Appendix 1) that were visible in this layer were excavated.

Layer 1 was removed mechanically by digger. Layer 2 was then excavated manually from west to east. This revealed a cut scarp to the west and south of the terrace. The profile of the natural ground level to the western scarp indicated that the terrace had been constructed on a 'bulge' in the knoll. A 200mm to 300mm wide drain (F65) was located at the base of the western and southern scarps (Figure 12). An additional drain running in an east/west direction was located towards the northern edge of the terrace (F81).

A series of post holes, as slots for dressed timber slabs located 600mm inside the centreline of the drainage channel, ultimately defined the house platform at Layer 3 (Figure 12). Seven post holes (F74 to F80) formed the western perimeter and two (F74 and F73) the southern perimeter (one other possible post hole was also located here). Although more or less evenly spaced, they were not equally sized and their configuration alternated between long and short. The largest post hole (slot) was 450mm long x 40mm wide x 450mm deep.

Continued on next page

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Figure 16. Internal stone lined feature (F64), left, and rock pile/scoop (F39), right (Kerrigan 2008:17)



South facing section

#### Figure 17. Section drawings of Area F House floor (Q07/1091); see Figure 12 for section locations

#### Area F – House Floor, *continued*

#### Description of the house platform:

The post holes (slots) formed part of the outline of a 6m long by 3m wide structure interpreted as a large house on a north/south axis. Side walls were represented by a series of post holes (slots) for dressed timber slabs positioned inwards of a drainage channel along the western and southern perimeter of the house platform. No post holes (as slots or round features) were found along the eastern and northern perimeter. The absence of post holes along the eastern perimeter may have been due to their location in softer fill, their bases resting on the firm natural ground layer. Along the northern perimeter the change in ground level created by a weathered rock platform with a regular edge implied a transition between internal and external spaces, and the likely position of the northern perimeter wall and a porch. However, no post holes (as slots or round features) were found to be able to locate the door within this wall. The interior of the house lacked internal ridgepole supports and was dominated by a right angled feature of weathered limestone rocks positioned on edge (F64). The absence of fire cracked rock or ash implied that this feature was not a hearth. The fire scoop/rock pile (F39, Figure 16) located centrally and along the outer perimeter of the assumed porch, contained *hebe* charcoal samples (A39).

#### **Reconstruction of the house**:

Based on a partial reconstruction of a 15<sup>th</sup> or 16<sup>th</sup> century house (Davidson 1984:153), Figure 18 shows the reconstructed elements of the excavated features with the probable framework reconstructed in Figure 19.

#### Artefact distribution:

The distribution of artefacts relative to the house platform is illustrated in Figure 20. Artefacts were generally excavated from Layer 2. Concentrations of flakes were excavated from the slope wash above the drain (F65) towards the north of the house platform, from the assumed porch, and in the area of the rock pile/scoop (F39). A further concentration of flakes (Figure 20) was excavated to the north of the drainage channel (F81).

The distribution of flakes towards the western perimeter of the terrace implied that they had been washed down from the top of the adjacent western scarp. This latter area was scraped down by a digger. It yielded a few pieces of obsidian, but there was no indication of the presence of a structure, or of any cultural activity. Stone tools were generally excavated from the slope wash in the region of the western scarp (Figure 20).



Figure 18. Sketch of house in Area F based on recorded features (C. Kerrigan)



Figure 19. Sketch of reconstructed framework of house in Area F (C. Kerrigan)



Figure 20. Distribution of artefacts in and around house (Area F)







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# Chapter 3: Excavation of Q07/1092

## SITE Q07/1092

Introduction	The site was located on top of a large knoll at the end of a spur that dropped from the high ridge to the north. Much of it was covered in gorse during the 1999 survey, but a number of substantial features were recorded on the knoll including terracing and pits.				
	The site was initially divided into several areas, although as time progressed it was clear these were linked together. However, for ease of description, the site is described in two main areas (Figure 23, Figure 24):				
	1. The southern end ('Area A')				
	2. The northern end ('Area B').				
	Area A (Figure 25) consisted of a combination of intercutting pits in conjunction with at least one and possibly two house floors. North of this, Area B included more than 10 storage pits of varying size and configuration.				
Area A	The southern end of the knoll was targeted as a likely location for habitation. The area was relatively flat although pits were also visible here. The basic stratigraphy of the area consisted of:				
	1. The upper topsoil				
	2. Intercutting fill material				
	3. Basal clay				
	However, confusing this basic picture was the presence of patches of 'rotten rock' where the natural rock was heavily weathered. This created an extra hindrance to features dug here originally.				
	The features in this area (Figure 25 and Appendix 1) consisted of:				
	1. A large pit (F5) at the end of the knoll				
	2. A number of small pits some intercutting to the north of F5.				
	3. Two likely house floors running approximately NNE intersected by a drain (F40) running from an early pit (F49).				
	Continued on next page				

Area A Pits The pits and other rectangular features in this area varied in size and shape (Figure 25). Feature 5, the largest of the pits in this part of the site (Figure 26) was situated right at the end of the knoll above the slope. It follows a classic pattern of post holes through the centreline of a feature that was repeated across the site, and also at site Q07/1103 (see below).

A series of 4 features was located just next to this large pit (Figure 27). It was possible to establish the sequence of features here and this information was used in the creation of a relative chronology of the site discussed further below (Features 6, 30, 49 and 153).

Two relatively shallow rectangular 'pits', F41 and F69, were also located further north adjacent to the area of 'house floors' (F30 and F54). A small narrow 'drain' (F150) in front of F69 within the neighbouring house floor (F30) may have been a 'drip-line' from a roof over the top of F69.

The drain (F40) running from F49, the smaller of two overlapping pits, provided useful information relating to the build-up of features in this area. It was possible to follow the drain initially running to the north-east, unusually, through the F30 house floor (see below) before curving around between F69 and F41, and then being cut off by F41.

Another additional feature in this area was a deep oval pit (F22) with sloping sides;  $3.3 \times 1.15$ m and <40cm deep from the scraped surface, which was itself 20-25cm below ground level. A pile of shell 2.1m long covered the northern two-thirds of the feature: mainly or wholly cockle, crushed on the surface but whole beneath. The fill around the shell was a dark grey soil, and in the southern end of the feature, where the shell had tailed out, a small adze was found 35cm above the base of the pit, at the scraped level. The surface on which the adze was found post-dated the feature and its fill. Excavation did not reveal any structural elements here but the density of shell suggested that this may have been an earlier feature used as a rubbish pit in a single event.

Area A House Floors
Two possible house floors were also found in this area (Figure 29). Feature 30 was a shallow feature with a centre line of posts oriented roughly north-south (perpendicular to the other features nearby). Two layers appeared to overlay this floor – a 20cm thick clean grey fill underneath a charcoal rich fill. The drain from F49 (F40) as well another odd drain like feature (F150) ran through the middle of the feature (Figure 30). It was not possible to establish the northern and southern walls of the feature with any certainty.

> A second house floor (F54) was also suggested by the presence of a welldefined wall at the northern end of the feature with eastern and western walls well defined at that end but petering out to the south. A large flat rock lay on its side against the wall in the northwest corner (Figure 31). Dense charcoal remains covered the floor across its extent and were particularly dense at the northern end (Figure 31). Burning of the floor was evident after the fill was removed. Only a single post hole was identified along the eastern wall.

The key relationships between the features in this area are described below:

- 1. The drain cut the fill that covered the original floor on Feature 30 and therefore post-dated the floor.
- 2. There was no similar infill over the top of the possible house floor F54, but the charcoal was dense in this area and had burnt the floor significantly directly.
- 3. The drain F40 was covered by the charcoal layer and some fragments of charcoal were observed in the fill of the drain (although it is likely the drain had already begun to fill naturally before the burning event).

The results are shown in Figure 32 (and further discussed below). They suggest that two possible houses were in this area. Feature 30 was abandoned and then damaged by the drain from F49, before a large burning event spread across the area and probably destroyed F54, which may have been still standing.

It cannot be ruled out that these features were used for storage, however, although their shallowness compared with Feature 5 nearby tends to support their attribution as house floors. The function of the neighbouring Feature 41 is also equivocal.

Area B - Pits The dominant features found in Area B were a series of kumara pits of various sizes found along the top and sides of the knoll (Figure 33). Interestingly, all the major features were aligned with their long axes roughly east-west as was found in Area A. This probably relates to the need for external drainage running to the nearest slope.

The proportions of the pits varied considerably (Figure 34), from Feature 1 (ratio of 3.75 for long axis:short axis), which was particularly long and narrow, to the almost square Feature 55 (ratio of 1.38 for long:short axis length).

While the shapes of the pits varied, the internal morphology followed a more general pattern: narrow drains running along the sides of the pits down one side (nearest the natural slope). In the larger pits it became obvious that the drains emptied out either in the corner or sides of the pits where external drains had been cut from the top (see below). A brief description of some of the major features in this area (F1, F2 and F53) follows below.

Area B – Feature 1 was one of the more impressive of the features excavated on the site.
 Field survey had suggested a large pit, but it had been considered possible that it was a series of inter-cutting pits. However, after initial test pitting, the feature was fully excavated and revealed an unusually long and narrow (9m x 2.4m) pit (Figure 35). A series of post holes down the centre of the pit provided the evidence for a typical triangular roof over the pit. A narrow drain ran along the eastern side of the pit and down both the north and south walls. Interestingly, the northern drain stopped short of the end of the pit and short of a circular depression approximately 50cm in diameter and about 25cm deep (F36). The depression had clean grey fill, similar to that found in the drains.

The southern drain led out through the south-west corner of the pit (Figure 35). The drain had been cut from the top and an orange clay fill had been put in place to rebuild the western wall. The drain was followed to the west of the pit and the section through this area confirmed that the drain had been cut from the top and ran down the western slope of the knoll.

A lump of mostly natural clay also remained at the base of the western wall in the centre, probably as a step into the pit, which was around 1m deep (F152). This also suggests that the entrance to the structure was at the western end rather than at the eastern end where the other site features are located.

The stratigraphy within the pit was typical of the pits on the site. The feature had been cut deep into natural yellow clay. With the abandonment of the features, the pit appeared to have filled with a mixture of clay material and natural sediment. Organic material then collected in the depression before burning events and natural decay occurred and topsoil formed.

Area B – Another large kumara pit (Figure 36) was found next to Feature 1 but not quite parallel in orientation. The pit was also not as narrow as Feature 1 but was quite similar otherwise, with a drain running around the edge of the pit and out to an external drain from the western wall. This drain was picked up in a small test trench further down the slope which confirmed that it had been cut from the top surface and may have been left open during the time the pit was in use, as in Feature 1. Later work suggested that the pit had cut out an earlier pit (F151) to the east.

Area B – Feature 55 was a pit, 4.6m x 3.3m, 80cm deep from the scraped surface at the west end, and c.50cm at the east end down the slope (Figure 37, Figure 38). The fill consisted of relatively homogenous grey clay, with yellow and black flecks.

At the eastern end, a drain (F58) was identified, but unlike the standard peripheral drains, this was restricted to the eastern one-third of the pit. The main arm drained from the south, and a smaller one joined it from the north, with the resulting channel exiting in the east wall c.40cm from the north-east corner of the pit. The drain outline in the pit itself was a rounded V shape, becoming deeper as it progressed. At its start, c.20cm out from the south wall, it was a barely discernible groove; where it ran past post hole F85 it was 7cm wide and 8cm deep, and where it exited through the wall it was 12cm wide and 15cm deep, and of a more regular parallel-sided and round-based shape. In the cut some 3-4m from the east end of the pit the drain (F121) was 9cm wide and 40cm deep. The drain fill was grey clay with charcoal flecks. The drain had a fall of 18cm from opposite F85 to where it appeared in the east cut.

The function of the drain appeared to be to take water away from the east end of the pit. The pit floor sloped to the east, and after rain the area covered by the drain was under water. The cross section of the drain in the pit is much more irregular than that where it exits through the east wall, suggesting it might have been open to erosion in the former.

The pit feature also contained two areas of burnt material (see Table 2, and Figure 37) and a line of central post holes with the centre-post hole full of charcoal at its base (Figure 38). A suggestion has been made that this burning event represented the firing of the structure, and that this took place after the pit had been semi-infilled, with the rest of the charcoal lying on the surface of the up-sloping fill (pers. comm. Rod Wallace). No evidence of this was found during the excavation of the feature, however.

Area B – Feature 55 was the nearest-to-square pit feature in Area A, and with its odd drain seems to have had a different function from the rest. It is unlikely to be one of the fabled pit houses, due to a lack of evidence for activities such as cooking.

Feature	Description
F82	Post hole = c.15cm diameter. Postmould = 6-7cm & 40cm deep from base
	of pit
F83	Post hole = ?; Post (mould) = 14cm dia. & 58cm deep from base of pit.
	This had burnt post in place.
F85	Post hole = 17cm; Postmould = 7cm, & 50cm deep from base of pit.
F84	A hole 16 x 9cm, and 7cm deep.
F57	Charcoal concentration on the pit floor, c.2.3m x 80cm, just to the north of
	the centre post hole (F82), which contained the burnt post.
F66	The imprint of a piece of timber (stick) in the floor near the south wall. This
	was 2.3m long, tapering from 40mm dia. at the east end to 60mm dia. at
	the west

#### Table 2. Internal features of pit F55

Area B – Other Pit Features and the 'Pataka Post Holes' The other pits followed much the pattern described for Features 1 and 2, although with different configurations of post holes and drains (see Figure 33). Overall, though, the number of these pits suggested that the area had been the focus of food storage over a period of time.

Two of the pits, however, contained large circular depressions that were particularly deep. In the north-east corner of Feature 60, what initially looked like a small firescoop was much deeper. The feature (F141) was sectioned and was over 1m deep. It looked like a deep large post-hole (Figure 39).

A similar feature (F137) was found in the neighbouring pit, Feature 93. Also in the north-east corner of the pit, F137 was cut through the original fill of F93, part of the floor of the pit, the drain running along the northern wall of the pit and part of the eastern wall itself (Figure 40). The fill of F137 was distinct from the pit fill, and recent rains made it very wet. As the fill was emptied the feature filled rapidly with water. The feature was sectioned by machine. The section revealed a bell-like cavity with layers of fill. The stratigraphy consisted of a bottom layer of grey fill, covered in a triangular block of clay that appeared to have fallen into the feature, with later grey fill over the top.

The purpose of these features is not definite, although it is considered unlikely that the bell-like F137 was used as a storage pit (*rua*) given the amount of water that would have filled the feature from the surrounding clay. The most likely explanation is that these were very large post holes, for single-pole *pataka* (storehouses) or *kaiwhata* (elevated storage, Figure 41). The bell-like shape probably resulted from erosion following the extraction of the poles.

Artefacts	Only one adze fragment was found in Area A (in F22) (Figure 42).		
Samples	Samples of charcoal were obtained from a number of features for further study (see Chapter 6).		
Relative Chronology of the Site	For many of the features, particularly in the northern area (B), it is not possible to provide a relatively chronology on the basis of structural information, with minor exceptions where pits had been intercut with other features. However, the drainage systems in Area A did provide the basis of relative chronology in this part of the site.		
	The stratigraphic relationships between the features were recorded (see Appendix 1). This information was based on observations in the field and in particular on identifying:		
	• internal features of larger features (which were therefore contemporary);		
	• equivalent features (i.e. the same feature found in different areas); and		
	• earlier features which had been cut by later features.		
	This information was then put into a form of a Harris Matrix using the 'Stratify 1.4' package to build a model of the relatively chronology of the site. The results showing the stratigraphic relationships between features that could be identified are illustrated in Figure 43.		
	The results of the Harris Matrix analysis suggest that there were at least 4-5 phases of use represented by the features in Area A. It is likely that most of these phases occurred within a relatively short period, although the build-up of fill on the floor of Feature 30, compared to the neighbouring house floor in Feature 54, suggests that these phases may relate to at least two periods of occupation. The earlier phase consisted of the possible house (F30) with some of the pits linked to that structure.		
	How the large pit complex to the north relates to these phases or periods in the south is not known. The possibility is that the burning observed in the house floors spread further and may have resulted in the burnt wood fragments found in pit F55. If that is the case then it is likely that the structure there was still present at the same time as the structure represented by Feature 54.		
	The other possible hint is that Feature 2 cut another earlier pit at the top of the knoll, which may indicate that this feature is also later in the occupation sequence, although how much later is not known.		



Figure 23. Aerial view of Q07/1092 (courtesy Matt Watson, Scantec Ltd)



Figure 24. Excavation plan of Q07/1092



Figure 25. Area A of Q07/1092



Figure 26. Feature 5, Area A looking SW (right: corner drain)



Figure 27. South section across pit features in Area A



Figure 28. Excavations in Area A



Figure 29. Area A before full excavation of house floors (looking SW)



Figure 30. Feature 30 (upper level) with drains



Figure 31. View of charcoal layer (left in baulk) above floor of Feature 54, looking south



Figure 32. Area A, summary of stratigraphic relationships associated with house floors



Figure 33. Northern half of excavation at Q07/1092 (Area B)



Figure 34. Ratio of 15 'pit' features from Q07/1092 (long axis/short axis)



Figure 35. Feature 1, Area B, Q07/1092

From left, clockwise: view of pit looking WNW; view of drain from Feature 1 looking back across to pit; closeup of section of drain in trench below Feature 1 showing cut from top surface down to the drain

Continued on next page





Figure 36. Area B F2 looking west

Figure 37. Area B, Feature 55 - showing burnt wood area (looking west)



Figure 38. Area B, Feature 55 after main excavation (looking NE)

(Inset, showing charcoal in central post hole, Feature 83)



Figure 39. Area B, east section of possible pataka post hole (F141)



Figure 40. Area B, south section of possible pataka post hole (F137)

Inset: view from top during excavation



White (1890 vol.vi:264)

White (1890, vi:33)

(from Best 1974: 67)

Figure 41. Pataka and kaiwhata (raised storage) showing possible interpretations of the large post holes found



Figure 42. Adze (#75) from Area A



104		84		
103	6 73 8 32	82		
10		28		
-		95		
205		59		
		85		
	10	101		
60		122		
		8		
	19 19	142		
99		67	86	
56		3	47	
57		55	88	
136		72	88	
50		_	49	

Figure 43. Harris Matrix of datable features in site Q07/1092

Other features from the site are not shown as there are no obvious chronological links to the other features

Additional	Road excavation:
Monitoring (2009)	Monitoring of a new access road and a trench around the top of Q07/1092 was carried out in May 2009 (Figure 44).
	The earthworks for the main access road were carried out with a weed bucket

The earthworks for the main access road were carried out with a weed bucket, taking off the topsoil and clay interface to a depth of 40cm and a width of 5-6m (Figure 45). The work was done in two stages:

- from the access road to the silt drain; and
- from the silt drain for c.10m further up the hill.

Nothing was found, but topsoil north of the silt drain was charcoal-rich with occasional shell (cockle) fragments.

#### Ring trench:

Further machine stripping of a ring trench lower down the top slope from the 2008 excavations was monitored (Figure 46). The trench was between 3m and 4m wide, and 30-40cm deep, running from 1m or so east of Feature 29 to c.8m south of the site high point of the site. Several features were noted, but only one was confirmed as cultural.

Feature 1 2009 was identified as a drain running at 220° at the northern end of the site (Figure 44, Figure 47). The drain was 17-20cm wide, around 40cm below ground level and at the mid-point of the trench was around 15cm deep. The fill was a dark soil.

#### The high point:

The high point just south of the most southern pit was cut down by 40-60cm, to a rock and soil surface. One topsoil patch extended into the subsoil, but no features were identified.

#### Adze:

A small Type 2B adze was recovered measuring 96 x 48mm, made of a silicious sandstone and very weathered and soft (Figure 48, Figure 49). It appears to be in its last stage of use – probably for gardening. It was found by iwi representative Fred Tito at the base of the topsoil (c.20cm below ground level) in the upper slope/side of the silt drain.



Figure 44. Location of features and monitoring works (2009)

# SITE Q07/1092, Continued



Figure 45. Looking south down access road



Figure 46. Looking southwest along ring ditch



Figure 47. Looking south along 2009 Feature 1



Figure 48. Area of adze findspot (2009)



Figure 49. Adze found during monitoring (left: back; right: front)

## Chapter 4: Excavation of Q07/1103

#### SITE Q07/1103

Introduction	When first recorded in 1999 by Simon Best, the site was described as being on 'the easternmost ridge-end knoll on the north side of the creek. An exposure of shell midden extending c.10 metres, is present on the east side of this and has originated from the flat top of the ridge, which is at its widest (c.12 metres) at this point (Pl 19 & 20). A few faint depressions are present on the top here, and may be the remains of features. A farm track up the east side of the ridge reaches the top at this location and has cut the north end of the shell deposit.' (Best 1999:24).
	Judging by Best's photographs (1999: Plate 19, 20 and 24), vegetation cover had changed little between 1999 and 2008. The top and much of the western slope was in grass while the steeper eastern slope was covered in a mix of grass and gorse. It appears that since 1999 the gorse cover on this slope had become thicker in parts. The slope immediately below the knoll at the southwest end of the ridge was covered in dense bush – mainly gorse. A wide strip of this was removed by the digger prior to our excavation. Surface inspection revealed no archaeological features (Figure 50).
	In 2008 there were two separate visible surface areas of midden that had previously been recorded by Best in 1999. These were test pitted and sampled during the February 2008 excavations and identified as 'Feature 29', and Feature 35 on the north side of a farm fence (see Figure 51 and Appendix 2).
	It was noted in Plate 19 (Best 1999:28) that the water trough was close to the fence at the northern end. Between 1999 and 2008 it had been moved to a new position (Figure 50-Figure 52) on top of a probable pit (Feature 13).
	Context of the site:
	The site is most likely associated with an unrecorded possible large pa at the top of the hill to the north, about 600m away. This hill slopes down and terminates at the end of the ridge where Q07/1103 is located. This pa has largely been destroyed by the quarry but some small remnants remain, comprising midden, terraces and pits. The remaining features suggest that the

Continued on next page

roads (now in disuse and grassed over).

pa was of considerable size but that most of its features were on the quarried (north) side facing the harbour. There has been considerable modification on the southern slopes also, including the reuse of old terraces as modern quarry

**Introduction,** From checking all written resources, this pa does not seem to be recorded. It is now the location of the current trig point, with electrical/TV installations also on it. It is the highest existing point in the area.

The Ngako stream/creek passes or once passed along the bottom of this knoll. While the eastern slope is quite steep with some erosion apparent, the western slope comprised a gentle gradient with no abrupt edge.

Method The topsoil from the whole top of the ridge was methodically and carefully stripped off down to the subsoil by mechanical excavator so that any shallow features would not be missed, leaving a remnant of the original pit walls to measure the depth of the features. The topsoil layer ranged from 15cm-30cm in depth, becoming deeper as the ridge sloped away to the west.

Part of the slope along the western side was also stripped down to the subsoil, as was an area above the midden exposure (Feature 35) on the eastern side of the ridge. No structural features were seen in the latter area. These slopes, though, did appear to have been modified by farming activities and the remains of old metal pipes were found (probably coming from the old water trough seen in Best 1999: Plate 19), along with areas of gravel possibly associated with an old farm road to the north of the midden. Rusted pieces of corrugated iron and wire were also uncovered by the digger. Such disturbance may have obliterated smaller archaeological features like post holes had they been present, but would not have done so for larger features like storage pits.

Stripping revealed that, apart from the midden down the eastern banks and the drains leading down the western slope, archaeological features appeared to be restricted to the top of the ridge. Archaeological features were spread over an area of some 110m by 12.5m (the breadth of the ridge at its widest point).

The feature outlines exposed by the surface stripping were mapped by total station prior to excavation (Figure 51). After excavation of the area was completed the excavated features were recorded.

**Excavation Results** Excavation revealed a greater complex of features than had been visible on the surface (Figure 50, Figure 51). At least ten probable storage pits were uncovered in the widest part of the ridge at the northern end (Figure 52, Figure 53, and see Appendix 2 for feature descriptions). All but one (F13) were fully excavated. Excavation of F13 could not be undertaken because a water trough in current use by cattle sat on top of it. A notable feature of these pits was the drainage systems flowing from them down the western slope.

> Other features included an area of firescoops and ash along the eastern margin towards the narrow southern end (Figure 54). None of the firescoops recorded on Q07/1103 had any associated faunal material and no midden material appeared from surface observation and probing to be located on the eastern slopes directly below them. No faunal remains were revealed on top of the ridge at all. Several of the firescoops were sectioned and charcoal samples taken (see Appendix 4 and Chapter 6). The area adjacent to the firescoops revealed no definitive archaeological features apart from the odd isolated firescoop. Two pieces of obsidian found in close proximity near the western edge of this area suggested the likelihood of possible domestic features, but careful stripping of the topsoil revealed no features like post holes.

> Midden (Feature 35) was found just below the ridge on the east side (originally observed by Best 1999a), where it had been exposed by a farm track. It became clear that the road had cut through the midden leaving just a narrow margin of intact material. A test pit was dug in this feature and the nearby Feature 29 (Figure 56) and midden samples taken for analysis (see Chapter 6).

All the pit and drain features (Figure 57) had been infilled (Figure 55). Evidence from some of the pits suggested that this may have been a gradual process. Pit F20 had three firescoops more or less in a line dug into the fill about half way between the top and the floor. The adjacent Feature 30 pit had a large patch of charcoal rich blackened soil at the same level, as did Features 12 and 31.

While there appeared to be no intercutting features, several episodes of use were suggested by some of the evidence. Feature 11 pit had several firescoops dug into the top of the fill. The Feature 30 pit had a double drain that might suggest a smaller pit dug into the larger one.

Other features included some small shallow rectangular features – possibly small pits (F2, F6, F24).

Artefacts Artefacts comprised eight pieces of obsidian – one piece in the firescoop area, three or four in the fills of pits, and three others scattered in the topsoil (Table 3 and see Chapter 5).

Table 3.	Artefacts	recovered	from	Q07/1103
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Bag	Location
01	15cm down in pit fill of F7 pit
02	In top 5cm of pit fill of F10
03	By F47 in firescoop area
04	In topsoil on west side of ridge adjacent to firescoop area
05	In topsoil several metres away from 04
11	In top of F20 pit fill
20	In area of F12 above burning
21	In pit fill of F10 pit – about halfway down between top and floor.



Figure 50. Aerial view of Q07/1103



Figure 51. Plan of Q07/1103



Figure 52. Oblique view of northern end of Q07/1103


Figure 53. Plan of features in 'Pit Area', northern end of Q07/1103



Figure 54. Plan of features at the southern end of Q07/1103



Figure 55. Typical pit fill from Q07/1103 (Natasha Phillips)



Figure 56. View of midden (F29) in Q07/1103



Figure 57. View of Pit Area in site after excavation

# **Chapter 5: Analysis**

## INTRODUCTION

# Analysis The analysis of the material collected at the Puwera excavation was carried out by the Field School students supervised by Dr Marianne Turner and Dr Rod Wallace. The key results presented below are derived from:

- the midden analysis;
- the description of stone and flake tools; and
- chemical analysis of obsidian artefacts.

Other student projects were carried out as part of the research, but are not discussed in detail in this volume. These include assessment of the sections and plans from the archaeological excavations, use-wear study on obsidian artefacts, and background information on prehistoric Maori houses.

**Overview** Midden was obtained from each of the sites, but from different types of contexts. In site Q07/1091, the midden was concentrated in Area D, which was clearly a cooking area with a least 3 separate fires, although these are likely to have been roughly contemporary. The midden concentration was dense but could still reflect a relatively short occupation by a small group of people. Above, at site Q07/1092, midden was found in small scatters in Area B, representing relatively ephemeral dumps near the occupation, and in a single dense concentration in Feature 22 (a deep oval pit) in the middle of Area A. The midden in site Q07/1103 was similar to that in Area B of site Q07/1092, being found in small amounts in and around the pit structures.

The majority of artefacts came from site Q07/1091, particularly from the working floor area (Area E) and the house floor just below (Area F). A range of activities were taking place in and around the house involving the manufacture and use of obsidian and chert flakes and the reworking of adzes. A similar range of activities was occurring in Area E. It was hoped that the analysis would add information regarding the relationship between these two areas, E and F.

The sourcing studies relating to the obsidian and the adzes were designed to explore the extent and nature of the trade and exchange network in which the occupants of Puwera were involved. Resources of both obsidian and stone can be found throughout the country and the presence of greenstone suggests that the networks did extend a considerable distance, although these may not have lasted a long time or have been based on direct exchange.

# **MIDDEN ANALYSIS**

### Study undertaken by Gina Macfarlane

**Introduction** Midden analysis focussed firstly on identifying and quantifying the shellfish species which were being harvested by the people who once lived at the Puwera site to achieve an understanding of the marine environments that were being utilised, as well as the size of the catchment area within which people would have ranged to obtain their shellfish.

The valves of the main shell fish species were measured to determine the size range and variation of the animals being gathered. Comparisons were made between the different degrees of shell breakage that existed between the various midden samples, and between the sizes of largely intact and fragmented shells from different samples. Hinge width and resilifer depth for cockle and pipi respectively were used as a proxy for the expected valve size. This was to determine whether the shells had experienced a pattern of breakage that was counter to what might be expected from natural taphonomic effects.

The following samples were analysed:

<u>Q07/1091, Area D</u> (two samples). This patch of midden was 20m from the Area F house site and may have been associated with it. The midden appeared to have two layers when in situ, so samples were examined from the upper and lower layers, referred to as samples Q07/1091, Sample 2 and 3 respectively (Figure 10).

<u>Q07 /1092</u>, Area A, Feature 22 (two samples). This midden was the fill of a deep oval pit (F22), on the top of the western knoll above and north of site Q07/1091. The two samples examined are referred to as samples A and B.

<u>Q07/1103</u>, Feature 29 and Feature 35 (one sample from each feature). These features were different midden patches in the central part of Q07/1103. The midden locations are shown in Figure 53.

**Methodology** All midden samples were dried and sieved. The shells were sorted into species, with the bivalves being further sorted into left and right valves from which MNI counts were obtained. The MNI of the mud snails was based on the number of apical whorls present. Shell weights were also taken for each species. The widths of relatively complete cockle and pipi shells, i.e. at least 75% intact, were obtained with digital callipers. The hinge width for cockles and the resilifer depth for pipis were also obtained for all valves where these elements were measurable, regardless of whether the shell was fragmented or intact. Due to their correlation to shell width, the hinge width and resilifer depth were used as a proxy for the shell width of fragmented valves.

### 91, Sample 2:

Q07 1091, Midden Area D

Sample 2 was taken from the top layer of the midden (Area D). The main shell fish species present were pipi (Paphies australis), cockle (Austrovenus stutchburyi), mud snail (Amphibola crenata) and ruheruhe (Cyclomactra ovata). Cockle accounted for 44% of the total MNI count, pipi 39%, mud snail 16% and ruheruhe only 1% with 5 individuals (Table 4, Figure 58). Of all the species ruheruhe were the most fragmented and were only identified by their hinges, as no bigger fragments were present. Several incidental species were present in the sample (Zeacumantus lutulentus and Cominella adspersa), which were of negligible weight. No fish, bird or mammal bone was present. The relatively complete pipi shells had a mean width of 57.03mm with a mean resilifer depth of 7.27mm. The 22.8% of pipi shell that was fragmented had a mean resilifer depth of 7.55mm. This suggests that the broken shells may have originally been slightly larger than the more complete shells. The cockles followed a similar pattern with the fragmented shells tending to have been larger than the shells which remained comparatively whole. However, 67% of the cockle shells were fragmented, compared to only 22.8% of the pipi. The mean shell width of the intact cockle shells was 23.9% with a corresponding hinge width of 6.98mm.

### Sample 3:

This sample was taken from the lower layer of the midden (Table 5, Figure 59). In comparison to the upper layer, the shells generally appeared to be far less fragmented, although field observations had suggested the reverse. Its composition showed a marked increase in the number of mud snail (Amphibola crenata) than were present in the upper layer. This layer consisted of 56% mud snail, 40% cockle (Austrovenus stutchburyi), 3% pipi (Paphies australis) and 1% made up of ruheruhe (Cvclomactra ovata) and miscellaneous shells (Austrofusus glans, Cominella adspersa, Zeacumantus lutulentus and Diloma subrostrata). This layer had the most intact ruheruhe shells, which due to their fragile nature tend only to be found in highly fragmented states. Their identification is usually totally dependent on the presence of the valve hinges which, being the strongest part of the shell, may be the only retrievable part. No fish, bird or mammal bone was present. The mean pipi shell width was 62.52mm with a corresponding resilifer depth of 8.33. 21.4% of the pipi shell was fragmented and had a mean resilifer depth of 5.28mm, suggesting the smaller shells had suffered more breakage than larger ones. Cockle shells had a mean width of 27.12mm with a hinge width of 7.48mm. Over 22% of the cockle shell was fragmented. These had a mean hinge width of 7.85mm, which was slightly larger than the mean hinge width of the complete cockle shells.

Q07/1091 Sample 2	MNI Count	Weight (gm)	Shell Width Mean (mm)	Hinge/resilifer Whole Mean (mm)	Hinge/resilifer Frag. Mean only (mm)	Percentage Broken
Pipi	270	4937	57.03	7.27	7.55	22.80%
Cockle	300	1733	23.87	6.98	7.41	67.03%
Mud Snail	109	96	n/a	n/a	n/a	n/a
Ruheruhe	5	40	n/a	n/a	n/a	n/a
Misc. Shell	3	n/a	n/a	n/a	n/a	n/a

### Table 4. Data for Q07/1091 Area D, Sample 2.

### Table 5. Data for Q07/1091 Area D, Sample 3

Q07/1091 Sample 3	MNI Count	Weight (gm)	Shell Width Mean (mm)	Hinge/resilifer Whole Mean (mm)	Hinge/resilifer Frag. Mean only (mm)	Percentage Broken
Pipi	35	800	62.52	8.33	5.28	21.42%
Cockle	495	2367	27.12	7.48	7.85	22.36%
Mud Snail	679	582	n/a	n/a	n/a	n/a
Ruheruhe	14	76	n/a	n/a	n/a	n/a
Misc. Shell	6	n/a	n/a	n/a	n/a	n/a

### Q07/1092,

Feature 22

Sample A:

The midden sample A taken from Feature 22 was almost exclusively cockle (Austrovenus stutchburyi), accounting for 97% of the sample. Pipi (Paphies australis) only contributed 2% of the total while several small gastropods (Diloma subrostrata and Zeacumantus lutulentus) made up the final 1% (Table 6, Figure 60). No mud snail (Amphibola crenata), ruheruhe (Cvclomactra *ovata*) nor any type of bone was present. The mean shell width of the relatively complete pipis was 34.18mm with a corresponding resilifer depth of 4.49mm while the mean resilifer depth taken from fragmented shells was 3.79mm. This is consistent with the slightly smaller pipis experiencing a greater degree of fragmentation. The fragmented shells accounted for 37.5% of the total quantity of pipi shell. The mean cockle shell width was 25.36 with a corresponding hinge width of 6.08mm. Over 36% of the cockle shell was fragmented and these broken shells had a mean hinge width of 6.39mm, revealing that, unlike the pipis, there was a slight tendency for breakage to have had a greater effected on the larger shells.

### Q07/ 1092, Sample B:

Feature 22,

continued

Despite Sample B being a much smaller sample size than A, it clearly demonstrated a different composition (Table 7, Figure 61). The percentage of pipi (*Paphies australis*) to cockle (*Austrovenus stutchburyi*) was much greater and there was a definite presence of mud snail (*Amphibola crenata*). Cockles comprised 59% of the sample, pipis 28% and mud snail 13%. No fish, bird or mammal bone was present. The mean pipi shell width was 52.26mm with a corresponding resilifer depth of 6.86. The percentage of fragmented pipi shell was 61.9% with a mean resilifer depth of 6.18 mm, suggesting that the smaller pipi shells experienced slightly more fragmentation than larger ones. The mean cockle shell width was 25.69mm with a mean hinge width of 6.91mm. Only 14.6% of the cockle shell was broken. Their hinge width (7.22mm) was again slightly larger than that of the whole cockles (Table 7). It is likely this sample was simply a small localised collection of material within the larger midden.

### Table 6. Data for Q07/1092, Feature 22, Sample A

Species	MNI Count	Weight (g)	Shell Width Mean mm	Hinge/resilifer Whole Mean (mm)	Hinge/resilifer Fragmented Mean (mm)	Percentage Broken
Pipi	9	16	35.18	4.49	3.79	37.5%
Cockle	419	1716	25.36	6.08	6.39	36.46%
Misc. shells	3	9	n/a	n/a	n/a	n/a

Table 7. Data for Q07/1092, Feature 22, Sample B

Species	MNI Count	Weight (g)	Shell Width Mean (mm)	Hinge/resilifer Whole Mean (mm)	Hinge/resilifer Fragmented Mean (mm)	Percentage Broken
Pipi	22	310	52.26	6.86	6.18	61.90%
Cockle	47	166	25.69	6.91	7.22	14.58%
Mud Snail	10	21	n/a	n/a	n/a	n/a

### **Q07/1103** Feature 35:

The sample consisted of 63% cockle, 21% mud snail, 15% pipi and 1% ruheruhe (Table 8, Figure 62). Miscellaneous shells consisted of mainly mud whelks (*Cominella adspersa*). The intact pipi shells had a mean width of 61.03mm and a mean resilifer depth of 7.94mm, while the mean resilifer depth of the fragmented shells, which accounted for 32% of the pipi shell, were slightly less at 6.72mm. The relatively whole cockle shells had a mean width of 26.38mm and a mean hinge width of 7.44mm. 35% of the cockle shell was fragmented and, as usual, the broken shells tended to be slightly larger, with a mean hinge width of 7.77mm, than the more complete shells.

### Feature 29:

The two main species present in this midden sample were evenly divided (Table 9, Figure 63), with cockle and pipi each accounting for 45% of the sample. Mud snail only comprised 6% of the sample and ruheruhe 4%. Miscellaneous shells consisted of two mud whelks (*Cominella adspersa*). The mean shell width of the relatively complete pipis was 60.03mm with a corresponding resilifer depth of 8.17mm while the mean resilifer depth taken from fragmented shells was 6.81mm. 37.28 % of all pipi shell was fragmented. Cockle shells had a mean width of 26.9mm with a hinge width of 8.00mm. Of the total quantity of cockle shell just over 23% was fragmented. These had a mean hinge width of 8.70mm, which was slightly larger than the mean hinge width of the complete cockle shells.

Species	MNI	Weight	Shell Width	Hinge/resilifer	Hinge/resilifer	%
_	Count	(g)	Mean (mm)	Whole Mean (mm)	Frag. Mean only (mm)	Broken
Pipi	82	1358	61.03	7.94	6.72	32%
Cockle	341	2027	26.38	7.44	7.77	35.39%
Mud Snail	111	237	n/a	n/a	n/a	n/a
Ruheruhe	5	36	n/a	n/a	n/a	n/a
Misc. Shell	5	n/a	n/a	n/a	n/a	n/a

 Table 8. Data for Q07/1103, Feature 35

 Table 9. Data for Q07/1103, Feature 29

Q07/1103	MNI	Weight	Shell Width	Hinge/resilifer	Hinge/resilifer	%
Feature 29	Count	(g)	Mean (mm)	Whole Mean (mm)	Frag. Mean only (mm)	Broken
Pipi	108	2314	60.03	8.17	6.81	37.28%
Cockle	109	557	26.9	8.00	8.70	23.21%
Mud Snail	14	16	n/a	n/a	n/a	n/a
Ruheruhe	10	27	n/a	n/a	n/a	n/a
Misc. Shell	2	n/a	n/a	n/a	n/a	n/a



Figure 58. Midden composition (MNI) of Q07/1091 Area D Sample 2



Figure 60. Midden composition of Q07/1092 Feature 22, Sample A







Figure 59. Midden composition (MNI) of Q07/1091 Area D, Sample 3



Figure 61. Midden composition of Q07/1092 Feature 22, Sample B



Figure 63. Midden Composition of Q07/1103 Feature 29

**Discussion** Cockle dominated half of the samples analysed but pipi achieved parity in sample A from Q07/1091 and at site Q07/1103 Feature 29. Sample B from Q07/1091 was unusual in that its largest component was mud snail (*Amphibola crenata*). Mud snail varied from being totally absent, as in both samples from Q07/1092 Feature 22, to being the dominant species at 56% in Q07/1091 Sample B. In all other samples mud snail varied from 6% to 21%. Pipi (*Paphies australis*) was generally present in all samples, varying from 2% to 45% of the compositions.

All species identified in the analysis could have been harvested locally from Whangarei Harbour. As there are no species of shell fish present that could not have been found near to the site, it is unlikely that the people who accumulated these middens were travelling very far to procure the shellfish. It is remarkable that no fish or animal bone was found in any of the midden samples

The variation in mean shell width of pipi between all midden samples ranged from 35.18mm in sample A of Feature 22 (Q07/1092) to 62.52mm in Q07/1091 Area D Sample 3. However, the mean pipi shell width from sample A (F22) was unusually small, as was the sample size. Excluding this sample, the variation ranged from 52.26mm to 62.52mm. The mean width of cockle shells was more consistent between samples, ranging from 23.87mm in Q07/1091 sample 2 to 27.12mm in sample 3 of the same midden. There was a greater degree of variation in cockle shell widths between the upper and lower levels of this one midden than existed between all other samples.

To compare the shell widths of fragmented shells with those of relatively complete shells (> 75%), the hinge width of cockle fragments and the resilifer depth of pipi fragments were used as a proxy for shell width, as they have a strong positive correlation to each other (Table 10). Pipi generally demonstrated a breakage pattern where the resilifer depth of the shell fragments was smaller than that of the more complete shells. This suggests that smaller pipi shells have a tendency to suffer more breakage than larger shells. The only exception to this was in Q07/1091 Sample A, which was from the upper level of the midden. Here the mean resilifer depth of pipi fragments (7.55mm) was slightly larger than that of the more complete shells (7.27mm), suggesting that the larger pipis had suffered more breakage.

**Discussion,** *continued* Cockle shells, in contrast to the pipi, demonstrated a clear tendency for the larger shells to be more fragmented than the smaller shells. Without exception, all midden samples had a greater mean hinge width for the fragmented shell than for the more complete shells. This implies that the tensile strength of the shell may be compromised as the shell grows larger, making larger shells more prone to breakage.

The proportions of fragmented shells in each of the pipi and cockle groups were assessed as a percentage of the whole group (Table 10). This revealed that in four of the six samples cockle and pipi shell suffered a similar degree of breakage within each midden sample as well as between midden samples. The two exceptions to this were Q07/1092 Sample B and Q07/1091 Sample 2.

In the case of 1091, the cockle shell from the upper layer of the midden suffered 67.03% breakage, while the lower layer (1091 Sample 3) only had 22.36% breakage. This would be consistent with cockle shell being less resilient to external pressure, i.e. trampling, than pipi shell, which had a low percentage of fragmentation in both deposits, and could also be an indication that the midden had been in an area that was well trodden. Q07/1092 Feature 22 Sample B demonstrated a high percentage of breakage for pipi shell. However, as the cockle shell in the same midden sample suffered only a low percentage of breakage (14.58%), it is unlikely that the high degree of pipi fragmentation was due to trampling. It could be explained by the pipis having been deliberately broken or smashed in order to extract the meat when raw. Alternatively, the sample size was quite small, so it could be simply a sampling error anomaly. A larger sample size would be needed to resolve the issue.

Percentage of Fragmented Valves	1092 – F.22 Sample A	1092 – F.22 Sample B	1091 - Sample 2 (Upper)	1091 – Sample 3 (Lower)	1103 – F.35	1103 - F. 29
Cockle	36.46%	14.58%	67.03%	22.36%	35.39%	23.21%
Pipi	37.50%	61.90%	17.24%	21.42%	32.00%	37.28%

Table 10. Percentages of shell fragmentation for all samples

**Conclusion** Cockle, pipi and mud snail were the main shellfish species present in the Puwera midden samples, with cockle generally being the most prevalent. Other species, such as ruheruhe and mud whelks, were sometimes present but only in low numbers. The shellfish were all species that could have been harvested from the nearby reaches of the Whangarei Harbour. No bone of any type was found in the samples.

An analysis of the breakage patterns for cockle and pipi revealed that cockles have a tendency for the larger valves to be more fragile than the smaller valves, while the opposite appears to be true for pipi valves. In most cases (4 of the 6 samples), the two species experienced a similar degree of fragmentation within the one midden. Exceptions to this, however, were quite extreme, suggesting that one of these middens (the upper level of the midden in Area D Q07/1091 – Sample 2) had been subjected to external pressures, such as trampling, not experienced by the others. Q07/1092 F22 Sample B was also unusual compared with Sample A, which may reflect a different approach to processing but might also relate to the sorting and mixing in the feature during deposition. The difference in relative proportion of pipi in these samples from F22 suggests that this effect relates more to deposition and later processes.

# **STONE TOOLS**

**Introduction** Seven adzes and 195 flakes were recovered from the Puwera archaeological investigations. These are listed in Appendix 3 and discussed below.

Adzes The measurements of the adzes are shown in Table 11. Images of the adzes are shown in Figure 21 and Figure 22 (from Q07/1091), Figure 42 (from Q07/1092) and Figure 49 (an adze found during monitoring in 2009 near Q07/1092). The distribution of the adzes found during the excavations is shown in Figure 64.

### Adze # 75 from Q07/1092:

This was a complete Nelson/Marlborough Argillite (green-grey), reworked 2B adze that was well ground with a few flake scar remnants, short steep bevel with ill-defined chin, irregular ground facets to back and bevel (Figure 42). Typical of Nelson/Marlborough argillite, the back and front are of almost equal width.

The adze is stubby with a rectangular cross-section. The adze has seen lots of use, with the blade rounded off in preparation for re-sharpening. There is evidence of previous corner damage and repair. The poll looks as though it has been hammered during use and is now quite fractured with a small piece missing. There are slight grooves and reduction at the sides near the poll as if it once had more well defined butt reduction or a tang.

### Artefact #39:

This greenstone chisel was found on the house floor in Area F Q07/1091 and is mostly complete (Figure 21c). The poll is damaged, probably from pounding during use. It was probably hafted in-line and struck with a mallet. The chisel has a rectangular cross section with well defined angular sharp corners, steep sided, and the blade remains in good condition. It is a well made tool being fully ground with a well defined straight chin, short steep bevel, and is quite robust for its size.

### Artefact #87:

A complete chisel made from Tahanga basalt was also found on the Area F house floor (Figure 21d). It was probably made from an adze flake derived from adze reworking. It has a rectangular cross-section with steep sides and thin and low bevel angles, suggesting it was designed for light trimming and not high angled work. The snapped sides from the flake were lightly ground with the rest well ground. It appears to have a blade at each end – one has been squared off in preparation for regrinding after a small corner chip while the other blade is a bit blunt and worn but otherwise in restorable condition.

Adze	Context	Material	Weight (g)	Length (mm)	Blade Width (mm)	Poll Width (mm)	Max. Thickness (mm)
75	Q07/1092 Area A F22 - Midden	Nelson/Marlborough Argillite	60	45	40	25	19
39	Q07/1091 Area F - House floor	Greenstone	2	18	5	7	4
87	Q07/1091 Area F - House floor	Tahanga Basalt	4	31	11	7	4
134	Q07/1091 Area F - House floor	Tahanga Basalt	162	88	34	31	24
141	Q07/1091 Area F - House floor	Gabbro	94	76	42	19*	22
143	Q07/1091 Area F - House floor	Nelson/Marlborough Argillite	75	69	32* (est. 40-55)	33	19
2009	Q07/1092	Serpentinite?	112	84	45	21	22

Table 11. Summary of adze measurements (\* indicates damage)



Figure 64. Distribution of adzes and adze flakes at Q07/1091 and Q07/1092

Adzes, continued

### Artefact #134:

A second Tahanga basalt chisel from the Area F house floor was also complete, and reworked and looks like a narrow 2B adze (Figure 22h). It is well ground with a few remnant flake scars. The chisel has a short steep bevel with well defined chin, blade narrower than body, front wider than back, blade straight and sharp, and is in good condition apart from a small fresh chip at one corner. It has a trapezoidal cross-section and sharply defined corners. The poll is ground over but has no evidence of haft polish.

### Artefact #141:

This is a complete late type 2B adze from the Area F house floor probably made from Gabbro (speckled with greenish colour and slightly magnetic) (Figure 22g). There is evidence of extensive hammerdressing to the back and poll, while the rest is well ground. It has a steep bevel with ill-defined chin, plano-convex cross-section, and the front is wider than back.

The blade has seen much use and repair and is now asymmetrical, that is, high and curved up at one corner, but is generally in good condition apart from a tiny (possibly recent) chip. The poll is damaged with about a third removed to one side, and no visible evidence of haft polish.

### Artefact #143:

This is a reworked Type 2B adze from the Area F house floor and probably made from Nelson/Marlborough argillite (Figure 22f). The adze has been burnt, making it difficult to identify the stone source, but it is not magnetic and appears to have veins and patterning more like Nelson/Marlborough argillite than the other likely contender, Motutapu greywacke.

This adze is badly damaged. Possibly a fire caused the lateral breakage of most of one side and there is also another big spall from the other blade corner. Only the top of the poll is intact.

Otherwise, the adze has a rectangular cross-section and is well ground over remnant flake scars especially to the back. It is quite angular with well defined sharp corners and chin, short steep bevel, and steep sides. The small blade remnant is sharp. The haft polish is quite marked on the poll which also clearly shows the original break surface.

### Adze found in 2009:

This adze was found after excavation in May 2009 during monitoring by Simon Best to the south-west of the excavated features of Q07/1092 (Figure 44). It looks as though it is made from a Far North siliceous limestone material, possibly serpentinite, and has badly weathered to a dirty cream colour with a crumbling blade (Figure 49).

Adzes, *continued*This Type 2B adze is complete but could be reworked. It was originally made by rough flaking then ground over. It is still asymmetrical in the butt area due to the rough flaking. It has a plano-convex cross-section, no defined chin and a steepish bevel. The front is wider than back and the poll looks a bit hammered. The blade is all badly damaged, some of that damage partially probably due to weathering.

### Discussion of Stone material:

Adzes

Four and possibly five of the seven adzes recovered were reworked. These reworked adzes are made from stone materials that were popular during the early or 'Archaic' period of Maori prehistory. They were probably originally made during this time as much larger adzes.

These adzes had long use-lives that reduced their size either suddenly through breakage or by gradual attrition through blade repair. As such, these adzes do not represent an original context of contact with areas from where these stone materials are (i.e. Coromandel for Tahanga basalt and Nelson/Marlborough). They do illustrate the ongoing functional value of these materials. It is interesting to note that reworked adzes made from early period materials are more common in the site overall than are those made from stone materials only utilised in the later (post-1500 AD) prehistoric period.

### Technology:

The size, shape and technology associated with the all the adzes were very similar. While the reworked adzes have a few flake scar remnants indicative of their origins, the predominant adze shaping and repair techniques are hammer-dressing and grinding which is typical of late period adze technology and results in a similar morphological appearance.

### Form and function:

All the adzes were small (less than 100mm in length). They are either narrowbladed chisels or small chopping adzes. The latter were probably placed in socketed hafts to extend their size and weight. Even so, they do not appear to be suited to any heavy wood working tasks. Rather, they probably performed a range of generalised everyday tasks like fire-wood chopping, vegetation clearance, and the shaping of wooden items like posts or other structural timbers (see also Best 1977). The greenstone chisel might suggest carving, but lashing grooves and perforations are also among the tasks to which this chisel would be suited.

### **Discussion of** Q07/1091 adzes: Adzes, Five of the adzes were found in the Q07/1091 Area F house floor area. This continued might be expected, given that houses were typically places where items of value like adzes were stored when not in use. It is less easy to explain why they were not removed when the site was abandoned. All but the burnt adze would have been still useable (some after some minor repair and/or re-sharpening). The burnt adze is interesting because there were no signs of the type of fire that could have burnt this adze, but not the others, within the house itself. This would appear to suggest that the adze was burnt and damaged elsewhere, then deliberately taken to the house as if the intention was to repair it at a later date. While it might be understandable for the occupants to leave this behind when making decisions about what to take with them when they left, it does not explain others like the Tahanga basalt adze A134 and the greenstone chisel that were in good operational condition and were therefore still valuable. Accidental loss is a possibility, particularly given that these adzes are all small

Accidental loss is a possibility, particularly given that these adzes are all small and might be difficult to relocate in the darkness of a house. Accidental loss might also explain the finding of the Nelson/Marlborough argillite adze in the Area A midden (F22). This adze was in the process of blade repair. It is easy to imagine a person working on this by the fire while waiting for food to cook, and to see how it might be easily misplaced, especially at night.

The finding of still operational wood-working tools, particularly when the majority were in the Area F house, might suggest instead an intention to reoccupy the site some time in the future. This did not obviously happen. If this was the case, we might ask why no other types of artefacts were found, apart from stone flakes which were generally used for a brief time and then discarded as rubbish (see below). We might expect that fishing gear, like hooks and sinkers, might also have been left and been preserved. Hooks, in particular, might be more easily lost than adzes. However, no fishing gear was found at Puwera.

The absence of fishing gear at Puwera might be explained by its location some distance inland, so either there was no reason for people to bring fishing gear to a site used for other activities, or they took it with them when they left the site. The probability is that they may have left Puwera to go to the coast for fishing and shellfish gathering.

# **Flakes** Flakes were recovered from most of the excavated sites and areas (Table 12). They were examined within four main contexts:

- Q07/1091 Area E: The flake assemblage on this terrace was clustered and likely to have been in primary context. Excavations here produced the largest flake assemblage (N = 104). The majority were obsidian, some were chert, and one greenstone adze flake was also found. The terrace probably functioned largely as a working area.
- Q07/1091 Area F: The house floor and porch area also produced a discrete assemblage, for the most part in primary context, though some material from the Area E terrace above may have spilled down into this area. This flake assemblage (N = 59), when compared to the one from Area E, had the potential to clarify the relationship between these spatially close areas. The majority of the flakes were obsidian, with some chert and two Tahanga basalt flakes.
- Q07/1092: Flakes were found in the midden areas and within the fill of pits and other features. Their distribution was scattered and the majority had probably been removed from their original context of manufacture and use. The numbers found were small (N = 24) and all were obsidian except for one chert flake. All the flakes were thus analysed as one assemblage.
- Q07/1103: A small assemblage of eight obsidian flakes was found scattered mainly in the fill of pits or between them.

### Adze flakes:

Three flakes were derived from finished adzes. Two quite large (4-5cm) ground flakes of Tahanga basalt probably came from the same adze. These were both found in Area F Q07/1091. In Area E nearby, a small (2cm) flat thin fully ground chip from a greenstone adze was found (Figure 22).

None of these flakes had a remnant of the blade or were part of the bevel; thus it is unlikely that the flakes and chip came from blade damage during adze use or blade repair. All signify that a more major process of repair was responsible for these flakes. It is likely that the adzes were being remodelled after major damage or breakage had occurred elsewhere.

### Stone sources:

The flakes comprised four different types of stone. Obsidian was the dominant material making up 84.1% of all the flakes recovered. The different obsidian sources represented are discussed below but are mentioned here where relevant. Notable are the higher frequencies of Mayor Island obsidian in Q07/1091 Area F.

Flakes,<br/>continuedChert made up 14.4% of the flake assemblage. Almost all these flakes were<br/>characteristic of the Onerahi source located on the northern side of the<br/>Whangarei Harbour. Only one flake was unlikely to have come from Onerahi<br/>due to its high translucency.

The remaining 1.5% comprised the three adze flakes that were probably produced during major repair and reworking of finished adzes as all had ground dorsal surfaces. As noted, two were Tahanga basalt and likely came from the same adze, and the other was a small chip from a greenstone adze.

### **Obsidian flakes**:

Obsidian flakes (N = 164) were found in all excavated areas. Most flakes were small (1-3cm maximum dimension). Only two cores were found, both of which were exhausted and were probably discarded deliberately. The core from the Area F house floor had been used as a pecking or pounding tool before it was tossed away. There were also few chunks. These are pieces that do not exhibit the conchoidal fracture and striking platforms characteristic of flakes. They can be produced as a result of flaws or pieces breaking from cores. Large chunks can themselves become cores but this was not observed at Puwera. They often prove useful as tools. Those from Puwera were generally small, of a similar size to flakes, and were used in a similar way.

Shatter is here defined as small shards and flakes (less 1cm and 1gm), that, in experiments (Turner 2005), are mainly generated as a by-product of flake manufacture, and these are generally too small to hold effectively for any useful purpose. The frequency of shatter relative to useful flakes can indicate whether manufacture took place in situ. In experiments in obsidian flake making, over 60% of the total number of pieces produced were 'shatter'. These included very tiny slivers that would probably not be retained in even the finest sieves in the field, so lower frequencies of shatter could be expected from archaeological assemblages even where they were discarded in the same place they were made. It was thus surprising that Area E produced such a high frequency of shatter (59%), very close to experimental results. It strengthens the likelihood that this was a working floor or 'workshop' area (Table 13).

The Area F house floor had much lower numbers of shatter (Table 13), and it is possible that the flakes in Area F were manufactured on the terrace above (Area E). The much lower frequencies of shatter in the other excavation areas supports other evidence that the flakes were mainly in a secondary context, swept up during the infilling of kumara pits and other features. It is probable that these flakes may have been used in associated activities, however, for example, pit structure construction.

Flakes, continued We might have expected higher frequencies of cortex in Area E, given that this appears to be a working area, one where cores might be prepared and reduced leaving more of the outer surface (cortex) as discarded material. This was not the case; rather this assemblage had the lowest number of cortical flakes. This was also not influenced by the obsidian source. Mayor Island cores usually have no cortex but Area E had very little of this material compared to Area F. Most of the obsidian was grey, from sources that usually take the form of small cortical cobbles. Possibly the cores that individuals carried about with them from one place to another were generally quite well used by the time they arrived at Puwera. The small size of both flakes and cores at Puwera provides additional support for this. The possible one cobble that created the flakes scattered around Q07/1103 may have been a fresh one judging by the high frequency of cortex on these flakes.

### Chert flakes:

Chert was the next most common material making up 14.3% of the assemblage. All but one flake came from Areas E and F (Q07/1091), with the latter having 60.7% of the total amount. In terms of technology and use patterns, the chert material exhibited similar patterns to those seen above with the obsidian. There were a few larger flakes of chert but for the main the size range was similar. Obsidian seems to have been more extensively used, but this might reflect the greater resistance of chert to damage due to its greater strength.

There are some curious differences between Areas E and F. In terms of technological factors, the pattern appears to be a reverse of that seen in the obsidian data. In Area F, there appears to be more manufacture and possibly even core preparation. Evidence for this can be seen in the notably higher frequency of cortical flakes in Area F compared to Area E, and the higher frequency of use on the Area E flakes (Table 14).

### Function:

Overall there were few differences between sites and areas in the frequency of flakes showing use-wear and in the types of use-wear commonly observed (Table 14). Only a few flakes showed no indication of use, and this was because they lacked useable edges. The majority were used in a fairly minor way with little modification. Sharp fine flake edges and pointed projections (often at corners) were commonly utilised. These features were sometimes enhanced by retouch and deliberate snapping (Turner 2005).

Flakes, continued Only seven flakes showed crushing damage opposite to the working edge to facilitate handling. This feature suggests more sustained use or functions that required some pressure to be exerted. Only the house floor area showed a wider range of functions. These included a core with bruising damage as if used as a hammerstone, and another with a ground edge that may have resulted from the sawing of sandstone (Turner 2005). Otherwise most used flakes relate to cutting activities that leave only minor damage to the used surface. Flax work, including the making of muka, is a likely common activity, with some sawing, scraping and cutting of harder materials like bone and wood.

It is notable that if Area E was a focus for the manufacture of flakes, the output was certainly used there also. This makes sense. If Area E was a workshop area, manufacture and use probably went hand in hand.

Material	Q07/1091 - Area E	Q07/1091 Area F	Q07/1092	Q07/1103	All
Obsidian	93	40	23	8	164
Chert (Total)	10	17	1		28
Grey	8	14			22
Orange	2	2	1		5
Translucent		1			1
Tahanga basalt		2			2
Greenstone	1				1
Total	104	59	24	8	195

Table 12. Breakdown of flake assemblage by material and area

						Max				Pt-				Ground	Mayor
Area/Site	Ν	Core	Flake	Chunk	Shatter*	Cm	Cortex	Broken	Used	edge	Point	Edge	Pecking	edge	ls
Q07/1091															
Area E	93	0	37	1	55	5	11	18	26	14	10	12	0	0	5
Q07/1091															
Area F	40	1	27	4	8	4	13	16	21	11	10	4	2	1	13
Q07/1092	23	1	15	2	5	3	7	7	9	8	5	3	0	0	1
Q07/1103	8	0	7	0	1	3	4	2	5	4	1	2	0	0	0
Total Number	164	2	86	7	69		35	43	87	37	26	21	2	1	19
Percentage															
Q07/1091															
Area E	56.7	0	39.8	1.1	59.1		28.9	47.3	94.7	36.8	26.3	31.6	0	0	13.1
Q07/1091															
Area F	24.4	2.5	67.5	10	20		40.6	50	87.9	34.3	31.2	10	5	2.5	40.6
Q07/1092	14	4.3	65.2	8.6	21.7		38.8	38.8	88.8	44.4	27.7	12.9	0	0	5.5
Q07/1103	4.4	0	87.5	0	12.5		57.1	28.5	99.9	57.1	12.5	28.5	0	0	0
Total		1.2	52.4	4.3	42.1		36.8	45.2	91.6	42.5	29.9	24.1	2.3	1.1	20.1
* excluded from o	other ar	nalyses	s so N =	: 18, 7, 3	8, 32 = 95.										

Table 13. Obsidian flakes by type and area

Context	N =	max cm	flakes	chunk	spall	shatter	cortex	used	edge	point	edge/pt	pecking
Q07/1092 gen	1	2	1	0	0	0	0	1	1	0	0	0
Q07/1091-Area E	10	8	6	0	0	4	1	5	2	1	2	0
Q07/1091-Area F	17	6	10	1	1	3	8	9	3	3	2	1
Total	28		17	1	1	7	9	15	6	4	4	1
%												
Q07/1091 - Area E	35.7		60	0	0	40	16.6	83.3	40	20	40	0
Q07/1091 - Area F	60.7		58.8	5.9	5.9	17.6	57.1	64.3	33.3	33.3	22.2	11.1
Total (Q07/1091)			60.7	3.6	3.6	25	42.8	71.4	40	26.6	26.6	6.6

Table 14. Chert flakes by function

# **OBSIDIAN SOURCING**

Study undertaken by Samuel Hoare

Obsidian Assemblage	Over 150 obsidian flakes were recovered from the three sites. The analysis of the tools included physical analysis to determine both the source of the obsidian as well as information relating to the tool technology. Chemical analysis using X-Ray Fluorescence (XRF) was used for sourcing the material. Full details are provided in the accompanying report by Hoare available on the DVD.
Sourcing	In New Zealand there are four distinct source regions associated with rhyolitic vulcanism (Sheppard 2004:151):
	1. Northland;
	2. The Coromandel Peninsula/Great Barrier Island/Hauraki;
	3. The Taupo volcanic zone; and
	4. Mayor Island (Tuhua).
	A 'source region' refers to a group of geographically related obsidian deposits whereas a 'source area' refers to a number of discrete obsidian deposits associated with a single rhyolitic eruption or series of closely related eruptive events (such as lava flows or lava domes) (Moore 1988:3). Obsidian deposits from source areas will usually have identical physical characteristics and similar elemental compositions (Moore 1988:3). Furthermore, source areas can vary considerably in size from small islands such as Fanal Island to whole districts such as the Kaeo region in Northland (Moore 1988: 3). Archaeologists have currently identified at least 27 geographically distinct sources of New Zealand obsidian.
	Figure 65 indicates the approximate extent of the four source regions of New Zealand obsidian. Note that Mayor Island is a small extant peralkaline volcano, with a diameter of approximately 4km, and lies 26km north-east of Tauranga (Sheppard 2004:152). Mayor Island was an important obsidian source because of its abundance of high quality obsidian readily available throughout most of the island, making this one of the premier obsidian source sites for prehistoric Maori throughout the entire country (Sheppard 2004:152). However, Mayor Island can be considered an exception to the nature of most obsidian sources, since most obsidian source areas in the present, and most probably in the past, consist of a low-density scatter of obsidian cores and flakes recovered from the Puwera sites to be noticeably larger than pieces of obsidian from different source areas.



Figure 65. Map illustrating the main source regions of New Zealand obsidian and the approximate location of the Puwera sites (Moore 1988: Figure 1)

Methodology This following methodology was used for sourcing:

- Step 1: describing physical characteristics
- Step 2: sourcing through elemental composition analysis using an XRF machine.
- Step 3: refined physical characterisation using the comparative results from chemical and physical analysis.

The results of the analysis were then used to attribute artefacts to a probable source region.

Q07/1091 Figure 66 shows, in terms of the number of obsidian pieces recovered from site Q07/1091 Area E, that approximately 23% was from the source area of Mayor Area E Island, approximately 43% was from the source area of Awana on Great Barrier Island, approximately 19% was from the source area of Kaeo (in Northland), approximately 10% was from source areas in the Coromandel peninsula, and the remaining 5% was from Huruiki, a source area in southern Northland. However, when the percentages are calculated according to the combined weights of obsidian from each source zone (Figure 67) the percentages that each source zone represents change dramatically. Mayor Island obsidian becomes the most dominant group of this assemblage representing 57% of quantity of obsidian at Q07/1091 Area E. Huruiki, the second smallest group according to number of pieces present, becomes the second largest obsidian source representing 18% of all obsidian at Q07/1091 Area E. Material from Awana makes up 17% of the obsidian, Kaeo represents 6%, and obsidian from the Coromandel source region is only a mere 2% of the obsidian recovered from site Q07/1091 Area E.

Q07/1091Figure 68 illustrates that in terms of the number of obsidian pieces recovered<br/>from site Q07/1091 Area F, Awana (Great Barrier Island) (37.5%) and Kaeo<br/>(Northland) (35%) represent the two largest obsidian source groups in this area<br/>of the Puwera site. Mayor Island obsidian represents 15% of the obsidian<br/>recovered, and Huruiki (southern Northland) represents the remaining 12.5% of<br/>obsidian. As is the case at site Q07/1091 Area E, there is a huge difference in<br/>compositional percentage of the obsidian found at Area F based on the<br/>combined weights of obsidian from each respective source zone, in comparison<br/>to counting the percentage based on the number of obsidian artefacts recovered<br/>(see Figure 69). Obsidian from Kaeo becomes the most dominant group (39%),<br/>followed by Huruiki (27%), followed by Mayor Island (23%), and obsidian<br/>from Great Barrier Island becomes the least dominant group representing just<br/>11% of the obsidian recovered at site Q07/1091 Area F.

Q07/1092 The results for Q07/1092 (Figure 70) demonstrate that obsidian flakes from Awana (Great Barrier Island) are the most dominant source group, representing 43% of the obsidian recovered at Q07/1092. Both the Kaeo source area and Mayor Island source each represent 22% of the obsidian recovered from site Q07/1092. Obsidian from Kaeo (Northland) represents the least dominant group representing a mere 13% of the obsidian excavated at the site.

Q07/1092, continued However, once more, considering the combined weight of obsidian from each source zone (Figure 71), Huruiki becomes the most dominant source area representing 58% of Q07/1092's obsidian assemblage. Awana obsidian remains prominent, representing 29% of the overall obsidian recovered from the site. Mayor Island obsidian only represents 9% and obsidian from Kaeo is only 4% of the quantity of obsidian discovered at site Q07/1092.

**Q07/1103** As only 8 obsidian pieces were recovered from site Q07/1103 little can be inferred regarding the importance of obsidian in this area (Figure 71, Figure 72). Three conclusions can be drawn from the obsidian sourcing data for site Q07/1103. Either (a) this site was not an area where obsidian tools were continuously crafted and used; or (b) obsidian artefacts and their use in prehistory are poorly represented at site Q07/1103 due to the incomplete nature of the archaeological record; or (c) the archaeological excavation at Q07/1103 was carried out in areas where the likelihood of finding many obsidian artefacts was slim. Interestingly, Josh Windsor (who worked on the obsidian usage study) noted that artefact #3, #11 and possibly #4 (see Appendix 3) appeared to have been flaked from the same core. This data appears to correlate well with the obsidian sourcing study, which indicates that all three of these artefacts appear to have come from the same unknown source (possibly Awana).

**Discussion** The abundance of Mayor Island obsidian at the Puwera sites suggests that this was the preferred obsidian for functional usage over other obsidian source areas. Although, in terms of number of obsidian pieces recovered from each site, Mayor Island constitutes less than a quarter of all obsidian recovered at the three sites, using the combined weights of obsidian recovered from each respective source area the Mayor Island obsidian represents a much greater percentage of the total obsidian recovered. This may suggest that Mayor Island obsidian is less fragmentary and of a higher quality in comparison to obsidian from other source areas.

In contrast, obsidian from Great Barrier Island, one of the closer geographical sources to the Puwera sites and presumably far more accessible than Mayor Island, constitutes the largest obsidian group at the three sites in terms of number of pieces recovered, but in terms of the combined weight of Great Barrier Island obsidian its importance at each site is diminished.

**Discussion,** *continued* In terms of geographic distance to the Puwera sites, Northland sources (particularly the southern Northland source area: Huruiki) and Great Barrier Island are the closest obsidian source areas. Figure 65 illustrates the approximate position of the Puwera sites in relation to obsidian source areas and regions throughout the North Island and illustrates that the Northland sources and Great Barrier Island are the closest obsidian sources to Puwera.

Considering the proximity of the Puwera sites to the Whangarei harbour (less than 5km), it is a reasonable assumption that obsidian was transported to the occupied sites in the Ngako Creek area by canoe. Figure 65 also shows Huruiki's close proximity to the coast, Kaeo's (Northland) close proximity to the coast, and Great Barrier Island's position in relation to the Puwera sites. Through observing the geographical distance to these sources it is no surprise that obsidian from these areas is found in high abundance at each of the sites.

Using the obsidian sourcing data gathered from the analysis of the obsidian obtained from Puwera, it becomes clear that the sites were inhabited by Maori during a time where the sources of obsidian were already well known. This claim is supported by the diversity of obsidian source regions evident from the data. For example, the obsidian assemblage obtained from site Q07/1091 Area E is representative of three obsidian source regions: Northland, Mayor Island and Coromandel (note that according to Moore (1988) Great Barrier Island can be considered as an area of the Coromandel obsidian source region) and within these source regions it is evident that a number of specific source areas were exploited for obsidian (Kaeo source area and Huruiki source area in Northland and southern Northland respectively, Awana on Great Barrier Island, and Cooks Beach in the Coromandel peninsula).

The results of the physical analysis of the obsidian were particularly useful for the material from Area E in Q07/1091 (Figure 74). The range of flakes indicated that this area was used to work the obsidian material and the natural terrace was probably a small activity area, perhaps relating to flax preparation, amongst other possibilities, near the house in Area F. Overall, though, obsidian from different sources was found on all three sites (Figure 74-Figure 77).



Figure 66. Obsidian from different source zones at site Q07/1091 Area E



Figure 68. Obsidian from different source zones at site Q07/1091 Area F



Figure 70. Obsidian from different source zones at Q07/1092



Figure 72. Obsidian from different source zones at Q07/1103



Figure 67. Chart showing the combined weight and the percentage by weight from Area E (Q07/1091)



Figure 69. Chart showing the combined weight of source zone and the percentage from Area F (Q07/1091)



Figure 71. Chart showing combined weight of a source zone and the percentage from Q07/1092



Figure 73. Chart showing the combined weight and the percentage from Q07/1103



Figure 74. Distribution of obsidian flakes by source on Q07/1091 Area E



Figure 75. Distribution of obsidian flakes by source on Q07/1091 Area F



Figure 76. Distribution of obsidian flakes by source on Q07/1092



Figure 77. Distribution of obsidian flakes by source on Q07/1103

# ARTEFACT SUMMARY

**Summary** The majority of artefacts came from the working area (Area E) and the house floor below (Area F) in site Q07/1091. Five adzes were found associated with the house. These artefacts were probably stored in the house while it was occupied, but, possibly due to accidental loss, were not removed when the house was abandoned. All the artefacts in Area E, in contrast, were probably deliberately discarded as rubbish. While the area was active, discarded flakes could still have the potential to be re-used, but they were probably not valuable enough to be worth removing. Cores, on the other hand, were portable and could produce numerous fresh flakes when needed. This explains why only two cores were recovered from excavations, and both were at the end of their uselives.

A range of activities were taking place in and around the house in Area F Q07/1091 involving the manufacture and use of obsidian and chert flakes and the reworking of at least one adze. A similar range of activities was occurring in Area E. Flakes in all areas were mainly small, rarely more than 3cm wide or long. Their size, coupled with generally minor use-wear patterns, suggests fairly light, short-term tasks such as those involved in flax preparation. This is an activity that was probably undertaken by both men and women, and one that was probably a continuous process whatever the nature of occupation.

The relationship between Areas E and F (Q07/1091) was not clarified by the nature of the artefacts recovered from them. There is no definitive evidence that suggests they could be contemporary, aside from the spatial association. But differences between these areas, for example, the much higher frequencies of Mayor Island obsidian in Area F, may simply reflect who was working where, what they were working on, and the nature of the core they were removing flakes from at the time. One individual, in a short period of time, could have made and used all the Mayor Island flakes in Area F, and then discarded the core when it became too small to work further (after briefly using it as a pecking tool).

The obsidian sourcing study demonstrated that the obsidian was obtained from a wide range of obsidian sources from Northland through to Great Barrier and the Coromandel region. Similarly the stone used to create tools was similarly from various sources including both South Island greenstone and Nelson argillite. The results confirm that the inhabitants of Puwera were part of a widespread trading network.

# **Chapter 6: Environment and Chronology**

# **ENVIRONMENT**

Charcoal Analysis	Charcoal analysis was carried out by Dr Rod Wallace (the data and species names are provided in Appendix 4).
	The objectives of the charcoal analysis were three-fold. Firstly, charcoal from the sites can provide information regarding the development of the local landscape before, during and after the settlement of the area. Secondly, the charcoal species can be instructive with regard to behavioural choices relating to gathering firewood and other activities. Finally, the species identification provided samples for radiocarbon dating.
	Charcoal is partially burnt wood that survives in sites after all other plant material has rotted away. In the Northland climate natural fires are rare and charcoal is more likely to be present as a result of human activity. While charcoal is non-biodegradable it will weather rapidly to fine fragments if exposed to weather and will survive in site only if rapidly buried.
	Many different human activities generate charcoal. Cooking or heating fires are an obvious source, usually readily identifiable. Typically, the charcoal is found in distinctive structures such as fire scoops, hangi, or in middens. Firewood charcoal will normally reflect vegetation growing in the immediate vicinity of the site at the time of occupation. Only 15 of the 50 charcoal samples collected were clearly from such a source.
	Many samples were extracted from the pit fills. Abandoned pits were either deliberately backfilled or quickly became partially filled by the loose earth of their raised rims that slumped inwards as their wooden superstructures decayed.
	Charcoal in pit fills could originate from the burning of vegetation cleared at the initial occupation of the site, from the burning of standing superstructures or from burning of vegetation growing on the site after its abandonment. Charcoal from clearance fires will be dispersed throughout fills. In contrast charcoal found as a concentrated layer on a feature floor is much more likely to be from burning of the framework, roofs and interior 'furniture' of the structures. This could be mixed with material from vegetation growing after abandonment, which can continue to accumulate until natural infilling of the pit ceases.
Site Q07/1091 Charcoal samples were recovered from F39 and the drains around the house in - House and Area F, and from the midden in Area D which contained hangi. The results are Midden given in Table 15 below and in Appendix 4. There is no evidence that the house was burnt down. There was one clear fire feature (F39), a scoop in front of the porch. The charcoal was all from a Hebe species, which made the sample excellent material for radiocarbon dating. The single species suggests that this feature was used only once. Charcoal found in the fill of drains that ran around the outside of the house walls might date any time from immediately before occupation to well after the house was abandoned. The house drain charcoal was dominated by large conifers and may represent burning during site clearance and construction. The rata here was a vine and may have also been construction material. Three charcoal samples were extracted from the large shell midden (Area D) located some 20m directly to the north on the house terrace, one from one of the hangi features (F133). As noted above, samples from cooking fires have secure provenance and can define the vegetation type of the area at the time of occupation with some accuracy. In the firewood charcoal from the midden, swamp forest trees such as pukatea, silver pine and kahikatea are abundant as well as large trees from drier slopes such as kawaka, kauri and matai. Broadleaf tree species such as puriri, tawa, rata and maire are also well represented. With no burnt structures present the better timber producing conifer species do not dominate as they do at the house or at Q07/1092 (see below). Shrub species indicating clearance such as manuka and tutu are present only in small numbers and might indicate use of the area over only a few seasons after forest clearance. The results indicate that mature broadleaf podocarp forest dominated the area when Q07/1091 was first occupied and that the site was abandoned before regenerating shrub species became abundant. Given that the site is on a spur immediately above a swampy flat it should be born in mind that, when occupied, the house may well have been at the level of the tree tops of the kahikatea forest in the valley below.

Species	Fire scoop (F39)	Drain	Midden	Plant type (%)
Tutu			2	
Hebe	10			Shrubs or
Coprosma			5	small trees
Manuka		1	2	
Mahoe			2	
Puriri			5	
Tawa			1	
Maire			4	Broadleaf trees
Pukatea			2	
Rata		9	7	
Kawaka			1	
Tanekaha		9		
Silver pine		12		Conifers
Kauri			1	
Kahikatea		2	2	
Matai			23	
Totals	10	33	57	

#### Table 15. Charcoal from Q07/1091 by feature type

**Site Q07/1092** Charcoal samples were examined from pit or house floor features (F3, F5, F30, F54 (the burnt layer), F55 (including F57), F56, F69; from the charcoal filled depression F38; and from the clay possible floor F72. Other samples from contexts such as later fills of pits (e.g., in F8) and midden in Area B were also included in the analysis. The results are summarised in Table 16 and Table 17.

The overall charcoal results for Q07/1092 are summarized in Table 16. Fully three quarters of the species present are from large, canopy forming trees. Matai, a large conifer typical of hill slopes, contributes 30% of the total charcoal. Swamp forest clearly occupied most of the valley bottom as the tree species typical of this habitat (kahikatea, silver pine and pukatea) comprise 26% of the total charcoal.

While these results demonstrate that mature broadleaf podocarp forest grew in this valley system at the time Q07/1092 was occupied, there is some indication of cleared areas. Bracken occurs in small amounts in this assemblage but it is always under-represented in charcoal assemblages as it not a woody species and its charcoal survives poorly in sediments. It does not grow in forested environments but reflects regeneration on land immediately after forest clearance. The woody shrub species that are associated with bracken, where charcoal does survive well, tend to give a more accurate picture of forest clearance. Manuka, kanuka, coprosma and pseudopanax make up a quarter of the assemblage. Such species tend to grow vigorously where forest is cleared.

Q07/1092,<br/>continuedCharcoal by context type:This assemblage was divided by

This assemblage was divided by context type (Table 17) to explore the data:

- Charcoal from shell middens, which probably originated as firewood.
- Charcoal found as concentrated layers in the base of features, which appear to represent the burning of wooden superstructures.
- Charcoal that had accumulated in a more random fashion in pit fills.

In areas where cooking firewood seems to have been the main source of charcoal, swamp forest trees such as kahikatea, silver pine and pukatea are completely absent. This indicates that firewood was collected in the immediate vicinity of a site from matai dominated forest and not from swamp forest in the valley bottom. Shrub species such as manuka and kanuka that indicate forest clearance comprised a quarter of the firewood which suggests that the site was established in an existing clearing in the bush or at the edge of the bush.

Tree species make up 84% of samples from the burnt structures. As almost half are the swamp forest species kahikatea, silver pine and pukatea, it indicates that building timber was brought up to the site from lower parts of the valley. Charcoal from shrubs and small trees is poorly represented in these samples (14%), suggesting that mainly building timber was burnt.

#### Bark:

An intriguing aspect of the charcoal from the burnt structures is the abundance of bark. While it is a regular occurrence in charcoal samples it normally only occurs in minor amounts. Being on the outside of stems it normally burns to ash. In the burnt layer in the base of the shallow rectangular feature (F54, possibly a house floor), however, nearly half of the charcoal was bark. Two tree species, kahikatea and matai, were present and theoretically the burnt wooden superstructure could have been made from slabs of these with bark still attached. Unfortunately, no comparative collection of bark was available to test this idea, so samples of kahitatea and matai bark were collected and thin sections examined under the microscope. The samples did not match the bark charcoal from this feature. The bark did not come from the timber present but must have been present on its own account as part of the structure.

**Q07/1092,** *continued* As there is historical evidence that totara bark was used for many purposes including as a roofing material for Maori structures<sup>3</sup> the suspicion arose that it was from this species. To test this, a sample of totara bark was taken and it was found that it matched the burnt bark in the samples perfectly. What is striking about this result is that totara wood charcoal does not appear in the assemblages from Puwera at all, despite it being present in the modern landscape. Totara bark may have been collected from the forest and brought to the site to be used in structures, probably as a roofing material.

#### Charcoal from pit fills:

Over 40% of the charcoal found in pit fills is from shrubs that regenerate after forest clearance. This probably indicates burning of scrub regenerating on the site after abandonment. Large tree species, however, still dominate these samples, indicating forest vegetation surrounding the site when it was occupied.

#### Table 16. Q07/1092 – all charcoal samples from Q07/1092

Species	# Pieces	Plant type (%)	# Samples
Bracken	6	Ferns	2
Punga	1	(1.7%)7	1
Shrub sp.	4		2
Coprosma sp.	14		2
Pseudopanax	7		1
Fivefinger	7	Shrubs or	2
Akeake	1	small trees	1
Mingimingi	1	(22%)	1
Мараи	5		1
Manuka	10		6
Kanuka	39		6
Supplejack	4		2
Karaka	10		1
Kohekohe	1	Lianes and Broadleaf Trees	1
Maire	2	(10%)	2
Mangaeo	1		1
Pukatea	16		2
Rata	5		1
Totara bark	32		
Kawaka	5		1
Tanekaha	10	Conifer wood	2
Silver pine	13	(67%)	2
Miro?	3		1
Kauri	6		3
Kahikatea	76		12
Matai	120		17
Totals	398		34

<sup>&</sup>lt;sup>3</sup> http://www.teara.govt.nz/en/conifers/4

		Fire wood	Burnt	structures		Pit fills
Species	#	Туре	#	Туре	#	Туре
Bracken	1	Fern	5	Fern		Fern
Punga		(1%)	1	(3%)		(0%)
Shrub sp.	3				1	
Coprosma sp.	5				9	
Pseudopanax			7			
Fivefinger	3	Shrubs or		Shrubs or	4	Shrubs or
Akeake	1	small trees		small trees		small trees
Mingimingi	1	(26%)		(14%)		(42%)
Mapau			5			
Manuka	5		1		4	
Kanuka	3		19		17	
Supplejack			4			
Karaka			10			Broadleaf trees (1%)
Kohekohe	1	Broadleaf trees		Broadleaf trees		
Maire	1	+ vines	1	(14%)		
Mangaeo		(9%)			1	
Rata	5					
Pukatea			16			
Bark	2		27		3	
Kawaka					5	
Tanekaha			10			
Kahikatea		Conifer	67	Conifer	9	Conifer
Silver pine		(64%)	8	(70%)	5	(63%)
Miro?					3	
Kauri	2		2		2	
Matai	49		46		25	
Totals	82		229		83	

#### Table 17. Q07/1092 – charcoal found in firewood, burnt structures and pit fills

#### Q07/1103

Twenty-one charcoal samples were obtained from Q07/1103: from firescoops F48, 49 and 60; from a firescoop F3 post-dating F11 pit fill; from 3 firescoops (F21-23) in the fill of pit F20; from drains F17, F19 and the drains of pits F10, F30 and F14. The results are summarised in Table 18.

Only three of the charcoal samples were obtained from the middens. Pit F30 contained the only evidence of a burnt superstructure. Charcoal in the drains probably relates to burning of vegetation growing on the site shortly after site abandonment. Firescoops and patches of blackened charcoal rich soil were the most abundant source of charcoal at this site. The results for charcoal from each of these differing sample types are summarized below in Table 18.

Eighty-seven percent of the midden charcoal is from large canopy forming forest trees. These are matai, kahikatea, rimu, maire, rata, kohekohe, tarairi, pukatea and puriri. This indicates that forest surrounded the area at the time the midden was dumped.

	Mid	den	Pit drains/	Structures	Burnt	Patches	Fire	scoops	
Species	#	%	#	%	#	%	#	%	Plant type
Punga			4	8%		28%		6%	
Bracken					8		5		Ferns
Tutu			5		11		16		
Hebe	1			Ĩ			5		
Coprosma	2		4	Ĩ			17		
Kawakawa	1			Ĩ					
Rangiora	3			Ĩ					
Olearia		13%		37%		72%	1	80%	Shrubs or
Akeake				Ĩ			1		small trees
Pittosporum	1								
Fivefinger							4		
Manuka	5		9		3		21		
Mapau							1		
Kanuka					8				
Puriri	2		2				4		
Tarairi	1								
Kohekohe	2								
Pukatea	1	39%		14%		0%		12%	Broadleaf trees
Rata	7		5						
Maire	26								
Mangrove							6		
Bark			15						
Kahikatea	11		2						
Silver pine							1		Conifer
Kauri		48%	3	41%	1	3%	1	2%	bark and wood
Rimu	1	]							
Matai	36								
Totals	100		49		26		83		

#### Table 18. Charcoal from Q07/1103 by feature type

# Q07/1103, *continued*

A sample from pit F30 (sample #29, see Appendix 4) contained only totara bark and kahikatea timber. It seems to be the remains of a timber superstructure very similar to the ones found at Q07/1092. The four samples from within pit structures contain kauri, puriri, rata and punga that might relate to pit superstructures, but the tutu, manuka and coprosma is more likely to be from vegetation regenerating on the site immediately after abandonment.

The charcoal assemblages from the burnt patches and firescoops are dominated by bracken and the shrub and scrub species tutu, hebe, coprosma, manuka and kanuka. Over 20% of the charcoal is tutu, a colonizer of bare ground that is barely woody and yields very poor firewood. The mangrove firewood in 3 of the fire scoops must have been transported from intertidal areas at least 1km away. Indications of forest in this assemblage are minimal as the only tree charcoal present is small amounts of puriri, kauri and silver pine. Puriri typically survives forest clearance and is still abundant today scattered over the grazed pasture that occupies most of the Ngako Creek catchment.

Q07/1103, continued

The heavily resinous root systems of kauri and silver pine survive as deadwood on landscapes for centuries after forest clearance. The absence of the forest tree species found in the midden samples is significant. A burnt over forest leaves logs and stumps littered on the landscape for several generations. These supply ideal firewood and the absence of this from the firescoops and the burnt patches demonstrates that the forest had been cleared for a very long time when they were formed.

#### Summary:

The landscape surrounding Q07/1103 was clothed in primary forest when the pits were built and the midden dumped, but by the time the scoop hearths were made and the burnt patches occurred the vegetation must have resembled the 'good fernland' recorded by surveyors in the mid 19th century (see Chapter 1). These results strongly suggest a two phase occupation of Q07/1103 with the firescoops and the burnt patches dating to a period long after the construction of the pit complex.

# CHRONOLOGY

# C14 Dating<sup>4</sup> The analysis of the charcoal provided a number of samples suitable for dating purposes. These were combined with samples of the shell from midden features. Sample selection was based on the following considerations:

- Dating the range of occupation of each of the three sites;
- Dating the different functional areas of sites (Q07/1091); and
- Dating particular events at sites (Q07/1092).

In general, though, all suitable samples were dated as the range of samples that contained suitable material was limited. Twelve samples in total were sent for radiocarbon dating (Table 19) and the dates calibrated using OxCal 4.1. Raw information is supplied in Appendix 5.

	Sample	Burnaga		Unmo	odelled	(BC/AD	)
	Number	Fuipose	-1σ	1σ	-2σ	2σ	median
Q07/1091							
Q07/1091-Area D Top	Wk23933	dates midden	1461	1581	1443	1650	1528
Q07/1091-Area D Bottom	Wk23934	dates midden	1535	1650	1481	1687	1590
Q07/1091-F39	Wk23932	Post dates house occupation	1648	1797	1629	1952	1748
Q07/1092							
Q07/1092-F54	Wk23936	dates pit complex occupation	1435	1479	1419	1614	1456
Q07/1092-F55	Wk23937	dates burnt feature	1510	1639	1497	1649	1561
Q07/1092-Area B	Wk23939	dates shell midden	1505	1625	1465	1666	1564
Q07/1092-F22	Wk23938	dates shell midden	1520	1639	1470	1675	1575
Q07/1103							
Q07/1103-F29	Wk23944	dates pit complex occupation	1469	1587	1449	1650	1535
Q07/1103-F30	Wk23943	dates pit complex occupation	1421	1456	1401	1496	1440
Q07/1103-F10	Wk23940	dates pit complex occupation	1452	1614	1443	1625	1496
Q07/1103-F10 (23cm)	Wk23941	dates later occupation	1455	1620	1451	1627	1530
Q07/1103-F21	Wk23942	dates later occupation	1483	1624	1462	1631	1554

Table 19.	Unmodelled	calibrated	radiocarbon	dates from	Puwera
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Anomalous The results of calibrating the radiocarbon dates were largely as predicted and ranged from the early 1400s AD to around 1800AD (Table 19 and Figure 78). However, two dates (Wk 23938 from Q07/1092 Feature 54 and Wk 23943 from Q07/1103) were particularly early relative to the stratigraphic contexts they were found in. Both samples contained totara bark, which appears to have had in-built age and skewed the results somewhat. The results of the rest of the samples did appear to fit well with the understanding of the site.

<sup>&</sup>lt;sup>4</sup> Analysis of the dates by Simon Bickler.

**Further Refinement** Calibration of the individual dates, though, did not incorporate any archaeological information to refine the results to better reflect the known occupation sequence of the sites. For Q07/1091, no good control was available for doing this and the results were unchanged. The stratigraphic sequence from Q07/1092 presented earlier was used to order the dating samples from that site and in particular include the likelihood that Feature 55 was earlier than Feature 22. Similarly at Q07/1103, the two samples from pit F10 were placed in stratigraphic order and the bottom sample set up to be 'earlier' in the calibration than the higher samples.

# **Results** The two anomalously early dates were eliminated from building a more detailed model of the occupation of the Puwera sites. The 10 remaining dates were then re-calibrated using the stratigraphic information available in each case. The following sequential information was used:

- Q07/1091 Area D Midden, top and bottom samples (top sample predicted to be younger than bottom sample)
- Q07/1092 sample Feature 22 is younger than Feature 55 (Figure 43)
- Q07/1103 Feature 10 base sample is earlier than material found in a layer within Feature 10 (23cm depth).

The results are shown in Table 20 and Figure 79. For Q07/1091, the obvious point is that the sample from the bottom layer has come out marginally younger than the upper layer. However, it is likely that both samples come from roughly contemporary deposits and it is therefore unlikely that there is a recognisable difference between them. The date from Feature 39 near the house site is significantly later. Neither set of dates definitely dates the actual house site – although Feature 39 probably sets the upper limit of its use. This does suggest that the house date may have been contemporary with the Area D midden.

The dates from Q07/1092 fit with the stratigraphic model with Feature 22 probably some 50-70 years later than Feature 55. Feature 22 is the deep midden in Area A and appeared to be very different to the rest of the pit and possible house floors in that area. Feature 55 in Area B (in the northeast of the site) is a substantial pit or house feature and probably represents one of the main occupation periods of the site. The date from the midden in Area B is the same age and suggests some differentiation in the site between living/storage areas and cooking areas also seen in Q07/1091. However, it is likely that parts of the site are probably earlier than the dates obtained.

Results, <i>continued</i>	The dates from Q07/1103 all fall in a relatively short time span and despite some stratigraphic information that the midden in upper layer of Feature 10 is later, it is not much later than the lower layer. Based on the lack of stratigraphic information the span of 120 years suggested by the model is not unreasonable.
Occupation Spans	The modelled dates were also used to estimate occupation spans represented by the dates. The results are shown in Table 21 and suggest that all three sites were occupied at much the same time between 1500–1700 AD. The two larger sites, Q07/1092 and Q07/1103, may have been abandoned by the middle of the 17 <sup>th</sup> century and this might also apply to Q07/1091. Later sporadic use of the area did occur, but the focus of settlement may have shifted to a more defensive location above. It is possible that there was a shift of both occupation and storage away from these sites further up the hill to a pa, where there was better protection.

#### Table 20. Modelled calibrated radiocarbon dates from Puwera

Sample	Modelled (BC/AD)	from	to	from	to	median
· ·	Site Q07/10	91				
Q07/1091-Area D Bottom		1508	1599	1466	1636	1552
Q07/1091-Area D Top		1555	1646	1490	1660	1594
Q07/1091-F39		1650	1796	1631	1808	1749
First Q07/1091		1508	1599	1466	1636	1552
Last Q07/1091		1650	1796	1631	1808	1749
Span Q07/1091		103	258	36	312	183
	Site Q07/10	92	-	-	_	-
Q07/1092-Area B		1505	1625	1466	1666	1564
Sequence 1						
Q07/1092-F55		1505	1570	1484	1640	1539
Q07/1092-F22		1567	1657	1521	1684	1608
First Q07/1092		1495	1560	1459	1595	1525
Last Q07/1092		1585	1663	1539	1688	1622
Span Q07/1092		41	131	11	172	89
	Site Q07/11	03				1
Q07/1103-F29		1470	1589	1450	1651	1535
Sequence 2						
Q07/1103-F10		1451	1499	1440	1612	1478
Q07/1103-F10 (23cm)		1481	1626	1468	1632	1575
Q07/1103-F21		1484	1624	1462	1631	1554
First Q07/1103		1451	1493	1434	1542	1473
Last Q07/1103		1578	1636	1508	1654	1604
Span Q07/1103		88	165	35	187	123

Site	Occupation range based on Median of earliest – Median of latest date (Years AD)	Span (years)	Notes
Q07/1091	1550-1750	100-300	Probably 2 occupations
Q07/1092	1525-1620	40-170	Earliest occupation not dated
Q07/1103	1470-1600	90-190	Probably 2 occupations

#### Table 21. Median occupation dates from Puwera



Figure 78. Radiocarbon calibration of all dates by site (Oxcal 4.1)



Figure 79. Revised radiocarbon calibration based on stratigraphic model

**Comparison with Other Sites Nearby** The results from Puwera were compared with those recently obtained from other archaeological projects (see Bibliography) in the nearby area (Metric Map Q07) and these are shown in Figure 80. The Puwera results represent one of the best sets of archaeological dates from the region and are comparable to the dates obtained from a number of projects from the One Tree Point area in recent times. Unlike One Tree Point though, the dates relate to only three archaeological sites that point to at least some occupation repeated around 1500-1700 AD. One Tree Point, though, mostly consisted of small midden sites with only limited lifetimes but spread over a wider area, exceptions including the Q07/1116 site (Phillips and Harlow 2001) near the Point itself.

Overall, though, the results from Puwera fall towards the early and middle period of the known occupation of the Whangarei Harbour; the two earliest dates shown here are considered to have in-built age issues from the totara bark. Interestingly, though, the occupation in Q07/1092 may have started earlier than the dates obtained and some the results of the analysis of the artefacts also suggests earlier links.



Figure 80. Recent radiocarbon dates from Q07 Map area (those from Puwera in lighter shading)

# **Chapter 7: Discussion and Conclusion**

## THE PUWERA EXCAVATIONS

Summary The excavations at Puwera revealed two major complexes of features relating to pre-European occupation around Ngako Creek by Maori. At the top of the knoll, at site Q07/1092, a series of occupations is represented by small houses with a large number of pits, most of which are thought to have been used for storage of kumara. Some of these pits were also very large, suggestive either of a large population or, given the nearby presence of a formal house, some status. It is also possible that two large post holes may represent single-pole pataka or storehouses that may have been a later adaptation to the area. Interestingly, a fire appears to have swept through part of the site and possibly destroyed features that were still either in use or not long abandoned.

Downhill from the main concentration of features on the knoll, at site Q07/1091, the floor of a rectangular house (whare) was excavated and tools, including a greenstone adze, were found in the fill. This whare was probably the most substantial of the houses in the area. The analyses of the stone artefacts illustrated how widespread the exchange networks were that connected the people living at Puwera and other areas. Good quality adze stone was still a relatively limited resource as the re-working on adzes, and the poor quality adze found during monitoring seem to suggest. The artefacts found around Q07/1091 suggested that the house may have been the home of a tohunga or certainly somebody of some wealth. An area just to the north of the whare was dense with shell and contained at least 3 hangi stone concentrations. This may have the cooking zone relating to the whare.

On the neighbouring spur, excavations at Q07/1103 showed a similar concentration of storage pits at the northern end of the site to that at Q07/1092. The pits were of similar size and internal organisation on both sites but oriented differently. Pits on Q07/1103 were generally oriented with their long axis parallel to the main ridge direction (approximately NE-SW), while most of the pits at site Q07/1092 were oriented perpendicular to the ridge direction (approximately WNW-ESE). All pits probably had pitched roofs, indicated by posts along the centre-line. Drainage was a major concern on both sites, with drains dug in almost all the major pits. However, no clear evidence of houses was found and the small firescoops found there are probably later and suggestive of more ephemeral occupation of the spur.

Radiocarbon dating suggests that all three sites were occupied at much the same time between 1500-1700AD. However, there is a possibility that Q07/1092 in particular was a little earlier. Both the two larger sites, Q07/1092 and Q07/1103, may have been abandoned by the middle of the  $17^{th}$  century and this might also apply to Q07/1091. Later sporadic use of the area did occur but the emphasis had probably shifted to a more defensive location at a (now destroyed) pa above.

**Environmental** The analysis of the charcoal found in the Puwera sites turned out to be one of the most instructive aspects of the project. At Q07/1092, in charcoal that seems to be related to use as cooking firewood, the species indicated matai forest, probably in the vicinity of the site, while swamp forest species in the valley were absent. Shrub species such as manuka and kanuka that indicate forest clearance comprised a quarter of the firewood, and suggest the site was established at the edge of the bush, perhaps in an existing clearing. At Q07/1091, the analysis indicated that the firewood was dominated by swamp forest and broadleaf tree species, with only small amounts of shrub species, perhaps indicating occupation shortly after forest clearance.

In the charcoal samples from the burnt structures at site Q07/1092, though, the results were mixed between the matai forest and swamp forest zones, suggesting that much of the building material for the structures was brought up from the valley floor. Shrubs and small trees constituted only a minor component in these contexts.

An intriguing aspect of the charcoal from the burnt structures is the abundance of bark. While it is a regular occurrence in charcoal samples, it normally only occurs in minor amounts as, being on the outside of stems, it usually burns to ash. However, in the burnt layer in the base of shallow rectangular feature interpreted as a possible house site (Feature 54 Q07/1092) nearly half of the charcoal was bark. Two tree species, kahikatea and matai, were present and it was initially thought that the burnt wooden superstructure could have been made from slabs of these with bark still attached. However, the bark proved to be totara, which was otherwise unrepresented, and it is likely that it was collected from the forest and brought to the site to be used in structures, possibly as a roofing material. Maori use of totara as a roofing material as well as for other structural components is historically attested. The absence of totara wood may also be due to its large size and scarcity, making it less suitable for structural uses than other species, or equally its durability may have meant that the posts were removed from the site when it was abandoned and used elsewhere

Analysis of charcoal from the pit fills from Q07/1092 found that over 40% of the charcoal was from shrubs that regenerate after forest clearance, which is likely to be indicative of the burning of scrub regenerating on the site after abandonment. Large tree species, however, still dominated these samples, indicating that forest vegetation surrounded the site when it was occupied.

**Environmental Information,** *continued* At Q07/1103 the analysis indicated that the landscape surrounding the site was clothed in primary forest when the site was first occupied, but at a later stage, based on evidence from firescoops and burnt patches, the vegetation must have resembled the 'good fernland' recorded by surveyors in the mid-19th century. The results strongly suggest a two phase occupation of Q07/1103. Taken together, the results suggest that the sites were originally located in mature broadleaf podocarp at the time of occupation, and that this was still nearby when the sites was abandoned. This is interesting given the likely need to clear areas for gardening to furnish the foodstuffs stored in the large number

to clear areas for gardening to furnish the foodstuffs stored in the large number of pits. Shrub species probably became increasingly abundant and replaced the forest after the sites were abandoned.

**Discussion** Best (1999a) had argued that the Ngako valley head was a small discrete archaeological landscape, containing the physical remains of a prehistoric social/political system (see Chapter 1). If there was no pa on the adjacent Mt Tikorangi, then this would not have been a satellite settlement, but rather a settlement in its own right that may have been associated with a larger stronghold some distance away. The results from the excavation do support this notion of an integrated settlement, but there may have been a pa site close by. The peak directly above the project sites has been substantially modified by quarry activities, but possible archaeological features identified during the project suggest that this might once have been a pa site.

The sites Q07/1091 and Q07/1092 are in close proximity to one another and are complementary. Functional differentiation is present at both sites and includes storage, cooking, working and living areas. However, at Q07/1091 the differentiation is between the large house, a working area and a cooking area, while above, at Q07/1092, the focus is on the large storage pit complex with living and cooking areas much smaller and generally concentrated in Area A. The design of the house structure at Q07/1091 is in keeping with later precontact houses – although the indications are that the structure may well be earlier than 1750 AD. Site Q07/1103 on the north side of the Ngako Creek may be a storage area associated with occupation further up the hill, although this has not been confirmed.

**Discussion,** *continued* The glaring absence of animal and fish bone in the midden at Puwera is difficult to explain. While preservation of fishbone in midden may be affected by the local soil conditions, the density of shell in Area D (Q07/1091) should have protected at least some bone, if deposited in this matrix. As at Omaha Beach (Bickler et al. 2003:181), this absence may relate to the removal of fish relatively intact from cooking, either from the fire or after smoking – consumption, and therefore discard of remains, taking place away from the shellfish processing area. This might lead to dispersal of the fish bones more widely and a lack of preservation at the sites. Dogs may also have contributed to the paucity of fish bone preserved in the record.

The results from Puwera contrast with those from other locations in the Whangarei catchment such as One Tree Point, but given the difference in environmental factors this is not surprising. The Puwera sites appear to be indicative of small to moderate site habitation with extensive storage facilities. This suggests that major gardens were nearby. Access to the shellfish and other fishing resources in the harbour was easy, but it is noted that the overall quantity of shellfish was not really that substantial. The concentration of shellfish in Area D at Q07/1091 is dense compared to the rest of the middens identified through excavation, but could have been made over a very short period of time by a relatively small number of people. At One Tree Point, almost no structural remains have been identified compared with the vast quantities of shellfish midden found there (see discussion in Chapter 1).

The contrast reflects the use of the diverse ecological zones – sand dunes of One Tree Point near the harbour for marine resource extraction while the higher grounds further inland were used for more significant living areas, access to garden land and also forest resources.

Excavations of sites on the northern and south-eastern side of Whangarei Harbour have also generally been on coastal sites with a similar emphasis on the larger number of middens excavated there. This does not mean that longer term habitation and gardening were not carried out there, as the number of pa sites and other habitation sites recorded there suggests otherwise, but more likely reflects the bias in excavations carried out to date, particularly as a result of coastal development.

The sites at Puwera date to the middle of the general New Zealand sequence and exhibit typical 'Classic' characteristics. However, the small tahanga adze is suggestive of the late 'Archaic', and the degree of reuse of the adzes is indicative of some curation of important items. The environmental data does indicate that the settlement of this area was in relatively 'pristine' forest and that earlier settlement may not have substantially modified the area. Sufficient forest was present near the settlements during the majority of their occupation for building and firewood.

**Conclusion** The Puwera excavations are one of the most comprehensive archaeological projects on pre-European Maori settlement in the Whangarei Harbour area. The sites are well dated and contain a range of occupation features. The large number and size of the pit features show how important food storage was to subsistence. The complexes of pits were located on small hilltops, which were probably the best locations for drainage in the clayey soils.

However, in contrast to this evidence of food storage were the relatively small amounts of shell midden observed at Q07/1092 and Q07/1103 and the lack of bone material within the midden despite the sieving of samples. This may be explained if much of the seafood was processed at the coast and the food component brought back to the sites at Puwera for storage and later consumption.

At Q07/1092, the dynamic nature of the site was established from the stratigraphic information obtained, suggesting a number of different occupations. Site Q07/1103 lacked some of the sequential development of Q07/1092, but still contained evidence for a large number of features concentrated in a relatively small area during an earlier phase, with later more sporadic occupation.

The formal house at Q07/1091 was located near a working floor area for obsidian and other stone tool manufacture (just uphill) and a large cooking area to the north. Such differentiation is tantalising as it demonstrates a pattern of social behaviour probably dating back to the 17<sup>th</sup> century. The range of artefacts found at the site shows how well the Puwera groups were integrated in the regional networks that connected the country.

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# APPENDICES

# Appendix 1 – Feature List for Q07/1091 and Q07/1092

#### Features from Site Q07/1091 are highlighted

ld	Туре	Notes	NS (m)	EW (m)	Depth	Parent Feature	Stratigra	phy
1	Pit	Very large rectangular pit - unusually narrow with drains, postholes, drain out south-west corner cut from the top; possible clay step along western side; round circular depression in NW corner of pit with drain stopping before the features	2.4	9				
2	Pit	Large rectangular pit, centreline postholes and drains around edge. Drain empties to the west; drain cut from the top	2	4.7				
3	Pit	Deep large rectangular pit with centre posts and drain running along northern and southern sides meeting and emptying out through drain (92) to the east; Cut from top	1.6	4.4				
4	Midden	Thin scatter of shell midden; no major features						
5	Pit	Rectangular pit; 6m x 2.4m cut into rock and natural clay; 5 major postholes (possible 1 additional) with a corner drain, cut from the top and a small drain in the centre; a possible step in the northern side	2.4	6				
6	Pit	Rectangular pit; 1.8m x 1.3 cut into natural material	1.3	1.8				
7	Unknown	Shallow depression	0.6	0.5	0.05			
8	Posthole	Possible posthole				4		
9	Unknown	Possible posthole	0.1	0.1				
10	Posthole	Posthole along centreline of F2				2	2=10	
11	Posthole	Posthole along centreline of F2				2	2=11	
12	Posthole	Posthole along centreline of F2				2	2=12	
13	Posthole	Posthole along centreline of F2				2	2=13	
14	Posthole	Posthole along centreline of F2				2	2=14	
15	Posthole	Posthole along centreline of F2				2	2=15	
16	Drain	Drain running around the sides of the pit (not in SE corner) and emptying out in western wall. Cut from the top				2	2=16	
17	Posthole	Centre-line post hole				5		
18	Posthole	Centre-line post hole				5		
19	Posthole	Centre-line post hole				5		
20	Posthole	Centre-line post hole				5		
21	Posthole	Centre-line post hole				5		
22	Midden	Deep depression filled with shell midden	1.5	2.1			22<45	
23	Unknown	Shallow circular depression containing some charcoal burnt material	1.25	1.15	0.1			
24	Unknown	Shallow circular depression containing some charcoal burnt material	0.45	0.4	0.05			
25	Drain	Corner drain cut from top surface in northwest corner of pit				5		
26	Drain	Possible drain in centre of pit				5		
27	Posthole	Centre-line posthole				5		
28	Drain	Drain from F1 down to western slopes; cut from top surface and visible in section				1	1=28	
29	Unknown	Unknown feature; looked like a possible pit or tree throw but no distinct features						
30	House Floor	Probably house floor; drains running below the main floor (see stratigraphic notes) with a burnt layer above a grey fill layer; a series of postholes along centreline;	5.6	2			30>40	
31	Posthole	Along centreline of F1				1	1=31	
32	Posthole	Along centreline of F2				1	1=32	
33	Posthole	Along centreline of F3				1	1=33	
34	Posthole	Along centreline of F4				1	1=34	
35	Drain					1	1=35	
36	Unknown	Circular depression with general, relatively clean, fill in NW corner of pit	0.45	0.45		1	1=36	

ld	Туре	Notes	NS (m)	EW (m)	Depth	Parent Feature	Stratigra	phy
37	Drain	Continuation of drain F16 running west towards	(11)	(11)		reature	16=37	
39	Linknown	slope; cut from top	0.38	0.56	0.1			
39	Rock pile	Small pile of rocks – hangi scoop?	0.50	0.50	0.1	46	46=39	
40	Drain	Long drain from base of F49 running north and				49	49=40	40<69
	-	then curving around feature 69						
41	Pit	Shallow rectangular pit with two centre line					41<40	
40	D'1	postholes;pit cuts drain F40	0.4	5				
42	Pit	Rectangular pit; with drains and postholes along	2.4	5				
43	Posthole	Along centreline of F30				30	30=43	
44	Posthole	At edge of possible house floor - burnt material	0.13	0.13	0.14	54		54=44
		up against it.						
45	Midden	Shallow depression with cockle shell	0.7	0.7				
46	House Floor	Rectangular House floor with rocks/postholes	6.7	3.7				
47	Posthole	Near west end of pit 41 - small	0.08	0.08	0.08	41	41=47	
48	Posthole	Centre line of pit; hole is 19cm diameter at top	0.19	0.19	0.21	41	41=48	
		but shrinks to 5cm at base						
49	Pit	Small rectangular pit with postholes - present at	1.4	3			49>50	
50	Pit	Dase of F50	27	55			CHECK	
50	1 1	and F6 with centreline postholes	2.1	0.0			GHECK	
51	Posthole	Probably relating to F50				50	51=50	
52	Posthole	Possibly relating to either F49 or F 50				50	52=50	
54	House Floor	Possible house floor; centre is burnt area with	4.5	1.7			54<30-54C	54=44
	Diff	wood at the base	<u> </u>					
55	Pit/House	Possible pit or house structure. Fully excavated	3.4	4.7				
56	Pit	Possible pit: Shallow and cut into F55 in western	15	15	0.2		56<55	
		wall; Not fully excavated;			0			
57	Burnt wood	Burnt wood on base of F55				55	57<55	
58	Drain	Drain running within F55 and going out towards				55	55=58	
50	Dit	northeast corner of pit; cut from the top	2.2	1.2				
59	гц	and stakeholes	2.3	4.3				
60	Pit	Rectangular pit with drains and post and						
		stakeholes. Also large Pataka posthole? In						
	<b>D</b> .	northeast corner (F141)						
61	Drain	(but from unknown location) to the east						
62	Firescoop	Shallow firescoop	0.8	0.78				62<61
63	Pit	Rectangular pit with drains and posthole in	1.3	3.6				
		centreline; one drain runs through centre of						
C.4	Deels	feature perpendicular to main orientation				40	40-04	
64	ROCK	house				40	40=04	
65	Drain	Drain/dripline running along western and				46	46=65	
		southern ends of house						
66	Burnt wood	Burnt wood on base of F55				55	66<55	
67	Posthole	Along centreline of F60				60	60=67	
08 60	Pit	Shallow rectangular nit? With posthole probably	├── ┤			50	69>30	69>40
03		earlier than F30; approximately 2.9 x 1.2m						50 - 40
70	Posthole	In F69				69	69=70	
71	Posthole	Along centreline of F60				60	60=71	
72	Unknown	Flattish are of hard clay. Possible floor but a bit						
72	Posthole	At southern end of house					46=73	
74	Posthole	Along western side of house					46=74	
75	Posthole	Along western side of house					46=75	
76	Posthole	Along western side of house					46=76	
77	Posthole	Along western side of house					46=77	
78	Posthole	Along western side of house					46=78	
/9	Posthole	Along western side of house					40=79	
81	Drain	Drain dripline north of house					46=81	
82	Posthole	Posthole in centre of F55				55	55=82	
83	Posthole	Posthole in centre of F55				55	55=83	
84	Unknown post	A hole 16 x 9cm, and 7cm deep.	]			55	55=84	
	hole							

ld	Туре	Notes	NS (m)	EW (m)	Depth	Parent Feature	Stratigra	phy
85	Posthole	Posthole in centre of F55	(11)	(111)		55	55=85	
86	Posthole	Probably relating to F49				49	49=86	
87	Posthole	Probably relating to F49				49	49=87	
88	Posthole	Probably relating to F49				49	49=88	
89	Posthole	Probably relating to F49				49	49=89	
90	Posthole	Along centreline of F30				30	30=90	
91	Posthole	Along centreline of F30				30	30=91	
92	Drain	Drain running out from F3 to east				3	92=107	
93	Pit	Large rectangular pit with drain running along	1.6	4.5				
		northern edge; Large 'pataka' posthole on						
	<u> </u>	eastern side					50.04	
94	Stakehole	Along centre line of pit F59				59	59=94	
95	Posthole	Along centre line of pit F59				59	59=95	
96	Firescoop	Possible firescoop in centre of feature				59	59=96	
97	Posthole	Off centre line of pit F59				59	59=97	
98	Postnole	Un centre line of pit F59				59	59=98	
99	Stakehole	Along centre line of pit F59				59	59=99	
100	Postnole	Along centre line of pit F59				59	59=100	
101	Drain	Drain along southern side of pit				60	59=101	
102	Posthole	Along centreline of F30				30	30=102	
103	Posthole	Along centreline of F3 in a pair				3	3=103	
104	Posthole	Along centreline of F3 in a pair				3	3=104	
105	Posthole	Along centreline of F3 in a pair				3	3=105	
106	Posthole	Along centreline of F3 in a pair				3	3=106	
107	Drain	Drain in interior wall of pit; Svv end may have				3	3=107	
100	Deathala	been disturbed by a tree root system				60	62-100	
108	Postnole	In centreline of pit				63	63=108	
109	Drain	Running N-S through pit				63	63=109	
110	Drain	F63				63	63=110	
111	Drain	Drain along southern side of E42				12	12=111	
112	Drain	Right-angled drain in western side of E42				42	42=111	112 2=
112	Drain					74	72-112	F42
113	Posthole	In centre line of F42				42	42=113	1 74
114	Posthole	In centre line of F43				42	42=114	
115	Posthole	In centre line of F44				42	42=115	
116	Posthole	In centre line of F45				42	42=116	
117	Posthole	Along centreline of F30				30	30=117	
118	Drain	Forked drain probably related to F59				49		49=118
119	Pit	Possible shallow pit but limited in features: drain	5	1				
		found in northeast corner		•				
120	Drain	Drain in possible pit				119	119-120	
121	Drain	Continuation of drain F58				55	58=121	
122	Pit	Small rectangular pit cur into wall of F60	1.9				122<60	
123	Drain	Along northern side of pit F60				60	60=123	
124	Posthole	Along centreline of F60				60	60=124	
125	Posthole	Along centreline of F60				61	60=125	
126	Posthole	Along centreline of F60				62	60=126	
127	Posthole	Along centreline of F60				63	60=127	
128	Posthole	Along centreline of F60				64	60=128	
129	Posthole	Along centreline of F60				65	60=129	
130	Posthole	Along centreline of F60				66	60=130	
131	Drain	Drain cut into northern side of F93; Also cut by				93	93=131	
		post F137 in the corner						
132	Rock	Flat. Oval rock in side of F54 with burnt material				54	54=132	
		over the top						
133	Hangi	Concentration of hangi stones in dense midden						
134	Hangi	Concentration of hangi stones in dense midden						
135	Hangi	Concentration of hangi stones in dense midden						
136	Drain	Drain parallel to F61 with a fork running towards					72<136	
107	Pataka	Large postbole dug into costorn side of E02	0 5 5	0 55			137-02	
137	Falaka Doetholo2	Large positione duy into eastern side of F93.	0.55	0.55			131-93	
		feature and also into the original wall of E03 and						
		angled down towards the north: section showed						
		'bell-like' base with lavers of fill possibly indicative						
		of a large post being removed. Note that the hole						
		filled quickly with water from the clay surrounds						
		after the rain and was very damp.						
138	Drain	Shallow drain out of NW corner of F41	0.1	2.8	0.1	41	138=41	

ld	Туре	Notes	NS	EW	Depth	Parent	Stratigra	phy
			(m)	(m)		Feature		
139	Unknown	Possible drain feature in Feature 49						
140	Drain	Along southern side of pit F60				60	60=140	
141	Pataka Posthole?	Very large posthole in north east corner of pit F60	0.55	0.55			60>141	
142	Posthole	Small posthole in Pit 151				151	151=142	
150	Drain	Drain running parallel and then into curving F40 under house floor F30; Approximately 2.4m long						150<40
151	Pit	Remains of rectangular pit cut by F2 pit					151>2	
152	Clay Step	Block of clay at western end of F1				1	1=152	
153	Pit	Possible pit cut into section at western end near F6						
154	Drain	Drain inside walls of pit F151					154=151	
200	Pit	Small rectangular pit with drain feature running to the west; 3m x 1.5m						
201	Posthole	diameter=12cm; depth=40cm in pit 200				200		
202	Posthole	diameter=19cm; depth=50cm in pit 200				200		
203	Posthole	diameter=10cm; depth=60cm in pit 200				200		
204	Drain	10cm deep around edge of pit in pit 200				200		
205	Firescoop	Round firescoop cut into earlier feature; charcoal mixed in with clay					205< 59	
30-54C	Charcoal Layer	Charcoal layer in Features 30 and 54						

# APPENDIX 2 – FEATURE LIST FOR Q07/1103

Feature	Туре	Description	Main Feature
F1	Posthole ?	Diameter 7.5cm, depth 10cm.	i cuture
F2	Pit	Shallow rectangular. Sectioned. Depth 10cm, 70x24cm long and wide. Straight cut walls. Solid base of rocks and orange clay, fill consisted a light brown soil with small charcoal flecks and loose small rocks. Uneven base – drain running from NE corner toward northern wall (possible tree root?)	
F3	Firescoop	On edge of Feature 11 pit dug into natural partially over pit fill so postdating the filling of F11 pit. Sectioned and sample (06) taken. 51x55cm and 9.5cm deep at centre. Fill: dark mixed soil with thick concentrations of charcoal.	F11
F4	Firescoop	Contemporary stratigraphically with firescoop F3 but F4 all dug into fill of F11 pit – smaller than F3. Sectioned and sample taken (07). Same fill as F3. 38x37 wide, 8cm deep at centre	F11
F5	Posthole	21x18cm wide, 23cm deep. Fill of mixed soil – minor traces of charcoal, oval shape narrowing to pointed base – slight slant. Sample taken from base (05).	
F6	Pit	Shallow square pit similar to F2, straight cut walls 7cm deep, 71x68cm size. Very rocky at base and edges with loose brown soil fill with small broken rocks.	
F7	Pit	Kumara pit with interesting drainage feature – drain from this pit continues downhill at NE corner Drain forks out into two branches as it goes down slope. Four postholes (F25-28) but 1 slightly offset, veryshallow (F27) and close to another – a mistake? Homogenous mixed fill – no features. 1.39m wide, 3.74cm long, 31cm deep. 1 piece of obsidian 15cm below surface in pit fill (01). Charcoal samples from base of pit (12 and 13)	
F8	Pit	Small shallow rectangular pit with a drain on two sides – no post holes, possibly drains down to connect with drain in Feature 9 pit which in turn flows down slope. Homogenous mixed fill. 2.4m x 1.2m. Depth approximately 20cm.	
F9	Pit	Small shallow pit parallel to pit F8 and connected to it probably by drain. The drain runs along 3 walls but, like F7, not along the west wall toward the slope. Looking at the original plan and the location of the one posthole (F36) found as well as the drain location along the south wall, it is possible that the pit was at some stage later extended to the south but not the drain. Homogenous mixed fill containing lots of loose rock. The drain running into east wall runs down slope probably connecting to F30 pit drain and possibly that of feature10 pit. 4x1 35m in size and 26cm deep.	
F10	Pit	A long skinny pit with drains along 3 walls but not the south wall probably due to lots of solid rock at this end. The drain continues down the slope from the north east corner and appears to connect with the drain of the F30 pit/pits directly below – this most clear in aerial photograph. The pit has 3 postholes (F32 34) and several patches of burning (charcoal rich) on the floor – one associated with a firescoop 50cm diam – 9cm deep (note this was not given a feature number) at the southern end – samples taken (22 and 23) and (17) from base of drain corner where it drains out down slope. Two pieces of obsidian, one found in the pit fill near the top (02) and the other near the bottom (21). 5.6x2.1m in size. 29-34cm deep. Drain 10 17cm wide and average 10cm deep except in sump corner.	
F11	Pit	A very long skinny pit just south west of F10 pit. This pit had several firescoops dug into its fill at the top (F3 and 4). There were 6 postholes (F50,F51-55,F61) and a firescoop (F52) in the floor near the centre. The drain was large and continuous around this pit with curved corners and drained out down the slope at the southeast corner. When probed the drain was average 10cm deep but in the corner draining down the slope it was at least 50cm deep. Around floor drain widths of 21-27cm. 7.2m long and 1.2m wide (as indicated by drain and remnant of back wall). 40-50cm deep (approximate).	
F12	Unknown	This was present as a large but somewhat irregular area of darkened soil when first revealed by the mechanical excavator. As the area was scraped down however, no regular pit-like shape emerged but there was a large blackened area (F31) some 15-20cm below the natural which decreased the further the area was scraped down – sample taken from this. A vaguely circular area at the same level as the floors of the other pits (F30 and F20) may have been a sump and/or part of the drain from F11 – no time to investigate further. 1 piece of obsidian found in fill (20) and charcoal sample (24) taken from blackened area of F31 at the same level as the F20 firescoops.	
F13	Pit (?)	A regular rectangular feature in line with F14 and F15. Feature 13 was not excavated due to mostly being covered by a water trough currently being used by cattle to drink from. It was very likely a pit as F14 and F15 turned out to be when excavated.	
F14	Pit	Drain on eastern wall and partially to the upper side walls – slopes down to west slope. Four postholes (F56- F59) – one offset. One in the drain on the eastern wall. Fill homogenous. 34cm deep3.6x1.8m in size.	
F15	Pit	A shallow pit with a drain all the way around following close to the walls. Homogenous fill – no features.	

Feature	Туре	Description	Main Feature
		Three possible postholes were identified by MT but proved from excavation to be very shallow slight depressions. 28cm deep. 3.7x1.9m in size.	
F16	Unknown	A vaguely rectangular feature on the surface but like F15 outline was hard to define. Excavation with mechanical excavator failed to reveal any pit like feature except for a section of a drain that may have come from Feature 15	
F17	Drain	Part of drain going from F9 and F7 pit corners – sample taken (09).	
F18	Drain	Amorphous depression possibly part of drainage system as above	
F19	Drain	Amorphous depression possibly part of drainage system as above – sample taken (10).	
F20	Pit	A storage pit with continuous wide drain (F43) all around draining out to the southwest corner. Six central postholes (F37-42) but 3 smaller ones are off centre. One piece of obsidian found near top of fill (11). 1.5x3.7m in size, 50cm deep. Drain 20cm wide and up to 20cm deep but in NW corner where probably drains down slope 46cm deep Three	
F21	Firescoop	In F20 – sectioned and sampled (14) 36cm below subsoil, 53cm diam, 10cm deep. Filled with large rocks and heavily stained with charcoal soil.	F20
F22	Firescoop	In F20; sectioned and sampled (15) somewhat indistinct, 1mx72cm wide.	F20
F23	Firescoop	In F20; sectioned and sampled (16). 37cm below top of subsoil, 7cm deep 42cm diam.	F20
F24	Pit	Very square steep cut sided shallow pit – no features in base – very close to /beside F10 pit. Brown fill with charcoal flecks and loose stone 84x62cm in size and 17cm deep. Aligned with Feature 10 pit.	
F25	Posthole	In F7. Depth: 20cm	F7
F26	Posthole	In F7. Depth: 10cm	F7
F27	Posthole	In F7. Depth: 20m	
F28 F29	Midden	In F7. Depth: 22cm. Just below ridge on east side originally noted by Simon Best where farm track had exposed it. Mechanical excavator stripped this down to where it was clear that the road had cut through the midden leaving just a narrow margin of intact material. Test pit dug and samples taken –total sample taken from top (19) and sample taken from base (18). Test pit 40cm square dug to 45cm depth to clay base.	
F30	Pit	Excavated in last hours to the floor. Initially appeared to be a relatively small storage pit with a very wide drain some 25cm wide. But partial excavation of this by Gina revealed a double drain both draining into sumps at western corners and undoubtedly to other drains going down the slope. Closer observations in field and in photographs suggest that the outer drain along the south side was considerably longer that the inner one. Given a noted pattern in the other pits excavated where the location of the walls were known (F7, F10, F14, F15, F20) – that of the drains very close to the pit walls, this might suggest that pit F30 is actually two pits; a smaller one dug within a larger one or that because of the upper pit draining into this one a double drain was required to cope with the run off. About halfway down into the pit a large concentrated patch of blackened soil and charcoal (sample 26) was revealed that lessened as fill continued to be removed – appeared at a similar level to that of Feature 12/31 and the firescoops in F20 pit (see above). In the excavated part of the drain – part of charred post and lots of charcoal – samples taken (29). Due to excavation straight to floor – depth not known but likely to be similar to that of F20 pit on same level with similar fill features – see F20 notes above) – about 50cm deep. Based on drain measurements: 2.5-4m long (1 <sup>st</sup> is inner 'drain, second is outer drain)1.8m wide. Three postholes (F44-46) – possibly another unfound between the two drains/walls. In excavated part of drains the inner drain was shallower at 7.5cm deep with outer 15cm deep.	
F31	Charcoal feature	Charcoal feature in surface of F12 – see above under F12 – sample taken (24)	F12
F32	Posthole	Posthole in F10 – 27cm deep	F10
F33	Posthole	Posthole in F10 pit; 30.5cm deep	F10
F34 F35	Postnole	Postnole in F1U pit 37.5cm deep	F10
F30	Deetheele	25m down from gate from slope spread of some 4x4m. Spade test pit 20cm deep to clay	50
F36	Posthole	Posthole in F9 pit = 25cm deep.	F9
F37	Postholo	Posthole in F20 pit = 39cm	F20
F39	Posthole	Posthole in F20 – 15cm	F20
F40	Posthole	Posthole in F20 pit = 34cm	F20
F41	Posthole	Posthole in F20 pit = 23cm	F20
F42	Posthole	Posthole in F20 pit = 25cm	F20
F43	Drain	In F20 pit = 20cm wide and 26cm deep	F20
F44	Posthole	Posthole in F30 pit = 18cm deep	F30
F45	Posthole	Posthole in F30 pit = 11cm deep	F30
F46	Posthole	Postnole in F3U pit = 9cm deep	F30
F4/		quite large – 1x1.3m wide and 60cm depth – charcoal stained soil with small flecks of charcoal and burnt rock (hangi stones), oval shape – possible hangi pit (but not for meat –	

Feature	Туре	Description	Main
			Feature
		vegetables – kumara?). Sample taken (27)	
F48	Firescoop	In 'Firescoop Area' – possibly two overlapping firescoops 80x115cm area, but quite shallow	
		– 10cm dark charcoal blackened soil with a lot of charcoal at base but no hangi stones.	
		Sample taken (30).	
F49	Firescoop	In 'firescoop area' but slightly away from edge 50cm diam, 6cm depth. Similar fill as others -	
		sample taken (28).	
F50	Posthole	Posthole in F11 pit = 42cm deep	F11
F51	Posthole	Posthole in F11 pit = 42cm deep	F11
F52	Firescoop	In F11 pit floor – 70x60cm diam, apart from probing to reveal relatively shallow feature and	F11
		not something like bin pit, not investigated – blackened soil fill	
F53	Posthole	Posthole in F11 pit = 14cm deep	F11
F54	Posthole	Posthole in F11 pit = 12cm deep	F11
F55	Posthole	Posthole in F11 pit = 40cm deep	F11
F56	Posthole	Posthole in F14 pit = in drain = 10cm deep	F14
F57	Posthole	Posthole in F14 pit = 12cm deep	F14
F58	Posthole	Posthole in F14 pit = 10cm deep	F14
F59	Posthole	Posthole F14 pit = 20cm deep	F14
F60	Firescoop	At the very end of 'firescoop area' at end of knoll 1.4x1m in size, 20cm deep, charcoal	
		stained soil – sample taken (31)	
F61	Posthole	In F11 pit = 36cm deep.	F11
F62	Unknown	Shallow cut feature beside F30 – small drains coming from it.	

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Sample	Context	Material	Weight (g)	Length (mm)	Blade Width (mm)	Poll Width	Max. Thickness
Number						(mm)	(mm)
75	Q07/1092 Area A F22 - Midden	Nelson/Marlborough Argillite	60	45	40	25	19
39	Q07/1091 Area F - House floor	Greenstone	2	18	5	7	4
87	Q07/1091 Area F - House floor	Tahanga Basalt	4	31	11	7	4
134	Q07/1091 Area F - House floor	Tahanga Basalt	162	88	34	31	24
141	Q07/1091 Area F - House floor	Gabbro	94	92	42	19*	22
143	Q07/1091 Area F - House floor	Nelson/Marlborough Argillite	75	69	32* / act 40 EE/	33	19
2009	007/1092	Serbentinite?	112	84	(est. 40-33) 45	21	22
			1				

# **Flake Assemblage**

Site Are	a Sample	Bag	Context	Stone	Tvpe	Modified	Size (cm)	Weight (g)	Cortex	Other
	-				•					B flake, complete, multiple-scarring - 3 directions, top prob for handling or from sp trimming when on core, unifacial retouch to one side creating notches - one tiny one shows unifacial crushing other unmod sharp curved edge has
1091 E	2	4	terrace	MIs obsidian	flake	yes	3.5	4	ou	micro-serration and a few chips - scraping damage probably
1091 E	4	7	terrace	obsidian	flake	yes	1.5	1.5	ou	snapped to triangular shape with point at narrow end
1091 E	46	8	terrace	obsidian	flake	yes	3	3	ou	snapped flake - creates sharp projection but also has fine straight sharp serrated edge - OO D
										CP, F flake - unifacial steep scraper type damage to SP edge, other sharp edge has serration - two types of
1091 E		<u>ი</u>	terrace	obsidian	flake	yes	2		yes	damage
										OP B - part snapped distal, blunting at SP but this poss due to SP issues - serration to both sharn straight lat
1091 E	2(	0 a	terrace	MIs obsidian	flake	yes	4	2	ou	margs
1091 E	2(	q o	terrace	obsidian	shatter	ou	0.5	0.5	ou	byproduct manu
1091 E	22	7 a	terrace	obsidian	chunk	yes	2	2	ves	wr smooth cortex both sides - has been retouched to point that is now snapped off
1091 E	2	7 b	terrace	obsidian	shatter	ou	0.5	0.5	ou	byproduct manu
1091 E	22	7 c	terrace	obsidian	shatter	no	0.5	0.5	ou	byproduct manu
1091 E	22	7 d	terrace	obsidian	shatter	no	0.5	0.5	no	byproduct manu
1091 E	2!	7 e	terrace	obsidian	shatter	no	0.5	0.5	ou	byproduct manu
1091 E	5;	7 f	terrace	obsidian	shatter	no	0.5	0.5	no	byproduct manu

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Other	yproduct manu	CP B - natural sharp projections that could have been	used for cutting	yproduct manu	Offlake, all irreg cortex, triangular creating sharp points at	corners by snapping all 3 sides - some tiny damage to one side of v.sharp fine point	byproduct manu	yproduct manu	byproduct manu	complete, multiple scarring - 3 directions, possible snapped point at one dm/lm corner with minor retouch at	and side, poss other sharp corners used, straight sharp	ustar Itiai giittitas a rew Tilcos - prouduly also useu soloon OD D Anto acconocionada aciata DD trinoo	ווטגפון טרי ט וומגפ - poss sitappeu politi - טר ואָספּג	yproduct manu	CP F small notch with c+c damage - not heavy	yproduct manu	yproduct manu	small flake, sharp edges - some v.minor micro-serration	snapped D OP flake - odd bits of damage - broken tool?	yproduct manu	yproduct manu	yproduct manu	DP B - some chips to one sharp edge, micro-serration to other	A flaker. t. cortex on sp. snapped at distal and 1 lm. has	quite steep micro-serration on straight edge to other Im - ceraner nrobably no fisc on d surf	voroduct manu	ovproduct manu	yproduct manu	yproduct manu	yproduct manu	A flake, snap at dist marg but prob during manu, all irreg hin cortex inc to edges - no really suitable edges to use -	a dud due to snapping at manu	byproduct manu	byproduct manu	yproduct manu	yproduct manu	yproduct manu	
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| byproduct manu | byproduct manu  | similar to 97 - C OP snapped two thick sides with crushing  | damage on remnant edges - proken tool of used as Is ?   | byproduct manu   | byproduct manu  | byproduct manu  | byproduct manu  | byproduct manu  | byproduct manu   | D flake, triangular blocky shape - snapped all 3 sides -  | creates sharp corners but would be hard to hold and no<br>blunting of sharp edges   | another chunky snapped C OP flake triangular - has  
   
   
   
   | damaged point at ne end   | E flake, bulb bulge suggests trauma in manu, chunky,   | poss damaged point at one end but not conclusive, some  | micro-chips to sharp eage but nothing conclusive  | retouched to point now very blunt - probably hand held -   | quite chunky, bears some resemblance to early period   | drillpoints but chunkier and less well defined   | snapped all edges with some blunting near oe - broken   
   
   
  | 1001 p100   | F flake, v.thin flat cortical surf - water prob, has natural  | sharp point at lm/dm corner but not damaged, ditto fine   | sharp edges but visible mod/use-wear, v.suitable for   
  | cutting  | byproduct manu   | byproduct manu  | byproduct manu   
   
   | byproduct manu  | byproduct manu  
  | OP D flake - snapped distal, retouched SP for handling -   | micro-serration on sharp edges  
  | byproduct manu  | byproduct manu   | byproduct manu   | byproduct manu   
  | byproduct manu   | flawed outer piece - byproduct manu  | byproduct manu  | byproduct manu   |  |
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| shatter        | shatter   |   | riake   | snatter  | shatter   | shatter   | shatter   | shatter   | shatter  |   | hroken flake  |   
   
   
   
   | flake   |  |   | liake   |  | -  | ilake  |   
   
   
  | liake   |   |   |  
  | flake  | shatter  | shatter   | shatter  
   
   | shatter   | shatter   
  |  | flake   
  | shatter   | shatter  | shatter  | shatter  
  | shatter  | shatter  | shatter   | shatter  | Раде 130   |
| obsidian       | grey chert  |   | obsidian  | obsidian   | obsidian  | obsidian  | obsidian  | obsidian  | obsidian   |   | Grev obsidian   |   
   
   
   
   | obsidian  |  |   | grey cnert  |  | -  | grey chert   |   
   
   
  | opsidian  |   |   |  
  | kaeo obsidian?   | obsidian   | obsidian  | grey chert   
   
   | obsidian  | obsidian  
  |  | obsidian  
  | obsidian  | obsidian   | obsidian   | obsidian   
  | obsidian   | grey chert   | obsidian  | obsidian   |  |
| terrace        | terrace   |   | terrace   | terrace  | terrace   | terrace   | terrace   | terrace   | terrace  |   | terrace   |   
   
   
   
   | terrace   |  |   | terrace   |  |  | terrace  | 00000   
   
   
  | terrace   |   |   |  
  | terrace  | terrace  | terrace   | terrace  
   
   | terrace   | terrace   
  |  | terrace   
  | terrace   | terrace  | terrace  | terrace  
  | terrace  | terrace  | terrace   | terrace  |  |
| 81g            | 82  | ç   | 83  | 84 a   | 84 b  | 84 c  | 84 d  | 84 e  | 84 f   |   | 85  | }   
   
   
   
   | 85  |  | C   | 80  |  | ()   | 96   | 20  
   
   
  | 31  |   |   |  
  | 98   | 66   | 100   | 101  
   
   | 102 a   | 102 b   
  |  | 102 c   
  | 103 a   | 103 b  | 103 c  | 103 d  
  | 103 e  | 111  | 113 a   | 113 b  |  |
| 1091 E         | 1091 E  | L   | 1091 E  | 1.601<br>1.601   | 1091 E  | 1091 E  | 1091 E  | 1091 E  | 1091 E   |   | 1091 F  | <br> <br> <br>  
   
   
   
   | 1091 E  |  | L   | 10A1 E  |  | L  | 1091 E   |   
   
   
  | 1081 E  |   |   |  
  | 1091 E   | 1091 E   | 1091 E  | 1091 E   
   
   | 1091 E  | 1091 E  
  |  | 1091 E  
  | 1091 E  | 1091 E   | 1091 E   | 1091 E   
  | 1091 E   | 1091 E   | 1091 E  | 1091 E   |  |
|                | 1091 E   81 g  terrace  obsidian  shatter  no   0.5  0.5 no  byproduct manu | 1091E   81 g  terrace  obsidian  shatter  no   0.5  0.5 no  byproduct manu<br>1091E   82  terrace grey chert  shatter  no   1  0.5 no  byproduct manu | 1091 E     81 g     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091 E     82     terrace     grey chert     shatter     no     1     0.5 no     byproduct manu       1091 E     82     terrace     grey chert     shatter     no     1     0.5 no     byproduct manu       1091 E     82     terrace     grey chert     shatter     no     1     0.5 no     byproduct manu | 1091 E     81 g     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091 E     82     terrace     grey chert     shatter     no     1     0.5 no     byproduct manu       1091 E     83     terrace     grey chert     shatter     no     1     0.5 no     byproduct manu       1091 E     83     terrace     obsidian     flake     yes     2     2 no     damage on remnant edges - broken tool or used as is? | 1091 E81 gterraceobsidianshatterno0.5 no0.5 nobyproduct manu1091 E82terracegrey chertshatterno10.5 nobyproduct manu1091 E83terraceobsidianflakeyes22 nodamage on remnant edges - broken tool or used as is?1091 E84 aterraceobsidianshatterno0.5 nobyproduct manu | 1091 E81 gterraceobsidianshatterno0.5 no0.5 nobyproduct manu1091 E82terracegrey chertshatterno10.5 nobyproduct manu1091 E83terraceobsidianflakeyes22 nodamage on remnant edges - broken tool or used as is?1091 E84 bterraceobsidianshatterno0.5 nobyproduct manu1091 E84 bterraceobsidianshatterno0.5 nobyproduct manu | 1091 E         81 g         terrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu           1091 E         82         terrace         grey chert         shatter         no         1         0.5 no         byproduct manu           1091 E         83         terrace         grey chert         shatter         no         1         0.5 no         byproduct manu           1091 E         84         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091 E         84 b         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091 E         84 b         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091 E         84 b         terrace         obsidian         shatter         no         0.5 no         byproduct manu | 1091 E         81 g         terrace         obsidian         shatter         no         0.5 no         0.5 no         byproduct manu           1091 E         82         terrace         grey chert         shatter         no         1         0.5 no         byproduct manu           1091 E         83         terrace         obsidian         flake         yes         2         2         no         byproduct manu           1091 E    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0.5 no         byproduct manu           1091         E         83         terrace         grey chert         shatter         no         1         0.5 no         byproduct manu           1091         E         83         terrace         obsidian         flake         yes         2         2 no         byproduct manu           1091         E         84 a         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091         E         84 b         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091         E         84 d         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091         E         84 d         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091         E         84 d         terrace | 1091 E         81 g         terrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu           1091 E         82         terrace         grey chert         shatter         no         0.5 no         byproduct manu           1091 E         82         terrace         grey chert         shatter         no         1         0.5 no         byproduct manu           1091 E         83         terrace         obsidian         flake         yes         2         2 no         byproduct manu           1091 E         84 b         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091 E         84 d         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091 E         84 d         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091 E         84 d         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091 E         84 d         terrace         obsidian         shatter         no         0.5 no         byproduct manu           1091 E | 1091         E         81         description         Instanter         Ino         0.5 | 1091         E         81         g         terrace         obsidian         shatter         no         0.5         0.5         o         byproduct manu           1091         E         82         terrace         grey chert         shatter         no         1         0.5         o         byproduct manu           1091         E         83         terrace         grey chert         shatter         no         1         0.5         o         byproduct manu           1091         E         83         terrace         obsidian         flake         yes         2         2         no         byproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091         B         84         terrace         obsidian         shatter         no <th>1031E       81 g       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       82       terrace       grey chert       shatter       no       1       0.5 no       byproduct manu         1091E       83       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 a       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 b       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 d       terrace       obsidian       shatter       no       0.5 no  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     terrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         no         pyproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         no         pyproduct manu&lt;</th> <th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     1     0.5     no     byproduct manu       1091E     83     terrace     obsidian     flake     yes     2     2     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian</th> <th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     82     terrace     grey chert     shatter     no     1     0.5 no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 a     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     8</th> <th>1091E     81 g     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     byproduct manu       1091E     83     terrace     obsidian     fiake     yes     2     2     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     byproduct manu       1091E     84     terrace     obsidian     bratter     no     0.5     byproduct man</th> <th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5 no     byproduct manu       1091E     83     terrace     obsidian     flake     yes     2     2 no     amage on remnant edges - broken tool or used as is?       1091E     84 a     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 d     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 d     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 d     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     s</th> <th>1091E     81g     Iterrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     82     Iterrace     obsidian     shatter     no     1     0.5 no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84</th> <th>1091E     81/g     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     82     terrace     opsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     <td< th=""><th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     0.5     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     ob</th><th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     85     terrace     obsidian     shatter     no     0.5</th><th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct
manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.</th><th>1091E     81g     terrace     lobsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     &lt;</th><th>1091E     81/g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     1     0.5     byproduct manu       1091E     83     terrace     grey chert     shatter     no     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5</th></td<><th>1031E         81g         Ierrace         Obsidian         Ishatter         no         0.5         0.5 ino         byproduct manu           1091E         82         terrace         grey chert         shatter         no         1         0.5 ino         byproduct manu           1091E         81         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         t</th><th>1091E         81 g         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82 terrace         grey chert         shatter         no         0.5         byproduct manu           1091E         83 terrace         beridan         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct man</th><th>1091E         81g         therrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82         terrace         gey chert         shatter         no         0.5         byproduct manu           1091E         83         terrace         obsidian         shatter         no         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu           <t< th=""><th>0091E         81g         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82         lerrace         obsidian         shatter         no         1         0.5         no         byproduct manu           1091E         83         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091E         84         lerrace         obsidian         no         0.5         0.5         pyproduct manu           1091E         84         lerrace         obsidian         no         0.5         0.</th><th>1051E         271         Description         Instance         Description         Syncollect manu           1051E         281         lerrace         grey chert         hatter         no         0.5         Deproduct manu           1051E         283         lerrace         obsidian         false         yes         2         2         no         anilar to 97 - C OP snapped two thick sides with cushing           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         option         sides         sides           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         sides           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         no         sides           1051E         285         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         no         sides           1051E         285         lerrace         obsidian         no         0.5 no         byproduct manu         no         no         no<th>1091E         21         Ginde         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the snaphing to 31- Snapped from the snapped from the snapped</th><th>1091E         81         Berrace         Obsidian         Istratter         no         0.5         D         Dyproduct manu           1091E 
       81         terrace         gev drieft         istratter         no         0.5         D         byproduct manu           1091E         83         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         85         terrace         obsidian         istratter         no         0.5         D         product manu           1091E         84         terrace         obsidian         fatter         no         D         product ma</th><th>1091E         81         Derrode obsidiant         Stratter         no         0.5         0.5         Deproduct manu           1091E         81         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         83         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu</th><th>OBJE         B13         Terrace         Obsidiant         Shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         by product manu         constraints           1091E         814         terrace         Obsidiant         by obsidiants</th><th>OB)E         BII         Britace         Obsidiant         Shatter         Inc         0.5         Ob         Pyroduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant</th><th>OBJE         BII         Enrace         Obsidiant         Initiate         District         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         84         Ierrace         Obsidiant<!--</th--><th>1091E         81g         Inrace         Distleter         Ino         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         No         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         Disproduct manu           1091E         84d         Inrace         Disproduct manu         Initier         Disproduct manu           1091E         84d         Inro         Disprout man</th><th>1051E         81/3         Britizate         Dio         0.5         Disponder manu           1051E         82         Herace         Disklet         No         0.5         Disponder manu           1051E         83         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet         Disklet         No           1051E         84         Herace         Disklet         No         0.5         Disklet         Disproduct manu           1051E         84         Herace         Disklet         No         0.5         Disproduct manu           1051E         84         Herace         Disklet         No         Disklet         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disprodu</th><th>1051E         81         Derace<br/>benotes         Devicient         Statete         Do         05         D         Dyproduct manu           1031E         83         Hences         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         prostelan         Statete         Do         Dyproduct manu           1031E         84         bencaco         prostela</th><th>Object         Big         Interrese         Obsidiant         Shatter         Pro         Statter         Pro         Shatter         Pro</th><th>(091E         B1         termed         Display         Inc.         Display         Chinany           (091E         81         termed         grey chert         shater         ho         1         0.5         ho         hypotoukit manu           (091E         84         termed         obsidiant         shater         ho         5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hot obsidiant         <td< th=""></td<></th></th></th></t<></th></th> | 1031E       81 g       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       82       terrace       grey chert       shatter       no       1       0.5 no       byproduct manu         1091E       83       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 a       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 b       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 d       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 d       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 d       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 d       terrace       obsidian       shatter       no       0.5 no       byproduct manu         1091E       84 f       terrace       obsidian       shatter       no       0.5 no       byproduct manu | 1031         81g         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091         E         82         terrace         grey chert         shatter         no         1         0.5         byproduct manu           1091         E         83         terrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091         E         84         terrace         obsidian         shatter         no
        0.5         0.5         no         pyproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         no         pyproduct manu           1091         E         84         terrace         obsidian         shatter         no         0.5         no         pyproduct manu< | 1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     1     0.5     no     byproduct manu       1091E     83     terrace     obsidian     flake     yes     2     2     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian | 1091E     81g     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     82     terrace     grey chert     shatter     no     1     0.5 no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 a     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     8 | 1091E     81 g     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     byproduct manu       1091E     83     terrace     obsidian     fiake     yes     2     2     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     byproduct manu       1091E     84     terrace     obsidian     bratter     no     0.5     byproduct man | 1091E     81g     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5 no     byproduct manu       1091E     83     terrace     obsidian     flake     yes     2     2 no     amage on remnant edges - broken tool or used as is?       1091E     84 a     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 d     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 d     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84 d     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     s | 1091E     81g     Iterrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     82     Iterrace     obsidian     shatter     no     1     0.5 no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5 no     byproduct manu       1091E     84 | 1091E     81/g     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     82     terrace     opsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5 no     byproduct manu       1091E     84     terrace     obsidian <td< th=""><th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     0.5     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     ob</th><th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     85     terrace     obsidian     shatter     no     0.5</th><th>1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no  
  0.</th><th>1091E     81g     terrace     lobsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     &lt;</th><th>1091E     81/g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     1     0.5     byproduct manu       1091E     83     terrace     grey chert     shatter     no     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5</th></td<> <th>1031E         81g         Ierrace         Obsidian         Ishatter         no         0.5         0.5 ino         byproduct manu           1091E         82         terrace         grey chert         shatter         no         1         0.5 ino         byproduct manu           1091E         81         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         t</th> <th>1091E         81 g         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82 terrace         grey chert         shatter         no         0.5         byproduct manu           1091E         83 terrace         beridan         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct man</th> <th>1091E         81g         therrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82         terrace         gey chert         shatter         no         0.5         byproduct manu           1091E         83         terrace         obsidian         shatter         no         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu           <t< th=""><th>0091E         81g         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82         lerrace         obsidian         shatter         no         1         0.5         no         byproduct manu           1091E         83         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091E         84         lerrace         obsidian         no         0.5         0.5         pyproduct manu           1091E         84         lerrace         obsidian         no         0.5         0.</th><th>1051E         271         Description         Instance         Description         Syncollect manu           1051E         281         lerrace         grey chert         hatter         no         0.5         Deproduct manu           1051E         283         lerrace         obsidian         false         yes         2         2         no         anilar to 97 - C OP snapped two thick sides with cushing           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         option         sides         sides           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         sides           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         no         sides           1051E         285         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         no         sides           1051E         285         lerrace         obsidian         no         0.5 no         byproduct manu         no         no         no<th>1091E         21         Ginde         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the snaphing to 31- Snapped from the snapped from the snapped</th><th>1091E         81         Berrace         Obsidian         Istratter         no         0.5         D         Dyproduct manu           1091E         81         terrace         gev drieft         istratter         no         0.5         D         byproduct manu           1091E         83         terrace         obsidian         istratter         no         0.5         D         byproduct manu        
  1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         85         terrace         obsidian         istratter         no         0.5         D         product manu           1091E         84         terrace         obsidian         fatter         no         D         product ma</th><th>1091E         81         Derrode obsidiant         Stratter         no         0.5         0.5         Deproduct manu           1091E         81         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         83         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu</th><th>OBJE         B13         Terrace         Obsidiant         Shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         by product manu         constraints           1091E         814         terrace         Obsidiant         by obsidiants</th><th>OB)E         BII         Britace         Obsidiant         Shatter         Inc         0.5         Ob         Pyroduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant</th><th>OBJE         BII         Enrace         Obsidiant         Initiate         District         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         84         Ierrace         Obsidiant<!--</th--><th>1091E         81g         Inrace         Distleter         Ino         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         No         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         Disproduct manu           1091E         84d         Inrace         Disproduct manu         Initier         Disproduct manu           1091E         84d         Inro         Disprout man</th><th>1051E         81/3         Britizate         Dio         0.5         Disponder manu           1051E         82         Herace         Disklet         No         0.5         Disponder manu           1051E         83         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet         Disklet         No           1051E         84         Herace         Disklet         No         0.5         Disklet         Disproduct manu           1051E         84         Herace         Disklet         No         0.5         Disproduct manu           1051E         84         Herace         Disklet         No         Disklet         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disprodu</th><th>1051E         81         Derace<br/>benotes         Devicient         Statete         Do         05         D         Dyproduct manu           1031E         83         Hences         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         prostelan         Statete         Do         Dyproduct manu           1031E         84         bencaco         prostela</th><th>Object         Big         Interrese         Obsidiant         Shatter         Pro         Statter         Pro         Shatter         Pro</th><th>(091E         B1         termed         Display         Inc.         Display         Chinany           (091E         81         termed         grey chert         shater         ho         1         0.5         ho         hypotoukit manu           (091E         84         termed         obsidiant         shater         ho         5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hot obsidiant         <td< th=""></td<></th></th></th></t<></th> | 1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     0.5     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     ob | 1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 b     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 c     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84 f     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     85     terrace  
  obsidian     shatter     no     0.5 | 1091E     81g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     83     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0. | 1091E     81g     terrace     lobsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     no     byproduct manu       1091E     84     terrace     obsidian     shatter     no     < | 1091E     81/g     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     82     terrace     grey chert     shatter     no     1     0.5     byproduct manu       1091E     83     terrace     grey chert     shatter     no     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5     0.5     byproduct manu       1091E     84     terrace     obsidian     shatter     no     0.5 | 1031E         81g         Ierrace         Obsidian         Ishatter         no         0.5         0.5 ino         byproduct manu           1091E         82         terrace         grey chert         shatter         no         1         0.5 ino         byproduct manu           1091E         81         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5 ino         byproduct manu           1091E         84         t | 1091E         81 g         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82 terrace         grey chert         shatter         no         0.5         byproduct manu           1091E         83 terrace         beridan         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84 b         terrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct man | 1091E         81g         therrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82         terrace         gey chert         shatter         no         0.5         byproduct manu           1091E         83         terrace         obsidian         shatter         no         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         terrace         obsidian         shatter         no         0.5         no         byproduct manu <t< th=""><th>0091E         81g         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82         lerrace         obsidian         shatter         no         1         0.5         no         byproduct manu           1091E         83         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091E         84         lerrace         obsidian         no         0.5         0.5         pyproduct manu           1091E         84         lerrace         obsidian         no         0.5         0.</th><th>1051E         271         Description         Instance         Description         Syncollect manu           1051E         281         lerrace         grey chert         hatter         no         0.5         Deproduct manu           1051E         283         lerrace         obsidian         false         yes         2         2         no         anilar to 97 - C OP snapped two thick sides with cushing           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         option         sides         sides           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         sides           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         no         sides           1051E         285         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         no         sides           1051E         285         lerrace         obsidian         no         0.5 no         byproduct manu         no         no         no<th>1091E         21         Ginde         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter        
Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the snaphing to 31- Snapped from the snapped from the snapped</th><th>1091E         81         Berrace         Obsidian         Istratter         no         0.5         D         Dyproduct manu           1091E         81         terrace         gev drieft         istratter         no         0.5         D         byproduct manu           1091E         83         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         85         terrace         obsidian         istratter         no         0.5         D         product manu           1091E         84         terrace         obsidian         fatter         no         D         product ma</th><th>1091E         81         Derrode obsidiant         Stratter         no         0.5         0.5         Deproduct manu           1091E         81         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         83         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu</th><th>OBJE         B13         Terrace         Obsidiant         Shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         by product manu         constraints           1091E         814         terrace         Obsidiant         by obsidiants</th><th>OB)E         BII         Britace         Obsidiant         Shatter         Inc         0.5         Ob         Pyroduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant</th><th>OBJE         BII         Enrace         Obsidiant         Initiate         District         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         84         Ierrace         Obsidiant<!--</th--><th>1091E         81g         Inrace         Distleter         Ino         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         No         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         Disproduct manu           1091E         84d         Inrace         Disproduct manu         Initier         Disproduct manu           1091E         84d         Inro         Disprout man</th><th>1051E         81/3         Britizate         Dio         0.5         Disponder manu           1051E         82         Herace         Disklet         No         0.5         Disponder manu           1051E         83         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet         Disklet         No           1051E         84         Herace         Disklet         No         0.5         Disklet         Disproduct manu           1051E         84         Herace         Disklet         No         0.5         Disproduct manu           1051E         84         Herace         Disklet         No         Disklet         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disprodu</th><th>1051E         81         Derace<br/>benotes         Devicient         Statete         Do         05         D         Dyproduct manu           1031E         83         Hences         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         prostelan         Statete         Do         Dyproduct manu           1031E         84         bencaco         prostela</th><th>Object         Big         Interrese         Obsidiant         Shatter         Pro         Statter         Pro         Shatter         Pro</th><th>(091E         B1         termed         Display         Inc.         Display         Chinany           (091E         81         termed         grey chert         shater         ho         1         0.5         ho         hypotoukit manu           (091E         84         termed         obsidiant         shater         ho         5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hot obsidiant         <td< th=""></td<></th></th></th></t<> | 0091E         81g         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         82         lerrace         obsidian         shatter         no         1         0.5         no         byproduct manu           1091E         83         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         0.5         no         byproduct manu           1091E         84         lerrace         obsidian         shatter         no         0.5         0.5         no         pyproduct manu           1091E         84         lerrace         obsidian         no    
    0.5         0.5         pyproduct manu           1091E         84         lerrace         obsidian         no         0.5         0. | 1051E         271         Description         Instance         Description         Syncollect manu           1051E         281         lerrace         grey chert         hatter         no         0.5         Deproduct manu           1051E         283         lerrace         obsidian         false         yes         2         2         no         anilar to 97 - C OP snapped two thick sides with cushing           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         option         sides         sides           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         sides           1051E         284         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         no         sides           1051E         285         lerrace         obsidian         shatter         no         0.5         0.5 no         byproduct manu         no         sides           1051E         285         lerrace         obsidian         no         0.5 no         byproduct manu         no         no         no <th>1091E         21         Ginde         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the shatter         Dispondic manu<br/>binlar to 37- C OF snapped from the snaphing to 31- Snapped from the snapped from the snapped</th> <th>1091E         81         Berrace         Obsidian         Istratter         no         0.5         D         Dyproduct manu           1091E         81         terrace         gev drieft         istratter         no         0.5         D         byproduct manu           1091E         83         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         85         terrace         obsidian         istratter         no         0.5         D         product manu           1091E         84         terrace         obsidian         fatter         no         D         product ma</th> <th>1091E         81         Derrode obsidiant         Stratter         no         0.5         0.5         Deproduct manu           1091E         81         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         83         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu</th> <th>OBJE         B13         Terrace         Obsidiant         Shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         by product manu         constraints           1091E         814         terrace         Obsidiant         by obsidiants</th> <th>OB)E         BII         Britace         Obsidiant         Shatter         Inc         0.5         Ob         Pyroduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant</th> <th>OBJE         BII         Enrace         Obsidiant         Initiate         District         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         84         Ierrace         Obsidiant<!--</th--><th>1091E         81g         Inrace         Distleter         Ino         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         No         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         Disproduct manu           1091E         84d         Inrace         Disproduct manu         Initier         Disproduct manu           1091E         84d         Inro         Disprout man</th><th>1051E         81/3         Britizate         Dio         0.5         Disponder manu           1051E         82         Herace         Disklet         No         0.5         Disponder manu           1051E         83         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet         Disklet         No           1051E         84         Herace         Disklet         No         0.5         Disklet         Disproduct manu           1051E         84         Herace         Disklet         No         0.5         Disproduct manu           1051E         84         Herace         Disklet         No         Disklet         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disprodu</th><th>1051E         81         Derace<br/>benotes         Devicient         Statete         Do         05         D         Dyproduct manu           1031E         83         Hences         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         provident     
   Statete         Do         Dyproduct manu           1031E         84         beneze         prostelan         Statete         Do         Dyproduct manu           1031E         84         bencaco         prostela</th><th>Object         Big         Interrese         Obsidiant         Shatter         Pro         Statter         Pro         Shatter         Pro</th><th>(091E         B1         termed         Display         Inc.         Display         Chinany           (091E         81         termed         grey chert         shater         ho         1         0.5         ho         hypotoukit manu           (091E         84         termed         obsidiant         shater         ho         5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hot obsidiant         <td< th=""></td<></th></th> | 1091E         21         Ginde         Dispondict manu<br>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondict manu<br>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         no         0.5         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         no         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the shatter         Dispondic manu<br>binlar to 37- C OF snapped from the snaphing to 31- Snapped from the snapped from the snapped | 1091E         81         Berrace         Obsidian         Istratter         no         0.5         D         Dyproduct manu           1091E         81         terrace         gev drieft         istratter         no         0.5         D         byproduct manu           1091E         83         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         84         terrace         obsidian         istratter         no         0.5         D         byproduct manu           1091E         85         terrace         obsidian         istratter         no         0.5         D         product manu           1091E         84         terrace         obsidian         fatter         no         D         product ma | 1091E         81         Derrode obsidiant         Stratter         no         0.5         0.5         Deproduct manu           1091E         81         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         83         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu           1091E         841         terrace         obsidiant         stratter         no         0.5         Deproduct manu | OBJE         B13         Terrace         Obsidiant         Shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         813         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         shatter         No         0.5         Dby product manu           1091E         814         terrace         Obsidiant         by product manu         constraints           1091E         814         terrace         Obsidiant         by obsidiants | OB)E         BII         Britace         Obsidiant         Shatter         Inc         0.5         Ob         Pyroduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         83         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant         shatter         no         0.5         Diproduct manu           1091E         84         terrace         obsidiant | OBJE         BII         Enrace         Obsidiant         Initiate         District         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         81         Ierrace         Obsidiant         Initiate         V7.         Disponduct manu           1091E         84         Ierrace         Obsidiant </th <th>1091E         81g         Inrace         Distleter         Ino         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         No         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         Disproduct manu           1091E         84d         Inrace         Disproduct manu         Initier         Disproduct manu           1091E         84d         Inro         Disprout man</th> <th>1051E         81/3         Britizate         Dio         0.5         Disponder manu           1051E         82         Herace         Disklet         No         0.5         Disponder manu           1051E         83         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet         Disklet         No           1051E         84         Herace         Disklet         No         0.5         Disklet         Disproduct manu           1051E         84         Herace         Disklet         No         0.5         Disproduct manu           1051E         84         Herace         Disklet         No         Disklet         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disprodu</th> <th>1051E         81         Derace<br/>benotes         Devicient         Statete         Do         05         D         Dyproduct manu           1031E         83         Hences         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         prostelan         Statete         Do         Dyproduct manu           1031E         84        
bencaco         prostela</th> <th>Object         Big         Interrese         Obsidiant         Shatter         Pro         Statter         Pro         Shatter         Pro</th> <th>(091E         B1         termed         Display         Inc.         Display         Chinany           (091E         81         termed         grey chert         shater         ho         1         0.5         ho         hypotoukit manu           (091E         84         termed         obsidiant         shater         ho         5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hot obsidiant         <td< th=""></td<></th> | 1091E         81g         Inrace         Distleter         Ino         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         No         05         Disproduct manu           1091E         81g         Inrace         Obsidian         Initier         Disproduct manu           1091E         84d         Inrace         Disproduct manu         Initier         Disproduct manu           1091E         84d         Inro         Disprout man | 1051E         81/3         Britizate         Dio         0.5         Disponder manu           1051E         82         Herace         Disklet         No         0.5         Disponder manu           1051E         83         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet           1051E         84         Herace         Disklet         No         0.5         Disklet         Disklet         No           1051E         84         Herace         Disklet         No         0.5         Disklet         Disproduct manu           1051E         84         Herace         Disklet         No         0.5         Disproduct manu           1051E         84         Herace         Disklet         No         Disklet         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disproduct manu         Disproduct manu           1051E         85         Herace         Disklet         No         Disprodu | 1051E         81         Derace<br>benotes         Devicient         Statete         Do         05         D         Dyproduct manu           1031E         83         Hences         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         provident         Statete         Do         Dyproduct manu           1031E         84         beneze         prostelan         Statete         Do         Dyproduct manu           1031E         84         bencaco         prostela | Object         Big         Interrese         Obsidiant         Shatter         Pro         Statter         Pro         Shatter         Pro | (091E         B1         termed         Display         Inc.         Display         Chinany           (091E         81         termed         grey chert         shater         ho         1         0.5         ho         hypotoukit manu           (091E         84         termed         obsidiant         shater         ho         5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hypotoukit manu           (091E         84.0         termed         obsidiant         shater         no         0.5         0.5         ho         hot obsidiant         hot obsidiant <td< th=""></td<> |

Site Area	I Sample Ba	Ig Context	Stone	Type	Modified	Size (cm)	Weight (g) Corte	ex Other
								B flake, odd no signs of mod as nice long triangular flake -
1091 E	114	terrace	arev chert	flake	ou	Ø	39 ves	make good big point tool -looks good quality - cortex on 3 sides
1091 E	115 a	terrace	obsidian	shatter	ou	0.5	0.5 no	byproduct manu
1091 E	115 b	terrace	obsidian	shatter	no	0.5	0.5 no	býproduct manu
1091 E	122	terrace	greenstone	sliver	no	2	1 no	all ground on v.flat surface, v.thin
1091 E	123 a	terrace	MIs obsidian	flake	Ves	e N	<u>а</u> З	B, complete, triangular shape, much chipping and crushing below and on Sp - step and hinge fractures poss sp trimming not go well, sharp side edges and points at corners - both used - some micro-serration but looks like mainly for cutting
1091 E	123 a	terrace	obsidian	flake	yes	4	5 5	OP B - snapped diag part distal, retouch one side, blunting at SP for handling, one v.sharp straight edge with distinct micro-serration
1091 E	123 b	terrace	Grev obsidian	flake	ves	4	3 110	F complete, unidirectional, 2 scar, long slightly curved sharp distal margin to corner - snapped, like a knife - edge has micro serration - cutting tool
1091 E	123 c	terrace	obsidian	flake	possible	3	3 no	OP B - micro-serration to long straight sharp edge
1091 E	123 d	terrace	obsidian	flake	possible	1.5	1 no	OP Fsmall notch plus sharp point at one corner
1091 E	123 e	terrace	kaeo obsidian?	flake	possible	1.5	1 yes	B flake, t.cortex on sp, uni-dir multi-scar, sharp nat point and sharp edge - v.faint micro-serration, cutting tool prob
1091 E	123 e	terrace	obsidian	shatter	ou	0.5	0.5 no	byproduct manu
1091 E	123 f	terrace	obsidian	shatter	no	~	1 no	byproduct manu
1091 E	123 g	terrace	obsidian	flake	yes	4	3 no	OP B flake - edges all bifac or unifacially retouched with overlay of c+c - all edges used quite heavily - like sawing
1091 E	123 h	terrace	obsidian	flake	possible	c	3.5 no	another badly snapped flake - OP C, sharp projection poss used and some edge?
				-		C		D OP flake - snapped transversely like others above - a pattern? - damaged point at one corner - quite marked serrated edge leading up to it - minor crushing for handling
1091 E	123]	terrace	opsidian	таке	yes	N	ou Z	
1091 E	123 k	terrace	obsidian	flake	possible	1.5	1.5 yes	CUSP, CP F Tiake - Taint micro-serration along sharp dist mrg
1091 E	1231	terrace	obsidian	shatter	ou	9.0	0.5 no	byproduct manu
1091 E	123 n	terrace	obsidian	shatter	no	0.5	0.5 no	byproduct manu
1091 E	123 0	terrace	obsidian	shatter	no	0.5	0.5 no	byproduct manu
1091 E	123 p	terrace	obsidian	shatter	no	0.5	0.5 no	byproduct manu
1091 E	123 q	terrace	obsidian	shatter	no	0.5	0.5 no	byproduct manu
1091 E	124 b	terrace	obsidian	flake	yes	5	5 no	v.knife like B OP - snapped one lat marg - other retouched and marked serration curving up to point
1091 E	124 c	terrace	obsidian	flake	yes	2	2 no	D OP flake - snapped transversely like others above - a pattern? - damaged point at one corner, serrated edge
				Page 131		WDC Puwe	əra Landfill: Final Repo	

Site Area	Sample Bé	ig Context	Stone	Type	Modified	Size (cm)	Weight (g) Co	rtex Other
1091 E	124 d	terrace	obsidian	flake	yes	2	2 no	OS F flake, scraper notch damage at two places
								OP B thin fine flake with some bad chipping damage plus
1091 E	124 f	terrace	obsidian	flake	yes	2.5	2 no	serration to 1 long lat marg
1091 E	124 h	terrace	obsidian	shatter	ou	0.5	0.5 no	byproduct manu
								snapped 3 sides for handling - top is chipped for ditto, the
1091 E	124	terrace	MIs obsidian	broken flake	yes	4	4 no	multiple scarring on dorsal surface - 3 directions
								F, complete, multiple-scarring - 2 directions, top prob for
								handling or from sp trimming when on core, snapped to
1091 E	124	terrace	Grey obsidian	flake	yes	e	3 no	on, other sidesharp with micro-serration
								A flake, snap at dist marg but prob during manu, all irreg
1091 E	124	terrace	Grev obsidian	flake	Q	1.5	2 ves	unin contex inc to euges - no really suitable euges to use - a dud due to snapping at manu
								primary scarring, thn with sharp edges and sharp point at
							1	dital margin, some steep unificacial dowh half of one
1091 E	125 a	terrace	grey chert	flake	yes	n	2.5 no	lateral margin and micro-serration at other
L		-	-	-	-	c		snapped distal margin creating sharp corner - minor
1091 E	125 b	terrace	grey chert	broken tlake	possible	ς,	1 no	damage to ttp, no fisc
								snapped sides and flaked off sp to form 2 small notches,
								opp sharp edge has quite marked micro-serration and also
								little nick at corner creating poss point, point also created
1091 F	13	house	MIs obsidian	broken flake	yes	2	2 no	at orig sp/lm corner by retouch notches
								F flake, sharp edge chipped - opp edge retouched for
1091 F	35	house	Grey obsidian	flake	yes	1.5	1 no	handling
								high quallity - shape like lemon slice with cortex on SP - like rind, long sharp edge has some minor micro-
1091 F	36	house	grey chert	flake	yes	6	10 yes	chipping/serration
1091 F	37	house	arev chert	chunk	ou	5	46 ves	flawed chunk - reject probably broken from larger boulder - one possible large flake scar so poss attempt at using as core but too flawed
1091 F	38	house	Grey obsidian	shatter	ou	~	1 no	byproduct manu
								complete, exhausted - too small for effective flake
								removal, conventional core snape with main 5p and flakes removed down sides - now prod flakes no more then
								1 5 cm long noss used after - crushing damage like notch
1091 F	40	house	MIs obsidian	core	ves	2.5	4 no	- Scraper?
1091 F	41	house	MIs obsidian	flake	yes	2	1.5 no	broken D flake - snapped and chipped to sharp point
1091 F	42	house	MIs obsidian	flake	yes	2	1.5 no	D flake snapped chipped to hsrp projections at corners
1091 F	43	house	Grey obsidian	flake	possible	2	2 yes	snapped lat E flake - damage at SP - poss blunted point
1091 F	44	house	MIs obsidian	flake	Ves	3	3 no	drillpoint looking point - tip snapped off , triangular, quite a lot of retouch - C type flake chipping for handling at butt
	-	0000		2	<u>,</u>	>	2	
				Page 132		WDC Puwe	era Landfill: Final R	

Site Area	Sample B	ag Context	Stone	Type	Modified	Size (cm)	Weight (g)	Cortex	Other
									COSP and most of dorsal, F, non cortical side has deep
1091 F	45	house	Grey obsidian	flake	yes	3	3	yes	chips - not sure what caused damage
									snapped laterally and Sp - D OP flake, like a knife with
1091 F	46	house	Grey obsidian	flake	yes	2	2	no	slight serrated edge leading to sharp projection
									cortex on sp, one end snapped off - possibly due to use -
1091 F	52	house	grey chert	flake	possible	2	1.5	yes	point?
L	C L					c	C		broken flake snapped to point with some retouch,
1091 F	53	nouse	IVIIS ODSIGIAN	riake	yes	3	7	Q	triangular drilipoint snape
1091 F	54	house	Grey obsidian	flake	yes	1.5	~	yes	COSP, B, chipped, snapped to point at one corner
1091 F	55 a	house	orange chert	flake	no	2	~	on	high quality material but probably too small for use
1091 F	22 p	house	grey chert	shatter	ou	0.5	0.5	yes	all cortex - tiny spall - byproduct of manu larger flakes
1091 F	68 a	house	grey chert	shatter	ou	L	0.5	ou	byproduct manu
1091 F	68 b	house	grey chert	shatter	ou	L	0.5	ou	byproduct manu
									from same adze as 88, part ground and hammerdressed,
1091 F	88 nd	upper tce	Tahanga basalt	RW flake	no	4	10	no	from corner - slightly rounded/convex
									all ground on flat surface, might have been retouched to
									point at SP/Lm margin but modern damage to one side
1091 F	88	house	Tahanga basalt	RW flake	possible	5	10	no	makes this difficult to confirm
1091 F	89	house	Grey obsidian	chunk	no	2	1.5	yes	all cortex, broken from core due to flaw?
1091 F	06	house	Grey obsidian	shatter	no	0.5	0.5	no	byproduct manu
									this the B OS flake with a well ground edge along 1 lat
1091 F	91	house	MIs obsidian	flake	yes	4	5	no	marg overlaps both v and d surfs
			:	-		- ,	•		thin fine edges with chipping, retouch to point at corner -
1091 F	94	nouse	Grey obsidian	tlake	yes	C.1	-	ou	snarp
1091 F	95 a	house	Grey obsidian	shatter	no	1	1	yes	byproduct manu
1091 F	95 b	house	MIs obsidian	flake	yes	1	1	no	broken tool - serrated edge and point at one corner - D
									COSP, B - 1 sharp edge no visible damage, cortical and
1091 F	104	house	Grey obsidian	flake	possible	3	3	yes	irregular on others
									OP F flake, to one side has 3 notches - q each side and
									end - all have that char scraper type damage but fine edge
									at opp end has vis serration and chattering - multi-purpose
1091 F	106	house	MIs obsidian	flake	yes	3	4	no	prob.
									not Onerahi - like chalcedony?, irregular t.cortex on Sp,
1091 F	107	house	translucent	flake	possible	1.5	1	yes	sharp edges with some v.faint micro-serration
									chunky, flawed, oone flattened thick end has some
1091 F	108 a	house	grey chert	broken flake	yes	4	15	no	bruising - has flattened working end
									multiple scarring, hinge fract at distal margin, one thin
		-	-	-	-	I	l		edge quite abraded but tunction unclear as is also whether
1091 F	108 b	house	grey chert	broken tlake	possible	5	5	Q	this is actual use-wear
1091 F	108.0	house	arev chert	hroken flake	nossible	3.5	4		primary scarring, snapped edges almost all - poss snapped point at one corner but in conclusive
1001		ponori Ponori	arey chart	flaka		3.5	- (*	2011	truical Onerahi chert water rolled cortex on half flake of
1021	1001	DenOII	gley ulter	IIanc	DI I	0.0	<b>)</b>	yas	ואטוכאן טוופומווו ניופור אמופי וטוופט טטונא טו וומוו, וומאס טו
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Other	good size with sharp edges but no visible signs of use	has sharp edge and pointed corner but otherwise no sign	of use - bad step fracturing to 1 side prob during manu	odd piece as if broken from edge of angular boulder - wr	cortex on two sides, triangular, narrow point like but no	signs of use	all cortex - like fire fracture spall - thin = poss sharp	projections and edges used but no visible ev	possible tip of snapped point but if so - snapped at flaw -	chisel like tip that shows no ev of use	thin sliver - sharp edges but no sign of use - probably too	small	F CP flake snapped laterally poss to sharp projection but	really to point - failed?	snapped D flake to sharp point - muka prob too small for	anything else	F, CP, retouched to create notched scrapper type	byproduct manu	bynroduct manu	ODSP - like a slice with cortex all around - proh evolains	2001 – ווועס מ סווטט אוונו סט נכא מוו מוסמוומ – או טט טאאומוווס אחרווגפ - אה sharn adrae		OP F flake - sharp edges but no visible use	almost all cortical lump - odd - one flake removed or	broken off end of bigger chunk	OS F - sharp edges - a few nicks	byproduct manu	all cortical, byproduct of manu	snapped broken flake - D - for sharp proj at right angles -	some chipping for handling	smooth wr cortex all one side, other is all flaked all around	<ul> <li>crushing at various edges like a small pecking/crushing</li> </ul>	tool - photo	complete B OS flake - sharp edges - v.faint micro-	serration	COSP CP F flake, sharp distal marg chipped and small	snaps	COSP, CP, B - point chipped at distal margin - tip	snapped	broken C flake - poss broken tool - snapped and	retouched but working end gone prob - robust point ?	snapped laterally and at SP - D - sharp edges micro- serration, OP	
Cortex			و			/es		/es		/es		סר		/es		þ	/es	OL OL		2	201	3	Q		/es	סר	OL	/es		סר			/es		סר		/es		/es		/es	o	ul Report
Weight (g)			31			2		1		1		1		3)		<del>-</del>	3	0.51	0 5				21		4	1	1	1		1.5			5		2		3		2		3	1.5	era Landfill: Fine
Size (cm)			e			4		2		1		1		2		1.5	e	-	•	-	~	1 (	N		e	2	1	1		2			3		3		n		2		N.	2	WDC Puw
Modified			possible			no		possible		possible		no		possible		yes	yes	ou		2	00	2	possible		no	possible	ou	ou		yes			yes		possible		possible		yes		yes	yes	
Type			broken flake			chunk		spall		chunk		flake		flake		flake	flake	shatter	chatter	31 I d I L C I	flake		tlake		chunk	flake	shatter	shatter		flake			chunk		flake		flake		flake	-	flake	flake	Page 134
Stone			grey chert			grey chert		grey chert		grey chert		grey chert		Grey obsidian		kaeo obsidian?	MIs obsidian	Grey obsidian	Grey obsidian		Grev obsidian		Grey obsidian		Grey obsidian	Grey obsidian	Grey obsidian	Grey obsidian		MIs obsidian			Grey obsidian		MIs obsidian		Grey obsidian		Grey obsidian	: - -	Grey obsidian	Grey obsidian	
Context			house			house		house		house		house		house		house	house	house	house	00000	police	Denou	house		house	house	house	house		house			house		house		house		house	Ļ	house	house	
Sample Bag			108 e			108 f		108 g		108 h		108 j		109		110	126	127	128	07	120 a		129 b		130 a	130 b	130 c	130 d		130 e			131		132		132		139	(	14Z a	142 b	
Site Area			1091 F			1091 F		1091 F		1091 F		1091 F		1091 F		1091 F	1091 F	1091 F	1001 F	-	1001 F		1091 F		1091 F	1091 F	1091 F	1091 F		1091 F			1091 F		1091 F		1091 F		1091 F		1091 F	1091 F	

Site Ares	a Sample Ba	g Context	Stone	Type	Modified	Size (cm)	Weight (g) Co	tex Other
								poss broke off something like core due to flaws - no sharp
1091 F	142 c	house	Grey obsidian	chunk	no	0	2 yes	edges
1091 F	142 d	house	MIs obsidian	shatter	ou	0.5	0.5 no	byproduct manu
								chunk broken off larger core due to flaw prob - flake scars
1092	1 a		obsidian	core	no	2	6 yes	to 4 surfaces
1092	1 b		obsidian	flake	yes	2	1 yes	COSP, CP F - distal snapped diag to form v.sharp point
1092	- 7		obsidian	shatter	ou	0.5	0.5 no	byproduct manu
1092	1 d		obsidian	shatter	ou	0.5	0.5 no	byproduct manu
								retouched to point at SP - crushing damage at tip -
	(		:	-		(	l	chipped and blunted at opp end for handling or also use?,
1092	7		obsidian	flake	yes	2	1.5 no	OP B
								OS B - 1 long sharp edge - little vis ev of use, other edge
			:					quite damaged - crushing and chipping, SP poss blunting
1092	e		obsidian	flake	yes	2	2 no	or SP trimming/cc
1092	4		obsidian	shatter	ou	9.0	0.5 no	byproduct manu
1092	5		obsidian	flake	possible	1.5	1.5 no	E OP - sharp proj at one corner
								OO F - v.flat dorsal surf, all sharp good edges - v.faint
1092	9		MIs obsidian	flake	yes	e	3 no	micro-serration
								snapped to thick triangle - C OO - v.faint micro-serration to
1092	7		obsidian	flake	possible	1.5	2 no	sharp edge remnant
								COSP, CP B, thin flake, fine edges is snapped and
1092	8		obsidian	flake	possible	2	1.5 yes	chipped - could be accidental
								triangular shape, snapped all sides, nice high quality
1092	6	midden	orange chert	broken flake	no	2	1 no	material
1092	11 b		obsidian	shatter	ou	9'0	0.5 no	byproduct manu
								OS F - like a mini reamer - retouched to create projection
								at corner, blunted at Sp for handling - areas either side of
								point have that scraper type uni damage but this could
1092	15	pit fill	obsidian	flake	yes	0	2 no	come from reaming also
								OP B thin flake - all edges chattering and marked
1092	16		obsidian	flake	yes	3	2 no	serration
								OS B - crushing below SP, damaged proj at corner micro-
1092	17	pit fill	obsidian	flake	possible	0	1.5 no	serration at sharp edges
1092	22	F6	obsidian	shatter	ou	9.0	0.5 yes	byproduct manu, all cortex
1092	25		obsidian	flake	possible	2	1 no	snapped distal margin, D OP - sharp projection
								this also has some trauma but not like above, snapped to
								one side to form sharp point, some blunting at opp end for
1092	78	F2 pit	obsidian	chunk	yes	4	6 yes	handling C CS
1092	137		obsidian	flake	no	2	2 yes	CO inc SP F - all edges cortical prob so unuseful
								OP C Doesn't refit to 148 and 149 but has same type of
1092	138	F60 pit	obsidian	chunk	possible	5	19 no	learnage but minor to one part, has been retouched mito reaming type tool - guite robust but most of point has
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Site Are	a Samp	le Bag	Context	Stone	Type	Modified	Size (cm) We	eight (g) Cortex	Other
									snapped off
									CP D - Major flake trauma ala Kohika workshop so poss
1092	<u>,</u>	48	F60 pit	obsidian	flake	possible	4	5 yes	not true flake - some sharp edges but no use ev
									COSP, C CP - same trauma as 148 and refits to it - to
1092	<del>,</del>	49	F60 pit	obsidian	flake	yes	4	6 yes	form a slice like a piece of orange - refit is size 6
									OP F - good sharp edges with faint micro-serration, SP
1092	<del>,</del>	51		obsidian	flake	yes	2	2 no	blunted for handling
									most likely a snapped point, triangular OS F - retouched to
1103		-	pit fill	obsidian	flake	yes	3	3 no	shap - robust type point
									D OP - broken snapped flake - micro serration on fine
1103		7	pit fill	obsidian	flake	yes	7	1.5 no	edges and sharp projections
1103		e		obsidian	flake	yes	2	1 yes	COSP, CO F, nicked to sharp proj at one corner
									COSP, CP B, thin flake, fine edges retouched, chattered
1103		4		obsidian	flake	yes	n	2 yes	and sharp proj at one corner
1103		5		obsidian	shatter	ou	0.5	0.5 no	byproduct of manu
									COSP - wr smooth, CP F, snapped to one side and a
									notch to create a point, curved sharp edges have micro-
1103				obsidian	flake	yes	2	2 yes	serratioon
									disc-like little scrapery thing - bifacial retouch and blunting,
1103	-	20	pit fill	obsidian	flake	yes	2	2 no	OS B
									COSP, CP, flawed, A, retouched along dm though not
1103		21	pit fill	obsidian	flake	yes	2.5	3 yes	clear why, point damaged at one corner

Locations of artefacts from Q07/1103 shown in Chapter 5. Other sample locations shown below.
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Continued on next page



APPENDIX 3 – ARTEFACT LIST, CONTINUED



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## APPENDIX 4 – CHARCOAL SAMPLES

Q07/1092 AREA [A]			Q07/1092 AREA B			
Q07/1092 (A) – F 5 Kahikatea	– #23 - fill 5		Q07/1092 (B) – F8 - Manuka	#26 - fill 2	4	
Q07/1092(A) – F5 - Kawaka	#30 5		Matai		12	
Q07/1092 (A) – F5 - Matai	#31	6	Q07/1092 (B) – #14 Bracken root Totara bark	– midden	area B 1 2	
Kahikatea	4		Manuka Rata	1	5	
Q07/1092 – F5 - #?	charcoal I	ayer	Kohekohe		1	
Coprosma	4	9	Matai		2 15	
Manuka Shrub sp.	2 1		Q07/1092 – F7 - #27	7 - midden	in hollow	,
007/1092 – F23 – #	67 – burn	t feature/hollow	Akeake Kanuka	1 3		
Kanuka	15	7	Matai	0	12	
Mapau		5	Q07/1092 - F7 - # -	midden in	hollow	
Maire		1	Matai		10	
Matai Q07/1092 – F30 - #	115 – dee	4 per layer	Q07/1092 – F205 – Shrub sp.	Bulk samp 3	ole (in Are	a B)
Kahikatea	8		Q07/1092 - F29 - b	ag 2 (Pit/ti	ree stump	hollow – Area B?)
Q07/1092 (A) – F30 Kabikataa	- #116 — s	subsoil layer – 1 piece wood	Manuka	2		
Kanikalea	5		Fivefinger	3	5	
Q07/1092 (A) – F30 Silver pine	- #117	8	Mingimingi		1	
Q07/1092 (A) – F30 Supplejack	- #118	1	Q07/1092 AREA B (	formerly A	vrea C)	
Matai		10	Q07/1092 – F1 - #? Totara bark	- drain		3
Q07/1092 (A) – F30 Matai	- #119 —	base of topsoil layer 8	Silver pine Matai		5 6	•
Q07/1092 (A) – F30	- #121 – '	charred wood'	Kauri		2	
Kahikatea	1		Q07/1092 – F2 - #32 Matai	2 - ditch	5	
Q07/1092 – F54 - # Kahikatea	- burnt lay 15	ver "house"	Q07/1092 – F2 - #28 Miro?	8 – Pit bas	e 3	
Q07/1092 – F54 - #	±144				,	
Totara bark Supplejack		6 3	Q07/1092 – F3 - #33 Matai	3 – Board's	8	
Matai		2	Kanuka	1		
Q07/1092 – F54 – p Totara bark	it base bu	rning 10	Q07/1092 (C) – F3 - Manuka	#? – Pit fi 2	ll base	
Kahikatea Matai	10	3	Q07/1092 (C) – F3 - Kanuka	#34 8		
Q07/1092 – (A) - F6 Totara bark	9 - #147	3	007/1002 (A) - E3 -	#145 - nit	drain	
Kakikatea	2	5	Kanuka	8	aram	
Tanekaha	1		Mangaeo	1		
Q07/1092 (A) – F72	- #146 (#	136?)	Q07/1092 - F55 - F8	34	_	
runga Totara bark		2	iviatal		C	
Kanuka	4		Q07/1092 – F55 - bu	urnt zone i	n centre o	of pit [= posthole #57 on
Karaka Kahikatea	10 5		map?j Pukatea	10		
	<b>~</b>		Kahikatea	8	_	
Q07/1092 (A) – Fea Kakikatea	ature #77 8	- pit drain – (in F30)	Matai		3	
	0		Q07/1092 – F55 - F8	32? - Post	hole	

Matai		6	Tutu		5
Pukatea	6		Coprosma		3
			Manuka	4	
Q07/1092 – F55 - F	57				
Bracken	5		[B] Q07/1103 - MID	DEN (dow	n slope from pits)
Manuka	1		007/4400 5 4	<b>00</b> I	
Totara bark	0	6	Q07/1103 – Feature	e 29 - char	coal from midden sample #18 - top
Motoi	9	F	Monuko	4	
Kahikatea	5	5	Pittosporum	4	1
Kauri	5	2	Rata		3
(duff		-	Pukatea	1	0
Q07/1091 HOUSE			Maire	•	9
Q07/1091 (F39) - #	93 – firesc	oop in front of porch	Matai		14
Hebe		10			
			Q07/1103 - Feature	e 29 - char	coal from midden sample #19 -
Q07/1091 (F) - #10	5 charcoal	in drain outside house wall	base of midden		
Silver pine		8	Hebe		1
			Coprosma		1
Q07/1091 (F) - #13	5 charcoal	in drain outside house wall	Manuka	1	
Manuka Dete vize lerre	1		Kohekohe		1
Rata vine large	9	4	Matei		11
Silver pille	0	4	Dimu		10
Kahikataa	9		Rimu		1
Naimatea	2		007/1103 Featur	e 35 – cha	arcoal from midden sample #25
007/1091 MIDDEN	Area D		Shruh sn	1	
QUIT TOUT MIDDEL	, a da B		Coprosma sp	•	1
Q07/1091 – Midder	า - F133 - <b>#</b>	ŧ?	Kawakawa		3
Matai		10	Rangiora	3	
			Vine rata	1	
Q07/1091 - #20 - M	lidden (top	)	Rata		3
Coprosma		4	Kohekohe		1
Manuka	1		Tarairi		2
Puriri		3	Puriri		1
Tawa		1	Maire		6
Rata		3	Matai		6
Maire	•	3	Kahikatea	11	
Pukatea	2	1			
Silver pine Matai		1 2	007/1103 - E10 - #	22 _patch	RES WITHIN PITS
Kawaka	1	5	Tutu	zz –paton	
Rawaka	I		Manuka	3	-
Q07/1091 - #21 - M	lidden (bas	(e)	manana	0	
Tutu	(	2	Q07/1103 - F5 - #8	3 - From po	osthole
Coprosma		1	Broadleaf sp.	•	2
Manuka	1				
Mahoe		2			
Puriri		2	Q07/1103 – #12 - fr	om pit fill o	of F7 pit
Rata		5	Kanuka	3	
Matai		3	0.0		
Maire	-	1	Q07/1103 - pit 31 -	#24 - sam	ple from F31 charcoal feature
Kakikatea	5	4	Bracken	2	<b>F</b>
Matai		 7	Tulu Kapuka	5	5
Iviala		7	Kauri	5	1
[A] 007/1103 - PIT	STRUCTI		Raun		1
O07/1103 - E30 - #	29 In the e	excavated part of the drain of Pit	Q07/1103 - E30 - #	26 – Jarge	concentrated patch of blackened
F30 – part of charre	ed post and	l lots of charcoal – sample 29)	soil and charcoal ha	alfwav dow	n pit fill
Totara bark		15	Bracken root		6
Kahikatea					
	2				
	2		[D] Q07/1103 - FIRI	ESCOOPS	;
Q07/1103 – F19 – #	2 #10 – drair	feature	[D] Q07/1103 - FIRI	ESCOOPS	
Q07/1103 – F19 – <del>i</del> Rata	2 #10 – drair 5	feature	[D] Q07/1103 - FIRI Q07/1103 – F10 - #	ESCOOPS 23 – firesc	oop/hearth in pit fill
Q07/1103 – F19 – <del>i</del> Rata	2 #10 – drair 5	feature	[D] Q07/1103 - FIRI Q07/1103 – F10 - # Tutu	ESCOOPS 23 – firesc	oop/hearth in pit fill 4
Q07/1103 – F19 – Rata Q07/1103 – F10 - #	2 #10 – drair 5 ±17 – from	i feature base of drain corner in F10 pit	[D] Q07/1103 - FIRI Q07/1103 – F10 - # Tutu Manuka	ESCOOPS 23 – firesc 11	oop/hearth in pit fill 4
Q07/1103 – F19 – Rata Q07/1103 – F10 - # Punga	2 #10 – drair 5 ±17 – from	i feature base of drain corner in F10 pit 4	[D] Q07/1103 - FIRI Q07/1103 - F10 - # Tutu Manuka Coprosma	ESCOOPS 23 – firesc 11	oop/hearth in pit fill 4 3
Q07/1103 – F19 – Rata Q07/1103 – F10 - Punga Coprosma	2 #10 – drair 5 #17 – from	i feature base of drain corner in F10 pit 4 1	[D] Q07/1103 - FIRI Q07/1103 - F10 - # Tutu Manuka Coprosma	ESCOOPS 23 – firesc 11	oop/hearth in pit fill 4 3
Q07/1103 – F19 – Rata Q07/1103 – F10 - Punga Coprosma Manuka	2 #10 – drair 5 #17 – from 5	n feature base of drain corner in F10 pit 4 1	[D] Q07/1103 - FIRI Q07/1103 - F10 - # Tutu Manuka Coprosma Q07/1103 #07 - F4	ESCOOPS 23 – firesc 11 firescoop	oop/hearth in pit fill 4 3 in top of pit F11 fill
Q07/1103 – F19 – Rata Q07/1103 – F10 - Punga Coprosma Manuka Kauri	2 #10 – drair 5 #17 – from 5	n feature base of drain corner in F10 pit 4 1 3	[D] Q07/1103 - FIRI Q07/1103 - F10 - # Tutu Manuka Coprosma Q07/1103 #07 - F4 Bracken	ESCOOPS 23 – firesc 11 firescoop 1	oop/hearth in pit fill 4 3 in top of pit F11 fill
Q07/1103 – F19 – Rata Q07/1103 – F10 - Punga Coprosma Manuka Kauri	2 #10 – drair 5 #17 – from 5	n feature base of drain corner in F10 pit 4 1 3	[D] Q07/1103 - FIRI Q07/1103 - F10 - # Tutu Manuka Coprosma Q07/1103 #07 - F4 Bracken Coprosma Olearia	ESCOOPS 23 – firesc 11 firescoop 1	oop/hearth in pit fill 4 3 in top of pit F11 fill 3
Q07/1103 – F19 – Rata Q07/1103 – F10 - Punga Coprosma Manuka Kauri Q07/1103 – F17 – Puriri?	2 #10 – drair 5 #17 – from 5 #9 – drain	n feature base of drain corner in F10 pit 4 1 3 feature 2	[D] Q07/1103 - FIRI Q07/1103 - F10 - # Tutu Manuka Coprosma Q07/1103 #07 - F4 Bracken Coprosma Olearia Shrub sp	ESCOOPS 23 – firesc 11 firescoop 1	oop/hearth in pit fill 4 3 in top of pit F11 fill 3 1
Q07/1103 – F19 – Rata Q07/1103 – F10 - Punga Coprosma Manuka Kauri Q07/1103 – F17 – Puriri?	2 #10 – drair 5 #17 – from 5 #9 – drain	n feature base of drain corner in F10 pit 4 1 3 feature 2	[D] Q07/1103 - FIRI Q07/1103 - F10 - # Tutu Manuka Coprosma Q07/1103 #07 - F4 Bracken Coprosma Olearia Shrub sp. Akeake	ESCOOPS 23 – firesc 11 firescoop 1 1	oop/hearth in pit fill 4 3 in top of pit F11 fill 3 1

Q07/1103 – #28 - fii Coprosma	rescoop F4	49 3
Q07/1103 – #30 - F Bracken Coprosma Mangrove	48 – firesc 2 3	eoop in "firescoop area" 2
Q07/1103 – F60 – s Tutu Manuka	ample 31 2	- F60 firescoop 2
Q07/1103 – Pit F11 Manuka	- F3 - #06 3	- Firescoop postdating F11 Pit fill.
Q07/1103 – F23 - # Bracken Hebe Coprosma Fivefinger Manuka Mangrove	16 – firesc 2 2 3 2	oop in Pit F20 pit fill 3 2
Q07/1103 – F21 - # Tutu Hebe Coprosma Fivefinger Manuka Puriri? Mangrove	14 – firesc 2 2 1	oop F21 in pit F20 fill 5 2 3
Q07/1103 – F22 - # Tutu Coprosma Mapau Silvor pino	15 - from f	irescoop? in pit F20 fill 5 1 1 1
		1

Ferns	
Punga	Probably a Cyathea species
Bracken	Pteridium esculentum
Shrubs or small trees	S
Tutu	Coriaria arborea
Hebe	one of several possible Hebe species
Coprosma	one of several possible Coprosma species
Olearia	one of several possible Olearia species
Fivefinger	Pseudopanax arborea
Pseudopanax	A different Pseudopanax species
Mingimingi	Leucopogon fasciculatus
Akeake	Dodonaea viscosa
Manuka	Leptospermum scoparium
Kanuka	Kunzea ericoides
Mapau	Myrsine australis
Mahoe	Melicytus ramiflorus
Forest broadleaf spe	cies
Supplejack	Ripogonum scandens
Tawa	Beilschmiedia tawa
Rata	Metrosideros sp. umbellate or robusta
Rata vine	Prob. Metrosideros robusta
Pukatea	Laurelia novae-zelandiae
Tawa	Beilschmiedia tawa
Karaka	Corynocarpus laevigatus
Kohekohe	Dysoxylum spectabile
Mangaeo	Litsea calicaris
Maire	Nestegis cunninghammii or lanceolata
Puriri	Vitex lucens
Mangrove	Avicennia marina
Forest conifers	
Totara	Podocarpus totara
Kawaka	Libocedrus plumosa
Matai	Prumnopitys taxifolia
Kahikatea	Dacrycarpus dacrydioides
Silver Pine	Manoao colensoi
Rimu	Rimu cupressinum
Kauri	Agathis australis

## APPENDIX 5 - C14 DATING SAMPLES

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[1] Q07/1092 – Area B midden - Bag 12 (dates occupation)
Pipi and cockle - 110 grams shell
[2] Q07/1092 - Area A - F22 (dates occupation)
Pipi and cockle - 200 grams shell
[3] Q07/1091 – Area D – top of midden (dates occupation)
Pipi and cockle - 240 grams shell
[4] Q07/1091 – Area D – Base of midden (dates occupation)
Pipi and cockle - 95 grams shell
[5] Q07/1103 - midden 19 - F29 (dates occupation)
Pipi and cockle – 245 grams shell
[6] Q07/1092 – Area A – F54 – burning on floor (dates pit complex occupation)
Totara bark
                         all
24 gram charcoal dating sample
[7] Q07/1092 – F55 - F57 (dates pit complex occupation)
Bracken
                5
Manuka
                 1
Totara bark
                         6
3 gram dating sample (NB too small)
[8] Q07/1091 (F) - #93 - firescoop in front of porch (dates whare occupation)
Hebe
                         20
18 gram charcoal dating sample
[9] Q07/1103 – F10 - #17 – drain corner of F10 pit (dates pit complex occupation)
Punga
                         4
Coprosma
                         1
Manuka
                 5
13 gram charcoal dating sample
[10] Q07/1103 - F30 - #29 - drain (dates pit complex occupation)
Totara bark
                         15
9 gram charcoal dating sample
[11] Q07/1103 - F23 - #16 - firescoop in Pit F20 pit fill (dates later occupation)
Bracken
                2
Hebe
                         3
                         2
Coprosma
                         2
Fivefinger
Manuka
                 3
                         2
Mangrove
8 gram charcoal dating sample
[12] Q07/1103 - F21 - #14 - firescoop F21 in pit F20 fill (dates later occupation)
                         5
Tutu
                         2
Hebe
Coprosma
                         3
Fivefinger
                         2
                2
Manuka
Mangrove
                         1
15 gram charcoal dating sample
[13] Q07/1103 - F10 (23) - firescoop/hearth in pit fill (dates later occupation) from within F10 at 23cm depth
Tutu
                         4
Manuka
                 11
Coprosma
                         3
8.5 gram charcoal dating sample
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